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)					
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					

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: _____

NOx Emissions	Unit X	Unit X	Unit X	Unit X		Notes
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
[illegible] air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of overfire air ports, number of overfire air levels, etc.)

Black & Veatch AQCS Information Needs

Power Plant: _____ Owner: _____

Unit _____ Project: _____

Economic Evaluation Factors:	Unit X	Unit X	Unit X	Unit X		Notes
Remaining Plant Life/Economic Life					years	
Annual Capacity Factor (over life of study/plant)					%	
Contingency Margin (can be determined by B&V)					%	
Owner Indirects Cost Margin					%	
Interest During Construction					%	
Levelized Fixed Charge Rate or Capital Recovery Factor					%	
Present Worth Discount Rate					%	
Capital Escalation Rate					%	
O&M Escalation Rate					%	
Energy Cost (energy to run in-house equipment)					$/MWh	
Replacement Energy Cost (required to be purchased during unit outage)					$/MWh	
Year-by-Year Fuel Prices (over life of study/plant)					$/MBtu	
					$/ton	
Base Fuel Price					$/MBtu	
					$/ton	
Fuel Price Escalation Rate					%	
Water Cost					$/1,000 gal	
Limestone Cost					$/ton	
Lime Cost					$/ton	
Ammonia Cost					$/ton	
Fully Loaded Labor Rate (per person)					$/year	
Fly Ash Sales					$/ton	
Bottom Ash Sales					$/ton	
FGD Byproduct Sales					$/ton	
Waste Disposal Cost						
Fly Ash					$/ton	
Bottom Ash					$/ton	
Scrubber Waste					$/ton	

Ghent

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)

Vanadium		%	
Arsenic		%	
Mercury		% or ppm	
Other LOI		%	
Natural gas firing capability (if any at all)	No		
Natural gas line (into the station) capacity (if applicable)	No		
Current Lost on Ignition (LOI)			
Start-up Fuel	# 2 Fuel Oil		
Ash Fusion Temperature			
Initial Deformation		°F	
Softening		°F	
Hemispherical		°F	
Hardgrove Grindability Index			

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 4		Notes
Maximum (Design) Fuel Burn Rate		B&V can determine some values from previous VISTA				MBtu/hr	
Boiler Type (e.g. wall-fired, tangential fired, cyclone)		tangential	tangential	ont/back wall fired	ont/back wall fired		
Boiler Manufacturer		CE	CE	FW	FW		
Net MW Rating (specify plant or turbine MW)						MW	
Gross MW Rating		541	517	523	526	MW	
Net Unit Heat Rate		10557	8904	11180	11070	Btu/kWh	
Net Turbine Heat Rate		8733	7565	8404	8439	Btu/kWh	
Boiler SO2 to SO3 Conversion Rate (if known)		1.50%		1.95%	2.20%	%	
Fly Ash/Bottom Ash Split						%	
Flue Gas Recirculation (FGR)							
Installed? (Y/N)		No	No	No	No		
In operation? (Y/N)		No	No	No	No		
Flue Gas Recirculation (if installed)		No	No	No	No	%	
Type of Air Heater		Lungstrom	Lungstrom	Lungstrom	Lungstrom		
Air Heater Configuration (horizontal or vertical flow or shaft)		vertical	vertical	vertical	vertical		
Design Pressure/Vacuum Rating for Steam Generator	+/-	35	26	35	35	in wg.	
Design Pressure/Vacuum Rating for Particulate Control	+/-	35"V	30" V	30" V	30" V	in wg.	
Electrical / Control							
DCS Manufacturer (e.g. Westinghouse, Foxboro, Honeywell, etc.)		Emerson	Emerson	Emerson	Emerson		
Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 3000, etc.)		Ovation	Ovation	Ovation	Ovation		
Neural Network Installed? (Y/N)		No	No	No	No		
Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)		n/a	n/a	n/a	n/a		
Extra Capacity available in DCS?		yes	yes	yes	yes		
Historian Manufacturer		Emerson	Emerson	Emerson	Emerson		
Additional Controls from DCS or local PLC w/tie-in		yes	yes	yes	yes		
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		729	610	731	791	°F	
Economizer Outlet Pressure		-323	-5.07	-5.12	-4.51	in wg.	
Excess Air or Oxygen at Economizer Outlet (full load/min load)		3	3.5	3.5	3.3	%	
Economizer Outlet Gas Flow		3775	4147	4506	4076	acfm	
						lb/hr	
Air Heater Outlet Temperature		345	309	315	309	°F	
Air Heater Outlet Pressure		-22.4	-18.6	-36.1	-29.4	in wg.	
Particulate Control Equipment Outlet Temperature		361	605	708	770	°F	
Particulate Control Equipment Outlet Pressure		-25.7	-10.8	-0.92	-0.82	in wg.	
FGD Outlet Temperature (if applicable)		125	83	130	128	°F	
FGD Outlet Pressure (if applicable)		1.65	1.45	2	1.56	in wg.	

