Ghent

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

GHENT UNIT 1 - PJFF COSTS

CAPITAL COST

Purchase Contracts		
Civil/Structural	$5,121,000	
Mechanical - Balance of Plant (BOP)	$14,669,000	
Electrical - Equipment, Raceway, Switchgears, MCC	$311,000	
Control - DCS Instrumentation	$345,000	
ID Fans	$2,493,000	Engineering Estimates
Subtotal Purchase Contract	**$22,939,000**	
Construction Contracts		
Civil/Structural Construction - Super Structures	$4,557,000	
Civil/Structural Construction - Sub-Structures	$1,732,000	
Mechanical/Chemical Construction	$17,332,000	
Electrical/Control Construction	$5,853,000	
Service Contracts & Construction Indirects	$283,000	
Demolition Costs	$6,000,000	Engineering Estimates
Subtotal Construction Contracts	**$35,757,000**	
Construction Difficulty Costs	**$57,211,200**	Engineering Estimates
Total Direct Costs	**$115,907,200**	
Indirect Costs		
Engineering Costs (Includes G&A & Fee)	$7,014,000	
EPC Construction Management (Includes G&A & Fee)	$4,590,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$693,000	
Sales Taxes	$247,000	
Project Contingency - 18%	$2,585,000	
Total Indirect Costs	**$15,129,000**	
Total Contracted Costs	$131,000,000	
Cost Effectiveness	*$242 /kW*	

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	81%	
Maintenance labor and materials	$3,930,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$3,930,000**			
Variable Annual Costs				
Byproduct disposal	$0	0 lb/hr and	15	$/ton
Bag replacement cost	$786,000	23,590 bags and	100	$/bag
Cage replacement cost	$393,000	23,590 cages and	50	$/cage
ID fan power	$600,000	3,400 kW and	0.02487	$/kWh
Auxiliary power	$179,000	1,015 kW and	0.02487	$/kWh
Subtotal Variable Annual Costs	$1,958,000			
Total Annual Costs	$5,888,000			
Levelized Capital Costs	**$15,943,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$21,831,000			

Ghent Unit 1
514 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$414,333	Ratio from Brown Unit 3 BACT Analysis			
Short-term storage silo	$272,276	Ratio from Brown Unit 3 BACT Analysis			
Air blowers	$378,818	Ratio from Brown Unit 3 BACT Analysis			
Rotary feeders	$47,352	Ratio from Brown Unit 3 BACT Analysis			
Injection system	$177,571	Ratio from Brown Unit 3 BACT Analysis			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$1,136,455	Ratio from Brown Unit 3 BACT Analysis			
Instrumentation and controls	$59,190	Ratio from Brown Unit 3 BACT Analysis			
Subtotal capital cost (CC)	$2,485,996				
Freight	$62,000	(CC) X	2.5%		
Total purchased equipment cost (PEC)	$2,548,000				
Direct installation costs					
Foundation & supports	$255,000	(PEC) X	10.0%		
Handling & erection	$510,000	(PEC) X	20.0%		
Electrical	$255,000	(PEC) X	10.0%		
Piping	$127,000	(PEC) X	5.0%		
Insulation	$51,000	(PEC) X	2.0%		
Painting	$127,000	(PEC) X	5.0%		
Demolition	$0	(PEC) X	0.0%		
Relocation	$0	(PEC) X	0.0%		
Total direct installation costs (DIC)	$1,325,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$3,948,000				
Indirect Costs					
Engineering	$474,000	(DC) X	12.0%		
Owner's cost	$474,000	(DC) X	12.0%		
Construction management	$395,000	(DC) X	10.0%		
Start-up and spare parts	$59,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$790,000	(DC) X	20.0%		
Total indirect costs (IC)	$2,292,000				
Allowance for Funds Used During Construction (AFDC)	$140,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$6,380,000				
Cost Effectiveness	*$12 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$118,000	(DC) X	3.0%		
Operating labor	$121,000		1 FTE and	121,000 $/year	Estimated manpower
Total fixed annual costs	$239,000				
Variable annual costs				81 %	capacity factor
Reagent (BPAC)	$3,903,000		500 lb/hr and	2200 $/ton	
Byproduct disposal cost	$27,000		500 lb/hr and	15 $/ton	
Auxiliary power	$39,000		220 kW and	0.02487 $/kWh	
Total variable annual costs	$3,969,000				
Total direct annual costs (DAC)	$4,208,000				
Indirect Annual Costs					
Cost for capital recovery	$776,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$776,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$4,984,000				

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

GHENT UNIT 2 - SCR COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$8,731,000	
Ductwork and Breeching	$6,743,000	
Mechanical - Balance of Plant (BOP)	$2,208,000	
Electrical - Equipment, Raceway	$2,522,000	
VFDs, Motors and Couplings	$500,000	Engineering Estimates
Switchgear and MCCs	$882,000	
Control - DCS Instrumentation	$284,000	
Air Heater Modifications	$0	Engineering Estimates
ID Fans	$2,858,000	Engineering Estimates
Catalyst	$3,547,000	
Selective Catalytic Reduction System (Including Ammonia System)	$3,094,000	
Subtotal Purchase Contract	**$31,369,000**	

Construction Contracts

Civil/Structural Construction - Super Structures	$5,375,000	
Civil/Structural Construction - Sub-Structures	$1,397,000	
Mechanical/Chemical Construction	$16,896,000	
Electrical/Control Construction	$7,727,000	
Service Contracts & Construction Indirects	$26,991,000	
Demolition Costs	$9,000,000	Engineering Estimates
Subtotal Construction Contracts	**$67,386,000**	
Construction Difficulty Costs	**$94,340,400**	Engineering Estimates
Total Direct Costs	**$193,095,400**	

Indirect Costs

Engineering Costs (Includes G&A & Fee)	$7,743,000	
EPC Construction Management (Includes G&A & Fee)	$4,858,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$1,275,000	
Sales Taxes	$1,800,000	
Project Contingency	$18,169,000	
Total Indirect Costs	**$33,845,000**	
Total Contracted Costs	**$227,000,000**	
Capital Cost Effectiveness	***$439***	***/kW***

ANNUAL COST

Capacity Factor = 71%

Fixed Annual Costs

Operating labor	$121,000	1	FTE and	121,000	$/year
Maintenance labor & materials	$5,793,000	(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	**$5,964,000**				

Variable Annual Costs

Reagent	$459,000	285	lb/hr and	517.55	$/ton
Auxiliary and ID fan power	$355,000	2,320	kW and	0.02459	$/kWh
Catalyst replacement	$300,000	65	m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$1,114,000**				
Total Annual Costs	**$7,078,000**				
Levelized Capital Costs	**$27,626,000**	(TCI) X 12.17%	CRF		
Levelized Annual Costs	**$34,704,000**				

GHENT UNIT 2 - PJFF COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$4,984,000	
Mechanical - Balance of Plant (BOP)	$14,275,000	
Electrical - Equipment, Raceway, Switchgears, MCC	$302,000	
Control - DCS Instrumentation	$336,000	
ID Fans	$1,319,000	Engineering Estimates
Subtotal Purchase Contract	**$21,216,000**	

Construction Contracts

Civil/Structural Construction - Super Structures	$4,435,000	
Civil/Structural Construction - Sub-Structures	$1,686,000	
Mechanical/Chemical Construction	$16,866,000	
Electrical/Control Construction	$5,695,000	
Service Contracts & Construction Indirects	$275,000	
Demolition Costs	$6,000,000	Engineering Estimates
Subtotal Construction Contracts	**$34,957,000**	

Construction Difficulty Costs	**$48,939,800**	Engineering Estimates
Total Direct Costs	**$105,112,800**	

Indirect Costs

Engineering Costs (Includes G&A & Fee)	$6,703,000
EPC Construction Management (Includes G&A & Fee)	$4,386,000
Startup Spare Parts (Included)	$0
Construction Utilites (Power & Water) - Included	$0
Project Insurance	$662,000
Sales Taxes	$236,000
Project Contingency - 18%	$2,470,000
Total Indirect Costs	**$14,457,000**
Total Contracted Costs	$120,000,000
Cost Effectiveness	*$232 /kW*

ANNUAL COST

Fixed Annual Costs Capacity Factor = 71%

Maintenance labor and materials	$3,600,000	(DC) X 3.0%
Subtotal Fixed Annual Costs	**$3,600,000**	

Variable Annual Costs

Byproduct disposal	$5,000	115 lb/hr and	15 $/ton
Bag replacement cost	$592,000	17,770 bags and	100 $/bag
Cage replacement cost	$296,000	17,770 cages and	50 $/cage
ID fan power	$392,000	2,560 kW and	0.02459 $/kWh
Auxiliary power	$117,000	765 kW and	0.02459 $/kWh
Subtotal Variable Annual Costs	$1,402,000		

Total Annual Costs	$5,002,000		
Levelized Capital Costs	**$14,604,000**	(TCI) X 12.17%	CRF
Levelized Annual Costs	$19,606,000		

Ghent Unit 2
517 MW
High Level Emissions Control Study

Technology: Sorbent Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$279,493	From Previous Mill Creek BACT Study			
Short-term storage silo	$185,493	From Previous Mill Creek BACT Study			
Air blowers	$254,427	From Previous Mill Creek BACT Study			
Rotary feeders	$41,360	From Previous Mill Creek BACT Study			
Injection system	$167,947	From Previous Mill Creek BACT Study			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$1,100,427	From Previous Mill Creek BACT Study			
Instrumentation and controls	$52,640	From Previous Mill Creek BACT Study			
Subtotal capital cost (CC)	$2,081,787				
Freight	$94,000	(CC) X	4.5%		
Total purchased equipment cost (PEC)	$2,176,000				
Direct installation costs					
Foundation & supports	$218,000	(PEC) X	10.0%		
Handling & erection	$435,000	(PEC) X	20.0%		
Electrical	$218,000	(PEC) X	10.0%		
Piping	$109,000	(PEC) X	5.0%		
Insulation	$44,000	(PEC) X	2.0%		
Painting	$109,000	(PEC) X	5.0%		
Demolition	$0	(PEC) X	0.0%		
Relocation	$0	(PEC) X	0.0%		
Total direct installation costs (DIC)	$1,133,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$3,384,000				
Indirect Costs					
Engineering	$406,000	(DC) X	12.0%		
Owner's cost	$406,000	(DC) X	12.0%		
Construction management	$338,000	(DC) X	10.0%		
Start-up and spare parts	$51,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$677,000	(DC) X	20.0%		
Total indirect costs (IC)	$1,978,000				
Allowance for Funds Used During Construction (AFDC)	$121,000	[(DC)+(IC)] X	4.50%	1	years (project time length X 1/2)
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$5,483,000				
Cost Effectiveness	*$11 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$102,000	(DC) X	3.0%		
Operating labor	$121,000	1	FTE and	121,000	$/year
Total fixed annual costs	$223,000				
Variable annual costs				71	% capacity factor
Lime	$2,233,000	5,450	lb/hr and	131.78	$/ton
Byproduct disposal	$291,000	6,230	lb/hr and	15	$/ton
Auxiliary power	$28,000	180	kW and	0.02459	$/kWh
Total variable annual costs	$2,552,000				
Total direct annual costs (DAC)	$2,775,000				
Indirect Annual Costs					
Cost for capital recovery	$667,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$667,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$3,442,000				

Ghent Unit 2
517 MW
High Level Emissions Control Study

Technology: PAC Injection   **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$395,952	Ratio from Brown Unit 3 BACT Analysis			
Short-term storage silo	$260,197	Ratio from Brown Unit 3 BACT Analysis			
Air blowers	$362,013	Ratio from Brown Unit 3 BACT Analysis			
Rotary feeders	$45,252	Ratio from Brown Unit 3 BACT Analysis			
Injection system	$169,694	Ratio from Brown Unit 3 BACT Analysis			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$1,086,039	Ratio from Brown Unit 3 BACT Analysis			
Instrumentation and controls	$56,565	Ratio from Brown Unit 3 BACT Analysis			
Subtotal capital cost (CC)	$2,375,711				
Freight	$59,000	(CC) X	2.5%		
Total purchased equipment cost (PEC)	$2,435,000				
Direct installation costs					
Foundation & supports	$244,000	(PEC) X	10.0%		
Handling & erection	$487,000	(PEC) X	20.0%		
Electrical	$244,000	(PEC) X	10.0%		
Piping	$122,000	(PEC) X	5.0%		
Insulation	$49,000	(PEC) X	2.0%		
Painting	$122,000	(PEC) X	5.0%		
Demolition	$0	(PEC) X	0.0%		
Relocation	$0	(PEC) X	0.0%		
Total direct installation costs (DIC)	$1,268,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$3,778,000				
Indirect Costs					
Engineering	$453,000	(DC) X	12.0%		
Owner's cost	$453,000	(DC) X	12.0%		
Construction management	$378,000	(DC) X	10.0%		
Start-up and spare parts	$57,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$756,000	(DC) X	20.0%		
Total indirect costs (IC)	$2,197,000				
Allowance for Funds Used During Construction (AFDC)	$134,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$6,109,000				
Cost Effectiveness	*$12 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$113,000	(DC) X	3.0%		
Operating labor	$121,000		1 FTE and	121,000 $/year	Estimated manpower
Total fixed annual costs	$234,000				
Variable annual costs				71 %	capacity factor
Reagent (BPAC)	$2,600,000		380 lb/hr and	2200 $/ton	
Byproduct disposal cost	$18,000		380 lb/hr and	15 $/ton	
Auxiliary power	$28,000		180 kW and	0.02459 $/kWh	
Total variable annual costs	$2,646,000				
Total direct annual costs (DAC)	$2,880,000				
Indirect Annual Costs					
Cost for capital recovery	$743,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$743,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$3,623,000				

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

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GHENT UNIT 3 - PJFF COSTS

CAPITAL COST

Purchase Contracts						
Civil/Structural	$10,036,000					
Mechanical - Balance of Plant (BOP)	$14,374,000					
Electrical - Equipment, Raceway, Switchgears, MCC	$305,000					
Control - DCS Instrumentation	$338,000					
ID Fans	$2,654,000	Engineering Estimates				
Subtotal Purchase Contract	**$27,707,000**					
Construction Contracts						
Civil/Structural Construction - Super Structures	$8,931,000					
Civil/Structural Construction - Sub-Structures	$3,395,000					
Mechanical/Chemical Construction	$16,984,000					
Electrical/Control Construction	$5,735,000					
Service Contracts & Construction Indirects	$277,000					
Demolition Costs	$1,500,000	Engineering Estimates				
Subtotal Construction Contracts	**$36,822,000**					
Construction Difficulty Costs	**$58,915,200**	Engineering Estimates				
Total Direct Costs	**$123,444,200**					
Indirect Costs						
Engineering Costs (Includes G&A & Fee)	$6,781,000					
EPC Construction Management (Includes G&A & Fee)	$4,437,000					
Startup Spare Parts (Included)	$0					
Construction Utilites (Power & Water) - Included	$0					
Project Insurance	$670,000					
Sales Taxes	$239,000					
Project Contingency - 18%	$2,499,000					
Total Indirect Costs	**$14,626,000**					
Total Contracted Costs	$138,000,000					
Cost Effectiveness	*$264 /kW*					
ANNUAL COST						
Fixed Annual Costs		Capacity Factor =		78%		
Maintenance labor and materials	$4,140,000	(DC) X 3.0%				
Subtotal Fixed Annual Costs	**$4,140,000**					
Variable Annual Costs						
Byproduct disposal	$4,000	85	lb/hr and	15	$/ton	
Bag replacement cost	$799,000	23,960	bags and	100	$/bag	
Cage replacement cost	$399,000	23,960	cages and	50	$/cage	
ID fan power	$601,000	3,455	kW and	0.02544	$/kWh	
Auxiliary power	$179,000	1,030	kW and	0.02544	$/kWh	
Subtotal Variable Annual Costs	$1,982,000					
Total Annual Costs	$6,122,000					
Levelized Capital Costs	**$16,795,000**	(TCI) X 12.17%		CRF		
Levelized Annual Costs	$22,917,000					

Ghent Unit 3
523 MW
High Level Emissions Control Study

Technology: PAC Injection | **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$400,547	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$263,217	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$366,214	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$45,777	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$171,663	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$1,098,643	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$57,221	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$2,403,282					
Freight	$60,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$2,463,000					
Direct installation costs						
Foundation & supports	$246,000	(PEC) X	10.0%			
Handling & erection	$493,000	(PEC) X	20.0%			
Electrical	$246,000	(PEC) X	10.0%			
Piping	$123,000	(PEC) X	5.0%			
Insulation	$49,000	(PEC) X	2.0%			
Painting	$123,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$1,280,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$3,818,000					
Indirect Costs						
Engineering	$458,000	(DC) X	12.0%			
Owner's cost	$458,000	(DC) X	12.0%			
Construction management	$382,000	(DC) X	10.0%			
Start-up and spare parts	$57,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$764,000	(DC) X	20.0%			
Total indirect costs (IC)	$2,219,000					
Allowance for Funds Used During Construction (AFDC)	$136,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)		
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$6,173,000					
Cost Effectiveness	*$12 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$115,000	(DC) X	3.0%			
Operating labor	$121,000		1 FTE and	121,000 $/year	Estimated manpower	
Total fixed annual costs	$236,000					
Variable annual costs				78 %	capacity factor	
Reagent (BPAC)	$3,833,000		510 lb/hr and	2200 $/ton		
Byproduct disposal cost	$26,000		510 lb/hr and	15 $/ton		
Auxiliary power	$39,000		225 kW and	0.02544 $/kWh		
Total variable annual costs	$3,898,000					
Total direct annual costs (DAC)	$4,134,000					
Indirect Annual Costs						
Cost for capital recovery	$751,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$751,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$4,885,000					

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

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GHENT UNIT 4 - PJFF COSTS

CAPITAL COST

Purchase Contracts					
Civil/Structural	$5,035,000				
Mechanical - Balance of Plant (BOP)	$14,424,000				
Electrical - Equipment, Raceway, Switchgears, MCC	$306,000				
Control - DCS Instrumentation	$339,000				
ID Fans	$2,574,000	Engineering Estimates			
Subtotal Purchase Contract	**$22,678,000**				
Construction Contracts					
Civil/Structural Construction - Super Structures	$4,481,000				
Civil/Structural Construction - Sub-Structures	$1,703,000				
Mechanical/Chemical Construction	$17,042,000				
Electrical/Control Construction	$5,755,000				
Service Contracts & Construction Indirects	$278,000				
Demolition Costs	$1,500,000	Engineering Estimates			
Subtotal Construction Contracts	**$30,759,000**				
Construction Difficulty Costs	**$49,214,400**	Engineering Estimates			
Total Direct Costs	**$102,651,400**				
Indirect Costs					
Engineering Costs (Includes G&A & Fee)	$6,820,000				
EPC Construction Management (Includes G&A & Fee)	$4,463,000				
Startup Spare Parts (Included)	$0				
Construction Utilites (Power & Water) - Included	$0				
Project Insurance	$674,000				
Sales Taxes	$240,000				
Project Contingency - 18%	$2,513,000				
Total Indirect Costs	**$14,710,000**				
Total Contracted Costs	$117,000,000				
Cost Effectiveness	*$222*	*/kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	77%		
Maintenance labor and materials	$3,510,000	(DC) X 3.0%			
Subtotal Fixed Annual Costs	**$3,510,000**				
Variable Annual Costs					
Byproduct disposal	$0	0	lb/hr and	15	$/ton
Bag replacement cost	$758,000	22,730	bags and	100	$/bag
Cage replacement cost	$379,000	22,730	cages and	50	$/cage
ID fan power	$551,000	3,280	kW and	0.0249	$/kWh
Auxiliary power	$165,000	980	kW and	0.0249	$/kWh
Subtotal Variable Annual Costs	$1,853,000				
Total Annual Costs	$5,363,000				
Levelized Capital Costs	**$14,239,000**	(TCI) X 12.17%	CRF		
Levelized Annual Costs	$19,602,000				

Ghent Unit 4
526 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$402,845	Ratio from Brown Unit 3 BACT Analysis			
Short-term storage silo	$264,726	Ratio from Brown Unit 3 BACT Analysis			
Air blowers	$368,315	Ratio from Brown Unit 3 BACT Analysis			
Rotary feeders	$46,039	Ratio from Brown Unit 3 BACT Analysis			
Injection system	$172,648	Ratio from Brown Unit 3 BACT Analysis			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$1,104,945	Ratio from Brown Unit 3 BACT Analysis			
Instrumentation and controls	$57,549	Ratio from Brown Unit 3 BACT Analysis			
Subtotal capital cost (CC)	$2,417,068				
Freight	$60,000	(CC) X	2.5%		
Total purchased equipment cost (PEC)	$2,477,000				
Direct installation costs					
Foundation & supports	$248,000	(PEC) X	10.0%		
Handling & erection	$495,000	(PEC) X	20.0%		
Electrical	$248,000	(PEC) X	10.0%		
Piping	$124,000	(PEC) X	5.0%		
Insulation	$50,000	(PEC) X	2.0%		
Painting	$124,000	(PEC) X	5.0%		
Demolition	$0	(PEC) X	0.0%		
Relocation	$0	(PEC) X	0.0%		
Total direct installation costs (DIC)	$1,289,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$3,841,000				
Indirect Costs					
Engineering	$461,000	(DC) X	12.0%		
Owner's cost	$461,000	(DC) X	12.0%		
Construction management	$384,000	(DC) X	10.0%		
Start-up and spare parts	$58,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$768,000	(DC) X	20.0%		
Total indirect costs (IC)	$2,232,000				
Allowance for Funds Used During Construction (AFDC)	$137,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	**$6,210,000**				
Cost Effectiveness	***$12 /kW***				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$115,000	(DC) X	3.0%		
Operating labor	$121,000		1 FTE and	121,000 $/year	Estimated manpower
Total fixed annual costs	$236,000				
Variable annual costs				77 %	capacity factor
Reagent (BPAC)	$3,599,000		485 lb/hr and	2200 $/ton	
Byproduct disposal cost	$25,000		485 lb/hr and	15 $/ton	
Auxiliary power	$36,000		215 kW and	0.0249 $/kWh	
Total variable annual costs	$3,660,000				
Total direct annual costs (DAC)	$3,896,000				
Indirect Annual Costs					
Cost for capital recovery	$756,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$756,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	**$4,652,000**				

Cane Run

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

CANE RUN UNIT 4 - SCR COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$4,448,000	
Ductwork and Breeching	$3,435,000	
Mechanical - Balance of Plant (BOP)	$1,125,000	
Electrical - Equipment, Raceway	$1,285,000	
VFDs, Motors and Couplings	$500,000	Engineering Estimates
Switchgear and MCCs	$449,000	
Control - DCS Instrumentation	$145,000	
Air Heater	$2,910,000	Engineering Estimates
ID Fans	$1,717,000	Engineering Estimates
Catalyst	$1,807,000	
Selective Catalytic Reduction System (Including Ammonia System)	$1,576,000	
Subtotal Purchase Contract	**$19,397,000**	

Construction Contracts

Civil/Structural Construction - Super Structures	$2,738,000	
Civil/Structural Construction - Sub-Structures	$712,000	
Mechanical/Chemical Construction	$8,607,000	
Electrical/Control Construction	$3,937,000	
Service Contracts & Construction Indirects	$13,750,000	
Demolition Costs	$2,754,000	Engineering Estimates
Subtotal Construction Contracts	**$32,498,000**	
Construction Difficulty Costs	**$0**	Engineering Estimates
Total Direct Costs	**$51,895,000**	

Indirect Costs

Engineering Costs (Includes G&A & Fee)	$2,516,000	
EPC Construction Management (Includes G&A & Fee)	$1,579,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$414,000	
Sales Taxes	$585,000	
Project Contingency	$5,904,000	
Total Indirect Costs	**$10,998,000**	
Total Contracted Costs	**$63,000,000**	
Capital Cost Effectiveness	***$375***	***/kW***

ANNUAL COST

Capacity Factor = 60%

Fixed Annual Costs

Operating labor	$127,000	1 FTE and	126,882	$/year
Maintenance labor & materials	$1,557,000	(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	**$1,734,000**			

Variable Annual Costs

Reagent	$202,000	145 lb/hr and	530.03	$/ton
Auxiliary and ID fan power	$146,000	965 kW and	0.0288	$/kWh
Catalyst replacement	$137,000	35 m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$485,000**			
Total Annual Costs	**$2,219,000**			
Levelized Capital Costs	**$7,667,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$9,886,000**			

CANE RUN UNIT 4 - WFGD COSTS

CAPITAL COST

Purchase Contracts			
Civil/Structural	$1,712,000		
Ductwork and Breeching	$2,638,000		
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$56,758,000		
Electrical - Equipment, Raceway	$6,304,000		
VFDs, Motors and Couplings	$3,705,000		
Switchgear and MCCs	$3,825,000		
Control - DCS Instrumentation	$3,537,000		
ID Fans	$1,189,000	Engineering Estimates	
Subtotal Purchase Contract	**$79,668,000**		
Construction Contracts			
Civil/Structural Construction - Super Structures	$6,373,000		
Civil/Structural Construction - Sub-Structures	$621,000		
Mechanical/Chemical Construction	$14,560,000		
Electrical/Control Construction	$5,969,000		
Service Contracts & Construction Indirects	$11,344,000		
Subtotal Construction Contracts	**$38,867,000**		
Construction Difficulty Costs	**$0**	Engineering Estimates	
Total Direct Costs	**$118,535,000**		
Indirect Costs			
Engineering Costs (Includes G&A & Fee)	$4,849,000		
EPC Construction Management (Includes G&A & Fee)	$6,369,000		
Startup Spare Parts (Included)	$0		
Construction Utilites (Power & Water) - Included	$0		
Project Insurance	$653,000		
Sales Taxes	$26,000		
Project Contingency	$21,236,000		
Total Indirect Costs	**$33,133,000**		
Total Contracted Costs	$152,000,000		
Cost Effectiveness	*$905 /kW*		

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	60%
Operating labor	$2,538,000	20 FTE and	126,882 $/year
Maintenance labor and materials	$3,556,000	(DC) X 3.0%	
Subtotal Fixed Annual Costs	**$6,094,000**		
Variable Annual Costs			
Reagent	$479,000	15,795 lb/hr and	11.54 $/ton
Byproduct disposal	$1,071,000	27,170 lb/hr and	15 $/ton
Auxiliary and ID fan power	$607,000	4,010 kW and	0.03 $/kWh
Water	$177,000	280 gpm and	2 $/1,000 gal
Subtotal Variable Annual Costs	$2,334,000		
Total Annual Costs	$8,428,000		
Levelized Capital Costs	**$18,498,000**	(TCI) X 12.17%	CRF
Levelized Annual Costs	$26,926,000		

CANE RUN UNIT 4 - PJFF COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$2,539,000			
Mechanical - Balance of Plant (BOP)	$7,272,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$154,000			
Control - DCS Instrumentation	$171,000			
ID Fans	$793,000	Engineering Estimates		
Subtotal Purchase Contract	**$10,929,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,259,000			
Civil/Structural Construction - Sub-Structures	$859,000			
Mechanical/Chemical Construction	$8,592,000			
Electrical/Control Construction	$2,901,000			
Service Contracts & Construction Indirects	$140,000			
Demolition Costs	$2,754,000	Engineering Estimates		
Subtotal Construction Contracts	**$17,505,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$28,434,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$2,178,000			
EPC Construction Management (Includes G&A & Fee)	$1,425,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$215,000			
Sales Taxes	$77,000			
Project Contingency - 18%	$803,000			
Total Indirect Costs	**$4,698,000**			
Total Contracted Costs	$33,000,000			
Cost Effectiveness	*$196 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	60%	
Maintenance labor and materials	$990,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$990,000**			
Variable Annual Costs				
Byproduct disposal	$551,000	13,975 lb/hr and	15	$/ton
Bag replacement cost	$134,000	4,030 bags and	100	$/bag
Cage replacement cost	$67,000	4,030 cages and	50	$/cage
ID fan power	$159,000	1,050 kW and	0.03	$/kWh
Auxiliary power	$23,000	155 kW and	0.03	$/kWh
Subtotal Variable Annual Costs	$934,000			
Total Annual Costs	$1,924,000			
Levelized Capital Costs	**$4,016,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$5,940,000			

Cane Run Unit 4
168 MW
High Level Emissions Control Study

Technology: Lime Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$124,880	From Previous Mill Creek BACT Study				
Short-term storage silo	$82,880	From Previous Mill Creek BACT Study				
Air blowers	$113,680	From Previous Mill Creek BACT Study				
Rotary feeders	$18,480	From Previous Mill Creek BACT Study				
Injection system	$75,040	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$491,680	From Previous Mill Creek BACT Study				
Instrumentation and controls	$23,520	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$930,160					
Freight	$42,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$972,000					
Direct installation costs						
Foundation & supports	$97,000	(PEC) X	10.0%			
Handling & erection	$194,000	(PEC) X	20.0%			
Electrical	$97,000	(PEC) X	10.0%			
Piping	$49,000	(PEC) X	5.0%			
Insulation	$19,000	(PEC) X	2.0%			
Painting	$49,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$505,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$1,552,000					
Indirect Costs						
Engineering	$186,000	(DC) X	12.0%			
Owner's cost	$186,000	(DC) X	12.0%			
Construction management	$155,000	(DC) X	10.0%			
Start-up and spare parts	$23,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$310,000	(DC) X	20.0%			
Total indirect costs (IC)	$960,000					
Allowance for Funds Used During Construction (AFDC)	$57,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,569,000					
Cost Effectiveness	*$15 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$47,000	(DC) X	3.0%			
Operating labor	$127,000		1 FTE and	126,882	$/year	Estimated manpower
Total fixed annual costs	$174,000					
Variable annual costs				60	%	capacity factor
Lime	$702,000		2,020 lb/hr and	132.19	$/ton	
Byproduct disposal	$91,000		2,310 lb/hr and	15	$/ton	
Auxiliary power	$16,000		105 kW and	0.0288	$/kWh	
Total variable annual costs	$809,000					
Total direct annual costs (DAC)	$983,000					
Indirect Annual Costs						
Cost for capital recovery	$313,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$313,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,296,000					

Cane Run Unit 4
168 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$141,532	Ratio from Brown Unit 3 BACT Analysis			
Short-term storage silo	$93,007	Ratio from Brown Unit 3 BACT Analysis			
Air blowers	$129,400	Ratio from Brown Unit 3 BACT Analysis			
Rotary feeders	$16,175	Ratio from Brown Unit 3 BACT Analysis			
Injection system	$60,656	Ratio from Brown Unit 3 BACT Analysis			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$388,201	Ratio from Brown Unit 3 BACT Analysis			
Instrumentation and controls	$20,219	Ratio from Brown Unit 3 BACT Analysis			
Subtotal capital cost (CC)	$849,190				
Freight	$21,000	(CC) X	2.5%		
Total purchased equipment cost (PEC)	$870,000				
Direct installation costs					
Foundation & supports	$87,000	(PEC) X	10.0%		
Handling & erection	$174,000	(PEC) X	20.0%		
Electrical	$87,000	(PEC) X	10.0%		
Piping	$44,000	(PEC) X	5.0%		
Insulation	$17,000	(PEC) X	2.0%		
Painting	$44,000	(PEC) X	5.0%		
Demolition	$0	(PEC) X	0.0%		
Relocation	$0	(PEC) X	0.0%		
Total direct installation costs (DIC)	$453,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$1,398,000				
Indirect Costs					
Engineering	$168,000	(DC) X	12.0%		
Owner's cost	$168,000	(DC) X	12.0%		
Construction management	$140,000	(DC) X	10.0%		
Start-up and spare parts	$21,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$280,000	(DC) X	20.0%		
Total indirect costs (IC)	$877,000				
Allowance for Funds Used During Construction (AFDC)	$51,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,326,000				
Cost Effectiveness	*$14 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$42,000	(DC) X	3.0%		
Operating labor	$127,000		1 FTE and	126,882 $/year	Estimated manpower
Total fixed annual costs	$169,000				
Variable annual costs				60 %	capacity factor
Reagent (BPAC)	$896,000		155 lb/hr and	2200 $/ton	
Byproduct disposal	$6,000		155 lb/hr and	15 $/ton	
Auxiliary power	$16,000		105 kW and	0.0288 $/kWh	
Total variable annual costs	$918,000				
Total direct annual costs (DAC)	$1,087,000				
Indirect Annual Costs					
Cost for capital recovery	$283,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$283,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,370,000				

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

CANE RUN UNIT 5 - SCR COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$4,651,000	
Ductwork and Breeching	$3,592,000	
Mechanical - Balance of Plant (BOP)	$1,176,000	
Electrical - Equipment, Raceway	$1,344,000	
VFDs, Motors and Couplings	$500,000	Engineering Estimates
Switchgear and MCCs	$470,000	
Control - DCS Instrumentation	$151,000	
Air Heater	$3,135,000	Engineering Estimates
ID Fans	$1,864,000	Engineering Estimates
Catalyst	$1,890,000	
Selective Catalytic Reduction System (Including Ammonia System)	$1,648,000	
Subtotal Purchase Contract	**$20,421,000**	

Construction Contracts

Civil/Structural Construction - Super Structures	$2,864,000	
Civil/Structural Construction - Sub-Structures	$744,000	
Mechanical/Chemical Construction	$9,001,000	
Electrical/Control Construction	$4,117,000	
Service Contracts & Construction Indirects	$14,379,000	
Demolition Costs	$2,967,000	Engineering Estimates
Subtotal Construction Contracts	**$34,072,000**	
Construction Difficulty Costs	**$0**	Engineering Estimates
Total Direct Costs	**$54,493,000**	

Indirect Costs

Engineering Costs (Includes G&A & Fee)	$2,711,000	
EPC Construction Management (Includes G&A & Fee)	$1,701,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$446,000	
Sales Taxes	$630,000	
Project Contingency	$6,361,000	
Total Indirect Costs	**$11,849,000**	
Total Contracted Costs	**$66,000,000**	
Capital Cost Effectiveness	***$365***	***/kW***

ANNUAL COST

Capacity Factor = 62%

Fixed Annual Costs

Operating labor	$127,000	1 FTE and	126,882 $/year	
Maintenance labor & materials	$1,635,000	(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	**$1,812,000**			

Variable Annual Costs

Reagent	$273,000	190 lb/hr and	530.03 $/ton
Auxiliary and ID fan power	$155,000	1,005 kW and	0.02835 $/kWh
Catalyst replacement	$181,000	45 m3 and	6,500 $/m3
Subtotal Variable Annual Costs	**$609,000**		
Total Annual Costs	**$2,421,000**		
Levelized Capital Costs	**$8,032,000**	(TCI) X 12.17%	CRF
Levelized Annual Costs	**$10,453,000**		

CANE RUN UNIT 5 - WFGD COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$1,791,000			
Ductwork and Breeching	$2,759,000			
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$59,354,000			
Electrical - Equipment, Raceway	$6,592,000			
VFDs, Motors and Couplings	$3,874,000			
Switchgear and MCCs	$4,000,000			
Control - DCS Instrumentation	$3,698,000			
ID Fans	$1,291,000	Engineering Estimates		
Subtotal Purchase Contract	**$83,359,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$6,665,000			
Civil/Structural Construction - Sub-Structures	$649,000			
Mechanical/Chemical Construction	$15,226,000			
Electrical/Control Construction	$6,242,000			
Service Contracts & Construction Indirects	$11,862,000			
Subtotal Construction Contracts	**$40,644,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$124,003,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$5,147,000			
EPC Construction Management (Includes G&A & Fee)	$6,760,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$693,000			
Sales Taxes	$27,000			
Project Contingency	$22,541,000			
Total Indirect Costs	**$35,168,000**			
Total Contracted Costs	**$159,000,000**			
Cost Effectiveness	***$878 /kW***			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	62%	
Operating labor	$2,538,000	20 FTE and	126,882	$/year
Maintenance labor and materials	$3,720,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$6,258,000**			
Variable Annual Costs				
Reagent	$542,000	17,310 lb/hr and	11.54	$/ton
Byproduct disposal	$1,216,000	29,850 lb/hr and	15	$/ton
Auxiliary and ID fan power	$617,000	4,010 kW and	0.03	$/kWh
Water	$156,000	240 gpm and	2	$/1,000 gal
Subtotal Variable Annual Costs	$2,531,000			
Total Annual Costs	**$8,789,000**			
Levelized Capital Costs	**$19,350,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$28,139,000**			

CANE RUN UNIT 5 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$2,655,000			
Mechanical - Balance of Plant (BOP)	$7,605,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$161,000			
Control - DCS Instrumentation	$179,000			
ID Fans	$861,000	Engineering Estimates		
Subtotal Purchase Contract	**$11,461,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,362,000			
Civil/Structural Construction - Sub-Structures	$898,000			
Mechanical/Chemical Construction	$8,985,000			
Electrical/Control Construction	$3,034,000			
Service Contracts & Construction Indirects	$146,000			
Demolition Costs	$2,967,000	Engineering Estimates		
Subtotal Construction Contracts	**$18,392,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$29,853,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$2,347,000			
EPC Construction Management (Includes G&A & Fee)	$1,536,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$232,000			
Sales Taxes	$83,000			
Project Contingency - 18%	$865,000			
Total Indirect Costs	**$5,063,000**			
Total Contracted Costs	$35,000,000			
Cost Effectiveness	*$193 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	62%	
Maintenance labor and materials	$1,050,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$1,050,000**			
Variable Annual Costs				
Byproduct disposal	$624,000	15,315 lb/hr and	15	$/ton
Bag replacement cost	$134,000	4,030 bags and	100	$/bag
Cage replacement cost	$67,000	4,030 cages and	50	$/cage
ID fan power	$162,000	1,050 kW and	0.03	$/kWh
Auxiliary power	$24,000	155 kW and	0.03	$/kWh
Subtotal Variable Annual Costs	$1,011,000			
Total Annual Costs	$2,061,000			
Levelized Capital Costs	**$4,260,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$6,321,000			

Cane Run Unit 5
181 MW
High Level Emissions Control Study

Technology: Lime Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$134,543	From Previous Mill Creek BACT Study				
Short-term storage silo	$89,293	From Previous Mill Creek BACT Study				
Air blowers	$122,477	From Previous Mill Creek BACT Study				
Rotary feeders	$19,910	From Previous Mill Creek BACT Study				
Injection system	$80,847	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$529,727	From Previous Mill Creek BACT Study				
Instrumentation and controls	$25,340	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$1,002,137					
Freight	$45,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$1,047,000					
Direct installation costs						
Foundation & supports	$105,000	(PEC) X	10.0%			
Handling & erection	$209,000	(PEC) X	20.0%			
Electrical	$105,000	(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)	$544,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$1,666,000					
Indirect Costs						
Engineering	$200,000	(DC) X	12.0%			
Owner's cost	$200,000	(DC) X	12.0%			
Construction management	$167,000	(DC) X	10.0%			
Start-up and spare parts	$25,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$333,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,025,000					
Allowance for Funds Used During Construction (AFDC)	$61,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)		
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,752,000					
Cost Effectiveness	*$15 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$50,000	(DC) X	3.0%			
Operating labor	$127,000		1 FTE and	126,882 $/year	Estimated manpower	
Total fixed annual costs	$177,000					
Variable annual costs				62 %	capacity factor	
Lime	$793,000		2,210 lb/hr and	132.19 $/ton		
Byproduct disposal	$103,000		2,530 lb/hr and	15 $/ton		
Auxiliary power	$16,000		105 kW and	0.0288 $/kWh		
Total variable annual costs	$912,000					
Total direct annual costs (DAC)	$1,089,000					
Indirect Annual Costs						
Cost for capital recovery	$335,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$335,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,424,000					

Cane Run Unit 5
181 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Long-term storage silo (with truck unloading sys.)	$152,484	Ratio from Brown Unit 3 BACT Analysis			
Short-term storage silo	$100,204	Ratio from Brown Unit 3 BACT Analysis			
Air blowers	$139,414	Ratio from Brown Unit 3 BACT Analysis			
Rotary feeders	$17,427	Ratio from Brown Unit 3 BACT Analysis			
Injection system	$65,350	Ratio from Brown Unit 3 BACT Analysis			
Ductwork modifications, supports, platforms	$0				
Electrical system upgrades	$418,241	Ratio from Brown Unit 3 BACT Analysis			
Instrumentation and controls	$21,783	Ratio from Brown Unit 3 BACT Analysis			
Subtotal capital cost (CC)	$914,902				
Freight	$23,000	(CC) X	2.5%		
Total purchased equipment cost (PEC)	$938,000				
Direct installation costs					
Foundation & supports	$94,000	(PEC) X	10.0%		
Handling & erection	$188,000	(PEC) X	20.0%		
Electrical	$94,000	(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)	$489,000				
Site preparation	$0	N/A			
Buildings	$75,000	Engineering estimate			
Total direct costs (DC) = (PEC) + (DIC)	$1,502,000				
Indirect Costs					
Engineering	$180,000	(DC) X	12.0%		
Owner's cost	$180,000	(DC) X	12.0%		
Construction management	$150,000	(DC) X	10.0%		
Start-up and spare parts	$23,000	(DC) X	1.5%		
Performance test	$100,000	Engineering estimate			
Contingencies	$300,000	(DC) X	20.0%		
Total indirect costs (IC)	$933,000				
Allowance for Funds Used During Construction (AFDC)	$55,000	[(DC)+(IC)] X	4.50%	1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$2,490,000				
Cost Effectiveness	*$14 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$45,000	(DC) X	3.0%		
Operating labor	$127,000		1 FTE and	126,882 $/year	Estimated manpower
Total fixed annual costs	$172,000				
Variable annual costs				62 %	capacity factor
Reagent (BPAC)	$926,000		155 lb/hr and	2200 $/ton	
Byproduct disposal	$6,000		155 lb/hr and	15 $/ton	
Auxiliary power	$16,000		105 kW and	0.0288 $/kWh	
Total variable annual costs	$948,000				
Total direct annual costs (DAC)	$1,120,000				
Indirect Annual Costs					
Cost for capital recovery	$303,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$303,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,423,000				

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

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CANE RUN UNIT 6 - SCR COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$5,794,000	
Ductwork and Breeching	$4,475,000	
Mechanical - Balance of Plant (BOP)	$1,465,000	
Electrical - Equipment, Raceway	$1,673,000	
VFDs, Motors and Couplings	$500,000	Engineering Estimates
Switchgear and MCCs	$585,000	
Control - DCS Instrumentation	$189,000	
Air Heater	$4,700,000	Engineering Estimates
ID Fans	$2,349,000	Engineering Estimates
Catalyst	$2,354,000	
Selective Catalytic Reduction System (Including Ammonia System)	$2,053,000	
Subtotal Purchase Contract	**$26,137,000**	

Construction Contracts

Civil/Structural Construction - Super Structures	$3,567,000	
Civil/Structural Construction - Sub-Structures	$927,000	
Mechanical/Chemical Construction	$11,211,000	
Electrical/Control Construction	$5,128,000	
Service Contracts & Construction Indirects	$17,911,000	
Demolition Costs	$4,279,000	Engineering Estimates
Subtotal Construction Contracts	**$43,023,000**	
Construction Difficulty Costs	**$0**	Engineering Estimates
Total Direct Costs	**$69,160,000**	

Indirect Costs

Engineering Costs (Includes G&A & Fee)	$3,909,000
EPC Construction Management (Includes G&A & Fee)	$2,453,000
Startup Spare Parts (Included)	$0
Construction Utilites (Power & Water) - Included	$0
Project Insurance	$644,000
Sales Taxes	$909,000
Project Contingency	$9,172,000
Total Indirect Costs	**$17,087,000**
Total Contracted Costs	**$86,000,000**
Capital Cost Effectiveness	***$330 /kW***

ANNUAL COST

Capacity Factor = 54%

Fixed Annual Costs

Operating labor	$127,000	1 FTE and	126,882	$/year
Maintenance labor & materials	$2,075,000	(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	**$2,252,000**			

Variable Annual Costs

Reagent	$207,000	165 lb/hr and	530.03	$/ton
Auxiliary and ID fan power	$194,000	1,360 kW and	0.03018	$/kWh
Catalyst replacement	$140,000	40 m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$541,000**			
Total Annual Costs	**$2,793,000**			
Levelized Capital Costs	**$10,466,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$13,259,000**			

CANE RUN UNIT 6 - WFGD COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$2,231,000			
Ductwork and Breeching	$3,437,000			
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$73,931,000			
Electrical - Equipment, Raceway	$8,211,000			
VFDs, Motors and Couplings	$4,826,000			
Switchgear and MCCs	$4,983,000			
Control - DCS Instrumentation	$4,607,000			
ID Fans	$1,626,000	Engineering Estimates		
Subtotal Purchase Contract	**$103,852,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$8,302,000			
Civil/Structural Construction - Sub-Structures	$809,000			
Mechanical/Chemical Construction	$18,966,000			
Electrical/Control Construction	$7,775,000			
Service Contracts & Construction Indirects	$14,776,000			
Subtotal Construction Contracts	**$50,628,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$154,480,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$6,898,000			
EPC Construction Management (Includes G&A & Fee)	$9,060,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$929,000			
Sales Taxes	$36,000			
Project Contingency	$30,210,000			
Total Indirect Costs	**$47,133,000**			
Total Contracted Costs	**$202,000,000**			
Cost Effectiveness	***$774 /kW***			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	54%	
Operating labor	$2,538,000	20 FTE and	126,882	$/year
Maintenance labor and materials	$4,634,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$7,172,000**			
Variable Annual Costs				
Reagent	$696,000	25,510 lb/hr and	11.54	$/ton
Byproduct disposal	$1,560,000	43,980 lb/hr and	15	$/ton
Auxiliary and ID fan power	$799,000	5,595 kW and	0.03	$/kWh
Water	$204,000	360 gpm and	2	$/1,000 gal
Subtotal Variable Annual Costs	$3,259,000			
Total Annual Costs	**$10,431,000**			
Levelized Capital Costs	**$24,583,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$35,014,000**			

CANE RUN UNIT 6 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$3,307,000			
Mechanical - Balance of Plant (BOP)	$9,473,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$201,000			
Control - DCS Instrumentation	$223,000			
ID Fans	$1,084,000	Engineering Estimates		
Subtotal Purchase Contract	**$14,288,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$2,943,000			
Civil/Structural Construction - Sub-Structures	$1,119,000			
Mechanical/Chemical Construction	$11,192,000			
Electrical/Control Construction	$3,779,000			
Service Contracts & Construction Indirects	$182,000			
Demolition Costs	$4,279,000	Engineering Estimates		
Subtotal Construction Contracts	**$23,494,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$37,782,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$3,384,000			
EPC Construction Management (Includes G&A & Fee)	$2,214,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$334,000			
Sales Taxes	$119,000			
Project Contingency - 18%	$1,247,000			
Total Indirect Costs	**$7,298,000**			
Total Contracted Costs	$45,000,000			
Cost Effectiveness	*$172 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	54%	
Maintenance labor and materials	$1,350,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$1,350,000**			
Variable Annual Costs				
Byproduct disposal	$801,000	22,570 lb/hr and	15	$/ton
Bag replacement cost	$188,000	5,630 bags and	100	$/bag
Cage replacement cost	$94,000	5,630 cages and	50	$/cage
ID fan power	$208,000	1,460 kW and	0.03	$/kWh
Auxiliary power	$31,000	215 kW and	0.03	$/kWh
Subtotal Variable Annual Costs	$1,322,000			
Total Annual Costs	$2,672,000			
Levelized Capital Costs	**$5,477,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$8,149,000			

Cane Run Unit 6
261 MW
High Level Emissions Control Study

Technology: Lime Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$194,010	From Previous Mill Creek BACT Study				
Short-term storage silo	$128,760	From Previous Mill Creek BACT Study				
Air blowers	$176,610	From Previous Mill Creek BACT Study				
Rotary feeders	$28,710	From Previous Mill Creek BACT Study				
Injection system	$116,580	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$763,860	From Previous Mill Creek BACT Study				
Instrumentation and controls	$36,540	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$1,445,070					
Freight	$65,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$1,510,000					
Direct installation costs						
Foundation & supports	$151,000	(PEC) X	10.0%			
Handling & erection	$302,000	(PEC) X	20.0%			
Electrical	$151,000	(PEC) X	10.0%			
Piping	$76,000	(PEC) X	5.0%			
Insulation	$30,000	(PEC) X	2.0%			
Painting	$76,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$786,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$2,371,000					
Indirect Costs						
Engineering	$285,000	(DC) X	12.0%			
Owner's cost	$285,000	(DC) X	12.0%			
Construction management	$237,000	(DC) X	10.0%			
Start-up and spare parts	$36,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$474,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,417,000					
Allowance for Funds Used During Construction (AFDC)	$85,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$3,873,000					
Cost Effectiveness	*$15 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$71,000	(DC) X	3.0%			
Operating labor	$127,000		1 FTE and	126,882 $/year		Estimated manpower
Total fixed annual costs	$198,000					
Variable annual costs				54 %		capacity factor
Lime	$1,019,000		3,260 lb/hr and	132.19 $/ton		
Byproduct disposal	$132,000		3,730 lb/hr and	15 $/ton		
Auxiliary power	$18,000		125 kW and	0.03018 $/kWh		
Total variable annual costs	$1,169,000					
Total direct annual costs (DAC)	$1,367,000					
Indirect Annual Costs						
Cost for capital recovery	$471,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$471,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,838,000					

Cane Run Unit 6
261 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$219,880	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$144,492	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$201,033	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$25,129	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$94,234	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$603,098	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$31,411	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$1,319,278					
Freight	$33,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$1,352,000					
Direct installation costs						
Foundation & supports	$135,000	(PEC) X	10.0%			
Handling & erection	$270,000	(PEC) X	20.0%			
Electrical	$135,000	(PEC) X	10.0%			
Piping	$68,000	(PEC) X	5.0%			
Insulation	$27,000	(PEC) X	2.0%			
Painting	$68,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$703,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$2,130,000					
Indirect Costs						
Engineering	$256,000	(DC) X	12.0%			
Owner's cost	$256,000	(DC) X	12.0%			
Construction management	$213,000	(DC) X	10.0%			
Start-up and spare parts	$32,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$426,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,283,000					
Allowance for Funds Used During Construction (AFDC)	$77,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$3,490,000					
Cost Effectiveness	*$13 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$64,000	(DC) X	3.0%			
Operating labor	$127,000		1 FTE and	126,882 $/year		Estimated manpower
Total fixed annual costs	$191,000					
Variable annual costs				54 %		capacity factor
Reagent (BPAC)	$1,119,000		215 lb/hr and	2200 $/ton		
Byproduct disposal	$8,000		215 lb/hr and	15 $/ton		
Auxiliary power	$18,000		125 kW and	0.03018 $/kWh		
Total variable annual costs	$1,145,000					
Total direct annual costs (DAC)	$1,336,000					
Indirect Annual Costs						
Cost for capital recovery	$425,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$425,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$1,761,000					

Mill Creek

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

MILL CREEK UNIT 1 - SCR COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$6,669,000			
Ductwork and Breeching	$5,151,000			
Mechanical - Balance of Plant (BOP)	$1,687,000			
Electrical - Equipment, Raceway	$1,926,000			
VFDs, Motors and Couplings	$500,000	Engineering Estimates		
Switchgear and MCCs	$674,000			
Control - DCS Instrumentation	$217,000			
Air Heater Modifications	$1,704,000	Engineering Estimates		
ID Fans	$3,262,000	Engineering Estimates		
Catalyst	$2,709,000			
Selective Catalytic Reduction System (Including Ammonia System)	$2,363,000			
Subtotal Purchase Contract	**$26,862,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$4,106,000			
Civil/Structural Construction - Sub-Structures	$1,067,000			
Mechanical/Chemical Construction	$12,906,000			
Electrical/Control Construction	$5,902,000			
Service Contracts & Construction Indirects	$20,617,000			
Demolition Costs	$4,104,000	Engineering Estimates		
Subtotal Construction Contracts	**$48,702,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$75,564,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$4,942,000			
EPC Construction Management (Includes G&A & Fee)	$3,101,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$814,000			
Sales Taxes	$1,149,000			
Project Contingency	$11,597,000			
Total Indirect Costs	**$21,603,000**			
Total Contracted Costs	**$97,000,000**			
Capital Cost Effectiveness	***$294***	***/kW***		

ANNUAL COST

		Capacity Factor =	68%	
Fixed Annual Costs				
Operating labor	$133,000	1 FTE and	132,901	$/year
Maintenance labor & materials	$2,267,000	(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	**$2,450,000**			
Variable Annual Costs				
Reagent	$418,000	265 lb/hr and	530.03	$/ton
Auxiliary and ID fan power	$233,000	1,815 kW and	0.02156	$/kWh
Catalyst replacement	$265,000	60 m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$916,000**			
Total Annual Costs	**$3,366,000**			
Levelized Capital Costs	**$11,805,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$15,171,000**			

MILL CREEK UNIT 1 - WFGD COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$2,568,000			
Ductwork and Breeching	$3,956,000			
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$85,104,000			
Electrical - Equipment, Raceway	$9,452,000			
VFDs, Motors and Couplings	$5,555,000			
Switchgear and MCCs	$5,736,000			
Control - DCS Instrumentation	$5,303,000			
ID Fans	$2,510,000	Engineering Estimates		
Subtotal Purchase Contract	**$120,184,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$9,556,000			
Civil/Structural Construction - Sub-Structures	$931,000			
Mechanical/Chemical Construction	$21,832,000			
Electrical/Control Construction	$8,950,000			
Service Contracts & Construction Indirects	$17,009,000			
Demolition Costs	$12,313,000	Engineering Estimates		
Subtotal Construction Contracts	**$70,591,000**			
Construction Difficulty Costs	**$49,414,000**	Engineering Estimates		
Total Direct Costs	**$240,189,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$8,322,000			
EPC Construction Management (Includes G&A & Fee)	$10,930,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$1,121,000			
Sales Taxes	$44,000			
Project Contingency	$36,445,000			
Total Indirect Costs	**$56,862,000**			
Total Contracted Costs	$297,000,000			
Cost Effectiveness	*$900 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	68%	
Operating labor	$2,658,000	20 FTE and	132,901	$/year
Maintenance labor and materials	$7,206,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$9,864,000**			
Variable Annual Costs				
Reagent	$713,000	31,765 lb/hr and	7.54	$/ton
Byproduct disposal	$2,444,000	54,715 lb/hr and	15	$/ton
Auxiliary and ID fan power	$963,000	7,495 kW and	0.02156	$/kWh
Water	$357,000	500 gpm and	2	$/1,000 gal
Subtotal Variable Annual Costs	$4,477,000			
Total Annual Costs	$14,341,000			
Levelized Capital Costs	**$36,145,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$50,486,000			

MILL CREEK UNIT 1 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$4,568,000			
Mechanical - Balance of Plant (BOP)	$13,085,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$277,000			
Control - DCS Instrumentation	$308,000			
ID Fans	$1,757,000	Engineering Estimates		
Subtotal Purchase Contract	**$19,995,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$4,065,000			
Civil/Structural Construction - Sub-Structures	$1,545,000			
Mechanical/Chemical Construction	$15,460,000			
Electrical/Control Construction	$5,221,000			
Service Contracts & Construction Indirects	$252,000			
Demolition Costs	$4,104,000	Engineering Estimates		
Subtotal Construction Contracts	**$30,647,000**			
Construction Difficulty Costs	**$21,452,900**	Engineering Estimates		
Total Direct Costs	**$72,094,900**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$4,279,000			
EPC Construction Management (Includes G&A & Fee)	$2,800,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$423,000			
Sales Taxes	$151,000			
Project Contingency - 18%	$1,577,000			
Total Indirect Costs	**$9,230,000**			
Total Contracted Costs	$81,000,000			
Cost Effectiveness	*$245 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	68%	
Maintenance labor and materials	$2,430,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$2,430,000**			
Variable Annual Costs				
Byproduct disposal	$0	0 lb/hr and	15	$/ton
Bag replacement cost	$471,000	14,140 bags and	100	$/bag
Cage replacement cost	$236,000	14,140 cages and	50	$/cage
ID fan power	$262,000	2,040 kW and	0.02156	$/kWh
Auxiliary power	$78,000	610 kW and	0.02156	$/kWh
Subtotal Variable Annual Costs	$1,047,000			
Total Annual Costs	$3,477,000			
Levelized Capital Costs	**$9,858,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$13,335,000			

Mill Creek Unit 1
330 MW
High Level Emissions Control Study

Technology: Electrostatic Precipitator (ESP) **Date:** 6/16/2010

Cost Item	$	Remarks			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
ESP	$7,399,831	From Previous Study			
Ash handling system	$538,703	From Previous Study			
ID fan	$501,831	Apportioned Engineering Estimate			
Flue gas ductwork	$2,000,000	Engineering Estimate			
Subtotal capital cost (CC)	$10,440,365				
Instrumentation and controls	$209,000	(CC) X	2.0%		
Taxes	$731,000	(CC) X	7.0%		
Freight	$522,000	(CC) X	5.0%		
Total purchased equipment cost (PEC)	$11,902,000				
Direct installation costs					
Foundation & supports	$1,785,000	(PEC) X	15.0%		
Handling & erection	$1,190,000	(PEC) X	10.0%		
Electrical	$2,380,000	(PEC) X	20.0%		
Piping	$298,000	(PEC) X	2.5%		
Insulation	$238,000	(PEC) X	2.0%		
Painting	$60,000	(PEC) X	0.5%		
Demolition	$2,052,000	Engineering Estimate			
Relocation	$1,000	(PEC) X	0.01%		
Total direct installation costs (DIC)	$8,004,000				
Site preparation	$200,000	Estimate			
Total direct costs (DC) = (PEC) + (DIC)	$20,106,000				
Indirect Costs					
Engineering	$2,413,000	(DC) X	12.0%		
Owners Cost	$603,000	(DC) X	3.0%		
Construction and field expenses	$2,011,000	(DC) X	10.0%		
Contractor fees	$2,011,000	(DC) X	10.0%		
Start-up	$603,000	(DC) X	3.0%		
Performance test	$40,000	(DC) X	0.2%		
Contingencies	$3,016,000	(DC) X	15.0%		
Total indirect costs (IC)	$10,697,000				
Allowance for Funds Used During Construction (AFDC)	$2,079,000	[(DC)+(IC)] X	4.50%	3 years (project time length)	
Total Capital Investment (TCI) = (DC) + (IC)	$32,882,000				
Cost Effectiveness	*$100 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$2,155,000	Engineering Estimates			
Total fixed annual costs	$2,155,000				
Variable annual costs				68 %	capacity factor
Byproduct disposal	$1,255,000		28,100 lb/hr and	15 $/ton	
ID fan power	$103,000		800 kW and	0.02156 $/kWh	
Auxiliary power	$68,000		530 kW and	0.02156 $/kWh	
Total variable annual costs	$1,426,000				
Total direct annual costs (DAC)	$3,581,000				
Indirect Annual Costs					
Cost for capital recovery	$4,002,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$4,002,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$7,583,000				

Mill Creek Unit 1
330 MW
High Level Emissions Control Study

Technology: Lime Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$223,000	From Previous Mill Creek BACT Study				
Short-term storage silo	$148,000	From Previous Mill Creek BACT Study				
Air blowers	$203,000	From Previous Mill Creek BACT Study				
Rotary feeders	$33,000	From Previous Mill Creek BACT Study				
Injection system	$134,000	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$26,000	Ratio from Brown Unit 3 BACT Analysis				
Electrical system upgrades	$878,000	From Previous Mill Creek BACT Study				
Instrumentation and controls	$42,000	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$1,687,000					
Freight	$76,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$1,763,000					
Direct installation costs						
Foundation & supports	$176,000	(PEC) X	10.0%			
Handling & erection	$353,000	(PEC) X	20.0%			
Electrical	$176,000	(PEC) X	10.0%			
Piping	$88,000	(PEC) X	5.0%			
Insulation	$35,000	(PEC) X	2.0%			
Painting	$88,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$916,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$2,754,000					
Indirect Costs						
Engineering	$330,000	(DC) X	12.0%			
Owner's cost	$330,000	(DC) X	12.0%			
Construction management	$275,000	(DC) X	10.0%			
Start-up and spare parts	$41,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$551,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,627,000					
Allowance for Funds Used During Construction (AFDC)	$99,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$4,480,000					
Cost Effectiveness	*$14 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$83,000	(DC) X	3.0%			
Operating labor	$133,000		1 FTE and	132,901 $/year		Estimated manpower
Total fixed annual costs	$216,000					
Variable annual costs				68 %		capacity factor
Lime	$1,428,000		4,060 lb/hr and	118.13 $/ton		
Byproduct disposal cost	$360,000		4,640 lb/hr and	15 $/ton		
Auxiliary power	$20,000		155 kW and	0.02156 $/kWh		
Total variable annual costs	$1,808,000					
Total direct annual costs (DAC)	$2,024,000					
Indirect Annual Costs						
Cost for capital recovery	$545,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$545,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$2,569,000					

Mill Creek Unit 1
330 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$278,009	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$182,691	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$254,179	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$31,772	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$119,147	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$23,829	Ratio from Brown Unit 3 BACT Analysis				
Electrical system upgrades	$762,538	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$39,716	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$1,691,882					
Freight	$42,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$1,734,000					
Direct installation costs						
Foundation & supports	$173,000	(PEC) X	10.0%			
Handling & erection	$347,000	(PEC) X	20.0%			
Electrical	$173,000	(PEC) X	10.0%			
Piping	$87,000	(PEC) X	5.0%			
Insulation	$35,000	(PEC) X	2.0%			
Painting	$87,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$902,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$2,711,000					
Indirect Costs						
Engineering	$325,000	(DC) X	12.0%			
Owner's cost	$325,000	(DC) X	12.0%			
Construction management	$271,000	(DC) X	10.0%			
Start-up and spare parts	$41,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$542,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,604,000					
Allowance for Funds Used During Construction (AFDC)	$97,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$4,412,000					
Cost Effectiveness	*$13 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$81,000	(DC) X	3.0%			
Operating labor	$133,000		1 FTE and	132,901 $/year		Estimated manpower
Total fixed annual costs	$214,000					
Variable annual costs				68 %		capacity factor
Reagent (BPAC)	$1,966,000		300 lb/hr and	2200 $/ton		
Byproduct disposal cost	$13,000		300 lb/hr and	15 $/ton		
Auxiliary power	$20,000		155 kW and	0.02156 $/kWh		
Total variable annual costs	$1,999,000					
Total direct annual costs (DAC)	$2,213,000					
Indirect Annual Costs						
Cost for capital recovery	$537,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$537,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$2,750,000					

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

MILL CREEK UNIT 2 - SCR COSTS

CAPITAL COST

Purchase Contracts		
Civil/Structural	$6,669,000	
Ductwork and Breeching	$5,151,000	
Mechanical - Balance of Plant (BOP)	$1,687,000	
Electrical - Equipment, Raceway	$1,926,000	
VFDs, Motors and Couplings	$500,000	Engineering Estimates
Switchgear and MCCs	$674,000	
Control - DCS Instrumentation	$217,000	
Air Heater Modifications	$1,704,000	Engineering Estimates
ID Fans	$3,262,000	Engineering Estimates
Catalyst	$2,709,000	
Selective Catalytic Reduction System (Including Ammonia System)	$2,363,000	
Subtotal Purchase Contract	**$26,862,000**	
Construction Contracts		
Civil/Structural Construction - Super Structures	$4,106,000	
Civil/Structural Construction - Sub-Structures	$1,067,000	
Mechanical/Chemical Construction	$12,906,000	
Electrical/Control Construction	$5,902,000	
Service Contracts & Construction Indirects	$20,617,000	
Demolition Costs	$4,104,000	Engineering Estimates
Subtotal Construction Contracts	**$48,702,000**	
Construction Difficulty Costs	**$0**	Engineering Estimates
Total Direct Costs	**$75,564,000**	
Indirect Costs		
Engineering Costs (Includes G&A & Fee)	$4,942,000	
EPC Construction Management (Includes G&A & Fee)	$3,101,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$814,000	
Sales Taxes	$1,149,000	
Project Contingency	$11,597,000	
Total Indirect Costs	**$21,603,000**	
Total Contracted Costs	**$97,000,000**	
Capital Cost Effectiveness	***$294***	***/kW***

ANNUAL COST

Capacity Factor = 70%

Fixed Annual Costs				
Operating labor	$133,000	1 FTE and	132,901	$/year
Maintenance labor & materials	$2,267,000	(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	**$2,450,000**			
Variable Annual Costs				
Reagent	$431,000	265 lb/hr and	530.03	$/ton
Auxiliary and ID fan power	$247,000	1,860 kW and	0.02169	$/kWh
Catalyst replacement	$273,000	60 m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$951,000**			
Total Annual Costs	**$3,401,000**			
Levelized Capital Costs	**$11,805,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$15,206,000**			

MILL CREEK UNIT 2 - WFGD COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$2,568,000			
Ductwork and Breeching	$3,956,000			
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$85,104,000			
Electrical - Equipment, Raceway	$9,452,000			
VFDs, Motors and Couplings	$5,555,000			
Switchgear and MCCs	$5,736,000			
Control - DCS Instrumentation	$5,303,000			
ID Fans	$2,510,000	Engineering Estimates		
Subtotal Purchase Contract	**$120,184,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$9,556,000			
Civil/Structural Construction - Sub-Structures	$931,000			
Mechanical/Chemical Construction	$21,832,000			
Electrical/Control Construction	$8,950,000			
Service Contracts & Construction Indirects	$17,009,000			
Demolition Costs	$12,313,000	Engineering Estimates		
Subtotal Construction Contracts	**$70,591,000**			
Construction Difficulty Costs	**$49,414,000**	Engineering Estimates		
Total Direct Costs	**$240,189,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$8,322,000			
EPC Construction Management (Includes G&A & Fee)	$10,930,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$1,121,000			
Sales Taxes	$44,000			
Project Contingency	$36,445,000			
Total Indirect Costs	**$56,862,000**			
Total Contracted Costs	$297,000,000			
Cost Effectiveness	*$900 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	70%	
Operating labor	$2,658,000	20 FTE and	132,901	$/year
Maintenance labor and materials	$7,206,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$9,864,000**			
Variable Annual Costs				
Reagent	$754,000	32,620 lb/hr and	7.54	$/ton
Byproduct disposal	$2,584,000	56,195 lb/hr and	15	$/ton
Auxiliary and ID fan power	$1,023,000	7,695 kW and	0.02169	$/kWh
Water	$379,000	515 gpm and	2	$/1,000 gal
Subtotal Variable Annual Costs	$4,740,000			
Total Annual Costs	$14,604,000			
Levelized Capital Costs	**$36,145,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$50,749,000			

MILL CREEK UNIT 2 - PJFF COSTS

CAPITAL COST

Purchase Contracts					
Civil/Structural	$4,568,000				
Mechanical - Balance of Plant (BOP)	$13,085,000				
Electrical - Equipment, Raceway, Switchgears, MCC	$277,000				
Control - DCS Instrumentation	$308,000				
ID Fans	$1,757,000	Engineering Estimates			
Subtotal Purchase Contract	**$19,995,000**				
Construction Contracts					
Civil/Structural Construction - Super Structures	$4,065,000				
Civil/Structural Construction - Sub-Structures	$1,545,000				
Mechanical/Chemical Construction	$15,460,000				
Electrical/Control Construction	$5,221,000				
Service Contracts & Construction Indirects	$252,000				
Demolition Costs	$4,104,000	Engineering Estimates			
Subtotal Construction Contracts	**$30,647,000**				
Construction Difficulty Costs	**$21,452,900**	Engineering Estimates			
Total Direct Costs	**$72,094,900**				
Indirect Costs					
Engineering Costs (Includes G&A & Fee)	$4,279,000				
EPC Construction Management (Includes G&A & Fee)	$2,800,000				
Startup Spare Parts (Included)	$0				
Construction Utilites (Power & Water) - Included	$0				
Project Insurance	$423,000				
Sales Taxes	$151,000				
Project Contingency - 18%	$1,577,000				
Total Indirect Costs	**$9,230,000**				
Total Contracted Costs	$81,000,000				
Cost Effectiveness	*$245 /kW*				

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	70%		
Maintenance labor and materials	$2,430,000	(DC) X 3.0%			
Subtotal Fixed Annual Costs	**$2,430,000**				
Variable Annual Costs					
Byproduct disposal	$0	0	lb/hr and	15	$/ton
Bag replacement cost	$484,000	14,520	bags and	100	$/bag
Cage replacement cost	$242,000	14,520	cages and	50	$/cage
ID fan power	$279,000	2,095	kW and	0.02169	$/kWh
Auxiliary power	$83,000	625	kW and	0.02169	$/kWh
Subtotal Variable Annual Costs	$1,088,000				
Total Annual Costs	$3,518,000				
Levelized Capital Costs	**$9,858,000**	(TCI) X 12.17%	CRF		
Levelized Annual Costs	$13,376,000				

Mill Creek Unit 2
330 MW
High Level Emissions Control Study

Technology: Electrostatic Precipitator (ESP) **Date:** 6/16/2010

Cost Item	$	Remarks			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
ESP	$7,399,831	From Previous Study			
Ash handling system	$538,703	From Previous Study			
ID fan	$501,831	Apportioned Engineering Estimate			
Flue gas ductwork	$2,000,000	Engineering Estimate			
Subtotal capital cost (CC)	$10,440,365				
Instrumentation and controls	$209,000	(CC) X	2.0%		
Taxes	$731,000	(CC) X	7.0%		
Freight	$522,000	(CC) X	5.0%		
Total purchased equipment cost (PEC)	$11,902,000				
Direct installation costs					
Foundation & supports	$1,785,000	(PEC) X	15.0%		
Handling & erection	$1,190,000	(PEC) X	10.0%		
Electrical	$2,380,000	(PEC) X	20.0%		
Piping	$298,000	(PEC) X	2.5%		
Insulation	$238,000	(PEC) X	2.0%		
Painting	$60,000	(PEC) X	0.5%		
Demolition	$2,052,000	Engineering Estimate			
Relocation	$1,000	(PEC) X	0.01%		
Total direct installation costs (DIC)	$8,004,000				
Site preparation	$200,000	Estimate			
Total direct costs (DC) = (PEC) + (DIC)	$20,106,000				
Indirect Costs					
Engineering	$2,413,000	(DC) X	12.0%		
Owners Cost	$603,000	(DC) X	3.0%		
Construction and field expenses	$2,011,000	(DC) X	10.0%		
Contractor fees	$2,011,000	(DC) X	10.0%		
Start-up	$603,000	(DC) X	3.0%		
Performance test	$40,000	(DC) X	0.2%		
Contingencies	$3,016,000	(DC) X	15.0%		
Total indirect costs (IC)	$10,697,000				
Allowance for Funds Used During Construction (AFDC)	$2,079,000	[(DC)+(IC)] X	4.50%	3 years (project time length)	
Total Capital Investment (TCI) = (DC) + (IC)	$32,882,000				
Cost Effectiveness	*$100 /kW*				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Maintenance labor and materials	$2,155,000	Engineering Estimates			
Total fixed annual costs	$2,155,000				
Variable annual costs				70 %	capacity factor
Byproduct disposal	$1,327,000		28,860 lb/hr and	15 $/ton	
ID fan power	$110,000		825 kW and	0.02169 $/kWh	
Auxiliary power	$72,000		545 kW and	0.02169 $/kWh	
Total variable annual costs	$1,509,000				
Total direct annual costs (DAC)	$3,664,000				
Indirect Annual Costs					
Cost for capital recovery	$4,002,000	(TCI) X	12.17%	CRF	
Total indirect annual costs (IDAC)	$4,002,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	$7,666,000				

Mill Creek Unit 2
330 MW
High Level Emissions Control Study

Technology: Lime Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$223,000	From Previous Mill Creek BACT Study				
Short-term storage silo	$148,000	From Previous Mill Creek BACT Study				
Air blowers	$203,000	From Previous Mill Creek BACT Study				
Rotary feeders	$33,000	From Previous Mill Creek BACT Study				
Injection system	$134,000	From Previous Mill Creek BACT Study				
Ductwork modifications, supports, platforms	$26,000	Ratio from Brown Unit 3 BACT Analysis				
Electrical system upgrades	$878,000	From Previous Mill Creek BACT Study				
Instrumentation and controls	$42,000	From Previous Mill Creek BACT Study				
Subtotal capital cost (CC)	$1,687,000					
Freight	$76,000	(CC) X	4.5%			
Total purchased equipment cost (PEC)	$1,763,000					
Direct installation costs						
Foundation & supports	$176,000	(PEC) X	10.0%			
Handling & erection	$353,000	(PEC) X	20.0%			
Electrical	$176,000	(PEC) X	10.0%			
Piping	$88,000	(PEC) X	5.0%			
Insulation	$35,000	(PEC) X	2.0%			
Painting	$88,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$916,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$2,754,000					
Indirect Costs						
Engineering	$330,000	(DC) X	12.0%			
Owner's cost	$330,000	(DC) X	12.0%			
Construction management	$275,000	(DC) X	10.0%			
Start-up and spare parts	$41,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$551,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,627,000					
Allowance for Funds Used During Construction (AFDC)	$99,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$4,480,000					
Cost Effectiveness	*$14 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$83,000	(DC) X	3.0%			
Operating labor	$133,000		1 FTE and	132,901 $/year	Estimated manpower	
Total fixed annual costs	$216,000					
Variable annual costs				70 %	capacity factor	
Lime	$1,510,000		4,170 lb/hr and	118.13 $/ton		
Byproduct disposal cost	$370,000		4,770 lb/hr and	15 $/ton		
Auxiliary power	$21,000		155 kW and	0.02169 $/kWh		
Total variable annual costs	$1,901,000					
Total direct annual costs (DAC)	$2,117,000					
Indirect Annual Costs						
Cost for capital recovery	$545,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$545,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$2,662,000					

Mill Creek Unit 2
330 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$278,009	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$182,691	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$254,179	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$31,772	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$119,147	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$23,829	Ratio from Brown Unit 3 BACT Analysis				
Electrical system upgrades	$762,538	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$39,716	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$1,691,882					
Freight	$42,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$1,734,000					
Direct installation costs						
Foundation & supports	$173,000	(PEC) X	10.0%			
Handling & erection	$347,000	(PEC) X	20.0%			
Electrical	$173,000	(PEC) X	10.0%			
Piping	$87,000	(PEC) X	5.0%			
Insulation	$35,000	(PEC) X	2.0%			
Painting	$87,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$902,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$2,711,000					
Indirect Costs						
Engineering	$325,000	(DC) X	12.0%			
Owner's cost	$325,000	(DC) X	12.0%			
Construction management	$271,000	(DC) X	10.0%			
Start-up and spare parts	$41,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$542,000	(DC) X	20.0%			
Total indirect costs (IC)	$1,604,000					
Allowance for Funds Used During Construction (AFDC)	$97,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$4,412,000					
Cost Effectiveness	*$13 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$81,000	(DC) X	3.0%			
Operating labor	$133,000		1 FTE and	132,901 $/year		Estimated manpower
Total fixed annual costs	$214,000					
Variable annual costs				70 %		capacity factor
Reagent (BPAC)	$2,091,000		310 lb/hr and	2200 $/ton		
Byproduct disposal cost	$14,000		310 lb/hr and	15 $/ton		
Auxiliary power	$21,000		155 kW and	0.02169 $/kWh		
Total variable annual costs	$2,126,000					
Total direct annual costs (DAC)	$2,340,000					
Indirect Annual Costs						
Cost for capital recovery	$537,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$537,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$2,877,000					

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

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MILL CREEK UNIT 3 - WFGD COSTS

CAPITAL COST

Purchase Contracts		
Civil/Structural	$2,980,000	
Ductwork and Breeching	$4,591,000	
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$98,775,000	
Electrical - Equipment, Raceway	$10,970,000	
VFDs, Motors and Couplings	$6,447,000	
Switchgear and MCCs	$6,657,000	
Control - DCS Instrumentation	$6,155,000	
ID Fans	$2,445,000	Engineering Estimates
Subtotal Purchase Contract	**$139,020,000**	
Construction Contracts		
Civil/Structural Construction - Super Structures	$11,091,000	
Civil/Structural Construction - Sub-Structures	$1,080,000	
Mechanical/Chemical Construction	$25,339,000	
Electrical/Control Construction	$10,387,000	
Service Contracts & Construction Indirects	$19,741,000	
Demolition Costs	$15,784,000	Engineering Estimates
Subtotal Construction Contracts	**$83,422,000**	
Construction Difficulty Costs	**$100,106,000**	Engineering Estimates
Total Direct Costs	**$322,548,000**	
Indirect Costs		
Engineering Costs (Includes G&A & Fee)	$10,150,000	
EPC Construction Management (Includes G&A & Fee)	$13,332,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$1,367,000	
Sales Taxes	$54,000	
Project Contingency	$44,453,000	
Total Indirect Costs	**$69,356,000**	
Total Contracted Costs	$392,000,000	
Cost Effectiveness	*$927 /kW*	

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	75%	
Operating labor	$2,658,000	20 FTE and	132,901	$/year
Maintenance labor and materials	$9,676,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$12,334,000**			
Variable Annual Costs				
Reagent	$1,027,000	41,470 lb/hr and	7.54	$/ton
Byproduct disposal	$3,520,000	71,435 lb/hr and	15	$/ton
Auxiliary and ID fan power	$1,518,000	9,910 kW and	0.02331	$/kWh
Water	$512,000	650 gpm and	2	$/1,000 gal
Subtotal Variable Annual Costs	$6,577,000			
Total Annual Costs	$18,911,000			
Levelized Capital Costs	**$47,706,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$66,617,000			

MILL CREEK UNIT 3 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$5,302,000			
Mechanical - Balance of Plant (BOP)	$15,187,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$322,000			
Control - DCS Instrumentation	$357,000			
ID Fans	$1,467,000	Engineering Estimates		
Subtotal Purchase Contract	**$22,635,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$4,718,000			
Civil/Structural Construction - Sub-Structures	$1,793,000			
Mechanical/Chemical Construction	$17,944,000			
Electrical/Control Construction	$6,059,000			
Service Contracts & Construction Indirects	$292,000			
Demolition Costs	$5,262,000	Engineering Estimates		
Subtotal Construction Contracts	**$36,068,000**			
Construction Difficulty Costs	**$43,282,000**	Engineering Estimates		
Total Direct Costs	**$101,985,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$5,485,000			
EPC Construction Management (Includes G&A & Fee)	$3,589,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$542,000			
Sales Taxes	$193,000			
Project Contingency - 18%	$2,021,000			
Total Indirect Costs	**$11,830,000**			
Total Contracted Costs	$114,000,000			
Cost Effectiveness	*$270 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	75%	
Maintenance labor and materials	$3,420,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$3,420,000**			
Variable Annual Costs				
Byproduct disposal	$5,000	95 lb/hr and	15	$/ton
Bag replacement cost	$635,000	19,040 bags and	100	$/bag
Cage replacement cost	$317,000	19,040 cages and	50	$/cage
ID fan power	$420,000	2,745 kW and	0.02331	$/kWh
Auxiliary power	$126,000	820 kW and	0.02331	$/kWh
Subtotal Variable Annual Costs	$1,503,000			
Total Annual Costs	$4,923,000			
Levelized Capital Costs	**$13,874,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$18,797,000			

Mill Creek Unit 3
423 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$356,357	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$234,177	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$325,812	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$40,726	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$152,724	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$30,545	Ratio from Brown Unit 3 BACT Analysis				
Electrical system upgrades	$977,435	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$50,908	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$2,168,685					
Freight	$54,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$2,223,000					
Direct installation costs						
Foundation & supports	$222,000	(PEC) X	10.0%			
Handling & erection	$445,000	(PEC) X	20.0%			
Electrical	$222,000	(PEC) X	10.0%			
Piping	$111,000	(PEC) X	5.0%			
Insulation	$44,000	(PEC) X	2.0%			
Painting	$111,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$1,155,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$3,453,000					
Indirect Costs						
Engineering	$414,000	(DC) X	12.0%			
Owner's cost	$414,000	(DC) X	12.0%			
Construction management	$345,000	(DC) X	10.0%			
Start-up and spare parts	$52,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$691,000	(DC) X	20.0%			
Total indirect costs (IC)	$2,016,000					
Allowance for Funds Used During Construction (AFDC)	$123,000	[(DC)+(IC)] X	4.50%	1	years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$5,592,000					
Cost Effectiveness	*$13 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$104,000	(DC) X	3.0%			
Operating labor	$133,000		1 FTE and	132,901	$/year	Estimated manpower
Total fixed annual costs	$237,000					
Variable annual costs				75	%	capacity factor
Reagent (BPAC)	$2,927,000		405 lb/hr and	2200	$/ton	
Byproduct disposal cost	$20,000		405 lb/hr and	15	$/ton	
Auxiliary power	$29,000		190 kW and	0.02331	$/kWh	
Total variable annual costs	$2,976,000					
Total direct annual costs (DAC)	$3,213,000					
Indirect Annual Costs						
Cost for capital recovery	$681,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$681,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$3,894,000					

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

MILL CREEK UNIT 4 - WFGD COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$3,392,000			
Ductwork and Breeching	$5,227,000			
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$112,444,000			
Electrical - Equipment, Raceway	$12,488,000			
VFDs, Motors and Couplings	$7,339,000			
Switchgear and MCCs	$7,578,000			
Control - DCS Instrumentation	$7,007,000			
ID Fans	$5,018,313	Engineering Estimates		
Subtotal Purchase Contract	**$160,493,313**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$12,626,000			
Civil/Structural Construction - Sub-Structures	$1,230,000			
Mechanical/Chemical Construction	$28,846,000			
Electrical/Control Construction	$11,825,000			
Service Contracts & Construction Indirects	$22,473,000			
Demolition Costs	$19,590,000	Engineering Estimates		
Subtotal Construction Contracts	**$96,590,000**			
Construction Difficulty Costs	**$115,908,000**	Engineering Estimates		
Total Direct Costs	**$372,991,313**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$12,065,000			
EPC Construction Management (Includes G&A & Fee)	$15,847,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$1,625,000			
Sales Taxes	$64,000			
Project Contingency	$52,840,000			
Total Indirect Costs	**$82,441,000**			
Total Contracted Costs	$455,000,000			
Cost Effectiveness	*$867 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	75%	
Operating labor	$2,658,000	20 FTE and	132,901	$/year
Maintenance labor and materials	$11,190,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$13,848,000**			
Variable Annual Costs				
Reagent	$1,250,000	50,465 lb/hr and	7.54	$/ton
Byproduct disposal	$4,284,000	86,935 lb/hr and	15	$/ton
Auxiliary and ID fan power	$1,770,000	12,055 kW and	0.02235	$/kWh
Water	$623,000	790 gpm and	2	$/1,000 gal
Subtotal Variable Annual Costs	$7,927,000			
Total Annual Costs	$21,775,000			
Levelized Capital Costs	**$55,374,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$77,149,000			

MILL CREEK UNIT 4 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$6,036,000			
Mechanical - Balance of Plant (BOP)	$17,289,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$366,000			
Control - DCS Instrumentation	$407,000			
ID Fans	$3,010,988	Engineering Estimates		
Subtotal Purchase Contract	**$27,108,988**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$5,371,000			
Civil/Structural Construction - Sub-Structures	$2,042,000			
Mechanical/Chemical Construction	$20,427,000			
Electrical/Control Construction	$6,898,000			
Service Contracts & Construction Indirects	$333,000			
Demolition Costs	$6,530,000	Engineering Estimates		
Subtotal Construction Contracts	**$41,601,000**			
Construction Difficulty Costs	**$49,921,000**	Engineering Estimates		
Total Direct Costs	**$118,630,988**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$6,807,000			
EPC Construction Management (Includes G&A & Fee)	$4,454,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$673,000			
Sales Taxes	$240,000			
Project Contingency - 18%	$2,508,000			
Total Indirect Costs	**$14,682,000**			
Total Contracted Costs	$133,000,000			
Cost Effectiveness	*$253*	*/kW*		
ANNUAL COST				
Fixed Annual Costs		Capacity Factor =	75%	
Maintenance labor and materials	$3,990,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$3,990,000**			
Variable Annual Costs				
Byproduct disposal	$1,000	30 lb/hr and	15	$/ton
Bag replacement cost	$768,000	23,050 bags and	100	$/bag
Cage replacement cost	$384,000	23,050 cages and	50	$/cage
ID fan power	$509,000	3,325 kW and	0.02331	$/kWh
Auxiliary power	$152,000	995 kW and	0.02331	$/kWh
Subtotal Variable Annual Costs	$1,814,000			
Total Annual Costs	$5,804,000			
Levelized Capital Costs	**$16,186,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$21,990,000			

Mill Creek Unit 4
##
High Level Emissions Control Study

Technology: PAC Injection | **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$442,287	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$290,646	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$404,376	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$50,547	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$189,551	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$37,910	Ratio from Brown Unit 3 BACT Analysis				
Electrical system upgrades	$1,213,129	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$63,184	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$2,691,630					
Freight	$67,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$2,759,000					
Direct installation costs						
Foundation & supports	$276,000	(PEC) X	10.0%			
Handling & erection	$552,000	(PEC) X	20.0%			
Electrical	$276,000	(PEC) X	10.0%			
Piping	$138,000	(PEC) X	5.0%			
Insulation	$55,000	(PEC) X	2.0%			
Painting	$138,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$1,435,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$4,269,000					
Indirect Costs						
Engineering	$512,000	(DC) X	12.0%			
Owner's cost	$512,000	(DC) X	12.0%			
Construction management	$427,000	(DC) X	10.0%			
Start-up and spare parts	$64,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$854,000	(DC) X	20.0%			
Total indirect costs (IC)	$2,469,000					
Allowance for Funds Used During Construction (AFDC)	$152,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$6,890,000					
Cost Effectiveness	*$13 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$128,000	(DC) X	3.0%			
Operating labor	$133,000		1 FTE and	132,901 $/year		Estimated manpower
Total fixed annual costs	$261,000					
Variable annual costs				75 %		capacity factor
Reagent (BPAC)	$3,541,000		490 lb/hr and	2200 $/ton		
Byproduct disposal cost	$24,000		490 lb/hr and	15 $/ton		
Auxiliary power	$32,000		220 kW and	0.02235 $/kWh		
Total variable annual costs	$3,597,000					
Total direct annual costs (DAC)	$3,858,000					
Indirect Annual Costs						
Cost for capital recovery	$839,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$839,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$4,697,000					

Trimble County

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

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TRIMBLE COUNTY UNIT 1 - PJFF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$6,186,000			
Mechanical - Balance of Plant (BOP)	$17,720,000			
Electrical - Equipment, Raceway, Switchgears, MCC	$375,000			
Control - DCS Instrumentation	$417,000			
ID Fans	$2,493,000	Engineering Estimates		
Subtotal Purchase Contract	**$27,191,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$5,505,000			
Civil/Structural Construction - Sub-Structures	$2,092,000			
Mechanical/Chemical Construction	$20,936,000			
Electrical/Control Construction	$7,070,000			
Service Contracts & Construction Indirects	$341,000			
Demolition Costs	$3,050,000	Engineering Estimates		
Subtotal Construction Contracts	**$38,994,000**			
Construction Difficulty Costs	**$46,793,000**	Engineering Estimates		
Total Direct Costs	**$112,978,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$7,092,000			
EPC Construction Management (Includes G&A & Fee)	$4,641,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$701,000			
Sales Taxes	$250,000			
Project Contingency - 18%	$2,613,000			
Total Indirect Costs	**$15,297,000**			
Total Contracted Costs	$128,000,000			
Cost Effectiveness	*$234 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	85%	
Maintenance labor and materials	$3,840,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$3,840,000**			
Variable Annual Costs				
Byproduct disposal	$0	0 lb/hr and	15	$/ton
Bag replacement cost	$785,000	23,550 bags and	100	$/bag
Cage replacement cost	$393,000	23,550 cages and	50	$/cage
ID fan power	$588,000	3,395 kW and	0.02325	$/kWh
Auxiliary power	$176,000	1,015 kW and	0.02325	$/kWh
Subtotal Variable Annual Costs	$1,942,000			
Total Annual Costs	$5,782,000			
Levelized Capital Costs	**$15,578,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$21,360,000			

Trimble County Unit 1
547 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$418,928	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$275,295	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$383,020	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$47,877	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$179,540	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$0					
Electrical system upgrades	$1,149,059	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$59,847	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$2,513,567					
Freight	$63,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$2,577,000					
Direct installation costs						
Foundation & supports	$258,000	(PEC) X	10.0%			
Handling & erection	$515,000	(PEC) X	20.0%			
Electrical	$258,000	(PEC) X	10.0%			
Piping	$129,000	(PEC) X	5.0%			
Insulation	$52,000	(PEC) X	2.0%			
Painting	$129,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$1,341,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$3,993,000					
Indirect Costs						
Engineering	$479,000	(DC) X	12.0%			
Owner's cost	$479,000	(DC) X	12.0%			
Construction management	$399,000	(DC) X	10.0%			
Start-up and spare parts	$60,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$799,000	(DC) X	20.0%			
Total indirect costs (IC)	$2,316,000					
Allowance for Funds Used During Construction (AFDC)	$142,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$6,451,000					
Cost Effectiveness	*$12 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$120,000	(DC) X	3.0%			
Operating labor	$132,000		1 FTE and	132,491 $/year		Estimated manpower
Total fixed annual costs	$252,000					
Variable annual costs				85 %		capacity factor
Reagent (BPAC)	$4,095,000		500 lb/hr and	2200 $/ton		
Byproduct disposal cost	$28,000		500 lb/hr and	15 $/ton		
Auxiliary power	$38,000		220 kW and	0.02325 $/kWh		
Total variable annual costs	$4,161,000					
Total direct annual costs (DAC)	$4,413,000					
Indirect Annual Costs						
Cost for capital recovery	$785,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$785,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$5,198,000					

Green River

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

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GREEN RIVER UNIT 3 - SCR COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$2,126,000	
Ductwork and Breeching	$1,642,000	
Mechanical - Balance of Plant (BOP)	$538,000	
Electrical - Equipment, Raceway	$614,000	
VFDs, Motors and Couplings	$500,000	Engineering Estimates
Switchgear and MCCs	$215,000	
Control - DCS Instrumentation	$69,000	
Air Heater	$1,638,000	Engineering Estimates
ID Fans	$718,534	Engineering Estimates
Catalyst	$864,000	
Selective Catalytic Reduction System (Including Ammonia System)	$753,000	
Subtotal Purchase Contract	**$9,677,534**	

Construction Contracts

Civil/Structural Construction - Super Structures	$1,309,000	
Civil/Structural Construction - Sub-Structures	$340,000	
Mechanical/Chemical Construction	$4,113,000	
Electrical/Control Construction	$1,881,000	
Service Contracts & Construction Indirects	$6,571,000	
Demolition Costs	$395,000	Engineering Estimates
Subtotal Construction Contracts	**$14,609,000**	
Construction Difficulty Costs	**$0**	Engineering Estimates
Total Direct Costs	**$24,286,534**	

Indirect Costs

Engineering Costs (Includes G&A & Fee)	$1,063,000	
EPC Construction Management (Includes G&A & Fee)	$667,000	
Startup Spare Parts (Included)	$0	
Construction Utilites (Power & Water) - Included	$0	
Project Insurance	$175,000	
Sales Taxes	$247,000	
Project Contingency	$2,495,000	
Total Indirect Costs	**$4,647,000**	
Total Contracted Costs	**$29,000,000**	
Capital Cost Effectiveness	***$408***	***/kW***

ANNUAL COST

Capacity Factor = 26%

Fixed Annual Costs

Operating labor	$122,000	1 FTE and	121,547	$/year
Maintenance labor & materials	$729,000	(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	**$901,000**			

Variable Annual Costs

Reagent	$60,000	100 lb/hr and	530.03	$/ton
Auxiliary and ID fan power	$37,000	470 kW and	0.03433	$/kWh
Catalyst replacement	$42,000	25 m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$139,000**			
Total Annual Costs	**$1,040,000**			
Levelized Capital Costs	**$3,529,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$4,569,000**			

GREEN RIVER UNIT 3 - CDS-FF COSTS

CAPITAL COST

Purchase Contracts

Civil/Structural	$863,000				
Ductwork and Breeching	$554,000				
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$114,000				
Electrical - Equipment, Raceway	$660,000				
Cable Bus	$180,000				
Switchgear and MCCs	$252,000				
Control - DCS Instrumentation	$166,000				
CDS Fabric Filter	$9,704,000				
ID Fans	$663,263	Engineering Estimates			
Subtotal Purchase Contract	**$13,156,263**				
Construction Contracts					
Civil/Structural Construction - Super Structures	$2,627,000				
Civil/Structural Construction - Sub-Structures	$1,780,000				
Mechanical/Chemical Construction	$3,996,000				
Electrical/Control Construction	$1,517,000				
Service Contracts & Construction Indirects	$7,004,000				
Subtotal Construction Contracts	**$16,924,000**				
Construction Difficulty Costs	**$0**	Engineering Estimates			
Total Direct Costs	**$30,080,263**				
Indirect Costs					
Engineering Costs (Includes G&A & Fee)	$2,623,000				
EPC Construction Management (Includes G&A & Fee)	$1,038,000				
Startup Spare Parts (Included)	$0				
Construction Utilites (Power & Water) - Included	$0				
Project Insurance	$272,000				
Sales Taxes	$502,000				
Project Contingency	$3,858,000				
Total Indirect Costs	**$8,293,000**				
Total Contracted Costs	$38,000,000				
Cost Effectiveness	*$535 /kW*				

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	26%		
Operating labor	$1,459,000	12 FTE and	121,547	$/year	
Maintenance labor and materials	$902,000	(DC) X 3.0%			
Subtotal Fixed Annual Costs	**$2,361,000**				
Variable Annual Costs					
Reagent	$3,431,000	22,790 lb/hr and	132.19	$/ton	
Byproduct disposal	$914,000	53,535 lb/hr and	15	$/ton	
Auxiliary and ID fan power	$138,000	1,760 kW and	0.03433	$/kWh	
Water	$30,000	110 gpm and	2	$/1,000 gal	
Subtotal Variable Annual Costs	$4,513,000				
Total Annual Costs	$6,874,000				
Levelized Capital Costs	**$4,625,000**	(TCI) X 12.17%	CRF		
Levelized Annual Costs	$11,499,000				

Green River Unit 3
71 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$60,000	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$39,000	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$55,000	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$7,000	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$26,000	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$0	From Ductwork Cost Calc				
Electrical system upgrades	$164,000	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$9,000	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$360,000					
Freight	$9,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$369,000					
Direct installation costs						
Foundation & supports	$37,000	(PEC) X	10.0%			
Handling & erection	$74,000	(PEC) X	20.0%			
Electrical	$37,000	(PEC) X	10.0%			
Piping	$18,000	(PEC) X	5.0%			
Insulation	$7,000	(PEC) X	2.0%			
Painting	$18,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$191,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$635,000					
Indirect Costs						
Engineering	$76,000	(DC) X	12.0%			
Owner's cost	$76,000	(DC) X	12.0%			
Construction management	$64,000	(DC) X	10.0%			
Start-up and spare parts	$10,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$127,000	(DC) X	20.0%			
Total indirect costs (IC)	$453,000					
Allowance for Funds Used During Construction (AFDC)	$24,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$1,112,000					
Cost Effectiveness	*$16 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$19,000	(DC) X	3.0%			
Operating labor	$122,000		1 FTE and	121,547 $/year		Estimated manpower
Total fixed annual costs	$141,000					
Variable annual costs				26 %		capacity factor
Reagent (BPAC)	$175,000		70 lb/hr and	2200 $/ton		
Byproduct disposal	$1,000		70 lb/hr and	15 $/ton		
Auxiliary power	$6,000		75 kW and	0.03433 $/kWh		
Total variable annual costs	$182,000					
Total direct annual costs (DAC)	$323,000					
Indirect Annual Costs						
Cost for capital recovery	$135,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$135,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$458,000					

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

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GREEN RIVER UNIT 4 - SCR COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$3,138,000			
Ductwork and Breeching	$2,423,000			
Mechanical - Balance of Plant (BOP)	$794,000			
Electrical - Equipment, Raceway	$906,000			
VFDs, Motors and Couplings	$500,000	Engineering Estimates		
Switchgear and MCCs	$317,000			
Control - DCS Instrumentation	$102,000			
Air Heater	$1,638,000	Engineering Estimates		
ID Fans	$1,207,000	Engineering Estimates		
Catalyst	$1,275,000			
Selective Catalytic Reduction System (Including Ammonia System)	$1,112,000			
Subtotal Purchase Contract	**$13,412,000**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$1,932,000			
Civil/Structural Construction - Sub-Structures	$502,000			
Mechanical/Chemical Construction	$6,072,000			
Electrical/Control Construction	$2,777,000			
Service Contracts & Construction Indirects	$9,700,000			
Demolition Costs	$606,000	Engineering Estimates		
Subtotal Construction Contracts	**$21,589,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$35,001,000**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$1,632,000			
EPC Construction Management (Includes G&A & Fee)	$1,024,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$269,000			
Sales Taxes	$380,000			
Project Contingency	$3,831,000			
Total Indirect Costs	**$7,136,000**			
Total Contracted Costs	**$42,000,000**			
Capital Cost Effectiveness	***$385***	***/kW***		

ANNUAL COST

			Capacity Factor =	32%
Fixed Annual Costs				
Operating labor	$122,000	1 FTE and	121,547	$/year
Maintenance labor & materials	$1,050,000	(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	**$1,222,000**			
Variable Annual Costs				
Reagent	$93,000	125 lb/hr and	530.03	$/ton
Auxiliary and ID fan power	$65,000	725 kW and	0.03187	$/kWh
Catalyst replacement	$62,000	30 m3 and	6,500	$/m3
Subtotal Variable Annual Costs	**$220,000**			
Total Annual Costs	**$1,442,000**			
Levelized Capital Costs	**$5,111,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	**$6,553,000**			

GREEN RIVER UNIT 4 - CDS-FF COSTS

CAPITAL COST

Purchase Contracts				
Civil/Structural	$1,190,000			
Ductwork and Breeching	$764,000			
Mechanical - Balance of Plant (BOP) (includes reagent prep and dewatering systems)	$158,000			
Electrical - Equipment, Raceway	$910,000			
Cable Bus	$249,000			
Switchgear and MCCs	$348,000			
Control - DCS Instrumentation	$229,000			
CDS Fabric Filter	$13,384,000			
ID Fans	$1,114,350	Engineering Estimates		
Subtotal Purchase Contract	**$18,346,350**			
Construction Contracts				
Civil/Structural Construction - Super Structures	$3,623,000			
Civil/Structural Construction - Sub-Structures	$2,454,000			
Mechanical/Chemical Construction	$5,511,000			
Electrical/Control Construction	$2,092,000			
Service Contracts & Construction Indirects	$9,660,000			
Subtotal Construction Contracts	**$23,340,000**			
Construction Difficulty Costs	**$0**	Engineering Estimates		
Total Direct Costs	**$41,686,350**			
Indirect Costs				
Engineering Costs (Includes G&A & Fee)	$4,027,000			
EPC Construction Management (Includes G&A & Fee)	$1,593,000			
Startup Spare Parts (Included)	$0			
Construction Utilites (Power & Water) - Included	$0			
Project Insurance	$418,000			
Sales Taxes	$770,000			
Project Contingency	$5,923,000			
Total Indirect Costs	**$12,731,000**			
Total Contracted Costs	$54,000,000			
Cost Effectiveness	*$495 /kW*			

ANNUAL COST

Fixed Annual Costs		Capacity Factor =	32%	
Operating labor	$1,459,000	12 FTE and	121,547	$/year
Maintenance labor and materials	$1,251,000	(DC) X 3.0%		
Subtotal Fixed Annual Costs	**$2,710,000**			
Variable Annual Costs				
Reagent	$5,726,000	30,905 lb/hr and	132.19	$/ton
Byproduct disposal	$1,526,000	72,600 lb/hr and	15	$/ton
Auxiliary and ID fan power	$265,000	2,970 kW and	0.03187	$/kWh
Water	$62,000	185 gpm and	2	$/1,000 gal
Subtotal Variable Annual Costs	$7,579,000			
Total Annual Costs	$10,289,000			
Levelized Capital Costs	**$6,572,000**	(TCI) X 12.17%	CRF	
Levelized Annual Costs	$16,861,000			

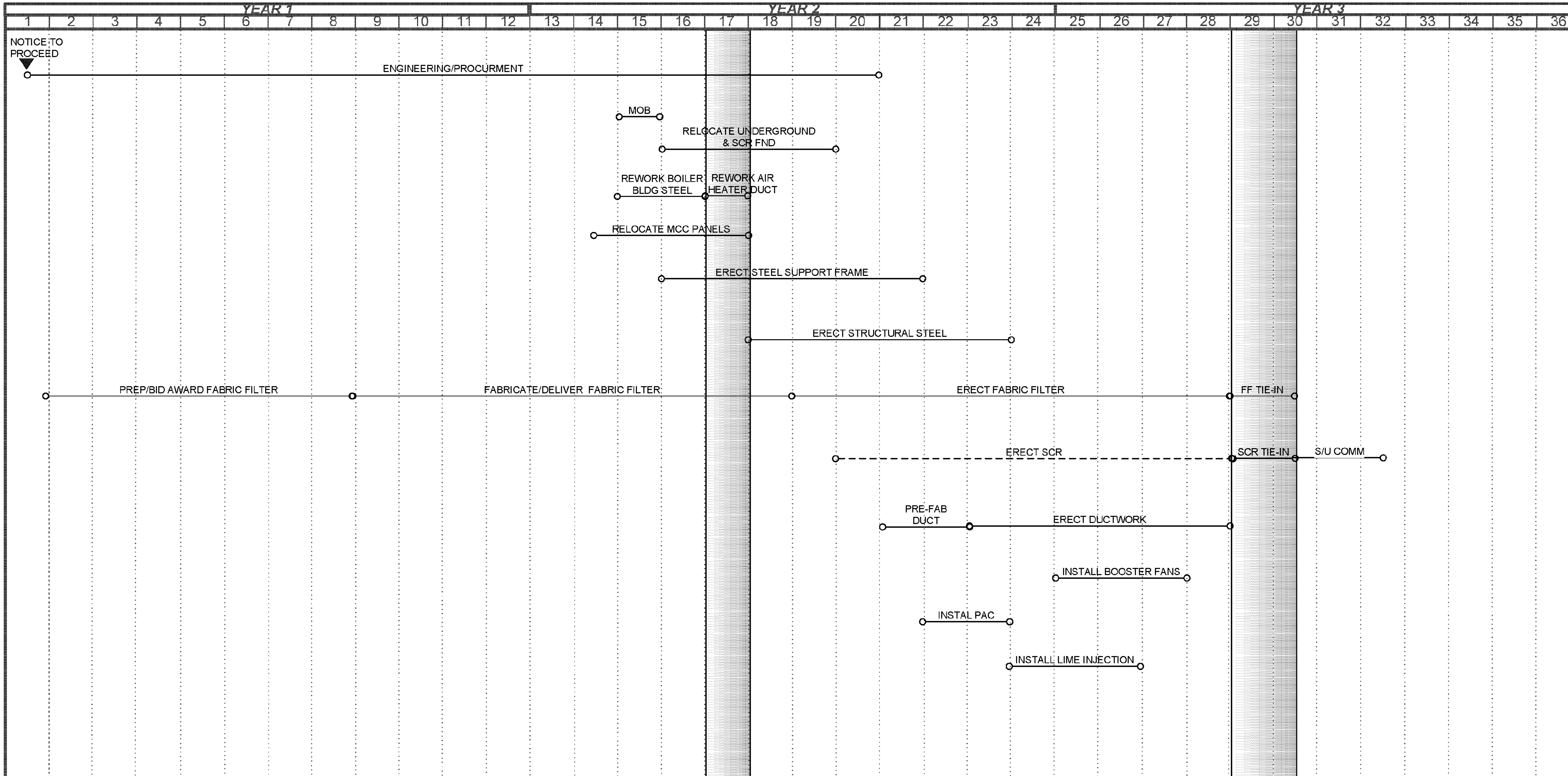
Green River Unit 4
109 MW
High Level Emissions Control Study

Technology: PAC Injection **Date:** 6/16/2010

Cost Item	$	Remarks/Cost Basis				
CAPITAL COST						
Direct Costs						
Purchased equipment costs						
Long-term storage silo (with truck unloading sys.)	$92,000	Ratio from Brown Unit 3 BACT Analysis				
Short-term storage silo	$60,000	Ratio from Brown Unit 3 BACT Analysis				
Air blowers	$84,000	Ratio from Brown Unit 3 BACT Analysis				
Rotary feeders	$10,000	Ratio from Brown Unit 3 BACT Analysis				
Injection system	$39,000	Ratio from Brown Unit 3 BACT Analysis				
Ductwork modifications, supports, platforms	$0	From Ductwork Cost Calc				
Electrical system upgrades	$252,000	Ratio from Brown Unit 3 BACT Analysis				
Instrumentation and controls	$13,000	Ratio from Brown Unit 3 BACT Analysis				
Subtotal capital cost (CC)	$550,000					
Freight	$14,000	(CC) X	2.5%			
Total purchased equipment cost (PEC)	$564,000					
Direct installation costs						
Foundation & supports	$56,000	(PEC) X	10.0%			
Handling & erection	$113,000	(PEC) X	20.0%			
Electrical	$56,000	(PEC) X	10.0%			
Piping	$28,000	(PEC) X	5.0%			
Insulation	$11,000	(PEC) X	2.0%			
Painting	$28,000	(PEC) X	5.0%			
Demolition	$0	(PEC) X	0.0%			
Relocation	$0	(PEC) X	0.0%			
Total direct installation costs (DIC)	$292,000					
Site preparation	$0	N/A				
Buildings	$75,000	Engineering estimate				
Total direct costs (DC) = (PEC) + (DIC)	$931,000					
Indirect Costs						
Engineering	$112,000	(DC) X	12.0%			
Owner's cost	$112,000	(DC) X	12.0%			
Construction management	$93,000	(DC) X	10.0%			
Start-up and spare parts	$14,000	(DC) X	1.5%			
Performance test	$100,000	Engineering estimate				
Contingencies	$186,000	(DC) X	20.0%			
Total indirect costs (IC)	$617,000					
Allowance for Funds Used During Construction (AFDC)	$35,000	[(DC)+(IC)] X	4.50%		1 years (project time length X 1/2)	
Total Capital Investment (TCI) = (DC) + (IC) + (AFDC)	$1,583,000					
Cost Effectiveness	*$15 /kW*					
ANNUAL COST						
Direct Annual Costs						
Fixed annual costs						
Maintenance labor and materials	$28,000	(DC) X	3.0%			
Operating labor	$122,000		1 FTE and	121,547 $/year		Estimated manpower
Total fixed annual costs	$150,000					
Variable annual costs				32 %		capacity factor
Reagent (BPAC)	$355,000		115 lb/hr and	2200 $/ton		
Byproduct disposal	$2,000		115 lb/hr and	15 $/ton		
Auxiliary power	$8,000		90 kW and	0.03187 $/kWh		
Total variable annual costs	$365,000					
Total direct annual costs (DAC)	$515,000					
Indirect Annual Costs						
Cost for capital recovery	$193,000	(TCI) X	12.17%	CRF		
Total indirect annual costs (IDAC)	$193,000					
Total Annual Cost (TAC) = (DAC) + (IDAC)	$708,000					

Appendix I
Level 1 Schedules

E.W. Brown



No.	Date	Revisions & Record of Issue	Dwn	Chk	Appd
0	06/16/2010	PHASE 1			

BLACK & VEATCH

Engineer | Drawn: S. CARUTHERS

Checked: T. VANGILDER | Date: JUNE 07, 2010

E.W. BROWN UNIT 1
OPTIONAL SCR & FABRIC FILTER

LEVEL 1 SCHEDULE

Drawing Number - REV 0

Code | Area

Page 1 of 1

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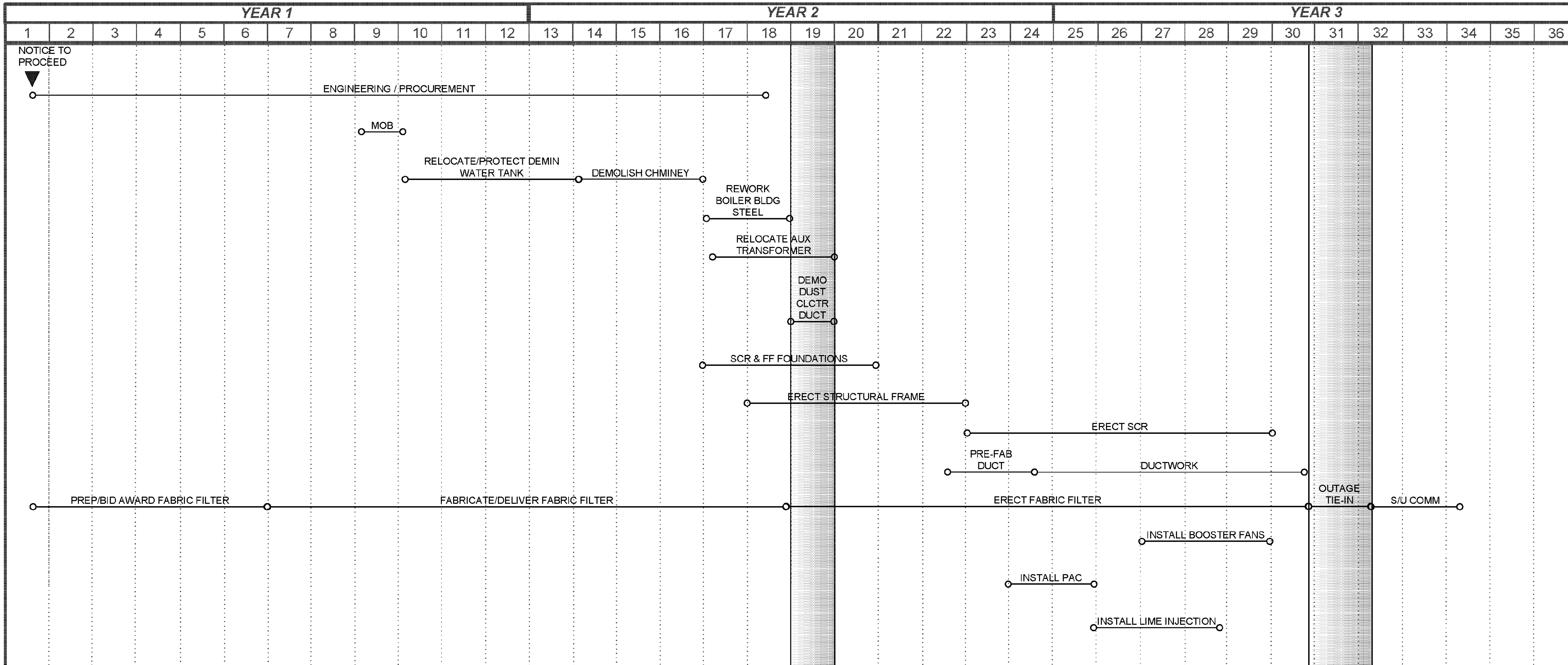

No.	Date	Revisions & Record of Issue	Dwn	Chk	Appd
0	06/16/2010	PHASE 1			

BLACK & VEATCH

Engineer	Drawn
	S. CARUTHERS
Checked	**Date**
T. VANGILDER	JUNE 07, 2010

E.W. BROWN UNIT 2
SCR & FABRIC FILTER

LEVEL 1 SCHEDULE

Code	Area

Page 1 of 1

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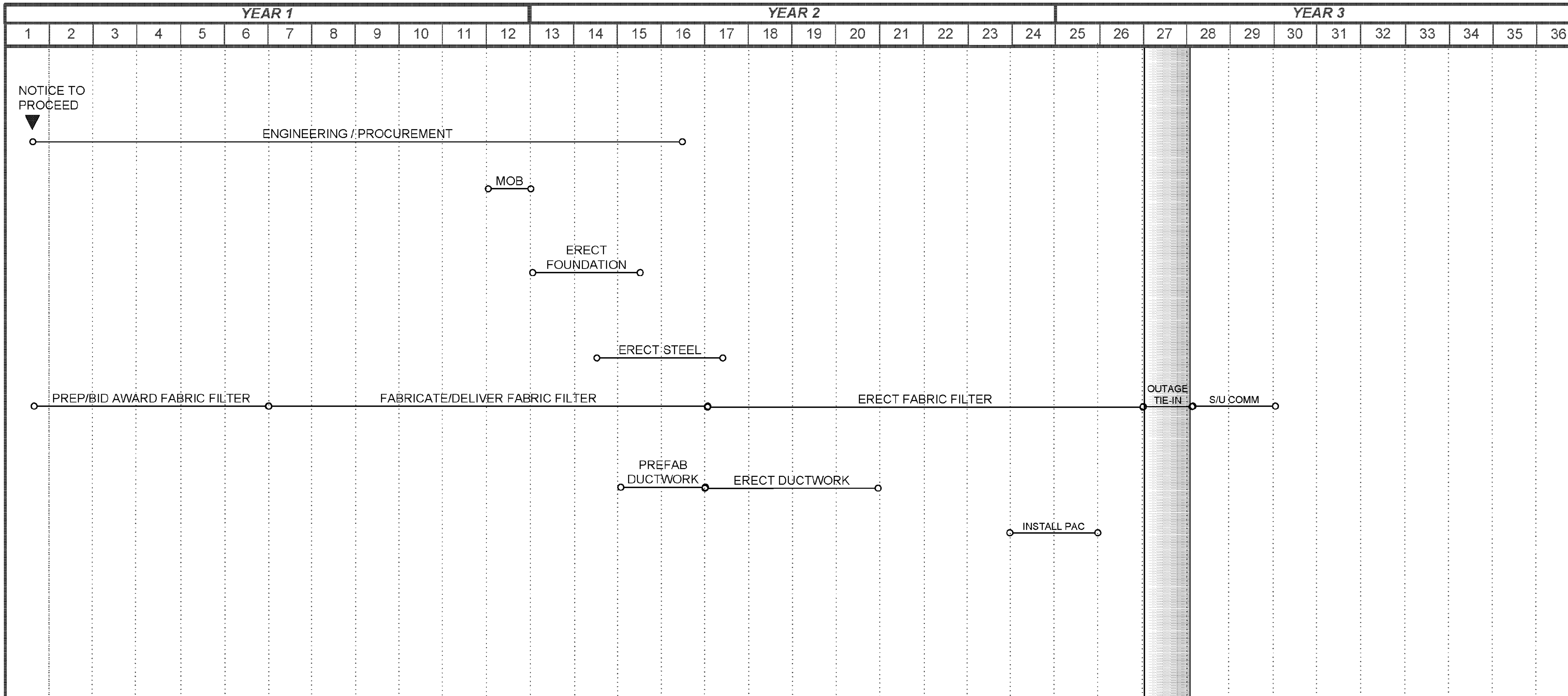

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BLACK & VEATCH

Engineer

Drawn: S. CARUTHERS

Checked: T. VANGILDER

Date: JUNE 07, 2010

E.W. BROWN UNIT 3 FABRIC FILTER

LEVEL 1 SCHEDULE

Drawing Number - REV 0

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Area

Page 1 of 1

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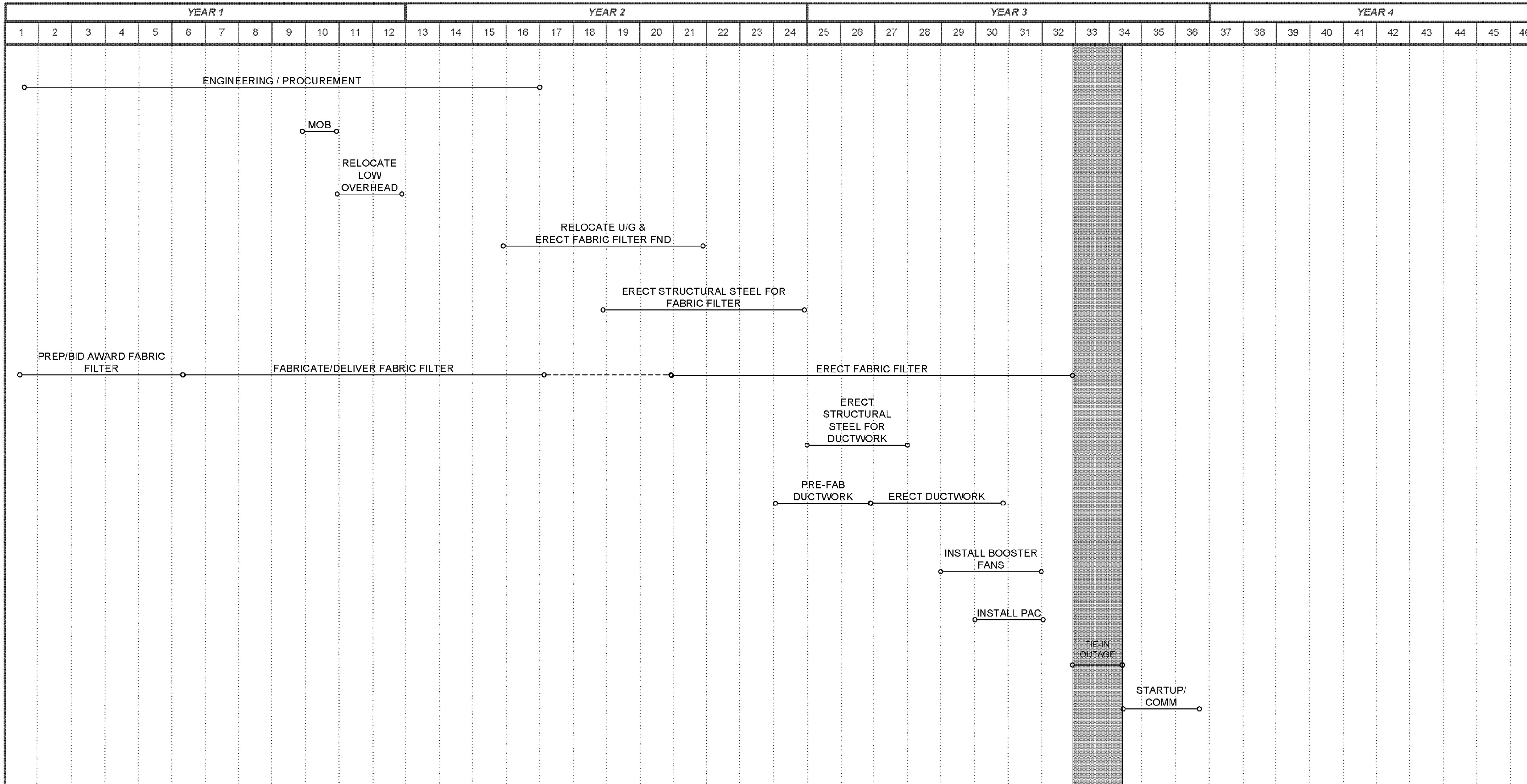
Ghent



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	S. CARUTHERS
Checked	**Date**
T. VANGILDER	JUNE 07, 2010

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FABRIC FILTER

LEVEL 1 SCHEDULE

Drawing Number - REV 0

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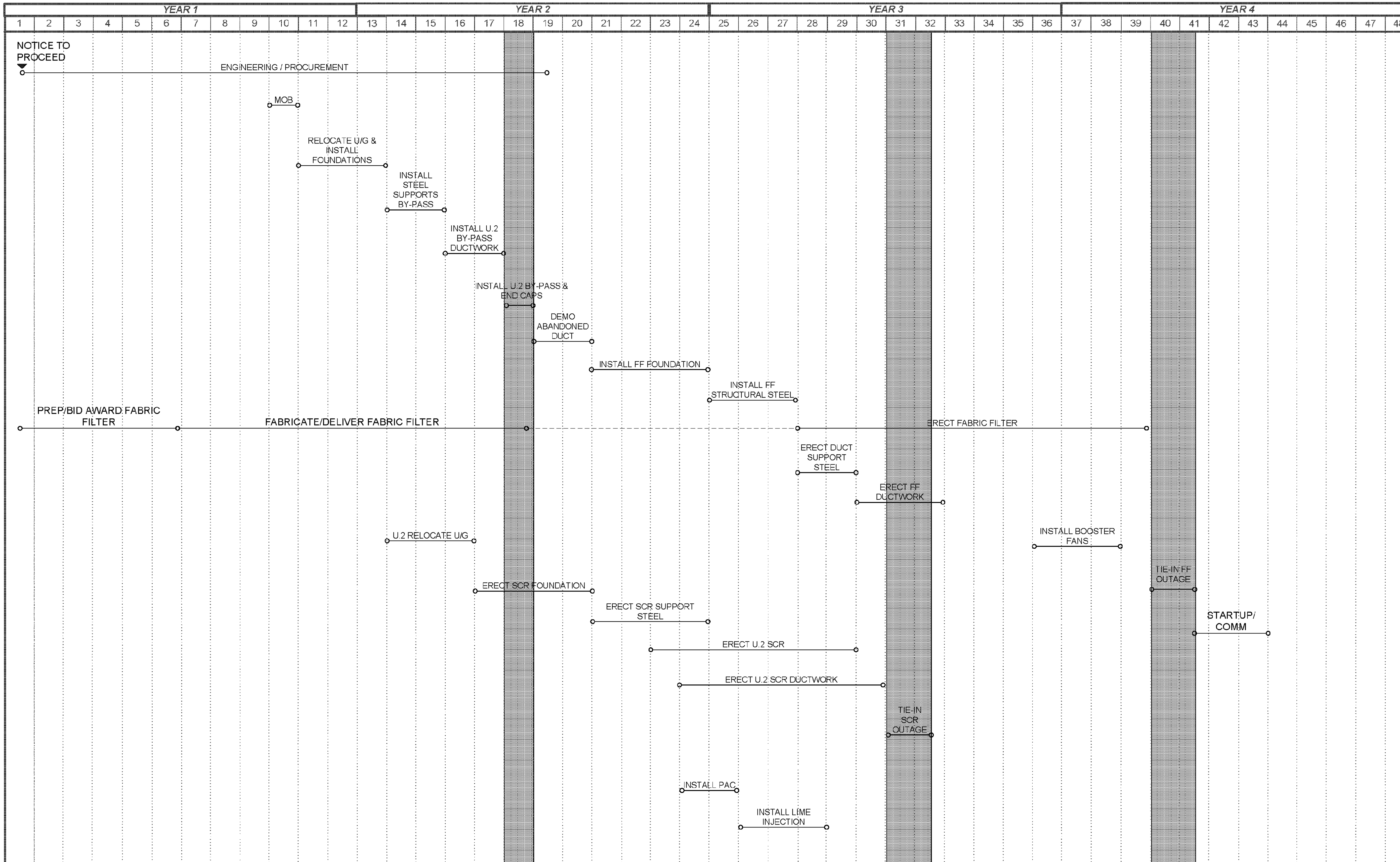
Page 1 of 1



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Engineer | Drawn: S. CARUTHERS

Checked: T. VANGILDER | Date: JUNE 07, 2010

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LEVEL 1 SCHEDULE

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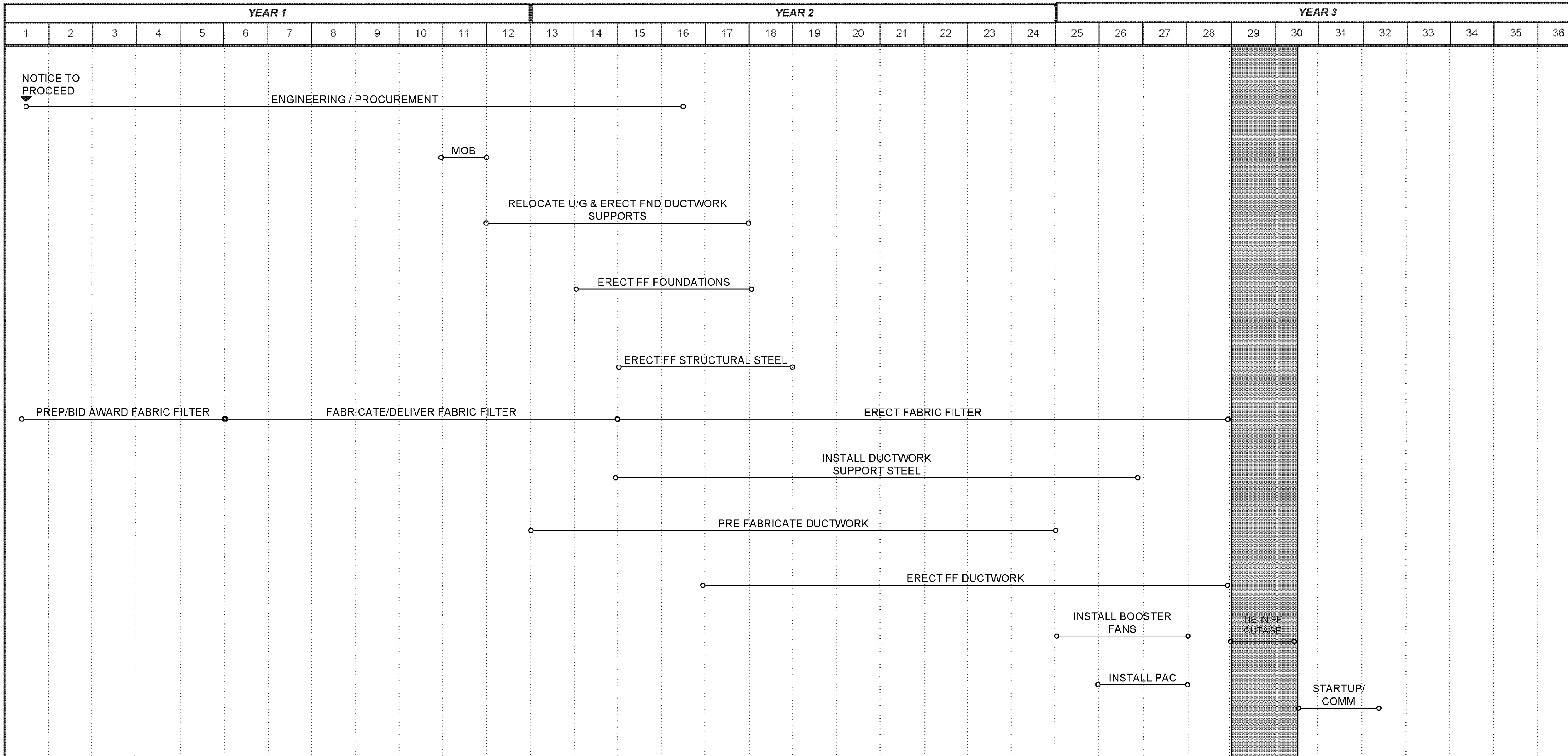
Page 1 of 1



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Drawn: S. CARUTHERS

Checked: T. VANGILDER

Date: JUNE 07, 2010

GHENT UNIT 3
FABRIC FILTER

LEVEL 1 SCHEDULE

Drawing Number - REV 0

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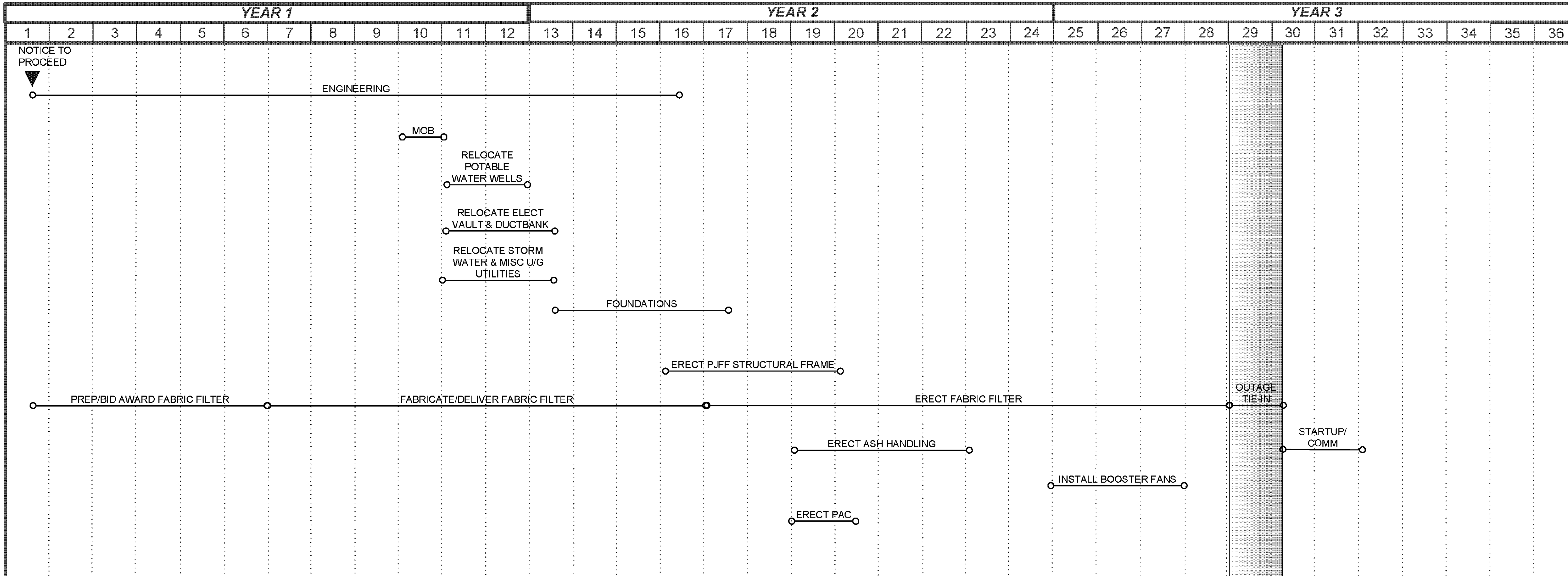
Page 1 of 1



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Engineer

Drawn: S. CARUTHERS

Checked: T. VANGILDER

Date: JUNE 07, 2010

GHENT UNIT 4
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LEVEL 1 SCHEDULE

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Area

Page 1 of 1

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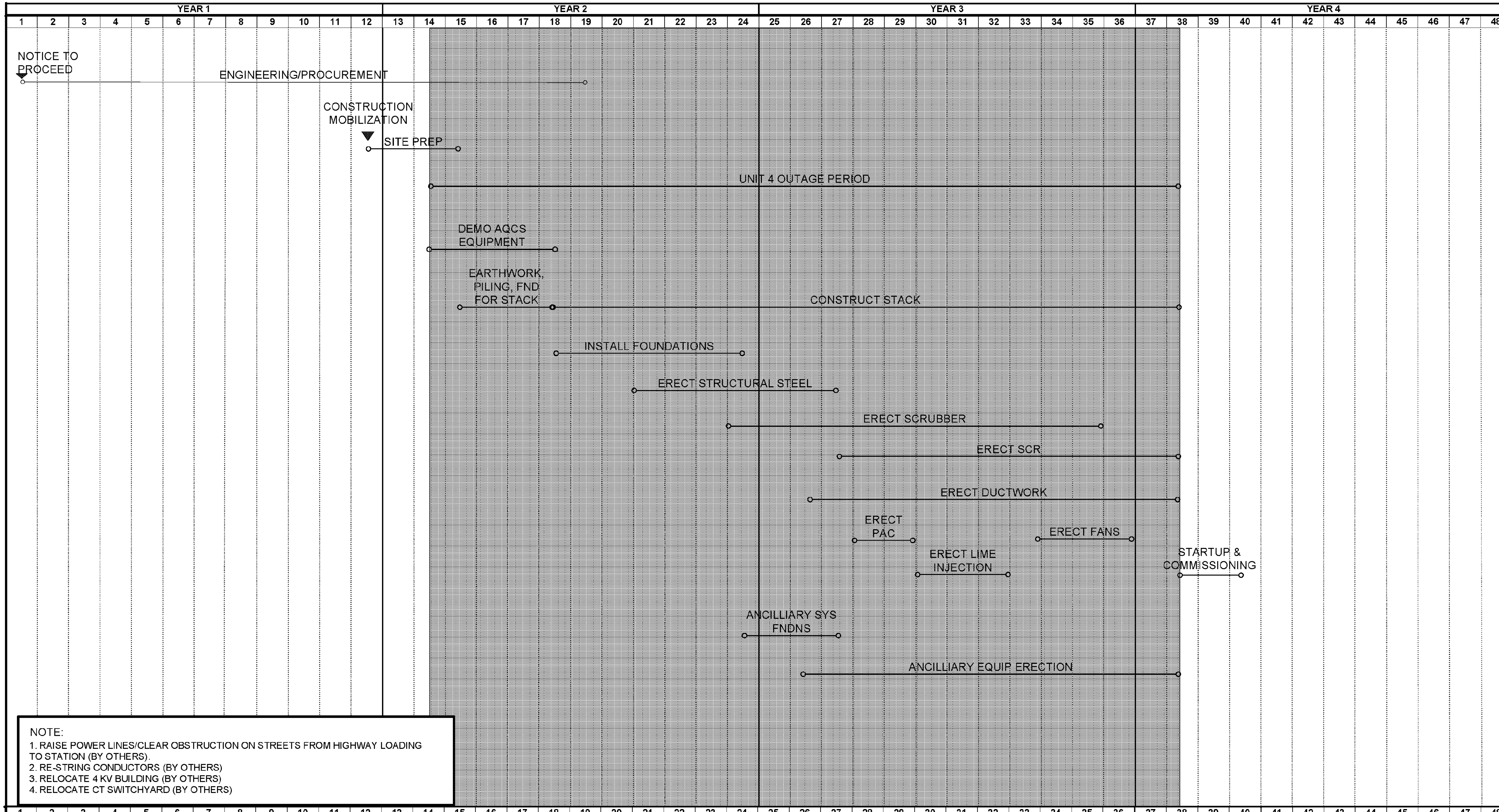
Cane Run



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FILE NAME

BLACK & VEATCH CORPORATION

ENGINEER

DRAWN S. CARUTHERS

CHECKED

DATE 06/03/2010

CANE RUN UNIT 4
SCR & SCRUBBER

LEVEL 1 SUMMARY SCHEDULE

DRAWING NUMBER REV 0

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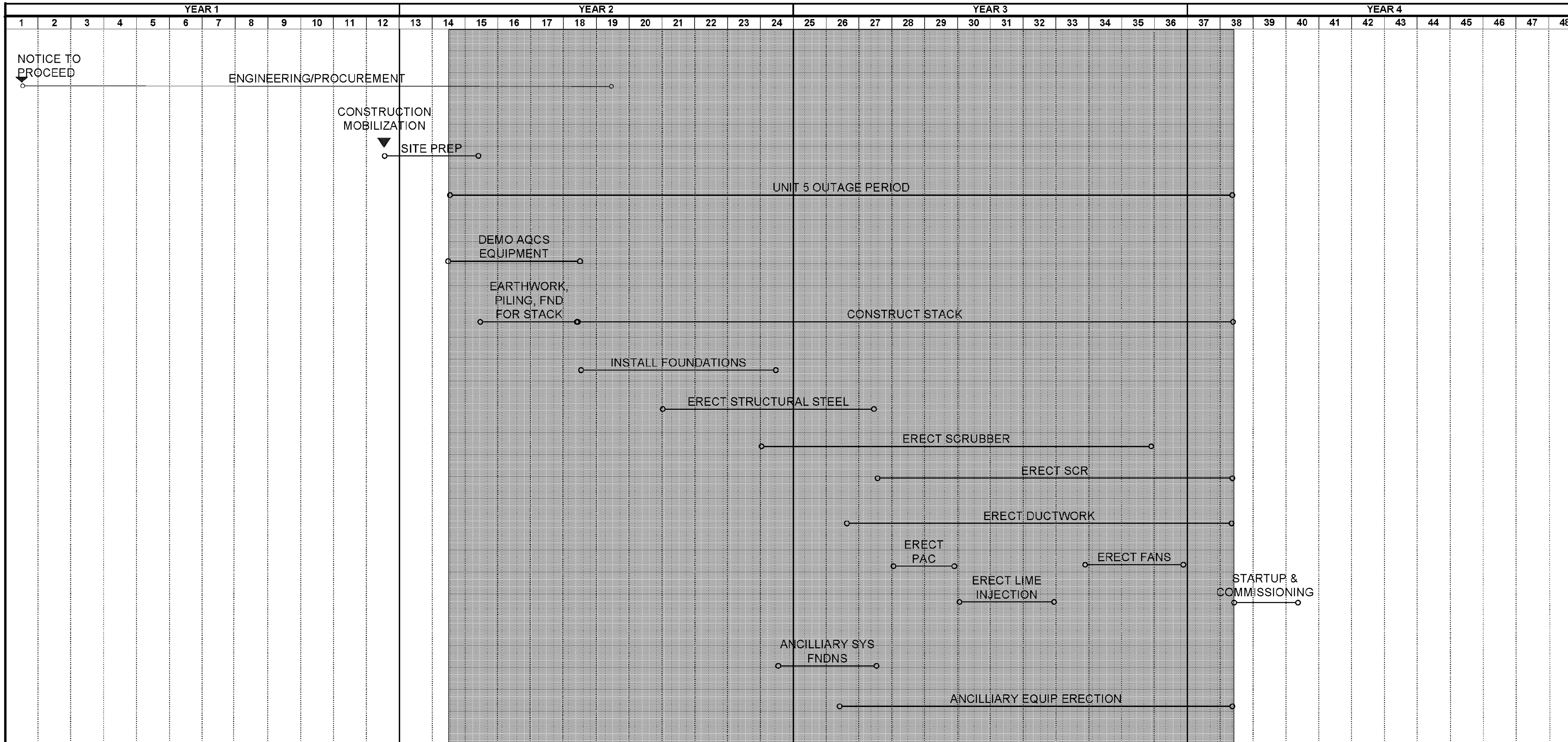
AREA

PAGE 1 OF 1



NOTE:
1. RAISE POWER LINES/CLEAR OBSTRUCTION ON STREETS FROM HIGHWAY LOADING TO STATION (BY OTHERS).
2. RE-STRING CONDUCTORS (BY OTHERS)
3. RELOCATE 4 KV BUILDING (BY OTHERS)
4. RELOCATE CT SWITCHYARD (BY OTHERS)

NO.	DATE	REVISIONS & RECORD OF ISSUE	DWN	CHK	APP	FLM
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FILE NAME

BLACK & VEATCH CORPORATION

ENGINEER
DRAWN S. CARUTHERS
CHECKED
DATE 06/03/2010

CANE RUN UNIT 5
SCR & SCRUBBER

LEVEL 1 SUMMARY SCHEDULE

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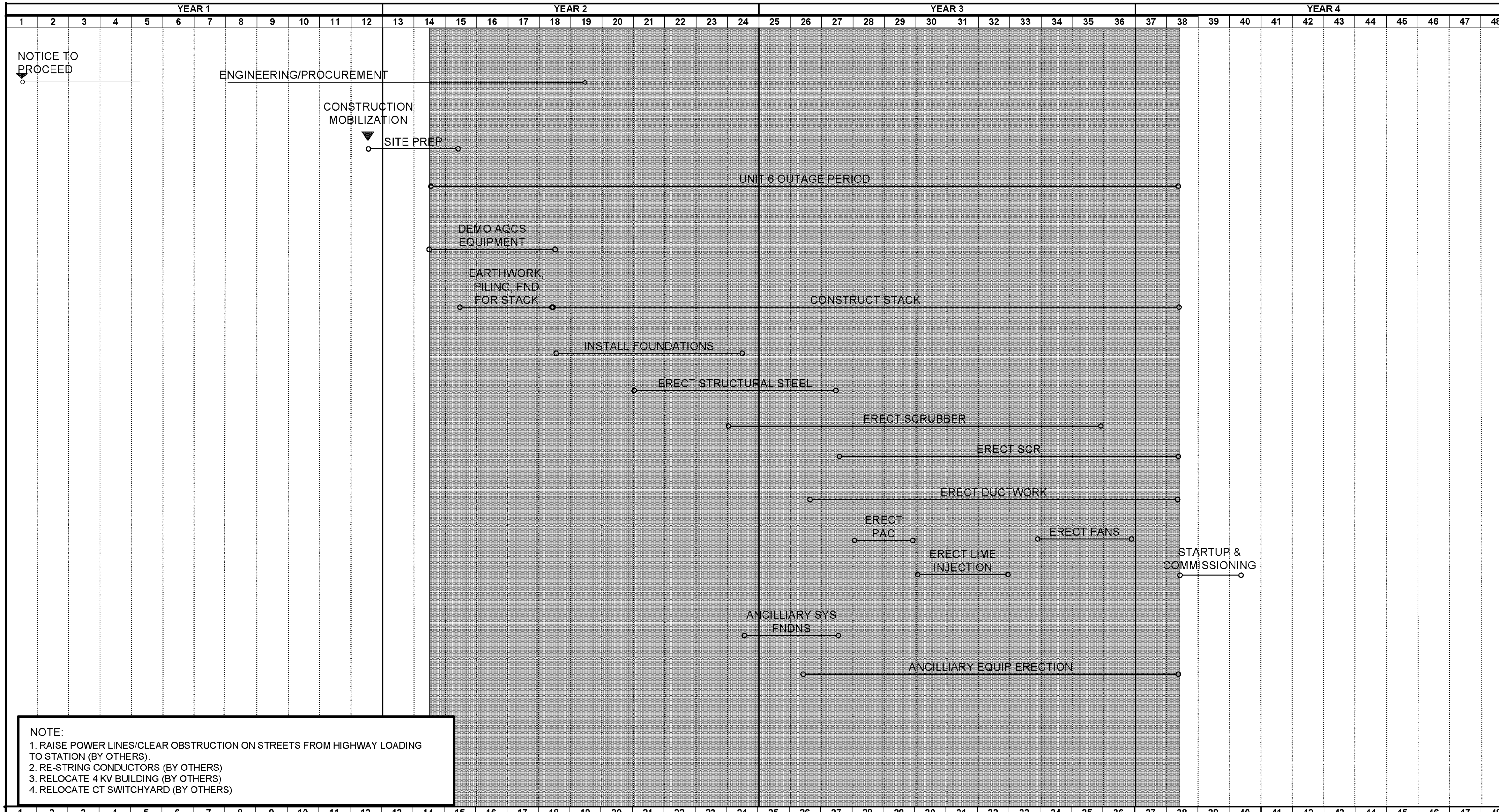
AREA
PAGE 1 OF 1



NOTE:
1. RAISE POWER LINES/CLEAR OBSTRUCTION ON STREETS FROM HIGHWAY LOADING TO STATION (BY OTHERS).
2. RE-STRING CONDUCTORS (BY OTHERS)
3. RELOCATE 4 KV BUILDING (BY OTHERS)
4. RELOCATE CT SWITCHYARD (BY OTHERS)

NO.	DATE	REVISIONS & RECORD OF ISSUE	DWN	CHK	APP	FLM
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FILE NAME

BLACK & VEATCH CORPORATION

ENGINEER
DRAWN S. CARUTHERS
CHECKED
DATE 06/03/2010

CANE RUN UNIT 6
SCR & SCRUBBER

LEVEL 1 SUMMARY SCHEDULE

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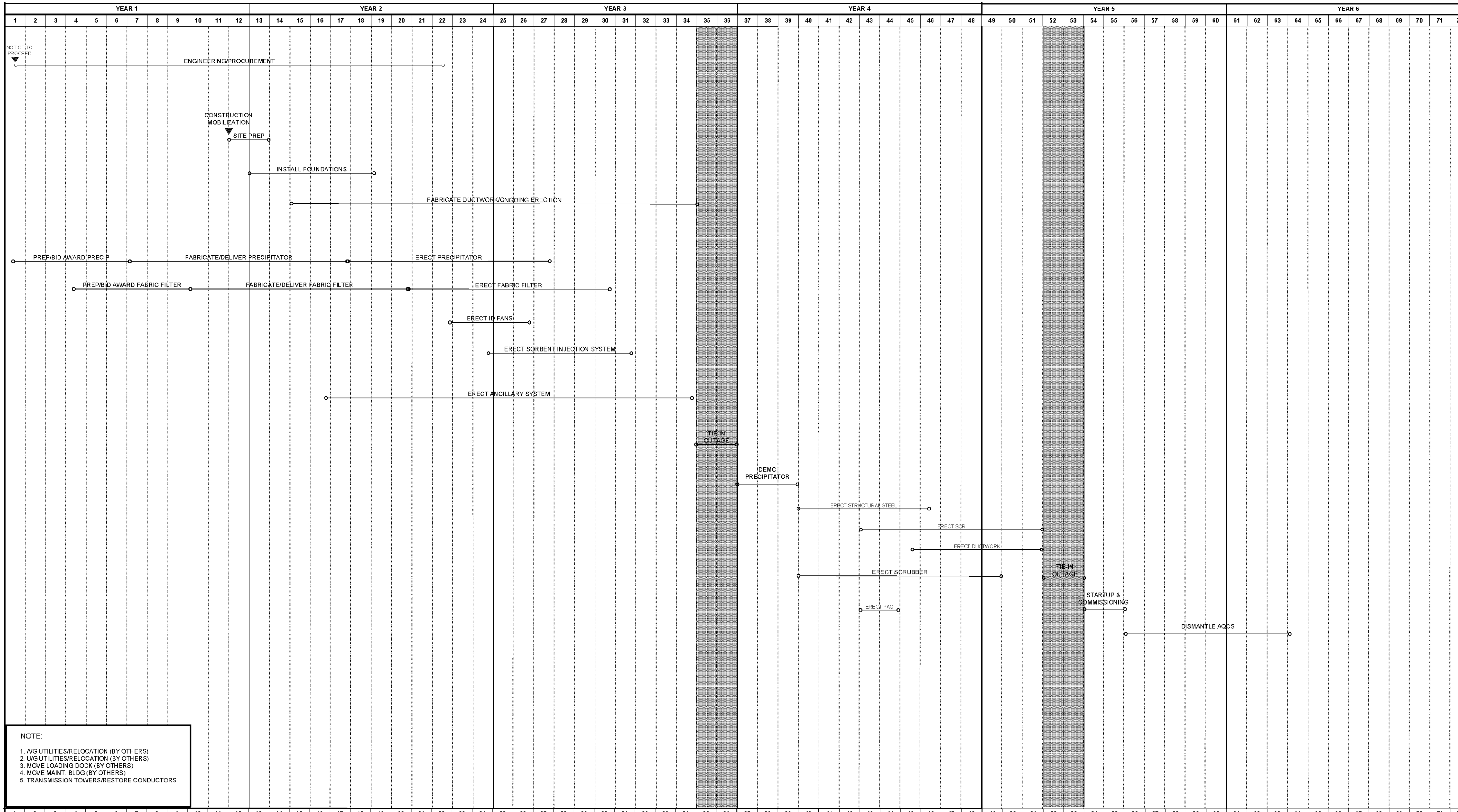
AREA
PAGE 1 OF 1

Mill Creek



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ENGINEER
DRAWN S. CARUTHERS
CHECKED
DATE 06/03/2010

MILL CREEK UNIT 1
SCRUBBER, ESP, FABRIC FILTER, & SCR

LEVEL 1 SUMMARY SCHEDULE

DRAWING NUMBER REV 0
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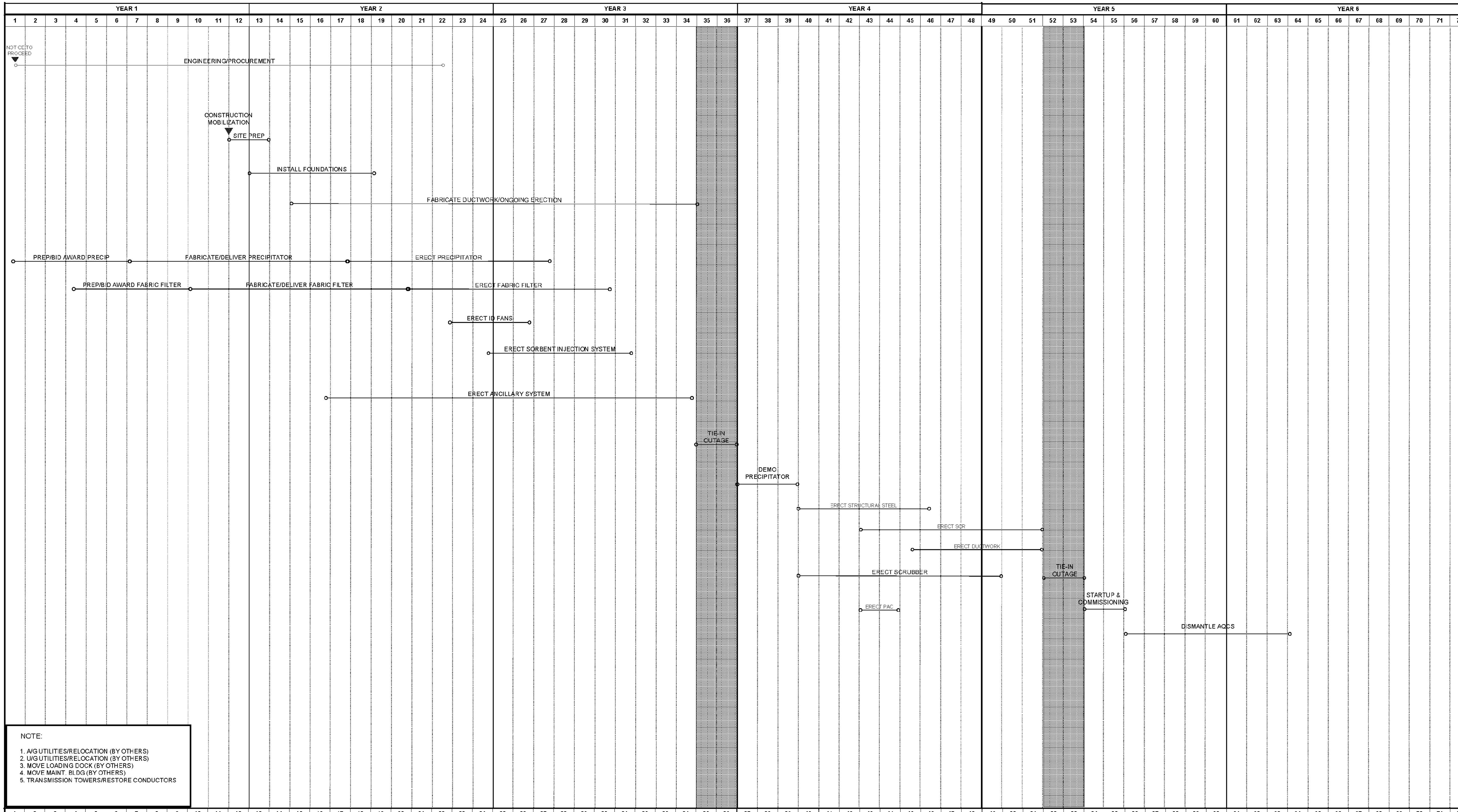
AREA
PAGE 1 OF 1



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BLACK & VEATCH CORPORATION

ENGINEER

DRAWN S. CARUTHERS

CHECKED

DATE 06/03/2010

MILL CREEK UNIT 2
SCRUBBER, ESP, FABRIC FILTER, & SCR

LEVEL 1 SUMMARY SCHEDULE

DRAWING NUMBER

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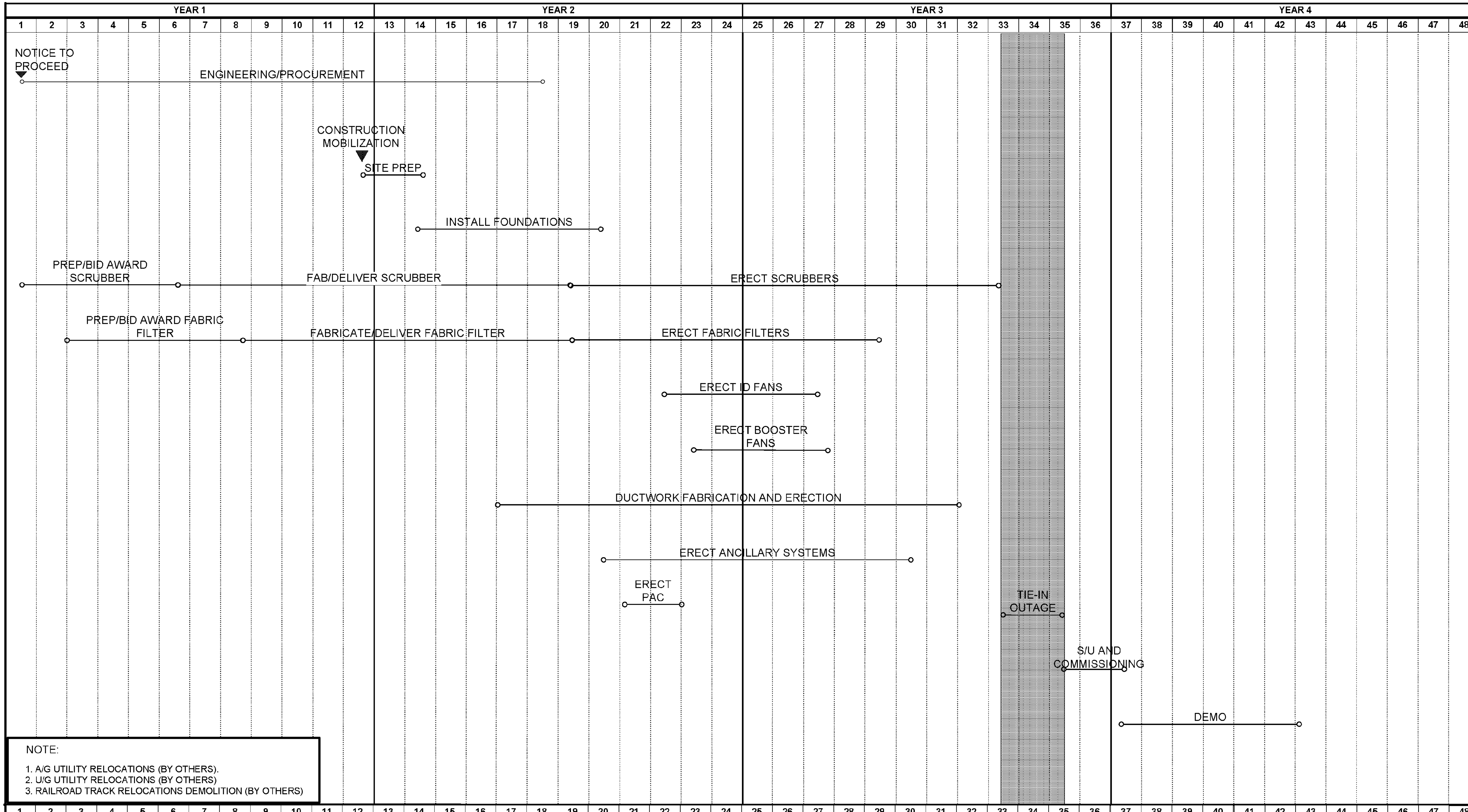
PAGE 1 OF 1