Black & Veatch AQCS Information Needs

Power Plant: _____ Owner: _____

Unit _____ Project: _____

NOx Emissions	Unit 1	Unit 2	Unit 3	Unit 4		Notes
Emissions Limit	0.45	0.4	0.46	0.46	lb/MBtu	
Type of NOx Control (if any) - LNB, OFA, etc.	LNB	LNB/OFA	LNB/OFA	LNB/OFA		
Current NOx Reduction with existing controls	SCR	SCR	SCR	SCR	%	
Type of Ammonia Reagent Used (Anhydrous or % H_2O or Urea)	anhydrous	anhydrous	anhydrous	anhydrous		
Reagent Cost					$/ton	
Current Emissions	330	1300	330	330	lb/hr	
	930	850	4800	850	ton/yr	
	0.04	0.35	0.04	0.04	lb/MBtu	
Particulate Emissions						
Emissions Limit					lb/MBtu	
Type of Emission Control - Hot Side ESP, Cold Side ESP or FF	Cold side ESP	Hot side ESP	Hot side ESP	Hot side ESP		
Oxygen Content of Flue Gas @ Air Heater Outlet					%	
Oxygen Content of Flue Gas @ ESP/FF Outlet					%	
Current Emissions	0.02 to 0.045 lbs/n	0.02 to 0.045 lbs/r	0.02 to 0.045 lbs/n	0.025 lbs/mmbtu	lb/MBtu	
Fly Ash Sold (Y/N) - See Economic Section	No	No	No	No		
ESP						
Specific Collection Area (SCA)	153	223	328	328	ft^2/1000 acfm	
Discharge Electrode Type	rigid	wire	wire	wire		
Supplier	PECO	GE	GE	GE		
Efficiency	99.2	99			%	
No. of Electrical Sections	4 in series	4 in series	7 in series	7 in series		
% of Fly Ash Sold	0	0	0	0	%	
Fabric Filter						
Air to Cloth Ratio (net)	N/A				ft/min	
Number of Compartments						
Number of Bags per Compartments						
Efficiency					%	
% of Fly Ash Sold					%	
SO_2 Emissions						
Emissions Limit	5.67 lbs/mmbtu (24 Hr)	? lbs/mmbtu (3 Hr)	? lbs/mmbtu (3 Hr)	? lbs/mmbtu (3 Hr)	lb/MBtu	
Type of Emission Control - wet or semi-dry FGD (if any)	wet FGD	wet FGD	wet FGD	wet FGD		
Current Emissions	600	600	1120	600	lb/hr	
	1400	2100	1400	1400	ton/yr	
	0.15	0.2	0.15	0.15	lb/MBtu	
Byproduct Sold (Y/N) - See Economic Section	yes	yes	yes	yes		