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BLACK & VEATCH CORPORATION

ENGINEER

DRAWN S. CARUTHERS

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DATE 06/03/2010

MILL CREEK UNIT 3
SCRUBBER & FABRIC FILTER

LEVEL 1 SUMMARY SCHEDULE

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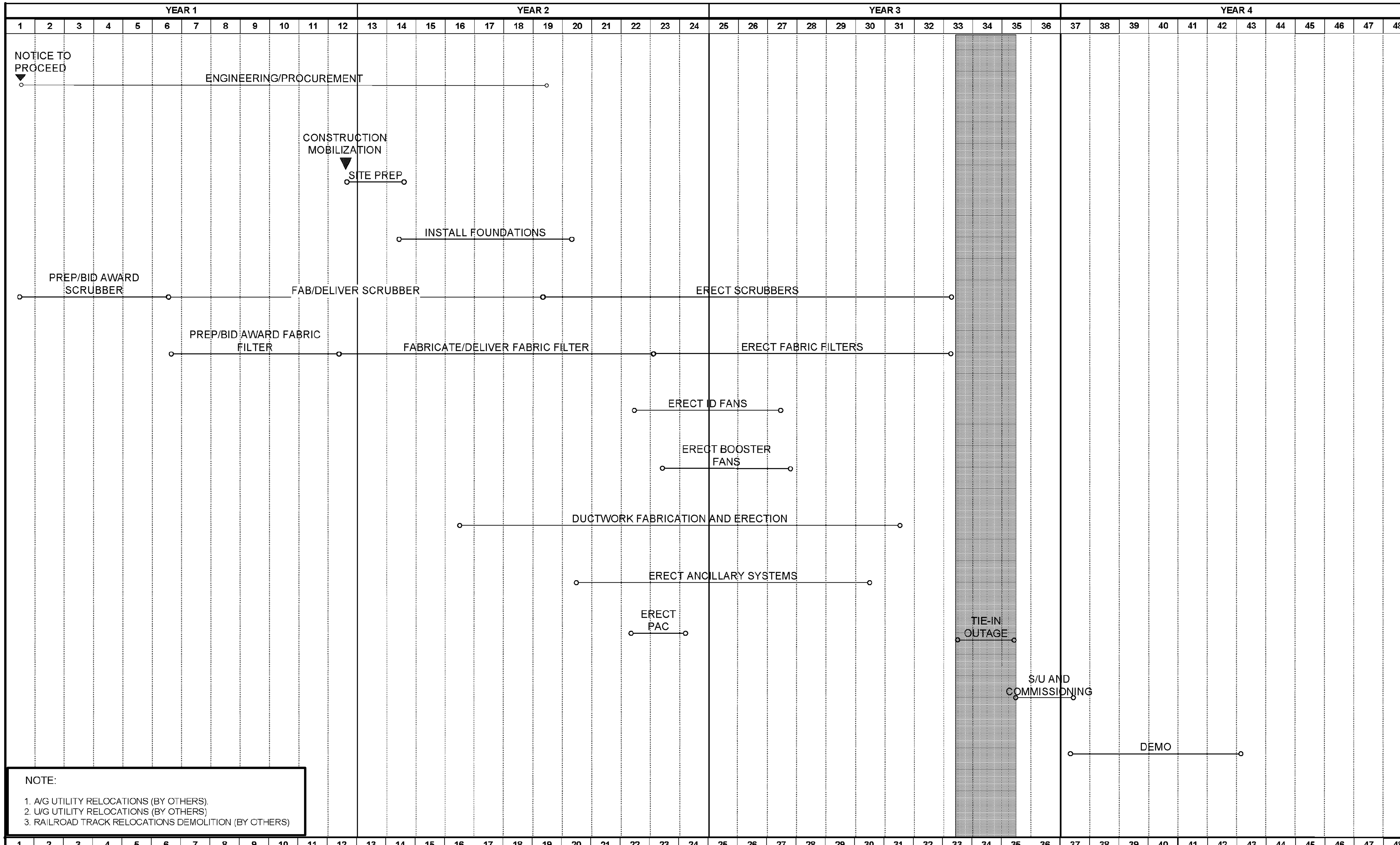
AREA

PAGE 1 OF 1



NOTE:

1. A/G UTILITY RELOCATIONS (BY OTHERS).
2. U/G UTILITY RELOCATIONS (BY OTHERS).
3. RAILROAD TRACK RELOCATIONS DEMOLITION (BY OTHERS)

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FILE NAME:

BLACK & VEATCH CORPORATION

ENGINEER

DRAWN S. CARUTHERS

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DATE 06/03/2010

MILL CREEK UNIT 4
SCRUBBER & FABRIC FILTER

LEVEL 1 SUMMARY SCHEDULE

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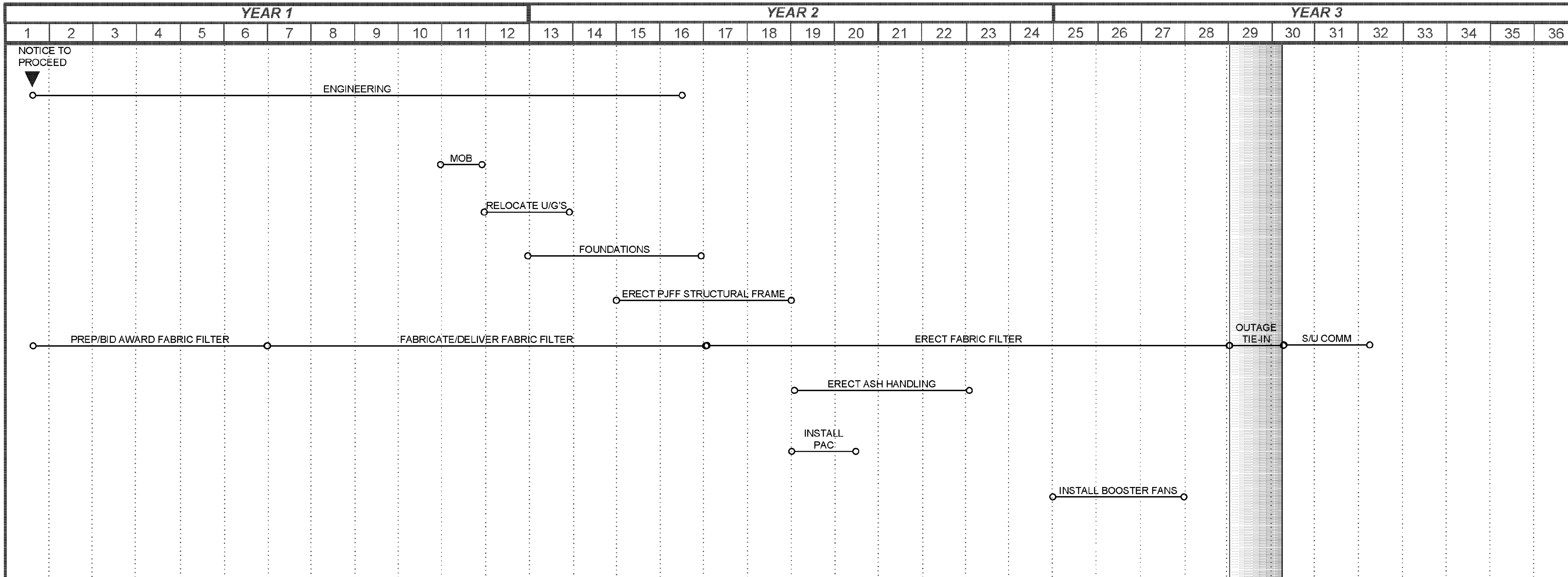
AREA

PAGE 1 OF 1

Trimble County



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Engineer:
Drawn: S. CARUTHERS
Checked: T. VANGILDER
Date: JUNE 07, 2010

TRIMBLE COUNTY UNIT 1
PAC & FABRIC FILTER

LEVEL 1 SCHEDULE

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Area

Page 1 of 1

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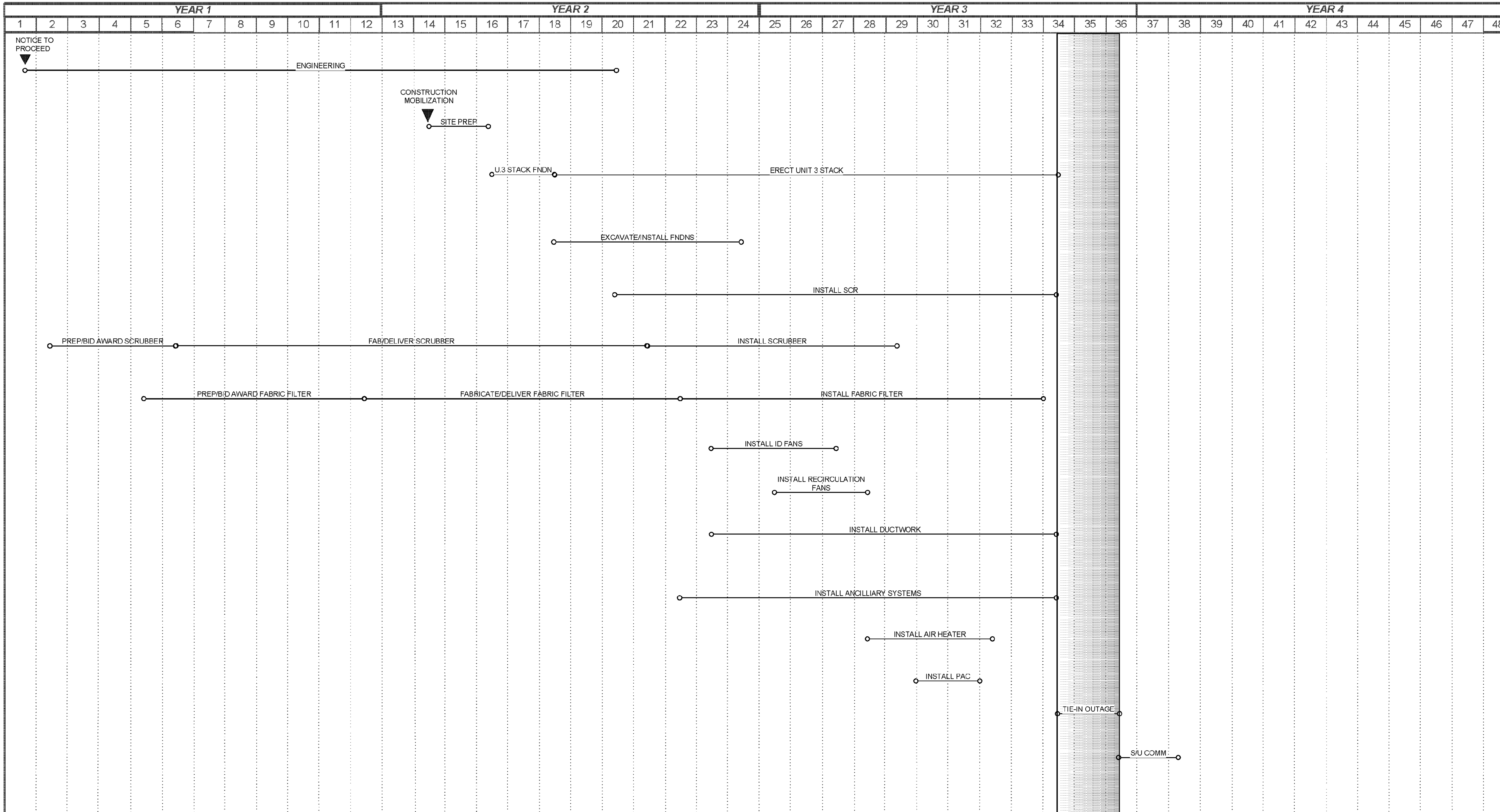
Green River



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Engineer	Drawn
	S. CARUTHERS
Checked	Date
T. VANGILDER	JUNE 07, 2010

GREEN RIVER UNIT 3
SCR, SCRUBBER & FABRIC FILTER

LEVEL 1 SCHEDULE

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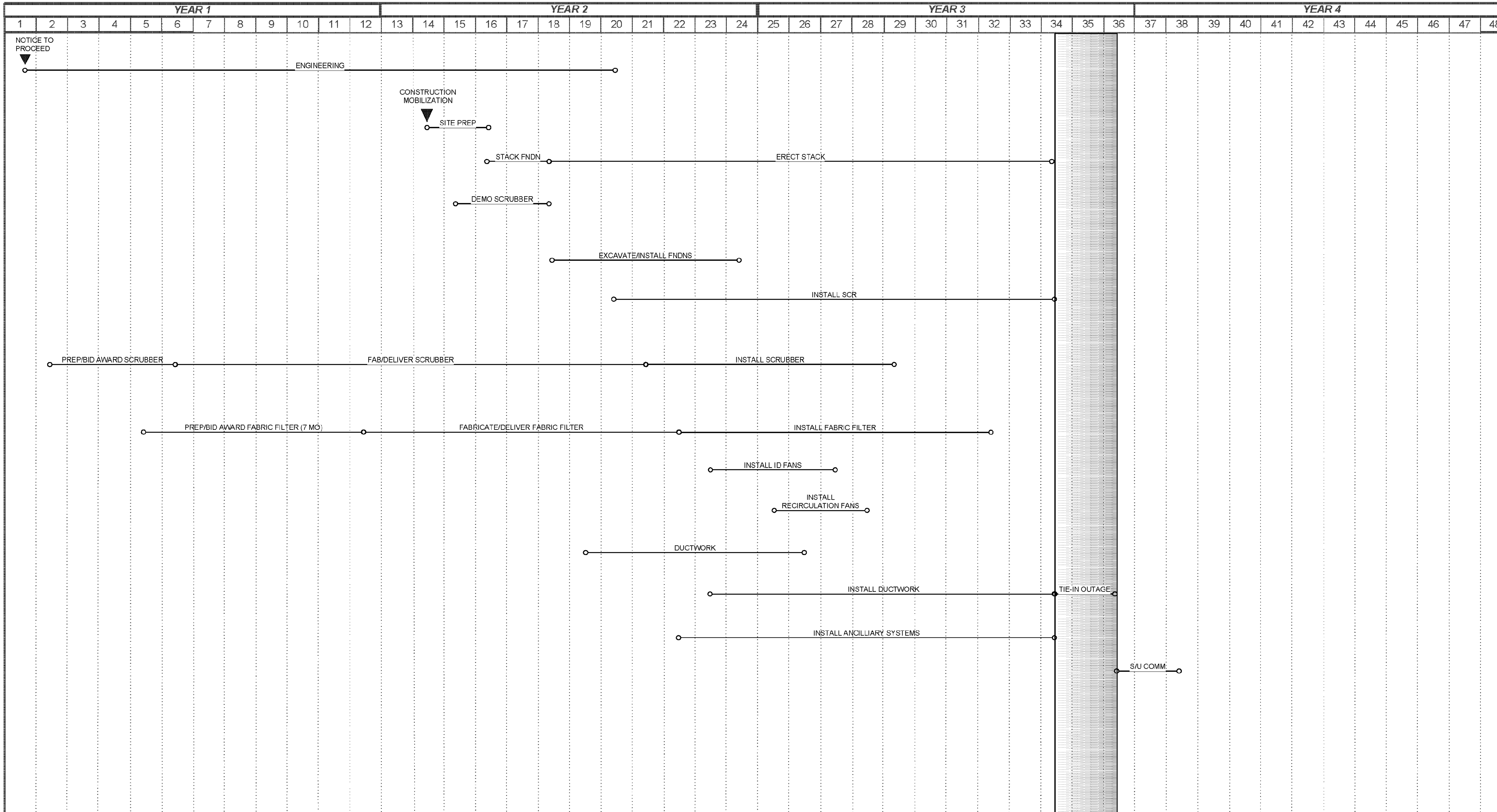
Page 1 of 1



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Engineer	Drawn
	S. CARUTHERS
Checked	Date
T. VANGILDER	JUNE 07, 2010

GREEN RIVER UNIT 4
SCR, SCRUBBER & FABRIC FILTER

LEVEL 1 SCHEDULE

Drawing Number - REV 0

Code Area

Page 1 of 1

From: Lively, Noel
To: Straight, Scott
Sent: 7/28/2010 2:00:20 PM
Subject: PE's Bi-Weekly Update of 7-30-10.docx
Attachments: PE's Bi-Weekly Update of 7-2-10.docx

Energy Services - Bi-Weekly Update
July 28, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the final draft of the Brown FGD audit with zero significant findings.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning nearing completion, the system is running.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction almost complete.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – Bechtel has installed new secondary air barrels. The first deliveries of new primary air and core air assemblies have begun to arrive. We continue to work with Bechtel and our fuels group to source an alternate fuel until the permanent solution is installed. **Bechtel anticipates restarting the unit mid-August with a new substantial completion date of Oct 12.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:
    - Bechtel FM Claims – Parked at the present time by both parties.
  - Issues/Risk:
    - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
    - Schedule/Execution – NTR
    - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
    - Engineering – proceeding as planned to support the spring 2012 in-service.
    - Budget - NTR
    - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
    - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
    - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
    - Permitting – NTR
    - Engineering/General:
        - Reviewing Voith updated scope for rehabilitation minus automation.
        - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
        - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
    - Budget:
        - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
    - Contracting:
        - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
    - Issues/Risk
        - Release of third unit runner to Voith is required in August to maintain schedule.
        - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
    - Safety - NTR
    - Auditing - NTR
    - Permitting - NTR
    - Engineering/General
        - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.
        - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.
        - Working with URS to procure long lead time equipment such as the verti-mill.
    - Budget
        - AIP development in progress.
        - Revised cash flow reflected in 2011 MTP

- Contracting - NTR
- Issue/Risk - NTR

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
  - Engineering
    - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Dewatering of the Gypsum Storage Pond was recently completed to allow investigation of existing clay liner thickness and permeability.
  - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
  - Engineering:
    - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
    - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk
    - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.
    - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution - NTR
  - Budgeting - NTR

- Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
- Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
- Contract Disputes/Resolution – NTR
- Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
  - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Work on Phase I is being suspended until a decision is made on whether to convert the main pond to a landfill. .
    - Aux Pond Phase II work awarded to Charah.
  - Budget – NTR
  - Contract Disputes/Resolution - NTR
  - Issues/Risk – A decision is required in July on whether to continue with the Main Pond or convert to a dry landfill. Economics indicate conversion now to be least cost compared to continuing with pond and then converting once regulations are final.

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
    - Safety – NTR
    - Schedule/Execution:
        - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
        - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
        - MC 4 tests by E.ON Engineering published.
        - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
    - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

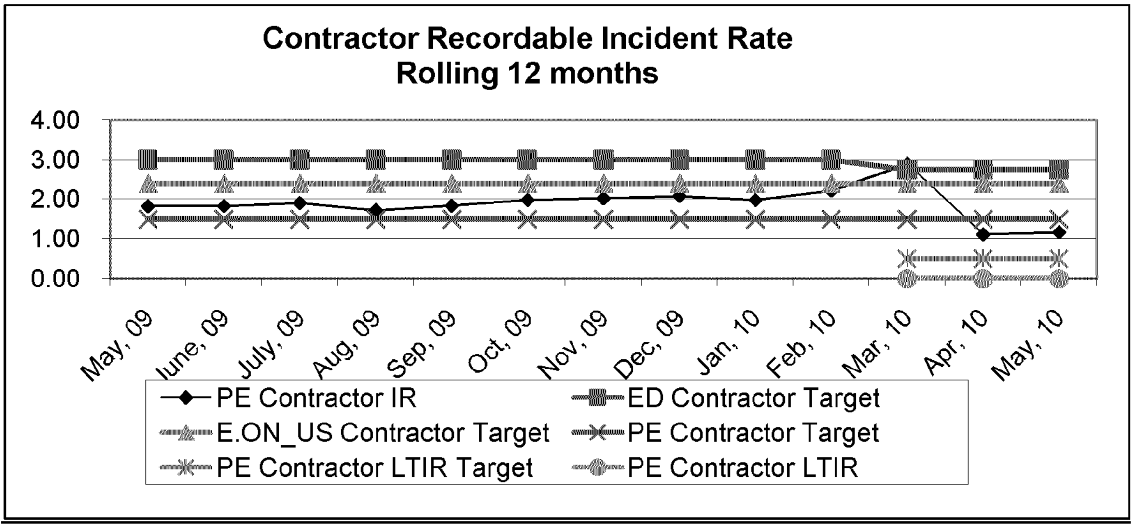
- **SO3 Mitigation (Ghent)**
    - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
    - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
    - Preparing a test plan and schedule for MgO injection at GH4.
    - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
    - B&V draft of SAM testing difficulties white paper received.
    - B&V draft of SAM calculations at Ghent Units received.
    - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
    - LFG
        - Second Landfill Gas Sample Result received.
        - LFG Technologies is planning visits to the landfills in July.
    - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
    - Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
    - FutureGen – NTR

- **General**
    - Impoundment Integrity Program – PE is transitioning this to Generation Services.
    - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost.

- o Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From:	Gregory, Ronald
To:	Saunders, Eileen
Sent:	7/28/2010 4:00:32 PM
Subject:	PE's Bi-Weekly Update of 7-28-10 (rdg).docx
Attachments:	PE's Bi-Weekly Update of 7-28-10 (rdg).docx

Energy Services - Bi-Weekly Update
July30, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – NTR.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Caps to be placed by helicopter on the two chimneys on July 25, 2010 weather permitting.
      - Elevators- Award Recommendation is circulating for signatures.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Product to be sent to the facility next week for final commissioning activity. This was delayed a week due to high ash content in gypsum stream.
        - Facility operation award recommendation signed and contract to go out for signatures 7/28.
      - E.W. Brown Coal Pile Modification
        - Bid received for engineering from MACTEC and PO under development.
      - Balance of Project Items
        - Paving scope out for bid
        - Elevator scope out for bid
  - Budget - The Brown FGD Program Current Budget with Fluor this period is at $489.2m. There is $2.7m included in the forecast for un-approved change orders and $4.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown was reduced by $1.3m, for a Total Brown FGD Program ITC of $408.8m.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the

burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.

- Budget – NTR
- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing - NTR
  - Permitting - NTR
  - Engineering/General
    - Pre-bid meeting was held at Mill Creek on July 8, 2010 and bids are due on July 23, 2010.
    - Working with URS to procure long lead time equipment such as the verti-mill.
  - Budget
    - AIP development in progress.
    - Revised cash flow reflected in 2011 MTP
  - Contracting - NTR
  - Issue/Risk - NTR

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
  - Engineering
    - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Dewatering of the Gypsum Storage Pond was recently completed to allow investigation of existing clay liner thickness and permeability.
  - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
  - Engineering:
    - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
    - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
  - Permitting – NTR

  - Contract Disputes/Resolution – NTR
  - Issues/Risk
    - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.
    - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution - NTR
  - Budgeting - NTR
  - Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
  - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**

- **E.W. Brown Starter Dike**
  - Safety – (0) Recordable
  - Schedule/Execution:
    - Contract work remains under suspension except for rock embankment placement, dust control, and general site maintenance.
    - 95% of exposed ash has been covered with either straw mats or filter fabric as dust control.
    - Rock placement continued on the West and South Embankments.
  - Budget – NTR
  - Contract Disputes/Resolution: NTR
  - Issues/Risk – Summit was given notice to suspend all work except rock placement and some minor activities beginning July 6th until further notice.

- **E.W. Brown Aux Pond 900'**
  - Schedule/Execution:
    - Installation of erosion and sediment control measures.
    - Topsoil stockpiles were relocated.
    - Began rock embankment blasting at the Houp Property.
  - Budget – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
    - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
    - MC 4 tests by E.ON Engineering published.
    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
  - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

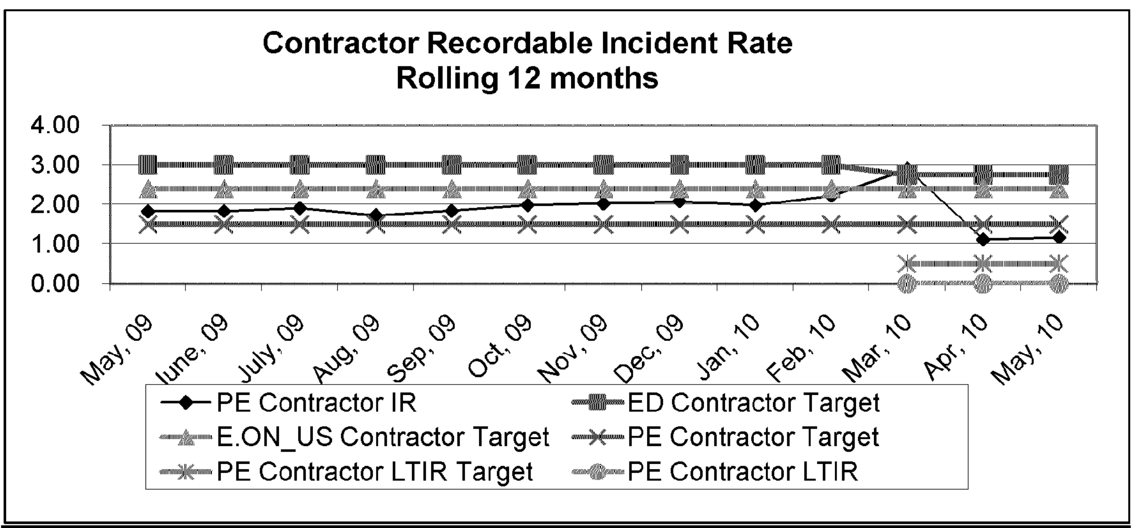
- **SO3 Mitigation (Ghent)**
  - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
  - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
  - Preparing a test plan and schedule for MgO injection at GH4.
  - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
  - B&V draft of SAM testing difficulties white paper received.

- B&V draft of SAM calculations at Ghent Units received.
- Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies is planning visits to the landfills in July.
  - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
  - Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
  - FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost. Plans are underway to extend the B&V contract to begin discussing various scenarios for compliance with upcoming environmental air regulations.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

<u>Metrics</u>



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From:	Saunders, Eileen
To:	Straight, Scott
CC:	Gregory, Ronald
Sent:	7/29/2010 9:24:52 AM
Subject:	PE's Bi-Weekly Update of 7-28-10 (rdg-els).docx
Attachments:	PE's Bi-Weekly Update of 7-28-10 (rdg-els).docx

Scott,

Ron and I sent a report on July 19, 2010 but did not see a final report. Therefore, we updated the report we originally sent to you.

Thanks,

Eileen

Energy Services - Bi-Weekly Update
July30, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – NTR.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site. An outage kickoff meeting is planned for August 4, 2010.
      - Chimney Capping – Caps placed by helicopter on the two chimneys on July 25, 2010. Contractor is beginning to demobilize.
      - Elevators- Award Recommendation is circulating for signatures.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Product to be sent to the facility next week for final commissioning activity. This was delayed a week due to high ash content in gypsum stream.
        - Facility operation award recommendation signed and contract to go out for signatures 7/28.
      - E.W. Brown Coal Pile Modification
        - Bid received for engineering from MACTEC and PO under development.
      - Balance of Project Items
        - Paving scope out for bid
        - Elevator scope out for bid
  - Budget - The Brown FGD Program Current Budget with Fluor this period is at \$489.2m. There is \$2.7m included in the forecast for un-approved change orders and \$4.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown was reduced by \$1.3m, for a Total Brown FGD Program ITC of \$408.8m.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index,

meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.

- Budget – NTR
- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
    - Safety - NTR
    - Auditing - NTR
    - Permitting - NTR
    - Engineering/General
        - Pre-bid meeting for the building extension work was held at Mill Creek on July 8, 2010 and bids were received July 23, 2010.
        - Working with URS to procure long lead time equipment such as the verti-mill.
    - Budget
        - AIP complete.
        - Revised cash flow reflected in 2011 MTP
    - Contracting - NTR

Issue/Risk – Potential delay in awarding the equipment and engineering for the verti-mills as the impacts of the new air regulations are being assessed.

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Engineering
        - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Dewatering of the Gypsum Storage Pond was recently completed to allow investigation of existing clay liner thickness and permeability.
    - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
    - Engineering:
        - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
        - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.

- Permitting – NTR
- Contract Disputes/Resolution – NTR
- Issues/Risk
  - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.
  - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution - NTR
  - Budgeting - NTR
  - Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
  - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
  - **E.W. Brown Starter Dike**
    - Safety – (0) Recordable
    - Schedule/Execution:
      - Contract work remains under suspension except for rock embankment placement, dust control, and general site maintenance.
      - 95% of exposed ash has been covered with either straw mats or filter fabric as dust control.
      - Rock placement continued on the West and South Embankments.
    - Budget – NTR
    - Contract Disputes/Resolution: NTR
    - Issues/Risk – Summit was given notice to suspend all work except rock placement and some minor activities beginning July 6th until further notice.
  - **E.W. Brown Aux Pond 900'**
    - Schedule/Execution:
      - Installation of erosion and sediment control measures.
      - Topsoil stockpiles were relocated.
      - Began rock embankment blasting at the Houp Property.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
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    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
  - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

- **SO3 Mitigation (Ghent)**
  - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
  - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
  - Preparing a test plan and schedule for MgO injection at GH4.
  - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.

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- B&V draft of SAM calculations at Ghent Units received.
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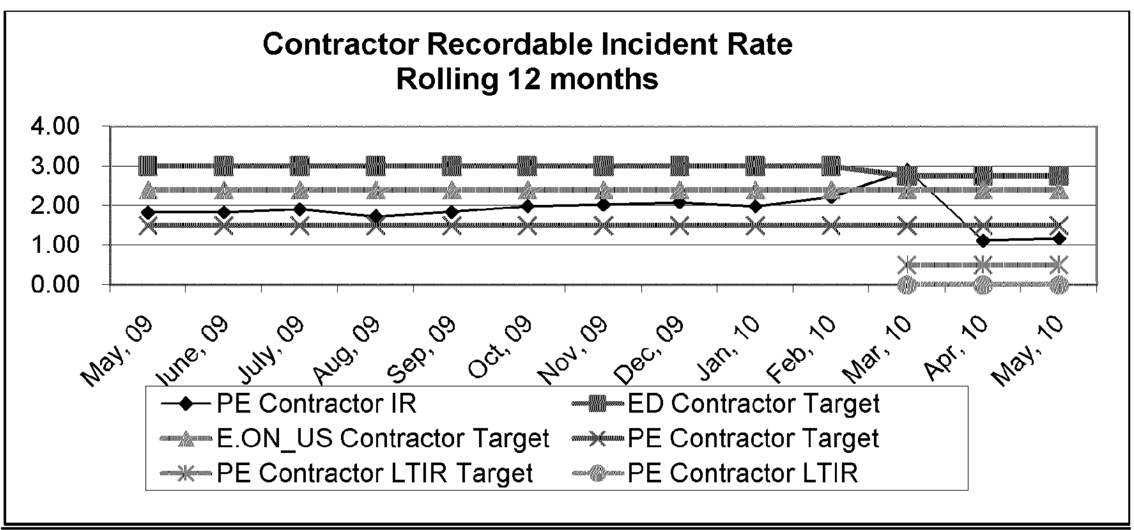
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies is planning visits to the landfills in July.
  - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
  - Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
  - FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost. Plans are underway to extend the B&V contract to begin discussing various scenarios for compliance with upcoming environmental air regulations.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From: Straight, Scott
To: Garrett, Chris; Hudson, Rusty
CC: Kuhl, Megan
Sent: 7/29/2010 10:26:59 AM
Subject: RE: Next level of Environmental engineering

Chris,
Yes, we would expect to incorporate the study(s) results into a revised MTP in September.

From: Garrett, Chris
Sent: Thursday, July 29, 2010 10:18 AM
To: Hudson, Rusty
Cc: Kuhl, Megan; Straight, Scott
Subject: RE: Next level of Environmental engineering

Yes, we can send this via email vote. Would we expect to incorporate the results into the MTP given the timing of the studies?

Thank you,

Chris

From: Hudson, Rusty
Sent: Thursday, July 29, 2010 10:07 AM
To: Garrett, Chris
Cc: Kuhl, Megan; Straight, Scott
Subject: Next level of Environmental engineering

Chris, in order to do the next level of engineering for the expected environmental air regs, PE is looking to contract with Black and Veatch for about $2m. This level of engineering will further define the best options available for compliance, including looking at options other than a complete re-build of the Mill Creek FGD's. In order to get the study completed for Mill Creek in August and Ghent in September, Scott would need to release the work as soon as possible. This work will lead to providing us with refined numbers to the current $4.1B estimated on the air side. I wanted to see if this is something we could consider for an electronic vote as early as next week. I have confirmed with Property Accounting that given the high probability that capital work will ultimately be required, they are okay with charging this work and future engineering work to capital. Rusty

From:	Imber, Philip
To:	Straight, Scott
Sent:	7/29/2010 11:41:49 AM
Subject:	PE's Bi-Weekly Update of 7-29-10 pai comment.docx
Attachments:	PE's Bi-Weekly Update of 7-29-10 pai comment.docx

Energy Services - Bi-Weekly Update
July29, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the final draft of the Brown FGD audit with zero significant findings.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning nearing completion, the system is running.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction almost complete.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:
    - Bechtel FM Claims – Parked at the present time by both parties.

- Issues/Risk:
  - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – CERAM Warranty issues are still outstanding; meeting scheduled for Aug. 5 for further discussion.

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
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    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing - NTR
  - Permitting - NTR
  - Engineering/General
    - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.

        - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.
        - Working with URS to procure long lead time equipment such as the verti-mill.
    - Budget
        - AIP development in progress.
        - Revised cash flow reflected in 2011 MTP
    - Contracting - NTR
    - Issue/Risk - NTR

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Engineering
        - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Dewatering of the Gypsum Storage Pond was recently completed to allow investigation of existing clay liner thickness and permeability.
    - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
    - Engineering:
        - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
        - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk
        - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.

        - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution - NTR
    - Budgeting - NTR
    - Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
    - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
    - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk:
        - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
    - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
    - Safety – NTR
    - Schedule/Execution:
        - Work on Phase I is being suspended until a decision is made on whether to convert the main pond to a landfill. .

    - Aux Pond Phase II work awarded to Charah.
  - Budget – NTR
  - Contract Disputes/Resolution - NTR
  - Issues/Risk – A decision is required in July on whether to continue with the Main Pond or convert to a dry landfill. Economics indicate conversion now to be least cost compared to continuing with pond and then converting once regulations are final.

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - Proposals from FP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI received July 20.
    - Bid review meetings held with all suppliers July 26 & 28.
    - Initial team evaluation sheets due COB Friday July 30. Summary discussion meeting to be set the week of Aug. 2.
    - Bid Summary – dry system pricing ranges from $2.2 to $6.3M per system with numerous clarifications and further engineering to be performed and evaluated. Meaningful pricing not submitted for the wet system.
      - URS – only offered core technology equipment, no BOP, no construction. 2 ppmv guarantee at the stack with LD to 10% of equipment cost
      - Nol-Tec – turn-key offer, similar to our existing systems with substantial upgrades. 2 ppmv guarantee with LD to contract price
      - BCSI – turnkey in concept, construction partners not finalized (systems pre-packaged to minimize on site fabrication). Highly redundant process, similar to our existing systems with upgrades. 1.9 ppmv guarantee with LD to contract price
      - UCC – turnkey, system designed to minimize cost at every point, 1 ppmv guarantee offered with LD to contract price. Based on our experience their proposal is not a technically sound offer.
      - FLS – turnkey, we are not familiar with the construction partners, 5 ppmv guarantee with LD to 20% contract price
      - Clyde Bergemann – turnkey system, similar to our existing systems but equipment is sized small, 3-5 ppmv guarantee (not firm in the discussion) and not firm on extent of LD.
    - All vendors owe further information/clarification by COB Tuesday August 4.
    - Path forward to October investment committee is convoluted due to URS submittal. Planning to pick 1 or 2 dry vendor systems to continue commercial and technical conformance. Likely hire URS to perform an engineering study to price Ghent 2 (with common systems sized for all Ghent units).
  - .
  - Budget – Spending $3M in 2010 is dependent on the procurement process and discussions surrounding delaying MC work.
  - Testing – Contracts need to be placed and test plans need to be prepared on the following:
    - Notify Air Quality Services that they will be doing testing from 8/16-8/27 at Brown.
    - Notify Clean Air Engineering that they will be doing testing from 8/16-8/27 at Ghent.
    - Notify EON Engineering that they will be doing testing from 8/22-9/3 at Ghent.

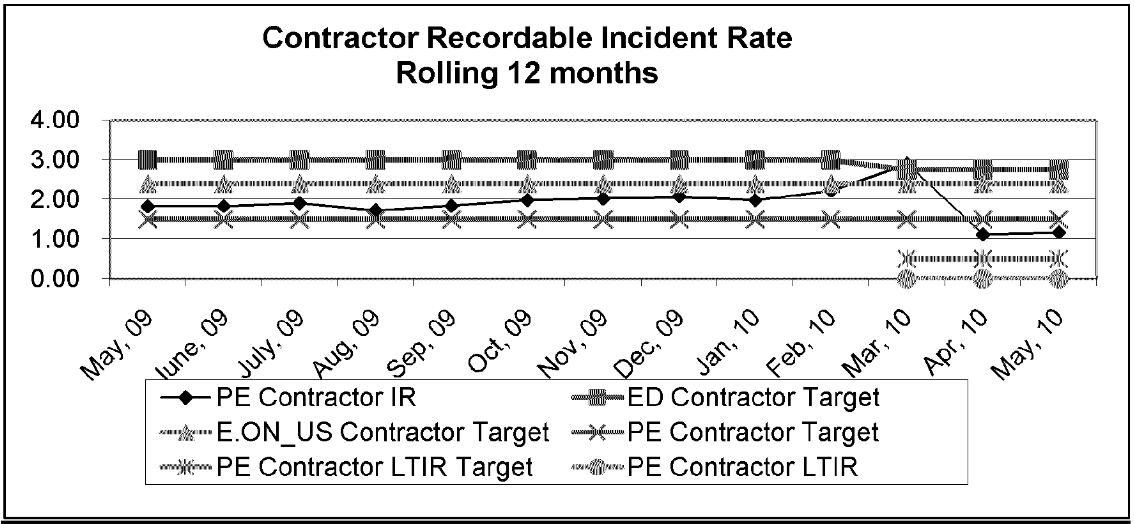
-

- **SO3 Mitigation (Ghent)**
    - Preparing for MgO injection at GH4.
    - Stoic Calculations for Ghent testing prepared.
    - B&V reworking SAM calculations for the Ghent Units based on Title V Heat Inputs..
    - B&V draft BACT analysis submitted and commented by E.ON.
    - B&V requested to prepare two more documents:
        - BACT based on 2005 RBLC database for emissions limits
        - Technology choice based on a 5 ppmv requirement

- **NBU1 and Other Generation Development**
    - LFG
        - Landfill Gas Sample Result completed – final sample report outstanding.
        - LFG Technologies completed landfill visits.
        - Draft report expected week of August 2.
    - NBU CR – Complete draft of documents submitted July 20. E.ON comments submitted July 28. Final draft expected week of August 2.
    - Biomass –
        - Complete draft report from B&V due the week of August 2.
        - Moore Ventures completed a fuel analysis assessment.
    -
    - CCS 100 MW Project – Prepared a SOW and RFP for study work regarding a DOE/State/E.ON project. Submitted comment to presentation to DOE. Project will not get funding for a 2016 100 MW project – as such internal work ceased prior to releasing RFP to Bechtel, Fluor, Battelle, and EPRI.
    - FutureGen – NTR

- **General**
    - Impoundment Integrity Program – PE is transitioning this to Generation Services.
    - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost.
    - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4^{th}.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber to interview for TC Commercial Manger on August 2.

From:	Heun, Jeff
To:	Straight, Scott
CC:	Waterman, Bob; Reed, Kathleen
Sent:	7/30/2010 7:26:51 AM
Subject:	Bi-Weekly Report
Attachments:	PE's Bi-Weekly Update of 7-2-10 RCWa & JBH Comments_28Jul10.docx

Scott,

Attached is the combined update from Bob and I.

Thanks,

Jeffrey B. Heun, P.E.
E.ON U.S.
Project Engineering
Sr Civil Engineer
(502) 627-4525 (Louisville Office)
(859) 367-1254 (Brown Office)
(502) 592-2421 (Mobile)
(502) 217-2678 (FAX)
jeff.heun@eon-us.com

Energy Services - Bi-Weekly Update
July2, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the final draft of the Brown FGD audit with zero significant findings.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning nearing completion, the system is running.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction almost complete.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:
    - Bechtel FM Claims – Parked at the present time by both parties.

- Issues/Risk:
  - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing - NTR
  - Permitting - NTR
  - Engineering/General
    - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.
    - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.

        - Working with URS to procure long lead time equipment such as the verti-mill.
    - Budget
        - AIP development in progress.
        - Revised cash flow reflected in 2011 MTP
    - Contracting - NTR
    - Issue/Risk - NTR

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Engineering
        - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
        - Meeting with the Plant and the engineer to discuss a reduced scope landfill that would facilitate the construction of a CCGT.
        - Transmission working towards relocation of the 69kV line.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.
    - Working with UCC to update their equipment and material pricing.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Gypsum Storage Pond is being prepared for the installation of the Flexible Membrane Liner (FML) and a Geosynthetic Clay Liner (GCL) scheduled to begin within the next 2 to 4 weeks.
        - Work continues on the fill placement and mechanically stabilized earth (MSE) wall for the north, south, and west dikes.
        - Work has begun on both Emergency Spillways.
        - Working continues on the fiberglass piping for the project
    - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
    - Engineering:
        - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
        - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.

- Permitting – NTR
- Contract Disputes/Resolution – NTR
- Issues/Risk
  - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from 2009 and the wet winter and spring in 2010.
  - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution - NTR
  - Budgeting - NTR
  - Engineering – The Detailed Engineering RFPs were received on Friday, 09Jul10. Three proposals were received. Proposal review is in progress.
  - Permitting – A meeting was held with USFWS on 27Jul10 concerning the resolution of the Indiana Bat issue. Anabat (acoustical) Testing on the Phase II (July) for the Indiana Bat is being concluded during the week of 26Jul10. Only two "hits" were recorded. Work continues on the development of the 401/404 Permits for Fall 2010 submittal.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines continues with Black & Veatch. Bids have been received and currently under review for the CCP transport Detailed Design. Procurement activities for the gypsum fines project are in progress. Detailed Engineering for the Landfill is focusing on completion of construction drawings.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
  - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential

additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Work on Phase I is being suspended until a decision is made on whether to convert the main pond to a landfill.
    - Working on evaluation and recommendation paper for the main pond conversion from a pond to a landfill .
    - Aux Pond Phase II work awarded to Charah.
  - Budget – NTR
  - Contract Disputes/Resolution - NTR
  - Issues/Risk – A decision is required in July on whether to continue with the Main Pond or convert to a dry landfill. Economics indicate conversion now to be least cost compared to continuing with pond and then converting once regulations are final.

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
    - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
    - MC 4 tests by E.ON Engineering published.
    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
  - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

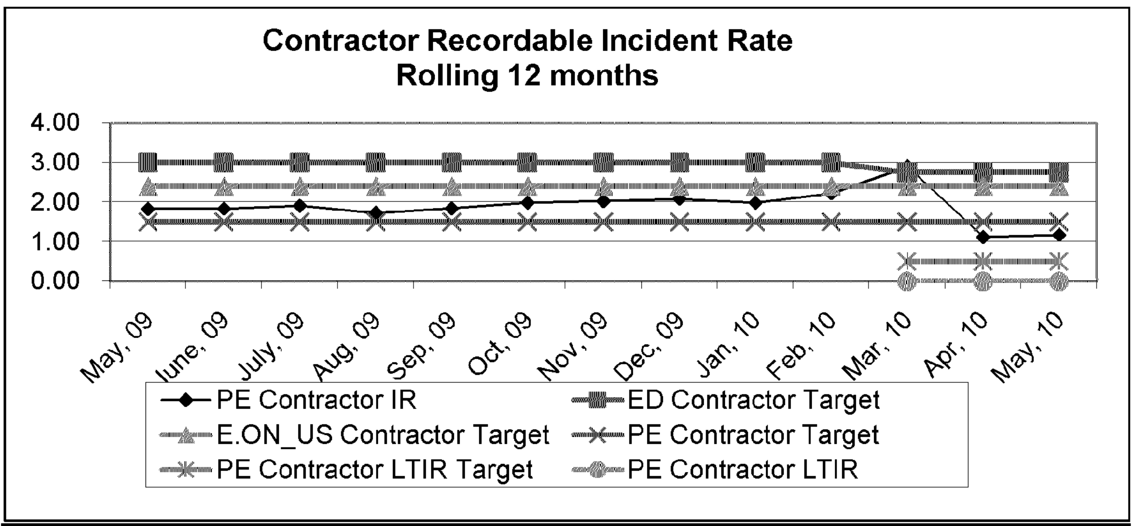
- **SO3 Mitigation (Ghent)**
  - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
  - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
  - Preparing a test plan and schedule for MgO injection at GH4.
  - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
  - B&V draft of SAM testing difficulties white paper received.
  - B&V draft of SAM calculations at Ghent Units received.
  - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**

- LFG
  - Second Landfill Gas Sample Result received.
  - LFG Technologies is planning visits to the landfills in July.
- NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
- Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
- FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From: Saunders, Eileen
To: Straight, Scott; Clements, Joe
Sent: 7/30/2010 11:18:04 AM
Subject: B&V IC Paper and SSA
Attachments: B& B Sole Source Authorization (7-30-10).doc; Investment Proposal for Investment Committee (7-30-10).docx

Scott and Joe,

Please see the enclosed documents and modify as needed. Also, please check the signature page to see if the appropriate people are included.

Thanks,

Eileen

SOLE SOURCE AUTHORIZATION

DATE____________________

Purchase Order /Contract No.___________

Requisition No.______________________

Estimated cost:__$2 M (Includes 20% Contingency)

Vendor/Contractor______Black and Veatch______________

This is to certify that two or more competitive quotations were not solicited or received for the above-referenced Contract or Purchase Order for the following reason:

___Single source item or service as designated by Proponent.

___Single source caused by lack of two or more acceptable sources of supply.

___Emergency requirement, time not permitting two or more quotations.

___Proprietary item.

__X_ Sole source item.

___Other (explain)

Justifications:

See Attached Investment Committee Paper

Requester______Eileen Lamar Saunders______________________

Authority levels are up to $50,000 Manager, up to $150,000 Director, up to $500,000 Vice President, up to $1 million Senior Officer, and over, $1 million Chief Executive Officer.

Manager__________________________________ Gen. Mgr./Director_______________

Vice President______________________________Sr. Officer__________________________

Chief Executive Officer____________________________________

Form SD 811
Rev. 5/16/01

Investment Proposal for Investment Committee

Project Name:	**Environmental Compliance – Air (Phase II)**
Total Expenditures:	**$2 M**
Project Number:	**118164 (KU) / 118169 (LG&E)**
Business Unit/Line of Business:	**Project Engineering/ Energy Service**
Prepared/Presented By:	**Eileen Saunders/Scott Straight**

Executive 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 to six weeks to provide Project Engineering with a high level estimate based on site visits, data collection from the plants and industry experience. As a result of the Phase I effort, approximately $4 billion (escalated) of additions and retrofits were identified as possible scenarios for bringing the fleet into compliance.

The purpose of this scope of work with Black and Veatch (B&V) is to build upon the previous fleet-wide, high-level air quality technology review and cost assessment in order to develop a facility-specific project definition consisting of a conceptual design and budgetary cost estimate for selected air quality control technologies. The Phase II scope of work is proposed for the Mill Creek, Ghent and Brown facilities. The work for each facility will be staggered with the Mill Creek effort commencing first.

Project Timeline

The proposal from B&V is based on an August, 2011 notice to proceed and a completion date for the final units (Brown) of April, 2011.

Recommendation

Considering the speed of which the initial study was conducted, it is important to refine the recommendations by engaging in focused engineering study that will produce a more realistic view of what technology should be constructed and associated costs. Initiating the Mill Creek study is especially critical as the recommendations for those units represent half of the overall cost impact identified in Phase I.

It is recommended that $2 M of capital funding be approved for the sole source hiring of Black and Veatch to assist Project Engineering and Station Management in developing an air control budgetary cost estimate. Black and Veatch conducted the initial study and will keep their original team in place to gain efficiencies for the Phase II work.

Eileen Saunders

Manager, Major Capital Projects

Scott Straight

Director, Project Engineering

Rusty Hudson

Director, Energy Services Accounting/Budget

John Voyles

VP-Transmission/Gen. Services

Ralph Bowling

VP- Generation

Paul Thompson

SVP-Energy Services

From:	Clements, Joe
To:	Saunders, Eileen; Straight, Scott
Sent:	7/30/2010 12:32:59 PM
Subject:	Investment Proposal for Investment Committee (7-30-10).docx
Attachments:	Investment Proposal for Investment Committee (7-30-10).docx

See my edits for consideration

Investment Proposal and Sole Source Contracting Proposal for Investment Committee

Project Name:	**Environmental Compliance – Air (Phase II)**
Total Expenditures:	**$2 M**
Project Number:	**118164 (KU) / 118169 (LG&E)**
Business Unit/Line of Business:	**Project Engineering/ Energy Service**
Prepared/Presented By:	**Eileen Saunders/Scott Straight**

Executive Summary

In May of 2010, Project Engineering was asked to investigate the technological and financial impacts of new Environmental Air regulations on the EON U.S. fleet of coal fired units. Black and Veatch was hired via a sole source contract valued at $XXX and given four to six weeks to provide a high level estimate based on site visits, data collection from the plants and industry experience. As a result of this Phase I effort, approximately $4 billion (escalated) of Air Emissions Mitigation System additions and retrofits were identified as possible scenarios for bringing the fleet into compliance with the projected standards.

Approval of this investment/contract proposal will allow funding of a Phase II engineering and estimating effort that will provide a facility-specific project definition consisting of conceptual designs and budgetary cost estimates for selected air quality control technologies. The Phase II scope is proposed for the Mill Creek, Ghent and EW Brown facilities. The work for each facility will be staggered with the Mill Creek effort commencing first. For work product continuity purposes, it is proposed herein to award the Phase II work to Black & Veatch on a time and material not to exceed sole source contract, with a value of $XX. Black and Veatch will keep their original team in place to gain efficiencies for the Phase II work.

The remainder of the investment funding will cover costs of internal labor and expenses and the use of other external engineering /construction firms that may be hired to apply their expert opinions of the constructability of the options put forth by Black and Veatch. **Phase II Project Timeline**

If approved Phase II work will commence e in August, 2010 and be complete by April, 2011.

Recommendation

Considering the speed of which the Phase I study was conducted, it is important to refine the recommendations by engaging in a focused engineering study that will produce a more realistic view of what technology should be constructed and associated costs. Initiating the Mill Creek study is especially critical as the recommendations for those units represent half of the overall cost impact identified in Phase I.

It is recommended that $2 M of capital funding be approved for (I) the sole source hiring of Black and Veatch ;and (ii) internal labor and expenses of Project Engineering, Station Management and other participating departments ; and (iii) the potential use of other external engineering firms in developing an air control budgetary cost estimate. The Phase II funding will be allocated from the XXX project and will be accounted for in the 2011 MTP.

______________________	______________________
Eileen Saunders	Scott Straight
Manager, Major Capital Projects	Director, Project Engineering
______________________	______________________
Rusty Hudson	John Voyles
Director, Energy Services Accounting/Budget	VP-Transmission/Gen. Services
______________________	______________________
Ralph Bowling	Paul Thompson
VP- Generation	SVP-Energy Services

From:	Saunders, Eileen
To:	Straight, Scott
CC:	Clements, Joe
Sent:	7/30/2010 12:59:07 PM
Subject:	Investment Proposal for Investment Committee (7-30-10) (3).docx
Attachments:	Investment Proposal for Investment Committee (7-30-10) (3).docx

Scott,

This version includes combined changes from Joe and I. Please see the highlighted area to add your input on where the funding for the project will come from for this work.

Thank you,

Eileen

Investment Proposal and Sole Source Contracting Proposal for Investment Committee

Project Name:	**Environmental Compliance – Air (Phase II)**
Total Expenditures:	**$2 M**
Project Number:	**118164 (KU) / 118169 (LG&E)**
Business Unit/Line of Business:	**Project Engineering/ Energy Service**
Prepared/Presented By:	**Eileen Saunders/Scott Straight**

Executive Summary

In May of 2010, Project Engineering was asked to investigate the technological and financial impacts of new Environmental Air regulations on the EON U.S. fleet of coal fired units. Black and Veatch was hired through a competitive bid process at a contract valued at $149K and given four to six weeks to provide a high level estimate based on site visits, data collection from the plants and industry experience. As a result of this Phase I effort, approximately $4 billion (escalated) of Air Emissions Mitigation System additions and retrofits were identified as possible scenarios for bringing the fleet into compliance with the projected standards.

Approval of this investment/contract proposal will allow funding of a Phase II engineering and estimating effort that will provide a facility-specific project definition consisting of conceptual designs and budgetary cost estimates for selected air quality control technologies. The Phase II scope is proposed for the Mill Creek, Ghent and EW Brown facilities. The work for each facility will be staggered with the Mill Creek effort commencing first. For work product continuity purposes, it is proposed herein to award the Phase II work to Black & Veatch on a time and material not to exceed sole source contract, with a value of $1.6M (plus 20 % contingency). Black and Veatch will keep their original team in place to gain efficiencies for the Phase II work.

The remainder of the investment funding will cover costs of internal labor and expenses and the use of other external engineering /construction firms that may be hired to apply their expert opinions of the constructability of the options put forth by Black and Veatch. **Phase II Project Timeline**

If approved Phase II work will commence e in August, 2010 and be complete by April, 2011.

Recommendation

Considering the speed of which the Phase I study was conducted, it is important to refine the recommendations by engaging in a focused engineering study that will produce a more realistic view of what technology should be constructed and associated costs. Initiating the Mill Creek study is especially critical as the recommendations for those units represent half of the overall cost impact identified in Phase I.

It is recommended that $2 M of capital funding be approved for (I) the sole source hiring of Black and Veatch ;and (ii) internal labor and expenses of Project Engineering, Station Management and other participating departments ; and (iii) the potential use of other external engineering firms in developing an air control budgetary cost estimate. The Phase II funding will be allocated from the XXX project and will be accounted for in the 2011 MTP.

Eileen Saunders

Manager, Major Capital Projects

Scott Straight

Director, Project Engineering

Rusty Hudson

Director, Energy Services Accounting/Budget

John Voyles

VP-Transmission/Gen. Services

Ralph Bowling

VP- Generation

Paul Thompson

SVP-Energy Services

From:	Straight, Scott
To:	Thompson, Paul; Voyles, John; Bowling, Ralph; Sturgeon, Allyson; Hudson, Rusty; Hincker, Loren; Sinclair, David; Schetzel, Doug; Yussman, Eric; Jackson, Fred
CC:	Waterman, Bob; Imber, Philip; Lively, Noel; Saunders, Eileen; Gregory, Ronald; Heun, Jeff; Hance, Chuck; Clements, Joe; Cooper, David (Legal); Jones, Greg; Keeling, Chip; Hendricks, Claudia; Ray, Barry; O'brien, Dorothy (Dot); Bellar, Lonnie; Blake, Kent
Sent:	7/30/2010 2:51:31 PM
Subject:	Project Engineering's ES Bi-Weekly Report - July 30, 2010
Attachments:	PE's Bi-Weekly Update of 7-30-10.docx

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Energy Services - Bi-Weekly Update
July30, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – NTR.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – An outage kickoff meeting is planned for 8/4/10.
      - Chimney Capping – Caps placed by helicopter on both chimneys on 7/25/10.
      - Elevators - Award Recommendation is circulating for signatures.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Product to be sent to the facility next week for final commissioning activity. This was delayed a week due to high ash content in gypsum stream.
        - Facility operation award recommendation being routed for signatures.
      - E.W. Brown Coal Pile Modification
        - Bid received for engineering from MACTEC and PO under development.
      - Balance of Project Items
        - Paving scope out for bid
        - Elevator scope out for bid
  - Budget – Slight reduction in the total Brown FGD Program ITC to $408.8m.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – Bechtel has installed new secondary burner air barrels. The first deliveries of new primary air and core air assemblies have begun to arrive. We continue to work with Bechtel and Fuels to source an alternate coal until the permanent burner solution is installed. **Bechtel anticipates restarting the unit mid-August with a new substantial completion date of 10/12/10.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – Minor additions made to MTP to account for staffing through 2011 and for the recently verbal agreement on FM and EE claim settlement.
  - Contract Disputes/Resolution:

        - Bechtel FM Claims – Verbal agreement on all FM and most EE claims reached. Written agreement expected within next two weeks.
    - Issues/Risk:
        - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
    - Schedule/Execution – NTR
    - Permitting – Request to KYDAQ for station-wide SAM annual emission limit sent to KYDAQ on 7/30/10. Permit to construct SCR dependent on agreement with KYDAQ on SAM limit.
    - Engineering – proceeding as planned to support the spring 2012 in-service.
    - Budget - NTR
    - Contracting – IC approved award of Hot Water Recirc to Alstom in the July IC meeting.
    - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
    - Schedule/Execution –NTR
    - Permitting – NTR
    - Engineering/General:
        - Reviewing Voith updated scope for rehabilitation minus automation.
        - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
    - Budget:
        - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope.
        - Revised project sanction planned for August IC meeting
    - Contracting:
        - Negotiations with Voith are progressing well. Voith has agreed to defer the need to issue a PO for the remaining runners pending approval of EPC from IC in August.
    - Issues/Risk
        - Release of third unit runner to Voith is required in August to maintain schedule.
        - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
    - Safety - NTR
    - Auditing - NTR
    - Permitting - NTR
    - Engineering/General
        - Pre-bid meeting for the building extension work was held at Mill Creek on July 8, 2010 and bids were received July 23, 2010.
        - Working with URS to develop RFQ for long lead equipment.
    - Budget
        - AIP complete.
        - Revised cash flow reflected in 2011 MTP

- Contracting – NTR
- Issue/Risk – Potential delay in awarding the equipment and engineering for the verti-mills as the impacts of the new air regulations are being assessed.

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
  - Engineering
    - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
    - Meeting with the Plant and the engineer to discuss a reduced scope landfill that would facilitate the construction of a CCGT.
    - Transmission working towards relocation of the 69kV line.
  - Budget – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.
  - Working with UCC to update their equipment and material pricing.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Gypsum Storage Pond is being prepared for the installation of the Flexible Membrane Liner (FML) and a Geosynthetic Clay Liner (GCL) scheduled to begin within the next 2 to 4 weeks.
    - Work continues on the fill placement and mechanically stabilized earth (MSE) wall for the north, south, and west dikes.
    - Work has begun on both Emergency Spillways.
    - Working continues on the fiberglass piping for the project
  - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
  - Engineering:
    - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
    - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk

        - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from 2009 and the wet winter and spring in 2010.
        - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution - NTR
    - Budgeting - NTR
    - Engineering – The Detailed Engineering RFPs were received on Friday, 09Jul10. Three proposals were received. Proposal review is in progress.
    - Permitting – A meeting was held with USFWS on 27Jul10 concerning the resolution of the Indiana Bat issue. Anabat (acoustical) Testing on the Phase II (July) for the Indiana Bat is being concluded during the week of 26Jul10. Only two "hits" were recorded. Work continues on the development of the 401/404 Permits for Fall 2010 submittal.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
    - Engineering – Detailed Engineering of gypsum fines continues with Black & Veatch. Bids have been received and currently under review for the CCP transport Detailed Design. Procurement activities for the gypsum fines project are in progress. Detailed Engineering for the Landfill is focusing on completion of construction drawings.
    - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk:
        - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
    - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Work on Phase I is being suspended until a decision is made on whether to convert the main pond to a landfill.
    - Working on evaluation and recommendation paper for the main pond conversion from a pond to a landfill .
    - Aux Pond Phase II work awarded to Charah.
  - Budget – NTR
  - Contract Disputes/Resolution - NTR
  - Issues/Risk – A decision is required in July on whether to continue with the Main Pond or convert to a dry landfill. Economics indicate conversion now to be least cost compared to continuing with pond and then converting once regulations are final.

- **E.W. Brown Ash Pond Project**
  - **E.W. Brown Starter Dike**
    - Safety – (0) Recordable
    - Schedule/Execution:
      - Contract work remains under suspension except for rock embankment placement, dust control, and general site maintenance.
      - 95% of exposed ash has been covered with either straw mats or filter fabric as dust control.
      - Rock placement continued on the West and South Embankments.
    - Budget – NTR
    - Contract Disputes/Resolution: NTR
    - Issues/Risk – Summit was given notice to suspend all work except rock placement and some minor activities beginning July 6th until further notice.

  - **E.W. Brown Aux Pond 900'**
    - Schedule/Execution:
      - Installation of erosion and sediment control measures.
      - Topsoil stockpiles were relocated.
      - Began rock embankment blasting at the Houp Property.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - Proposals for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI received July 20.
    - Bid review meetings held with stations and all suppliers July 26 & 28.
    - Initial team evaluation sheets due COB Friday July 30. Summary discussion meeting to be set the week of Aug. 2.

        - Bid Summary – dry system pricing ranges from $2.2 to $6.3M per system with numerous clarifications and further engineering to be performed and evaluated. **Meaningful pricing not submitted for the wet system.**
            - URS – only offered core technology equipment, no BOP, no construction. 2 ppmv guarantee at the stack with LD to 10% of equipment cost
            - Nol-Tec – turn-key offer, similar to our existing systems with substantial upgrades. 2 ppmv guarantee with LD to contract price
            - BCSI – turnkey in concept, construction partners not finalized (systems pre-packaged to minimize on site fabrication). Highly redundant process, similar to our existing systems with upgrades. 1.9 ppmv guarantee with LD to contract price
            - UCC – turnkey, system designed to minimize cost at every point, 1 ppmv guarantee offered with LD to contract price. Based on our experience their proposal is not a technically sound offer.
            - FLS – turnkey, we are not familiar with the construction partners, 5 ppmv guarantee with LD to 20% contract price
            - Clyde Bergemann – turnkey system, similar to our existing systems but equipment is sized small, 3-5 ppmv guarantee (not firm in the discussion) and not firm on extent of LD.
        - All vendors owe further information/clarification by COB Tuesday August 4.
        - Path forward to October investment committee is convoluted due to URS submittal. Planning to pick 1 or 2 dry vendor systems to continue commercial and technical conformance. Likely hire URS to perform an engineering study to price Ghent 2 (with common systems sized for all Ghent units).
    - Budget – Spending $3M in 2010 is dependent on the procurement process and discussions surrounding delaying MC work.
    - Testing – Contracts need to be placed and test plans need to be prepared on the following:
        - Notify Air Quality Services that they will be doing testing from 8/16-8/27 at Brown.
        - Notify Clean Air Engineering that they will be doing testing from 8/16-8/27 at Ghent.
        - Notify EON Engineering that they will be doing testing from 8/22-9/3 at Ghent.

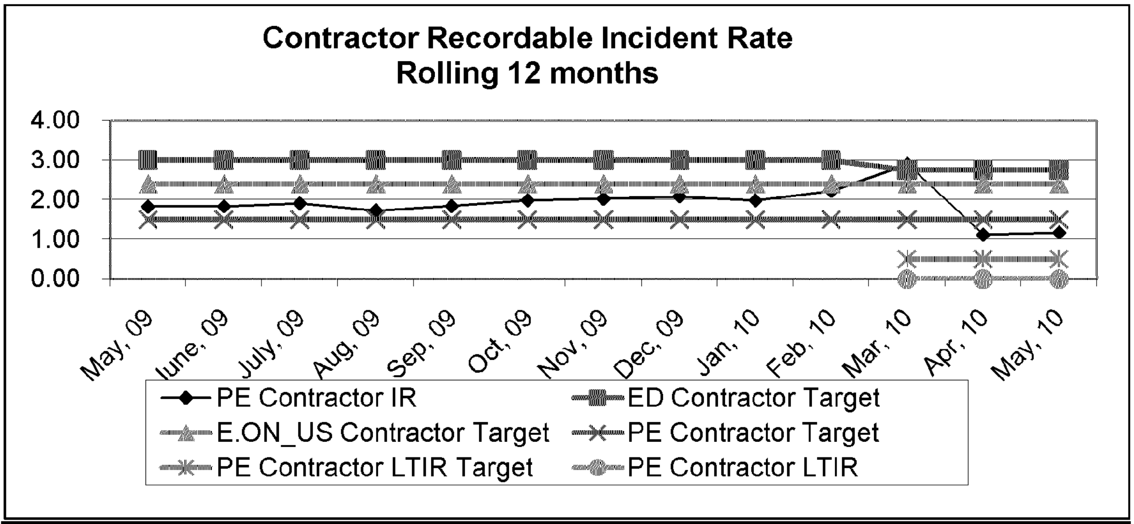
- **SO3 Mitigation (Ghent)**
    - Preparing for MgO injection at GH4.
    - Stoic Calculations for Ghent testing prepared.
    - B&V reworking SAM calculations for the Ghent Units based on Title V Heat Inputs..
    - B&V draft BACT analysis submitted and commented by E.ON.
    - B&V requested to prepare two more documents:
        - BACT based on 2005 RBLC database for emissions limits
        - Technology choice based on a 5 ppmv requirement

- **NBU1 and Other Generation Development**
    - LFG
        - Landfill Gas Sample Result completed – final sample report outstanding.
        - LFG Technologies completed landfill visits.
        - Draft report expected week of August 2.

- NBU CR – Complete draft of documents submitted July 20. E.ON comments submitted July 28. Final draft expected week of August 2.
- Biomass –
  - Complete draft report from B&V due the week of August 2.
  - Moore Ventures completed a fuel analysis assessment.
- CCS 100 MW Project – Prepared a SOW and RFP for study work regarding a DOE/State/E.ON project. Submitted comment to presentation to DOE. Project will not get funding for a 2016 100 MW project – as such internal work ceased prior to releasing RFP to Bechtel, Fluor, Battelle, and EPRI.
- FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost. Plans are underway to extend the B&V contract to begin discussing various scenarios for compliance with upcoming environmental air regulations.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A revised recommendation will be presented to officers within ES the week of 8/6/10.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two postings outside of ES.
3. Jason Finn has submitted for positions.
4. Charlie Jacobs, Lana Linkenhoker, Charlie White and Bill Moerhke out due to surgery/illness.

From:	Wilson, Stuart
To:	Karavayev, Louanne
Sent:	6/29/2010 4:24:30 PM
Subject:	FW: 2011 MTP B&V Study vs. Env Scenario Planning
Attachments:	2011 MTP Environmental Summay - B&V vs Env Scenario Planning.xlsx

Lou Anne,

Almost made it a whole day... I'm going to stop by before 5:00 to talk to you about this. Something to do for tomorrow...

Stuart

From: Straight, Scott
Sent: Tuesday, June 29, 2010 10:34 AM
To: Hudson, Rusty; Schram, Chuck; Wilson, Stuart; Saunders, Eileen
Cc: Voyles, John; Bowling, Ralph
Subject: 2011 MTP B&V Study vs. Env Scenario Planning

Rusty, is this what you were looking for?

To All, please provide comments to this draft comparison table that identifies the unit, technology and cost of the 2011 MTP B&V Study to the Environmental Scenario Planning.

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	A	B	C	D	E	F	G
1							
2							
3			**2011 MTP Black & Veatch Study (x $1,000)**		**Environmental Scenario Planning (x $1,000)**		
4							
5	**Brown**						
6	Brown 1 - SCR		59,000				
7	Brown 1 - SNCR				11,000		
8	Brown 1 - Baghouse		34,000				
9	Brown 1 - PAC Injection		1,599				
10	Brown 1 - Hg Control				3,000		
11	Brown 1 - Neural Networks		500				
12	Brown 1 - SAM Mitigation		4,000				
13	Brown 1 - Escalation		21,238				
14	Brown 1 - CO2				3,000		
15	Total Brown 1		**120,337**		**17,000**		
16							
17	Brown 2 - SCR		92,000				
18	Brown 2 - SCNR				11,000		
19	Brown 2 - Baghouse		34,000				
20	Brown 2 - PAC Injection		2,476				
21	Brown 2 - Hg Control				3,000		
22	Brown 2 - Neural Networks		500				
23	Brown 2 - Lime Injection		2,739				
24	Brown 2 - SAM Mitigation		4,000				
25	Brown 2 - Escalation		48,799				
26	Brown 2 - CO2				5,000		
27	Total Brown 2		**184,514**		**19,000**		
28							
29	Brown 3 - Baghouse		61,000				
30	Brown 3 - PAC Injection		5,426				
31	Brown 3 - Hg Control				4,000		
32	Brown 3 - Neural Networks		1,000				
33	Brown 3 - Escalation		16,952				
34	Brown 3 - CO2				13,000		
35	Total Brown 3		**84,378**		**17,000**		
36							
37	**Total Brown**		**389,229**		**53,000**		
38							
39	**Ghent**						
40	Ghent 1 - Baghouse		131,000				
41	Ghent 1 - PAC Injection		6,380				
42	Ghent 1 - Hg Control				77,000		
43	Ghent 1 - Neural Networks		1,000				

	A	B	C	D	E	F	G
44	Ghent 1 - Escalation		22,965				
45	Ghent 1 - CO2				15,000		
46	Total Ghent 1		**161,345**		**92,000**		
47							
48	Ghent 2 - SCR		227,000		152,000		
49	Ghent 2 - Baghouse		120,000				
50	Ghent 2 - PAC Injection		6,109				
51	Ghent 2 - Hg Control				7,000		
52	Ghent 2 - Lime Injection		5,483				
53	Ghent 2 - Neural Networks		1,000				
54	Ghent 2 - Escalation		57,338				
55	Ghent 2 - CO2				15,000		
56	Total Ghent 2		**416,930**		**174,000**		
57							
58	Ghent 3 - Baghouse		138,000				
59	Ghent 3 - PAC Injection		6,173				
60	Ghent 3 - Hg Control				77,000		
61	Ghent 3 - Neural Networks		1,000				
62	Ghent 3 - Escalation		33,368				
63	Ghent 3 - CO2				15,000		
64	Total Ghent 3		**178,541**		**92,000**		
65							
66	Ghent 4 - Baghouse		117,000				
67	Ghent 4 - PAC Injection		6,210				
68	Ghent 4 - Hg Control				77,000		
69	Ghent 4 - Neural Networks		1,000				
70	Ghent 4 - Escalation		28,313				
71	Ghent 4 - CO2				15,000		
72	Total Ghent 4		**152,523**		**92,000**		
73							
74	**Total Ghent**		**909,338**		**450,000**		
75							
76							
77	**Mill Creek**						
78	Mill Creek 1 - FGD		297,000		20,000		
79	Mill Creek 1 - SCR		97,000		121,000		
80	Mill Creek 1 - Baghouse		81,000				
81	Mill Creek 1 - Electrostatic Precipitator		32,882				
82	Mill Creek 1 - PAC Injection		4,412				
83	Mill Creek 1 - Hg Control				60,000		
84	Mill Creek 1 - SAM Mitigation		8,000				
85	Mill Creek 1 - Lime Injection		4,480				
86	Mill Creek 1 - Neural Networks		1,000				
87	Mill Creek 1 - Escalation		120,469				
88	Mill Creek 1 - CO2				10,000		

	A	B	C	D	E	F	G
89	Total Mill Creek 1		**646,243**		**211,000**		
90							
91	Mill Creek 2 - FGD		297,000		20,000		
92	Mill Creek 2 - SCR		97,000		121,000		
93	Mill Creek 2 - Baghouse		81,000				
94	Mill Creek 2 - Electrostatic Precipitator		32,882				
95	Mill Creek 2 - PAC Injection		4,412				
96	Mill Creek 2 - Hg Control				60,000		
97	Mill Creek 2 - SAM Control		8,000				
98	Mill Creek 2 - Lime Injection		4,480				
99	Mill Creek 2 - Neural Networks		1,000				
100	Mill Creek 2 - Escalation		101,752				
101	Mill Creek 2 - CO2				10,000		
102	Total Mill Creek 2		**627,526**		**211,000**		
103							
104	Mill Creek 3 - FGD		392,000		20,000		
105	Mill Creek 3 - Baghouse		114,000				
106	Mill Creek 3 - PAC Injection		5,592				
107	Mill Creek 3 - Hg Control				69,000		
108	Mill Creek 3 - Neural Networks		1,000				
109	Mill Creek 3 - Escalation		111,307				
110	Mill Creek 3 - CO2				12,000		
111	Total Mill Creek 3		**623,899**		**101,000**		
112							
113	Mill Creek 4 - FGD		455,000		20,000		
114	Mill Creek 4 - Baghouse		133,000				
115	Mill Creek 4 - PAC Injection		6,890				
116	Mill Creek 4 - Hg Control				77,000		
117	Mill Creek 4 - Neural Networks		1,000				
118	Mill Creek 4 - Escalation		157,787				
119	Mill Creek 4 - CO2				15,000		
120	Total Mill Creek 4		**753,677**		**112,000**		
121							
122	**Total Mill Creek**		**2,651,346**		**635,000**		
123							
124							
125	**Trimble**						
126	Trimble 1 - Baghouse		128,000				
127	Trimble 1 - PAC Injection		6,451				
128	Trimble 1 - Hg Control				4,000		
129	Trimble 1 - Neural Networks		1,000				
130	Trimble 1 - Escalation		30,738				
131	Trimble 1 - CO2				16,000		
132	Total Trimble 1		**166,189**		**20,000**		
133							

	A	B	C	D	E	F	G
134	**Total Trimble**		**166,189**		**20,000**		
135							
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**		
137							
138							
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141							
142							
143							
144							
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146							
147							
148							
149							
150							
151							
152	**Sensitivities**						
153	**Green River**						
154	Green River 3 - SCR		29,000				
155	Green River 3 - CDS-FF		38,000				
156	Green River 3 - PAC Injection		1,112				
157	Green River 3 - Neural Networks		500				
158	Green River 3 - Escalation		17,899				
159	Total Green River 3		**86,511**				
160							
161	Green River 4 - SCR		42,000				
162	Green River 4 - CDS-FF		54,000				
163	Green River 4 - PAC Injection		1,583				
164	Green River 4 - Neural Networks		500				
165	Green River 4 - Escalation		20,877				
166	Total Green River 4		**118,960**				
167							
168	**Total Green River**		**205,471**				
169							
170							
171	**Cane Run**						
172	Cane Run 4 - FGD		152,000				
173	Cane Run 4 - SCR		63,000				
174	Cane Run 4 - Baghouse		33,000				
175	Cane Run 4 - PAC Injection		2,326				
176	Cane Run 4 - Lime Injection		2,569				
177	Cane Run 4 - Neural Networks		500				
178	Cane Run 4 - Escalation		45,571				

	A	B	C	D	E	F	G
179	Total Cane Run 4		**298,966**				
180							
181	Cane Run 5 - FGD		159,000				
182	Cane Run 5 - SCR		66,000				
183	Cane Run 5 - Baghouse		35,000				
184	Cane Run 5 - PAC Injection		2,490				
185	Cane Run 5 - Lime Injection		2,752				
186	Cane Run 5 - Neural Networks		500				
187	Cane Run 5 - Escalation		59,628				
188	Total Cane Run 5		**325,370**				
189							
190	Cane Run 6 - FGD		202,000				
191	Cane Run 6 - SCR		86,000				
192	Can Rune 6 - Baghouse		45,000				
193	Cane Run 6 - PAC Injection		3,490				
194	Cane Run 6 - Lime Injection		3,873				
195	Cane Run 6 - Neural Networks		500				
196	Cane Run 6 - Escalation		60,222				
197	Total Can Run 6		401,085				
198							
199	**Total Cane Run**		**1,025,422**				
200							
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**				
202							
203							
204	**Grand Total Environmental Compliance Air**		**5,346,993**				

	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				$536
8	Brown 1 - Baghouse				$309
9	Brown 1 - PAC Injection				$15
10	Brown 1 - Neural Networks				$5
11	Brown 1 - Overfire Air				$193
12	Total Brown 1		110		**$1,058**
13					
14	Brown 2 - SCR				$511
15	Brown 2 - Baghouse				$189
16	Brown 2 - PAC Injection				$14
17	Brown 2 - Neural Networks				$3
18	Brown 2 - Lime Injection				$15
19	Total Brown 2		180		**$732**
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**		**$521**
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**		**$432**
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**		**$1,142**
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**		**$1,681**
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**		**$1,649**
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**		**$922**

From:	Karavayev, Louanne
To:	Black, Greg
CC:	Wilson, Stuart
Sent:	6/29/2010 5:10:06 PM
Subject:	FW: 2011 MTP B&V Study vs. Env Scenario Planning
Attachments:	2011 MTP Environmental Summay - B&V vs Env Scenario Planning.xlsx

Greg,
Please take a look at the attachment below. I would like to get your help with matching up the capital investments in the attachment to future environmental regulations. Please let me know when you might be available to meet with 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

From: Wilson, Stuart
Sent: Tuesday, June 29, 2010 4:25 PM
To: Karavayev, Louanne
Subject: FW: 2011 MTP B&V Study vs. Env Scenario Planning

Lou Anne,

Almost made it a whole day... I'm going to stop by before 5:00 to talk to you about this. Something to do for tomorrow...

Stuart

From: Straight, Scott
Sent: Tuesday, June 29, 2010 10:34 AM
To: Hudson, Rusty; Schram, Chuck; Wilson, Stuart; Saunders, Eileen
Cc: Voyles, John; Bowling, Ralph
Subject: 2011 MTP B&V Study vs. Env Scenario Planning

Rusty, is this what you were looking for?

To All, please provide comments to this draft comparison table that identifies the unit, technology and cost of the 2011 MTP B&V Study to the Environmental Scenario Planning.

Scott Straight
Director Project Engineering
E.ON U.S. LLC
O 502-627-2701
F 502-214-2040
scott.straight@eon-us.com

	A	B	C	D	E	F	G
1							
2							
3			**2011 MTP Black & Veatch Study**	**(x $1,**	**Environmental Scenario Planning (x $1,000)**		
4							
5	**Brown**						
6	Brown 1 - SCR		59,000				
7	Brown 1 - SNCR				11,000		
8	Brown 1 - Baghouse		34,000				
9	Brown 1 - PAC Injection		1,599				
10	Brown 1 - Hg Control				3,000		
11	Brown 1 - Neural Networks		500				
12	Brown 1 - SAM Mitigation		4,000				
13	Brown 1 - Escalation		21,238				
14	Brown 1 - CO2				3,000		
15	Total Brown 1		**120,337**		**17,000**		
16							
17	Brown 2 - SCR		92,000				
18	Brown 2 - SCNR				11,000		
19	Brown 2 - Baghouse		34,000				
20	Brown 2 - PAC Injection		2,476				
21	Brown 2 - Hg Control				3,000		
22	Brown 2 - Neural Networks		500				
23	Brown 2 - Lime Injection		2,739				
24	Brown 2 - SAM Mitigation		4,000				
25	Brown 2 - Escalation		48,799				
26	Brown 2 - CO2				5,000		
27	Total Brown 2		**184,514**		**19,000**		
28							
29	Brown 3 - Baghouse		61,000				
30	Brown 3 - PAC Injection		5,426				
31	Brown 3 - Hg Control				4,000		
32	Brown 3 - Neural Networks		1,000				
33	Brown 3 - Escalation		16,952				
34	Brown 3 - CO2				13,000		
35	Total Brown 3		**84,378**		**17,000**		
36							
37	**Total Brown**		**389,229**		**53,000**		
38							
39	**Ghent**						
40	Ghent 1 - Baghouse		131,000				
41	Ghent 1 - PAC Injection		6,380				
42	Ghent 1 - Hg Control				77,000		
43	Ghent 1 - Neural Networks		1,000				

	A	B	C	D	E	F	G
44	Ghent 1 - Escalation		22,965				
45	Ghent 1 - CO2				15,000		
46	Total Ghent 1		**161,345**		**92,000**		
47							
48	Ghent 2 - SCR		227,000		152,000		
49	Ghent 2 - Baghouse		120,000				
50	Ghent 2 - PAC Injection		6,109				
51	Ghent 2 - Hg Control				7,000		
52	Ghent 2 - Lime Injection		5,483				
53	Ghent 2 - Neural Networks		1,000				
54	Ghent 2 - Escalation		57,338				
55	Ghent 2 - CO2				15,000		
56	Total Ghent 2		**416,930**		**174,000**		
57							
58	Ghent 3 - Baghouse		138,000				
59	Ghent 3 - PAC Injection		6,173				
60	Ghent 3 - Hg Control				77,000		
61	Ghent 3 - Neural Networks		1,000				
62	Ghent 3 - Escalation		33,368				
63	Ghent 3 - CO2				15,000		
64	Total Ghent 3		**178,541**		**92,000**		
65							
66	Ghent 4 - Baghouse		117,000				
67	Ghent 4 - PAC Injection		6,210				
68	Ghent 4 - Hg Control				77,000		
69	Ghent 4 - Neural Networks		1,000				
70	Ghent 4 - Escalation		28,313				
71	Ghent 4 - CO2				15,000		
72	Total Ghent 4		**152,523**		**92,000**		
73							
74	**Total Ghent**		**909,338**		**450,000**		
75							
76							
77	**Mill Creek**						
78	Mill Creek 1 - FGD		297,000		20,000		
79	Mill Creek 1 - SCR		97,000		121,000		
80	Mill Creek 1 - Baghouse		81,000				
81	Mill Creek 1 - Electrostatic Precipitator		32,882				
82	Mill Creek 1 - PAC Injection		4,412				
83	Mill Creek 1 - Hg Control				60,000		
84	Mill Creek 1 - SAM Mitigation		8,000				
85	Mill Creek 1 - Lime Injection		4,480				
86	Mill Creek 1 - Neural Networks		1,000				
87	Mill Creek 1 - Escalation		120,469				
88	Mill Creek 1 - CO2				10,000		

	A	B	C	D	E	F	G
89	Total Mill Creek 1		**646,243**		**211,000**		
90							
91	Mill Creek 2 - FGD		297,000		20,000		
92	Mill Creek 2 - SCR		97,000		121,000		
93	Mill Creek 2 - Baghouse		81,000				
94	Mill Creek 2 - Electrostatic Precipitator		32,882				
95	Mill Creek 2 - PAC Injection		4,412				
96	Mill Creek 2 - Hg Control				60,000		
97	Mill Creek 2 - SAM Control		8,000				
98	Mill Creek 2 - Lime Injection		4,480				
99	Mill Creek 2 - Neural Networks		1,000				
100	Mill Creek 2 - Escalation		101,752				
101	Mill Creek 2 - CO2				10,000		
102	Total Mill Creek 2		**627,526**		**211,000**		
103							
104	Mill Creek 3 - FGD		392,000		20,000		
105	Mill Creek 3 - Baghouse		114,000				
106	Mill Creek 3 - PAC Injection		5,592				
107	Mill Creek 3 - Hg Control				69,000		
108	Mill Creek 3 - Neural Networks		1,000				
109	Mill Creek 3 - Escalation		111,307				
110	Mill Creek 3 - CO2				12,000		
111	Total Mill Creek 3		**623,899**		**101,000**		
112							
113	Mill Creek 4 - FGD		455,000		20,000		
114	Mill Creek 4 - Baghouse		133,000				
115	Mill Creek 4 - PAC Injection		6,890				
116	Mill Creek 4 - Hg Control				77,000		
117	Mill Creek 4 - Neural Networks		1,000				
118	Mill Creek 4 - Escalation		157,787				
119	Mill Creek 4 - CO2				15,000		
120	Total Mill Creek 4		**753,677**		**112,000**		
121							
122	**Total Mill Creek**		**2,651,346**		**635,000**		
123							
124							
125	**Trimble**						
126	Trimble 1 - Baghouse		128,000				
127	Trimble 1 - PAC Injection		6,451				
128	Trimble 1 - Hg Control				4,000		
129	Trimble 1 - Neural Networks		1,000				
130	Trimble 1 - Escalation		30,738				
131	Trimble 1 - CO2				16,000		
132	Total Trimble 1		**166,189**		**20,000**		
133							

	A	B	C	D	E	F	G
134	**Total Trimble**		**166,189**		**20,000**		
135							
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**		
137							
138							
139							
140							
141							
142							
143							
144							
145							
146							
147							
148							
149							
150							
151							
152	**Sensitivities**						
153	**Green River**						
154	Green River 3 - SCR		29,000				
155	Green River 3 - CDS-FF		38,000				
156	Green River 3 - PAC Injection		1,112				
157	Green River 3 - Neural Networks		500				
158	Green River 3 - Escalation		17,899				
159	Total Green River 3		**86,511**				
160							
161	Green River 4 - SCR		42,000				
162	Green River 4 - CDS-FF		54,000				
163	Green River 4 - PAC Injection		1,583				
164	Green River 4 - Neural Networks		500				
165	Green River 4 - Escalation		20,877				
166	Total Green River 4		**118,960**				
167							
168	**Total Green River**		**205,471**				
169							
170							
171	**Cane Run**						
172	Cane Run 4 - FGD		152,000				
173	Cane Run 4 - SCR		63,000				
174	Cane Run 4 - Baghouse		33,000				
175	Cane Run 4 - PAC Injection		2,326				
176	Cane Run 4 - Lime Injection		2,569				
177	Cane Run 4 - Neural Networks		500				
178	Cane Run 4 - Escalation		45,571				

	A	B	C	D	E	F	G
179	Total Cane Run 4		**298,966**				
180							
181	Cane Run 5 - FGD		159,000				
182	Cane Run 5 - SCR		66,000				
183	Cane Run 5 - Baghouse		35,000				
184	Cane Run 5 - PAC Injection		2,490				
185	Cane Run 5 - Lime Injection		2,752				
186	Cane Run 5 - Neural Networks		500				
187	Cane Run 5 - Escalation		59,628				
188	Total Cane Run 5		**325,370**				
189							
190	Cane Run 6 - FGD		202,000				
191	Cane Run 6 - SCR		86,000				
192	Can Rune 6 - Baghouse		45,000				
193	Cane Run 6 - PAC Injection		3,490				
194	Cane Run 6 - Lime Injection		3,873				
195	Cane Run 6 - Neural Networks		500				
196	Cane Run 6 - Escalation		60,222				
197	Total Can Run 6		401,085				
198							
199	**Total Cane Run**		**1,025,422**				
200							
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**				
202							
203							
204	**Grand Total Environmental Compliance Air**		**5,346,993**				

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3					
4					
5			**MW**		**$/kW**
6	**BROWN**				
7	Brown 1 - Low NOx Burners				$536
8	Brown 1 - Baghouse				$309
9	Brown 1 - PAC Injection				$15
10	Brown 1 - Neural Networks				$5
11	Brown 1 - Overfire Air				$193
12	Total Brown 1		110		**$1,058**
13					
14	Brown 2 - SCR				$511
15	Brown 2 - Baghouse				$189
16	Brown 2 - PAC Injection				$14
17	Brown 2 - Neural Networks				$3
18	Brown 2 - Lime Injection				$15
19	Total Brown 2		180		**$732**
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**		**$521**
27					
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29	**GHENT**				
30	Ghent 1 - Baghouse				$242
31	Ghent 1 - PAC Injection				$12
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36	Ghent 2 - Baghouse				$232
37	Ghent 2 - PAC Injection				$12
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39	Ghent 2 - Neural Networks				$2
40	Total Ghent 2		517		**$696**
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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**		**$432**
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**		**$1,142**
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
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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**
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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**		**$1,681**
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**		**$1,649**
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**		**$922**

From:	Saunders, Eileen
To:	Straight, Scott; Clements, Joe
CC:	Gregory, Ronald
Sent:	7/19/2010 2:17:53 PM
Subject:	PE's Bi-Weekly Update of 7-15-10 (rdg-els).docx
Attachments:	PE's Bi-Weekly Update of 7-15-10 (rdg-els).docx

Scott/Joe,

Here is the report for Brown and Ghent.

Thank you,

Eileen

Energy Services - Bi-Weekly Update
July16, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – NTR.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Caps to be placed by helicopter on the two chimneys on July 25, 2010 weather permitting.
      - Elevators- Award Recommendation is circulating for signatures.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Schedule/Execution:
          - Fluor completed the DCS checkout.
          - Product to be sent to the facility next week for final commissioning activity.
        - Award recommendation for operation contract to be submitted week of 7/12.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:

        - Bechtel FM Claims – Parked at the present time by both parties.
    - Issues/Risk:
        - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
    - Schedule/Execution – NTR
    - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
    - Engineering – proceeding as planned to support the spring 2012 in-service.
    - Budget - NTR
    - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
    - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
    - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
    - Permitting – NTR
    - Engineering/General:
        - Reviewing Voith updated scope for rehabilitation minus automation.
        - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
        - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
    - Budget:
        - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
    - Contracting:
        - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
    - Issues/Risk
        - Release of third unit runner to Voith is required in August to maintain schedule.
        - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
    - Safety - NTR
    - Auditing - NTR
    - Permitting - NTR
    - Engineering/General
        - Pre-bid meeting was held at Mill Creek on July 8, 2010 and bids are due on July 23, 2010.
        - Working with URS to procure long lead time equipment such as the verti-mill.

- Budget
  - AIP development in progress.
  - Revised cash flow reflected in 2011 MTP
- Contracting - NTR
- Issue/Risk - NTR

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
  - Engineering
    - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Dewatering of the Gypsum Storage Pond was recently completed to allow investigation of existing clay liner thickness and permeability.
  - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
  - Engineering:
    - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
    - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk
    - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.
    - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**

- Schedule/Execution - NTR
- Budgeting - NTR
- Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
- Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
- Contract Disputes/Resolution – NTR
- Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
  - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
  - **E.W. Brown Starter Dike**
    - Safety – (0) Recordable
    - Schedule/Execution:
    - Approximately 40% of the pond covered with straw mats as dust control measures. Approximately 10 acres of ash is exposed awaiting liner system installation. The exposed ash is being controlled temporarily by water trucks and flat drum rollers.
    - Rock placement continued on the West and South Embankments. Approximately 98% of the rock embankment has been placed to date.

        - Clay placement, ash grading, and liner system placement was suspended.
        - Budget – NTR
        - Contract Disputes/Resolution: NTR
        - Issues/Risk – Summit was given notice to suspend all work except rock placement and some minor activities beginning July 6th until further notice.

    - **E.W. Brown Aux Pond 900'**
        - Schedule/Execution:
        - Installation of erosion and sediment control measures.
        - Topsoil stockpiles were relocated.
        - Budget – NTR
        - Contract Disputes/Resolution – NTR
        - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
    - Safety – NTR
    - Schedule/Execution:
        - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
        - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
        - MC 4 tests by E.ON Engineering published.
        - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
    - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

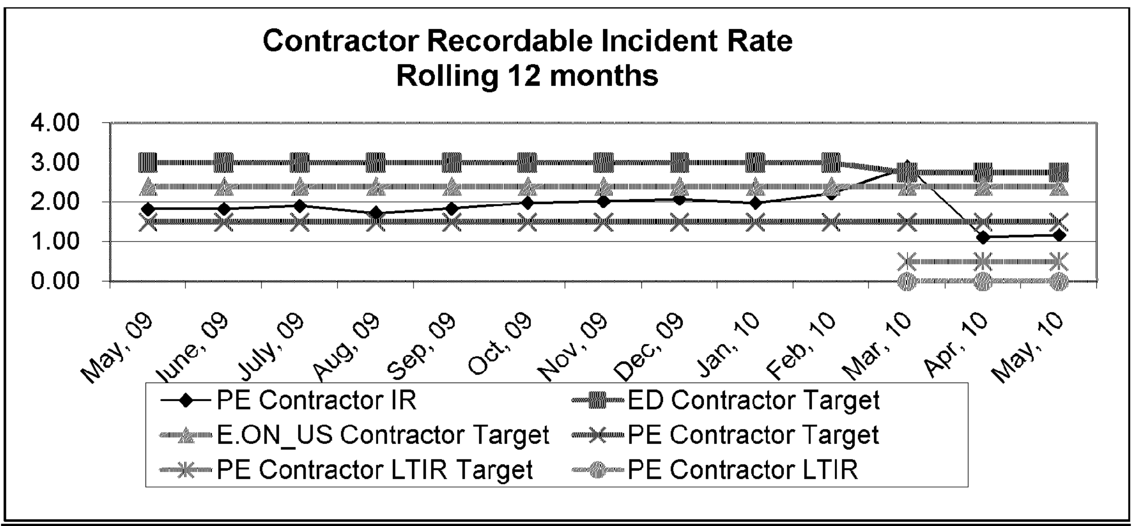
- **SO3 Mitigation (Ghent)**
    - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
    - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
    - Preparing a test plan and schedule for MgO injection at GH4.
    - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
    - B&V draft of SAM testing difficulties white paper received.
    - B&V draft of SAM calculations at Ghent Units received.
    - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
    - LFG
        - Second Landfill Gas Sample Result received.
        - LFG Technologies is planning visits to the landfills in July.

- NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
- Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
- FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost. Plans are underway to extend the B&V contract to begin discussing various scenarios for compliance with upcoming environmental air regulations.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From:	Karavayev, Louanne
To:	Black, Greg
CC:	Wilson, Stuart; Schram, Chuck
Sent:	6/30/2010 11:07:06 AM
Subject:	RE: 2011 MTP B&V Study vs. Env Scenario Planning
Attachments:	20100630_2011MTPEnvironmentalSummary-B&VvsEPARegs_LAK.xlsx; Generation Future Environmental Requirements.xlsx

Greg,
Per our phone conversation, here is my best guess at the Regulations portion of the attached spreadsheet. I realize that some of the new equipment will potentially contribute to more than one of the regulations, but I am looking for the most applicable. Please let me know if you have any questions. I apologize for the late notice on this request, but David Sinclair has requested this before the end of the day.

Also, here is the list of regulations from Gary Revlett which I used in determining my best guess.

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

From: Karavayev, Louanne
Sent: Tuesday, June 29, 2010 5:10 PM
To: Black, Greg
Cc: Wilson, Stuart
Subject: FW: 2011 MTP B&V Study vs. Env Scenario Planning

Greg,
Please take a look at the attachment below. I would like to get your help with matching up the capital investments in the attachment to future environmental regulations. Please let me know when you might be available to meet with me.
Thank you,

Lou Anne Karavayev
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f (502) 217-4969
e LouAnne.Karavayev@EON-US.com

From: Wilson, Stuart
Sent: Tuesday, June 29, 2010 4:25 PM
To: Karavayev, Louanne
Subject: FW: 2011 MTP B&V Study vs. Env Scenario Planning

Lou Anne,

Almost made it a whole day... I'm going to stop by before 5:00 to talk to you about this. Something to do for tomorrow...

Stuart

From: Straight, Scott
Sent: Tuesday, June 29, 2010 10:34 AM
To: Hudson, Rusty; Schram, Chuck; Wilson, Stuart; Saunders, Eileen
Cc: Voyles, John; Bowling, Ralph
Subject: 2011 MTP B&V Study vs. Env Scenario Planning

Rusty, is this what you were looking for?

To All, please provide comments to this draft comparison table that identifies the unit, technology and cost of the 2011 MTP B&V Study to the Environmental Scenario Planning.

<< File: 2011 MTP Environmental Summay - B&V vs Env Scenario Planning.xlsx >>

Scott Straight
Director Project Engineering
E.ON U.S. LLC
O 502-627-2701
F 502-214-2040
scott.straight@eon-us.com

	A	B	C	D	E	F	G
1							
2							
3			**2011 MTP Black & Veatch Study**		**Environmental Scenario Planning (x $1**		**Regulation**
4							
5	**Brown**						
6	Brown 1 - SCR		59,000				Revised CAIR
7	Brown 1 - SNCR				11,000		Revised CAIR
8	Brown 1 - Baghouse		34,000				EGU MACT
9	Brown 1 - PAC Injection		1,599				EGU MACT
10	Brown 1 - Hg Control				3,000		EGU MACT
11	Brown 1 - Neural Networks		500				EGU MACT
12	Brown 1 - SAM Mitigation		4,000				Brown Consent Decree
13	Brown 1 - Escalation		21,238				Escalation
14	Brown 1 - CO2				3,000		
15	Total Brown 1		**120,337**		**17,000**		
16							
17	Brown 2 - SCR		92,000				Revised CAIR
18	Brown 2 - SCNR				11,000		Revised CAIR
19	Brown 2 - Baghouse		34,000				EGU MACT
20	Brown 2 - PAC Injection		2,476				EGU MACT
21	Brown 2 - Hg Control				3,000		EGU MACT
22	Brown 2 - Neural Networks		500				EGU MACT
23	Brown 2 - Lime Injection		2,739				EGU MACT
24	Brown 2 - SAM Mitigation		4,000				Brown Consent Decree
25	Brown 2 - Escalation		48,799				Escalation
26	Brown 2 - CO2				5,000		
27	Total Brown 2		**184,514**		**19,000**		
28							
29	Brown 3 - Baghouse		61,000				EGU MACT
30	Brown 3 - PAC Injection		5,426				EGU MACT
31	Brown 3 - Hg Control				4,000		EGU MACT
32	Brown 3 - Neural Networks		1,000				EGU MACT
33	Brown 3 - Escalation		16,952				Escalation
34	Brown 3 - CO2				13,000		
35	Total Brown 3		**84,378**		**17,000**		
36							
37	**Total Brown**		**389,229**		**53,000**		
38							
39	**Ghent**						
40	Ghent 1 - Baghouse		131,000				EGU MACT
41	Ghent 1 - PAC Injection		6,380				EGU MACT
42	Ghent 1 - Hg Control				77,000		EGU MACT
43	Ghent 1 - Neural Networks		1,000				EGU MACT

	A	B	C	D	E	F	G
44	Ghent 1 - Escalation		22,965				Escalation
45	Ghent 1 - CO2				15,000		
46	Total Ghent 1		**161,345**		**92,000**		
47							
48	Ghent 2 - SCR		227,000		152,000		Revised CAIR
49	Ghent 2 - Baghouse		120,000				EGU MACT
50	Ghent 2 - PAC Injection		6,109				EGU MACT
51	Ghent 2 - Hg Control				7,000		EGU MACT
52	Ghent 2 - Lime Injection		5,483				EGU MACT
53	Ghent 2 - Neural Networks		1,000				EGU MACT
54	Ghent 2 - Escalation		57,338				Escalation
55	Ghent 2 - CO2				15,000		
56	Total Ghent 2		**416,930**		**174,000**		
57							
58	Ghent 3 - Baghouse		138,000				EGU MACT
59	Ghent 3 - PAC Injection		6,173				EGU MACT
60	Ghent 3 - Hg Control				77,000		EGU MACT
61	Ghent 3 - Neural Networks		1,000				EGU MACT
62	Ghent 3 - Escalation		33,368				Escalation
63	Ghent 3 - CO2				15,000		
64	Total Ghent 3		**178,541**		**92,000**		
65							
66	Ghent 4 - Baghouse		117,000				EGU MACT
67	Ghent 4 - PAC Injection		6,210				EGU MACT
68	Ghent 4 - Hg Control				77,000		EGU MACT
69	Ghent 4 - Neural Networks		1,000				EGU MACT
70	Ghent 4 - Escalation		28,313				Escalation
71	Ghent 4 - CO2				15,000		
72	Total Ghent 4		**152,523**		**92,000**		
73							
74	**Total Ghent**		**909,338**		**450,000**		
75							
76							
77	**Mill Creek**						
78	Mill Creek 1 - FGD		297,000		20,000		Revised CAIR
79	Mill Creek 1 - SCR		97,000		121,000		Revised CAIR
80	Mill Creek 1 - Baghouse		81,000				EGU MACT
81	Mill Creek 1 - Electrostatic Precipitator		32,882				EGU MACT
82	Mill Creek 1 - PAC Injection		4,412				EGU MACT
83	Mill Creek 1 - Hg Control				60,000		EGU MACT
84	Mill Creek 1 - SAM Mitigation		8,000				Mill Creek BART
85	Mill Creek 1 - Lime Injection		4,480				EGU MACT
86	Mill Creek 1 - Neural Networks		1,000				EGU MACT
87	Mill Creek 1 - Escalation		120,469				Escalation
88	Mill Creek 1 - CO2				10,000		

	A	B	C	D	E	F	G
89	Total Mill Creek 1		**646,243**		**211,000**		
90							
91	Mill Creek 2 - FGD		297,000		20,000		Revised CAIR
92	Mill Creek 2 - SCR		97,000		121,000		Revised CAIR
93	Mill Creek 2 - Baghouse		81,000				EGU MACT
94	Mill Creek 2 - Electrostatic Precipitator		32,882				EGU MACT
95	Mill Creek 2 - PAC Injection		4,412				EGU MACT
96	Mill Creek 2 - Hg Control				60,000		EGU MACT
97	Mill Creek 2 - SAM Control		8,000				Mill Creek BART
98	Mill Creek 2 - Lime Injection		4,480				EGU MACT
99	Mill Creek 2 - Neural Networks		1,000				EGU MACT
100	Mill Creek 2 - Escalation		101,752				Escalation
101	Mill Creek 2 - CO2				10,000		
102	Total Mill Creek 2		**627,526**		**211,000**		
103							
104	Mill Creek 3 - FGD		392,000		20,000		Revised CAIR
105	Mill Creek 3 - Baghouse		114,000				EGU MACT
106	Mill Creek 3 - PAC Injection		5,592				EGU MACT
107	Mill Creek 3 - Hg Control				69,000		EGU MACT
108	Mill Creek 3 - Neural Networks		1,000				EGU MACT
109	Mill Creek 3 - Escalation		111,307				Escalation
110	Mill Creek 3 - CO2				12,000		
111	Total Mill Creek 3		**623,899**		**101,000**		
112							
113	Mill Creek 4 - FGD		455,000		20,000		Revised CAIR
114	Mill Creek 4 - Baghouse		133,000				EGU MACT
115	Mill Creek 4 - PAC Injection		6,890				EGU MACT
116	Mill Creek 4 - Hg Control				77,000		EGU MACT
117	Mill Creek 4 - Neural Networks		1,000				EGU MACT
118	Mill Creek 4 - Escalation		157,787				Escalation
119	Mill Creek 4 - CO2				15,000		
120	Total Mill Creek 4		**753,677**		**112,000**		
121							
122	**Total Mill Creek**		**2,651,346**		**635,000**		
123							
124							
125	**Trimble**						
126	Trimble 1 - Baghouse		128,000				EGU MACT
127	Trimble 1 - PAC Injection		6,451				EGU MACT
128	Trimble 1 - Hg Control				4,000		EGU MACT
129	Trimble 1 - Neural Networks		1,000				EGU MACT
130	Trimble 1 - Escalation		30,738				Escalation
131	Trimble 1 - CO2				16,000		
132	Total Trimble 1		**166,189**		**20,000**		
133							

	A	B	C	D	E	F	G
134	**Total Trimble**		**166,189**		**20,000**		
135							
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**		
137							
138							
139							
140							
141							
142							
143							
144							
145							
146							
147							
148							
149							
150							
151							
152	**Sensitivities**						
153	**Green River**						
154	Green River 3 - SCR		29,000				
155	Green River 3 - CDS-FF		38,000				
156	Green River 3 - PAC Injection		1,112				
157	Green River 3 - Neural Networks		500				
158	Green River 3 - Escalation		17,899				
159	Total Green River 3		**86,511**				
160							
161	Green River 4 - SCR		42,000				
162	Green River 4 - CDS-FF		54,000				
163	Green River 4 - PAC Injection		1,583				
164	Green River 4 - Neural Networks		500				
165	Green River 4 - Escalation		20,877				
166	Total Green River 4		**118,960**				
167							
168	**Total Green River**		**205,471**				
169							
170							
171	**Cane Run**						
172	Cane Run 4 - FGD		152,000				
173	Cane Run 4 - SCR		63,000				
174	Cane Run 4 - Baghouse		33,000				
175	Cane Run 4 - PAC Injection		2,326				
176	Cane Run 4 - Lime Injection		2,569				
177	Cane Run 4 - Neural Networks		500				
178	Cane Run 4 - Escalation		45,571				

	A	B	C	D	E	F	G
179	Total Cane Run 4		**298,966**				
180							
181	Cane Run 5 - FGD		159,000				
182	Cane Run 5 - SCR		66,000				
183	Cane Run 5 - Baghouse		35,000				
184	Cane Run 5 - PAC Injection		2,490				
185	Cane Run 5 - Lime Injection		2,752				
186	Cane Run 5 - Neural Networks		500				
187	Cane Run 5 - Escalation		59,628				
188	Total Cane Run 5		**325,370**				
189							
190	Cane Run 6 - FGD		202,000				
191	Cane Run 6 - SCR		86,000				
192	Can Rune 6 - Baghouse		45,000				
193	Cane Run 6 - PAC Injection		3,490				
194	Cane Run 6 - Lime Injection		3,873				
195	Cane Run 6 - Neural Networks		500				
196	Cane Run 6 - Escalation		60,222				
197	Total Can Run 6		401,085				
198							
199	**Total Cane Run**		**1,025,422**				
200							
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**				
202							
203							
204	**Grand Total Environmental Compliance Air**		**5,346,993**				

	A	B
1		
2		**Total ($M)**
3	Revised CAIR	2,013
4	EGU MACT	1,328
5	Brown Consent Decree	8
6	Mill Creek BART	16
7		3,365
8		
9	Escalation	751
10		4,116

	A	B	C	D	E	F	G
1							
2	**Estimated Requirements Under Future New Environmental Regulations**						
3							
4	**Task**	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
5	**No.**	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
6	4.1	GHG Inventory	No additional limits			N/A	Spring - 2010
7	4.2	ing Engine NSPS and	PM	lorsepower. Certified to meet Tier		Unit	ting MACT & at insta
8			NO_x				
9			VOC				
10			CO				
11	4.3	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
12			MC4 - SAM	76.5	lbs/hour		
13	4.4	fferson Co. STAR Re				Plant	Spring - 2012
14			fuels (As) 20 - 50 ppm or ~$1x10^{-5}$ lbs/mmBtu emis				
15	&	rown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
16			SO_2	97%	Removal		
17			NO_x	0.07 /0.08	lbs/mmBtu		
18			SAM	110 -220	lbs/mmBtu		
19	4.7	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
20	4.8	GHG NSR	GHG	Energy Efficiency Projects		Unit/Plant	January, 2011
21	4.9	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	Beginning in 2014
22			NO_x	0.11	lbs/mmBtu		
23	4.10	New EGU MACT	Mercury	90% or	Removal	Plant	with 1-yr extension
24				0.012	lbs/GWH		
25			Acids (HCl)	0.002	lbs/mmBtu	Unit	
26			Metals (PM)	0.03	lbs/mmBtu		
27			Metals (As)	0.5×10^{-5}	lbs/mmBtu		
28			Organics (CO)	0.10	lbs/mmBtu		
29			Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
30	4.11	n Co. Ozone Non-at	NO_x	5 - 10 % reductior	NOx emissions	County-wide	Spring - 2016
31	4.11	v 1-hour NAAQS for	NO_x	letermined based on m	lbs/hours	Plant	During - 2015
32	4.12	v 1-hour NAAQS for	SO_2	letermined based on m	lbs/hours	Plant	Spring - 2016
33	4.13	Reduction & Renew	GHG	letermined based on m	tons/year	Fleet	Beginning in 2014
34	Plan Risk	2.5 Emission Reduct	12.5 (Condensabl	letermined based on m	lbs/mmBtu	Unit/Plant	After 2013
35	4.14	CWA 316(a)	Thermal impacts	Biological Studies	N/A	Plant	Starting in 2010

	A	B	C	D	E	F	G
36	4.15	CWA 316(b)	Withdraw impacts	Biological Studies	N/A	Plant	Starting in 2012
37	4.16	ew Effluent Standa	etals, Chlorides, et	anaylsis is just begi	anaylsis is just begi	Plant	During - 2015
38	4.17	CCR Classification	Toxic Metals	landfill; possible closing existing ash po		Plant	Beginning in 2012;
39							
40		- New requirements have been finalized					

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Current Estimated Implementation - Fast)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	Brown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	e I in 2014; Limits in Phas
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	with 1-yr extension -
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	on Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2016
24	w 1-hour NAAQS for N	NO_x	termined based on r	lbs/hours	Plant	During - 2015
25	w 1-hour NAAQS for S	SO_2	termined based on r	lbs/hours	Plant	Spring - 2016
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	termined based on r	lbs/hours	Plant	During 2016
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation)**					
4						
5	**Program Name**	**Regulated Pollutants**			**Unit/Plant Averaging**	**Forcasted Date for Compliance**
6		**Pollutant**	**Limit**	**Units**		
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	rown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	ber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	ase I in 2016; Limits in Phase I
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	017 for high utilitization u
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	n Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2017
24	v 1-hour NAAQS for	NO_x	termined based on	lbs/hours	Plant	During - 2016
25	v 1-hour NAAQS for	SO_2	termined based on	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$I_{2.5}$ or Condensable F	termined based on	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation and Higher Limits)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	own Consent Decr	PM	0.03	lbs/mmBtu	Unit 3	nber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.4	lbs/mmBtu	Plant	hase I in 2016; Limits in Phase II
15		NO_x	0.2	lbs/mmBtu		
16	New EGU MACT	Mercury	85% or	Removal	Plant	2017 for high utilitization un
17			0.021	lbs/GWH		
18		Acids (HCl)	0.02	lbs/mmBtu	Unit	
19		Metals (PM) or	0.04	lbs/mmBtu		
20		Metals (As)	$2. \times 10^{-5}$	lbs/mmBtu		
21		Organics (CO)	0.20	lbs/mmBtu		
22		Dioxin/Furan	50×10^{-18}	lbs/mmBtu		
23	Co. Ozone Non-at	NO_x	5 % reduction	NOx emissions	County-wide	Spring - 2017
24	1-hour NAAQS for	NO_x	etermined based on n	lbs/hours	Plant	During - 2016
25	1-hour NAAQS fo	SO_2	etermined based on n	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	etermined based on n	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

From: Heun, Jeff
To: Straight, Scott
CC: Waterman, Bob; Watson, Joseph; Ballinger, Kayla; Phelps, Grant; Reed, Kathleen
Sent: 6/30/2010 11:25:25 AM
Subject: PE's Bi-Weekly Update
Attachments: PE's Bi-Weekly Update of 6-28-10 RCWa Comments.docx

Scott,

Attached is the updated Bi-Weekly report that contains comments on the projects that Bob and I are working on.

Thanks,

Jeffrey B. Heun, P.E.
E.ON U.S.
Project Engineering
Sr Civil Engineer
(502) 627-4525 (Louisville Office)
(859) 367-1254 (Brown Office)
(502) 592-2421 (Mobile)
(502) 217-2678 (FAX)
jeff.heun@eon-us.com

Energy Services - Bi-Weekly Update
June 28, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing in the final stages of activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Coating application is complete. Testing of the application will take place 90 days after the coating application.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Contractor on site June 30th with work starting July 6th.
      - Elevators- Bids received June 7, 2010 and are under review.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD continues to operate very well. Brown 2 is expected to be directed through the FGD in late June, well ahead of original plan.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning of the vacuum pump, motor, and filter belt continues.
        - Fluor continues to work on the DCS and commissioning of the Fluor supplied equipment.
        - Construction and commissioning work to be complete week of 6/21.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction 97% complete.
        - Plumbing and final building inspection expected within a week.
  - Budget:
    - Brown – NTR.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - The elevator bids came back higher than anticipated and the schedule shows some work moving into the first quarter of 2011. We are continuing to evaluate the bids and challenge the vendors on cost saving opportunities. This will be picked up in the 2011 MTP.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – Auditing released their audit report on TC2 invoicing with no findings.
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15. Bechtel has been experiencing significant combustion tuning issues that have delayed the first full load until late June. **Bechtel's latest forecasted substantial completion date is now July 30.**
  - Budget – Revised EPC authorization and project sanction approved in May IC meeting.

- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Commissioning versus schedule.
  - Current unit issues: Combustion tuning.

- **Brown 3 SCR**
  - Schedule/Execution – The 2012 spring outage needs to be picked up in the 2011 MTP.
  - Permitting – SAM testing took place in late May. Additional testing being planned for summer.
  - Engineering – EPC engineering kick off meeting held in Denver, CO (home of Zachry Engineering). All parties are working very well together. Alstom to be released on engineering of the HW recirc for economizer exit control to allow wider range of unit operation for SCR.
  - Budget - NTR
  - Contracting - NTR
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.
- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing- NTR
  - Permitting- NTR
  - Engineering/General
    - Transition meeting held with the plant to coordinating moving the activities associated with the project from the Plant to PE.

        - Review of the URS Engineering Study held with the plant.
        - Scope development for the limestone building extension is underway. Working to send out a bid package to local constructors the week of June 28, 2010.
        - Working with URS to procure long lead time equipment.
    - Budget
        - AIP development in progress.
    - Contracting
        - Working with the Director and Commercial Manager to develop an overall engineering, procurement and construction strategy.
    - Issue/Risk
        - Tight schedule for completing the building extension by the end of the year.

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
        - Running Buffalo Cover study was performed with no findings.
    - Engineering
        - Development of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - While PE has not restarted engineering/procurement work, discussions with Crutcher indicate negotiations may begin to accelerate with Holcim.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Construction on the project continues with work on the MSE Wall, Dike Extension, BAP to GSP Emergency Spillway, and Piping. Dewatering of the Gypsum Storage Pond was recently completed.
    - Budgeting – NTR
    - Engineering:
        - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Outlook is to get clay liner to proposed new regs thus allowing the clay liner and FML planned to meet future requirements. Consideration is also being given to installing a geosynthetic clay liner (GCL), if the existing clay does not meet the requirements.
        - A repair strategy for the BAP is also being developed as a result of the EPA Inspection in June 2009.
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk

        - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
        - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution – NTR
    - Budgeting – NTR
    - Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals. Bids are due in early July.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Work continues on the development of the 401/404 Permits
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – Conceptual Engineering of the CCP transport systems have resulted in a revised estimate significantly over the original amount included in the initial project ECR filings. PE will be working with station through the 2011 MTP development to refine the scope and reduce the cost impact.
    - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
    - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk:
        - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. Final offers are planned to three remaining land owners in June, followed by a formal letter to them announcing our potential intent to begin condemnation proceedings. A final decision of changing designs versus condemnation of remaining property needed for initial plan expected in late July.

- **General CCP Projects**
    - Study report reviewing potential range of cost to comply with EPA options of CCP storage has been received. Range of cost is $700 - $1,100 million, depending on Subpart C or Subpart D. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. The cost will be socialized the week of June 21 with management and stations.

- **E.W. Brown Ash Pond Project**
    - Safety – NTR

- Schedule/Execution:
  - Approximately 60% of the pond covered with straw mats for dust control. Mats rolled up in areas as needed to facilitate ash-grading activity and rock placement.
  - Rock placement began on the West and South Embankments. Approximately 88% of the rock embankment has been placed to date.
  - Aux Pond Phase II work awarded to Charah with mobilization occurring on 6/14.
- Budget – NTR
- Contract Disputes/Resolution: NTR
- Issues/Risk – NTR

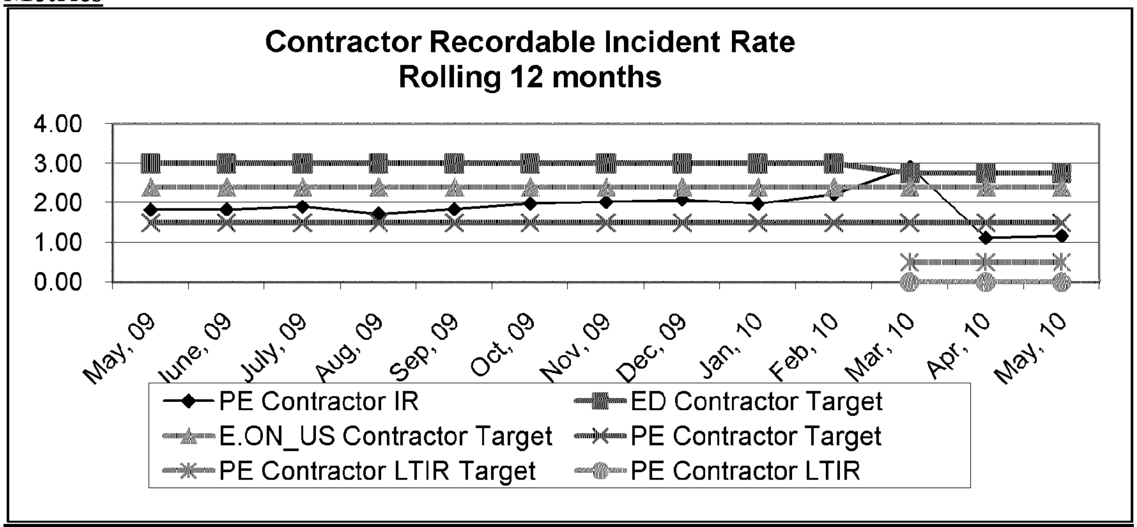
- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
  - Safety – A recordable occurred on the MC3 testing due to a minor injury resulting in a pain reliever being prescribed.
  - Schedule/Execution:
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests by E.ON Engineering for PM testing have not been published. .
    - MC 3 testing is nearing completion.

- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24th was canceled.
  - B&V BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper in development.
  - Emissions Monitoring Inc. (Jim Peeler) has drafted a white paper on CEMS/Compliance Monitoring Testing.
  - Teleconference with Duke regarding experience with SBS Injection System at Gibson revealed they have expended significant expenses on testing with hundreds of test. Their system was reported to be meeting sub 2 ppm emissions on a continuous basis.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Result received.
    - LFG Technologies is under contract to perform study work.
  - NBU CR – HDR draft of estimate received and under review.
  - Biomass – Black and Veatch under contract to perform MC Project Implementation Planning study work.
  - FutureGen – NTR

- General
  - Impoundment Integrity Program – this is nearing completion of the initial program with PE looking to transfer all future work to Generation Services.
  - Environmental Scenario Planning – B&V completed the initial cost estimate and the initial report was received on June 17th. Reviews of the estimate are in progress with cost exceeding $4 billion. Iterations between PE and Generation Planning expected to refine scope throughout the fleet and reduce the overall cost to the $3 billion range.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July..

Metrics



Upcoming PWT Needs:

Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

Staffing - NTR

From:	Wilson, Stuart
To:	Schram, Chuck
CC:	Karavayev, Louanne
Sent:	6/30/2010 3:16:17 PM
Subject:	Environmental Capex by Regulation
Attachments:	20100630_2011MTPEnvironmentalSummary-B&VvsEPARegs_LAK.xlsx; Generation Future Environmental Requirements.xlsx

Chuck,

I've attached (from Lou Anne) a summary of the new B&V environmental capex dollars by environmental regulation. The vast majority of the spending is the result of two regulations: revised CAIR and EGU MACT (Hg/HAPS). According to Greg Black, we hope to comply with (for example) the new 1-hour NAAQS for NOX/SO2 standards using the technology we're acquiring for revised CAIR.

I've attached Lou Anne's summary and a summary of environmental regulations from Gary Revlett...

Stuart

	A	B	C	D	E	F	G
1							
2							
3			**2011 MTP Black & Veatch Study**	**Environmental Scenario Planning (x $1**			**Regulation**
4							
5	**Brown**						
6	Brown 1 - SCR		59,000				Revised CAIR
7	Brown 1 - SNCR				11,000		Revised CAIR
8	Brown 1 - Baghouse		34,000				EGU MACT
9	Brown 1 - PAC Injection		1,599				EGU MACT
10	Brown 1 - Hg Control				3,000		EGU MACT
11	Brown 1 - Neural Networks		500				EGU MACT
12	Brown 1 - SAM Mitigation		4,000				Brown Consent Decree
13	Brown 1 - Escalation		21,238				Escalation
14	Brown 1 - CO2				3,000		
15	Total Brown 1		**120,337**		**17,000**		
16							
17	Brown 2 - SCR		92,000				Revised CAIR
18	Brown 2 - SCNR				11,000		Revised CAIR
19	Brown 2 - Baghouse		34,000				EGU MACT
20	Brown 2 - PAC Injection		2,476				EGU MACT
21	Brown 2 - Hg Control				3,000		EGU MACT
22	Brown 2 - Neural Networks		500				EGU MACT
23	Brown 2 - Lime Injection		2,739				EGU MACT
24	Brown 2 - SAM Mitigation		4,000				Brown Consent Decree
25	Brown 2 - Escalation		48,799				Escalation
26	Brown 2 - CO2				5,000		
27	Total Brown 2		**184,514**		**19,000**		
28							
29	Brown 3 - Baghouse		61,000				EGU MACT
30	Brown 3 - PAC Injection		5,426				EGU MACT
31	Brown 3 - Hg Control				4,000		EGU MACT
32	Brown 3 - Neural Networks		1,000				EGU MACT
33	Brown 3 - Escalation		16,952				Escalation
34	Brown 3 - CO2				13,000		
35	Total Brown 3		**84,378**		**17,000**		
36							
37	**Total Brown**		**389,229**		**53,000**		
38							
39	**Ghent**						
40	Ghent 1 - Baghouse		131,000				EGU MACT
41	Ghent 1 - PAC Injection		6,380				EGU MACT
42	Ghent 1 - Hg Control				77,000		EGU MACT
43	Ghent 1 - Neural Networks		1,000				EGU MACT

	A	B	C	D	E	F	G
44	Ghent 1 - Escalation		22,965				Escalation
45	Ghent 1 - CO2				15,000		
46	Total Ghent 1		**161,345**		**92,000**		
47							
48	Ghent 2 - SCR		227,000		152,000		Revised CAIR
49	Ghent 2 - Baghouse		120,000				EGU MACT
50	Ghent 2 - PAC Injection		6,109				EGU MACT
51	Ghent 2 - Hg Control				7,000		EGU MACT
52	Ghent 2 - Lime Injection		5,483				EGU MACT
53	Ghent 2 - Neural Networks		1,000				EGU MACT
54	Ghent 2 - Escalation		57,338				Escalation
55	Ghent 2 - CO2				15,000		
56	Total Ghent 2		**416,930**		**174,000**		
57							
58	Ghent 3 - Baghouse		138,000				EGU MACT
59	Ghent 3 - PAC Injection		6,173				EGU MACT
60	Ghent 3 - Hg Control				77,000		EGU MACT
61	Ghent 3 - Neural Networks		1,000				EGU MACT
62	Ghent 3 - Escalation		33,368				Escalation
63	Ghent 3 - CO2				15,000		
64	Total Ghent 3		**178,541**		**92,000**		
65							
66	Ghent 4 - Baghouse		117,000				EGU MACT
67	Ghent 4 - PAC Injection		6,210				EGU MACT
68	Ghent 4 - Hg Control				77,000		EGU MACT
69	Ghent 4 - Neural Networks		1,000				EGU MACT
70	Ghent 4 - Escalation		28,313				Escalation
71	Ghent 4 - CO2				15,000		
72	Total Ghent 4		**152,523**		**92,000**		
73							
74	**Total Ghent**		**909,338**		**450,000**		
75							
76							
77	**Mill Creek**						
78	Mill Creek 1 - FGD		297,000		20,000		Revised CAIR
79	Mill Creek 1 - SCR		97,000		121,000		Revised CAIR
80	Mill Creek 1 - Baghouse		81,000				EGU MACT
81	Mill Creek 1 - Electrostatic Precipitator		32,882				EGU MACT
82	Mill Creek 1 - PAC Injection		4,412				EGU MACT
83	Mill Creek 1 - Hg Control				60,000		EGU MACT
84	Mill Creek 1 - SAM Mitigation		8,000				Mill Creek BART
85	Mill Creek 1 - Lime Injection		4,480				EGU MACT
86	Mill Creek 1 - Neural Networks		1,000				EGU MACT
87	Mill Creek 1 - Escalation		120,469				Escalation
88	Mill Creek 1 - CO2				10,000		

	A	B	C	D	E	F	G
89	Total Mill Creek 1		**646,243**		**211,000**		
90							
91	Mill Creek 2 - FGD		297,000		20,000		Revised CAIR
92	Mill Creek 2 - SCR		97,000		121,000		Revised CAIR
93	Mill Creek 2 - Baghouse		81,000				EGU MACT
94	Mill Creek 2 - Electrostatic Precipitator		32,882				EGU MACT
95	Mill Creek 2 - PAC Injection		4,412				EGU MACT
96	Mill Creek 2 - Hg Control				60,000		EGU MACT
97	Mill Creek 2 - SAM Control		8,000				Mill Creek BART
98	Mill Creek 2 - Lime Injection		4,480				EGU MACT
99	Mill Creek 2 - Neural Networks		1,000				EGU MACT
100	Mill Creek 2 - Escalation		101,752				Escalation
101	Mill Creek 2 - CO2				10,000		
102	Total Mill Creek 2		**627,526**		**211,000**		
103							
104	Mill Creek 3 - FGD		392,000		20,000		Revised CAIR
105	Mill Creek 3 - Baghouse		114,000				EGU MACT
106	Mill Creek 3 - PAC Injection		5,592				EGU MACT
107	Mill Creek 3 - Hg Control				69,000		EGU MACT
108	Mill Creek 3 - Neural Networks		1,000				EGU MACT
109	Mill Creek 3 - Escalation		111,307				Escalation
110	Mill Creek 3 - CO2				12,000		
111	Total Mill Creek 3		**623,899**		**101,000**		
112							
113	Mill Creek 4 - FGD		455,000		20,000		Revised CAIR
114	Mill Creek 4 - Baghouse		133,000				EGU MACT
115	Mill Creek 4 - PAC Injection		6,890				EGU MACT
116	Mill Creek 4 - Hg Control				77,000		EGU MACT
117	Mill Creek 4 - Neural Networks		1,000				EGU MACT
118	Mill Creek 4 - Escalation		157,787				Escalation
119	Mill Creek 4 - CO2				15,000		
120	Total Mill Creek 4		**753,677**		**112,000**		
121							
122	**Total Mill Creek**		**2,651,346**		**635,000**		
123							
124							
125	**Trimble**						
126	Trimble 1 - Baghouse		128,000				EGU MACT
127	Trimble 1 - PAC Injection		6,451				EGU MACT
128	Trimble 1 - Hg Control				4,000		EGU MACT
129	Trimble 1 - Neural Networks		1,000				EGU MACT
130	Trimble 1 - Escalation		30,738				Escalation
131	Trimble 1 - CO2				16,000		
132	Total Trimble 1		**166,189**		**20,000**		
133							

	A	B	C	D	E	F	G
134	**Total Trimble**		**166,189**		**20,000**		
135							
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**		
137							
138							
139							
140							
141							
142							
143							
144							
145							
146							
147							
148							
149							
150							
151							
152	**Sensitivities**						
153	**Green River**						
154	Green River 3 - SCR		29,000				
155	Green River 3 - CDS-FF		38,000				
156	Green River 3 - PAC Injection		1,112				
157	Green River 3 - Neural Networks		500				
158	Green River 3 - Escalation		17,899				
159	Total Green River 3		**86,511**				
160							
161	Green River 4 - SCR		42,000				
162	Green River 4 - CDS-FF		54,000				
163	Green River 4 - PAC Injection		1,583				
164	Green River 4 - Neural Networks		500				
165	Green River 4 - Escalation		20,877				
166	Total Green River 4		**118,960**				
167							
168	**Total Green River**		**205,471**				
169							
170							
171	**Cane Run**						
172	Cane Run 4 - FGD		152,000				
173	Cane Run 4 - SCR		63,000				
174	Cane Run 4 - Baghouse		33,000				
175	Cane Run 4 - PAC Injection		2,326				
176	Cane Run 4 - Lime Injection		2,569				
177	Cane Run 4 - Neural Networks		500				
178	Cane Run 4 - Escalation		45,571				

	A	B	C	D	E	F	G
179	Total Cane Run 4		**298,966**				
180							
181	Cane Run 5 - FGD		159,000				
182	Cane Run 5 - SCR		66,000				
183	Cane Run 5 - Baghouse		35,000				
184	Cane Run 5 - PAC Injection		2,490				
185	Cane Run 5 - Lime Injection		2,752				
186	Cane Run 5 - Neural Networks		500				
187	Cane Run 5 - Escalation		59,628				
188	Total Cane Run 5		**325,370**				
189							
190	Cane Run 6 - FGD		202,000				
191	Cane Run 6 - SCR		86,000				
192	Can Rune 6 - Baghouse		45,000				
193	Cane Run 6 - PAC Injection		3,490				
194	Cane Run 6 - Lime Injection		3,873				
195	Cane Run 6 - Neural Networks		500				
196	Cane Run 6 - Escalation		60,222				
197	Total Can Run 6		401,085				
198							
199	**Total Cane Run**		**1,025,422**				
200							
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**				
202							
203							
204	**Grand Total Environmental Compliance Air**		**5,346,993**				

	A	B
1		
2		**Total ($M)**
3	Revised CAIR	2,013
4	EGU MACT	1,328
5	Brown Consent Decree	8
6	Mill Creek BART	16
7		3,365
8		
9	Escalation	751
10		4,116

	A	B	C	D	E	F	G
1							
2	**Estimated Requirements Under Future New Environmental Regulations**						
3							
4	**Task**	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
5	**No.**	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
6	4.1	GHG Inventory	No additional limits			N/A	Spring - 2010
7			PM				
8	4.2	ing Engine NSPS and	NO_x	Horsepower. Certified to meet Tier		Unit	ting MACT & at insta
9			VOC				
10			CO				
11	4.3	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
12			MC4 - SAM	76.5	lbs/hour		
13	4.4	fferson Co. STAR Re				Plant	Spring - 2012
14			fuels (As) 20 - 50 ppm or ~$1x10^{-5}$ lbs/mmBtu emis				
15			PM	0.03	lbs/mmBtu		
16			SO_2	97%	Removal		
17	&	rown Consent Decre	NO_x	0.07 /0.08	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
18			SAM	110 -220	lbs/mmBtu		
19	4.7	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
20	4.8	GHG NSR	GHG	Energy Efficiency Projects		Unit/Plant	January, 2011
21	4.9	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	Beginning in 2014
22			NO_x	0.11	lbs/mmBtu		
23			Mercury	90% or	Removal	Plant	
24				0.012	lbs/GWH		
25			Acids (HCl)	0.002	lbs/mmBtu		
26	4.10	New EGU MACT	Metals (PM)	0.03	lbs/mmBtu		with 1-yr extension
27			Metals (As)	0.5×10^{-5}	lbs/mmBtu	Unit	
28			Organics (CO)	0.10	lbs/mmBtu		
29			Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
30	4.11	n Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2016
31	4.11	v 1-hour NAAQS for	NO_x	determined based on m	lbs/hours	Plant	During - 2015
32	4.12	v 1-hour NAAQS for	SO_2	determined based on m	lbs/hours	Plant	Spring - 2016
33	4.13	Reduction & Renew	GHG	determined based on m	tons/year	Fleet	Beginning in 2014
34	Plan Risk	$_{2.5}$ Emission Reduct	12.5 (Condensabl	determined based on m	lbs/mmBtu	Unit/Plant	After 2013
35	4.14	CWA 316(a)	Thermal impacts	Biological Studies	N/A	Plant	Starting in 2010

	A	B	C	D	E	F	G
36	4.15	CWA 316(b)	Withdraw impacts	Biological Studies	N/A	Plant	Starting in 2012
37	4.16	ew Effluent Standa	etals, Chlorides, et	anaylsis is just begi	anaylsis is just begi	Plant	During - 2015
38	4.17	CCR Classification	Toxic Metals	landfill; possible closing existing ash po		Plant	Beginning in 2012;
39							
40		- New requirements have been finalized					

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Current Estimated Implementation - Fast)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	Brown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	e I in 2014; Limits in Phas
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	with 1-yr extension -
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	on Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2016
24	w 1-hour NAAQS for N	NO_x	termined based on r	lbs/hours	Plant	During - 2015
25	w 1-hour NAAQS for S	SO_2	termined based on r	lbs/hours	Plant	Spring - 2016
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	termined based on r	lbs/hours	Plant	During 2016
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	rown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	ber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	ase I in 2016; Limits in Phase I
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	2017 for high utilitization u
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	n Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2017
24	v 1-hour NAAQS for	NO_x	termined based on	lbs/hours	Plant	During - 2016
25	v 1-hour NAAQS for	SO_2	termined based on	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$M_{2.5}$ or Condensable F	termined based on	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation and Higher Limits)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	own Consent Decr	PM	0.03	lbs/mmBtu	Unit 3	nber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.4	lbs/mmBtu	Plant	hase I in 2016; Limits in Phase II
15		NO_x	0.2	lbs/mmBtu		
16	New EGU MACT	Mercury	85% or	Removal	Plant	2017 for high utilitization un
17			0.021	lbs/GWH		
18		Acids (HCl)	0.02	lbs/mmBtu	Unit	
19		Metals (PM) or	0.04	lbs/mmBtu		
20		Metals (As)	$2. \times 10^{-5}$	lbs/mmBtu		
21		Organics (CO)	0.20	lbs/mmBtu		
22		Dioxin/Furan	50×10^{-18}	lbs/mmBtu		
23	Co. Ozone Non-at	NO_x	5 % reduction	NOx emissions	County-wide	Spring - 2017
24	1-hour NAAQS for	NO_x	etermined based on n	lbs/hours	Plant	During - 2016
25	1-hour NAAQS fo	SO_2	etermined based on n	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	etermined based on n	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

From: Saunders, Eileen
To: Ritchey, Stacy
Sent: 6/30/2010 4:04:36 PM
Subject: FW: 2011 MTP B&V Study vs. Env Scenario Planning
Attachments: 2011 MTP Environmental Summay - B&V vs Env Scenario Planning.xlsx

From: Straight, Scott
Sent: Tuesday, June 29, 2010 10:34 AM
To: Hudson, Rusty; Schram, Chuck; Wilson, Stuart; Saunders, Eileen
Cc: Voyles, John; Bowling, Ralph
Subject: 2011 MTP B&V Study vs. Env Scenario Planning

Rusty, is this what you were looking for?

To All, please provide comments to this draft comparison table that identifies the unit, technology and cost of the 2011 MTP B&V Study to the Environmental Scenario Planning.

Scott Straight
Director Project Engineering
E.ON U.S. LLC
O 502-627-2701
F 502-214-2040
scott.straight@eon-us.com

	A	B	C	D	E	F	G
1							
2							
3			**2011 MTP Black & Veatch Study**	**Environmental Scenario Planning (x $1,000)**			
4							
5	**Brown**						
6	Brown 1 - SCR		59,000				
7	Brown 1 - SNCR				11,000		
8	Brown 1 - Baghouse		34,000				
9	Brown 1 - PAC Injection		1,599				
10	Brown 1 - Hg Control				3,000		
11	Brown 1 - Neural Networks		500				
12	Brown 1 - SAM Mitigation		4,000				
13	Brown 1 - Escalation		21,238				
14	Brown 1 - CO2				3,000		
15	Total Brown 1		**120,337**		**17,000**		
16							
17	Brown 2 - SCR		92,000				
18	Brown 2 - SCNR				11,000		
19	Brown 2 - Baghouse		34,000				
20	Brown 2 - PAC Injection		2,476				
21	Brown 2 - Hg Control				3,000		
22	Brown 2 - Neural Networks		500				
23	Brown 2 - Lime Injection		2,739				
24	Brown 2 - SAM Mitigation		4,000				
25	Brown 2 - Escalation		48,799				
26	Brown 2 - CO2				5,000		
27	Total Brown 2		**184,514**		**19,000**		
28							
29	Brown 3 - Baghouse		61,000				
30	Brown 3 - PAC Injection		5,426				
31	Brown 3 - Hg Control				4,000		
32	Brown 3 - Neural Networks		1,000				
33	Brown 3 - Escalation		16,952				
34	Brown 3 - CO2				13,000		
35	Total Brown 3		**84,378**		**17,000**		
36							
37	**Total Brown**		**389,229**		**53,000**		
38							
39	**Ghent**						
40	Ghent 1 - Baghouse		131,000				
41	Ghent 1 - PAC Injection		6,380				
42	Ghent 1 - Hg Control				77,000		
43	Ghent 1 - Neural Networks		1,000				

	A	B	C	D	E	F	G
44	Ghent 1 - Escalation		22,965				
45	Ghent 1 - CO2				15,000		
46	Total Ghent 1		**161,345**		**92,000**		
47							
48	Ghent 2 - SCR		227,000		152,000		
49	Ghent 2 - Baghouse		120,000				
50	Ghent 2 - PAC Injection		6,109				
51	Ghent 2 - Hg Control				7,000		
52	Ghent 2 - Lime Injection		5,483				
53	Ghent 2 - Neural Networks		1,000				
54	Ghent 2 - Escalation		57,338				
55	Ghent 2 - CO2				15,000		
56	Total Ghent 2		**416,930**		**174,000**		
57							
58	Ghent 3 - Baghouse		138,000				
59	Ghent 3 - PAC Injection		6,173				
60	Ghent 3 - Hg Control				77,000		
61	Ghent 3 - Neural Networks		1,000				
62	Ghent 3 - Escalation		33,368				
63	Ghent 3 - CO2				15,000		
64	Total Ghent 3		**178,541**		**92,000**		
65							
66	Ghent 4 - Baghouse		117,000				
67	Ghent 4 - PAC Injection		6,210				
68	Ghent 4 - Hg Control				77,000		
69	Ghent 4 - Neural Networks		1,000				
70	Ghent 4 - Escalation		28,313				
71	Ghent 4 - CO2				15,000		
72	Total Ghent 4		**152,523**		**92,000**		
73							
74	**Total Ghent**		**909,338**		**450,000**		
75							
76							
77	**Mill Creek**						
78	Mill Creek 1 - FGD		297,000		20,000		
79	Mill Creek 1 - SCR		97,000		121,000		
80	Mill Creek 1 - Baghouse		81,000				
81	Mill Creek 1 - Electrostatic Precipitator		32,882				
82	Mill Creek 1 - PAC Injection		4,412				
83	Mill Creek 1 - Hg Control				60,000		
84	Mill Creek 1 - SAM Mitigation		8,000				
85	Mill Creek 1 - Lime Injection		4,480				
86	Mill Creek 1 - Neural Networks		1,000				
87	Mill Creek 1 - Escalation		120,469				
88	Mill Creek 1 - CO2				10,000		

	A	B	C	D	E	F	G
89	Total Mill Creek 1		**646,243**		**211,000**		
90							
91	Mill Creek 2 - FGD		297,000		20,000		
92	Mill Creek 2 - SCR		97,000		121,000		
93	Mill Creek 2 - Baghouse		81,000				
94	Mill Creek 2 - Electrostatic Precipitator		32,882				
95	Mill Creek 2 - PAC Injection		4,412				
96	Mill Creek 2 - Hg Control				60,000		
97	Mill Creek 2 - SAM Control		8,000				
98	Mill Creek 2 - Lime Injection		4,480				
99	Mill Creek 2 - Neural Networks		1,000				
100	Mill Creek 2 - Escalation		101,752				
101	Mill Creek 2 - CO2				10,000		
102	Total Mill Creek 2		**627,526**		**211,000**		
103							
104	Mill Creek 3 - FGD		392,000		20,000		
105	Mill Creek 3 - Baghouse		114,000				
106	Mill Creek 3 - PAC Injection		5,592				
107	Mill Creek 3 - Hg Control				69,000		
108	Mill Creek 3 - Neural Networks		1,000				
109	Mill Creek 3 - Escalation		111,307				
110	Mill Creek 3 - CO2				12,000		
111	Total Mill Creek 3		**623,899**		**101,000**		
112							
113	Mill Creek 4 - FGD		455,000		20,000		
114	Mill Creek 4 - Baghouse		133,000				
115	Mill Creek 4 - PAC Injection		6,890				
116	Mill Creek 4 - Hg Control				77,000		
117	Mill Creek 4 - Neural Networks		1,000				
118	Mill Creek 4 - Escalation		157,787				
119	Mill Creek 4 - CO2				15,000		
120	Total Mill Creek 4		**753,677**		**112,000**		
121							
122	**Total Mill Creek**		**2,651,346**		**635,000**		
123							
124							
125	**Trimble**						
126	Trimble 1 - Baghouse		128,000				
127	Trimble 1 - PAC Injection		6,451				
128	Trimble 1 - Hg Control				4,000		
129	Trimble 1 - Neural Networks		1,000				
130	Trimble 1 - Escalation		30,738				
131	Trimble 1 - CO2				16,000		
132	Total Trimble 1		**166,189**		**20,000**		
133							

	A	B	C	D	E	F	G
134	**Total Trimble**		**166,189**		**20,000**		
135							
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**		
137							
138							
139							
140							
141							
142							
143							
144							
145							
146							
147							
148							
149							
150							
151							
152	**Sensitivities**						
153	**Green River**						
154	Green River 3 - SCR		29,000				
155	Green River 3 - CDS-FF		38,000				
156	Green River 3 - PAC Injection		1,112				
157	Green River 3 - Neural Networks		500				
158	Green River 3 - Escalation		17,899				
159	Total Green River 3		**86,511**				
160							
161	Green River 4 - SCR		42,000				
162	Green River 4 - CDS-FF		54,000				
163	Green River 4 - PAC Injection		1,583				
164	Green River 4 - Neural Networks		500				
165	Green River 4 - Escalation		20,877				
166	Total Green River 4		**118,960**				
167							
168	**Total Green River**		**205,471**				
169							
170							
171	**Cane Run**						
172	Cane Run 4 - FGD		152,000				
173	Cane Run 4 - SCR		63,000				
174	Cane Run 4 - Baghouse		33,000				
175	Cane Run 4 - PAC Injection		2,326				
176	Cane Run 4 - Lime Injection		2,569				
177	Cane Run 4 - Neural Networks		500				
178	Cane Run 4 - Escalation		45,571				

	A	B	C	D	E	F	G
179	Total Cane Run 4		**298,966**				
180							
181	Cane Run 5 - FGD		159,000				
182	Cane Run 5 - SCR		66,000				
183	Cane Run 5 - Baghouse		35,000				
184	Cane Run 5 - PAC Injection		2,490				
185	Cane Run 5 - Lime Injection		2,752				
186	Cane Run 5 - Neural Networks		500				
187	Cane Run 5 - Escalation		59,628				
188	Total Cane Run 5		**325,370**				
189							
190	Cane Run 6 - FGD		202,000				
191	Cane Run 6 - SCR		86,000				
192	Can Rune 6 - Baghouse		45,000				
193	Cane Run 6 - PAC Injection		3,490				
194	Cane Run 6 - Lime Injection		3,873				
195	Cane Run 6 - Neural Networks		500				
196	Cane Run 6 - Escalation		60,222				
197	Total Can Run 6		401,085				
198							
199	**Total Cane Run**		**1,025,422**				
200							
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**				
202							
203							
204	**Grand Total Environmental Compliance Air**		**5,346,993**				

	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				$536
8	Brown 1 - Baghouse				$309
9	Brown 1 - PAC Injection				$15
10	Brown 1 - Neural Networks				$5
11	Brown 1 - Overfire Air				$193
12	Total Brown 1		110		**$1,058**
13					
14	Brown 2 - SCR				$511
15	Brown 2 - Baghouse				$189
16	Brown 2 - PAC Injection				$14
17	Brown 2 - Neural Networks				$3
18	Brown 2 - Lime Injection				$15
19	Total Brown 2		180		**$732**
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**		**$521**
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**		**$432**
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**		**$1,142**
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**		**$1,681**
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**		**$1,649**
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**		**$922**

From:	Saunders, Eileen
To:	Straight, Scott
Sent:	6/29/2010 7:49:37 AM
Subject:	FW: B&V Cost Estimates - Updated Per Eileen
Attachments:	Environmental Summay (rev5 6-3-10).xlsx

From: Ritchey, Stacy
Sent: Thursday, June 03, 2010 8:14 AM
To: Voyles, John; Bowling, Ralph; Straight, Scott
Cc: Saunders, Eileen
Subject: B&V Cost Estimates - Updated Per Eileen

Stacy Ritchey
Budget Analyst III, Project Engineering
BOC 3
BOC Phone: (502) 627-4388
EW Brown Phone (859) 748-4455
Fax: (502) 217-4980
E-mail: Stacy.Ritchey@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:	Ritchey, Stacy
To:	Straight, Scott
CC:	Saunders, Eileen
Sent:	6/29/2010 9:18:50 AM
Subject:	Environmental Air Request
Attachments:	Environmental Summay (rev6 6-29-10).xlsx

Scott,

Per your request, please see the attached. Let us know if you have any questions. Thanks.

Stacy Ritchey
Budget Analyst III, Project Engineering
BOC 3
BOC Phone: (502) 627-4388
EW Brown Phone (859) 748-4455
Fax: (502) 217-4980
E-mail: Stacy.Ritchey@eon-us.com

	A	B	C
1	Black & Veatch Study Cost Estimates (including SAM Mitigation & Escalation)		
2	$ in thousands		
3			**Capital Cost**
4	**Main Plan**		
5	**Brown**		
6	Brown 1 - SCR		$59,000
7	Brown 1 - Baghouse		$34,000
8	Brown 1 - PAC Injection		$1,599
9	Brown 1 - Neural Networks		$500
10	Brown 1 - Escalation		$21,238
11	Total Brown 1		**$116,337**
12			
13	Brown 2 - SCR		$92,000
14	Brown 2 - Baghouse		$34,000
15	Brown 2 - PAC Injection		$2,476
16	Brown 2 - Neural Networks		$500
17	Brown 2 - Lime Injection		$2,739
18	Brown 2 - Escalation		$48,799
19	Total Brown 2		**$180,514**
20			
21	**Brown 1 & 2 - SAM Mitigation**		**$8,000**
22			
23	Brown 3 - Baghouse		$61,000
24	Brown 3 - PAC Injection		$5,426
25	Brown 3 - Neural Networks		$1,000
26	Brown 3 - Escalation		$16,952
27	Total Brown 3		**$84,378**
28			
29	**Total Brown**		**$389,229**
30			
31	**Ghent**		
32	Ghent 1 - Baghouse		$131,000
33	Ghent 1 - PAC Injection		$6,380
34	Ghent 1 - Neural Networks		$1,000
35	Ghent 1 - Escalation		$22,965
36	Total Ghent 1		**$161,345**
37			
38	Ghent 2 - SCR		$227,000
39	Ghent 2 - Baghouse		$120,000
40	Ghent 2 - PAC Injection		$6,109
41	Ghent 2 - Lime Injection		$5,483
42	Ghent 2 - Neural Networks		$1,000
43	Ghent 2 - Escalation		$57,338
44	Total Ghent 2		**$416,930**
45			
46	Ghent 3 - Baghouse		$138,000
47	Ghent 3 - PAC Injection		$6,173
48	Ghent 3 - Neural Networks		$1,000
49	Ghent 3 - Escalation		$33,368
50	Total Ghent 3		**$178,541**
51			

	A	B	C
52	Ghent 4 - Baghouse		$117,000
53	Ghent 4 - PAC Injection		$6,210
54	Ghent 4 - Neural Networks		$1,000
55	Ghent 4 - Escalation		$28,313
56	Total Ghent 4		**$152,523**
57			
58	**Total Ghent**		**$909,338**
59			
60			
61	**Mill Creek**		
62	Mill Creek 1 - FGD		$297,000
63	Mill Creek 1 - SCR		$97,000
64	Mill Creek 1 - Baghouse		$81,000
65	Mill Creek 1 - Electrostatic Precipitator		$32,882
66	Mill Creek 1 - PAC Injection		$4,412
67	Mill Creek 1 - Lime Injection		$4,480
68	Mill Creek 1 - Neural Networks		$1,000
69	Mill Creek 1 - Escalation		$120,469
70	Total Mill Creek 1		**$638,243**
71			
72	Mill Creek 2 - FGD		$297,000
73	Mill Creek 2 - SCR		$97,000
74	Mill Creek 2 - Baghouse		$81,000
75	Mill Creek 2 - Electrostatic Precipitator		$32,882
76	Mill Creek 2 - PAC Injection		$4,412
77	Mill Creek 2 - Lime Injection		$4,480
78	Mill Creek 2 - Neural Networks		$1,000
79	Mill Creek 2 - Escalation		$101,752
80	Total Mill Creek 2		**$619,526**
81			
82	**Mill Creek 1 & 2 - SAM Mitigation**		**$12,000**
83			
84	Mill Creek 3 - FGD		$392,000
85	Mill Creek 3 - Baghouse		$114,000
86	Mill Creek 3 - PAC Injection		$5,592
87	Mill Creek 3 - Neural Networks		$1,000
88	Mill Creek 3 - Escalation		$111,307
89	Total Mill Creek 3		**$623,899**
90			
91	Mill Creek 4 - FGD		$455,000
92	Mill Creek 4 - Baghouse		$133,000
93	Mill Creek 4 - PAC Injection		$6,890
94	Mill Creek 4 - Neural Networks		$1,000
95	Mill Creek 4 - Escalation		$157,787
96	Total Mill Creek 4		**$753,677**
97			
98	**Total Mill Creek**		**$2,647,346**
99			
100			
101	**Trimble**		
102	Trimble 1 - Baghouse		$128,000

	A	B	C
103	Trimble 1 - PAC Injection		$6,451
104	Trimble 1 - Neural Networks		$1,000
105	Trimble 1 - Escalation		$30,738
106	Total Trimble 1		**$166,189**
107			
108	**Total Trimble**		**$166,189**
109			
110	**Total Environmental Compliance Air - Main Plan**		**$4,112,101**
111			
112			
113			
114			
115	**Sensitivities**		
116	**Green River**		
117	Green River 3 - SCR		$29,000
118	Green River 3 - CDS-FF		$38,000
119	Green River 3 - PAC Injection		$1,112
120	Green River 3 - Neural Networks		$500
121	Green River 3 - Escalation		$17,899
122	Total Green River 3		**$86,511**
123			
124	Green River 4 - SCR		$42,000
125	Green River 4 - CDS-FF		$54,000
126	Green River 4 - PAC Injection		$1,583
127	Green River 4 - Neural Networks		$500
128	Green River 4 - Escalation		$20,877
129	Total Green River 4		**$118,960**
130			
131	**Total Green River**		**$205,471**
132			
133			
134	**Cane Run**		
135	Cane Run 4 - FGD		$152,000
136	Cane Run 4 - SCR		$63,000
137	Cane Run 4 - Baghouse		$33,000
138	Cane Run 4 - PAC Injection		$2,326
139	Cane Run 4 - Lime Injection		$2,569
140	Cane Run 4 - Neural Networks		$500
141	Cane Run 4 - Escalation		$45,571
142	Total Cane Run 4		**$298,966**
143			
144	Cane Run 5 - FGD		$159,000
145	Cane Run 5 - SCR		$66,000
146	Cane Run 5 - Baghouse		$35,000
147	Cane Run 5 - PAC Injection		$2,490
148	Cane Run 5 - Lime Injection		$2,752
149	Cane Run 5 - Neural Networks		$500
150	Cane Run 5 - Escalation		$59,628
151	Total Cane Run 5		**$325,370**
152			

	A	B	C
153	Cane Run 6 - FGD		$202,000
154	Cane Run 6 - SCR		$86,000
155	Can Rune 6 - Baghouse		$45,000
156	Cane Run 6 - PAC Injection		$3,490
157	Cane Run 6 - Lime Injection		$3,873
158	Cane Run 6 - Neural Networks		$500
159	Cane Run 6 - Escalation		$60,222
160	Total Can Run 6		$401,085
161			
162	**Total Cane Run**		**$1,025,422**
163			
164	**Total Environmental Compliance Air - Sensitivities**		**$1,230,892**
165			
166			
167	**Grand Total Environmental Compliance Air**		**$5,342,993**

	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				$536
8	Brown 1 - Baghouse				$309
9	Brown 1 - PAC Injection				$15
10	Brown 1 - Neural Networks				$5
11	Brown 1 - Overfire Air				$193
12	Total Brown 1		110		**$1,058**
13					
14	Brown 2 - SCR				$511
15	Brown 2 - Baghouse				$189
16	Brown 2 - PAC Injection				$14
17	Brown 2 - Neural Networks				$3
18	Brown 2 - Lime Injection				$15
19	Total Brown 2		180		**$732**
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**		**$521**
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**		**$432**
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**		**$1,142**
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**		**$1,681**
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**		**$1,646**
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**		**$921**

From: Schram, Chuck
To: Sinclair, David
Sent: 7/1/2010 8:25:12 AM
Subject: FW: Environmental Capex by Regulation
Attachments: 20100630_2011MTPEnvironmentalSummary-B&VvsEPARegs_LAK.xlsx; Generation Future Environmental Requirements.xlsx

David,

Attached is a first pass at the "CAPEX by Reg". I'm checking into some additional detail on this, particularly around the local/regional requirements vs. unit specific requirements as specified by B&V. We also need to identify the spend that is driven by more than one regulation.

Chuck

From: Wilson, Stuart
Sent: Wednesday, June 30, 2010 3:16 PM
To: Schram, Chuck
Cc: Karavayev, Louanne
Subject: Environmental Capex by Regulation

Chuck,

I've attached (from Lou Anne) a summary of the new B&V environmental capex dollars by environmental regulation. The vast majority of the spending is the result of two regulations: revised CAIR and EGU MACT (Hg/HAPS). According to Greg Black, we hope to comply with (for example) the new 1-hour NAAQS for NOX/SO2 standards using the technology we're acquiring for revised CAIR.

I've attached Lou Anne's summary and a summary of environmental regulations from Gary Revlett...