Black & Veatch AQCS Information Needs

Power Plant: _____ Owner: _____

Unit _____ Project: _____

ID Fan Information (at Full Load):	Unit 1	Unit 2	Unit 3	Unit 4		Notes
ID Fan Inlet Pressure	-22.5	-18.7	-36	-28.9	in wg.	
ID Fan Discharge Pressure	6.08	11.4	5.94	14.6	in wg.	
ID Fan Inlet Temperature	358	309	322	309	F	
Oxygen Content of Flue Gas @ ID Fan Inlet	3	3.5	3.5	3.17	%	
ID Fan Motor Voltage (Rated)	4160	6600	13200	4000	volts	
ID Fan Motor Amps (Operating)	990	670	410	1385	A	
ID Fan Motor Amps (Rated)	1113	953	535	1020	A	
ID Fan Motor Power (Rated)	9000	12500	13600	8000	hp	
ID Fan Motor Service Factor (1.0 or 1.15)	1.15	1.15	1.15	1.15		
Chimney Information:						
Flue Liner Material	fiber glass	brick	brick	fiber glass		Ghent 2 and 3 share a common stack-each unit is mixed
Flue Diameter	29'6"	34'5"	34'5"	29'6"	ft	into a common exit flue
Chimney Height	660	580	580	660	ft	
Number of Flues	1	2	2	1		

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
[illegible] air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of overfire air ports, number of overfire air levels, etc.)

Black & Veatch AQCS Information Needs

Power Plant: _____ Owner: _____
Unit _____ Project: _____

Economic Evaluation Factors:	Unit X	Unit X	Unit X	Unit X		Notes
Remaining Plant Life/Economic Life					years	
Annual Capacity Factor (over life of study/plant)					%	
Contingency Margin (can be determined by B&V)					%	
Owner Indirects Cost Margin					%	
Interest During Construction					%	
Levelized Fixed Charge Rate or Capital Recovery Factor					%	
Present Worth Discount Rate					%	
Capital Escalation Rate					%	
O&M Escalation Rate					%	
Energy Cost (energy to run in-house equipment)					$/MWh	
Replacement Energy Cost (required to be purchased during unit outage)					$/MWh	
Year-by-Year Fuel Prices (over life of study/plant)					$/MBtu	
					$/ton	
Base Fuel Price					$/MBtu	
					$/ton	
Fuel Price Escalation Rate					%	
Water Cost					$/1,000 gal	
Limestone Cost					$/ton	
Lime Cost					$/ton	
Ammonia Cost					$/ton	
Fully Loaded Labor Rate (per person)					$/year	
Fly Ash Sales					$/ton	
Bottom Ash Sales					$/ton	
FGD Byproduct Sales					$/ton	
Waste Disposal Cost						
Fly Ash					$/ton	
Bottom Ash					$/ton	
Scrubber Waste					$/ton	

Cane Run

Black & Veatch AQCS Information Needs

Power Plant: Cane Run Owner: Louisville Gas & Electric
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	61.4	59.8	63.14	
Hydrogen	4.3	4.09	4.3	
Sulfur	3.2	2.23	3.2	
Nitrogen	1.3	1.26	1.5	
Oxygen	6.5	6.62	7.44	
Chlorine	0.1			
Ash	10.8	9.13	11.67	
Moisture	12.4	11.92	15.18	
Total	100	95.05	106.43	
Higher Heating Value, Btu/lb (as received)	10921.64	10391	11673	
Ash Mineral Analysis (% by mass):				
Silica(SiO_2)	46.02	42.41	49.07	
Alumina (Al_2O_3)	23.27	20.81	25.64	
Titania (TiO_2)	1.09	0.99	1.21	
Phosphorous Pentoxide (P_2O_5)	0.255	0.16	0.34	
Calcium Oxide (CaO)	1.211	0.88	1.89	
Magnesium Oxide (MgO)	0.98	0.87	1.14	
Sodium Oxide (Na_2O)	0.3	0.22	0.44	
Iron Oxide (Fe_2O_3)	22.97	17.48	27.84	
Sulfur Trioxide (SO_3)	0.95	0.52	1.7	
Potassium Oxide (K_2O)	2.6	2.24	2.93	