Stuart

<<...>> <<...>>

	A	B	C	D	E	F	G
1							
2							
3			**2011 MTP Black & Veatch Study**	**(x $1**	**Environmental Scenario Planning (x $1**		**Regulation**
4							
5	**Brown**						
6	Brown 1 - SCR		59,000				Revised CAIR
7	Brown 1 - SNCR				11,000		Revised CAIR
8	Brown 1 - Baghouse		34,000				EGU MACT
9	Brown 1 - PAC Injection		1,599				EGU MACT
10	Brown 1 - Hg Control				3,000		EGU MACT
11	Brown 1 - Neural Networks		500				EGU MACT
12	Brown 1 - SAM Mitigation		4,000				Brown Consent Decree
13	Brown 1 - Escalation		21,238				Escalation
14	Brown 1 - CO2				3,000		
15	Total Brown 1		**120,337**		**17,000**		
16							
17	Brown 2 - SCR		92,000				Revised CAIR
18	Brown 2 - SCNR				11,000		Revised CAIR
19	Brown 2 - Baghouse		34,000				EGU MACT
20	Brown 2 - PAC Injection		2,476				EGU MACT
21	Brown 2 - Hg Control				3,000		EGU MACT
22	Brown 2 - Neural Networks		500				EGU MACT
23	Brown 2 - Lime Injection		2,739				EGU MACT
24	Brown 2 - SAM Mitigation		4,000				Brown Consent Decree
25	Brown 2 - Escalation		48,799				Escalation
26	Brown 2 - CO2				5,000		
27	Total Brown 2		**184,514**		**19,000**		
28							
29	Brown 3 - Baghouse		61,000				EGU MACT
30	Brown 3 - PAC Injection		5,426				EGU MACT
31	Brown 3 - Hg Control				4,000		EGU MACT
32	Brown 3 - Neural Networks		1,000				EGU MACT
33	Brown 3 - Escalation		16,952				Escalation
34	Brown 3 - CO2				13,000		
35	Total Brown 3		**84,378**		**17,000**		
36							
37	**Total Brown**		**389,229**		**53,000**		
38							
39	**Ghent**						
40	Ghent 1 - Baghouse		131,000				EGU MACT
41	Ghent 1 - PAC Injection		6,380				EGU MACT
42	Ghent 1 - Hg Control				77,000		EGU MACT
43	Ghent 1 - Neural Networks		1,000				EGU MACT

	A	B	C	D	E	F	G
44	Ghent 1 - Escalation		22,965				Escalation
45	Ghent 1 - CO2				15,000		
46	Total Ghent 1		**161,345**		**92,000**		
47							
48	Ghent 2 - SCR		227,000		152,000		Revised CAIR
49	Ghent 2 - Baghouse		120,000				EGU MACT
50	Ghent 2 - PAC Injection		6,109				EGU MACT
51	Ghent 2 - Hg Control				7,000		EGU MACT
52	Ghent 2 - Lime Injection		5,483				EGU MACT
53	Ghent 2 - Neural Networks		1,000				EGU MACT
54	Ghent 2 - Escalation		57,338				Escalation
55	Ghent 2 - CO2				15,000		
56	Total Ghent 2		**416,930**		**174,000**		
57							
58	Ghent 3 - Baghouse		138,000				EGU MACT
59	Ghent 3 - PAC Injection		6,173				EGU MACT
60	Ghent 3 - Hg Control				77,000		EGU MACT
61	Ghent 3 - Neural Networks		1,000				EGU MACT
62	Ghent 3 - Escalation		33,368				Escalation
63	Ghent 3 - CO2				15,000		
64	Total Ghent 3		**178,541**		**92,000**		
65							
66	Ghent 4 - Baghouse		117,000				EGU MACT
67	Ghent 4 - PAC Injection		6,210				EGU MACT
68	Ghent 4 - Hg Control				77,000		EGU MACT
69	Ghent 4 - Neural Networks		1,000				EGU MACT
70	Ghent 4 - Escalation		28,313				Escalation
71	Ghent 4 - CO2				15,000		
72	Total Ghent 4		**152,523**		**92,000**		
73							
74	**Total Ghent**		**909,338**		**450,000**		
75							
76							
77	**Mill Creek**						
78	Mill Creek 1 - FGD		297,000		20,000		Revised CAIR
79	Mill Creek 1 - SCR		97,000		121,000		Revised CAIR
80	Mill Creek 1 - Baghouse		81,000				EGU MACT
81	Mill Creek 1 - Electrostatic Precipitator		32,882				EGU MACT
82	Mill Creek 1 - PAC Injection		4,412				EGU MACT
83	Mill Creek 1 - Hg Control				60,000		EGU MACT
84	Mill Creek 1 - SAM Mitigation		8,000				Mill Creek BART
85	Mill Creek 1 - Lime Injection		4,480				EGU MACT
86	Mill Creek 1 - Neural Networks		1,000				EGU MACT
87	Mill Creek 1 - Escalation		120,469				Escalation
88	Mill Creek 1 - CO2				10,000		

	A	B	C	D	E	F	G
89	Total Mill Creek 1		**646,243**		**211,000**		
90							
91	Mill Creek 2 - FGD		297,000		20,000		Revised CAIR
92	Mill Creek 2 - SCR		97,000		121,000		Revised CAIR
93	Mill Creek 2 - Baghouse		81,000				EGU MACT
94	Mill Creek 2 - Electrostatic Precipitator		32,882				EGU MACT
95	Mill Creek 2 - PAC Injection		4,412				EGU MACT
96	Mill Creek 2 - Hg Control				60,000		EGU MACT
97	Mill Creek 2 - SAM Control		8,000				Mill Creek BART
98	Mill Creek 2 - Lime Injection		4,480				EGU MACT
99	Mill Creek 2 - Neural Networks		1,000				EGU MACT
100	Mill Creek 2 - Escalation		101,752				Escalation
101	Mill Creek 2 - CO2				10,000		
102	Total Mill Creek 2		**627,526**		**211,000**		
103							
104	Mill Creek 3 - FGD		392,000		20,000		Revised CAIR
105	Mill Creek 3 - Baghouse		114,000				EGU MACT
106	Mill Creek 3 - PAC Injection		5,592				EGU MACT
107	Mill Creek 3 - Hg Control				69,000		EGU MACT
108	Mill Creek 3 - Neural Networks		1,000				EGU MACT
109	Mill Creek 3 - Escalation		111,307				Escalation
110	Mill Creek 3 - CO2				12,000		
111	Total Mill Creek 3		**623,899**		**101,000**		
112							
113	Mill Creek 4 - FGD		455,000		20,000		Revised CAIR
114	Mill Creek 4 - Baghouse		133,000				EGU MACT
115	Mill Creek 4 - PAC Injection		6,890				EGU MACT
116	Mill Creek 4 - Hg Control				77,000		EGU MACT
117	Mill Creek 4 - Neural Networks		1,000				EGU MACT
118	Mill Creek 4 - Escalation		157,787				Escalation
119	Mill Creek 4 - CO2				15,000		
120	Total Mill Creek 4		**753,677**		**112,000**		
121							
122	**Total Mill Creek**		**2,651,346**		**635,000**		
123							
124							
125	**Trimble**						
126	Trimble 1 - Baghouse		128,000				EGU MACT
127	Trimble 1 - PAC Injection		6,451				EGU MACT
128	Trimble 1 - Hg Control				4,000		EGU MACT
129	Trimble 1 - Neural Networks		1,000				EGU MACT
130	Trimble 1 - Escalation		30,738				Escalation
131	Trimble 1 - CO2				16,000		
132	Total Trimble 1		**166,189**		**20,000**		
133							

	A	B	C	D	E	F	G
134	**Total Trimble**		**166,189**		**20,000**		
135							
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**		
137							
138							
139							
140							
141							
142							
143							
144							
145							
146							
147							
148							
149							
150							
151							
152	**Sensitivities**						
153	**Green River**						
154	Green River 3 - SCR		29,000				
155	Green River 3 - CDS-FF		38,000				
156	Green River 3 - PAC Injection		1,112				
157	Green River 3 - Neural Networks		500				
158	Green River 3 - Escalation		17,899				
159	Total Green River 3		**86,511**				
160							
161	Green River 4 - SCR		42,000				
162	Green River 4 - CDS-FF		54,000				
163	Green River 4 - PAC Injection		1,583				
164	Green River 4 - Neural Networks		500				
165	Green River 4 - Escalation		20,877				
166	Total Green River 4		**118,960**				
167							
168	**Total Green River**		**205,471**				
169							
170							
171	**Cane Run**						
172	Cane Run 4 - FGD		152,000				
173	Cane Run 4 - SCR		63,000				
174	Cane Run 4 - Baghouse		33,000				
175	Cane Run 4 - PAC Injection		2,326				
176	Cane Run 4 - Lime Injection		2,569				
177	Cane Run 4 - Neural Networks		500				
178	Cane Run 4 - Escalation		45,571				

	A	B	C	D	E	F	G
179	Total Cane Run 4		**298,966**				
180							
181	Cane Run 5 - FGD		159,000				
182	Cane Run 5 - SCR		66,000				
183	Cane Run 5 - Baghouse		35,000				
184	Cane Run 5 - PAC Injection		2,490				
185	Cane Run 5 - Lime Injection		2,752				
186	Cane Run 5 - Neural Networks		500				
187	Cane Run 5 - Escalation		59,628				
188	Total Cane Run 5		**325,370**				
189							
190	Cane Run 6 - FGD		202,000				
191	Cane Run 6 - SCR		86,000				
192	Can Rune 6 - Baghouse		45,000				
193	Cane Run 6 - PAC Injection		3,490				
194	Cane Run 6 - Lime Injection		3,873				
195	Cane Run 6 - Neural Networks		500				
196	Cane Run 6 - Escalation		60,222				
197	Total Can Run 6		401,085				
198							
199	**Total Cane Run**		**1,025,422**				
200							
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**				
202							
203							
204	**Grand Total Environmental Compliance Air**		**5,346,993**				

	A	B
1		
2		**Total ($M)**
3	Revised CAIR	2,013
4	EGU MACT	1,328
5	Brown Consent Decree	8
6	Mill Creek BART	16
7		3,365
8		
9	Escalation	751
10		4,116

	A	B	C	D	E	F	G
1							
2	**Estimated Requirements Under Future New Environmental Regulations**						
3							
4	**Task**	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
5	**No.**	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
6	4.1	GHG Inventory	No additional limits			N/A	Spring - 2010
7	4.2	ing Engine NSPS anc	PM	lorsepower. Certified to meet Tier		Unit	ting MACT & at insta
8			NO_x				
9			VOC				
10			CO				
11	4.3	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
12			MC4 - SAM	76.5	lbs/hour		
13	4.4	fferson Co. STAR Re				Plant	Spring - 2012
14			fuels (As) 20 - 50 ppm or ~1x10^{-5} lbs/mmBtu emis				
15	&	rown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
16			SO_2	97%	Removal		
17			NO_x	0.07 /0.08	lbs/mmBtu		
18			SAM	110 -220	lbs/mmBtu		
19	4.7	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
20	4.8	GHG NSR	GHG	Energy Efficiency Projects		Unit/Plant	January, 2011
21	4.9	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	Beginning in 2014
22			NO_x	0.11	lbs/mmBtu		
23	4.10	New EGU MACT	Mercury	90% or	Removal	Plant	with 1-yr extension
24				0.012	lbs/GWH		
25			Acids (HCl)	0.002	lbs/mmBtu	Unit	
26			Metals (PM)	0.03	lbs/mmBtu		
27			Metals (As)	0.5 x 10^{-5}	lbs/mmBtu		
28			Organics (CO)	0.10	lbs/mmBtu		
29			Dioxin/Furan	15 x 10^{-18}	lbs/mmBtu		
30	4.11	n Co. Ozone Non-at	NO_x	5 - 10 % reductior	NOx emissions	County-wide	Spring - 2016
31	4.11	v 1-hour NAAQS for	NO_x	letermined based on m	lbs/hours	Plant	During - 2015
32	4.12	v 1-hour NAAQS for	SO_2	letermined based on m	lbs/hours	Plant	Spring - 2016
33	4.13	Reduction & Renew	GHG	letermined based on m	tons/year	Fleet	Beginning in 2014
34	Plan Risk	$_{2.5}$ Emission Reduct	12.5 (Condensabl	letermined based on m	lbs/mmBtu	Unit/Plant	After 2013
35	4.14	CWA 316(a)	Thermal impacts	Biological Studies	N/A	Plant	Starting in 2010

	A	B	C	D	E	F	G
36	4.15	CWA 316(b)	Withdraw impacts	Biological Studies	N/A	Plant	Starting in 2012
37	4.16	ew Effluent Standa	etals, Chlorides, et	anaylsis is just begi	anaylsis is just begi	Plant	During - 2015
38	4.17	CCR Classification	Toxic Metals	landfill; possible closing existing ash po		Plant	Beginning in 2012;
39							
40		- New requirements have been finalized					

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Current Estimated Implementation - Fast)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	Brown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	e I in 2014; Limits in Phas
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	with 1-yr extension -
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	on Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2016
24	w 1-hour NAAQS for N	NO_x	termined based on r	lbs/hours	Plant	During - 2015
25	w 1-hour NAAQS for S	SO_2	termined based on r	lbs/hours	Plant	Spring - 2016
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	termined based on r	lbs/hours	Plant	During 2016
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	rown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	ber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	ase I in 2016; Limits in Phase I
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	2017 for high utilitization u
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	n Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2017
24	v 1-hour NAAQS for	NO_x	termined based on	lbs/hours	Plant	During - 2016
25	v 1-hour NAAQS for	SO_2	termined based on	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$M_{2.5}$ or Condensable F	termined based on	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation and Higher Limits)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	own Consent Decr	PM	0.03	lbs/mmBtu	Unit 3	nber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.4	lbs/mmBtu	Plant	ase I in 2016; Limits in Phase II
15		NO_x	0.2	lbs/mmBtu		
16	New EGU MACT	Mercury	85% or	Removal	Plant	2017 for high utilitization un
17			0.021	lbs/GWH		
18		Acids (HCl)	0.02	lbs/mmBtu	Unit	
19		Metals (PM) or	0.04	lbs/mmBtu		
20		Metals (As)	$2. \times 10^{-5}$	lbs/mmBtu		
21		Organics (CO)	0.20	lbs/mmBtu		
22		Dioxin/Furan	50×10^{-18}	lbs/mmBtu		
23	Co. Ozone Non-at	NO_x	5 % reduction	NOx emissions	County-wide	Spring - 2017
24	1-hour NAAQS for	NO_x	etermined based on n	lbs/hours	Plant	During - 2016
25	1-hour NAAQS fo	SO_2	etermined based on n	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	etermined based on n	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

From:	Gregory, Ronald
To:	Saunders, Eileen
Sent:	7/1/2010 8:56:17 AM
Subject:	PE's Bi-Weekly Update of 7-01-10 (rdg).docx
Attachments:	PE's Bi-Weekly Update of 7-01-10 (rdg).docx

Energy Services - Bi-Weekly Update
July 01, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the draft report for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Coating application is complete. Testing of the application will take place 90 days after the coating application.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Contractor on site June 30th with work starting July 6th.
      - Elevators- Bids received June 7, 2010 and are under review.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD continues to operate very well. Brown 2 is expected to be directed through the FGD sometime this summer, after some additional control system logic changes are implemented.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning of the vacuum pump, motor, and filter belt completed by FLS..
        - Fluor continues to work on the DCS and commissioning of the Fluor supplied equipment.
        - Facility operation contract bid reviews ongoing. Bid review of short list contractors completed and an award should take place next week.
      - E.W. Brown Gypsum Lab
        - Construction complete and certificate of occupancy granted. Plant has begun to use the facility.
  - Budget:
    - Brown – The Brown FGD Program Current Budget with Fluor this period is at $489.2m. There is $3.4m included in the forecast for un-approved change orders and $5.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown was unchanged, for a Total Brown FGD Program ITC of $410.1m.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - The elevator bids came back higher than anticipated and the schedule shows some work moving into the first quarter of 2011. We are continuing to evaluate the bids and challenge the vendors on cost saving opportunities. This will be picked up in the 2011 MTP.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – Auditing released their audit report on TC2 invoicing with no findings.

- Schedule/Execution:
  - Bechtel EPC – TC2 achieved 50% load Jun 15. Bechtel has been experiencing significant combustion tuning issues that have delayed the first full load until late June. **Bechtel's latest forecasted substantial completion date is now July 30.**
- Budget – Revised EPC authorization and project sanction approved in May IC meeting.
- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Commissioning versus schedule.
  - Current unit issues: Combustion tuning.

- **Brown 3 SCR**
  - Schedule/Execution – The 2012 spring outage needs to be picked up in the 2011 MTP.
  - Permitting – SAM testing took place in late May. Additional testing being planned for summer.
  - Engineering – EPC engineering kick off meeting held in Denver, CO (home of Zachry Engineering). All parties are working very well together. Alstom to be released on engineering of the HW recirc for economizer exit control to allow wider range of unit operation for SCR.
  - Budget - NTR
  - Contracting - NTR
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.
- **Mill Creek Limestone Project**
  - Safety - NTR

- Auditing- NTR
- Permitting- NTR
- Engineering/General
  - Transition meeting held with the plant to coordinating moving the activities associated with the project from the Plant to PE.
  - Review of the URS Engineering Study held with the plant.
  - Scope development for the limestone building extension is underway. Working to send out a bid package to local constructors the week of June 28, 2010.
  - Working with URS to procure long lead time equipment.
- Budget
  - AIP development in progress.
- Contracting
  - Working with the Director and Commercial Manager to develop an overall engineering, procurement and construction strategy.
- Issue/Risk
  - Tight schedule for completing the building extension by the end of the year.

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Running Buffalo Cover study was performed with no findings.
  - Engineering
    - Development of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – project remains tracking to or below sanction.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - While PE has not restarted engineering/procurement work, discussions with Crutcher indicate negotiations may begin to accelerate with Holcim.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
  - Budgeting – NTR
  - Engineering – Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Outlook is to get clay liner to proposed new regs thus allowing the clay liner and FML planned to meet future requirements.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk

    - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
    - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution – NTR
  - Budgeting – NTR
  - Engineering – The Detailed Engineering RFP is planned to be issued in June.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering of the CCP transport systems have resulted in a revised estimate significantly over the original amount included in the initial project ECR filings. PE will be working with station through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. Final offers are planned to three remaining land owners in June, followed by a formal letter to them announcing our potential intent to begin condemnation proceedings. A final decision of changing designs versus condemnation of remaining property needed for initial plan expected in late July.

- **General CCP Projects**
  - Study report reviewing potential range of cost to comply with EPA options of CCP storage has been received. Range of cost is $700 - $1,100 million, depending on Subpart C or Subpart D. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. The cost will be socialized the week of June 21 with management and stations.

- **E.W. Brown Ash Pond Project**
  - **E.W. Brown Starter Dike**
    - Safety – (0) Recordable
    - Schedule/Execution:

        - Approximately 50% of the pond covered with straw mats for dust control. Mats rolled up in areas as needed to facilitate ash-grading activity.
        - Rock placement continued on the West and South Embankments. Approximately 95% of the rock embankment has been placed to date.
        - In-Situ work completed.
        - Ash grading continued on the South and East portion of the pond and in the In-Situ interface areas where applicable.
        - Clay placement is slow due to the amount of oversized rock present in the material stockpiled by Summit.
        - Budget – NTR
        - Contract Disputes/Resolution: NTR
        - Issues/Risk – NTR

    - **E.W. Brown Aux Pond 900'**
        - Schedule/Execution:
        - Mobilization efforts continued.
        - Installation of erosion and sediment control measures.
        - Budget – NTR
        - Contract Disputes/Resolution – NTR
        - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
    - Safety – A recordable occurred on the MC3 testing due to a minor injury resulting in a pain reliever being prescribed.
    - Schedule/Execution:
        - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
        - MC 4 tests by E.ON Engineering for PM testing have not been published. .
        - MC 3 testing is nearing completion.

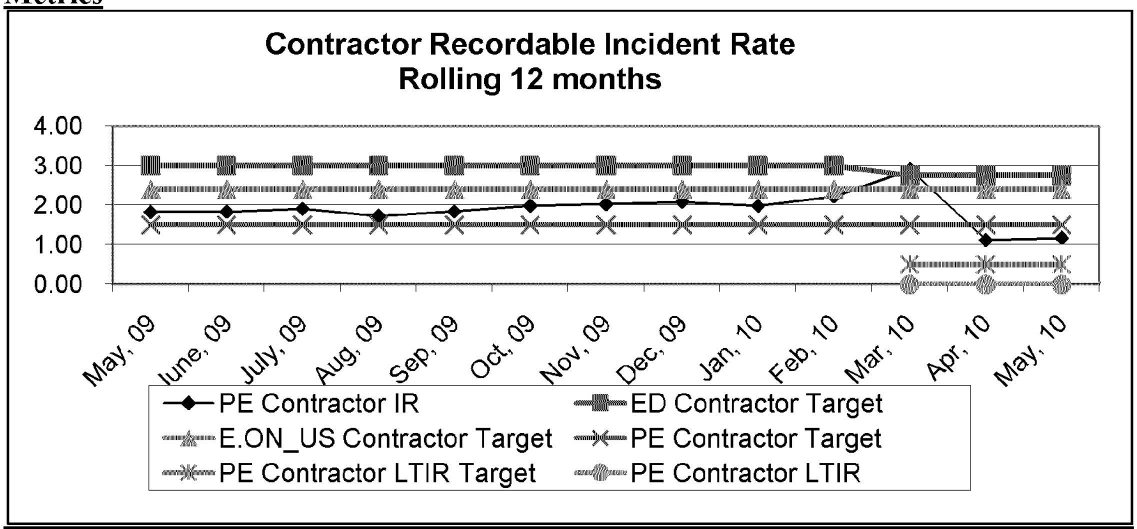
- **SO3 Mitigation (Ghent)**
    - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24th was canceled.
    - B&V BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper in development.
    - Emissions Monitoring Inc. (Jim Peeler) has drafted a white paper on CEMS/Compliance Monitoring Testing.
    - Teleconference with Duke regarding experience with SBS Injection System at Gibson revealed they have expended significant expenses on testing with hundreds of test. Their system was reported to be meeting sub 2 ppm emissions on a continuous basis.

- **NBU1 and Other Generation Development**
    - LFG
        - First Landfill Gas Sample Result received.
        - LFG Technologies is under contract to perform study work.
    - NBU CR – HDR draft of estimate received and under review.
    - Biomass – Black and Veatch under contract to perform MC Project Implementation Planning study work.

- FutureGen – NTR

- General
  - Impoundment Integrity Program – this is nearing completion of the initial program with PE looking to transfer all future work to Generation Services.
  - Environmental Scenario Planning – B&V completed the initial cost estimate and the initial report was received on June 17th. Reviews of the estimate are in progress with cost exceeding $4 billion. Iterations between PE and Generation Planning expected to refine scope throughout the fleet and reduce the overall cost to the $3 billion range.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July..

Metrics



Upcoming PWT Needs:

Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

Staffing - NTR

From:	Karavayev, Louanne
To:	Black, Greg
CC:	Wilson, Stuart
Sent:	7/1/2010 10:44:01 AM
Subject:	FW: 2011 MTP B&V Study vs. Env Scenario Planning
Attachments:	20100630_2011MTPEnvironmentalSummary-B&VvsEPARegs_LAK1.xlsx; 20100630_2011MTPEnvironmentalSummary-B&VvsEPARegs_LAK.xlsx; Generation Future Environmental Requirements.xlsx

Greg,
As a follow-up on the spreadsheet you helped me with yesterday, I am being asked to specify additional regulations that may be met with the new equipment. My best guess for this is attached. Please let me know if you have any changes or questions. 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

From: Karavayev, Louanne
Sent: Wednesday, June 30, 2010 11:07 AM
To: Black, Greg
Cc: Wilson, Stuart; Schram, Chuck
Subject: RE: 2011 MTP B&V Study vs. Env Scenario Planning

Greg,
Per our phone conversation, here is my best guess at the Regulations portion of the attached spreadsheet. I realize that some of the new equipment will potentially contribute to more than one of the regulations, but I am looking for the most applicable. Please let me know if you have any questions. I apologize for the late notice on this request, but David Sinclair has requested this before the end of the day.

Also, here is the list of regulations from Gary Revlett which I used in determining my best guess.

Thank you,

Lou Anne Karavayev
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e LouAnne.Karavayev@EON-US.com

From: Karavayev, Louanne
Sent: Tuesday, June 29, 2010 5:10 PM
To: Black, Greg
Cc: Wilson, Stuart
Subject: FW: 2011 MTP B&V Study vs. Env Scenario Planning

Greg,
Please take a look at the attachment below. I would like to get your help with matching up the capital investments in the

attachment to future environmental regulations. Please let me know when you might be available to meet with me.
Thank you,

Lou Anne Karavayev
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From: Wilson, Stuart
Sent: Tuesday, June 29, 2010 4:25 PM
To: Karavayev, Louanne
Subject: FW: 2011 MTP B&V Study vs. Env Scenario Planning

Lou Anne,

Almost made it a whole day... I'm going to stop by before 5:00 to talk to you about this. Something to do for tomorrow...

Stuart

From: Straight, Scott
Sent: Tuesday, June 29, 2010 10:34 AM
To: Hudson, Rusty; Schram, Chuck; Wilson, Stuart; Saunders, Eileen
Cc: Voyles, John; Bowling, Ralph
Subject: 2011 MTP B&V Study vs. Env Scenario Planning

Rusty, is this what you were looking for?

To All, please provide comments to this draft comparison table that identifies the unit, technology and cost of the 2011 MTP B&V Study to the Environmental Scenario Planning.

<< File: 2011 MTP Environmental Summay - B&V vs Env Scenario Planning.xlsx >>

Scott Straight
Director Project Engineering
E.ON U.S. LLC
O 502-627-2701
F 502-214-2040
scott.straight@eon-us.com

	A	B	C	D	E	F	G
1							
2							
3			**2011 MTP Black & Veatch Study**	**(x $1**	**Environmental Scenario Planning (x $1**		**Regulation**
4							
5	**Brown**						
6	Brown 1 - SCR		59,000				Revised CAIR
7	Brown 1 - SNCR				11,000		Revised CAIR
8	Brown 1 - Baghouse		34,000				EGU MACT
9	Brown 1 - PAC Injection		1,599				EGU MACT
10	Brown 1 - Hg Control				3,000		EGU MACT
11	Brown 1 - Neural Networks		500				EGU MACT
12	Brown 1 - SAM Mitigation		4,000				Brown Consent Decree
13	Brown 1 - Escalation		21,238				Escalation
14	Brown 1 - CO2				3,000		
15	Total Brown 1		**120,337**		**17,000**		
16							
17	Brown 2 - SCR		92,000				Revised CAIR
18	Brown 2 - SCNR				11,000		Revised CAIR
19	Brown 2 - Baghouse		34,000				EGU MACT
20	Brown 2 - PAC Injection		2,476				EGU MACT
21	Brown 2 - Hg Control				3,000		EGU MACT
22	Brown 2 - Neural Networks		500				EGU MACT
23	Brown 2 - Lime Injection		2,739				EGU MACT
24	Brown 2 - SAM Mitigation		4,000				Brown Consent Decree
25	Brown 2 - Escalation		48,799				Escalation
26	Brown 2 - CO2				5,000		
27	Total Brown 2		**184,514**		**19,000**		
28							
29	Brown 3 - Baghouse		61,000				EGU MACT
30	Brown 3 - PAC Injection		5,426				EGU MACT
31	Brown 3 - Hg Control				4,000		EGU MACT
32	Brown 3 - Neural Networks		1,000				EGU MACT
33	Brown 3 - Escalation		16,952				Escalation
34	Brown 3 - CO2				13,000		
35	Total Brown 3		**84,378**		**17,000**		
36							
37	**Total Brown**		**389,229**		**53,000**		
38							
39	**Ghent**						
40	Ghent 1 - Baghouse		131,000				EGU MACT
41	Ghent 1 - PAC Injection		6,380				EGU MACT
42	Ghent 1 - Hg Control				77,000		EGU MACT
43	Ghent 1 - Neural Networks		1,000				EGU MACT

	A	B	C	D	E	F	G
44	Ghent 1 - Escalation		22,965				Escalation
45	Ghent 1 - CO2				15,000		
46	Total Ghent 1		**161,345**		**92,000**		
47							
48	Ghent 2 - SCR		227,000		152,000		Revised CAIR
49	Ghent 2 - Baghouse		120,000				EGU MACT
50	Ghent 2 - PAC Injection		6,109				EGU MACT
51	Ghent 2 - Hg Control				7,000		EGU MACT
52	Ghent 2 - Lime Injection		5,483				EGU MACT
53	Ghent 2 - Neural Networks		1,000				EGU MACT
54	Ghent 2 - Escalation		57,338				Escalation
55	Ghent 2 - CO2				15,000		
56	Total Ghent 2		**416,930**		**174,000**		
57							
58	Ghent 3 - Baghouse		138,000				EGU MACT
59	Ghent 3 - PAC Injection		6,173				EGU MACT
60	Ghent 3 - Hg Control				77,000		EGU MACT
61	Ghent 3 - Neural Networks		1,000				EGU MACT
62	Ghent 3 - Escalation		33,368				Escalation
63	Ghent 3 - CO2				15,000		
64	Total Ghent 3		**178,541**		**92,000**		
65							
66	Ghent 4 - Baghouse		117,000				EGU MACT
67	Ghent 4 - PAC Injection		6,210				EGU MACT
68	Ghent 4 - Hg Control				77,000		EGU MACT
69	Ghent 4 - Neural Networks		1,000				EGU MACT
70	Ghent 4 - Escalation		28,313				Escalation
71	Ghent 4 - CO2				15,000		
72	Total Ghent 4		**152,523**		**92,000**		
73							
74	**Total Ghent**		**909,338**		**450,000**		
75							
76							
77	**Mill Creek**						
78	Mill Creek 1 - FGD		297,000		20,000		Revised CAIR
79	Mill Creek 1 - SCR		97,000		121,000		Revised CAIR
80	Mill Creek 1 - Baghouse		81,000				EGU MACT
81	Mill Creek 1 - Electrostatic Precipitator		32,882				EGU MACT
82	Mill Creek 1 - PAC Injection		4,412				EGU MACT
83	Mill Creek 1 - Hg Control				60,000		EGU MACT
84	Mill Creek 1 - SAM Mitigation		8,000				Mill Creek BART
85	Mill Creek 1 - Lime Injection		4,480				EGU MACT
86	Mill Creek 1 - Neural Networks		1,000				EGU MACT
87	Mill Creek 1 - Escalation		120,469				Escalation
88	Mill Creek 1 - CO2				10,000		

	A	B	C	D	E	F	G
89	Total Mill Creek 1		**646,243**		**211,000**		
90							
91	Mill Creek 2 - FGD		297,000		20,000		Revised CAIR
92	Mill Creek 2 - SCR		97,000		121,000		Revised CAIR
93	Mill Creek 2 - Baghouse		81,000				EGU MACT
94	Mill Creek 2 - Electrostatic Precipitator		32,882				EGU MACT
95	Mill Creek 2 - PAC Injection		4,412				EGU MACT
96	Mill Creek 2 - Hg Control				60,000		EGU MACT
97	Mill Creek 2 - SAM Control		8,000				Mill Creek BART
98	Mill Creek 2 - Lime Injection		4,480				EGU MACT
99	Mill Creek 2 - Neural Networks		1,000				EGU MACT
100	Mill Creek 2 - Escalation		101,752				Escalation
101	Mill Creek 2 - CO2				10,000		
102	Total Mill Creek 2		**627,526**		**211,000**		
103							
104	Mill Creek 3 - FGD		392,000		20,000		Revised CAIR
105	Mill Creek 3 - Baghouse		114,000				EGU MACT
106	Mill Creek 3 - PAC Injection		5,592				EGU MACT
107	Mill Creek 3 - Hg Control				69,000		EGU MACT
108	Mill Creek 3 - Neural Networks		1,000				EGU MACT
109	Mill Creek 3 - Escalation		111,307				Escalation
110	Mill Creek 3 - CO2				12,000		
111	Total Mill Creek 3		**623,899**		**101,000**		
112							
113	Mill Creek 4 - FGD		455,000		20,000		Revised CAIR
114	Mill Creek 4 - Baghouse		133,000				EGU MACT
115	Mill Creek 4 - PAC Injection		6,890				EGU MACT
116	Mill Creek 4 - Hg Control				77,000		EGU MACT
117	Mill Creek 4 - Neural Networks		1,000				EGU MACT
118	Mill Creek 4 - Escalation		157,787				Escalation
119	Mill Creek 4 - CO2				15,000		
120	Total Mill Creek 4		**753,677**		**112,000**		
121							
122	**Total Mill Creek**		**2,651,346**		**635,000**		
123							
124							
125	**Trimble**						
126	Trimble 1 - Baghouse		128,000				EGU MACT
127	Trimble 1 - PAC Injection		6,451				EGU MACT
128	Trimble 1 - Hg Control				4,000		EGU MACT
129	Trimble 1 - Neural Networks		1,000				EGU MACT
130	Trimble 1 - Escalation		30,738				Escalation
131	Trimble 1 - CO2				16,000		
132	Total Trimble 1		**166,189**		**20,000**		
133							

	A	B	C	D	E	F	G
134	**Total Trimble**		**166,189**		**20,000**		
135							
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**		
137							
138							
139							
140							
141							
142							
143							
144							
145							
146							
147							
148							
149							
150							
151							
152	**Sensitivities**						
153	**Green River**						
154	Green River 3 - SCR		29,000				
155	Green River 3 - CDS-FF		38,000				
156	Green River 3 - PAC Injection		1,112				
157	Green River 3 - Neural Networks		500				
158	Green River 3 - Escalation		17,899				
159	Total Green River 3		**86,511**				
160							
161	Green River 4 - SCR		42,000				
162	Green River 4 - CDS-FF		54,000				
163	Green River 4 - PAC Injection		1,583				
164	Green River 4 - Neural Networks		500				
165	Green River 4 - Escalation		20,877				
166	Total Green River 4		**118,960**				
167							
168	**Total Green River**		**205,471**				
169							
170							
171	**Cane Run**						
172	Cane Run 4 - FGD		152,000				
173	Cane Run 4 - SCR		63,000				
174	Cane Run 4 - Baghouse		33,000				
175	Cane Run 4 - PAC Injection		2,326				
176	Cane Run 4 - Lime Injection		2,569				
177	Cane Run 4 - Neural Networks		500				
178	Cane Run 4 - Escalation		45,571				

	A	B	C	D	E	F	G
179	Total Cane Run 4		**298,966**				
180							
181	Cane Run 5 - FGD		159,000				
182	Cane Run 5 - SCR		66,000				
183	Cane Run 5 - Baghouse		35,000				
184	Cane Run 5 - PAC Injection		2,490				
185	Cane Run 5 - Lime Injection		2,752				
186	Cane Run 5 - Neural Networks		500				
187	Cane Run 5 - Escalation		59,628				
188	Total Cane Run 5		**325,370**				
189							
190	Cane Run 6 - FGD		202,000				
191	Cane Run 6 - SCR		86,000				
192	Can Rune 6 - Baghouse		45,000				
193	Cane Run 6 - PAC Injection		3,490				
194	Cane Run 6 - Lime Injection		3,873				
195	Cane Run 6 - Neural Networks		500				
196	Cane Run 6 - Escalation		60,222				
197	Total Can Run 6		401,085				
198							
199	**Total Cane Run**		**1,025,422**				
200							
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**				
202							
203							
204	**Grand Total Environmental Compliance Air**		**5,346,993**				

	A	B
1		
2		**Total ($M)**
3	Revised CAIR	2,013
4	EGU MACT	1,328
5	Brown Consent Decree	8
6	Mill Creek BART	16
7		3,365
8		
9	Escalation	751
10		4,116

	A	B	C	D	E	F	G	H	I
1									
2									
3			**2011 MTP Black & Veatch Study**		**onmental Scenario Plannin**		**Primary Regulation**	**Secondary Regulation**	**Tertiary Regulation**
4									
5	**Brown**								
6	Brown 1 - SCR		59,000				Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
7	Brown 1 - SNCR				11,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
8	Brown 1 - Baghouse		34,000				EGU MACT		
9	Brown 1 - PAC Injection		1,599				EGU MACT		
10	Brown 1 - Hg Control				3,000		EGU MACT		
11	Brown 1 - Neural Networks		500				EGU MACT		
12	Brown 1 - SAM Mitigation		4,000				Brown Consent Decree		
13	Brown 1 - Escalation		21,238				Escalation		
14	Brown 1 - CO2				3,000				
15	Total Brown 1		**120,337**		**17,000**				
16									
17	Brown 2 - SCR		92,000				Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
18	Brown 2 - SCNR				11,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
19	Brown 2 - Baghouse		34,000				EGU MACT		
20	Brown 2 - PAC Injection		2,476				EGU MACT		
21	Brown 2 - Hg Control				3,000		EGU MACT		
22	Brown 2 - Neural Networks		500				EGU MACT		
23	Brown 2 - Lime Injection		2,739				EGU MACT		
24	Brown 2 - SAM Mitigation		4,000				Brown Consent Decree		
25	Brown 2 - Escalation		48,799				Escalation		
26	Brown 2 - CO2				5,000				
27	Total Brown 2		**184,514**		**19,000**				
28									
29	Brown 3 - Baghouse		61,000				EGU MACT		
30	Brown 3 - PAC Injection		5,426				EGU MACT		
31	Brown 3 - Hg Control				4,000		EGU MACT		
32	Brown 3 - Neural Networks		1,000				EGU MACT		
33	Brown 3 - Escalation		16,952				Escalation		
34	Brown 3 - CO2				13,000				
35	Total Brown 3		**84,378**		**17,000**				
36									
37	**Total Brown**		**389,229**		**53,000**				
38									
39	**Ghent**								
40	Ghent 1 - Baghouse		131,000				EGU MACT		
41	Ghent 1 - PAC Injection		6,380				EGU MACT		
42	Ghent 1 - Hg Control				77,000		EGU MACT		
43	Ghent 1 - Neural Networks		1,000				EGU MACT		

	A	B	C	D	E	F	G	H	I
44	Ghent 1 - Escalation		22,965				Escalation		
45	Ghent 1 - CO2				15,000				
46	Total Ghent 1		**161,345**		**92,000**				
47									
48	Ghent 2 - SCR		227,000		152,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
49	Ghent 2 - Baghouse		120,000				EGU MACT		
50	Ghent 2 - PAC Injection		6,109				EGU MACT		
51	Ghent 2 - Hg Control				7,000		EGU MACT		
52	Ghent 2 - Lime Injection		5,483				EGU MACT		
53	Ghent 2 - Neural Networks		1,000				EGU MACT		
54	Ghent 2 - Escalation		57,338				Escalation		
55	Ghent 2 - CO2				15,000				
56	Total Ghent 2		**416,930**		**174,000**				
57									
58	Ghent 3 - Baghouse		138,000				EGU MACT		
59	Ghent 3 - PAC Injection		6,173				EGU MACT		
60	Ghent 3 - Hg Control				77,000		EGU MACT		
61	Ghent 3 - Neural Networks		1,000				EGU MACT		
62	Ghent 3 - Escalation		33,368				Escalation		
63	Ghent 3 - CO2				15,000				
64	Total Ghent 3		**178,541**		**92,000**				
65									
66	Ghent 4 - Baghouse		117,000				EGU MACT		
67	Ghent 4 - PAC Injection		6,210				EGU MACT		
68	Ghent 4 - Hg Control				77,000		EGU MACT		
69	Ghent 4 - Neural Networks		1,000				EGU MACT		
70	Ghent 4 - Escalation		28,313				Escalation		
71	Ghent 4 - CO2				15,000				
72	Total Ghent 4		**152,523**		**92,000**				
73									
74	**Total Ghent**		**909,338**		**450,000**				
75									
76									
77	**Mill Creek**								
78	Mill Creek 1 - FGD		297,000		20,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for SO2
79	Mill Creek 1 - SCR		97,000		121,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
80	Mill Creek 1 - Baghouse		81,000				EGU MACT		
81	Mill Creek 1 - Electrostatic Precipitator		32,882				EGU MACT		
82	Mill Creek 1 - PAC Injection		4,412				EGU MACT		
83	Mill Creek 1 - Hg Control				60,000		EGU MACT		
84	Mill Creek 1 - SAM Mitigation		8,000				Mill Creek BART		
85	Mill Creek 1 - Lime Injection		4,480				EGU MACT		
86	Mill Creek 1 - Neural Networks		1,000				EGU MACT		
87	Mill Creek 1 - Escalation		120,469				Escalation		
88	Mill Creek 1 - CO2				10,000				

	A	B	C	D	E	F	G	H	I
89	Total Mill Creek 1		**646,243**		**211,000**				
90									
91	Mill Creek 2 - FGD		297,000		20,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for SO2
92	Mill Creek 2 - SCR		97,000		121,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
93	Mill Creek 2 - Baghouse		81,000				EGU MACT		
94	Mill Creek 2 - Electrostatic Precipitator		32,882				EGU MACT		
95	Mill Creek 2 - PAC Injection		4,412				EGU MACT		
96	Mill Creek 2 - Hg Control				60,000		EGU MACT		
97	Mill Creek 2 - SAM Control		8,000				Mill Creek BART		
98	Mill Creek 2 - Lime Injection		4,480				EGU MACT		
99	Mill Creek 2 - Neural Networks		1,000				EGU MACT		
100	Mill Creek 2 - Escalation		101,752				Escalation		
101	Mill Creek 2 - CO2				10,000				
102	Total Mill Creek 2		**627,526**		**211,000**				
103									
104	Mill Creek 3 - FGD		392,000		20,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for SO2
105	Mill Creek 3 - Baghouse		114,000				EGU MACT		
106	Mill Creek 3 - PAC Injection		5,592				EGU MACT		
107	Mill Creek 3 - Hg Control				69,000		EGU MACT		
108	Mill Creek 3 - Neural Networks		1,000				EGU MACT		
109	Mill Creek 3 - Escalation		111,307				Escalation		
110	Mill Creek 3 - CO2				12,000				
111	Total Mill Creek 3		**623,899**		**101,000**				
112									
113	Mill Creek 4 - FGD		455,000		20,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for SO2
114	Mill Creek 4 - Baghouse		133,000				EGU MACT		
115	Mill Creek 4 - PAC Injection		6,890				EGU MACT		
116	Mill Creek 4 - Hg Control				77,000		EGU MACT		
117	Mill Creek 4 - Neural Networks		1,000				EGU MACT		
118	Mill Creek 4 - Escalation		157,787				Escalation		
119	Mill Creek 4 - CO2				15,000				
120	Total Mill Creek 4		**753,677**		**112,000**				
121									
122	**Total Mill Creek**		**2,651,346**		**635,000**				
123									
124									
125	**Trimble**								
126	Trimble 1 - Baghouse		128,000				EGU MACT		
127	Trimble 1 - PAC Injection		6,451				EGU MACT		
128	Trimble 1 - Hg Control				4,000		EGU MACT		
129	Trimble 1 - Neural Networks		1,000				EGU MACT		
130	Trimble 1 - Escalation		30,738				Escalation		
131	Trimble 1 - CO2				16,000				
132	Total Trimble 1		**166,189**		**20,000**				
133									

	A	B	C	D	E	F	G	H	I
134	**Total Trimble**		**166,189**		**20,000**				
135									
136	**Total Environmental Compliance Air - Main Plan**		**4,116,101**		**1,158,000**				
137									
138									
139									
140									
141									
142									
143									
144									
145									
146									
147									
148									
149									
150									
151									
152	**Sensitivities**								
153	**Green River**								
154	Green River 3 - SCR		29,000						
155	Green River 3 - CDS-FF		38,000						
156	Green River 3 - PAC Injection		1,112						
157	Green River 3 - Neural Networks		500						
158	Green River 3 - Escalation		17,899						
159	Total Green River 3		**86,511**						
160									
161	Green River 4 - SCR		42,000						
162	Green River 4 - CDS-FF		54,000						
163	Green River 4 - PAC Injection		1,583						
164	Green River 4 - Neural Networks		500						
165	Green River 4 - Escalation		20,877						
166	Total Green River 4		**118,960**						
167									
168	**Total Green River**		**205,471**						
169									
170									
171	**Cane Run**								
172	Cane Run 4 - FGD		152,000						
173	Cane Run 4 - SCR		63,000						
174	Cane Run 4 - Baghouse		33,000						
175	Cane Run 4 - PAC Injection		2,326						
176	Cane Run 4 - Lime Injection		2,569						
177	Cane Run 4 - Neural Networks		500						
178	Cane Run 4 - Escalation		45,571						

	A	B	C	D	E	F	G	H	I
179	Total Cane Run 4		**298,966**						
180									
181	Cane Run 5 - FGD		159,000						
182	Cane Run 5 - SCR		66,000						
183	Cane Run 5 - Baghouse		35,000						
184	Cane Run 5 - PAC Injection		2,490						
185	Cane Run 5 - Lime Injection		2,752						
186	Cane Run 5 - Neural Networks		500						
187	Cane Run 5 - Escalation		59,628						
188	Total Cane Run 5		**325,370**						
189									
190	Cane Run 6 - FGD		202,000						
191	Cane Run 6 - SCR		86,000						
192	Can Rune 6 - Baghouse		45,000						
193	Cane Run 6 - PAC Injection		3,490						
194	Cane Run 6 - Lime Injection		3,873						
195	Cane Run 6 - Neural Networks		500						
196	Cane Run 6 - Escalation		60,222						
197	Total Can Run 6		401,085						
198									
199	**Total Cane Run**		**1,025,422**						
200									
201	**Total Environmental Compliance Air - Sensitivities**		**1,230,892**						
202									
203									
204	**Grand Total Environmental Compliance Air**		**5,346,993**						

	A	B
1		
2		**Total ($M)**
3	Revised CAIR	2,013
4	EGU MACT	1,328
5	Brown Consent Decree	8
6	Mill Creek BART	16
7		3,365
8		
9	Escalation	751
10		4,116

	A	B	C	D	E	F	G
1							
2	**Estimated Requirements Under Future New Environmental Regulations**						
3							
4	**Task**	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
5	**No.**	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
6	4.1	GHG Inventory	No additional limits			N/A	Spring - 2010
7	4.2	ing Engine NSPS and	PM	lorsepower. Certified to meet Tier		Unit	ting MACT & at insta
8			NO_x				
9			VOC				
10			CO				
11	4.3	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
12			MC4 - SAM	76.5	lbs/hour		
13	4.4	fferson Co. STAR Re				Plant	Spring - 2012
14			fuels (As) 20 - 50 ppm or ~$1x10^{-5}$ lbs/mmBtu emis				
15	&	rown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
16			SO_2	97%	Removal		
17			NO_x	0.07 /0.08	lbs/mmBtu		
18			SAM	110 -220	lbs/mmBtu		
19	4.7	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
20	4.8	GHG NSR	GHG	Energy Efficiency Projects		Unit/Plant	January, 2011
21	4.9	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	Beginning in 2014
22			NO_x	0.11	lbs/mmBtu		
23	4.10	New EGU MACT	Mercury	90% or	Removal	Plant	with 1-yr extension
24				0.012	lbs/GWH		
25			Acids (HCl)	0.002	lbs/mmBtu	Unit	
26			Metals (PM)	0.03	lbs/mmBtu		
27			Metals (As)	0.5×10^{-5}	lbs/mmBtu		
28			Organics (CO)	0.10	lbs/mmBtu		
29			Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
30	4.11	n Co. Ozone Non-at	NO_x	5 - 10 % reductior	NOx emissions	County-wide	Spring - 2016
31	4.11	v 1-hour NAAQS for	NO_x	letermined based on m	lbs/hours	Plant	During - 2015
32	4.12	v 1-hour NAAQS for	SO_2	letermined based on m	lbs/hours	Plant	Spring - 2016
33	4.13	Reduction & Renew	GHG	letermined based on m	tons/year	Fleet	Beginning in 2014
34	Plan Risk	$_{2.5}$ Emission Reduct	12.5 (Condensabl	letermined based on m	lbs/mmBtu	Unit/Plant	After 2013
35	4.14	CWA 316(a)	Thermal impacts	Biological Studies	N/A	Plant	Starting in 2010

	A	B	C	D	E	F	G
36	4.15	CWA 316(b)	Withdraw impacts	Biological Studies	N/A	Plant	Starting in 2012
37	4.16	ew Effluent Standa	etals, Chlorides, et	anaylsis is just begi	anaylsis is just begi	Plant	During - 2015
38	4.17	CCR Classification	Toxic Metals	landfill; possible closing existing ash po		Plant	Beginning in 2012;
39							
40		- New requirements have been finalized					

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Current Estimated Implementation - Fast)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	Brown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	er, 2010 NO_x & SA
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	e I in 2014; Limits in Phas
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	with 1-yr extension -
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	on Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2016
24	w 1-hour NAAQS for N	NO_x	termined based on r	lbs/hours	Plant	During - 2015
25	w 1-hour NAAQS for S	SO_2	termined based on r	lbs/hours	Plant	Spring - 2016
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	termined based on r	lbs/hours	Plant	During 2016
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation)**					
4						
5	**Program Name**	**Regulated Pollutants**			**Unit/Plant Averaging**	**Forcasted Date for Compliance**
6		**Pollutant**	**Limit**	**Units**		
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	rown Consent Decre	PM	0.03	lbs/mmBtu	Unit 3	ber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.25	lbs/mmBtu	Plant	ase I in 2016; Limits in Phase I
15		NO_x	0.11	lbs/mmBtu		
16	New EGU MACT	Mercury	90% or	Removal	Plant	2017 for high utilitization ur
17			0.012	lbs/GWH		
18		Acids (HCl)	0.002	lbs/mmBtu	Unit	
19		Metals (PM) or	0.03	lbs/mmBtu		
20		Metals (As)	0.5×10^{-5}	lbs/mmBtu		
21		Organics (CO)	0.10	lbs/mmBtu		
22		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
23	n Co. Ozone Non-att	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2017
24	v 1-hour NAAQS for	NO_x	termined based on	lbs/hours	Plant	During - 2016
25	v 1-hour NAAQS for	SO_2	termined based on	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$M_{2.5}$ or Condensable P	termined based on	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

	A	B	C	D	E	F
1						
2	**Estimated Limits & Compliance Dates Under Future New Air Requirements**					
3	**(Slower Implementation and Higher Limits)**					
4						
5	**Program**	**Regulated Pollutants**			**Unit/Plant**	**Forcasted Date**
6	**Name**	**Pollutant**	**Limit**	**Units**	**Averaging**	**for Compliance**
7	Mill Creek BART	MC3 - SAM	64.3	lbs/hour	Unit	During - 2011
8		MC4 - SAM	76.5	lbs/hour		
9	own Consent Decr	PM	0.03	lbs/mmBtu	Unit 3	nber, 2010 NO_x & SAM
10		SO_2	97%	Removal		
11		NO_x	0.07 /0.08	lbs/mmBtu		
12		SAM	110 -220	lbs/mmBtu		
13	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
14	Revised CAIR	SO_2	0.4	lbs/mmBtu	Plant	nase I in 2016; Limits in Phase II
15		NO_x	0.2	lbs/mmBtu		
16	New EGU MACT	Mercury	85% or	Removal	Plant	2017 for high utilitization un
17			0.021	lbs/GWH		
18		Acids (HCl)	0.02	lbs/mmBtu	Unit	
19		Metals (PM) or	0.04	lbs/mmBtu		
20		Metals (As)	$2. x 10^{-5}$	lbs/mmBtu		
21		Organics (CO)	0.20	lbs/mmBtu		
22		Dioxin/Furan	$50 x 10^{-18}$	lbs/mmBtu		
23	Co. Ozone Non-at	NO_x	5 % reduction	NOx emissions	County-wide	Spring - 2017
24	1-hour NAAQS for	NO_x	etermined based on m	lbs/hours	Plant	During - 2016
25	1-hour NAAQS for	SO_2	etermined based on m	lbs/hours	Plant	Spring - 2017
26	$PM_{2.5}$ NAAQS	$_{2.5}$ or Condensable	etermined based on m	lbs/hours	Plant	During 2017
27						
28		- New requirements have been finalized				

From:	Saunders, Eileen
To:	Straight, Scott
CC:	Gregory, Ronald
Sent:	7/1/2010 4:09:42 PM
Subject:	PE's Bi-Weekly Update of 7-01-10 (rdg-els).docx
Attachments:	PE's Bi-Weekly Update of 7-01-10 (rdg-els).docx

Scott,

Please see the report for Brown and Ghent.

Thanks,

Eileen

Energy Services - Bi-Weekly Update
July 01, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the draft report for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Coating application is complete. Testing of the application will take place 90 days after the coating application.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Contractor on site June 30th with work starting July 6th.
      - Elevators- NTR
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD continues to operate very well. Brown 2 is expected to be directed through the FGD sometime this summer, after some additional control system logic changes are implemented.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning of the vacuum pump, motor, and filter belt completed by FLS..
        - Fluor continues to work on the DCS and commissioning of the Fluor supplied equipment.
        - Facility operation contract bid reviews ongoing. Bid review of short list contractors completed and an award should take place next week.
      - E.W. Brown Gypsum Lab
        - Construction complete and certificate of occupancy granted. Plant has begun to use the facility.
  - Budget:
    - Brown – The Brown FGD Program Current Budget with Fluor this period is at $489.2m. There is $3.4m included in the forecast for un-approved change orders and $5.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown was unchanged, for a Total Brown FGD Program ITC of $410.1m.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - The elevator bids came back higher than anticipated and the schedule shows some work moving into the first quarter of 2011. We are continuing to evaluate the bids and challenge the vendors on cost saving opportunities. This will be picked up in the 2011 MTP.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – Auditing released their audit report on TC2 invoicing with no findings.

- Schedule/Execution:
  - Bechtel EPC – TC2 achieved 50% load Jun 15. Bechtel has been experiencing significant combustion tuning issues that have delayed the first full load until late June. **Bechtel's latest forecasted substantial completion date is now July 30.**
- Budget – Revised EPC authorization and project sanction approved in May IC meeting.
- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Commissioning versus schedule.
  - Current unit issues: Combustion tuning.

- **Brown 3 SCR**
  - Schedule/Execution – The 2012 spring outage needs to be picked up in the 2011 MTP.
  - Permitting – SAM testing took place in late May. Additional testing being planned for summer.
  - Engineering – EPC engineering kick off meeting held in Denver, CO (home of Zachry Engineering). All parties are working very well together. Alstom to be released on engineering of the HW recirc for economizer exit control to allow wider range of unit operation for SCR.
  - Budget - NTR
  - Contracting - NTR
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.
- **Mill Creek Limestone Project**
  - Safety - NTR

- Auditing- NTR
- Permitting- NTR
- Engineering/General
  - Meeting held with URS, Metso and the plant to refine the limestone equipment scope on July 1, 2010. A refined price estimate is due back to E.ON by July 16, 2010.
  -
- Bids for the building were sent out June 28, 2010 and the pre-bid will take place the week of July 5, 2010.Budget
  - AIP approval in progress in Power Plant.
- Contracting
  - Working with the Director and Commercial Manager to develop an overall engineering, procurement and construction strategy.
- Issue/Risk
  - Tight schedule for completing the building extension by the end of the year.

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Running Buffalo Cover study was performed with no findings.
  - Engineering
    - Development of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – project remains tracking to or below sanction.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - While PE has not restarted engineering/procurement work, discussions with Crutcher indicate negotiations may begin to accelerate with Holcim.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
  - Budgeting – NTR
  - Engineering – Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Outlook is to get clay liner to proposed new regs thus allowing the clay liner and FML planned to meet future requirements.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk
    - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.

        - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution – NTR
    - Budgeting – NTR
    - Engineering – The Detailed Engineering RFP is planned to be issued in June.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – Conceptual Engineering of the CCP transport systems have resulted in a revised estimate significantly over the original amount included in the initial project ECR filings. PE will be working with station through the 2011 MTP development to refine the scope and reduce the cost impact.
    - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
    - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk:
        - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. Final offers are planned to three remaining land owners in June, followed by a formal letter to them announcing our potential intent to begin condemnation proceedings. A final decision of changing designs versus condemnation of remaining property needed for initial plan expected in late July.

- **General CCP Projects**
    - Study report reviewing potential range of cost to comply with EPA options of CCP storage has been received. Range of cost is $700 - $1,100 million, depending on Subpart C or Subpart D. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. The cost will be socialized the week of June 21 with management and stations.

- **E.W. Brown Ash Pond Project**
    - **E.W. Brown Starter Dike**
        - Safety – (0) Recordable
        - Schedule/Execution:
        - Approximately 50% of the pond covered with straw mats for dust control. Mats rolled up in areas as needed to facilitate ash-grading activity.

    - Rock placement continued on the West and South Embankments. Approximately 95% of the rock embankment has been placed to date.
    - In-Situ work completed.
    - Ash grading continued on the South and East portion of the pond and in the In-Situ interface areas where applicable.
    - Clay placement is slow due to the amount of oversized rock present in the material stockpiled by Summit.
    - Budget – NTR
    - Contract Disputes/Resolution: NTR
    - Issues/Risk – NTR

  - **E.W. Brown Aux Pond 900'**
    - Schedule/Execution:
    - Mobilization efforts continued.
    - Installation of erosion and sediment control measures.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

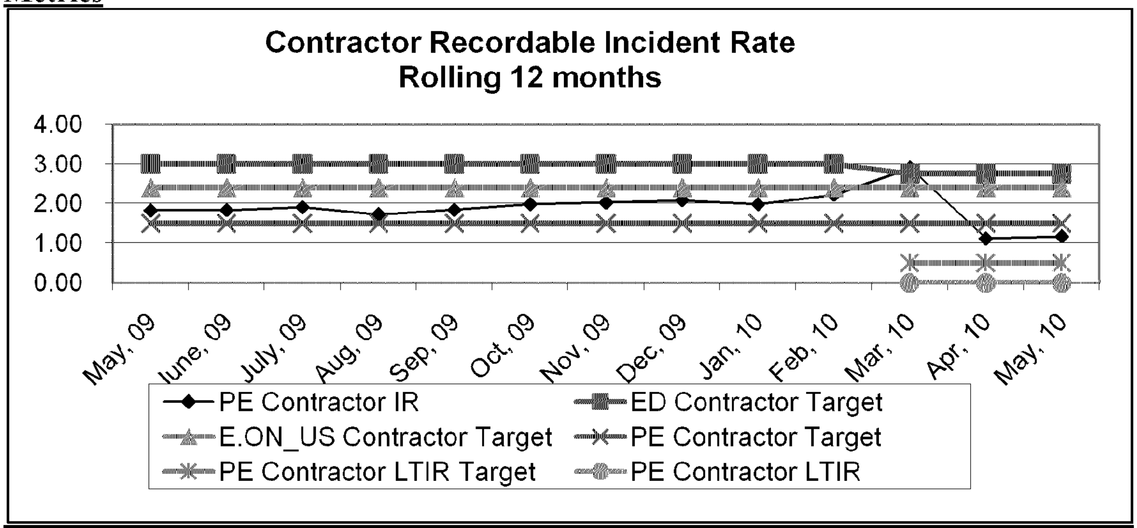
- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
  - Safety – A recordable occurred on the MC3 testing due to a minor injury resulting in a pain reliever being prescribed.
  - Schedule/Execution:
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests by E.ON Engineering for PM testing have not been published. .
    - MC 3 testing is nearing completion.

- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24^{th} was canceled.
  - B&V BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper in development.
  - Emissions Monitoring Inc. (Jim Peeler) has drafted a white paper on CEMS/Compliance Monitoring Testing.
  - Teleconference with Duke regarding experience with SBS Injection System at Gibson revealed they have expended significant expenses on testing with hundreds of test. Their system was reported to be meeting sub 2 ppm emissions on a continuous basis.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Result received.
    - LFG Technologies is under contract to perform study work.
  - NBU CR – HDR draft of estimate received and under review.
  - Biomass – Black and Veatch under contract to perform MC Project Implementation Planning study work.
  - FutureGen – NTR

- General
  - Impoundment Integrity Program – this is nearing completion of the initial program with PE looking to transfer all future work to Generation Services.
  - Environmental Scenario Planning – B&V completed the initial cost estimate and the initial report was received on June 17th. Reviews of the estimate are in progress with cost exceeding $4 billion. Iterations between PE and Generation Planning expected to refine scope throughout the fleet and reduce the overall cost to the $3 billion range.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July..

Metrics



Upcoming PWT Needs:

Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

Staffing - NTR

From:	Imber, Philip
To:	Straight, Scott
Sent:	7/1/2010 4:56:33 PM
Subject:	PE's Bi-Weekly Update of 6-18-10 pai.docx
Attachments:	PE's Bi-Weekly Update of 6-18-10 pai.docx

Bi-weekly report comments.

Energy Services - Bi-Weekly Update
June 18, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing in the final stages of activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Coating application is complete. Testing of the application will take place 90 days after the coating application.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Contractor on site June 30th with work starting July 6th.
      - Elevators- Bids received June 7, 2010 and are under review.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD continues to operate very well. Brown 2 is expected to be directed through the FGD in late June, well ahead of original plan.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning of the vacuum pump, motor, and filter belt continues.
        - Fluor continues to work on the DCS and commissioning of the Fluor supplied equipment.
        - Construction and commissioning work to be complete week of 6/21.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction 97% complete.
        - Plumbing and final building inspection expected within a week.
  - Budget:
    - Brown – NTR.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - The elevator bids came back higher than anticipated and the schedule shows some work moving into the first quarter of 2011. We are continuing to evaluate the bids and challenge the vendors on cost saving opportunities. This will be picked up in the 2011 MTP.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – Auditing released their audit report on TC2 invoicing with no findings.
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15. Bechtel has been experiencing significant combustion tuning issues that have delayed the first full load until late June. **Bechtel's latest forecasted substantial completion date is now July 30.**
  - Budget – Revised EPC authorization and project sanction approved in May IC meeting.

- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Commissioning versus schedule.
  - Current unit issues: Combustion tuning.

- **Brown 3 SCR**
  - Schedule/Execution – The 2012 spring outage needs to be picked up in the 2011 MTP.
  - Permitting – SAM testing took place in late May. Additional testing being planned for summer.
  - Engineering – EPC engineering kick off meeting held in Denver, CO (home of Zachry Engineering). All parties are working very well together. Alstom to be released on engineering of the HW recirc for economizer exit control to allow wider range of unit operation for SCR.
  - Budget - NTR
  - Contracting - NTR
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.
- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing- NTR
  - Permitting- NTR
  - Engineering/General
    - Transition meeting held with the plant to coordinating moving the activities associated with the project from the Plant to PE.

    - Review of the URS Engineering Study held with the plant.
    - Scope development for the limestone building extension is underway. Working to send out a bid package to local constructors the week of June 28, 2010.
    - Working with URS to procure long lead time equipment.
  - Budget
    - AIP development in progress.
  - Contracting
    - Working with the Director and Commercial Manager to develop an overall engineering, procurement and construction strategy.
  - Issue/Risk
    - Tight schedule for completing the building extension by the end of the year.

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Running Buffalo Cover study was performed with no findings.
  - Engineering
    - Development of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – project remains tracking to or below sanction.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - While PE has not restarted engineering/procurement work, discussions with Crutcher indicate negotiations may begin to accelerate with Holcim.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
  - Budgeting – NTR
  - Engineering – Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Outlook is to get clay liner to proposed new regs thus allowing the clay liner and FML planned to meet future requirements.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk
    - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
    - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution – NTR
  - Budgeting – NTR
  - Engineering – The Detailed Engineering RFP is planned to be issued in June.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering of the CCP transport systems have resulted in a revised estimate significantly over the original amount included in the initial project ECR filings. PE will be working with station through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. Final offers are planned to three remaining land owners in June, followed by a formal letter to them announcing our potential intent to begin condemnation proceedings. A final decision of changing designs versus condemnation of remaining property needed for initial plan expected in late July.

- **General CCP Projects**
  - Study report reviewing potential range of cost to comply with EPA options of CCP storage has been received. Range of cost is $700 - $1,100 million, depending on Subpart C or Subpart D. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. The cost will be socialized the week of June 21 with management and stations.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Approximately 60% of the pond covered with straw mats for dust control. Mats rolled up in areas as needed to facilitate ash-grading activity and rock placement.
    - Rock placement began on the West and South Embankments. Approximately 88% of the rock embankment has been placed to date.
    - Aux Pond Phase II work awarded to Charah with mobilization occurring on 6/14.
  - Budget – NTR
  - Contract Disputes/Resolution: NTR
  - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR.
  - Schedule/Execution:
    - RFP for MC3, MC4, EWB3 and G2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings at site July 7 & 8 scheduled. Bids due July 20 if no extension is granted.
    - RFP addendum being prepared to include bid request for wet systems on all four Ghent units
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests by E.ON Engineering published.
    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack. Significant ESP issues during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels. ADA/Breen completed testing and demobilization June 26. .
  - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.
    -

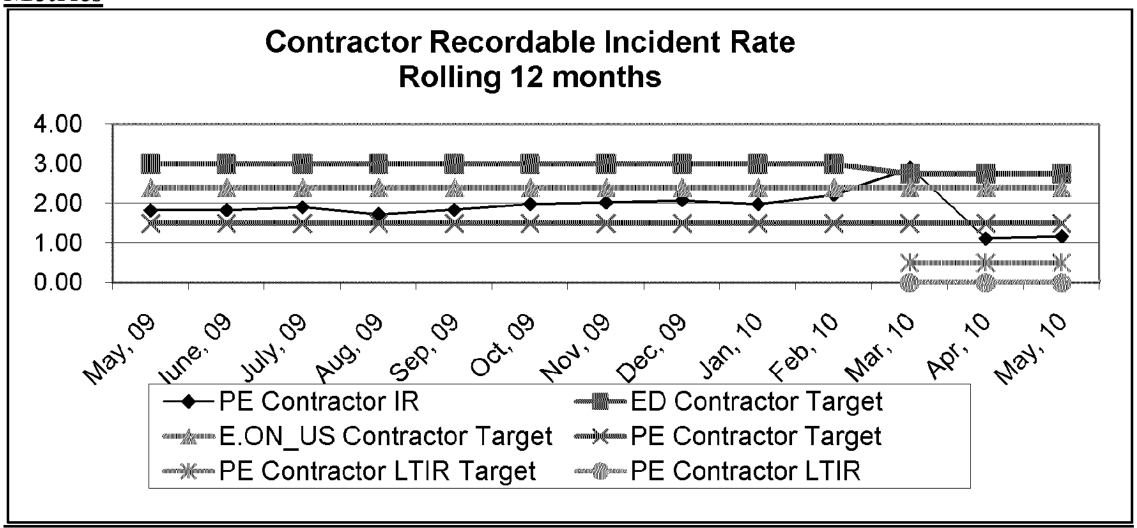
- **SO3 Mitigation (Ghent)**
  - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. Breen sent a $50k cancelation charge. They propose retracting the cancelation charge and putting it toward MgO injection in the boiler under the same cost provisions for the dry reagent injection contract. Currently preparing a test plan and schedule for MgO injection at Ghent Unit 4.
  - Ghent plant is currently installing the "permanent" temporary system from Nol-Tek – expect operation around July 9th.
  - B&V draft of testing white received.
  - B&V draft SAM calculation at Ghent Units received.
  - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies is planning visits to the landfills in July.
  - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
  - Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
  - FutureGen – NTR

- General

- Impoundment Integrity Program – this is nearing completion of the initial program with PE looking to transfer all future work to Generation Services.
- Environmental Scenario Planning – B&V completed the initial cost estimate and the initial report was received on June 17th. Reviews of the estimate are in progress with cost exceeding $4 billion. Iterations between PE and Generation Planning expected to refine scope throughout the fleet and reduce the overall cost to the $3 billion range.
- Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July..

Metrics



Upcoming PWT Needs:

Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

Staffing - NTR

From:	Lively, Noel
To:	Straight, Scott
Sent:	7/14/2010 8:05:03 AM
Subject:	PE's Bi-Weekly Update of 7-16-10.docx
Attachments:	PE's Bi-Weekly Update of 7-2-10.docx

Energy Services - Bi-Weekly Update
July 16, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the final draft of the Brown FGD audit with zero significant findings.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning nearing completion, the system is running.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction almost complete.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – Bechtel has begun to install new secondary air barrels as they are received. The first wave of new primary air and core air assemblies are expected July 23. We continue to work with Bechtel and our fuels group to source an alternate fuel until the permanent solution is installed. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 12.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:
    - Bechtel FM Claims – Parked at the present time by both parties.
  - Issues/Risk:
    - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing - NTR
  - Permitting - NTR
  - Engineering/General
    - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.
    - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.
    - Working with URS to procure long lead time equipment such as the verti-mill.
  - Budget
    - AIP development in progress.
    - Revised cash flow reflected in 2011 MTP

  - Contracting - NTR
  - Issue/Risk - NTR

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
  - Engineering
    - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Dewatering of the Gypsum Storage Pond was recently completed to allow investigation of existing clay liner thickness and permeability.
  - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
  - Engineering:
    - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
    - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk
    - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.
    - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution - NTR
  - Budgeting - NTR

- Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
- Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
- Contract Disputes/Resolution – NTR
- Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
  - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Work on Phase I is being suspended until a decision is made on whether to convert the main pond to a landfill. .
    - Aux Pond Phase II work awarded to Charah.
  - Budget – NTR
  - Contract Disputes/Resolution - NTR
  - Issues/Risk – A decision is required in July on whether to continue with the Main Pond or convert to a dry landfill. Economics indicate conversion now to be least cost compared to continuing with pond and then converting once regulations are final.

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
    - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
    - MC 4 tests by E.ON Engineering published.
    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
  - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

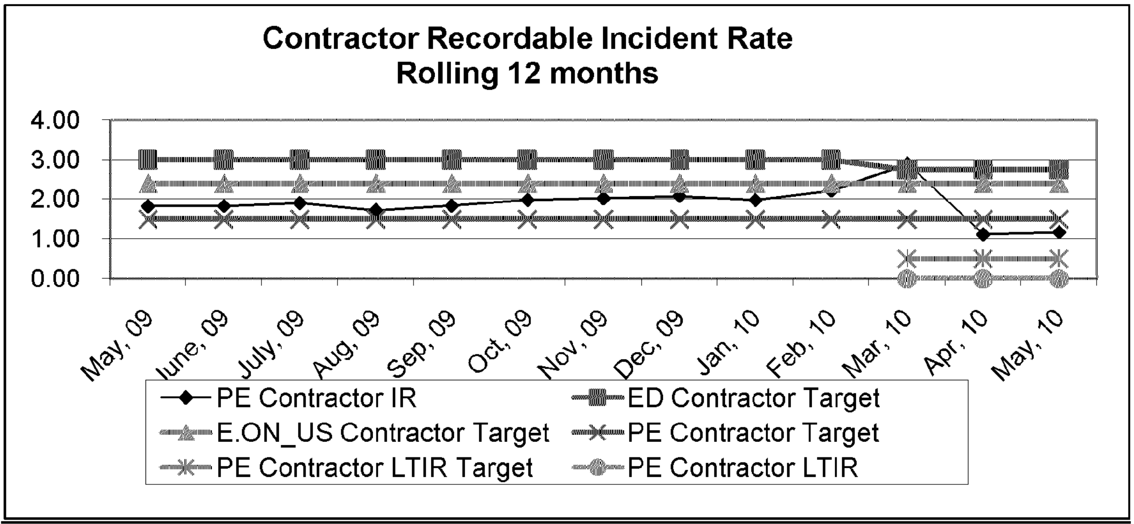
- **SO3 Mitigation (Ghent)**
  - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
  - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
  - Preparing a test plan and schedule for MgO injection at GH4.
  - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
  - B&V draft of SAM testing difficulties white paper received.
  - B&V draft of SAM calculations at Ghent Units received.
  - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies is planning visits to the landfills in July.
  - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
  - Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
  - FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost.

- o Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From:	Jackson, Fred
To:	Thompson, Paul
CC:	Voyles, John
Sent:	7/6/2010 3:48:49 PM
Subject:	Draft Energy Services Major Projects Report - June 2010
Attachments:	Energy Services Major Projects Monthly Report June 2010 Draft .docx; PE's Bi-Weekly Update of 6-18-10.docx

Paul,

Attached is a draft of the June 2010 ES Major Projects Monthly Report. All updates are shown as tracked changes against the May report you sent to Vic.

I also attached the June 18 Project Engineering Bi-Weekly Update as reference.

Please let me know if questions.

Thanks,
Fred

Energy Services Major Projects Monthly Report
June 2010

I. KU SOx Program

A. Safety

No Issues to report.

B. Schedule

Ghent 3: Mechanically complete. Shakedown activities are continuing and moving towards final contract settlement, including LD claims. Operationally, the re-engineered ID fan bearing replacement made in June is operating satisfactorily but continues under close monitoring.

Ghent 4: Mechanically complete. Second rewound ID fan motor installed and placed into service. Planning to install FlaktWoods axial fans in September 2010 outage.

Ghent 1: Mechanically complete.

Ghent Site: Restoration projects in progress.

Brown: FGD tie-in to Unit 3 successfully completed May 21. FGD now in service for Unit 3 only. Units 1 and 2 operational on plan to be placed in service later this year.

C. Budget

Ghent 3: No Material Change.

Ghent 4: No Material Change.

Ghent 1: No Material Change.

Brown: Currently forecasting a positive variance to budget of greater than $50M.

D. Issues/Risks

ID Fan Bearing issues as noted above. FlaktWoods and Flour have signed the Final Settlement Term Sheet. Finalized trade of one Brown ID fan motor for spare blades for two fans at Ghent. Blades received at Ghent. WEG (Subcontractor to FlaktWoods) ID Fan motor inspection complete. Motor is expected to be on site before GH4 scheduled outage in fall 2010.

Significant icing and fogging experienced on Ghent 1 FGD from Ghent 2 Cooling Tower. Contract awarded for siding on Ghent Unit 1 SCR and FGD. Work in progress.

Ghent FGDs experiencing numerous leaking valves. Replacement of valves is planned.

II. Trimble County 2

A. Safety

No Issues to report.

B. Schedule

Achieved 50% load on June 17. Significant combustion tuning issues have delayed first full load. COD revised to July 30, 2010.

C. Budget

Sanction amount is $964.5M. Forecasted costs at 8 to 9% above sanction.

D. Issues/Risks

Schedule as noted above. Force Majeure claims on weather events still under discussion.

Discussion on Bechtel Excusable Event letters in progress.

Bechtel cancelled air blows based on no strategic value. Reviewing a change order to recover associated reduced costs.

Significant combustion tuning issues as noted above.

Delayed COD.

III. Brown Ash Pond

A. Safety

No issues to Report

B. Schedule

On Plan

C. Budget

No Material Change

D. Issues/Risks

No issues to report.

IV. KU NOx Program (Brown 3)

A. Safety

No issues to Report

B. Schedule

Technology agreement executed December 9, 2009.
EPC contract awarded to Zachary May 19 including assignment of technology purchase agreement.

C. Budget

No material change.

D. Issues/Risks

Timeliness of permits to construct.

V. Trimble County Coal Combustion Products

A. Safety

No issues to Report

B. Schedule

See Issues/Risks below

C. Budget

No Material Change

D. Issues/Risks

State in process of responding to comments from public hearing on KPDES permit.

Meeting long term on site disposal needs is a schedule concern based engineering/construction and permitting. CCN issued December 23, 2009.

Negotiating with U.S. Fish and Wildlife on mitigation plan for Indiana Bat.

Holcim contract negotiations for beneficial reuse have resumed.

Negotiating with GAI (Consultant) to resolve an issue associated with costs for the mechanical engineering scope of the Bottom Ash Pond/Gypsum Pond work.

VI. Ghent Coal Combustion Products

A. Safety

No Issues to Report

B. Schedule

See Issues/Risks below. All permit applications submitted.

C. *Budget*

No Material Change

D. *Issues/Risks*

Meeting on site disposal needs is a schedule concern based on timeline associated land acquisition, permitting, and engineering/construction. CCN issued December 23, 2009. Review of potential modifications to landfill design to eliminate need for these three properties complete. Developing strategy with respect to any additional land purchase.

VII. Cane Run Coal Combustion Products

A. *Safety*

No issues to Report

B. *Schedule*

404/401 and Special Waste Landfill permit applications submitted to KY Division of Water and KY Division of Waste Management, respectively.

C. *Budget*

No Material Change

D. *Issues/Risks*

Meeting on site disposal needs is a schedule concern based on timeline associated with permitting and engineering/construction. No land acquisition expected under current construction plan.

Based on updated CCP production rates, the maximum life of the proposed landfill is 16 years.

Energy Services - Bi-Weekly Update
June 18, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing in the final stages of activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Coating application is complete. Testing of the application will take place 90 days after the coating application.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Contractor on site June 30th with work starting July 6th.
      - Elevators- Bids received June 7, 2010 and are under review.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD continues to operate very well. Brown 2 is expected to be directed through the FGD in late June, well ahead of original plan.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning of the vacuum pump, motor, and filter belt continues.
        - Fluor continues to work on the DCS and commissioning of the Fluor supplied equipment.
        - Construction and commissioning work to be complete week of 6/21.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction 97% complete.
        - Plumbing and final building inspection expected within a week.
  - Budget:
    - Brown – NTR.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - The elevator bids came back higher than anticipated and the schedule shows some work moving into the first quarter of 2011. We are continuing to evaluate the bids and challenge the vendors on cost saving opportunities. This will be picked up in the 2011 MTP.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – Auditing released their audit report on TC2 invoicing with no findings.
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15. Bechtel has been experiencing significant combustion tuning issues that have delayed the first full load until late June. **Bechtel's latest forecasted substantial completion date is now July 30.**
  - Budget – Revised EPC authorization and project sanction approved in May IC meeting.

- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Commissioning versus schedule.
  - Current unit issues: Combustion tuning.

- **Brown 3 SCR**
  - Schedule/Execution – The 2012 spring outage needs to be picked up in the 2011 MTP.
  - Permitting – SAM testing took place in late May. Additional testing being planned for summer.
  - Engineering – EPC engineering kick off meeting held in Denver, CO (home of Zachry Engineering). All parties are working very well together. Alstom to be released on engineering of the HW recirc for economizer exit control to allow wider range of unit operation for SCR.
  - Budget - NTR
  - Contracting - NTR
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.
- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing- NTR
  - Permitting- NTR
  - Engineering/General
    - Transition meeting held with the plant to coordinating moving the activities associated with the project from the Plant to PE.

        - Review of the URS Engineering Study held with the plant.
        - Scope development for the limestone building extension is underway. Working to send out a bid package to local constructors the week of June 28, 2010.
        - Working with URS to procure long lead time equipment.
    - Budget
        - AIP development in progress.
    - Contracting
        - Working with the Director and Commercial Manager to develop an overall engineering, procurement and construction strategy.
    - Issue/Risk
        - Tight schedule for completing the building extension by the end of the year.

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
        - Running Buffalo Cover study was performed with no findings.
    - Engineering
        - Development of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - While PE has not restarted engineering/procurement work, discussions with Crutcher indicate negotiations may begin to accelerate with Holcim.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
    - Budgeting – NTR
    - Engineering – Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Outlook is to get clay liner to proposed new regs thus allowing the clay liner and FML planned to meet future requirements.
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk
        - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
        - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution – NTR
  - Budgeting – NTR
  - Engineering – The Detailed Engineering RFP is planned to be issued in June.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering of the CCP transport systems have resulted in a revised estimate significantly over the original amount included in the initial project ECR filings. PE will be working with station through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. Final offers are planned to three remaining land owners in June, followed by a formal letter to them announcing our potential intent to begin condemnation proceedings. A final decision of changing designs versus condemnation of remaining property needed for initial plan expected in late July.

- **General CCP Projects**
  - Study report reviewing potential range of cost to comply with EPA options of CCP storage has been received. Range of cost is $700 - $1,100 million, depending on Subpart C or Subpart D. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. The cost will be socialized the week of June 21 with management and stations.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Approximately 60% of the pond covered with straw mats for dust control. Mats rolled up in areas as needed to facilitate ash-grading activity and rock placement.
    - Rock placement began on the West and South Embankments. Approximately 88% of the rock embankment has been placed to date.
    - Aux Pond Phase II work awarded to Charah with mobilization occurring on 6/14.
  - Budget – NTR
  - Contract Disputes/Resolution: NTR
  - Issues/Risk – NTR

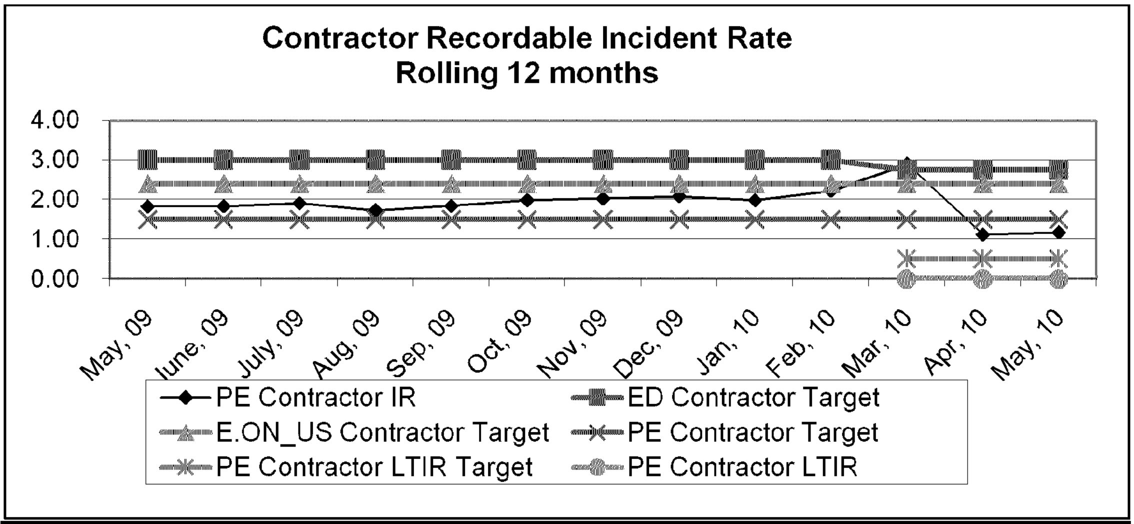
- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
  - Safety – A recordable occurred on the MC3 testing due to a minor injury resulting in a pain reliever being prescribed.
  - Schedule/Execution:
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests by E.ON Engineering for PM testing have not been published. .
    - MC 3 testing is nearing completion.

- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24th was canceled.
  - B&V BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper in development.
  - Emissions Monitoring Inc. (Jim Peeler) has drafted a white paper on CEMS/Compliance Monitoring Testing.
  - Teleconference with Duke regarding experience with SBS Injection System at Gibson revealed they have expended significant expenses on testing with hundreds of test. Their system was reported to be meeting sub 2 ppm emissions on a continuous basis.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Result received.
    - LFG Technologies is under contract to perform study work.
  - NBU CR – HDR draft of estimate received and under review.
  - Biomass – Black and Veatch under contract to perform MC Project Implementation Planning study work.
  - FutureGen – NTR

- General
  - Impoundment Integrity Program – this is nearing completion of the initial program with PE looking to transfer all future work to Generation Services.
  - Environmental Scenario Planning – B&V completed the initial cost estimate and the initial report was received on June 17th. Reviews of the estimate are in progress with cost exceeding $4 billion. Iterations between PE and Generation Planning expected to refine scope throughout the fleet and reduce the overall cost to the $3 billion range.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July..

Metrics



Upcoming PWT Needs:

Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

Staffing - NTR

From:	Straight, Scott
To:	Thompson, Paul; Voyles, John; Bowling, Ralph; Sturgeon, Allyson; Hudson, Rusty; Hincker, Loren; Sinclair, David; Schetzel, Doug; Yussman, Eric; Jackson, Fred; Keeling, Chip; Hendricks, Claudia; Ray, Barry; O'brien, Dorothy (Dot); Bellar, Lonnie
CC:	Waterman, Bob; Imber, Philip; Lively, Noel; Saunders, Eileen; Gregory, Ronald; Heun, Jeff; Hance, Chuck; Clements, Joe; Cooper, David (Legal); Jones, Greg
Sent:	7/2/2010 9:45:23 AM
Subject:	Project Engineering's ES Bi-Weekly Report - July 2, 2010
Attachments:	PE's Bi-Weekly Update of 7-2-10.docx

Here is PE's Energy Services Bi-Weekly Update for July 2, 2010. I have added Dot and Lonnie to the distribution.

Scott Straight, P.E.
Project Engineering - E.ON U.S.
Director, Project Engineering
O (502) 627-2701
F (502) 217-2040
scott.straight@eon-us.com

Energy Services - Bi-Weekly Update
July2, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the final draft of the Brown FGD audit with zero significant findings.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning nearing completion, the system is running.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction almost complete.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:
    - Bechtel FM Claims – Parked at the present time by both parties.

- Issues/Risk:
  - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing - NTR
  - Permitting - NTR
  - Engineering/General
    - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.
    - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.

    - Working with URS to procure long lead time equipment such as the verti-mill.
  - Budget
    - AIP development in progress.
    - Revised cash flow reflected in 2011 MTP
  - Contracting - NTR
  - Issue/Risk - NTR

- **Cane Run CCP Project**
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    - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
  - Engineering
    - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

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  - Schedule/Execution:
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  - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
  - Engineering:
    - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
    - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk
    - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.
    - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

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  - Budgeting - NTR
  - Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

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- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Work on Phase I is being suspended until a decision is made on whether to convert the main pond to a landfill. .
    - Aux Pond Phase II work awarded to Charah.
  - Budget – NTR
  - Contract Disputes/Resolution - NTR

  - Issues/Risk – A decision is required in July on whether to continue with the Main Pond or convert to a dry landfill. Economics indicate conversion now to be least cost compared to continuing with pond and then converting once regulations are final.

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
    - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
    - MC 4 tests by E.ON Engineering published.
    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
  - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

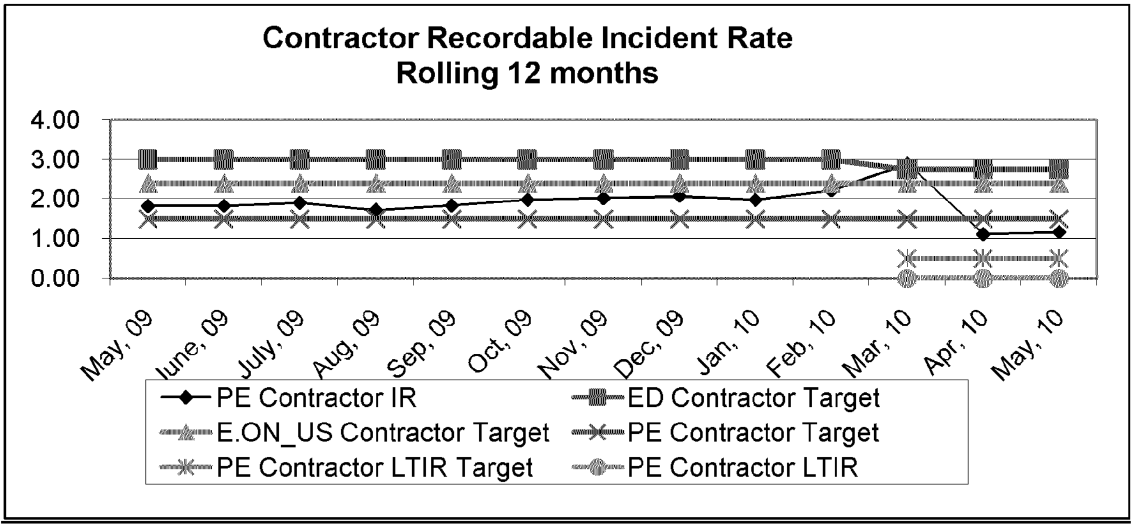
- **SO3 Mitigation (Ghent)**
  - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
  - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
  - Preparing a test plan and schedule for MgO injection at GH4.
  - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
  - B&V draft of SAM testing difficulties white paper received.
  - B&V draft of SAM calculations at Ghent Units received.
  - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies is planning visits to the landfills in July.
  - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
  - Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
  - FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.

- Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost.
- Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From: Sturgeon, Allyson
To: Conroy, Robert
Sent: 7/2/2010 10:41:50 AM
Subject: FW: Project Engineering's ES Bi-Weekly Report - July 2, 2010
Attachments: PE's Bi-Weekly Update of 7-2-10.docx

From: Straight, Scott
Sent: Friday, July 02, 2010 9:45 AM
To: Thompson, Paul; Voyles, John; Bowling, Ralph; Sturgeon, Allyson; Hudson, Rusty; Hincker, Loren; Sinclair, David; Schetzel, Doug; Yussman, Eric; Jackson, Fred; Keeling, Chip; Hendricks, Claudia; Ray, Barry; O'brien, Dorothy (Dot); Bellar, Lonnie
Cc: Waterman, Bob; Imber, Philip; Lively, Noel; Saunders, Eileen; Gregory, Ronald; Heun, Jeff; Hance, Chuck; Clements, Joe; Cooper, David (Legal); Jones, Greg
Subject: Project Engineering's ES Bi-Weekly Report - July 2, 2010

Here is PE's Energy Services Bi-Weekly Update for July 2, 2010. I have added Dot and Lonnie to the distribution.

Scott Straight, P.E.
Project Engineering - E.ON U.S.
Director, Project Engineering
O (502) 627-2701
F (502) 217-2040
scott.straight@eon-us.com

Energy Services - Bi-Weekly Update
July2, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the final draft of the Brown FGD audit with zero significant findings.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning nearing completion, the system is running.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction almost complete.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:
    - Bechtel FM Claims – Parked at the present time by both parties.

- Issues/Risk:
  - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing - NTR
  - Permitting - NTR
  - Engineering/General
    - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.
    - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.

    - Working with URS to procure long lead time equipment such as the verti-mill.
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    - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
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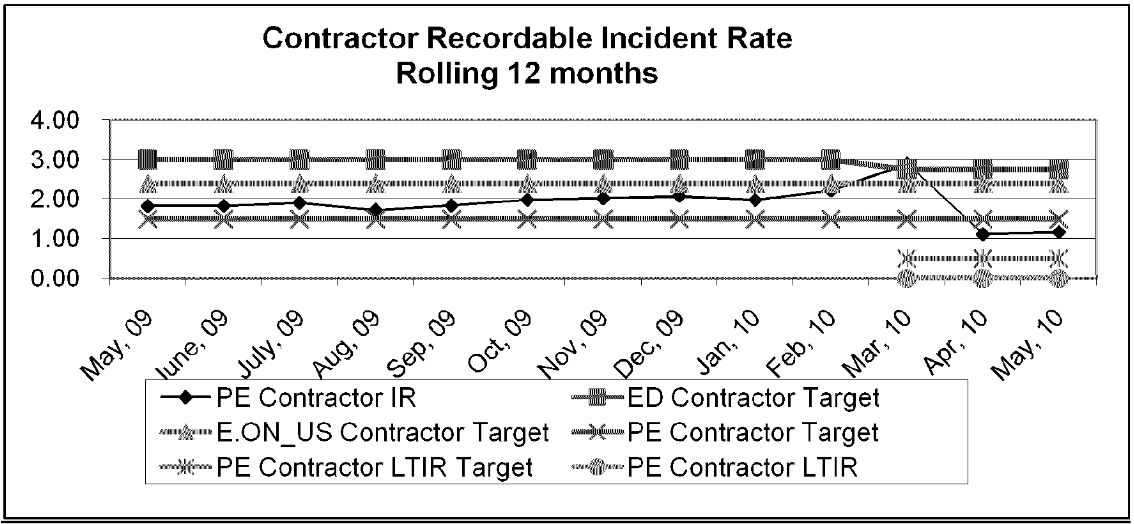

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From:	Wilson, Stuart
To:	Sinclair, David; Schram, Chuck
CC:	Karavayev, Louanne
Sent:	7/2/2010 5:44:07 PM
Subject:	Summary of Environmental Compliance Costs by Regulation
Attachments:	20100630_2011MTPEnvironmentalSummary-B&VvsEPARegs_LAK.xlsx

David/Chuck,

Lou Anne and I met with Gary Revlett this morning to gather some additional information regarding the breakdown of environmental compliance costs by regulation. David, I believe Chuck sent you a first pass of this information earlier this week.

The attached workbook (in the 'Costs' worksheet) contains the primary, secondary, and tertiary regulation for which a given piece of equipment is being considered. In addition, we've included a 'comments' column with observations from our discussion with Gary. In the 'SummarybyReg' worksheet, we've updated the summary of B&V costs by regulation and added a 'Modified B&V' column to reflect Gary's observations. Key take-aways:

1. Compared to what Chuck sent you previously, we're now associating almost all of the 'Revised CAIR' dollars with the 'New 1-hour NAAQS for SO2' and 'EGU MACT' regulations. EGU MACT is synonymous with Hg/HAPS.
2. Based on our conversation with Gary, approximately $1 billion of the equipment MAY not be necessary. I want to be clear... Gary didn't disagree with the B&V numbers necessarily - he simply identified equipment that 'may' not be necessary - depending on the impact of other/existing controls. To me, the differences between the two columns highlight areas where additional discussions may be warranted.

Please let us know if you have any questions.

Stuart

	A	B	C	D	E	F	G	H	I
1									
2									
3			**2011 MTP Black & Veatch Study**		**onmental Scenario Plannin**		**Primary Regulation**	**Secondary Regulation**	**Tertiary Regulation**
4									
5	**Brown**								
6	Brown 1 - SCR		59,000				Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
7	Brown 1 - SNCR				11,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
8	Brown 1 - Baghouse		34,000				EGU MACT		
9	Brown 1 - PAC Injection		1,599				EGU MACT		
10	Brown 1 - Hg Control				3,000		EGU MACT		
11	Brown 1 - Neural Networks		500				EGU MACT		
12	Brown 1 - SAM Mitigation		4,000				Brown Consent Decree		
13	Brown 1 - Escalation		21,238				Escalation		
14	Brown 1 - CO2				3,000				
15	Total Brown 1		**120,337**		**17,000**				
16									
17	Brown 2 - SCR		92,000				Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
18	Brown 2 - SCNR				11,000		Revised CAIR	EGU MACT	New 1-hour NAAQS for NOx
19	Brown 2 - Baghouse		34,000				EGU MACT		
20	Brown 2 - PAC Injection		2,476				EGU MACT		
21	Brown 2 - Hg Control				3,000		EGU MACT		
22	Brown 2 - Neural Networks		500				EGU MACT		
23	Brown 2 - Lime Injection		2,739				EGU MACT		
24	Brown 2 - SAM Mitigation		4,000				Brown Consent Decree		
25	Brown 2 - Escalation		48,799				Escalation		
26	Brown 2 - CO2				5,000				
27	Total Brown 2		**184,514**		**19,000**				
28									
29	Brown 3 - Baghouse		61,000				EGU MACT		
30	Brown 3 - PAC Injection		5,426				EGU MACT		
31	Brown 3 - Hg Control				4,000		EGU MACT		
32	Brown 3 - Neural Networks		1,000				EGU MACT		
33	Brown 3 - Escalation		16,952				Escalation		
34	Brown 3 - CO2				13,000				
35	Total Brown 3		**84,378**		**17,000**				
36									
37	**Total Brown**		**389,229**		**53,000**				
38									
39	**Ghent**								
40	Ghent 1 - Baghouse		131,000				EGU MACT		
41	Ghent 1 - PAC Injection		6,380				EGU MACT		
42	Ghent 1 - Hg Control				77,000		EGU MACT		
43	Ghent 1 - Neural Networks		1,000				EGU MACT		
44	Ghent 1 - Escalation		22,965				Escalation		
45	Ghent 1 - CO2				15,000				
46	Total Ghent 1		**161,345**		**92,000**				

	J	K	L
1			
2			
3	**Comments**	**Subtract**	
4			
5			
6	With SCR at BR3, NAAQS is probably not a concern		59,000
7	With SCR at BR3, NAAQS is probably not a concern		0
8			34,000
9			1,599
10			0
11			500
12	May not need SAM mitigation for unit 1 with I	1	0
13			21,238
14			0
15			
16			
17	With SCR at BR3, NAAQS is probably not a concern		92,000
18	With SCR at BR3, NAAQS is probably not a concern		0
19			34,000
20			2,476
21			0
22			500
23			2,739
24	May not need SAM mitigation for unit 2 with I	1	0
25			48,799
26			0
27			
28			
29			61,000
30			5,426
31			0
32			1,000
33			16,952
34			0
35			
36			
37			
38			
39			
40	May not need baghouse or other controls; SCI	1	0
41		1	0
42		1	0
43		1	0
44		1	0
45			0
46			

	A	B	C	D	E	F	G	H	I
47									
48	Ghent 2 - SCR		227,000		152,000		EGU MACT	Revised CAIR	
49	Ghent 2 - Baghouse		120,000				EGU MACT		
50	Ghent 2 - PAC Injection		6,109				EGU MACT		
51	Ghent 2 - Hg Control				7,000		EGU MACT		
52	Ghent 2 - Lime Injection		5,483				EGU MACT		
53	Ghent 2 - Neural Networks		1,000				EGU MACT		
54	Ghent 2 - Escalation		57,338				Escalation		
55	Ghent 2 - CO2				15,000				
56	Total Ghent 2		**416,930**		**174,000**				
57									
58	Ghent 3 - Baghouse		138,000				EGU MACT		
59	Ghent 3 - PAC Injection		6,173				EGU MACT		
60	Ghent 3 - Hg Control				77,000		EGU MACT		
61	Ghent 3 - Neural Networks		1,000				EGU MACT		
62	Ghent 3 - Escalation		33,368				Escalation		
63	Ghent 3 - CO2				15,000				
64	Total Ghent 3		**178,541**		**92,000**				
65									
66	Ghent 4 - Baghouse		117,000				EGU MACT		
67	Ghent 4 - PAC Injection		6,210				EGU MACT		
68	Ghent 4 - Hg Control				77,000		EGU MACT		
69	Ghent 4 - Neural Networks		1,000				EGU MACT		
70	Ghent 4 - Escalation		28,313				Escalation		
71	Ghent 4 - CO2				15,000				
72	Total Ghent 4		**152,523**		**92,000**				
73									
74	**Total Ghent**		**909,338**		**450,000**				
75									
76									
77	**Mill Creek**								
78	Mill Creek 1 - FGD		297,000		20,000		New 1-hour NAAQS for SO2	EGU MACT	Revised CAIR
79	Mill Creek 1 - SCR		97,000		121,000		EGU MACT	New 1-hour NAAQS for NOx	Revised CAIR
80	Mill Creek 1 - Baghouse		81,000				EGU MACT		
81	Mill Creek 1 - Electrostatic Precipitator		32,882				EGU MACT		
82	Mill Creek 1 - PAC Injection		4,412				EGU MACT		
83	Mill Creek 1 - Hg Control				60,000		EGU MACT		
84	Mill Creek 1 - SAM Mitigation		8,000				Mill Creek BART		
85	Mill Creek 1 - Lime Injection		4,480				EGU MACT		
86	Mill Creek 1 - Neural Networks		1,000				EGU MACT		
87	Mill Creek 1 - Escalation		120,469				Escalation		
88	Mill Creek 1 - CO2				10,000				
89	Total Mill Creek 1		**646,243**		**211,000**				
90									
91	Mill Creek 2 - FGD		297,000		20,000		New 1-hour NAAQS for SO2	EGU MACT	Revised CAIR
92	Mill Creek 2 - SCR		97,000		121,000		EGU MACT	New 1-hour NAAQS for NOx	Revised CAIR
93	Mill Creek 2 - Baghouse		81,000				EGU MACT		
94	Mill Creek 2 - Electrostatic Precipitator		32,882				EGU MACT		

	J	K	L
47			
48	Already meeting NAAQS for Nox		227,000
49	May not need baghouse or other controls; SCF	1	0
50		1	0
51		1	0
52		1	0
53		1	0
54		1	0
55			0
56			
57			
58	May not need baghouse or other controls; SCF	1	0
59		1	0
60		1	0
61		1	0
62		1	0
63			0
64			
65			
66	May not need baghouse or other controls; SCF	1	0
67		1	0
68		1	0
69		1	0
70		1	0
71			0
72			
73			
74			
75			
76			
77			
78			297,000
79	SCR may not be needed if baghouse is installe	1	0
80			81,000
81			32,882
82			4,412
83			0
84			8,000
85	With upgraded FGD, may not need lime injecti	1	0
86			1,000
87			120,469
88			0
89			
90			
91			297,000
92	SCR may not be needed if baghouse is installe	1	0
93			81,000
94			32,882

	A	B	C	D	E	F	G	H	I
95	Mill Creek 2 - PAC Injection		4,412				EGU MACT		
96	Mill Creek 2 - Hg Control				60,000		EGU MACT		
97	Mill Creek 2 - SAM Control		8,000				Mill Creek BART		
98	Mill Creek 2 - Lime Injection		4,480				EGU MACT		
99	Mill Creek 2 - Neural Networks		1,000				EGU MACT		
100	Mill Creek 2 - Escalation		101,752				Escalation		
101	Mill Creek 2 - CO2				10,000				
102	Total Mill Creek 2		**627,526**		**211,000**				
103									
104	Mill Creek 3 - FGD		392,000		20,000		New 1-hour NAAQS for SO2	EGU MACT	Revised CAIR
105	Mill Creek 3 - Baghouse		114,000				EGU MACT		
106	Mill Creek 3 - PAC Injection		5,592				EGU MACT		
107	Mill Creek 3 - Hg Control				69,000		EGU MACT		
108	Mill Creek 3 - Neural Networks		1,000				EGU MACT		
109	Mill Creek 3 - Escalation		111,307				Escalation		
110	Mill Creek 3 - CO2				12,000				
111	Total Mill Creek 3		**623,899**		**101,000**				
112									
113	Mill Creek 4 - FGD		455,000		20,000		New 1-hour NAAQS for SO2	EGU MACT	Revised CAIR
114	Mill Creek 4 - Baghouse		133,000				EGU MACT		
115	Mill Creek 4 - PAC Injection		6,890				EGU MACT		
116	Mill Creek 4 - Hg Control				77,000		EGU MACT		
117	Mill Creek 4 - Neural Networks		1,000				EGU MACT		
118	Mill Creek 4 - Escalation		157,787				Escalation		
119	Mill Creek 4 - CO2				15,000				
120	Total Mill Creek 4		**753,677**		**112,000**				
121									
122	**Total Mill Creek**		**2,651,346**		**635,000**				
123									
124									
125	**Trimble**								
126	Trimble 1 - Baghouse		128,000				EGU MACT		
127	Trimble 1 - PAC Injection		6,451				EGU MACT		
128	Trimble 1 - Hg Control				4,000		EGU MACT		
129	Trimble 1 - Neural Networks		1,000				EGU MACT		
130	Trimble 1 - Escalation		30,738				Escalation		
131	Trimble 1 - CO2				16,000				
132	Total Trimble 1		**166,189**		**20,000**				
133									
134	**Total Trimble**		**166,189**		**20,000**				
135									
136	**Total Env. Compliance Air - Main Plan**		**4,116,101**		**1,158,000**				
137									
138									
139									
140									
141									
142									

	J	K	L
95			4,412
96			0
97			8,000
98	With upgraded FGD, may not need lime injecti	1	0
99			1,000
100			101,752
101			0
102			
103			
104			392,000
105			114,000
106			5,592
107			0
108			1,000
109			111,307
110			0
111			
112			
113			455,000
114			133,000
115			6,890
116			0
117			1,000
118			157,787
119			0
120			
121			
122			
123			
124			
125			
126	TC currently meets 90% Hg standard - may no	1	0
127		1	0
128		1	0
129		1	0
130		1	0
131			0
132			
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134			
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143									
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147									
148									
149									
150									
151									
152	**Sensitivities**								
153	**Green River**								
154	Green River 3 - SCR		29,000						
155	Green River 3 - CDS-FF		38,000						
156	Green River 3 - PAC Injection		1,112						
157	Green River 3 - Neural Networks		500						
158	Green River 3 - Escalation		17,899						
159	Total Green River 3		**86,511**						
160									
161	Green River 4 - SCR		42,000						
162	Green River 4 - CDS-FF		54,000						
163	Green River 4 - PAC Injection		1,583						
164	Green River 4 - Neural Networks		500						
165	Green River 4 - Escalation		20,877						
166	Total Green River 4		**118,960**						
167									
168	**Total Green River**		**205,471**						
169									
170									
171	**Cane Run**								
172	Cane Run 4 - FGD		152,000						
173	Cane Run 4 - SCR		63,000						
174	Cane Run 4 - Baghouse		33,000						
175	Cane Run 4 - PAC Injection		2,326						
176	Cane Run 4 - Lime Injection		2,569						
177	Cane Run 4 - Neural Networks		500						
178	Cane Run 4 - Escalation		45,571						
179	Total Cane Run 4		**298,966**						
180									
181	Cane Run 5 - FGD		159,000						
182	Cane Run 5 - SCR		66,000						
183	Cane Run 5 - Baghouse		35,000						
184	Cane Run 5 - PAC Injection		2,490						
185	Cane Run 5 - Lime Injection		2,752						
186	Cane Run 5 - Neural Networks		500						
187	Cane Run 5 - Escalation		59,628						
188	Total Cane Run 5		**325,370**						
189									
190	Cane Run 6 - FGD		202,000						

	J	K	L
143			
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	A	B	C	D	E	F	G	H	I
191	Cane Run 6 - SCR		86,000						
192	Can Rune 6 - Baghouse		45,000						
193	Cane Run 6 - PAC Injection		3,490						
194	Cane Run 6 - Lime Injection		3,873						
195	Cane Run 6 - Neural Networks		500						
196	Cane Run 6 - Escalation		60,222						
197	Total Can Run 6		401,085						
198									
199	**Total Cane Run**		**1,025,422**						
200									
201	**onmental Compliance Air - Sensitivities**		**1,230,892**						
202									
203									
204	**nd Total Environmental Compliance Air**		**5,346,993**						

	A	B	C	D	E	F	G
1		**B&V**	**Modified B&V - Per Discussions w/ Gary Revlett**				
2		**Total ($M)**	**Total ($M)**				
3	Revised CAIR	151	151				
4	EGU MACT	1,749	870				
5	Brown Consent Decree	8	-				
6	New 1-hour NAAQS for SO2	1,441	1,441				
7	Mill Creek BART	16	16				
8		3,365	2,478				
9							
10	Escalation	751	578				
11		4,116	3,057				
12							
13	Please note: The 'modified B&V' information is based on high-level discussions with						
14	Gary Revlett regarding 'possible/potential' savings. The differences between the						
15	two columns highlight areas where additional discussions may be warranted. Gary is						
16	not saying the B&V numbers are wrong. He simply identified equipment that 'may'						
17	not be necessary – depending on the impact of other/existing controls.						

From:	Heun, Jeff
To:	Straight, Scott
CC:	Waterman, Bob; Reed, Kathleen
Sent:	7/14/2010 9:55:12 AM
Subject:	Bi-Weekly Report Update
Attachments:	PE's Bi-Weekly Update of 12Jul10.docx

Scott,

Attached is the bi-weekly update from Bob and I.

Thanks,

Jeffrey B. Heun, P.E.
E.ON U.S.
Project Engineering
Sr Civil Engineer
(502) 627-4525 (Louisville Office)
(859) 367-1254 (Brown Office)
(502) 592-2421 (Mobile)
(502) 217-2678 (FAX)
jeff.heun@eon-us.com

Energy Services - Bi-Weekly Update
July2, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing has issued the final draft of the Brown FGD audit with zero significant findings.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning nearing completion, the system is running.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction almost complete.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:
    - Bechtel FM Claims – Parked at the present time by both parties.

- Issues/Risk:
  - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
  - Schedule/Execution – NTR
  - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
  - Engineering – proceeding as planned to support the spring 2012 in-service.
  - Budget - NTR
  - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing - NTR
  - Permitting - NTR
  - Engineering/General
    - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.
    - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.

        - Working with URS to procure long lead time equipment such as the verti-mill.
    - Budget
        - AIP development in progress.
        - Revised cash flow reflected in 2011 MTP
    - Contracting - NTR
    - Issue/Risk - NTR

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Engineering
        - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
        - Review of landfill layout and capacity related to CCGT project.
        - Transmission working towards relocation of the 69kV line.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed. Contacted UCC to provide updated cost information.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Gypsum Storage Pond is being prepared for the installation of the Flexible Membrane Liner (FML) and a Geosynthetic Clay Liner (GCL) scheduled to begin within the next 2 to 4 weeks.
        - Work continues on the fill placement and mechanically stabilized earth (MSE) wall for the north, south, and west dikes.
        - Work has begun on the Emergency Spillways.
    - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
    - Engineering:
        - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
        - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk

        - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from 2009 and the wet winter and spring in 2010.
        - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution - NTR
    - Budgeting - NTR
    - Engineering – The Detailed Engineering RFPs were received on Friday, 09Jul10. Three proposals were received. Proposal review is in progress.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact. Costs have been reduced by approximately $40M.
    - Engineering – Detailed Engineering of gypsum fines with Black & Veatch. Procurement activities for the gypsum fines project are in progress. Detailed Engineering for the Landfill is focusing on completion of construction drawings. Detailed Engineering for the CCP transport is out for bid.
    - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk:
        - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
    - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Work on Phase I is being suspended until a decision is made on whether to convert the main pond to a landfill. .
    - Aux Pond Phase II work awarded to Charah.
  - Budget – NTR
  - Contract Disputes/Resolution - NTR
  - Issues/Risk – A decision is required in July on whether to continue with the Main Pond or convert to a dry landfill. Economics indicate conversion now to be least cost compared to continuing with pond and then converting once regulations are final.

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
  - Safety – NTR
  - Schedule/Execution:
    - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
    - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
    - MC 4 tests by E.ON Engineering published.
    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
  - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

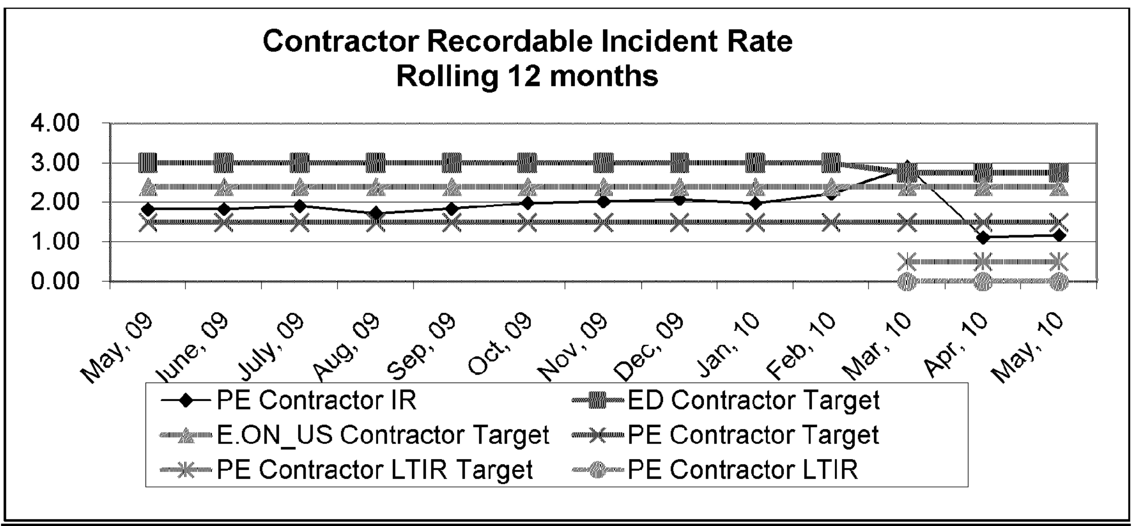
- **SO3 Mitigation (Ghent)**
  - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
  - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
  - Preparing a test plan and schedule for MgO injection at GH4.
  - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
  - B&V draft of SAM testing difficulties white paper received.
  - B&V draft of SAM calculations at Ghent Units received.
  - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies is planning visits to the landfills in July.
  - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.

- Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
- FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.
3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From:	Straight, Scott
To:	Imber, Philip; Heun, Jeff
Sent:	5/27/2010 10:53:28 AM
Subject:	FW: PE's Bi-Weekly Update of 5-27-10 (rdg-els).docx
Attachments:	PE's Bi-Weekly Update of 5-27-10 (rdg-els).docx

Please provide your updates to this version and show track changes.

From: Saunders, Eileen
Sent: Thursday, May 27, 2010 8:59 AM
To: Straight, Scott
Cc: Gregory, Ronald; Linkenhoker, Lana
Subject: PE's Bi-Weekly Update of 5-27-10 (rdg-els).docx

Scott,

Here is the report for Brown and Ghent.

Thank you,

Eileen

Energy Services - Bi-Weekly Update
May 28, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – On May 4, 2010 during the Kentucky Governors Safety Conference held in Louisville, Kentucky, Fluor was presented the Governors Safety Award for 2,000,000 safe work hours without a lost time incident. The KU SO2 Compliance Project at E.W. Brown Generating Station in Harrodsburg, KY achieved the 2,000,000 hour milestone in October of 2009. Currently, the project has passed 2.5 million safe work hours and finished the Unit 3 outage successfully, putting the FGD "scrubber" on line.
  - Auditing – Internal Auditing continues activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent Remaining Scope/Schedule
      - Chimney Coatings – Chimney coating application complete. The seven day cure process has begun and the coating will be tested next week.
      - SCR/FGD Icing Siding – Installation in progress.
      - Unit 4 ID Fans – On plan for fall 2010 install.
      - Chimney Capping – Contractor will mobilize mid-June.
      - Elevators- Bids are due June 7, 2010.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD tie-in for Brown Unit 3 was successfully completed during the BR3 outage that ended on May 21, 2010.
  - Budget:
    - Brown – The Brown FGD Program Current Budget with Fluor this period is at \$489.2m. There is \$3.4m included in the forecast for un-approved change orders and \$5.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown decreased by \$278k for a Total Brown FGD Program ITC of \$410.1m.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - NTR.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved first turbine roll and is on schedule for first fire on coal 5/15 followed by load testing around 5/20. **This supports Bechtel's latest forecasted substantial completion date of July 22.**
    - Non-Bechtel Scope:
      - PRB Upgrades – Complete.
  - Budget – Revised EPC authorization and project sanction going to May IC for approval.
  - Contract Disputes/Resolution:

        - Bechtel FM Claims – Meeting held with PWT, JV, RSS, Brightman and Futcher on 5/5 with no resolution being reached. Both parties agreed to let the settlement discussions lay for a month, to continue focusing on commissioning, and to not push for formal dispute resolution.
    - Issues/Risk:
        - Bechtel's schedule performance, Excusable Event claims, start-up of all plant equipment to operational mode, and the expected increase in Labor Claim amounts against budget.

- **Brown 3 SCR**
    - Schedule/Execution – PE and the station have agreed to move the outage to the spring of 2012.
    - Permitting – Working with EA on SO3 BACT responses to KYDAQ.
    - Engineering – RPI is in full engineering/procurement activities.
    - Budget:
        - NTR
    - Contracting:
        - EPC – IC approval obtained pending resolution of Builder's Risk insurance. Meeting scheduled for 5/18 with PWT and Rives to review recommendation for Zachry to retain insurance. Contract signing set for May 19. RPI contract amendments agreed for execution.
    - SCR Supplier – NTR
    - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
    - Schedule/Execution – Voith Hydro, the original vendor for first two units completed, has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014.
    - Permitting – NTR
    - Engineering/General:
        - Reviewing Voith updated scope for rehabilitation minus automation.
        - Reviewed plant goals for keeping automation scope in-house.
        - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
        - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
        - Reviewing inventory of parts on hand for third unit.
    - Budget:
        - Voith Hydro submitted revised pricing as planned. Their submittal is under review. PE continues to assemble pricing for work outside hydro vendor scope
    - Contracting:
        - Work continues on developing a dewatering engineering scope of work for RFQ.
    - Issues/Risk
        - If Voith remains as hydro equipment supplier, they will need to release their turbine runner for the fourth unit sometime in early August in order to meet the tentative schedule.
        - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Cane Run CCP Project**
  - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone better than expected.
  - Development of construction drawings are on hold until the KYDWM has completed their initial review.
  - Transmission working towards relocation of the 69kV line.
  - Budget – project remains tracking to or below sanction.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - Discussions between the Plant and Holcim have resumed; however, no action has been taken to restart the design of the barge loading system.
  - Budget – project remains tracking to or below sanction.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – Status and timing of Holcim contract.

- **TC CCP Project – BAP/GSP**
  - Schedule/Execution:
    - Construction on the project has resumed on a limited basis as the weather continues to be a factor. Ohio River flooding has been a recent factor in addition to the heavy rains. Concrete work for the southwest pipe culvert has been completed and minor pipe work continues. Work on the Mechanically Stabilized Earth walls has resumed.
  - Budgeting – NTR
  - Engineering – NTR
  - Permitting – NTR
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meeting held on 5/7 with contractor with further meetings anticipated.

- **TC CCP Project – Landfill**
  - Schedule/Execution – NTR
  - Budgeting – NTR
  - Engineering – Engineering continues on the single landfill alternative.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

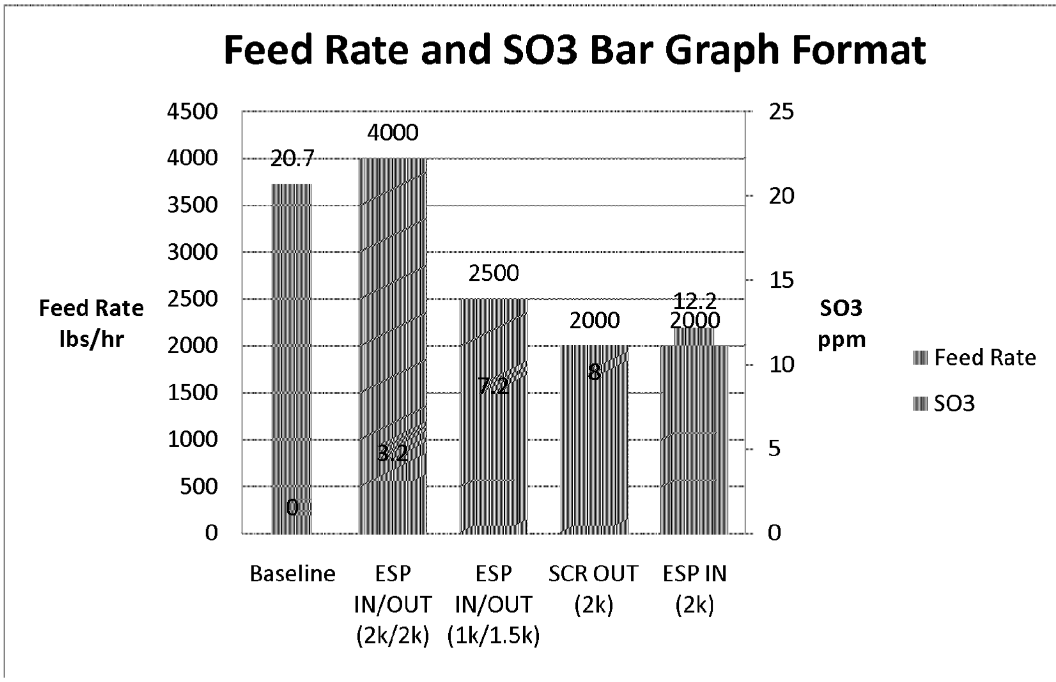
- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – NTR
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Conceptual Design for the CCP transport at Ghent is complete. Procurement activities for the gypsum fines project are in progress.

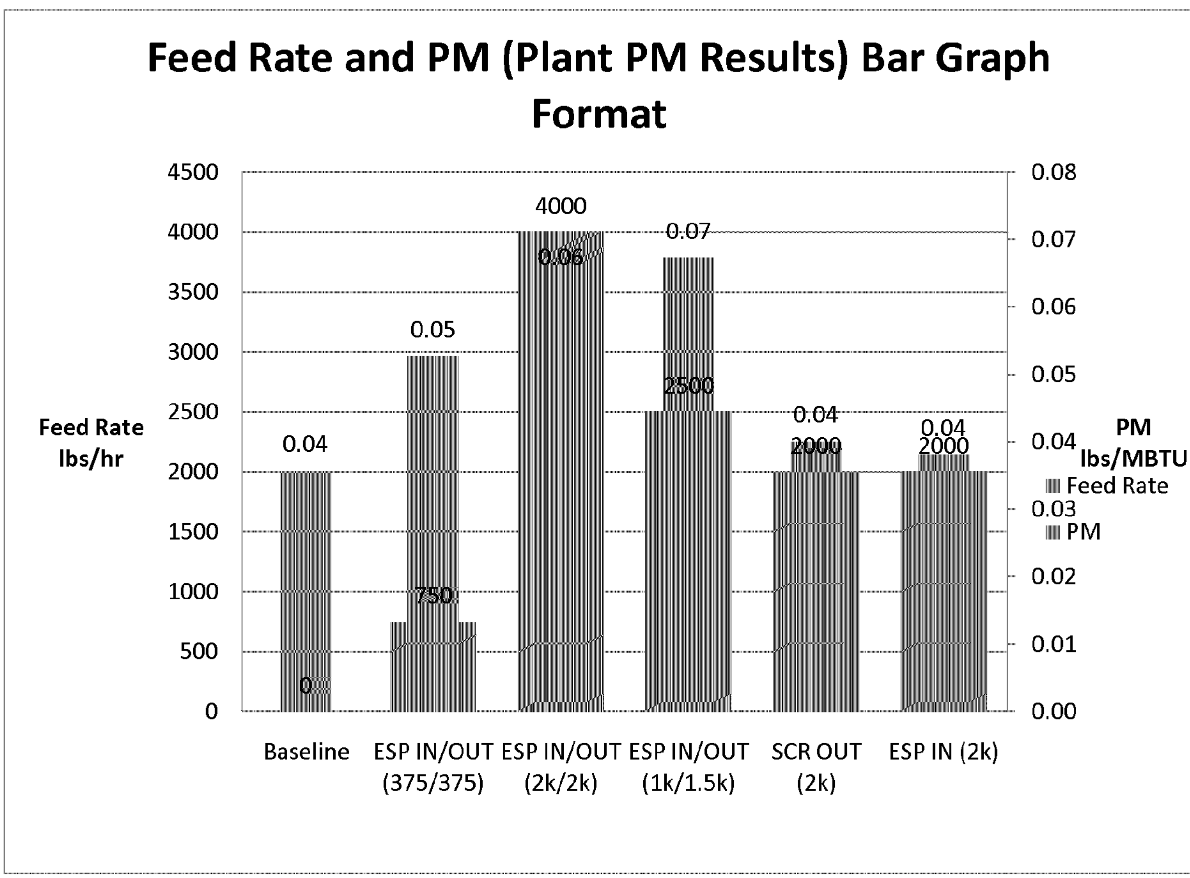
- Permitting – The DWM Permit Application was filed on 5/6. This completes the filings of ALL the permits for the project.
- Contract Disputes/Resolution – NTR
- Issues/Risk:
    - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases.

- **General CCP Projects**
 Project Engineering will be developing a high level order of magnitude cost estimate to bring the entire EON US fleet of CCP ponds into compliance with the EPA's Draft CCP Ruling of 5/5 for Subpart C, D and D Prime. The review is expected to be in draft form the first week in June.

- **E.W. Brown Aux Pond 900'**
    - Contract has been awarded to Charah for Phase II.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
    - Safety - NTR
    - Schedule/Execution:
        - MC3's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
        - Preliminary Engineering reports on Wet (URS) and Dry (Nol-Tec) are under review. Dry Injection total installed cost is 2/3 of Wet Injection system, with O&M estimates being comparable.
        - MC 4 tests complete. Baseline was 21 ppm. Max injection at ESP Inlet/ESP Outlet resulted in 3 ppm SAM at the stack. Other configuration of injection ranged from 7-12 ppm. Filterable PM (based on CEMS) **increased** with ESP Outlet injection (most effective SAM reduction injection point), with a total PM increase of >7 tons. E.ON Engineering results for PM testing are due week of 5/17. See graphs below.





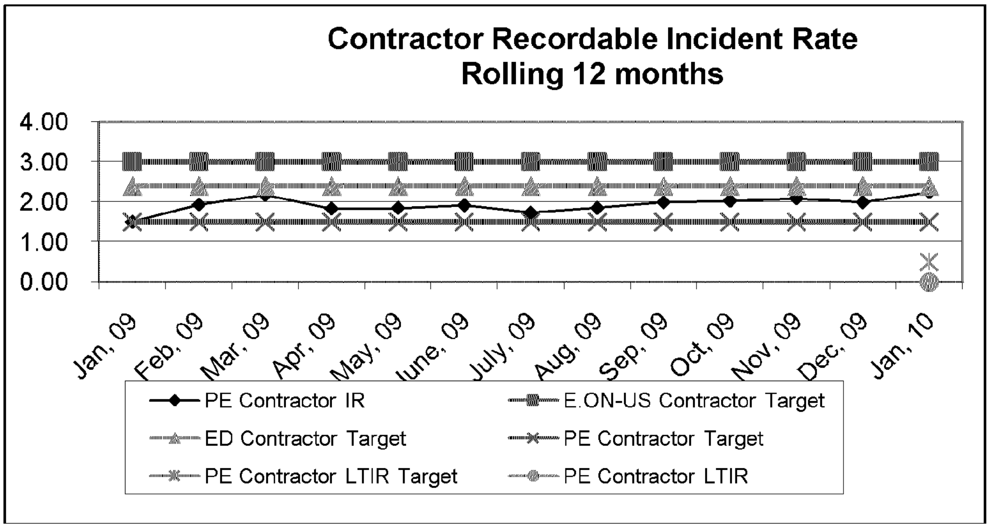
- MC 3 test ports scheduled for installation by Hall the week of May 24. Testing is planned for the week of June 7.

- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing currently scheduled for the week of May 24 may be postponed to mid/late June due to conflicts at the site. Ghent 2 long term temporary injection system being procured by the plant.
  - Requested BACT analysis proposals from Black and Veatch and Trinity. Black and Veatch is a "one stop shop" for this work. Trinity does not have the engineering in house to perform cost estimates and other engineering work related to the BACT analysis. Black and Veatch needs to prove they have the available manpower to do the BACT analysis and SAM position papers.
  - Contacted several testing suppliers regarding a CEMS and Testing position paper. E.ON Engineering is interested. Still checking the market place for others (RMB-Consulting, Grace Engineering, Catalyst Air Management, and AQS.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Results due May 14.
    - LFG Technologies is under contract to perform study work.
  - NBU CR – HDR is under contract to perform study work. They plan to visit CR on May 25th.
  - Environmental Regulatory Planning –
    - Black and Veatch under contract to perform the study.
    - Kick off meeting held Monday May 10.
    - B&V visited the sites week of May 10.
  - Biomass –
    - Released Moore Ventures (MV) to prepare submittals to get MC, TC, and Ghent certified as a Biomass Conversion Facilities (BCF) under the Biomass Conversion Assistance Program (BCAP). MV visited the Ghent & Trimble Landfill projects to assess the timber.
    - Bids received for further MC Project Implementation Planning study work – Black and Veatch, Burns and McDonnell, HDR and KEMA. Although Black and Veatch is not the lowest cost, they preferred scope including the ability to run our Vista modeling with biomass fuel inputs. Will release a contract the week of May 17.
  - FutureGen – NTR

- General
  - Impoundment Integrity Program
    - Meet with Energy Services Training Staff to discuss the process of incorporating the new impoundment integrity policy information into the Coursemill program.
    - Scheduling a meeting with Legal for week of May 31, 2010 to review comments.
    - Working on completing the Site Specific sections of the program.
  - Environmental Scenario Planning – B&V completed site visits and gave preliminary technology recommendations to PE for review. Recommendations were discussed with plant management and their staff and comments were returned to B&V. Initial cost estimates are being prepared and will be sent to PE by close of business on June 1, 2010.
  - Alstom Master Agreement- Negotiations continue.

Metrics



Upcoming PWT Needs:

This calendar is in the process of being modified. Next report will include the revised calendar.

Staffing - NTR

From: Heun, Jeff
To: Straight, Scott; Imber, Philip
Sent: 5/27/2010 1:54:28 PM
Subject: RE: PE's Bi-Weekly Update of 5-27-10 (rdg-els).docx
Attachments: PE's Bi-Weekly Update of 5-27-10 (rdg-els-jbh).docx

Scott,

Here is the updated file for the CCP projects.

JBH

From: Straight, Scott
Sent: Thursday, May 27, 2010 10:53 AM
To: Imber, Philip; Heun, Jeff
Subject: FW: PE's Bi-Weekly Update of 5-27-10 (rdg-els).docx

Please provide your updates to this version and show track changes.

From: Saunders, Eileen
Sent: Thursday, May 27, 2010 8:59 AM
To: Straight, Scott
Cc: Gregory, Ronald; Linkenhoker, Lana
Subject: PE's Bi-Weekly Update of 5-27-10 (rdg-els).docx

Scott,

Here is the report for Brown and Ghent.

Thank you,

Eileen

<< File: PE's Bi-Weekly Update of 5-27-10 (rdg-els).docx >>

Energy Services - Bi-Weekly Update
May 28, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – On May 4, 2010 during the Kentucky Governors Safety Conference held in Louisville, Kentucky, Fluor was presented the Governors Safety Award for 2,000,000 safe work hours without a lost time incident. The KU SO2 Compliance Project at E.W. Brown Generating Station in Harrodsburg, KY achieved the 2,000,000 hour milestone in October of 2009. Currently, the project has passed 2.5 million safe work hours and finished the Unit 3 outage successfully, putting the FGD "scrubber" on line.
  - Auditing – Internal Auditing continues activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent Remaining Scope/Schedule
      - Chimney Coatings – Chimney coating application complete. The seven day cure process has begun and the coating will be tested next week.
      - SCR/FGD Icing Siding – Installation in progress.
      - Unit 4 ID Fans – On plan for fall 2010 install.
      - Chimney Capping – Contractor will mobilize mid-June.
      - Elevators- Bids are due June 7, 2010.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD tie-in for Brown Unit 3 was successfully completed during the BR3 outage that ended on May 21, 2010.
  - Budget:
    - Brown – The Brown FGD Program Current Budget with Fluor this period is at $489.2m. There is $3.4m included in the forecast for un-approved change orders and $5.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown decreased by $278k for a Total Brown FGD Program ITC of $410.1m.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - NTR.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved first turbine roll and is on schedule for first fire on coal 5/15 followed by load testing around 5/20. **This supports Bechtel's latest forecasted substantial completion date of July 22.**
    - Non-Bechtel Scope:
      - PRB Upgrades – Complete.
  - Budget – Revised EPC authorization and project sanction going to May IC for approval.
  - Contract Disputes/Resolution:

    - Bechtel FM Claims – Meeting held with PWT, JV, RSS, Brightman and Futcher on 5/5 with no resolution being reached. Both parties agreed to let the settlement discussions lay for a month, to continue focusing on commissioning, and to not push for formal dispute resolution.
  - Issues/Risk:
    - Bechtel's schedule performance, Excusable Event claims, start-up of all plant equipment to operational mode, and the expected increase in Labor Claim amounts against budget.

- **Brown 3 SCR**
  - Schedule/Execution – PE and the station have agreed to move the outage to the spring of 2012.
  - Permitting – Working with EA on SO3 BACT responses to KYDAQ.
  - Engineering – RPI is in full engineering/procurement activities.
  - Budget:
    - NTR
  - Contracting:
    - EPC – IC approval obtained pending resolution of Builder's Risk insurance. Meeting scheduled for 5/18 with PWT and Rives to review recommendation for Zachry to retain insurance. Contract signing set for May 19. RPI contract amendments agreed for execution.
  - SCR Supplier – NTR
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro, the original vendor for first two units completed, has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Reviewed plant goals for keeping automation scope in-house.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
    - Reviewing inventory of parts on hand for third unit.
  - Budget:
    - Voith Hydro submitted revised pricing as planned. Their submittal is under review. PE continues to assemble pricing for work outside hydro vendor scope
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - If Voith remains as hydro equipment supplier, they will need to release their turbine runner for the fourth unit sometime in early August in order to meet the tentative schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Cane Run CCP Project**
    - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone better than expected.
    - KYDWM held a public meeting on Mary 25th with a turnout of over 100 people. The meeting was very heated but no major issues were identified.
    - Running Buffalo Cover study was performed with no findings.
    - Development of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - Discussions between the Plant and Holcim have resumed; however, no action has been taken to restart the design of the barge loading system.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – Status and timing of Holcim contract.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
    - Budgeting – NTR
    - Engineering – NTR
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
    - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike due to high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution – NTR
    - Budgeting – NTR
    - Engineering – A Scope of Work for the Detailed Engineering phase has been developed and being prepared to be sent to bidders. A Pre-Bid Meeting will occur in June, 2010.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
    - Contract Disputes/Resolution – NTR
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- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – NTR

- Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Conceptual Design for the CCP transport at Ghent is complete. Procurement activities for the gypsum fines project are in progress.
- Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
- Contract Disputes/Resolution – NTR
- Issues/Risk:
  - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. . A meeting with Project Engineering and Real Estate is scheduled during the week of 31May10 to develop strategy going forward.

- **General CCP Projects**
  Project Engineering will be developing a high level order of magnitude cost estimate to bring the entire EON US fleet of CCP ponds into compliance with the EPA's Draft CCP Ruling of 5/5 for Subpart C, D and D Prime. The review is expected to be in draft form the first week in June.

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  - Contract has been awarded to Charah for Phase II.
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  - Safety - NTR
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    - MC3's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
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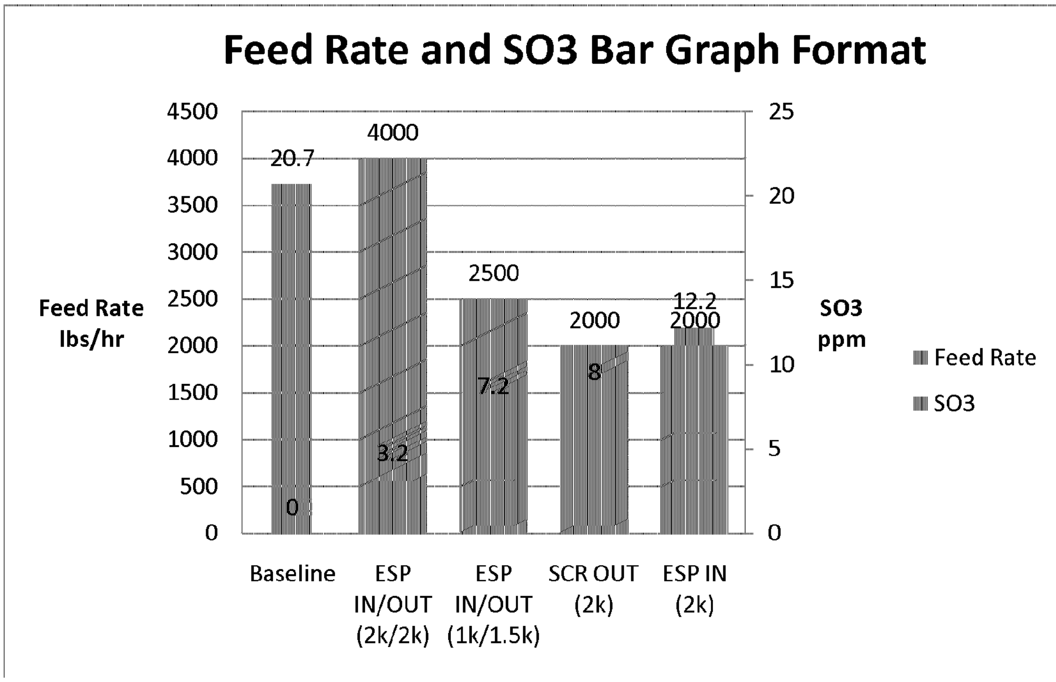

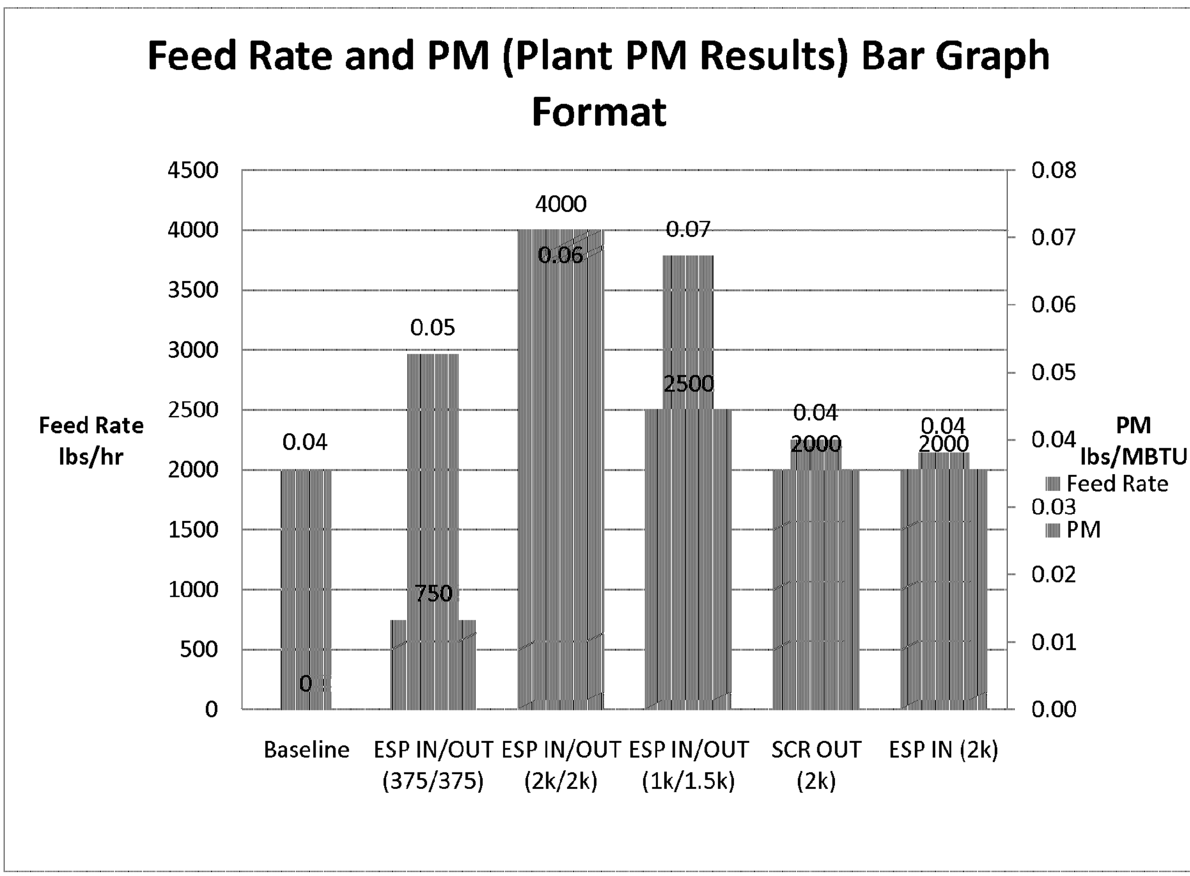

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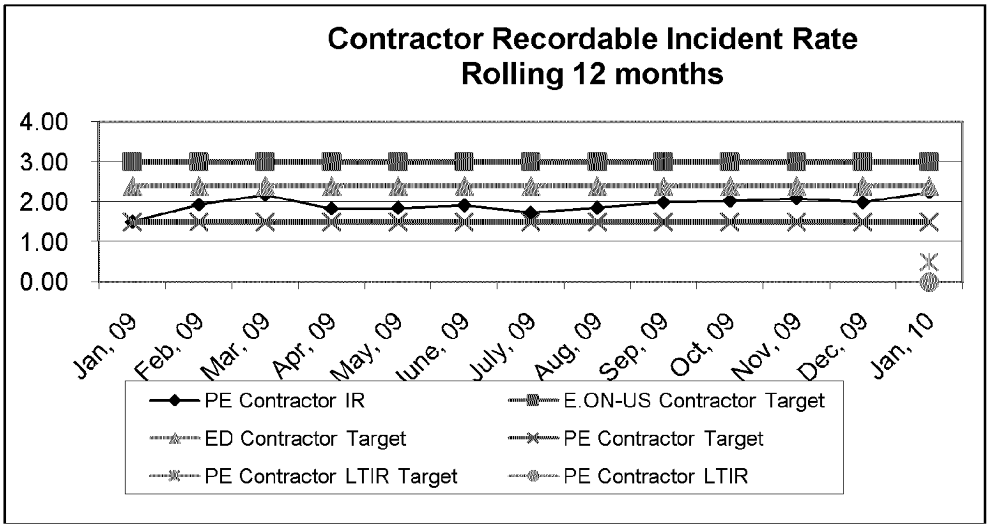

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From:	Imber, Philip
To:	Straight, Scott
Sent:	5/27/2010 2:41:47 PM
Subject:	PE's Bi-Weekly Update of 5-27-10 (rdg-els-jbh).docx
Attachments:	PE's Bi-Weekly Update of 5-27-10 (rdg-els-jbh).docx

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May 28, 2010
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        - Bechtel's schedule performance, Excusable Event claims, start-up of all plant equipment to operational mode, and the expected increase in Labor Claim amounts against budget.

- **Brown 3 SCR**
    - Schedule/Execution – PE and the station have agreed to move the outage to the spring of 2012.
    - Permitting –SAM testing on EW Brown units taking place week of May 24.
    - Engineering – EPC engineering kick off meeting scheduled for June 3.
    - Budget:
        - NTR
    - Contracting:
        - EPC – Contract with Zachry signed May 19.
    - SCR Supplier – SCR Supplier Contract amended and assigned to EPC Contractor.
    - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
    - Schedule/Execution – Voith Hydro, the original vendor for first two units completed, has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014.
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  - Schedule/Execution:
    - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
  - Budgeting – NTR
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  - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike due to high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution – NTR
  - Budgeting – NTR
  - Engineering – A Scope of Work for the Detailed Engineering phase has been developed and being prepared to be sent to bidders. A Pre-Bid Meeting will occur in June, 2010.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – NTR
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Conceptual Design for the CCP

transport at Ghent is complete. Procurement activities for the gypsum fines project are in progress.
- Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
- Contract Disputes/Resolution – NTR
- Issues/Risk:
  - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. . A meeting with Project Engineering and Real Estate is scheduled during the week of 31May10 to develop strategy going forward.

- **General CCP Projects**
 Project Engineering will be developing a high level order of magnitude cost estimate to bring the entire EON US fleet of CCP ponds into compliance with the EPA's Draft CCP Ruling of 5/5 for Subpart C, D and D Prime. The review is expected to be in draft form the first week in June.

- **E.W. Brown Aux Pond 900'**
  - Contract has been awarded to Charah for Phase II.
  - <u>Budget</u> – project remains tracking to or below sanction.
  - <u>Contract Disputes/Resolution</u> – NTR
  - <u>Issues/Risk</u> – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
  - Safety - NTR
  - Schedule/Execution:
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests: E.ON Engineering results for PM testing have not been published. .

    - MC 3 air heater inlet and SCR inlet test ports installed by Hall week of May 24. A&D is 40% complete on the ESP inlet and ESP outlet test ports; work to be complete May 29.. Testing by E.ON Engineering with ADA/Breen Temporary Injection is planned for the week of June 7.

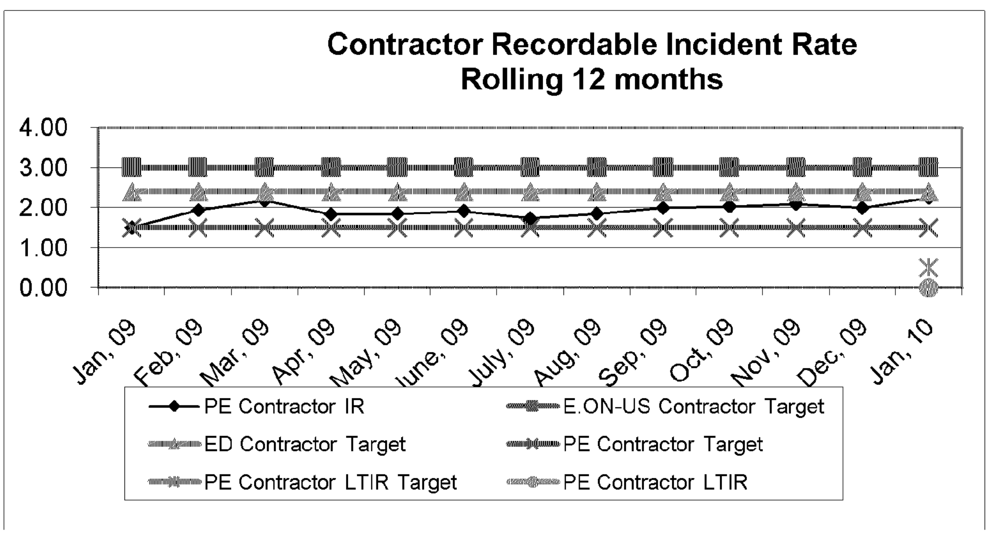
- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24th was canceled.
  - Contract to B&V on May 25 for BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper. They have not signed the Contract as of May 27.
  - Contract to Emissions Monitoring Inc. (Jim Peeler) to provide a white paper on CEMS/Compliance Monitoring Test White Paper.

- Had teleconference with Duke regarding experience with SBS Injection System at Gibson.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Result received.
    - LFG Technologies is under contract to perform study work.
  - NBU CR – HDR had site visit/kick off on May 25th at Cane Run.
  -
  - Biomass –
    - .
    - Black and Veatch under contract to perform MC Project Implementation Planning study work. Site visit/kick off meeting at Mill Creek was held on May 18.
  - FutureGen – NTR

- General
  - Impoundment Integrity Program
    - Meet with Energy Services Training Staff to discuss the process of incorporating the new impoundment integrity policy information into the Coursemill program.
    - Scheduling a meeting with Legal for week of May 31, 2010 to review comments.
    - Working on completing the Site Specific sections of the program.
  - Environmental Scenario Planning – B&V completed site visits and gave preliminary technology recommendations to PE for review. Recommendations were discussed with plant management and their staff and comments were returned to B&V. Initial cost estimates are being prepared and will be sent to PE by close of business on June 1, 2010.
  - Alstom Master Agreement- Negotiations continue.

Metrics



Upcoming PWT Needs:

This calendar is in the process of being modified. Next report will include the revised calendar.

Staffing - NTR

From: Gregory, Ronald
To: Saunders, Eileen
Sent: 7/15/2010 4:48:44 PM
Subject: PE's Bi-Weekly Update of 7-15-10 (rdg).docx
Attachments: PE's Bi-Weekly Update of 7-15-10 (rdg).docx

Don't hate me, I can't help it if it is report time again this week.

Energy Services - Bi-Weekly Update
July16, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – NTR.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Testing of the coating application remain.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Work to begin July 6th.
      - Elevators- Bids higher than anticipated but within budget. New schedules and higher cost being accounted for in the 2011 MTP.
    - Brown
      - The FGD continues to operate very well.
      - E.W. Brown Gypsum Dewatering Facility
        - Schedule/Execution:
          - Fluor completed the DCS checkout.
          - Product to be sent to the facility next week for final commissioning activity.
        - Award recommendation for operation contract to be submitted week of 7/12.
  - Budget - NTR.
  - Contract Disputes/Resolution - NTR
  - Issues/Risks - NTR

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – NTR
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15th. Bechtel has experienced significant combustion issues that have resulted in significant damage to about half of the 30 burners. The Root Cause Analysis (RCA) has not been issued but Doosan claims the Dodge Hill coal has a high Free Swelling Index, meaning the coal becomes plastic as it burns resulting in heavy slagging in the burner. It appears likely that we will have to resume commissioning on an alternate fuel while Doosan redesigns the burners for our fuel box post commissioning or until Bechtel changes to another vendor's burners. **Bechtel's anticipates restarting the unit mid-August with a new substantial completion date of Oct 8.** This impact to commissioning was communicated through a formal letter to KYPSC.
  - Budget – NTR
  - Contract Disputes/Resolution:

        - Bechtel FM Claims – Parked at the present time by both parties.
    - Issues/Risk:
        - Delivery of the new burners, design of the DBEL burners for our coal specification, remaining commissioning beyond the 50% load achieved to date.

- **Brown 3 SCR**
    - Schedule/Execution – NTR
    - Permitting – waiting on permit to construct pending resolution of SAM with KYDAQ.
    - Engineering – proceeding as planned to support the spring 2012 in-service.
    - Budget - NTR
    - Contracting – authorization to award the Hot Water Recirc contract to Alstom planned for the July IC meeting.
    - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
    - Schedule/Execution – Working towards finalizing a schedule with Voith Hydro that supports all units being completed by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
    - Permitting – NTR
    - Engineering/General:
        - Reviewing Voith updated scope for rehabilitation minus automation.
        - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
        - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
    - Budget:
        - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
    - Contracting:
        - Negotiations with Voith ramping up to wrap all existing contracts and purchase orders into a single Lump Sum contract.
    - Issues/Risk
        - Release of third unit runner to Voith is required in August to maintain schedule.
        - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
    - Safety - NTR
    - Auditing - NTR
    - Permitting - NTR
    - Engineering/General
        - Meetings continue with station management and URS to move the activities associated with the project from the Plant to PE.

        - Scope development for the limestone building extension is underway with the RFQ being issued to the market within the next few weeks.
        - Working with URS to procure long lead time equipment such as the verti-mill.
    - Budget
        - AIP development in progress.
        - Revised cash flow reflected in 2011 MTP
    - Contracting - NTR
    - Issue/Risk - NTR

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications remain under review by the agencies. Preparing to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
    - Engineering
        - Finalization of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - PE notified to re-start engineering and procurement activities due to negotiations with Holcim being resumed.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Dewatering of the Gypsum Storage Pond was recently completed to allow investigation of existing clay liner thickness and permeability.
    - Budgeting – The additional $1.5m net against a project sanction of $25m net to fund modifying the GSP liner system to meet anticipated future regulations will require IC approval and a revised AIP.
    - Engineering:
        - Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Path forward is to utilize the existing clay liner as part of a composite liner system to meet proposed new regulations before the pond is placed into service.
        - A repair strategy for the BAP is being developed in response to the EPA Inspection in June 2009.
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk
        - Weather remains the biggest risk. The contractor has submitted a request for adjustments to the LDs due to the weather delays from the wet winter and spring.

        - PE is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution - NTR
    - Budgeting - NTR
    - Engineering – The Detailed Engineering RFP has been issued and bidders are preparing proposals with bids due in early July.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue. Recent testing on the IN bat was completed with a single finding. Work continues on the development of the 401/404 Permits for an August/September submittal.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – Conceptual Engineering on the CCP transport systems has resulted in a refined estimate that is significantly over the original amount included in the project ECR filings. PE will continue working with B&V and station management through the 2011 MTP development to refine the scope and reduce the cost impact.
    - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
    - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application. Relocation of the impacted cemetery continues with planning with the local authorities and the cemetery where the remains will be relocated.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk:
        - Land Acquisition – a final offer that will discuss condemnation potential will be sent to the remaining three land owners in early July. A final recommendation will be presented to management for approval on whether to change designs or condemn the remaining property in late July.

- **General CCP Projects**
    - Study by PE and GAI has been completed in final draft form that identifies very conceptual cost to comply with EPA options of CCP storage. Range of cost is $700 - $1,100 million and is dependent on Subpart C or Subpart D final ruling. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. These cost have been included in PE's 2011 MTP draft.

- **E.W. Brown Ash Pond Project**
    - **E.W. Brown Starter Dike**
        - Safety – (0) Recordable
        - Schedule/Execution:

        - Approximately 40% of the pond covered with straw mats as dust control measures. Approximately 10 acres of ash is exposed awaiting liner system installation. The exposed ash is being controlled temporarily by water trucks and flat drum rollers.
        - Rock placement continued on the West and South Embankments. Approximately 98% of the rock embankment has been placed to date.
        - Clay placement, ash grading, and liner system placement was suspended.
        - Budget – NTR
        - Contract Disputes/Resolution: NTR
        - Issues/Risk – Summit was given notice to suspend all work except rock placement and some minor activities beginning July 6th until further notice.

    - **E.W. Brown Aux Pond 900'**
        - Schedule/Execution:
        - Installation of erosion and sediment control measures.
        - Topsoil stockpiles were relocated.
        - Budget – NTR
        - Contract Disputes/Resolution – NTR
        - Issues/Risk – NTR

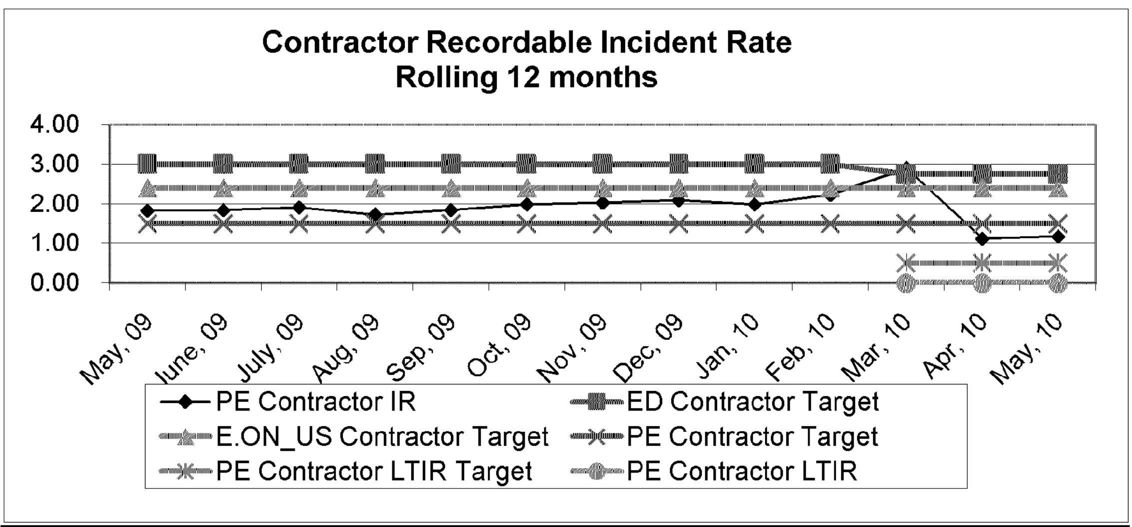
- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3, Ghent)**
    - Safety – NTR
    - Schedule/Execution:
        - RFP for MC3, MC4, BR3 and GH2 released June 29 to URS, Nol-Tek, UCC, FLsmidth, ClydeBergemann, and BCSI. Pre-bid meetings scheduled at sites July 7 & 8 with bids due July 20 unless extension are granted.
        - RFP addendum being prepared to include bid request for wet systems on all four Ghent units as part of the work on Ghent NOV.
        - MC 4 tests by E.ON Engineering published.
        - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack; however, significant ESP issues occurred during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels.
    - Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.