Coal Trace Element Analysis (mercury and especially arsenic if fly ash is returned to boiler)			
Vanadium	46.75	%	
Arsenic	15.47	%	
Mercury	0.09	% or ppm	
Other LOI		%	
Natural gas firing capability (if any at all)	Y		
Natural gas line (into the station) capacity (if applicable)			
Current Lost on Ignition (LOI)			
Start-up Fuel	Gas		
Ash Fusion Temperature			
Initial Deformation	2025.56	°F	
Softening	2211.44	°F	
Hemispherical	2332.11	°F	
Hardgrove Grindability Index	62		

Black & Veatch AQCS Information Needs

Power Plant: Cane Run Owner: Louisville Gas & Electric
Unit Project:

Plant Size and Operation Data: (provide for each unit)		CR4	CR5	CR6		Notes
Maximum (Design) Fuel Burn Rate		1601.9	1753.4	2395.7	MBtu/hr	
Boiler Type (e.g. wall-fired, tangential fired, cyclone)		Wall	Wall	Wall		
Boiler Manufacturer		CE	Riley	CE		
Net MW Rating (specify plant or turbine MW)		155	168	240	MW	
Gross MW Rating		168	181	261	MW	
Net Unit Heat Rate		10340	10458	10789	Btu/kWh	
Net Turbine Heat Rate		8414	8429	8625	Btu/kWh	
Boiler SO2 to SO3 Conversion Rate (if known)		-	-	-	%	
Fly Ash/Bottom Ash Split		80/20	80/20	80/20	%	
Flue Gas Recirculation (FGR)						
Installed? (Y/N)		Y	N	N		
In operation? (Y/N)		Y	N	N		
Flue Gas Recirculation (if installed)					%	
Type of Air Heater		Ljungstrom	Ljungstrom	Ljungstrom		
Air Heater Configuration (horizontal or vertical flow or shaft)		Horizontal	Horizontal	Horizontal		
Design Pressure/Vacuum Rating for Steam Generator	+/-	1800/3.5	1800/1.5	2400/3.5	in wg.	
Design Pressure/Vacuum Rating for Particulate Control	+/-	no data	20" H2O/-8.75	no data	in wg.	
Electrical / Control						
DCS Manufacturer (e.g. Westinghouse, Foxboro, Honeywell, etc.)		Honeywell	Honeywell	Honeywell		
Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 3000, etc.)		TDC3000/Experion	TDC3000/Experion	TDC3000/Experion		
Neural Network Installed? (Y/N)		Y	Y	Y		
Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)		Neuco	Neuco	Neuco		
Extra Capacity available in DCS?		Y	Y	Y		
Historian Manufacturer		Honeywell	Honeywell	Honeywell		
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)		N	N	N		
Operating Conditions						
Economizer Outlet Temperature		580.45	630.24	617.2	°F	
Economizer Outlet Pressure					in wg.	
Excess Air or Oxygen at Economizer Outlet (full load/min load)					%	
Economizer Outlet Gas Flow					acfm	
					lb/hr	
Air Heater Outlet Temperature		369.22	299.15	317.59	°F	
Air Heater Outlet Pressure					in wg.	
Particulate Control Equipment Outlet Temperature		132.6	128.4	132.8	°F	Summer design Temperature
Particulate Control Equipment Outlet Pressure					in wg.	ID Fan Suction Pressure
FGD Outlet Temperature (if applicable)		127			°F	
FGD Outlet Pressure (if applicable)					in wg.	