- **SO3 Mitigation (Ghent)**
    - Met with EPA in Atlanta to discuss the NOV issue on June 29 - E.ON technical action items to respond by mid July.
    - GH2 testing postponed until the "permanent" temporary system is installed by the plant.
    - Preparing a test plan and schedule for MgO injection at GH4.
    - Ghent station is currently installing the "permanent" temporary system from Nol-Tek with operation expected around July 9th.
    - B&V draft of SAM testing difficulties white paper received.
    - B&V draft of SAM calculations at Ghent Units received.
    - Emissions Monitoring Inc. (Jim Peeler) has published a white paper on CEMS/Compliance Monitoring Testing.

- **NBU1 and Other Generation Development**
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies is planning visits to the landfills in July.
  - NBU CR – HDR updated estimate received. Layout and landfill issues assessed. Gas pipeline issues assessed. Water balance issues assessed. On schedule for late July report draft.
  - Biomass – Black and Veatch submitted draft of Co-Firing Early Estimates and Level I Schedule for MTP purposes. They are progressing with Vista models. On schedule for early August report draft.
  - FutureGen – NTR

- **General**
  - Impoundment Integrity Program – PE is transitioning this to Generation Services.
  - Environmental Scenario Planning – The review and refinement of the draft B&V report continues relative to scopes and cost.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July.

Metrics



Upcoming PWT Needs:

1. Award of the BR3 HWRS to Alstom will need approval in July IC meeting.
2. Decision to convert TC's GSP to a composite liner or maintain current plan. Changing design and implementation now versus later is significantly less expensive and less disruptive to station operations than waiting until after the pond is placed into service. A recommendation from PE and the station will be presented to officers within ES the week after July 4th.

3. Decision to convert Brown's Main Pond to a landfill. Changing direction now before the Main Pond is placed into service is showing to be least cost and least disruptive to station operations. A recommendation from PE and the station will be presented to officers within ES by mid-July.

Staffing

1. Significant staffing increases in PE will be required to manage the current slate of projects in PE's draft 2011 MTP.
2. Philip Imber has submitted for two Manager postings outside of ES.

From: Saunders, Eileen
To: Imber, Philip
Sent: 6/18/2010 8:25:06 AM
Subject: FW: Draft -Cost Estimates and Assumptions
Attachments: Environmental Summay (rev5 6-3-10).xlsx

Please see the two emails below for cost estimate information.

Thanks,

Eileen

From: Saunders, Eileen
Sent: Friday, June 11, 2010 3:03 PM
To: Cosby, David
Subject: Draft -Cost Estimates and Assumptions

David,

I was thinking the other day that you may be interested in seeing the cost summary we have shared with Stuart's group. Next week, we will receive schedules that will help us determine a cash flow so we can see when the O&M and Capital cost impacts will hit. Also, the O&M numbers represent a combined fixed and variable cost. When we receive their report on the 18th, the costs will be broken out.

Please see the list of assumptions below as you review the summary.

Thanks,

Eileen

From: Saunders, Eileen
Sent: Tuesday, June 08, 2010 10:29 AM
To: Wilson, Stuart; Karavayev, Louanne
Subject: Assumptions

Stuart and LouAnne,

Here are the assumptions I sent to John, Ralph and Scott:

Enclosed, please find a summary of the costs provided by B&V as part of the Environmental Compliance Study. As you review this information, please note the following:

- *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.*
- *The cost estimate does not include provisions for SO3 Mitigation Systems or Combined Cycle Costs. Both of those costs will be included in estimates provided by others.*
- *For Cane Run, Ghent, Trimble, Mill Creek and Green River, mercury technology solutions are included by Unit. The Brown Plant Management Team preferred to look at a mercury solution by plant. Environmental is unsure as to if the mercury regulations will be by plant or by unit so I supported their requests. If we believe*

that we should look at mercury by plant as the basis of what goes into the MTP, the costs may go down.

- *A generic Neural Network number was used as a means of addressing CO.*
- *The second attachment, from Environmental Affair, has been updated to reflect the proper CO limits.*

Additionally, we discussed yesterday that the estimate does not account for market impact (i.e. markups we may receive from vendors/contractors since the demand for equipment will increase due to the new regulations).

Please call me if you have any questions.

Thank you,

Eileen

	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.
Sent:	5/28/2010 11:59:30 AM
Subject:	EON Draft Cost Example
Attachments:	EXAMPLE Unit 4 Cost Estimates 052810.pdf

Eileen,
Attached please find a draft cost example prepared for the AQC project. We would like to discuss the format of the deliverable with you. Specifically, we noticed that your MTP example sheets (you provided last week) list primary controlled pollutants and secondary controlled pollutants. We understand there is a co-benefit of control for some of these pollutants and would like to appropriately proportion the costs but need some guidance from you as to how best to account for this.
We'll call you in 10 minutes to discuss further.

Thanks
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:	Unit 4
MW	168
Project description	High Level Emissions Control Study

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	$8,42[illegible]0	$26,926,000
Fabric Filter	$33,000,000	$196	[illegible]1,9[illegible]	$5,940,000
Lime Injection	$2,569,000	$15	[illegible]39[illegible]	$1,205,000
PAC Injection	$2,326,000	$14	[illegible]1,[illegible]1,[illegible]0	$1,364,000
Total	$252,895,000	$1,5[illegible]	$[illegible]54[illegible]00	$45,321,000

From:	Saunders, Eileen
To:	Straight, Scott
CC:	Gregory, Ronald; Linkenhoker, Lana
Sent:	6/18/2010 9:37:36 AM
Subject:	PE's Bi-Weekly Update of 6-17-10 (rdg-els).docx
Attachments:	PE's Bi-Weekly Update of 6-17-10 (rdg-els).docx

Scott,

Enclosed is the Brown and Ghent report. Please see the new section for the Limestone Project as well.

Thanks,

Eileen

Energy Services - Bi-Weekly Update
June 17, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report.
  - Auditing – Internal Auditing is in the final stages of activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent Remaining Scope/Schedule
      - Chimney Coatings – Coating application is complete. Tnemec requested that final testing take place 90 days after the coating application. They are expected to be back on site
      - SCR/FGD Icing Siding – Installation in progress and nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install.
      - Chimney Capping – Contractor will be on site June 30, 2010 for a mobilization meeting with PE. Work will begin on July 6, 2010.
      - Elevators- Bids were received June 7, 2010. Reviews of the bids have begun and a meeting was held on June 17, 2010 with one of the bidders.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD tie-in for Brown Unit 3 was successfully completed during the BR3 outage that ended on May 21, 2010 and has continued to operate since. Brown Unit 2 is expected to be directed through the FGD sometime before the end of this month, unless something changes.
      - E.W. Brown Gypsum Dewatering Facility
        - Schedule/Execution:
          - Commissioning of the vacuum pump, motor, and filter belt continues.
          - Fluor continues to work on the DCS and commissioning of the Fluor supplied equipment.
          - Construction and commissioning work to be complete week of 6/21.
          - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Schedule/Execution:
          - Construction 97% complete.
          - Plumbing inspection and final building inspection to occur week of 6/14.
  - Budget:
    - Brown – NTR.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - The elevator bids came back higher than anticipated and the schedule shows some work moving into the first quarter of 2011. We are continuing to evaluate the bids and challenge the vendors on cost saving opportunities.

- **TC2**
  - Safety – NTR
  - Permitting – NTR

- Auditing – Auditing released their audit report on TC2 invoicing with no findings.
- Schedule/Execution:
  - Bechtel EPC – TC2 achieved initial synchronization May 18 and has been at 200 MW intermittently for mill tuning. First full load is planned for mid-June. **This supports Bechtel's latest forecasted substantial completion date of July 22.**
  - Non-Bechtel Scope:
    - PRB Upgrades – Complete. NOTE: The non-Bechtel scope will be removed from future reports due to all scope being completed.
- Budget – Revised EPC authorization and project sanction was approved in the May IC meeting.
- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Commissioning versus schedule.
  - Current unit issues: Economizer inlet valve actuator, turbine bearing #6 high metal temperature, FD fan controller, 2B ID fan blade pitch actuator hysteresis, BAP water level.

- **Brown 3 SCR**
  - Schedule/Execution – PE and the station have agreed to move the outage to the spring of 2012.
  - Permitting –SAM testing on EW Brown units taking place the week of May 24.
  - Engineering – EPC engineering kick off meeting scheduled for June 3 in Denver, CO (home of Zachry Engineering).
  - Budget:
    - NTR
  - Contracting:
    - EPC – Contract with Zachry signed May 19, including the assignment of the RPI purchase agreement to Zachry.
  - SCR Supplier – SCR Supplier Contract amended and assigned to EPC Contractor.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro, the original vendor for first two units completed, has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Reviewed plant goals for keeping automation scope in-house.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
    - Reviewing inventory of parts on hand for third unit.
  - Budget:
    - Voith Hydro submitted revised pricing as planned. Their submittal is under review. PE continues to assemble pricing for work outside hydro vendor scope

- Contracting:
  - Work continues on developing a dewatering engineering scope of work for RFQ.
- Issues/Risk
  - If Voith remains as hydro equipment supplier, they will need to release their turbine runner for the fourth unit sometime in early August in order to meet the tentative schedule.
  - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Mill Creek Limestone Project**
  - Saftey- NTR
  - Auditing- NTR
  - Permitting- NTR
  - Engineering/General
    - Transition meeting held with the plant to coordinating moving the activities associated with the project from the Plant to PE.
    - Review of the URS Engineering Study held with the plant.
    - Scope development for the limestone building extension is underway. Working to send out a bid package to local constructors the week of June 28, 2010.
    - Working with URS to procure long lead time equipment.
  - Budget
    - AIP development in progress.
  - Contracting
    - Working with the Director and Commercial Manager to develop an overall engineering, procurement and construction strategy.
  - Issue/Risk
    - Tight schedule for completing the building extension by the end of the year.

- **Cane Run CCP Project**
  - Permitting
    - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone better than expected.
    - KYDWM held a public meeting on Mary 25th with a turnout of over 100 people. The meeting included some heated remarks but no major issues that would deter our permit were identified.
    - Running Buffalo Cover study was performed with no findings.
  - Engineering
    - Development of construction drawings are on hold until the KYDWM has completed their initial review.
    - Transmission working towards relocation of the 69kV line.
  - Budget – project remains tracking to or below sanction.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
  - NTR

- **TC CCP Project – BAP/GSP**

- Schedule/Execution:
  - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
- Budgeting – NTR
- Engineering – NTR
- Permitting – NTR
- Contract Disputes/Resolution – NTR
- Issues/Risk
  - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
  - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution – NTR
  - Budgeting – NTR
  - Engineering – A Scope of Work for the Detailed Engineering phase has been developed and being prepared to be sent to bidders. A Pre-Bid Meeting will occur in June, 2010.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – NTR
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Conceptual Design for the CCP transport at Ghent is complete. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. . A meeting with Project Engineering and Real Estate is scheduled during the week of 31May10 to develop strategy going forward.

- **General CCP Projects**

  Project Engineering will be developing a high level order of magnitude cost estimate to bring the entire EON US fleet of CCP ponds into compliance with the EPA's Draft CCP Ruling of 5/5 for Subpart C, D and D Prime. The review is expected to be in draft form the first week in June.

- **E.W. Brown Starter Dike**
  - **Safety – (0) Recordable**

- **Schedule/Execution:**
  - **Approximately 60% of the pond covered with straw mats for dust control. Mats rolled up in areas as needed to facilitate ash-grading activity and rock embankment placement.**
  - **Rock placement began on the West and South Embankments. Approximately 88% of the rock embankment has been placed to date.**
  - **In-Situ work 95% complete.**
  - **Ash grading continued on the South and East portion of the pond and in the In-Situ interface areas where applicable.**
  - **Clay placement began and is slow due to the amount of oversized rock present in the stockpiled material.**
- **Budget – NTR**
- **Contract Disputes/Resolution: NTR**
- **Issues/Risk – Discussed open issues with Summit management on 6/14/10 pertaining to inclement weather delays and fuel oil adjustment.**

- **E.W. Brown Aux Pond 900'**
  - Schedule/Execution:
    - Construction contract awarded to Charah.
    - Mobilization began on 6/14/10.
  - <u>Budget</u> – project remains tracking to or below sanction.
  - <u>Contract Disputes/Resolution</u> – NTR
  - <u>Issues/Risk</u> – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
  - Safety - NTR
  - Schedule/Execution:
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests: E.ON Engineering results for PM testing have not been published. .
    - MC 3 air heater inlet and SCR inlet test ports installed by Hall the week of May 24. A&D is 40% complete on the ESP inlet and ESP outlet test ports; work to be complete May 29.. Testing by E.ON Engineering with ADA/Breen Temporary Injection is planned for the week of June 7.

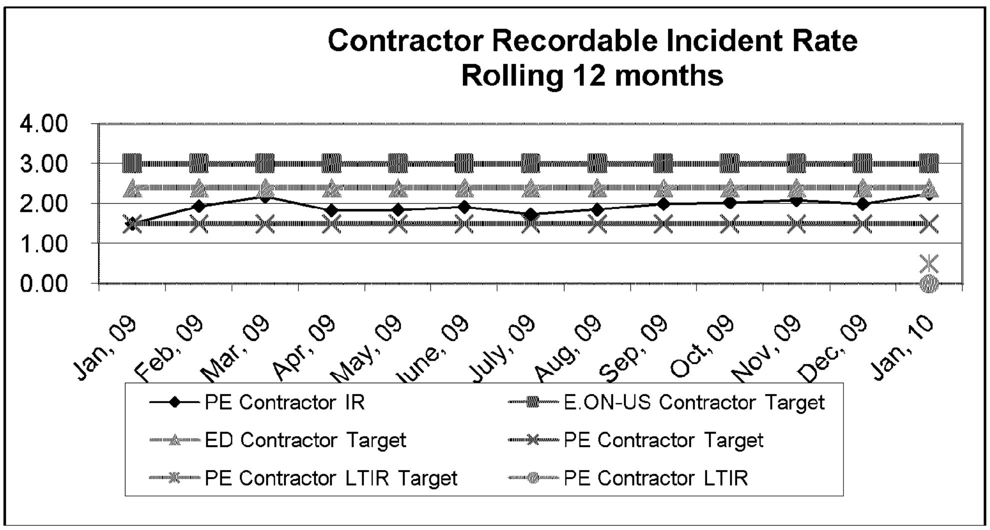
- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24th was canceled.
  - B&V contracted for BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper.
  - Contract signed to Emissions Monitoring Inc. (Jim Peeler) to provide a white paper on CEMS/Compliance Monitoring Test White Paper.
  - Had teleconference with Duke regarding experience with SBS Injection System at Gibson.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Result received.
    - LFG Technologies is under contract to perform study work.

- NBU CR – HDR had site visit/kick off on May 25th at Cane Run.
- Biomass – Black and Veatch under contract to perform MC Project Implementation Planning study work. Site visit/kick off meeting at Mill Creek was held on May 18.
- FutureGen – NTR

- General
  - Impoundment Integrity Program
    - .
    - Legal review complete.
    - Working on completing the Site Specific sections of the program.
  - Environmental Scenario Planning – B&V completed the initial cost estimate by June 1 and submitted their initial report on June 18 as scheduled. Reviews of the estimate are in progress.
  - Alstom Master Agreement- Negotiations continue.

Metrics



Upcoming PWT Needs:

This calendar is in the process of being modified. Next report will include the revised calendar.

Staffing - NTR

From:	Straight, Scott
To:	Straight, Scott; Thompson, Paul; Voyles, John; Bowling, Ralph; Sturgeon, Allyson; Hudson, Rusty; Hincker, Loren; Sinclair, David; Schetzel, Doug; Yussman, Eric; Jackson, Fred; Keeling, Chip; Hendricks, Claudia; Ray, Barry
CC:	Waterman, Bob; Imber, Philip; Lively, Noel; Saunders, Eileen; Gregory, Ronald; Heun, Jeff; Hance, Chuck; Clements, Joe; Cooper, David (Legal); Jones, Greg
Sent:	6/18/2010 2:18:52 PM
Subject:	Project Engineering's ES Bi-Weekly Report - June 18, 2010
Attachments:	PE's Bi-Weekly Update of 6-18-10.docx

Scott Straight, P.E.
Project Engineering - E.ON U.S.
Director, Project Engineering
O (502) 627-2701
F (502) 217-2040
scott.straight@eon-us.com

Energy Services - Bi-Weekly Update
June 18, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – Nothing new to report (NTR).
  - Auditing – Internal Auditing in the final stages of activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent
      - Chimney Coatings – Coating application is complete. Testing of the application will take place 90 days after the coating application.
      - SCR/FGD Icing Siding – Installation nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install. Fluor mobilizing to the site.
      - Chimney Capping – Contractor on site June 30th with work starting July 6th.
      - Elevators- Bids received June 7, 2010 and are under review.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD continues to operate very well. Brown 2 is expected to be directed through the FGD in late June, well ahead of original plan.
      - E.W. Brown Gypsum Dewatering Facility
        - Commissioning of the vacuum pump, motor, and filter belt continues.
        - Fluor continues to work on the DCS and commissioning of the Fluor supplied equipment.
        - Construction and commissioning work to be complete week of 6/21.
        - Facility operation contract bid reviews ongoing.
      - E.W. Brown Gypsum Lab
        - Construction 97% complete.
        - Plumbing and final building inspection expected within a week.
  - Budget:
    - Brown – NTR.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - The elevator bids came back higher than anticipated and the schedule shows some work moving into the first quarter of 2011. We are continuing to evaluate the bids and challenge the vendors on cost saving opportunities. This will be picked up in the 2011 MTP.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – Auditing released their audit report on TC2 invoicing with no findings.
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved 50% load Jun 15. Bechtel has been experiencing significant combustion tuning issues that have delayed the first full load until late June. **Bechtel's latest forecasted substantial completion date is now July 30.**
  - Budget – Revised EPC authorization and project sanction approved in May IC meeting.

- Contract Disputes/Resolution:
  - Bechtel FM Claims – Parked at the present time by both parties.
- Issues/Risk:
  - Commissioning versus schedule.
  - Current unit issues: Combustion tuning.

- **Brown 3 SCR**
  - Schedule/Execution – The 2012 spring outage needs to be picked up in the 2011 MTP.
  - Permitting – SAM testing took place in late May. Additional testing being planned for summer.
  - Engineering – EPC engineering kick off meeting held in Denver, CO (home of Zachry Engineering). All parties are working very well together. Alstom to be released on engineering of the HW recirc for economizer exit control to allow wider range of unit operation for SCR.
  - Budget - NTR
  - Contracting - NTR
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
  - Budget:
    - Total roll up of estimate to complete work under a lump sum to Voith Hydro is essentially at 2010 MTP values. PE continues to assemble pricing for work outside hydro vendor scope. Revised project sanction planned for July/August IC meeting along with award of remaining runners to Voith through a separate PO while the lump sum contract is negotiated and drafted for a August/September IC meeting.
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - Release of third unit runner to Voith is required in August to maintain schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.
- **Mill Creek Limestone Project**
  - Safety - NTR
  - Auditing- NTR
  - Permitting- NTR
  - Engineering/General
    - Transition meeting held with the plant to coordinating moving the activities associated with the project from the Plant to PE.

        - Review of the URS Engineering Study held with the plant.
        - Scope development for the limestone building extension is underway. Working to send out a bid package to local constructors the week of June 28, 2010.
        - Working with URS to procure long lead time equipment.
    - Budget
        - AIP development in progress.
    - Contracting
        - Working with the Director and Commercial Manager to develop an overall engineering, procurement and construction strategy.
    - Issue/Risk
        - Tight schedule for completing the building extension by the end of the year.

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone well.
        - Running Buffalo Cover study was performed with no findings.
    - Engineering
        - Development of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - While PE has not restarted engineering/procurement work, discussions with Crutcher indicate negotiations may begin to accelerate with Holcim.

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
    - Budgeting – NTR
    - Engineering – Performing a study on the GSP clay liner originally installed to compare against potential new regulations. Outlook is to get clay liner to proposed new regs thus allowing the clay liner and FML planned to meet future requirements.
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk
        - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
        - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
  - Schedule/Execution – NTR
  - Budgeting – NTR
  - Engineering – The Detailed Engineering RFP is planned to be issued in June.
  - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
  - Schedule/Execution – NTR
  - Budget – Conceptual Engineering of the CCP transport systems have resulted in a revised estimate significantly over the original amount included in the initial project ECR filings. PE will be working with station through the 2011 MTP development to refine the scope and reduce the cost impact.
  - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Procurement activities for the gypsum fines project are in progress.
  - Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk:
    - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. Final offers are planned to three remaining land owners in June, followed by a formal letter to them announcing our potential intent to begin condemnation proceedings. A final decision of changing designs versus condemnation of remaining property needed for initial plan expected in late July.

- **General CCP Projects**
  - Study report reviewing potential range of cost to comply with EPA options of CCP storage has been received. Range of cost is $700 - $1,100 million, depending on Subpart C or Subpart D. These costs do not include potential additional landfill cost at Mill Creek, Green River, or conversion of Brown ATB to Landfill. The cost will be socialized the week of June 21 with management and stations.

- **E.W. Brown Ash Pond Project**
  - Safety – NTR
  - Schedule/Execution:
    - Approximately 60% of the pond covered with straw mats for dust control. Mats rolled up in areas as needed to facilitate ash-grading activity and rock placement.
    - Rock placement began on the West and South Embankments. Approximately 88% of the rock embankment has been placed to date.
    - Aux Pond Phase II work awarded to Charah with mobilization occurring on 6/14.
  - Budget – NTR
  - Contract Disputes/Resolution: NTR
  - Issues/Risk – NTR

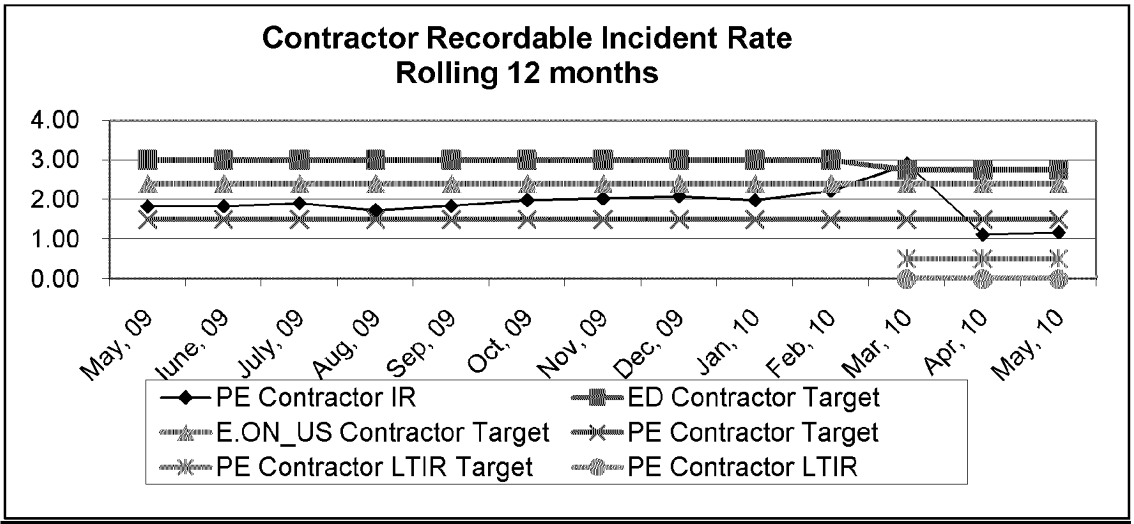
- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
  - Safety – A recordable occurred on the MC3 testing due to a minor injury resulting in a pain reliever being prescribed.
  - Schedule/Execution:
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests by E.ON Engineering for PM testing have not been published. .
    - MC 3 testing is nearing completion.

- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24th was canceled.
  - B&V BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper in development.
  - Emissions Monitoring Inc. (Jim Peeler) has drafted a white paper on CEMS/Compliance Monitoring Testing.
  - Teleconference with Duke regarding experience with SBS Injection System at Gibson revealed they have expended significant expenses on testing with hundreds of test. Their system was reported to be meeting sub 2 ppm emissions on a continuous basis.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Result received.
    - LFG Technologies is under contract to perform study work.
  - NBU CR – HDR draft of estimate received and under review.
  - Biomass – Black and Veatch under contract to perform MC Project Implementation Planning study work.
  - FutureGen – NTR

- General
  - Impoundment Integrity Program – this is nearing completion of the initial program with PE looking to transfer all future work to Generation Services.
  - Environmental Scenario Planning – B&V completed the initial cost estimate and the initial report was received on June 17th. Reviews of the estimate are in progress with cost exceeding $4 billion. Iterations between PE and Generation Planning expected to refine scope throughout the fleet and reduce the overall cost to the $3 billion range.
  - Alstom Master Agreement- Negotiations continue and progressing towards a final agreement in July..

Metrics



Upcoming PWT Needs:

Award of the BR3 HWRS to Alstom will need approval in July IC meeting.

Staffing - NTR

From:	Imber, Philip
To:	Straight, Scott
Sent:	6/18/2010 2:21:42 PM
Subject:	PE's Bi-Weekly Update of 5-31-10.docx
Attachments:	PE's Bi-Weekly Update of 5-31-10.docx

Sorry, I started this morning with this and kept getting pushed off.

Energy Services - Bi-Weekly Update
May 28, 2010
PROJECT ENGINEERING

- **KU SOx**
  - Safety – On May 4, 2010 Fluor was presented the Governors Safety Award for 2,000,000 safe work hours without a lost time incident. The 2,000,000 hour milestone was achieved in October of 2009. Currently, the project has passed 2.5 million safe work hours while successfully completing the Unit 3 outage that put the FGD "scrubber" on line for the first time.
  - Auditing – Internal Auditing continues activities for the Brown FGD audit.
  - Schedule/Execution:
    - Ghent Remaining Scope/Schedule
      - Chimney Coatings – Coating application is complete. The seven day cure process has begun and the coating will be tested next week.
      - SCR/FGD Icing Siding – Installation in progress and nearing completion.
      - Unit 4 ID Fans – On plan for fall 2010 install.
      - Chimney Capping – Contractor will mobilize mid-June.
      - Elevators- Bids are due June 7, 2010.
    - Brown
      - FGD, Limestone and BOP construction continues to track to plan. The FGD tie-in for Brown Unit 3 was successfully completed during the BR3 outage that ended on May 21, 2010.
  - Budget:
    - Brown – The Brown FGD Program Current Budget with Fluor this period is at $489.2m. There is $3.4m included in the forecast for un-approved change orders and $5.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown decreased by $278k for a Total Brown FGD Program ITC of $410.1m.
    - Ghent – NTR
    - Contract Disputes/Resolution - NTR
  - Issues/Risks:
    - NTR.

- **TC2**
  - Safety – NTR
  - Permitting – NTR
  - Auditing – Auditing released their audit report on TC2 invoicing with no findings.
  - Schedule/Execution:
    - Bechtel EPC – TC2 achieved initial synchronization May 18 and has been at 200 MW intermittently for mill tuning. First full load is planned for mid-June. **This supports Bechtel's latest forecasted substantial completion date of July 22.**
    - Non-Bechtel Scope:
      - PRB Upgrades – Complete. NOTE: The non-Bechtel scope will be removed from future reports due to all scope being completed.
  - Budget – Revised EPC authorization and project sanction was approved in the May IC meeting.
  - Contract Disputes/Resolution:

    - Bechtel FM Claims – Parked at the present time by both parties.
  - Issues/Risk:
    - Commissioning versus schedule.
    - Current unit issues: Economizer inlet valve actuator, turbine bearing #6 high metal temperature, FD fan controller, 2B ID fan blade pitch actuator hysteresis, BAP water level.

- **Brown 3 SCR**
  - Schedule/Execution – PE and the station have agreed to move the outage to the spring of 2012.
  - Permitting –More SAM testing on EW Brown units taking place the week of June 30 & July 1. PE is checking the market for the availability of continuous testing crews at Brown and Ghent.
  - Engineering – EPC engineering kick off meeting scheduled for June 3 in Denver, CO (home of Zachry Engineering).
  - Budget:
    - NTR
  - Contracting:
    - EPC – Contract with Zachry signed May 19, including the assignment of the RPI purchase agreement to Zachry.
  - SCR Supplier – Model Demonstration Certificate issued June 18.
  - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
  - Schedule/Execution – Voith Hydro, the original vendor for first two units completed, has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
  - Permitting – NTR
  - Engineering/General:
    - Reviewing Voith updated scope for rehabilitation minus automation.
    - Reviewed plant goals for keeping automation scope in-house.
    - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
    - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
    - Reviewing inventory of parts on hand for third unit.
  - Budget:
    - Voith Hydro submitted revised pricing as planned. Their submittal is under review. PE continues to assemble pricing for work outside hydro vendor scope
  - Contracting:
    - Work continues on developing a dewatering engineering scope of work for RFQ.
  - Issues/Risk
    - If Voith remains as hydro equipment supplier, they will need to release their turbine runner for the fourth unit sometime in early August in order to meet the tentative schedule.
    - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Cane Run CCP Project**
    - Permitting
        - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone better than expected.
        - KYDWM held a public meeting on Mary 25th with a turnout of over 100 people. The meeting included some heated remarks but no major issues that would deter our permit were identified.
        - Running Buffalo Cover study was performed with no findings.
    - Engineering
        - Development of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - NTR

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
    - Budgeting – NTR
    - Engineering – NTR
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk
        - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
        - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution – NTR
    - Budgeting – NTR
    - Engineering – A Scope of Work for the Detailed Engineering phase has been developed and being prepared to be sent to bidders. A Pre-Bid Meeting will occur in June, 2010.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – NTR

- Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Conceptual Design for the CCP transport at Ghent is complete. Procurement activities for the gypsum fines project are in progress.
- Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
- Contract Disputes/Resolution – NTR
- Issues/Risk:
    - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. . A meeting with Project Engineering and Real Estate is scheduled during the week of 31May10 to develop strategy going forward.

- **General CCP Projects**
  Project Engineering will be developing a high level order of magnitude cost estimate to bring the entire EON US fleet of CCP ponds into compliance with the EPA's Draft CCP Ruling of 5/5 for Subpart C, D and D Prime. The review is expected to be in draft form the first week in June.

- **E.W. Brown Aux Pond 900'**
    - Contract has been awarded to Charah for Phase II.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

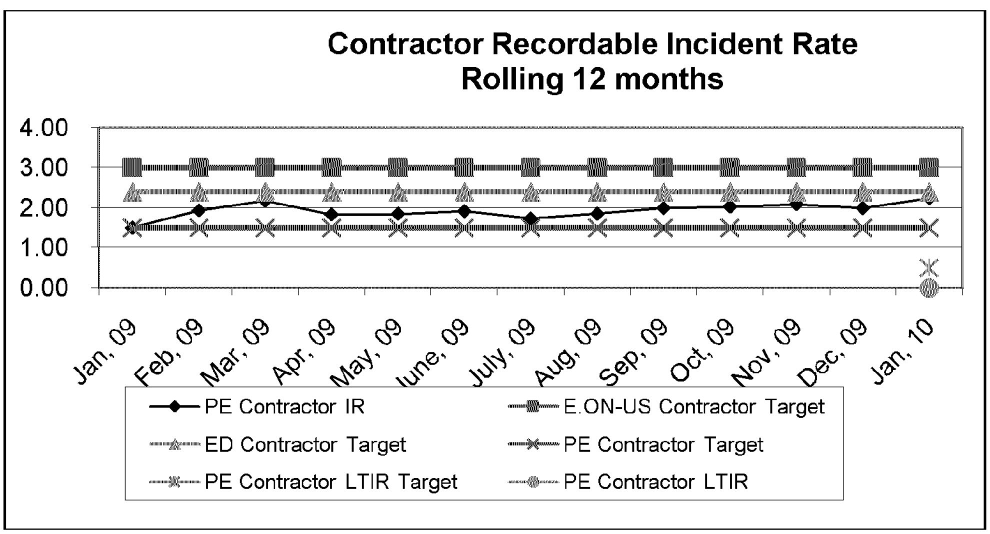
- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
    - Safety - Hydrated lime in the eye of a contractor during the testing – recordable injury.
    - Schedule/Execution:
        - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
        - Specification Preparation continues with draft for internal reviews expected week of June 21 and release to the market by the end of the month.
        - MC 4 tests: E.ON Engineering results for PM testing were corrupt. Final report is pending.
    - MC 3 testing performed for one week with ADA/Breen. Initial results include 8 ppm and 2.3 ppm at the stack. Significant ESP issues during the test period. ESP issues are being assessed to see if there is a relationship to the testing or if sections tripped due to high hopper levels. ADA/Breen propose further injection and demobilization the week of June 21. Other – Visited IPL Harding Station with Vincent Forcellini and Brad Pabian. They have URS's SBS Injection System on one unit.
- **SO3 Mitigation (Ghent)**
    - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant.
    - The Project Engineering test plan for the week of May 24th was canceled. Breen sent a $50k cancelation charge. They propose retracting the cancelation charge and putting it toward MgO injection in the boiler under the same cost provisions for the dry reagent injection contract. Ghent General Manager to decide path forward as this work is under his funding.

- B&V progressing on BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper.
- Emissions Monitoring Inc. (Jim Peeler) provided a draft and final draft white paper on CEMS/Compliance Monitoring Test White Paper. Paper needs final review prior to full publication
-

- **NBU1 and Other Generation Development**
  - LFG
    - Second Landfill Gas Sample Result received.
    - LFG Technologies planning visits to landfills the week of June 28.
  - NBU CR – HDR submitted Cost Estimates. General Arrangement agreed for planning purposes.
  - Biomass – Black and Veatch submitted initial draft of Co-Firing Early Estimates and Level I Schedule.
  - FutureGen – NTR

- General
  - Impoundment Integrity Program
    - Met with Energy Services Training Staff to discuss the process of incorporating the new impoundment integrity policy information into the Coursemill program.
    - Scheduling a meeting with Legal for week of May 31, 2010 to review comments.
    - Working on completing the Site Specific sections of the program.
  - Environmental Scenario Planning – B&V completed site visits and gave preliminary technology recommendations to PE for review. Recommendations were discussed with plant management and their staff and comments were returned to B&V. Initial cost estimates are being prepared and will be sent to PE by close of business on June 1, 2010.
  - Alstom Master Agreement- Negotiations continue.

Metrics



Upcoming PWT Needs:

This calendar is in the process of being modified. Next report will include the revised calendar.

Staffing - NTR

From:	Straight, Scott
To:	Thompson, Paul; Voyles, John; Bowling, Ralph; Sturgeon, Allyson; Hudson, Rusty; Hincker, Loren; Sinclair, David; Schetzel, Doug; Yussman, Eric; Jackson, Fred; Keeling, Chip; Hendricks, Claudia
CC:	Waterman, Bob; Imber, Philip; Lively, Noel; Saunders, Eileen; Gregory, Ronald; Heun, Jeff; Hance, Chuck; Clements, Joe; Cooper, David (Legal); Jones, Greg
Sent:	6/1/2010 9:15:17 AM
Subject:	Project Engineering's ES Bi-Weekly Report - May 31, 2010
Attachments:	PE's Bi-Weekly Update of 5-31-10.docx

All, here is PE's Bi-Weekly Report.

Claudia or Chip, can someone contact Ronald Gregory about a brief article on Brown's FGD Program. There are two things I would like to inform people of, the first being the recent award from the Governor for the project's safety record through October 2009 (which has gotten better since then) and also the FGD has been placed into operation for the first time on Unit 3. We still are commissioning the FGD, but it is operating well and scrubbing SO2.

Scott Straight, P.E.
Project Engineering - E.ON U.S.
Director, Project Engineering
O (502) 627-2701
F (502) 217-2040
scott.straight@eon-us.com

Energy Services - Bi-Weekly Update
May 28, 2010
PROJECT ENGINEERING

- **KU SOx**
    - Safety – On May 4, 2010 Fluor was presented the Governors Safety Award for 2,000,000 safe work hours without a lost time incident. The 2,000,000 hour milestone was achieved in October of 2009. Currently, the project has passed 2.5 million safe work hours while successfully completing the Unit 3 outage that put the FGD "scrubber" on line for the first time.
    - Auditing – Internal Auditing continues activities for the Brown FGD audit.
    - Schedule/Execution:
        - Ghent Remaining Scope/Schedule
            - Chimney Coatings – Coating application is complete. The seven day cure process has begun and the coating will be tested next week.
            - SCR/FGD Icing Siding – Installation in progress and nearing completion.
            - Unit 4 ID Fans – On plan for fall 2010 install.
            - Chimney Capping – Contractor will mobilize mid-June.
            - Elevators- Bids are due June 7, 2010.
        - Brown
            - FGD, Limestone and BOP construction continues to track to plan. The FGD tie-in for Brown Unit 3 was successfully completed during the BR3 outage that ended on May 21, 2010.
    - Budget:
        - Brown – The Brown FGD Program Current Budget with Fluor this period is at $489.2m. There is $3.4m included in the forecast for un-approved change orders and $5.5m included in the forecast for the "Non-Target" structural reinforcement work. The current month Fluor forecast for Brown decreased by $278k for a Total Brown FGD Program ITC of $410.1m.
        - Ghent – NTR
        - Contract Disputes/Resolution - NTR
    - Issues/Risks:
        - NTR.

- **TC2**
    - Safety – NTR
    - Permitting – NTR
    - Auditing – Auditing released their audit report on TC2 invoicing with no findings.
    - Schedule/Execution:
        - Bechtel EPC – TC2 achieved initial synchronization May 18 and has been at 200 MW intermittently for mill tuning. First full load is planned for mid-June. **This supports Bechtel's latest forecasted substantial completion date of July 22.**
        - Non-Bechtel Scope:
            - PRB Upgrades – Complete. NOTE: The non-Bechtel scope will be removed from future reports due to all scope being completed.
    - Budget – Revised EPC authorization and project sanction was approved in the May IC meeting.
    - Contract Disputes/Resolution:

        - Bechtel FM Claims – Parked at the present time by both parties.
    - Issues/Risk:
        - Commissioning versus schedule.
        - Current unit issues: Economizer inlet valve actuator, turbine bearing #6 high metal temperature, FD fan controller, 2B ID fan blade pitch actuator hysteresis, BAP water level.

- **Brown 3 SCR**
    - Schedule/Execution – PE and the station have agreed to move the outage to the spring of 2012.
    - Permitting –SAM testing on EW Brown units taking place the week of May 24.
    - Engineering – EPC engineering kick off meeting scheduled for June 3 in Denver, CO (home of Zachry Engineering).
    - Budget:
        - NTR
    - Contracting:
        - EPC – Contract with Zachry signed May 19, including the assignment of the RPI purchase agreement to Zachry.
    - SCR Supplier – SCR Supplier Contract amended and assigned to EPC Contractor.
    - Issues/Risk – NTR

- **Ohio Falls Rehabilitation**
    - Schedule/Execution – Voith Hydro, the original vendor for first two units completed, has submitted tentative schedule for third unit work to begin in June, 2011 with the remaining five following every 7/8 months, with all units complete by the end of 2014. PE is investigating being able to de-water two units simultaneously to gain schedule float.
    - Permitting – NTR
    - Engineering/General:
        - Reviewing Voith updated scope for rehabilitation minus automation.
        - Reviewed plant goals for keeping automation scope in-house.
        - Working with power marketing group on interconnection issues regarding unit testing and commercial dates.
        - Reviewing Historic Preservation and Maintenance Plan developed in 2008.
        - Reviewing inventory of parts on hand for third unit.
    - Budget:
        - Voith Hydro submitted revised pricing as planned. Their submittal is under review. PE continues to assemble pricing for work outside hydro vendor scope
    - Contracting:
        - Work continues on developing a dewatering engineering scope of work for RFQ.
    - Issues/Risk
        - If Voith remains as hydro equipment supplier, they will need to release their turbine runner for the fourth unit sometime in early August in order to meet the tentative schedule.
        - The tentative schedule for completion of all units by late 2014 is highly dependent on year-round dewatering.

- **Cane Run CCP Project**
    - Permitting

        - 404/401 and Landfill Permit applications have been submitted and are currently under review. Working to respond to comments on the 404 and Landfill Permit applications. To date permitting process has gone better than expected.
        - KYDWM held a public meeting on Mary 25th with a turnout of over 100 people. The meeting included some heated remarks but no major issues that would deter our permit were identified.
        - Running Buffalo Cover study was performed with no findings.
    - Engineering
        - Development of construction drawings are on hold until the KYDWM has completed their initial review.
        - Transmission working towards relocation of the 69kV line.
    - Budget – project remains tracking to or below sanction.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Trimble Co. Barge Loading/Holcim**
    - NTR

- **TC CCP Project – BAP/GSP**
    - Schedule/Execution:
        - Construction on the project continues with work on the MSE Wall, Dike Extension, and Piping.
    - Budgeting – NTR
    - Engineering – NTR
    - Permitting – NTR
    - Contract Disputes/Resolution – NTR
    - Issues/Risk
        - Weather. The contractor has submitted a letter requesting adjustments to the project's Liquidated Damages due to the weather delays. Meetings continue to be held with the contractor concerning the scheduling issues.
        - Project Engineering is developing plans to expedite the completion of the GSP and/or South Dike to help mitigate the high water elevations in the BAP.

- **TC CCP Project – Landfill**
    - Schedule/Execution – NTR
    - Budgeting – NTR
    - Engineering – A Scope of Work for the Detailed Engineering phase has been developed and being prepared to be sent to bidders. A Pre-Bid Meeting will occur in June, 2010.
    - Permitting – Negotiations continue with USFWS on the resolution of the Indiana Bat issue.
    - Contract Disputes/Resolution – NTR
    - Issues/Risk – NTR

- **Ghent CCP Projects - Landfill**
    - Schedule/Execution – NTR
    - Budget – NTR
    - Engineering – Detailed Engineering of gypsum fines and Conceptual Engineering on CCP transport for landfill continues with Black & Veatch. Conceptual Design for the CCP

transport at Ghent is complete. Procurement activities for the gypsum fines project are in progress.
- Permitting – All permit applications have been made. Project Engineering is working with the various agencies on minimal questions being asked during the review of the permit application.
- Contract Disputes/Resolution – NTR
- Issues/Risk:
  - Land Acquisition – the review of potential modifications to the landfill's footprint has been completed. Additional land purchases, while preferred, are not necessarily needed. Review of CCP production is currently on-going to finalize path forward on land purchases. . A meeting with Project Engineering and Real Estate is scheduled during the week of 31May10 to develop strategy going forward.

- **General CCP Projects**
  Project Engineering will be developing a high level order of magnitude cost estimate to bring the entire EON US fleet of CCP ponds into compliance with the EPA's Draft CCP Ruling of 5/5 for Subpart C, D and D Prime. The review is expected to be in draft form the first week in June.

- **E.W. Brown Aux Pond 900'**
  - Contract has been awarded to Charah for Phase II.
  - Budget – project remains tracking to or below sanction.
  - Contract Disputes/Resolution – NTR
  - Issues/Risk – NTR

- **SO3 Mitigation (Mill Creek 3, Mill Creek 4, Brown 3)**
  - Safety - NTR
  - Schedule/Execution:
    - MC3 and MC4's schedule is now tied to the BART requirement for the end of 2011, with tie-in still required during spring 2011 outage.
    - MC 4 tests: E.ON Engineering results for PM testing have not been published. .
    - MC 3 air heater inlet and SCR inlet test ports installed by Hall the week of May 24. A&D is 40% complete on the ESP inlet and ESP outlet test ports; work to be complete May 29.. Testing by E.ON Engineering with ADA/Breen Temporary Injection is planned for the week of June 7.

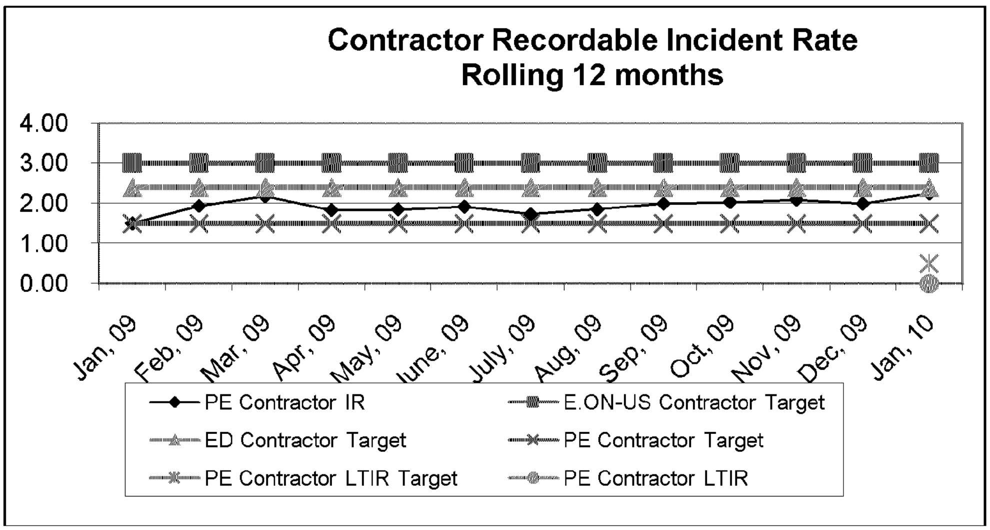
- **SO3 Mitigation (Ghent)**
  - Ghent 2 testing postponed until the "permanent" temporary system is installed by the plant. The Project Engineering test plan for the week of May 24th was canceled.
  - B&V contracted for BACT Analysis, SAM Generation White Paper, and CEMS/Compliance Monitoring Test White Paper.
  - Contract signed to Emissions Monitoring Inc. (Jim Peeler) to provide a white paper on CEMS/Compliance Monitoring Test White Paper.
  - Had teleconference with Duke regarding experience with SBS Injection System at Gibson.

- **NBU1 and Other Generation Development**
  - LFG
    - First Landfill Gas Sample Result received.
    - LFG Technologies is under contract to perform study work.

- NBU CR – HDR had site visit/kick off on May 25th at Cane Run.
- Biomass – Black and Veatch under contract to perform MC Project Implementation Planning study work. Site visit/kick off meeting at Mill Creek was held on May 18.
- FutureGen – NTR

- General
  - Impoundment Integrity Program
    - Met with Energy Services Training Staff to discuss the process of incorporating the new impoundment integrity policy information into the Coursemill program.
    - Scheduling a meeting with Legal for week of May 31, 2010 to review comments.
    - Working on completing the Site Specific sections of the program.
  - Environmental Scenario Planning – B&V completed site visits and gave preliminary technology recommendations to PE for review. Recommendations were discussed with plant management and their staff and comments were returned to B&V. Initial cost estimates are being prepared and will be sent to PE by close of business on June 1, 2010.
  - Alstom Master Agreement- Negotiations continue.

Metrics



Upcoming PWT Needs:

This calendar is in the process of being modified. Next report will include the revised calendar.

Staffing - NTR

From:	Saunders, Eileen
To:	Clark, Janice
Sent:	6/3/2010 8:17:20 AM
Subject:	Fw: B&V Cost Estimates - Updated Per Eileen
Attachments:	Environmental Summay (rev5 6-3-10).xlsx

Good Morning Janice,

I am on my way up for a meeting with John. Would you mind printing a copy of this document for him? We noticed a mistake a few minutes ago and I just had it corrected.

Thank you,

Eileen

From: Ritchey, Stacy
To: Voyles, John; Bowling, Ralph; Straight, Scott
Cc: Saunders, Eileen
Sent: Thu Jun 03 08:13:44 2010
Subject: B&V Cost Estimates - Updated Per Eileen

<<Environmental Summay (rev5 6-3-10).xlsx>>

Stacy Ritchey
Budget Analyst III, Project Engineering
BOC 3
BOC Phone: (502) 627-4388
EW Brown Phone (859) 748-4455

Fax: (502) 217-4980
E-mail: Stacy.Ritchey@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:	Ritchey, Stacy
To:	Saunders, Eileen
CC:	Raque, Gary
Sent:	6/1/2010 11:25:56 AM
Subject:	B&V Study Cost Summary
Attachments:	Environmental Summay.xlsx

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	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: Jackson, Audrey
Sent: 6/21/2010 11:25:52 AM
Subject: FW: 167987.26.0000 100617 - EON Draft AQC Technology Cost Report
Attachments: COMPLETE Draft EON AQC Cost Study 061710.pdf

From: Lucas, Kyle J. [mailto:LucasKJ@bv.com]
Sent: Thursday, June 17, 2010 10:20 PM
To: Saunders, Eileen
Cc: Hillman, Timothy M.; Mahabaleshwarkar, Anand; Lawson, Stacy J.
Subject: 167987.26.0000 100617 - EON Draft AQC Technology Cost Report

Eileen,
Attached, please find the draft air quality control Technology Cost Report. Please review the document and provide one set of consolidated written comments by COB Thursday June 24, 2010. B&V will review the consolidated comments and incorporate, as appropriate, into the final report.

Additionally, Please confirm receipt of this document.

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 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
June 2010
Rev. B

BLACK & VEATCH
Building a world of difference.

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Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)
Tables
Summary of Plant AQC Technology Costs

Acronym List

AQC	Air Quality Control
BOP	Balance-of-Plant
CAIR	Clean Air Interstate Rule
CDS	Circulating Dry Scrubber
CO	Carbon Monoxide
EPA	Environmental Protection Agency
ESP	Electrostatic Precipitator
H_2SO_4	Sulfuric Acid
HCl	Hydrogen Chloride
Hg	Mercury
ID	Induced Draft
LNB	Low NO_x Burners
MACT	Maximum Achievable Control Technology
MBtu	Million British Thermal Unit
NN	Neural Network
NO_x	Nitrogen Oxides
O&M	Operation and Maintenance
OFA	Overfire Air
PAC	Powdered Activated Carbon
PJFF	Pulse Jet Fabric Filter
PM	Particulate Matter
SCR	Selective Catalytic Reduction
SO_2	Sulfur Dioxide

Executive Summary

The purpose of this study was to develop fleet-wide, high-level, capital and O&M costs for recommend air quality control equipment necessary to meet future environmental requirements at 18 coal-fired units located at 6 facilities (E.W. Brown, Ghent, Cane Run, Mill Creek, Trimble County, and Green River) owned and operated by E.ON. The study was conducted at a high-level and under a tight schedule in order to meet E.ON's requirements.

To perform the study, Black &Veatch dispatched two teams of engineers to conduct site visits and walk-downs at each of the 6 facilities over the course of 3 days. Based on information gathered during these site visits, initial air quality control equipment recommendations were prepared for E.ON's review and approval before proceeding with the cost estimate. Following E.ON's approval, high-level capital and O&M costs were determined for each unit and air quality control technology. Table ES-1 summarizes the capital and O&M cost totals rolled up for each facility.

Table ES-1
Summary of Plant AQC Technology Costs

Plant	Capital Cost ($/1,000)	Operating Cost ($/kW)	O&M Cost ($/1,000)	Levelized Annual Cost ($/1,000)
E.W. Brown	260,163	1,374	15,556	47,218
Ghent	767,355	1,465	47,746	141,134
Cane Run	860,000	4,282	48,870	153,532
Mill Creek	2,144,030	5,485	117,530	378,462
Trimble County	135,451	248	10,295	26,780
Green River	166,695	1,866	20,583	40,870
Total	4,333,694	14,720	260,580	787,996

This report contains a breakdown of the aforementioned costs and summarizes the basis and supporting documentation used to develop them. The supporting documentation includes site visit notes, control technology recommendations, design basis, process flow diagrams, equipment layout drawings, and milestone implementation schedules for the selected technologies.

1.0 Introduction

Black & Veatch was tasked by E.ON to provide a high-level cost estimate of air quality compliance expenditures necessary to meet expected future regulatory requirements for budgetary purposes. The following coal fired units were considered in this study:

- E.W. Brown – Units 1, 2, and 3.
- Ghent – Units 1, 2, 3, and 4.
- Cane Run – Units 4, 5, and 6.
- Mill Creek – Units 1, 2, 3, and 4.
- Trimble County – Units 1 and 2.[1]
- Green River – Units 3 and 4.

To accomplish this objective, Black & Veatch personnel collected the necessary unit-specific data and performed onsite observations to prepare this AQC retrofit technology and cost assessment. Based on information gathered during these site visits, initial air quality control equipment recommendations were prepared for E.ON's review and approval before proceeding with the cost estimate. To support this process, design basis, process flow diagrams, equipment layout drawings, and milestone implementation schedules for the selected technologies were developed.

Based on B&V experience, technical and economic assumptions were made in order to facilitate rapid development of the technical calculations and costs estimates. Of special note, the capital cost estimates and annual operating cost data for the AQC equipment should be considered as high-level conceptual design estimates and should be confirmed with a more detailed follow-up assessment before initiating an implementation plan.

The assessment identifies AQC technologies for reducing unit-specific air emissions for pollutants such as sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM), carbon monoxide (CO), mercury (Hg), hydrogen chloride (HCl), and dioxin/furans. This report documents the assumptions and findings of the assessment, including the identification of retrofit AQC technologies to achieve compliance at each unit, as well as order-of-magnitude costs capital and operation and maintenance (O&M) cost estimates, process flow diagrams, summary plot plan drawings, and Level 1

[1]Unit 2 at Trimble County is a new unit currently in startup and tuning before becoming commercially operational and has new AQC equipment assumed to be sufficiently designed to meet the target emissions in this study. Therefore, this unit was excluded from further analyses.

summary schedules to engineer, procure, and install each recommended technology. Additionally, the report identifies potential impacts the AQC technologies may impose on balance-of-plant (BOP) systems as applicable, such as, electric systems, ash handling systems, water supply and wastewater treatment systems.

2.0 Pollutant Emission Targets

The potential impact of future regulations are the primary driver for both the timing and nature of environmental controls planned at the E.ON plants. Among the regulatory drivers are the Utility Maximum Achievable Control Technology (MACT) and the Transport Rule -- Clean Air Interstate Rule (CAIR) replacement to be proposed by the United States Environmental Protection Agency (USEPA) by March 2011 and summer 2010, respectively. These two regulatory drivers and their associated emission levels serve as the primary basis used by Black & Veatch to develop unit-by-unit AQC technology recommendations.

E.ON provided a matrix of estimated requirements under future new environmental regulations, as well as a summary implementation schedule of regulatory programs. This information is provided in Appendix A. From this information, E.ON developed specific pollutant emission limit targets with the intent that the limits would be applied to each unit individually to assess current compliance and the potential for additional AQC equipment. For the purposes of this study, compliance options beyond the addition of new AQC technology (such as fuel switching, shutdown of existing emission units, development of new power generation, and emissions averaging scenarios) were not considered. Table 2-1 summarizes the future pollution emission targets provided by E.ON for each unit.

Table 2-1
Future Pollution Emission Targets

Pollutant	Future Pollutant Emission Limit (lb/MBtu)
NO_x	0.11
SO_2	0.25
PM	0.03
CO	0.10[a]
Hg	0.000001[b]
HCl	0.002
Dioxin/Furan	15×10^{-18}

[a]E.ON's original emission matrix provided a CO emission level of 0.02 lb/MBtu. It was determined that there was not a feasible and proven control technology available for the type and size of unit being assessed. Therefore, on May 21, 2010, the future pollutant emission limit was modified to reflect 0.10 lb/MBtu, which is considered reflective of potentially achievable CO emissions from coal fired units.
[b]The emission matrix indicated 0.012 lb/GWh or 90 percent reduction.

3.0 Study Basis and Methodology

The following sections discuss the basis and methodology used to make the AQC technology recommendations and cost estimates presented herein. These activities included site visits, development of a design basis, costs estimate methodology development, and economic assumptions.

3.1 Site Visits

During the week of May 10, 2010, E.ON provided Black & Veatch personnel access to each plant site to review existing unit systems and components and discuss current operational issues with appropriate plant personnel. The discussions focused on plant-specific issues that could potentially impact the selection, installation, and operation of future AQC technologies, such as:

- Available space to locate new AQC equipment.
- Availability of auxiliary power.
- Condition assessment of major equipment.
- Identification of BOP issues.
- Constructability issues.

These discussions were followed by plant lead facility tours. Each plant site visit ended with an exit meeting, where the initial recommendations and findings were summarized with the plant team. A brief description of site visit observations and AQC considerations for E.W. Brown, Ghent, Cane Run, Mill Creek, Trimble, and Green River are included in Sections 4.1.1, 4.2.1, 4.3.1, 4.4.1, 4.5.1, and 4.6.1, respectively. Table 3-1 identifies team personnel and facilities visited by each Black & Veatch team.

Table 3-1
Black & Veatch Team Members

Black & Veatch Team Member	Position
Team No. 1[a]	
Black & Veatch Team Member	**Position**
Anand Mahabaleshwarkar	Air Quality Control Engineer
Richard Hooper	Mechanical Engineer
Mike Ballard	Civil/Structural Engineer
Team No. 2[b]	
Black & Veatch Team Member	**Position**
Pratik Mehta	Air Quality Control Engineer
Dave Muggli	Mechanical Engineer
Roger Goodlet	Civil/Structural Engineer

[a]Visited Cane Run, Mill Creek, and Green River Stations on May 11, May 12, and May 13, respectively.
[b]Visited Ghent, Trimble County, and E.W. Brown Stations on May 11, May 12, and May 13, respectively.

3.2 Design Basis

A design basis was established for each unit based on information provided by E.ON (included in Appendix B) and results from Black & Veatch's internal combustion calculations. Information in the design basis was used as the basis for estimating equipment sizes, performance calculations, cost estimates (capital, operating, and maintenance) and also for estimating resource consumption, auxiliary power requirements, and byproduct disposal volumes. The performance calculations developed were based on the established design basis parameters and served as the basis for estimating capital and annual O&M costs for proven and feasible AQC equipment. The design basis is provided in Appendix C.

3.3 Cost Methodology

Capital and annual O&M costs to procure, install, and operate the E.ON approved AQC technologies were developed for each of 17 units[2]. All cost information was produced for unit-specific combinations of new AQC technology components —

[2] Unit 2 at Trimble County is a new unit currently in startup and tuning before becoming commercially operational and has new AQC equipment assumed to be sufficiently designed to meet the target emissions in this study. Therefore, this unit was excluded from further analyses.

upgrades to existing AQC equipment were not considered. A brief description of the proven and feasible AQC technologies considered for this study is included in Appendix D.

To support the cost estimate, Black & Veatch performed a high-level fatal flaw analysis of the following for each selected emission control technology for each unit:

- Flue Gas Conditions. Based on design fuel analysis, boiler steaming capacity, and current operating characteristics, Black & Veatch determined the flue gas conditions to be used as the basis for the AQC equipment design basis.
- Draft Fan Analysis. Black & Veatch identified the new fan requirements with high-level approximations for the new or modified ID or booster fans.
- Simplified AQCS Mass Balance. Simplified mass balances for the AQC process was completed to determine the level of reagent use and the quantity of byproduct produced.
- Black & Veatch identified new auxiliary electric loads with approximate values for recommended technologies.
- Chimney Analysis. A high-level analysis was performed to evaluate, for each air pollution control equipment option identified, modifications or replacement of the existing chimney.
- Constructability Review. A high-level constructability review was performed to assure that each conceptual site layout considers necessary access for construction without disrupting existing plant and AQC equipment. Construction and schedule are key considerations in the success of any major capital plan.
- Conceptual Equipment Arrangements. Black & Veatch produced overlays of existing site layout drawings supplied by E.ON to identify potential equipment locations (AQC equipment footprint boxes) for the approved AQC technologies. These layouts approximate the footprints and the real estate constraints.
- Schedule. Black & Veatch developed a general high-level project schedule (Level 1) including construction and erection plan of recommended AQC technologies.

The capital cost estimates were factored from recent detailed studies of similar coal fired applications and previous in-house design/build projects, include direct and indirect costs, and are stated in 2010 dollars. These costs also include allowances for auxiliary electric, draft fan upgrades, control system upgrades and other required BOP system upgrades and high-level estimates of capital cost for new stacks, induced draft (ID) and booster fans, and ductwork. Likewise, O&M costs were also estimated for the aforementioned equipment and were similarly based on data from either in-house design/build projects or, as in most case, were estimated based on a factor. The capital and O&M represent order-of-magnitude costs. The following sections briefly describe these costs.

3.3.1 Capital Costs Estimate

Direct costs consist of purchased equipment, installation, and miscellaneous costs including foundation, handling equipment, electrical, demolition, buildings, relocation costs, etc. The purchased equipment costs are the costs for purchasing the equipment, including taxes and freight. An itemized list of key components of the direct capital cost has been included in the costs for each feasible control technology described later in this report. The installation costs include construction costs for installing the new controls. The installation costs take into account the retrofit difficulty of the existing site configuration and condition and the installation requirements of the evaluated technology. Finally, the costs of miscellaneous items such as site preparation, buildings, and other site structures needed to implement the control technology are included.

Indirect costs are those costs that are not related to the equipment purchased but are associated with any engineering project, such as the retrofit of an AQC technology. Indirect costs addressed in this evaluation include the following:

- Contingency.
- Engineering.
- Owner's Cost.
- Construction Management.
- Startup and Spare Parts.
- Performance Tests.

The following sections briefly describe the indirect capital costs considered for this study.

3.3.1.1 Contingency. Contingency accounts for unpredictable events and costs that could not be anticipated during the normal cost development of a project. Costs assumed to be included in the contingency cost category are items such as possible redesign and equipment modifications, errors in estimation, unforeseen weather-related delays, strikes and labor shortages, escalation increases in equipment costs, increases in labor costs, delays encountered in startup, etc.

3.3.1.2 Engineering. Engineering costs include any services provided by an architect/engineer or other consultant for support, design, and procurement of the AQC project.

3.3.1.3 Owner's Cost. Table 3-2 lists possible Owner's costs for this category. The Owner's costs are identified as indirect costs. Some of the categories are not applicable to all of the evaluated technologies, but are representative of the typical expenditures that an Owner would experience as part of an AQC retrofit project.

3.3.1.4 Construction Management. Construction management services include field management staff such as support personnel, field contract administration, field inspection and quality assurance, project controls, technical direction, and management of startup. It also includes cleanup expense for the portion not included in the direct-cost construction contracts, safety and medical services, guards and other security services, insurance premiums, other required labor-related insurance, performance bond, and liability insurance for equipment and tools.

3.3.1.5 Startup and Spare Parts. Startup services include the management of the startup planning and procedure and the training of personnel for the commissioning of the newly installed AQC technology. Also included are the general low-cost spare parts required for each AQC technology system. High-cost critical spare part components are kept only if recommended by the manufacturer; they are determined and accounted for on a case-by-case basis.

3.3.1.6 Performance Tests. Performance test services are typically required after every AQC technology addition to validate the performance of the emissions reduction system. The results of the performance tests are used to ensure compliance with performance guarantees and emissions limits.

Table 3-2
Typical Owner's Cost Categories

Project Development: • Legal assistance • Environmental permitting/offsets • Public relations/community development • Road modifications/upgrades	**Plant Startup/Construction Support:** • Owner's site mobilization • O&M staff training • Initial test fluids and lubricants • Initial inventory of chemicals/reagents • Consumables • Construction all-risk insurance • Auxiliary power purchase
Financing: • Debt service reserve fund • Analyst and engineer	
Owner's Project Management: • Provide project management • Perform engineering due diligence • Prepare bid documents and select contractors and suppliers	**Taxes/Advisory Fees/Legal:** • Taxes • Market and environmental consultants • Owner's legal expenses: – Power purchase agreement – Interconnect agreements – Contract--procurement and construction – Property transfer

3.3.2 Annual O&M Cost Estimate

Annual O&M costs typically consist of both fixed and variable O&M costs. The following cost categories are a few of the fixed and variable costs considered:

- Reagent costs.
- Electric power costs.
- Makeup water costs.
- Wastewater treatment and byproduct disposal costs.
- Operating labor costs.
- Maintenance materials and labor costs.

The costs of reagent, electric power, makeup water, wastewater, and byproduct disposal are variable annual costs and are dependent on the specific control technology. O&M materials and labor are fixed annual costs.

The following sections briefly discuss some of the fixed and variable O&M costs considered for this study.

3.2.2.1 Reagent Costs. Reagent costs include the costs for the material, delivery of the reagent to the facility, and reagent preparation. Reagent costs are a function of the quantity of the reagent used and the price of the reagent. The quantity of reagent used will vary with the quantity of pollutant removed. Reagent costs were defined for the following reagents:

- Anhydrous ammonia.
- Limestone.
- Lime.
- Trona.
- Powdered Activated Carbon (PAC).

3.2.2.2 Electric Power Costs. Additional auxiliary power will be required to run some of the new control technology systems. The power requirements of each system vary, depending on the type of technology and the complexity of the system. Electric power costs include an increase in fan power caused by the flue gas pressure losses through the new equipment. The additional fan power was estimated with a basis of 90 percent fan efficiency and 80 percent motor efficiency.

3.2.2.3 Makeup and Service Water Costs. Makeup water or service water is required for some of the processes in the new control technology systems. Examples of water consumption include water to support AQC activities for the SO_2 scrubber systems.

3.2.2.4 Wastewater and Byproduct Disposal Costs. Some control technologies generate wastewater and/or byproduct that will require treatment or disposal. Examples of wastewater and disposal to support the AQC activities include the SO_2 scrubber systems and the pulse jet fabric filter (PJFF) systems.

3.2.2.5 Operating Labor Costs. Operating labor costs are developed by estimating the number and type of employees that will be required to run the new AQC equipment. This estimate was based on common industry practices. The labor cost was based on a fully loaded labor rate and 40 hours per work week.

Typically, a complex emissions control technology will require a combination of the following personnel:

- Supervisor.
- Control Room Operator.
- Roving Operator.
- Relief Operator.
- Laboratory Technicians.
- Equipment Operators.

3.2.2.6 Maintenance Materials and Labor Costs. The annual maintenance materials and labor costs are typically estimated as a percentage of the total equipment costs of the system. Based on typical electrical utility industry experience, maintenance materials were estimated to be between 1 and 5 percent of the total direct capital costs. Some initial recommended spare parts were included (assumed) in the capital costs. An annual maintenance value of 3 percent of the total direct capital costs was used as the basis for the yearly maintenance materials and labor cost. For technologies that replace a similar existing technology at the current plant site, a determination of the additional maintenance requirements was performed. If the required maintenance materials and labor were similar to the existing technology, no additional maintenance costs were credited for the new control technology.

3.4 Economic Data and Assumptions

The following are the economic data and assumptions used in the cost analysis.

3.4.1 Economic Data

Economic data were provided by E.ON for use in development of the annual O&M costs. However, some economic data were not available for some units/plants. Therefore, Black & Veatch assumed the highest value provided by E.ON as representative of the equivalent variable for any plant with missing economic data. The economic data are presented in Table 3-3. The assumed cost data have been denoted in bold-italic font and are summarized below:

- The limestone cost for Cane Run and Green River is $11.54/ton.
- The lime cost for Cane Run and Green River plant is $132.19/ton.

Table 3-3
Economic Evaluation Parameters[a]

Economic Parameters	Economic Criteria																
	E.W. Brown			**Ghent**				**Cane Run**			**Mill Creek**				**Trimble County**		**Green River**	
Unit Identification	**1**	**2**	**3**	**1**	**2**	**3**	**4**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Remaining Plant Life (years)	30			30				20			30				30		30	
Capacity Factor (percent)	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
Auxiliary Power Cost ($/MWh)	42.66	36.46	36.24	24.87	24.59	25.44	24.9	28.88	28.35	30.18	21.56	21.69	23.31	22.35	23.25	21.49	34.33	31.87
Limestone Cost ($/ton)	11.54			8.22				***11.54***[b]			7.54				8.24		***11.54***[b]	
Lime Cost ($/ton)	132.19			131.78				***132.19***[b]			118.13				131.78		***132.19***[b]	
Ash Disposal Cost ($/tonne)	***15***[b]			***15***[b]				***15***[b]			***15***[b]				***15***[b]		***15***[b]	
SCR Catalyst Replacement Cost ($/m³)	***6,500***[b]			***6,500***[b]				***6,500***[b]			***6,500***[b]				***6,500***[b]		***6,500***[b]	
Ammonia Cost for SCR ($/ton)	***530.03***[b]			517.55				***530.03***[b]			530.03				522.7		***530.03***[b]	
Trona Cost ($/ton)	200.42			200.42				***200.42***[b]			195				***200.42***[b]		***200.42***[b]	
Halogenated PAC Cost ($/lb)	***1.1***[b]			***1.1***[b]				***1.1***[b]			***1.1***[b]				***1.1***[b]		***1.1***[b]	
Water Cost ($/1,000 gal)	***2***[b]			***2***[b]				***2***[b]			***2***[b]				***2***[b]		***2***[b]	
Fully-Loaded Labor Rate ($/h)	123,325			121,000				126,882			132,901				132,491		121,547	
Capital Escalation Rate (percent)	2.5																	
O&M Escalation Rate (percent)	2																	
Levelized Fixed Charge Rate or Capital Recovery Factor (percent)	12.17																	
Interest During Construction (percent)	4.5																	

[a]Utilities costs are as delivered costs.
[b]Economic variable was not provided by E.ON and are assumed data based on similar economic data for other E.ON plants.

- The ash disposal cost for E.W. Brown, Ghent, Cane Run, Mill Creek, Trimble County, and Green River is $15/ton.
- The selective catalytic reduction (SCR) catalyst replacement cost for E.W. Brown, Ghent, Cane Run, Mill Creek, Trimble County, and Green River is $6,500/m^3.
- The anhydrous ammonia cost for E.W. Brown, Cane Run, and Green River is $530.03/ton.
- The trona cost for Cane Run, Trimble County and Green River is $200.42/ton.
- The halogenated PAC costs for E.W. Brown, Ghent, Cane Run, Mill Creek, Trimble County, and Green River is $1.1/lb.
- The water costs for E.W. Brown, Ghent, Cane Run, Mill Creek, Trimble County, and Green River is $2/1,000 gallons.

3.4.1 Economic Assumptions

Based on Black & Veatch's experience technical and economic assumptions were made to appropriately characterize costs for the study. These assumptions are briefly described, but are not limited to, the following:

1. The direct cost estimates reflect the following:
   - Costs for regulatory and environmental permitting were not included.
   - Costs for additional equipment studies were not included.
   - Regular supply of construction craft labor and equipment is available.
   - Normal lead-times for equipment deliveries are expected.
2. Compliance options beyond the addition of new AQC technology (such as fuel switching, shutdown of existing emission units, development of new power generation, and emissions averaging scenarios) and their associated cost were not considered.
3. Costs for loss of generation for construction outage were not included as part of the indirect costs.
4. Annual operating cost estimates are based on operation at full-load conditions utilizing E.ON supplied load factors.
5. Sizing of AQC components and estimates of flue gas flow and pressure drops are developed from calculations based on the coal composition as provided by E.ON.

6. Sizing of AQC components is based on the AQC equipment being capable of achieving Best Available Control Technology emission levels. However, O&M costs were based on achieving the identified pollutant emission rates.
7. The cost estimate includes calculated values for escalation and contingency.
8. Owner's costs (project development, financing, etc.) are estimated as a percentage of the total capital cost.
9. Annual O&M costs associated with the AQC retrofit equipment are differential O&M costs associated with the equipment, rather than with the entire plant O&M costs.
10. Common economic components of each AQC technology are apportioned to the technologies rather than identified separately.
11. Neural networks (NNs) were assumed for all units as the proven and feasible control technology to reduce emissions of CO from the coal fired units[3]. For units less than 300 MW, a capital and O&M cost of $500,000 and $50,000, respectively, was assumed. For units greater than 300 MW, a capital and O&M cost of $1,000,000 and $100,000, respectively, was assumed.
12. H_2SO_4 (SO_3) emissions were not an identified pollutant in E.ON's emission matrix. However, due to generation of sulfuric acid mist[4] (H_2SO_4) (SO_3) from SO_2 to SO_3 conversion across the SCR technology catalyst, Black & Veatch included costs for a H_2SO_4 (SO_3) mitigation system for units with approved SCR AQC technologies.
13. Costs estimates have been included in the unit specific AQC equipment costs for AQC equipment that requires new reagent preparation systems, dewatering systems, or byproduct handling systems.

[3] Neural networks are proven and feasible technologies to reduce CO emissions. However, CO emission reductions due to installation of NN vary from unit to unit based on each unit's specific equipment configuration and operation. It is recommended that detailed studies be performed to determine the potential benefit from NN installation.

[4] Emissions of H_2SO_4 (SO_3) were not included in the emission matrix as a primary pollutant requiring assessment for new AQC technology.

4.0 Control Cost Estimate (Capital and O&M)

The following sections describe the existing conditions, site visit observations, AQC recommendations, cost estimates, special considerations, and implementation schedules for each unit.

4.1 E.W. Brown - Units 1, 2, and 3

The E.W. Brown Station is located on Herrington Lake in Mercer County, Kentucky, between Shakertown and Burgin, off of Hwy 33. The station was constructed on the west side of Herrington Lake, the impoundment behind Dix Dam. The plant began commercial operation in 1957. The station includes three coal fired electric generating units with a total nameplate capacity of 747 MW gross. The electrical power from the E.W. Brown Station units is used to provide both load and voltage support for the 138 kV transmission systems.

Unit 1 has a gross capacity of 110 MW and is equipped with old generation LNBs and cold side dry ESP for NO_x and PM control, respectively. Unit 2 has a gross capacity of 180 MW and is equipped with LNBs, OFA, and cold-side dry ESP for NO_x and PM control. Unit 3 has a gross capacity of 457 MW and is equipped with LNBs, OFA, and cold-side dry ESP for NO_x and PM control. E.ON is in the process of installing an SCR (in-service date, 2012) on Unit 3 to control NO_x and a common wet FGD scrubber for Units 1, 2, and 3 (in-service date, late 2010).

4.1.1 Site Visit Observations and AQC Considerations

At the E.W. Brown Generating Station, the Black & Veatch team met Brad Pabian (Mechanical Engineer), Barry Carman (Results Coordinator), and Ronald Gregory (Plant Manager) from E.ON. The following text is a narrative summary of the site visit conducted on May 13, 2010.

The installation of SCR on Unit 1 will require significant demolition and relocation of the circulating water system, service water piping, and soot blower air compressors tanks and modification of secondary air heater duct in the boiler building. This would require a significant outage time and is generally thought to be a difficult and expensive alternative. In order to achieve plantwide NO_x emission compliance with future regulatory requirements, it was decided by E.ON to install new generation low NO_x burners (LNBs) and overfire air (OFA) instead of SCR on Unit 1[5].

Installing SCR on Unit 2 will require demolishing the abandoned Unit 2 chimney, relocation of the storage tank, relocation of auxiliary transformer, demolition of the dust collector and associated ductwork and support steel, and relocation of underground utilities. The new SCR duct tie-ins to the existing Unit 2 air heater inlet duct will require boiler building structural steel bracing and girts to be modified to accommodate ductwork. The existing coal conveyor and ductwork block crane access to the northeast side of Unit 2 boiler house. This will require Unit 2 SCR structures to be constructed using a large tonnage crane with extended reach capabilities, or by extending the structural support frame system to the east and using a pick and slide execution method to erect the SCR modules.

Installing individual PJFF on Unit 1 and Unit 2 will require some demolition of ductwork and structural steel and relocation of ductwork and associated support steel for tie-in. Crane access around the footprint of the ID fans for Unit 1 and Unit 2 is restricted, and it will be difficult to stage the construction equipment necessary to erect the ductwork support frame and associated foundations. There is no real estate available for construction of PJFF on Unit 2, and the PJFF on Unit 2 will be elevated above the grade level and constructed above (downstream) the existing cold-side dry electrostatic precipitators (ESPs). For Unit 3, the new PJFF will be installed downstream of the existing cold-side dry ESP.

Installing individual PJFF on Unit 3 will require some demolition of ductwork and structural steel and relocation of ductwork and associated support steel for tie-in. It will also require relocation of underground utility lines.

Following the site visits, Black & Veatch developed recommendations for specific AQC technology for each unit based on the air emission levels provided by E.ON. The AQC technology recommendations were provided to E.ON for review and approval. Following E.ON's approval of the recommended AQC technologies, costs estimates were developed. The approved AQC technology options selection sheets are provided in Appendix E. The following sections describe the recommended AQC technologies and associated costs.

5 It should be noted that Black & Veatch originally recommended an SCR for E.W. Brown Unit 1. However, on May 21, 2010, E.ON approved LNB and OFA technology in lieu of SCR. E.ON later requested costs for SCR, which were provided separately on June 14, 2010.

4.1.2 Control Technology Summary

The following discussion summarizes the approved AQC technologies and considerations for installation of these technologies on each unit. The pollutants that require new control technologies to be installed that will meet target emission levels are NO_x, PM, CO, Hg, and dioxin/furan. New sorbent (lime) injection control technology may be required for H_2SO_4 abatement where SCR is installed.

To meet the identified pollutant emission limits, new AQC technologies are required for Brown Unit 1. These AQC technologies include installation of new generation LNBs, OFA, and PAC injection coupled with a new PJFF located downstream of the existing ESP. The new generation LNB and OFA system can reduce NO_x emissions to 0.30 lb/MBtu. The new PJFF will be installed downstream of the existing cold-side dry ESP. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

To meet the identified pollutant emission limits, new AQC technologies are required for Brown Unit 2. These AQC technologies include the installation of new SCR and PAC injection coupled with a new PJFF located downstream of the existing dry ESP. The new SCR system can reduce NO_x emissions to 0.11 lb/MBtu or lower. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu. New sorbent (lime) injection for H_2SO_4 abatement needs to be installed and will be into the new ductwork upstream of the PJFF. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

As previously noted, E.ON is in the process of installing an SCR (in-service date, 2012) on Unit 3 that will be capable of reducing NO_x emissions to 0.11 lb/MBtu or lower. To meet the identified pollutant emission limits, new AQC technologies are required for Brown Unit 3. These AQC technologies include installation of new PAC injection coupled with a new PJFF located downstream of the existing dry ESP. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

Also noted, a common wet FGD scrubber for Units 1, 2, and 3 is in the process of being built (in-service date, late 2010) at E.W. Brown. This wet FGD will serve to meet or exceed the SO_2 target emission of 0.25 lb/MBtu and the HCl target emission of 0.002 lb/MBtu. Therefore, no new SO_2 or HCl emission control technologies are proposed for these units.

To support the costs analyses described in the next section, Black & Veatch developed process flow diagrams for the approved AQC technologies to illustrate the potential equipment locations and better understand the retrofit issues with the existing system, as well as potential constructability issues. Additionally, high-level control technology equipment arrangement drawings indicating one possible layout of new equipment for each plant were developed. The equipment arrangement drawings are preliminary and are not meant to replace a detailed engineering study. The drawings illustrate high-level box sketches indicating locations of new ductwork (noted in green) and new AQC equipment (noted in red). The drawings also indicate gas flow paths and include a brief description of the constructability issues considered. The process flow diagrams and equipment arrangements are included in Appendices F and G, respectively.

4.1.3 Capital and O&M Costs

The total estimated capital cost to upgrade E.W. Brown Unit 1, Unit 2, and Unit 3 with recommended technologies are \$44,000,000 (\$400/kW), \$149,000,000 (\$826/kW), and \$67,000,000 (\$148/kW), respectively. Capital, O&M, and levelized annual costs are shown in Tables 4-1, 4-2, and 4-3. Detailed cost summaries are included in Appendix H.

Table 4-1
Capital and O&M Cost Summary – E.W. Brown Unit 1

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

Table 4-2
Capital and O&M Cost Summary – E.W. Brown Unit 2

AQC Equipment	Capital Cost, $	$/kW	O&M Cost,$	Levelized Annual Cost,$
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**

Table 4-3
Capital and O&M Cost Summary – E.W. Brown Unit 3

AQC Equipment	Capital Cost, $	$/kW	O&M Cost,$	Levelized Annual Cost,$
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**

4.1.4 Special Considerations

To arrive at the aforementioned cost estimates, BOP and ancillary operations, available space at the plant, and constructability issues were considered. The following highlight several of these issues considered for the development of the AQC equipment costs:

- **Auxiliary Power**--Additional auxiliary power requirements will need to be considered for booster fan or upgraded ID fans to accommodate the additional pressure drop of the new AQC equipment.
- **Water**--New wet FGD is not required. No significant change in water supply is needed.
- **Wet FGD Byproduct Handling**--No new wet FGD byproduct handling system will be needed.
- **Ash Handling**--Additional new ash handling system will be needed for Units 1, 2, and 3 PJFF.
- **Ammonia Storage**--Ammonia storage for Unit 3 can be utilized to supply Unit 2 ammonia for new SCR.
- **H_2SO_4 (SO_3) Emissions**--Consideration was given to Unit 3's H_2SO_4 (SO_3) emissions although these emissions were not a primary focus for this study.
- **Footprint**:
  - There is very limited space to install a new SCR on Unit 2. Therefore, the SCR will be located between the existing plant wall and the original Unit 2 stack. To achieve this, it will be necessary to demolish the existing mechanical dust collector and demolish the abandoned Unit 2 stack.
  - Because of the limited available footprint, the PJFF on Unit 2 will be located above the existing dry ESP.
- **Constructability Challenges**:
  - The new SCR duct tie-ins to the existing Unit 2 air heater inlet duct will require boiler building structural steel bracing and girts to be modified to accommodate ductwork.
  - The new Unit 2 SCR support structure and reactor structure will require extensive relocation/demolition of existing plant components.
  - The relocation or protection of field fabricated tank located in base of abandoned Unit 2 chimney shell.
  - The demolition of Unit 2 chimney.

- The demolition of the dust collection ductwork located along the northeast exterior wall of Unit 2 boiler building.
- The relocation of Unit 2 auxiliary transformer located outside of the northeast exterior wall of Unit 2 boiler building.
- Extensive underground investigation will be required to identify operating utilities prior to installing new foundations for Unit 2 fabric filter structural steel support frame.
- The existing coal conveyor and ductwork block crane access to the northeast side of Unit 2 boiler house. This will require Unit 2 SCR and fabric filter structures to be constructed using a large tonnage crane with extended reach capabilities, or by extending the structural support frame system to the east and using a pick and slide execution method to erect the SCR and fabric filter modules.

4.1.5 AQC Equipment Implementation Schedule

AQC equipment implementation schedules for each unit are included in Appendix I. These schedules include milestones in months for the conceptual design, and construction and can help to identify critical path considerations for the approved AQC technologies. While these schedules represent a sequence of events to minimize site outages required for installation of the new AQC equipment, consideration of unit-specific outages outside the scope of this study, have not been included. The following highlight scheduling related issues that were considered in the development of the implementation schedules.

Unit 1

The Unit 1 arrangement (Appendix G) will allow for the majority of the construction of the PJFF to occur without taking a plant outage. The tie-in of the PJFF and the installation of the LNBs and OFA will require a plant outage.

Unit 2

Because of the tight space constraints, particularly for the installation sequencing of the SCR and somewhat for the PJFF, the construction efforts for Unit 2 will likely require an extended single outage or two shorter outages with the SCR being installed during the first outage. This allows for the major construction of the PJFFs with the plant in operation and requiring another shorter outage for the tie-in.

Unit 3

The Unit 3 arrangement shown on the drawing will allow for the majority of the construction of the PJFF to occur without taking a plant outage. The tie-in of the PJFF will require a plant outage.

4.1.6 Summary

The cost of new AQC equipment to meet or exceed defined future emission targets at E.W. Brown is nominally $260,000,000 ($1,400/kW). The O&M and levelized annual costs of new AQC equipment at E.W. Brown is nominally $15,600,000 and $47,000,000, respectively.

4.2 Ghent - Units 1, 2, 3, and 4

The Ghent Generating Station is located approximately 9 miles northeast of Carrolton, Kentucky. Ghent, which began commercial operations in February 1, 1974, is situated on approximately 1,670 acres.

The plant is a four unit pulverized coal fired electric power plant with gross capacity of 2,007 MW. Two of the boilers are manufactured by Combustion Engineering and two by Foster Wheeler. The Combustion Engineering boilers are tangential-fired, balanced draft forced circulation boilers, and Foster Wheeler boilers are balanced draft natural circulation boilers. Unit 1 has a gross capacity of 541 MW and is equipped with LNBs and SCR for NO_x control; cold-side dry ESP for PM control; wet FGD system for SO_2 control, and lime injection system for H_2SO_4 or SO_3 control. Unit 2 has a gross capacity of 517 MW and is equipped with LNBs, OFA for NO_x control; hot-side dry ESP for PM control; and wet FGD system for SO_2 control. Units 3 and 4 have a gross capacity of 523 MW and 526 MW, respectively, and are equipped with LNBs, OFA, and low-dust SCR for NO_x control; hot-side dry ESP for PM control; wet FGD system for SO_2 control, and trona injection system for H_2SO_4 (SO_3) control.

4.2.1 Site Visit Observations and AQC Considerations

At the Ghent Generating Station, the Black & Veatch team met David Pennybaker (Project Engineer), Carla Piening (Senior Scientist), Stephen Nix (Lead Engineer), and Jeff Joyce (Plant Manager) from E.ON. The following text is a narrative summary of the site visit conducted on May 11, 2010.

Installing PJFF for Units 1 and 2 requires significant site preparation and demolition. Crane access is difficult at Units 1 and 2 because of a low overhead piperack on the roadways around the cooling towers. Some piping bridges on the northeast side of the cooling tower and access roads to Unit 1 will need to be temporarily taken down or relocated. Lattice boom crawler crane booms will need to be final assembled and reeved at the working location. Access lanes around Units 1 and 2 are also the maintenance lanes for the cooling towers. Cranes and construction equipment will block access on these roads at various periods during project execution. Careful crane placement will be required in order to provide operations access to the cooling tower area. Current arrangement for Unit 2 fabric filters require a section of bypass ductwork to be installed in order to isolate/demolish existing ductwork/duct supports and provide the required footprint for the new equipment. Tie-in portions of this work scope must be accomplished during early plant outages. The new PJFF will be elevated aboveground. Erection of Unit 2 SCR will require construction material and equipment to be lifted over areas of high personnel traffic.

Installing PJFF on Units 3 and 4 requires removal of underground utility lines. Current arrangement for Unit 3 fabric filters requires an extensive length of inlet/outlet ductwork to be routed above and across the existing Unit 3 and 4 ESPs. Access around the footprint of the dry ESPs is restricted, and it will be difficult to stage the construction equipment necessary to erect the ductwork support frame and associated foundations. Existing underground electrical manholes, water wells, storm sewer boxes and piping, and circulating cooling water piping all run in the proposed footprint for Unit 4 fabric filter. The electrical manholes, water wells, and storm sewer piping will need to be relocated in order to install the foundations for the Unit 4 fabric filter structural frame.

Following the site visits, Black & Veatch developed recommendations for specific AQC technology for each unit based on the air emission levels provided by E.ON. The AQC technology recommendations were provided to E.ON for review and approval. Following E.ON's approval of the recommended AQC technologies, costs estimates were developed. The approved AQC technology options selection sheets are provided in Appendix E. The following sections describe the recommended AQC technologies and associated costs.

4.2.2 Control Technology Summary

The following discussion summarizes the approved AQC technologies and considerations for installation of these technologies on each unit. The pollutants that require new control technologies to be installed that will meet target emission levels are NO_x, PM, CO, Hg, and dioxin/furan. New sorbent (lime) injection control technology may be required for H_2SO_4 abatement where SCR is installed.

To meet the identified pollutant emission limits, new AQC technologies are required for Ghent Unit 1. These AQC technologies include installation of a new PAC injection system coupled with a new PJFF located downstream of the existing dry ESP. The new PJFF will be elevated aboveground. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15×10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu. Unit 1 has an existing SCR to control NO_x emissions to the future NO_x emission target of 0.11 lb/MBtu or lower. No further new NO_x emission control technology is needed on this unit.

To meet the identified pollutant emission limits, new AQC technologies are required for Ghent Unit 2. These AQC technologies include installation of new SCR system, new PAC injection system coupled with a new PJFF located downstream of the existing ID fans. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu. New sorbent (lime/trona) injection for H_2SO_4 abatement needs to be installed and will be into the ductwork upstream of the hot-side dry ESP. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

To meet the identified pollutant emission limits, new AQC technologies are required for Ghent Units 3 and 4. These AQC technologies include installation of new PAC injection system coupled with a new PJFF located downstream of the existing ID fans of Units 3 and 4. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu. Units 3 and 4 have existing SCRs to control NO_x emissions to the future NO_x emission target of 0.11 lb/MBtu or lower. No further new NO_x emission control technology is needed on these units.

All four Ghent units have existing individual wet FGDs that will meet the SO_2 target emission of 0.25 lb/MBtu or lower and the HCl target emission of 0.002 lb/MBtu or lower. No new SO_2 or HCl emission controls are considered for this study, and there is no need to replace existing stacks.

To support the costs analyses described in the next section, Black & Veatch developed process flow diagrams for the approved AQC technologies to illustrate the potential equipment locations and better understand the retrofit issues with the existing system, as well as potential constructability issues. Additionally, high-level control technology equipment arrangement drawings indicating one possible layout of new equipment for each plant were developed. The equipment arrangement drawings are preliminary and are not meant to replace a detailed engineering study. The drawings illustrate high-level box sketches indicating locations of new ductwork (noted in green) and new AQC equipment (noted in red). The drawings also indicate gas flow paths and include a brief description of the constructability issues considered. The process flow diagrams and equipment arrangements are included in Appendices F and G, respectively.

4.2.3 Capital and O&M Costs

The total estimated capital costs to upgrade Ghent Unit 1, Unit 2, Unit 3, and Unit 4 with recommended technologies are \$138,000,000 (\$256/kW), \$360,000,000

($696/kW), $145,000,000 ($278/kW), and $124,000,000 ($236/kW), respectively. Capital, O&M, and levelized annual costs are shown in Tables 4-4, 4-5, 4-6, and 4-7. Detailed cost summaries are included in Appendix H.

4.2.4 Special Considerations

To arrive at the aforementioned cost estimates, BOP and ancillary operations, available space at the plant, and constructability issues were considered. The following highlight several of these issues considered for the development of the AQC equipment costs:

- **Auxiliary Power**--Additional auxiliary power requirements will need to be considered for booster fan or upgraded ID fans to accommodate the additional pressure drop of the new AQC equipment.
- **Water**--New wet FGD is not required. No significant change in water supply is needed.
- **Wet FGD Byproduct Handling**--No new wet FGD byproduct handling system will be needed.

Table 4-4
Capital and O&M Cost Summary – Ghent Unit 1

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
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**

Table 4-5
Capital and O&M Cost Summary – Ghent Unit 2

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
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**

Table 4-6
Capital and O&M Cost Summary – Ghent Unit 3

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
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**

Table 4-7 Capital and O&M Cost Summary – Ghent Unit 4				
AQC Equipment	**Capital Cost, $**	**$/kW**	**O&M Cost, $**	**Levelized Annual Cost, $**
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**

- **Ash Handling**--Additional new ash handling system will be needed for Units 1, 2, 3, and 4 PJFF. It is understood that a new byproduct ash system is currently being studied at the plant. Contingent on the final determination of installed AQC technology, further investigation and coordination of ash handling systems will be required.
- **H_2SO_4 (SO_3) Emissions**-- Consideration was given to Unit 1, 2, 3, and 4 3's H_2SO_4 (SO_3) emissions although these emissions were not a primary focus for this study.
- **Ammonia Storage**--Ammonia storage for Unit 3 can be utilized to supply Unit 2 ammonia for new SCR.
- **Footprint**:
  - Unit 1 and Unit 2 PJFF do not have any real estate available on the grade elevation for construction. Hence these PJFF will be elevated above the ground level.
  - The Unit 3 PJFF could be installed between boilers of Units 2 and 3, adjacent to the new Unit 2 SCR. However, plant personnel want to keep this area clear for staging and equipment lay-down purposes. Hence, Unit 3 PJFF will be installed on the south side of the Unit 4 dry ESP, with booster fan or ID fan upgrades because there is very limited space available between the ID fan outlet and wet scrubber inlet on the west side.

- **Constructability Challenges**:
  - Crane access is difficult at Units 1 and 2 because of low overhead piperack on the roadways around the cooling towers. Some piping bridges on the northeast side of the cooling tower and access roads to Unit 1 will need to be temporarily taken down or relocated. Lattice boom crawler crane booms will need to be final assembled and reeved at the working location.
  - Erection of Unit 2 SCR will require construction material and equipment to be lifted over areas of high personnel traffic.
  - Access lanes around Units 1 and 2 are also the maintenance lanes for the cooling towers. Cranes and construction equipment will block access on these roads at various periods during project execution. Careful crane placement will be required in order to provide operations access to the cooling tower area.
  - The current arrangement for Unit 2 fabric filters requires a section of bypass ductwork to be installed in order to isolate/demolish existing ductwork/duct supports and provide the required footprint for the new equipment. Tie-in portions of this work scope must be accomplished during early plant outages.
  - The current arrangement for Unit 3 fabric filters requires an extensive length of inlet/outlet ductwork to be routed above and across the existing Unit 3 and 4 dry ESPs. Access around the footprint of the dry ESPs is restricted, and it will be difficult to stage the construction equipment necessary to erect the ductwork support frame and associated foundations.
  - Crane access will be restricted around the tie-in for Unit 3 fabric filter inlet/outlet ductwork.
  - Existing underground electrical manholes, water wells, storm sewer boxes and piping, and circulating cooling water piping all run in the proposed footprint for Unit 4 fabric filter. The electrical manholes, water wells, and storm sewer piping will need to be relocated in order to install the foundations for the Unit 4 fabric filter structural frame.

4.2.5 AQC Equipment Implementation Schedule

AQC equipment implementation schedules for each unit are included in Appendix I. These schedules include milestones in months for the conceptual design, and construction and can help to identify critical path considerations for the approved AQC technologies. While these schedules represent a sequence of events to minimize site outages required for installation of the new AQC equipment, consideration of unit-specific outages outside the scope of this study, have not been included. The following highlight scheduling related issues that were considered in the development of the implementation schedules.

Units 1, 2, 3, and 4

The arrangement shown on the drawing will allow for the majority of the construction of the PJFF to occur without taking a plant outage. The tie-in of the PJFF will require a plant outage. Unit 2 arrangements shown on the drawing will allow for the majority of the construction of the SCR to occur without taking a plant outage. The tie-in of the SCR will require a plant outage.

4.2.6 Summary

The cost of new AQC equipment to meet or exceed defined future emission targets at Plant Ghent is nominally $767,400,000 ($1,500/kW). The O&M and levelized annual costs of new AQC equipment at Ghent is nominally $47,800,000 and $141,000,000, respectively.

4.3 Cane Run - Units 4, 5, and 6

The Cane Run Generating Station is located at 5252 Cane Run Road (State Highway 1849), about 8 miles southwest of Louisville, Kentucky. The facility includes approximately 500 acres between Cane Run Road and the Ohio River. The pulverized coal fired electric power plant began commercial operation in 1954 in response to the demand for electricity by industries that were located in Louisville during World War II. Three of its six units are now retired. Units 4, 5, and 6 are currently active and have a gross capacity of 610 MW. Unit 4 was placed in service in 1962, Unit 5 in 1966, and Unit 6 in 1969.

Units 4, 5, and 6 have a gross capacity of 168 MW, 181 MW, and 261 MW, respectively, and are equipped with LNBs or OFA (Units 4 and 5 have LNBs but no OFA, Unit 6 has OFA but no LNBs) for NO_x control; cold-side dry ESP for PM control; and wet FGD system for SO_2 control.

4.3.1 Site Visit Observations and AQC Considerations

At the Cane Run Station, the Black & Veatch team met Keron Miller, Mike Hensley, and Chuck Hance from E.ON. The following text is a narrative summary of the site visit conducted on May 11, 2010.

Cane Run Units 4, 5, and 6 have existing LNBs and FGD emission control devices. Performance of the aging FGD scrubbers is sufficient to meet the current stack emission limit, and NO_x emissions are currently controllable to the existing limits using only LNBs. Current PM emissions are controlled by the combination of the efficient ESPs and FGD designs. In general, the plant is capable of maintaining the current emissions levels but requires new AQC technologies to meet the future pollutant emission limits and have operational flexibility. According to plant personnel, upgrades to the existing scrubber towers are currently being considered that would increase scrubbing efficiency to meet the future emission standards. However, due to space constraints, upstream control devices (e.g., SCR, fabric filter) require real estate that precludes use of the existing FGD vessels. Plant personnel also pointed out that maintenance of boiler tubes is considerably exacerbated because of lower oxygen combustion zone to minimize NO_x emissions.

New AQC technologies for each unit will be identical except for the sizing of components. Each unit will need new ID fans (2 x 50 percent) to overcome the added pressure drop of the new ductwork, SCR, PJFF, and wet FGD. A new single chimney will house three lined wet stacks; one liner for each unit. The SCR will increase the H_2SO_4 (SO_3) concentration in the flue gas and exacerbate the potential for corrosion on the cooler surfaces downstream of the air heater. Lime will be added downstream of the air heater (upstream of the PJFF) to minimize the impact of acid components in the flue gas on downstream surfaces. Injection of PAC is also recommended upstream of the PJFF.

Installation of SCR on Units 4, 5, and 6 would become a constraining factor from a construction perspective. There is not sufficient room to successfully install the connections from and back into the ductwork after the economizer section on any of the units. Any attempt to do so would compromise the performance of the SCR and would also be an operational challenge over the life of the plant. This decision alone leads to the difficult alternative of selectively demolishing the existing back end AQC equipment one unit at a time. This means that for an extended period of time only two of the three units would be operational. Scheduled outages on the remaining units will reduce plant availability even more.

Installation of SCR technology requires access to the hopper/ductwork exiting the economizer sections of each boiler. The hot fly ash laden flue gas must be transported to the SCR and ducted from the SCR to the air heater inlet. The existing equipment at this plant is too close-coupled in this area to allow adequate access for attaching these new ducts. The space required to install new AQC technologies is currently occupied by the existing wet FGD components and stacks. Any new technologies should be installed directly in lieu of the existing equipment. This requires a complete demolish and removal of existing equipment prior to installation of the new equipment. This will cause an extended outage as shown in the AQC replacement schedule in Subsection 4.3.5. Demolition of the existing and construction of new AQC equipment is planned in series for each unit. This lengthens the unit outage time and increases the cost associated to meet new emission standards.

Due to lack of available space to add the new equipment, the new AQC technologies required for the three units will need to use the existing footprint. Demolition of existing equipment will need to be completed prior to construction of new equipment to provide space for installation of the new equipment. Demolition of all existing AQC equipment one unit at a time from the economizer section back is proposed to minimize outage time (at least 24 month outages are estimated). Power lines above each unit will need to be moved for safe demolition and construction. There appear to be adequate areas available for equipment laydown during construction.

Demolition and construction of each unit will be in series. For example, Unit 5 could be taken out of service and demolished from the economizer to the FGD equipment. The common stack and other common equipment (ammonia storage area, common reaction tank) could be built prior to the outage. Moving of transmission lines could also be accomplished prior to the outage along with preparation of lay-down areas and moving of needed underground utilities.

Following the site visits, Black & Veatch developed recommendations for specific AQC technology for each unit based on the air emission levels provided by E.ON. The AQC technology recommendations were provided to E.ON for review and approval. Following E.ON's approval of the recommended AQC technologies, costs estimates were developed. The approved AQC technology options selection sheets are provided in Appendix E. The following sections describe the recommended AQC technologies and associated costs.

4.3.2 Control Technology Summary

The following discussion summarizes the approved AQC technologies and considerations for installation of these technologies on each unit.

The pollutants that require new control technologies to be installed that will meet target emission levels are NO_x, SO_2, PM, CO, Hg, HCl and dioxin/furan. New sorbent (lime) injection control technology may be required for H_2SO_4 abatement where SCR is installed.

To meet the identified pollutant emission limits, new AQC technologies are required for Cane Run Units 4, 5, and 6. The AQC technologies identified for each of the three units are the same and include installation of a new SCR system to reducing NO_x to 0.11 lb/MBtu or lower, new PJFF to reduce PM emissions to 0.03 lb/MBtu or lower; a new wet FGD system to reduce SO_2 emissions to 0.25 lb/MBtu or lower and HCl emissions to 0.002 lb/MBtu or lower; a new halogenated PAC injection to reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu, new sorbent (lime) injection system for H_2SO_4 abatement, and New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

To support the costs analyses described in the next section, Black & Veatch developed process flow diagrams for the approved AQC technologies to illustrate the potential equipment locations and better understand the retrofit issues with the existing system, as well as potential constructability issues. Additionally, high-level control technology equipment arrangement drawings indicating one possible layout of new equipment for each plant were developed. The equipment arrangement drawings are preliminary and are not meant to replace a detailed engineering study. The drawings illustrate high-level box sketches indicating locations of new ductwork (noted in green) and new AQC equipment (noted in red). The drawings also indicate gas flow paths and include a brief description of the constructability issues considered. The process flow diagrams and equipment arrangements are included in Appendices F and G, respectively.

4.3.3 Capital and O&M Costs

The total estimated capital costs to upgrade Cane Run Unit 4, Unit 5, and Unit 6 with recommended technologies are $253,000,000 ($1,508/kW), $266,000,000 ($1,468/kW), and $341,000,000 ($1,306/kW), respectively. Capital, O&M, and levelized annual costs are shown in Tables 4-8, 4-9, and 4-10. Detailed cost summaries are included in Appendix H.

4.3.4 Special Considerations

To arrive at the aforementioned cost estimates, BOP and ancillary operations, available space at the plant, and constructability issues were considered. The following highlight several of these issues considered for the development of the AQC equipment costs:

- **Auxiliary Power**--Additional auxiliary power requirement will need to be considered for new ID fans to accommodate the additional pressure drop of the new AQC equipment.
- **Water**--A new wet FGD is required. There will be a significant change in the amount of wastewater produced by the wet FGD. A new or a possible upgrade in wastewater treatment facility is required.
- **Wet FGD Byproduct Handling**--There will be a significant change in the amount of byproduct produced by the wet FGD because of the high amount of sulfur removal from the coal. A new or a possible upgrade in byproduct handling system is required.
- **Wet FGD Reagent Preparation System**--There will be a significant change in the amount of reagent required by the wet FGD because of the high amount of sulfur removal from the coal. A new or a possible upgrade in reagent preparation system is required.
- **Ash Handling**--Cane Run has limited new space available for landfill of waste (ash and scrubber solids). Onsite landfill space is expected to be consumed in less than 20 years. Additional new ash handling system or a possible upgrade in the ash handling system will be required.
- **Ammonia Storage**--A new ammonia storage facility will be required for new SCRs. Detailed investigation or study will be required to identify the site location for ammonia storage and supply.

Table 4-8
Capital and O&M Cost Summary – Cane Run Unit 4

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
SCR	$63,000,000	$375	$2,219,000	$9,886,000
Wet FGD	$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**

Table 4-9
Capital and O&M Cost Summary – Cane Run Unit 5

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
SCR	$66,000,000	$365	$2,421,000	$10,453,000
Wet FGD	$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**

Table 4-10
Capital and O&M Cost Summary – Cane Run Unit 6

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
SCR	$86,000,000	$330	$2,793,000	$13,259,000
Wet FGD	$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

- **Footprint**--The new AQC equipment will be installed where the existing AQCS equipment is currently operating.
- **Constructability Challenges**:
  - Ingress from highways - Multiple power lines need to be raised to accommodate high loads.
  - Barge unloading is not economically feasible.
  - Existing overhead power lines are routed over each unit and must be relocated for crane access.
  - 4 kV building and CT switchyard needs to be relocated.
  - Entire Unit 5 "back-end" must be dismantled prior to starting any work on Unit 4.
  - There is a need for multiple mob/de-mob/outages for tie-ins and access to build new AQC equipment.
  - Underground utility interferences/relocations.
  - Aboveground utility interferences/relocations.
  - Need for areas to build ammonia storage, ash handling systems, limestone handling, reagent preparation dewatering (ancillary systems).
  - Extended outages (entire plant) needed to accommodate construction of new AQC systems.
  - Demolition must be performed in multiple phases followed by extensive earthwork activities to bring existing site up to proper elevation.
  - Soils must be tested and stabilized for heavy lift crane operations.
  - Space is very limited around units; the most efficient use of modularization will be compromised.

4.3.5 AQC Equipment Implementation Schedule

AQC equipment implementation schedules for each unit are included in Appendix I. These schedules include milestones in months for the conceptual design, and construction and can help to identify critical path considerations for the approved AQC technologies. While these schedules represent a sequence of events to minimize site outages required for installation of the new AQC equipment, consideration of unit-specific outages outside the scope of this study, have not been included. The following highlight scheduling related issues that were considered in the development of the implementation schedules.

Units 4, 5, and 6

Plant life is restricted at Cane Run because of the amount of available land required for landfill of waste products. Installation of new AQC equipment is made particularly difficult by the close-coupling of existing equipment. B&V proposes to demolish the existing dry ESP and FGD equipment one unit at a time to make room for the new equipment. B&V estimates that this will require an extended construction outage of approximately 24 months per unit. One time-saving benefit is provided by construction of a single chimney with three liners.

4.3.6 Summary

The cost of new AQC equipment to meet or exceed defined future emission targets at Cane Run is nominally $860,000,000 ($4,300/kW). The O&M and levelized annual costs of new AQC equipment at Cane Run is nominally $48,900,000 and $153,500,000, respectively.

4.4 Mill Creek - Units 1, 2, 3, and 4

The Mill Creek Station is located in southwestern Jefferson County, approximately 10.5 miles southwest of the city of Louisville, Kentucky, on a 509 acre site. Mill Creek Station includes four coal fired electric generating units with a gross total generating capacity of 1,608 MW. Mill Creek Station Unit 1 was placed in service in 1972, Mill Creek Station Unit 2 was placed in service in 1974, and Mill Creek Station Units 3 and 4 were each placed in service at 4 year intervals afterward in 1978 and 1982, respectively.

The Mill Creek Station consists of four coal fired electric generating units. All four boilers fire high sulfur bituminous coal. Each Mill Creek Station unit is composed of one GE reheat tandem compound, double-flow turbine with a condenser and hydrogen-cooled generator. Units 1 and 2 each consist of one Combustion Engineering subcritical, balanced draft boiler and have a gross capacity of 330 MW each and are equipped with LNBs and OFA for NO_x control; a cold-side dry ESP for PM control, and a wet FGD for SO_2 and HCl control. Units 3 and 4 each consist of one Babcock & Wilcox (B&W) balanced draft, Carolina type radiant boiler and have a gross capacity of 423 MW and 525 MW, respectively, and are equipped with LNBs and SCR for NO_x control; a cold-side dry ESP for PM control and a wet FGD for SO_2 and HCl control.

4.4.1 Site Visit Observations and AQC Considerations

At the Mill Creek Station, the Black & Veatch team met Mike Kirkland, Michael Buckner, Marc Blackwell, Alex Betz, Tiffany Koller, and Bill Moehrke from E.ON. The following text is a narrative summary of the site visit conducted on May 12, 2010.

Mill Creek Units 1 and 2 require a complete new set of AQC system equipment. Units 3 and 4 have existing SCR to control NO_x emissions to 0.11 lb/MBtu or lower. No further new NO_x emission control technology is needed on Units 3 and 4 based on the identified emission levels. Units 3 and 4 have an existing cold-side dry ESP which will be retained and used for pre-filtration and fly ash sales.

The option to modify the existing wet FGD equipment and use of additives was considered plausible to meet the new emission target. However, Black & Veatch concluded that new limestone scrubbing technology would provide a more reliable long-term emission control technology to meet and exceed the study's SO_2 emission target considering the current state of the existing scrubbers and also the impact on the wastewater treatment facility. Additionally, there is no need to replace the existing wet stacks, and these stacks will be reused for all the four units.

Installation of SCR on Units 1 and 2 would require demolition of the existing dry ESPs to allow space for installation of a new SCR reactor and ductwork. Black & Veatch engineers believe that there is not sufficient room to successfully install the connections from and back into the air heater after the economizer section on either of the units. The new pre-filter dry ESP could be designed for minimal efficiency (~ 90 percent) to reduce size and allow fly ash to help build cake on the downstream bags of the new PJFF. The new PJFF will be stacked above the pre-filter dry ESP. New sorbent (lime) injection for H_2SO_4 abatement needs to be installed and will be routed into the new ductwork upstream of the new cold-side dry ESP. The existing dry ESP will be demolished and a new cold-side dry ESP will be installed for pre-filtration and fly ash sales. These new components could be installed on-line prior to demolition of the existing dry ESP. Once the tie-in to the new PM control devices is completed (New ID fan required), the units can be brought back online for demolition of the existing dry ESP and installation of the new SCR. Segments of the new FGD could begin construction during this period. Tie-in of the new SCR, ductwork, and new FGD would then allow demolition of existing FGD components, if needed. Units 1 and 2 will require new ID fans (2 x 50 percent) to overcome the added pressure drop of the new ductwork, SCR, cold-side dry ESP, PJFF, and wet FGD. A phased construction approach as described above is necessary for Units 1 and 2 due to site real estate constraints and to reduce the 'loss of generation' aspect of the capital project.

Units 3 and 4 are particularly challenging with respect to finding a footprint for the new AQC equipment that did not require extremely long outages for demolition of existing equipment. Units 3 and 4 have limited space available for construction. The existing rail road tracks and the coal conveyors are the biggest challenges for these units. The new equipment will occupy land currently used as a roadway and historically used for rail. The roadway will need to be moved to provide future plant access. One set of inner tracks will remain for trains to continue to move coal throughout the plant.

Installation of AQC equipment for Units 1 and 2 requires phased installation and demolition activities. Installation of new PJFF and new Wet FGD on Units 3 and 4 will require the scrubber towers to be split to 2 x 50-60 percent capacity absorbers and the PJFFs be stacked and will be installed downstream of the existing cold-side dry ESP. This will avoid the expensive elevated construction option to create a tunnel over the road and rail. New sorbent (lime) injection for H_2SO_4 abatement needs to be installed and will be into the ductwork upstream of the existing cold-side dry ESP. The existing dry ESP will remain in service for pre-filtration and fly ash sales. Units 3 and 4 will require new booster fans (2 x 50 percent) to overcome the added pressure drop of the new ductwork, PJFF, and wet FGD systems. Existing power transmission lines would need to be moved for construction. There appears to be space available for addition of another tank to the existing ammonia tank farm if needed. It may be possible to simply increase the number of deliveries of anhydrous ammonia to account for the added demand of the new SCRs on Units 1 and 2.

The most imperative site constraint relating to the selection of post-combustion emission control technologies at Mill Creek is that greater than 80 percent of all solid waste is trucked offsite for use in other applications. Offsite transportation of solid waste minimizes onsite landfill needs and thereby helps extend plant life expectations. Therefore, because of the landfill issues, pre-filter dry ESPs are necessary for all units to mitigate the landfill challenge at Mill Creek as the collected ash will be disposed off to another location off site as a possible recycle material. Otherwise the use of a dry ESP for pre-filtration is not required for PM emissions control as new PJFFs are designed as full size PJFFs and not polishing filtration technology.

Following the site visits, Black & Veatch developed recommendations for specific AQC technology for each unit based on the air emission levels provided by E.ON. The AQC technology recommendations were provided to E.ON for review and approval. Following E.ON's approval of the recommended AQC technologies, costs estimates were developed. The approved AQC technology options selection sheets are provided in Appendix E. The following sections describe the recommended AQC technologies and associated costs.

4.4.2 Control Technology Summary

The following discussion summarizes the approved AQC technologies and considerations for installation of these technologies on each unit. The pollutants that require new control technologies to be installed that will meet target emission levels are NO_x (only on Units 1 and 2), PM, SO_2, CO, Hg, HCl, and dioxin/furan. New sorbent (lime) injection control technology may be required for H_2SO_4 abatement where SCR is installed.

To meet the identified pollutant emission limits, new AQC technologies are required for Mill Creek Units 1 and 2. These AQC technologies include installation of new SCR and PAC injection coupled with a new PJFF located downstream of the new dry ESP. Also a new wet FGD system will be required. The new SCR system can reduce NO_x emissions to 0.11 lb/MBtu or lower. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. The new wet FGD system will reduce SO_2 emissions to 0.25 lb/MBtu or lower and HCl emissions to 0.002 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

To meet the identified pollutant emission limits, new AQC technologies are required for Mill Creek Units 3 and 4. These AQC technologies include installation of new PAC injection coupled with a new PJFF located downstream of the existing dry ESP. Also, a new wet FGD system will be required. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. The new wet FGD system will reduce SO_2 emissions to 0.25 lb/MBtu or lower and HCl emissions to 0.002 lb/MBtu or lower. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15 x 10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

To support the costs analyses described in the next section, Black & Veatch developed process flow diagrams for the approved AQC technologies to illustrate the potential equipment locations and better understand the retrofit issues with the existing system, as well as potential constructability issues. Additionally, high-level control technology equipment arrangement drawings indicating one possible layout of new equipment for each plant were developed. The equipment arrangement drawings are preliminary and are not meant to replace a detailed engineering study. The drawings illustrate high-level box sketches indicating locations of new ductwork (noted in green) and new AQC equipment (noted in red). The drawings also indicate gas flow paths and include a brief description of the constructability issues considered. The process flow diagrams and equipment arrangements are included in Appendices F and G, respectively.

4.4.3 Capital and O&M Costs

The total estimated capital cost to upgrade Mill Creek Units 1 and 2 with recommended technologies are is \$518,000,000 (\$1,569/kW) each. The total estimated capital costs to upgrade Mill Creek Units 3 and 4 with recommended technologies are \$513,000,000 (\$1,212/kW) and \$596,000,000 (\$1,135/kW), respectively. Capital, O&M, and levelized annual costs are shown in Tables 4-11, 4-12, 4-13, and 4-14. Detailed cost summaries are included in Appendix H.

Table 4-11
Capital and O&M Cost Summary – Mill Creek Unit 1

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
SCR	$97,000,000	$294	$3,366,000	$15,171,000
Wet FGD	$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 Network	$1,000,000	$3	$100,000	$222,000
Total	**$517,774,000**	**$1,569**	**$29,102,000**	**$92,116,000**

Table 4-12
Capital and O&M Cost Summary – Mill Creek Unit 2

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
SCR	$97,000,000	$294	$3,401,000	$15,206,000
Wet FGD	$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 Network	$1,000,000	$3	$100,000	$222,000
Total	**$517,774,000**	**$1,569**	**$29,744,000**	**$92,758,000**

Table 4-13
Capital and O&M Cost Summary – Mill Creek Unit 3

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
Wet FGD	$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 Network	$1,000,000	$2	$100,000	$222,000
Total	**$512,592,000**	**$1,212**	**$27,147,000**	**$89,530,000**

Table 4-14
Capital and O&M Cost Summary – Mill Creek Unit 4

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
Wet FGD	$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 Network	$1,000,000	$2	$100,000	$222,000
Total	**$595,890,000**	**$1,135**	**$31,537,000**	**$104,058,000**

4.4.4 Special Considerations

To arrive at the aforementioned cost estimates, BOP and ancillary operations, available space at the plant, and constructability issues were considered. The following highlight several of these issues considered for the development of the AQC equipment costs:

- **Auxiliary Power**--Additional auxiliary power requirement will need to be considered for new ID/booster fans to accommodate the additional pressure drop of the new AQC equipment.
- **Water**--A new wet FGD is required for all the Units. There will be a significant change in the amount of waste water produced by the wet FGD. A new or a possible upgrade in wastewater treatment facility is required.

- **Wet FGD Byproduct Handling**--There will be a significant change in the amount of byproduct produced by the wet FGD because of the high amount of sulfur removal from the coal. A new or a possible upgrade in byproduct handling system is required.
- **Wet FGD Reagent Preparation System**--There will be a significant change in the amount of reagent required by the wet FGD because of the high amount of sulfur removal from the coal. A new or a possible upgrade in reagent preparation system is required.
- **Ash Handling**--Additional new ash handling system or a possible upgrade in the ash handling system will be required.
- **Ammonia Storage**--Detailed investigation or study will be required to identify if a new ammonia storage facility is required or an existing ammonia storage facility can be upgraded for accommodating Units 1 and 2 ammonia supply.
- **Biomass Utilization**--Black & Veatch is currently completing a biomass utilization study for Mill Creek. Should it be determined that biomass will be considered as a fuel source in one or more units at the plant, a detailed investigation or study will be required to identify potential affect to the approved AQC equipment and how these many affect the aforementioned costs.
- **Footprint**—For units 1 and 2 the SCR will be installed where the existing dry ESP equipment is currently operating. For units 1, 2, 3, and 4 existing scrubbers can be retired in place to save costs or demolished to create access.
- **Constructability Challenges**:
  - Barge unloading is not economically feasible.
  - Overhead power lines and at least two transmission towers must be moved.
  - Numerous underground utility interferences/relocations.
  - Numerous aboveground utility interferences/relocations.
  - Very limited access around units due to existing AQC systems.
  - Multiple mobilization/demobilization (very selective) dismantling operations are needed to ensure tie-in work is accomplished efficiently.
  - Building between Units 1 and 3 from Unit 1 work will present logistical problems for both plant work and construction.

- Access/height restrictions will dictate the magnitude of modularization that can be utilized.
- Warehouse and loading dock on Unit 2 side must be relocated.
- High complexity of ancillary systems routing to avoid interference with existing AQC systems.
- Ground stability will need to be verified and modified to accommodate heavy lift cranes.
- Multiple plant outages will be needed for tie-ins because of utilizing existing scrubbers, etc., throughout project.
- Ductwork routing is more extensive due to the layout of the existing plant and existing AQC systems in use.
- Space will be a premium for excavations/foundations/duct steel erection.
- Large existing concrete foundations will need to be removed to accommodate equipment.
- Outage windows are very short and limited.
- Site constraints due to the existing railroad and roadway exist.

4.4.5 AQC Equipment Implementation Schedule

AQC equipment implementation schedules for each unit are included in Appendix I. These schedules include milestones in months for the conceptual design, and construction and can help to identify critical path considerations for the approved AQC technologies. While these schedules represent a sequence of events to minimize site outages required for installation of the new AQC equipment, consideration of unit-specific outages outside the scope of this study, have not been included. The following highlight scheduling related issues that were considered in the development of the implementation schedules.

Units 1 and 2

The new dry ESP, PJFF, and ID fans on Units 1 and 2 can be installed with temporary ductwork to connect back to the air heater and to the existing wet FGD during a short outage. This will allow the existing dry ESPs to be demolished and the new SCRs and new wet FGD equipment to be constructed with the units remaining online. The remainder of the new equipment can then be tied into existing ductwork during a normal outage period.

Units 3 and 4

The new AQC equipment for these units can be installed without extensive off-line construction related outages. The tie-in of new ductwork can be scheduled to occur during planned unit outages.

4.4.6 Summary

The cost of new AQC equipment to meet or exceed defined future emission targets at Mill Creek is nominally $2,100,000,000 ($5,500/kW). The O&M and levelized annual costs of new AQC equipment at Mill Creek is nominally $117,500,000 and $378,500,000, respectively.

4.5 Trimble County - Units 1 and 2

Trimble County Generating Station Unit 1 is a pulverized coal fired power plant located approximately 5 miles west of Bedford, Kentucky. Unit 1 began commercial operation in December 23 1990. Unit 2, a 760 MW coal plant, is under construction on the site and is due to be completed on June 15, 2010. Unit 1 consists of one Combustion Engineering (CE) tangential balanced draft, forced circulation boiler and one General Electric (GE) reheat double-flow steam turbine with a hydrogen-cooled generator.

Unit 1 has a gross capacity of 547 MW and is equipped with LNBs, OFA, and SCR for NO_x control; a cold-side dry ESP for PM control and a wet FGD for SO_2 and HCl control. Unit 2 is a new coal fired unit, has a gross capacity of 750 MW, and is equipped with LNBs, OFA, and SCR for NO_x control; boiler combustion optimization and NNs for CO control; a cold-side dry ESP for PM control, a PJFF with PAC injection for Hg and dioxin/furan control, a wet FGD for SO_2 and HCl control and a wet ESP for H_2SO_4 (SO_3) control.

4.5.1 Site Visit Observations and AQC Considerations

At the Trimble County Station, the Black & Veatch team met Kenny Craigmyle (Project Engineer) and Haley Turner (Chemical Engineer) from E.ON. The following text is a narrative summary of the site visit conducted on May 12, 2010.

The Trimble County plant is the newest plant in the E.ON fleet and Unit 1 has AQC technologies already exceeding operation capabilities of other E.ON coal fired units. Unit 2 is a new unit currently in startup and tuning before becoming commercially operational and has new AQC equipment assumed to be sufficiently designed to meet the target emissions in this study. Thus, the Trimble County plant is already generally capable of meeting nearly all the defined pollutant emission targets. However, it has been determined that Unit 1 will need to add AQC technology to control emissions of Hg and dioxin/furan.

Installing a PJFF on Unit 1 will require demolition of an existing abandoned tower crane foundation and multiple runs of electrical duct bank which covers a large percentage of the area within the footprint proposed to install foundations for the Unit 1 fabric filter support frame. Extensive underground investigation will be required to identify operating utilities prior to installing new foundations.

Plant personnel indicated that the variable speed controller for the existing ID fans has been replaced and has additional capacity beyond what is currently required. This should be verified during any preliminary engineering for a PJFF installation project.

Following the site visits, Black & Veatch developed recommendations for specific AQC technology for each unit based on the air emission levels provided by

E.ON. The AQC technology recommendations were provided to E.ON for review and approval. Following E.ON's approval of the recommended AQC technologies, costs estimates were developed. The approved AQC technology options selection sheets are provided in Appendix E. The following sections describe the recommended AQC technologies and associated costs.

4.5.2 Control Technology Summary

The following discussion summarizes the approved AQC technologies and considerations for installation of these technologies on each unit.

To meet the identified pollutant emission limits, new AQC technologies are required for Trimble County Unit 1. These AQC technologies include installation of new PAC injection coupled with a new PJFF located downstream of the existing dry ESP. The existing cold-side dry ESP is capable of meeting the future PM emission limit of 0.03 lb/MBtu or lower; however, for Hg and dioxin/furan removal and to continue fly ash sales, a new PJFF would be required. The PJFF will reduce PM emissions to 0.03 lb/MBtu or lower. The new PJFF will be elevated above the grade level and will be installed downstream of the existing cold-side dry ESP. The existing dry ESP will be kept in service for pre-filtration and fly ash sales. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the new PJFF, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15×10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu.

As previously discussed, Unit 2 is currently in startup mode to test the unit's systems prior to becoming commercially operational. It has been assumed that this unit, and its existing AQC equipment, will meet the identified pollutant emission limits, and no new AQC technologies will be required.

To support the costs analyses described in the next section, Black & Veatch developed process flow diagrams for the approved AQC technologies to illustrate the potential equipment locations and better understand the retrofit issues with the existing system, as well as potential constructability issues. Additionally, high-level control technology equipment arrangement drawings indicating one possible layout of new equipment for each plant were developed. The equipment arrangement drawings are preliminary and are not meant to replace a detailed engineering study. The drawings illustrate high-level box sketches indicating locations of new ductwork (noted in green) and new AQC equipment (noted in red). The drawings also indicate gas flow paths and include a brief description of the constructability issues considered. The process flow diagrams and equipment arrangements are included in Appendices F and G, respectively.

4.5.3 Capital and O&M Costs

The total estimated capital cost to upgrade Trimble County Unit 1 with recommended technologies is $136,000,000 ($248/kW). Capital, O&M, and levelized annual costs are shown in Table 4-15. Detailed cost summaries are included in Appendix H.

Table 4-15
Capital and O&M Cost Summary – Trimble County Unit 1

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
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 Network	$1,000,000	$2	$100,000	$222,000
Total	**$135,451,000**	**$248**	**$10,295,000**	**$26,780,000**

4.5.4 Special Considerations

To arrive at the aforementioned cost estimates, BOP and ancillary operations, available space at the plant, and constructability issues were considered. The following highlight several of these issues considered for the development of the AQC equipment costs:

- **Auxiliary Power**--Additional auxiliary power requirement will need to be considered for upgrading the ID fans to accommodate the additional pressure drop of the new PJFF.
- **Water**--New wet FGD is not required. No significant change in water supply is needed.
- **Wet FGD Byproduct Handling**--No new wet FGD byproduct handling system will be needed.
- **Ash Handling**--Additional new ash handling system will be needed for PJFF.
- **Ammonia Storage**--No new ammonia storage is required.
- **Footprint**--The new PJFF will be elevated and installed above the existing cold-side dry ESP.
- **Constructability Challenges**--An existing abandoned tower crane foundation and multiple runs of electrical duct bank cover a large percentage of the area within the footprint proposed to install foundations for the Unit 1 fabric filter support frame. Extensive underground investigation will be required to identify operating utilities prior to installing new foundations.

4.5.5 AQC Equipment Implementation Schedule

AQC equipment implementation schedules for each unit are included in Appendix I. These schedules include milestones in months for the conceptual design, and construction and can help to identify critical path considerations for the approved AQC technologies. While these schedules represent a sequence of events to minimize site outages required for installation of the new AQC equipment, consideration of unit-specific outages outside the scope of this study, have not been included. The following highlight scheduling related issues that were considered in the development of the implementation schedules.

Unit 1

The new PJFF can be installed without extensive construction related outages. The tie-in of new ductwork can be scheduled to occur during planned unit outages.

4.5.6 Summary

The cost of new AQC equipment to meet or exceed defined future emission targets at Trimble County is nominally $135,500,000 ($250/kW). The O&M and levelized annual costs of new AQC equipment at Trimble County are nominally $10,300,000 and $26,800,000, respectively.

4.6 Green River - Units 3 and 4

The Green River Generating Station is located 3 miles north of Central City in Muhlenberg County. The station is a four unit, coal fired electric generating station with a total nameplate capacity of 168 MW net. Units 3 and 4 are pulverized coal fired generating units. Units 1 and 2 were decommissioned in January 2002 and are, therefore, not included within this review. Units 3 and 4 have a gross capacity of 71 MW and 109 MW, respectively, and are equipped with LNBs for NO_x control; and dry ESP (cold-side dry ESP for Unit 3 and hot-side dry ESP for Unit 4) for PM control.

4.6.1 Site Visit Observations and AQC Considerations

At the Green River Station, the Black & Veatch team met Travis Harper, Jim Edelen, and Eileen Saunders from E.ON. The following text is a narrative summary of the site visit conducted on May 13, 2010.

The Green River plant is the oldest and most uncontrolled coal fired plant in the E.ON fleet. Green River Units 1 and 2 have been retired in place since 1948. Units 3 and 4 were put into service in 1954 and 1959, respectively. Both remaining Units 3 and 4 are load following. Low load is approximately 40 MW for each unit, and (according to plant personnel) it is not unusual for both units to sit at low loads for extended periods just to support line voltage drop.

This low load operating issue for Units 3 and 4 impacts the flue gas temperature at the economizer outlet of both units. To properly operate a new SCR, significant economizer bypass will be needed to keep the SCR inlet temperature from dropping below design limits. The Installation of new AQC systems on Units 3 and 4 would require relocation of overhead power lines and one tower for Unit 4 AQC Equipment. Underground and aboveground utility interferences need to be relocated for Unit 3 AQC equipment. The existing Unit 3 tubular air heater will be replaced with a new regenerative type air heater. Flue gas will be diverted from the economizer section to the SCR inlet duct and will flow vertically upward to the top of the SCR. The SCR will be located above the new air heater and will require economizer bypass to control the flue gas temperature to the SCR inlet. Flue gas flow from the new air heater to the bottom of the new CDS vessel where the bed will be kept fluidized across the load range using recirculated gas from the PJFF outlet. The scrubbed flue gas will be drawn through the CDS and PJFF with a new ID fan that will direct clean flue gas to the new Unit 3 carbon steel stack. Solids collected in the PJFF (fly ash + unreacted reagent) will be recycled back to the CDS inlet to optimize reagent utilization.

The existing Unit 3 cold-side dry ESP and Unit 4 hot-side dry ESP were put into service in 1974. The Unit 4 hot-side dry ESP outlet duct will be connected to the new

SCR by new ductwork. Flue gas will travel upward to the top of the SCR and be routed back to the existing regenerative air heater flue gas inlet. Flue gas will travel out from the air heater to the bottom of the CDS. Scrubbed gas will then travel into two new PJFF housings located on each side of the CDS vessel. New ID fans will draw flue gas through the PJFF housings and deliver the clean flue gas to the new Unit 4 stack located between the new AQC equipment and the existing building wall. The hardware and footprint for PAC injection equipment is minimal and will be located near the air heater outlet ductwork before it splits into two PJFF inlet ducts.

Green River Units 3 and 4 require a complete new set of AQC system equipment along with two new carbon steel dry stacks.

Following the site visits, Black & Veatch developed recommendations for specific AQC technology for each unit based on the air emission levels provided by E.ON. The AQC technology recommendations were provided to E.ON for review and approval. Following E.ON's approval of the recommended AQC technologies, costs estimates were developed. The approved AQC technology options selection sheets are provided in Appendix E. The following sections describe the recommended AQC technologies and associated costs.

4.6.2 Control Technology Summary

The following discussion summarizes the approved AQC technologies and considerations for installation of these technologies on each unit.

To meet the identified pollutant emission limits, new AQC technologies are required for Green River Units 3 and 4. These AQC technologies include installation of a new SCR and PAC injection coupled with a new circulating dry scrubber (CDS) and PJFF located downstream of the air heater. The new SCR system can reduce NO_x emissions to 0.11 lb/MBtu or lower. The CDS and PJFF will reduce PM emissions to 0.03 lb/MBtu or lower, SO_2 emissions to 0.25 lb/MBtu or lower, and HCl emissions to 0.002 lb/MBtu or lower. The existing cold-side dry ESP on Unit 3 will be retired in place/demolished and existing hot-side dry ESP on Unit 4 will be kept in service for pre-filtration of fly ash. Halogenated PAC injection for Hg and dioxin/furan removal will be into the new ductwork upstream of the CDS, and it will reduce Hg emissions to 1 lb/TBtu or lower and dioxin/furan emissions to 15×10^{-18} lb/MBtu. New NN systems are recommended as a technology option for consideration to meet the future CO compliance limit of 0.1 lb/MBtu. Units 3 and 4 will require new ID fans (2 x 50 percent) to overcome the added pressure drop of the new ductwork, SCR, CDS, and PJFF.

To support the costs analyses described in the next section, Black & Veatch developed process flow diagrams for the approved AQC technologies to illustrate the potential equipment locations and better understand the retrofit issues with the existing system, as well as potential constructability issues. Additionally, high-level control technology equipment arrangement drawings indicating one possible layout of new equipment for each plant were developed. The equipment arrangement drawings are preliminary and are not meant to replace a detailed engineering study. The drawings illustrate high-level box sketches indicating locations of new ductwork (noted in green) and new AQC equipment (noted in red). The drawings also indicate gas flow paths and include a brief description of the constructability issues considered. The process flow diagrams and equipment arrangements are included in Appendices F and G, respectively.

4.6.3 Capital and O&M Costs

The total estimated capital cost to upgrade Green River Units 3 and 4 with recommended technologies are $69,000,000 ($966/kW) and $98,000,000 ($900/kW) respectively. Capital, O&M, and levelized annual costs are shown in Tables 4-16 and 4-17. Detailed cost summaries are included in Appendix H.

Table 4-16
Capital and O&M Cost Summary – Green River Unit 3

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
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 Network	$500,000	$7	$50,000	$111,000
Total	**$68,612,000**	**$966**	**$8,287,000**	**$16,637,000**

Table 4-17
Capital and O&M Cost Summary – Green River Unit 4

AQC Equipment	Capital Cost, $	$/kW	O&M Cost, $	Levelized Annual Cost, $
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 Network	$500,000	$5	$50,000	$111,000
Total	**$98,083,000**	**$900**	**$12,296,000**	**$24,233,000**

4.6.4 Special Considerations

To arrive at the aforementioned cost estimates, BOP and ancillary operations, available space at the plant, and constructability issues were considered. The following highlight several of these issues considered for the development of the AQC equipment costs:

- **Auxiliary Power**--Additional auxiliary power requirement will need to be considered for new ID fans to accommodate the additional pressure drop of the new AQC equipment.
- **Water**--A new CDS-PJFF is required for all the Units. The makeup water system may require a possible upgrade.
- **CDS Byproduct Handling**--There will be a significant amount of byproduct produced by the CDS because of the high amount of sulfur removal from the coal. A new byproduct handling system is required.

- **CDS Reagent Preparation System**--There will be a significant amount of reagent required by the CDS because of the high amount of sulfur removal from the coal. A new reagent preparation system is required.
- **Ammonia Storage**--A new ammonia storage facility will be required for new SCRs. Detailed investigation or study will be required to identify the site location for ammonia storage and supply.
- **Footprint**--The new AQC equipment will be installed in the new location as shown on the equipment layout drawing included in Appendix G.
- **Constructability Challenges**:
  - Relocation of some existing transmission lines and one tower will be needed for safe installation of new AQC equipment.
  - Relocation of the existing generator set will be needed to make space available for the new AQC equipment.
  - Some underground utility interferences/relocations.
  - Some aboveground utility interferences/relocations.

4.6.5 AQC Equipment Implementation Schedule

AQC equipment implementation schedules for each unit are included in Appendix I. These schedules include milestones in months for the conceptual design, and construction and can help to identify critical path considerations for the approved AQC technologies. While these schedules represent a sequence of events to minimize site outages required for installation of the new AQC equipment, consideration of unit-specific outages outside the scope of this study, have not been included. The following highlight scheduling related issues that were considered in the development of the implementation schedules.

Unit 3 and 4

The plant has available space for the new AQC equipment, and the new AQC equipment can be installed without extensive off-line construction related outages.

4.6.6 Summary

The cost of new AQC equipment to meet or exceed defined future emission targets at Green River is nominally $167,000,000 ($1,900/kW). The O&M and levelized annual costs of new AQC equipment at Green River are nominally $20,600,000 and $40,900,000, respectively.

Appendix A
E.ON Environmental Matrix

Estimated Requirements Under Future New Environmental Regulations

Task No.	Program Name	Regulated Pollutants			Unit/Plant Averaging	Forcasted Date for Compliance
		Pollutant	Limit	Units		
4.1	GHG Inventory	No additional limits			N/A	Spring - 2010
4.2	New & Existing Engine NSPS and RICE MACT	PM NO_x VOC CO	Varies by Model Year and Horsepower. Certified to meet Tier III, Interim Tier IV or Tier IV		Unit	Spring 2013 for existing MACT & at installation for new NSPS
4.3	Mill Creek BART	MC3 - SAM MC4 - SAM	64.3 76.5	lbs/hour lbs/hour	Unit	During - 2011
4.4	Jefferson Co. STAR Reg.	metals in fuels (As) 20 - 50 ppm or $\sim 1x10^{-5}$ lbs/mmBtu emission rate			Plant	Spring - 2012
4.5 & 4.6	Brown Consent Decree	PM SO_2 NO_x SAM	0.03 97% 0.07 /0.08 110 -220	lbs/mmBtu Removal lbs/mmBtu lbs/mmBtu	Unit 3	SO_2 & PM - December, 2010 NO_x & SAM - December, 2012
4.7	Ghent NOVs	SAM	3.5 - 10	ppm	Unit	During - 2012
4.8	GHG NSR	GHG	Energy Efficiency Projects		Unit/Plant	January, 2011
4.9	Revised CAIR	SO_2 NO_x	0.25 0.11	lbs/mmBtu lbs/mmBtu	Plant	Beginning in 2014
4.10	New EGU MACT	Mercury	90% or 0.012	Removal lbs/GWH	Plant	January, 2015; with 1-yr extension - January, 2016
		Acids (HCl)	0.002	lbs/mmBtu	Unit	
		Metals (PM) Metals (As)	0.03 0.5×10^{-5}	lbs/mmBtu lbs/mmBtu		
		Organics (CO)	0.02	lbs/mmBtu		
		Dioxin/Furan	15×10^{-18}	lbs/mmBtu		
4.11	Jefferson Co. Ozone Non-attainment	NO_x	5 - 10 % reduction	NOx emissions	County-wide	Spring - 2016
4.11	New 1-hour NAAQS for NO_x	NO_x	To be determined based on modeling	lbs/hours	Plant	During - 2015
4.12	New 1-hour NAAQS for SO_2	SO_2	To be determined based on modeling	lbs/hours	Plant	Spring - 2016
4.13	GHG Reduction & Renewables	GHG	To be determined based on modeling	tons/year	Fleet	Beginning in 2014
Plan Risk	$PM_{2.5}$ Emission Reductions	PM2.5 (Condensables)	To be determined based on modeling	lbs/mmBtu	Unit/Plant	After 2013
4.14	CWA 316(a)	Thermal impacts	Biological Studies	N/A	Plant	Starting in 2010
4.15	CWA 316(b)	Withdraw impacts	Biological Studies	N/A	Plant	Starting in 2012
4.16	New Effluent Standard	Metals, Chlorides, etc.	EPA anaylsis is just beginning	EPA anaylsis is just beginning	Plant	During - 2015
4.17	CCR Classification	Toxic Metals	Handle dry in landfill; possible closing existing ash ponds in 5 years		Plant	Beginning in 2012;

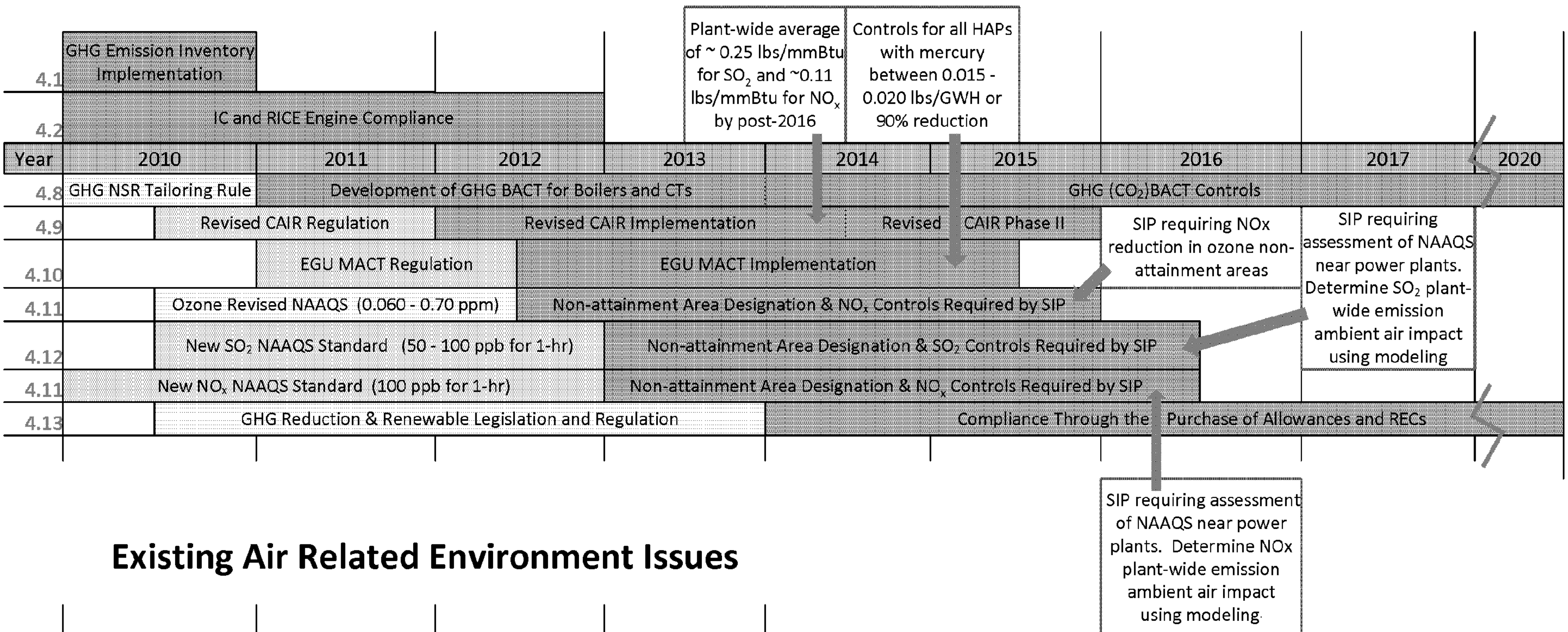
- New requirements have been finalized

U.S.

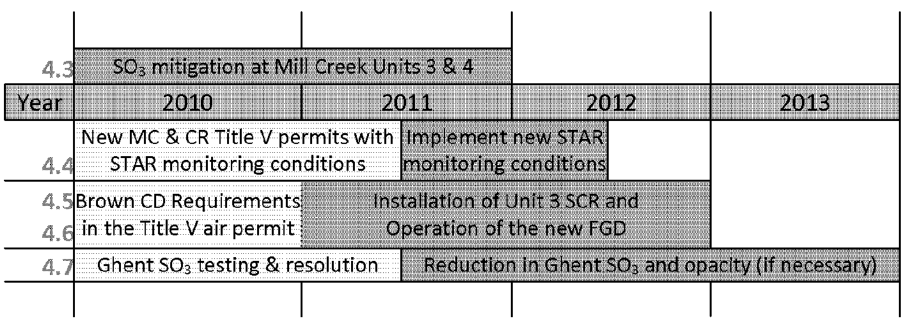
Major Assumptions (Air)

Generation
2011-2013 MTP

Air Related Environmental Regulatory Program Implementation



Existing Air Related Environment Issues



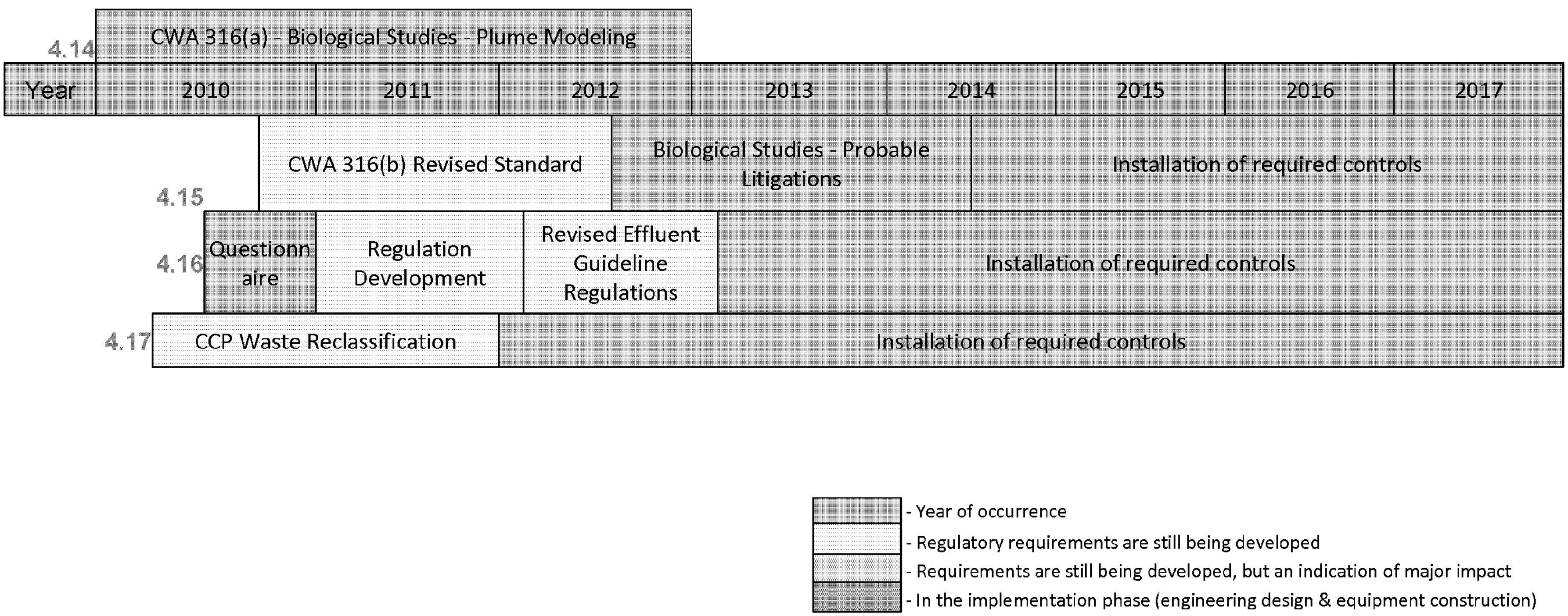
Note:

If the environmental action is above the "Year" row, then regulatory requirements are finalized.

- Year of occurrence
- Regulatory requirements are still being developed
- Requirements are still being developed, but an indication of major impact
- In the implementation phase (engineering design & equipment construction)

e·on | U.S. **Major Assumptions (Land & Water)** Generation 2011-2013 MTP

Land & Water Related Environmental Regulatory Program Implementation



Appendix B
E.ON Unit Specific Data

E.W. Brown

Black & Veatch AQCS Information Needs

Power Plant: ____________ Owner: ____________
Unit ____________ Project: ____________

References:
1)
2)
3)
4)

Yellow highlight denotes Critical Focus Needs.

Fuel Data

Ultimate Coal Analysis (% by mass as received):	Typical	Minimum	Maximum		Notes
Carbon				%	
Hydrogen				%	
Sulfur				%	
Nitrogen				%	
Oxygen				%	
Chlorine				%	
Ash				%	
Moisture				%	
Total					
Higher Heating Value, Btu/lb (as received)				Btu/lb	
Ash Mineral Analysis (% by mass):					
Silica(SiO_2)				%	
Alumina (Al_2O_3)				%	
Titania (TiO_2)				%	
Phosphorous Pentoxide (P_2O_5)				%	
Calcium Oxide (CaO)				%	
Magnesium Oxide (MgO)				%	
Sodium Oxide (Na_2O)				%	
Iron Oxide (Fe_2O_3)				%	
Sulfur Trioxide (SO_3)				%	
Potassium Oxide (K_2O)				%	

Coal Trace Element Analysis (mercury and especially arsenic if fly ash is returned to boiler)

			Notes
Vanadium		%	
Arsenic		%	
Mercury		% or ppm	
Other LOI		%	
Natural gas firing capability (if any at all)			
Natural gas line (into the station) capacity (if applicable)			
Current Lost on Ignition (LOI)			
Start-up Fuel			
Ash Fusion Temperature			
Initial Deformation		°F	
Softening		°F	
Hemispherical		°F	
Hardgrove Grindability Index			

Brown.xls 6/16/2010

Black & Veatch AQCS Information Needs

Power Plant: ______ Owner: ______
Unit ______ Project: ______

Plant Size and Operation Data: (provide for each unit)		Unit 1	Unit 2	Unit 3	Unit X		Notes
Maximum (Design) Fuel Burn Rate		4 * 14.91 Tons/hr	4 * 22.6 Tons/hr	5 * 46.75 Tons		MBtu/hr	# Pulv * Pulv rating
Boiler Type (e.g. wall-fired, tangential fired, cyclone)		Wall-Fired	Tangential Fired	Tangential Fired			
Boiler Manufacturer		B&W	CE	CE			
Net MW Rating (specify plant or turbine MW)		102	169	433		MW	Dispatch Generator Ratings
Gross MW Rating		110	180	457		MW	Dispatch Generator Ratings
Net Unit Heat Rate		9802	9855	9516		Btu/kWh	S&L Design Heat Balance
Net Turbine Heat Rate		8104	8149	8019		Btu/kWh	S&L Design Heat Balance
Boiler SO2 to SO3 Conversion Rate (if known)		na	na	na		%	
Fly Ash/Bottom Ash Split		80/20	80/20	80/20		%	Typical values used on other reports
Flue Gas Recirculation (FGR)							
Installed? (Y/N)		N	N	N			
In operation? (Y/N)							
Flue Gas Recirculation (if installed)						%	
Type of Air Heater		Ljungstrom	Ljungstrom	Ljungstrom			
Air Heater Configuration (horizontal or vertical flow or shaft)		Vertical	Vertical	Vertical			
Design Pressure/Vacuum Rating for Steam Generator	+/-					in wg.	
Design Pressure/Vacuum Rating for Particulate Control	+/-					in wg.	
Electrical / Control							
DCS Manufacturer (e.g. Westinghouse, Foxboro, Honeywell, etc.)							
Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 3000, etc.)							
Neural Network Installed? (Y/N)							
Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)							
Extra Capacity available in DCS?							
Historian Manufacturer							
Additional Controls from DCS or local PLC w/tie-in							
Transformer Rating for Intermediate Voltage Switchgear							
(SUS's) and Ratings of Equipment in These Cubicles							
Auxiliary Electric Limited (Y/N)							
Operating Conditions							
Economizer Outlet Temperature		650	730	730		°F	Typical data from PI historian
Economizer Outlet Pressure		-8	-3.7	-5		in wg.	Typical data from PI historian
Excess Air or Oxygen at Economizer Outlet (full load/min load)		5/8 O2	3/4 O2	2.8/3.3		%	Typical data from PI historian
Economizer Outlet Gas Flow		na	na	na		acfm	
						lb/hr	
Air Heater Outlet Temperature		350	330	340		°F	Typical data from PI historian
Air Heater Outlet Pressure		-14	-8	-18		in wg.	Typical data from PI historian; Unit 1 has back pass dampers
Particulate Control Equipment Outlet Temperature		340	320	330		°F	Typical data from PI historian
Particulate Control Equipment Outlet Pressure		-18	-12	-19		in wg.	Typical data from PI historian
FGD Outlet Temperature (if applicable)		na	na	na		°F	Typical data from PI historian
FGD Outlet Pressure (if applicable)		na	na	na		in wg.	

Black & Veatch AQCS Information Needs

Power Plant: ______ Owner: ______
Unit ______ Project: ______

	Unit X	Unit X	Unit X	Unit X		Notes
NOx Emissions						
Emissions Limit	0.5	0.45	0.07		lb/MBtu	Units 1 & 2 on averaging plan for Nox so this is target rather
Type of NOx Control (if any) - LNB, OFA, etc.	lnb	lnb, ofa	lnb, ofa			
Current NOx Reduction with existing controls	na	na	na		%	
Type of Ammonia Reagent Used (Anhydrous or % H_2O or Urea)						
Reagent Cost					$/ton	
Current Emissions					lb/hr	
					ton/yr	
					lb/MBtu	
Particulate Emissions						
Emissions Limit	0.254	0.162	0.03		lb/MBtu	Title V permit for 1 & 2, Consent Decree Unit 3
Type of Emission Control - Hot Side ESP, Cold Side ESP or FF	Cold Side ESP	Cold Side ESP	Cold Side ESP			
Oxygen Content of Flue Gas @ Air Heater Outlet	na	na	na		%	
Oxygen Content of Flue Gas @ ESP/FF Outlet	na	na	na		%	
Current Emissions	0.241	0.068	0.07		lb/MBtu	Latest compliance PM testing
Fly Ash Sold (Y/N) - See Economic Section	n	n	n			
ESP						
Specific Collection Area (SCA)					ft^2/1000 acfm	
Discharge Electrode Type						
Supplier						
Efficiency					%	
No. of Electrical Sections						
% of Fly Ash Sold					%	
Fabric Filter						
Air to Cloth Ratio (net)					ft/min	
Number of Compartments						
Number of Bags per Compartments						
Efficiency					%	
% of Fly Ash Sold					%	
SO_2 Emissions						
Emissions Limit	5.15	5.15	.1 or 97%		lb/MBtu	Title V permit for 1 & 2, Consent Decree Unit 3
Type of Emission Control - wet or semi-dry FGD (if any)						
Current Emissions	2.5	2.5	2.5		lb/hr	Typical Value from CEMS (typically varies from 1.5 to 3.5 wit
					ton/yr	
					lb/MBtu	
Byproduct Sold (Y/N) - See Economic Section						

Black & Veatch AQCS Information Needs

Power Plant: ____________ Owner: ____________
Unit ____________ Project: ____________

ID Fan Information (at Full Load):	Unit X	Unit X	Unit X	Unit X		Notes
ID Fan Inlet Pressure	-14	-8	-18		in wg.	
ID Fan Discharge Pressure	0.5	0.5	0.5		in wg.	
ID Fan Inlet Temperature	340	320	330		F	
Oxygen Content of Flue Gas @ ID Fan Inlet	na	na	na		%	
ID Fan Motor Voltage (Rated)	13200	2300	13200		volts	
ID Fan Motor Amps (Operating)	na	400	na		A	
ID Fan Motor Amps (Rated)	see fan curve	see fan curve	see fan curve		A	
ID Fan Motor Power (Rated)	see fan curve	see fan curve	see fan curve		hp	
ID Fan Motor Service Factor (1.0 or 1.15)	see fan curve	see fan curve	see fan curve			

Chimney Information:						
Flue Liner Material						
Flue Diameter					ft	
Chimney Height					ft	
Number of Flues						

Drawing and Other Information Needs:

Baseline pollutant emissions data for AQC analysis
Technical evaluations performed to support recent consent decree activity
Existing Plant/AQC system general design and performance issues
Full detailed boiler front, side, and rear elevation drawings
Boiler Design Data (Boiler Data Sheet)
Ductwork Arrangement Drawing (emphasis from economizer outlet to air heater inlet)
Ductwork Arrangement Drawing (emphasis from air heater outlet to stack)
Plant Arrangement Drawings (showing column row spacing)
CEM Quarterly and Annual Data (required if base emissions are to be verified)
Recent Particulate Emission Test Report (If available)
Current Mercury Testing Results (If available)
Current Site Arrangement Drawing
Foundation Drawings and/or Soils Report
Underground Utilities Drawings
Plant One Line Electrical Drawing
Fan Curves for Existing ID Fans (including current system resistance curve)
Acceptable Fan Operating Margins
Plant Outage Schedule
overfire air ports, number of overfire air levels, etc.)