Black & Veatch AQCS Information Needs

Power Plant: Cane Run Owner: Louisville Gas & Electric
Unit Project:

NOx Emissions	CR4	CR5	CR6		Notes
Emissions Limit	0.3372	0.3934	0.3276	lb/MBtu	
Type of NOx Control (if any) - LNB, OFA, etc.	LNB	LNB	OFA		
Current NOx Reduction with existing controls				%	
Type of Ammonia Reagent Used (Anhydrous or % H_2O or Urea)	N/A	N/A	N/A		
Reagent Cost				$/ton	
Current Emissions	0.337	0.384	0.286	lb/hr	
				ton/yr	
				lb/MBtu	
Particulate Emissions					
Emissions Limit	0.11	0.11	0.11	lb/MBtu	
Type of Emission Control - Hot Side ESP, Cold Side ESP or FF					
Oxygen Content of Flue Gas @ Air Heater Outlet	5.78	5.82	4.53	%	
Oxygen Content of Flue Gas @ ESP/FF Outlet				%	
Current Emissions	0.041	0.034	0.024	lb/MBtu	
Fly Ash Sold (Y/N) - See Economic Section	N	N	N		
ESP					
Specific Collection Area (SCA)				ft^2/1000 acfm	
Discharge Electrode Type	0.109" Copper Bessemer	0.109" Copper Bessemer			
Supplier	Research-Cottrell	Research-Cottrell	Buell Engineering		Original supplier
Efficiency	99.1	96.1	99.2	%	
No. of Electrical Sections	48		49		
% of Fly Ash Sold	N/A	N/A	N/A	%	
Fabric Filter					
Air to Cloth Ratio (net)				ft/min	
Number of Compartments					
Number of Bags per Compartments					
Efficiency				%	
% of Fly Ash Sold	N/A	N/A	N/A	%	
SO_2 Emissions					
Emissions Limit	1.2	1.2	1.2	lb/MBtu	
Type of Emission Control - wet or semi-dry FGD (if any)	Wet	Wet	Wet		
Current Emissions	0.411	0.419	0.676	lb/hr	
				ton/yr	
				lb/MBtu	
Byproduct Sold (Y/N) - See Economic Section	N	N	N		

Black & Veatch AQCS Information Needs

Power Plant: Cane Run
Unit
Owner: Louisville Gas & Electric
Project:

ID Fan Information (at Full Load):	Unit X	Unit X	Unit X		Notes
ID Fan Inlet Pressure	-9.11	-6.82	-9.84	in wg.	
ID Fan Discharge Pressure	8	7	8	in wg.	
ID Fan Inlet Temperature				F	
Oxygen Content of Flue Gas @ ID Fan Inlet				%	
ID Fan Motor Voltage (Rated)	4160	4160	4000	volts	
ID Fan Motor Amps (Operating)	104.23	194.37	146.11	A	
ID Fan Motor Amps (Rated)	157	211	265	A	
ID Fan Motor Power (Rated)	1250	3000	2000	hp	
ID Fan Motor Service Factor (1.0 or 1.15)	1	1	1.15		
Chimney Information:					
Flue Liner Material	Pre-Krete	Hadite/Pre-krete	Hastalloy C276		
Flue Diameter	14'2"	15'6"	24'41/2"	ft	
Chimney Height	239	239	500	ft	
Number of Flues	1	1	1		

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
Specific burner and overfire air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of overfire air ports, number of overfire air levels, etc.)

Black & Veatch AQCS Information Needs

Power Plant: Cane Run Owner: Louisville Gas & Electric
Unit Project:

Economic Evaluation Factors:	Unit X	Unit X	Unit X		Notes
Remaining Plant Life/Economic Life	20	20	20	years	
Annual Capacity Factor (over life of study/plant)	65	65	65	%	
Contingency Margin (can be determined by B&V)				%	
Owner Indirects Cost Margin				%	
Interest During Construction				%	
Levelized Fixed Charge Rate or Capital Recovery Factor				%	
Present Worth Discount Rate	6.4	6.4	6.4	%	
Capital Escalation Rate	4%	4%	4%	%	
O&M Escalation Rate	3%	3%	3%	%	
Energy Cost (energy to run in-house equipment)				$/MWh	
Replacement Energy Cost (required to be purchased during unit outage)				$/MWh	
Year-by-Year Fuel Prices (over life of study/plant)				$/MBtu	
				$/ton	
Base Fuel Price				$/MBtu	
				$/ton	
Fuel Price Escalation Rate				%	
Water Cost				$/1,000 gal	
Limestone Cost	N/A	N/A	N/A	$/ton	
Lime Cost	$112.54	$112.54	$112.54	$/ton	Total cost $773,013.3
Ammonia Cost	N/A	N/A	N/A	$/ton	
Fully Loaded Labor Rate (per person)				$/year	
Fly Ash Sales	N/A	N/A	N/A	$/ton	
Bottom Ash Sales	N/A	N/A	N/A	$/ton	
FGD Byproduct Sales	N/A	N/A	N/A	$/ton	
Waste Disposal Cost					
Fly Ash	$2.73			$/ton	Values represent total O&M cost for 2009. Plant Total
Bottom Ash	$8.40			$/ton	Values represent total O&M cost for 2009. Plant total
Scrubber Waste	$3,469.00	$4,989.00	$8,734.00	000$	Values represent total O&M cost for 2009.

Mill Creek

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	64			%	
Hydrogen	4.5			%	
Sulfur	3.5			%	
Nitrogen	1.3			%	
Oxygen	4.62			%	
Chlorine	0.08			%	
Ash	12			%	
Moisture	10			%	
Total	100.00				
Higher Heating Value, Btu/lb (as received)	11471.82			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)					
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					

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 4		Notes
Maximum (Design) Fuel Burn Rate	B&V can determine some values from previous VISTA				MBtu/hr	
Boiler Type (e.g. wall-fired, tangential fired, cyclone)	Tangential fired	Tangential fired	opposed wall	opposed wall		
Boiler Manufacturer	CE	CE	B&W	B&W		
Net MW Rating (specify plant or turbine MW) Winter ratings	303MW	303MW	397MW	492MW	MW	
Gross MW Rating Winter ratings	330MW	330MW	423MW	525MW	MW	
Net Unit Heat Rate	10639	10929	10602	10410	Btu/kWh	
Net Turbine Heat Rate					Btu/kWh	
Boiler SO2 to SO3 Conversion Rate (if known)					%	
Fly Ash/Bottom Ash Split	80/20	80/20	80/20	80/20	%	
Flue Gas Recirculation (FGR)						
Installed? (Y/N)	N	N	N	N		
In operation? (Y/N)						
Flue Gas Recirculation (if installed)					%	
Type of Air Heater	Air Preheater Co.	Air Preheater Co.	Ljungstrom	Ljungstrom		
Air Heater Configuration (horizontal or vertical flow or shaft)	Vertical Flow	Vertical Flow	Vertical Flow	Vertical Flow		
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.)	Honeywell	Honeywell	Honeywel	Honeywell		
Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 3000, etc.)	TC3000			Experion		
Neural Network Installed? (Y/N)	Y	Y	N	N		
Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)	Neuco	Neuco				
Extra Capacity available in DCS?	minimal	minimal	minimal	minimal		
Historian Manufacturer	Honeywell	Honeywell	Honeywell	Honeywell		
Additional Controls from DCS or local PLC w/tie-in						
Transformer Rating for Intermediate Voltage Switchgear						
Capacity of Spare Electrical Cubicles in Existing MCC's and LCUS's (SUS's) and Ratings of Equipment in These Cubicles						
Auxiliary Electric Limited (Y/N)	N	N	N	N		
Operating Conditions						
Economizer Outlet Temperature	760	760	690	640	°F	
Economizer Outlet Pressure	-5	-5	-5	-5	in wg.	
Excess Air or Oxygen at Economizer Outlet (full load/min load)	5	5	5	5	%	
Economizer Outlet Gas Flow	1524804	1524804	1958726	2239453	acfm	
	2976508	2976508	4056287	4848440	lb/hr	
Air Heater Outlet Temperature	375	375	325	315	°F	
Air Heater Outlet Pressure	-10	-10	-18	-18	in wg.	
Particulate Control Equipment Outlet Temperature	375	375	325	315	°F	
Particulate Control Equipment Outlet Pressure	-14	-14	-23	-21	in wg.	
FGD Outlet Temperature (if applicable)	133	133	130	130	°F	
FGD Outlet Pressure (if applicable)	1	1	1	1	in wg.	

Black & Veatch AQCS Information Needs

Power Plant: _____ Owner: _____

Unit _____ Project: _____

NOx Emissions	Unit 1	Unit 2	Unit 3	Unit 4		Notes
Emissions Limit			0.7	0.7	lb/MBtu	
Type of NOx Control (if any) - LNB, OFA, etc.	LNB/OFA	LNB/OFA	LNB/SCR	LNB/SCR		
Current NOx Reduction with existing controls			90%	90%	%	
Type of Ammonia Reagent Used (Anhydrous or % H_2O or Urea)			Anhydrous	Anhydrous		
Reagent Cost			500	500	$/ton	
Current Emissions	0.32	0.32	0.05	0.05	lb/hr	
					ton/yr	
					lb/MBtu	
Particulate Emissions						
Emissions Limit	0.115	0.115	0.105	0.105	lb/MBtu	
Type of Emission Control - Hot Side ESP, Cold Side ESP or FF	Cold Side ESP	Cold Side ESP	Cold Side ESP	Cold Side ESP		
Oxygen Content of Flue Gas @ Air Heater Outlet	4	4	4	4	%	
Oxygen Content of Flue Gas @ ESP/FF Outlet	4	4	4	4	%	
Current Emissions	0.36	0.48	0.05	0.04	lb/MBtu	
Fly Ash Sold (Y/N) - See Economic Section	Y	Y	Y	Y		Very minimal at this point in time
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	1.2	1.2	1.2	1.2	lb/MBtu	
Type of Emission Control - wet or semi-dry FGD (if any)	Wet FGD	Wet FGD	Wet FDG	Wet FGD		
Current Emissions	0.47	0.47	0.58	0.47	lb/hr	
					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 1	Unit 2	Unit 3	Unit 4		Notes
ID Fan Inlet Pressure	-16	-16.5	-22	-23	in wg.	
ID Fan Discharge Pressure	-2	-1			in wg.	
ID Fan Inlet Temperature	340	340	330	330	F	
Oxygen Content of Flue Gas @ ID Fan Inlet	4	4	4	4	%	
ID Fan Motor Voltage (Rated)	4160	4160	4160	4160	volts	
ID Fan Motor Amps (Operating)	275	275	920	1115	A	
ID Fan Motor Amps (Rated)	320	320	1176		A	
ID Fan Motor Power (Rated)	2500	2500	9000	9500	hp	
ID Fan Motor Service Factor (1.0 or 1.15)	1.15	1.15	1	1.15		

Chimney Information:						
Flue Liner Material	C276	C276	C276	C276		
Flue Diameter	15' 6"	15' 6"	19' 6"	19' 6"	ft	top of liner
Chimney Height	623	623	630	630	ft	
Number of Flues	1	1	1	1		1&2 share a common stack

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
[illegible] air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of overfire air ports, number of overfire air levels, etc.)

Black & Veatch AQCS Information Needs

Power Plant: _____ Owner: _____
Unit _____ Project: _____

Economic Evaluation Factors:	Unit X	Unit X	Unit X	Unit X		Notes
Remaining Plant Life/Economic Life					years	
Annual Capacity Factor (over life of study/plant)					%	
Contingency Margin (can be determined by B&V)					%	
Owner Indirects Cost Margin					%	
Interest During Construction					%	
Levelized Fixed Charge Rate or Capital Recovery Factor					%	
Present Worth Discount Rate					%	
Capital Escalation Rate					%	
O&M Escalation Rate					%	
Energy Cost (energy to run in-house equipment)					$/MWh	
Replacement Energy Cost (required to be purchased during unit outage)					$/MWh	
Year-by-Year Fuel Prices (over life of study/plant)					$/MBtu	
					$/ton	
Base Fuel Price					$/MBtu	
					$/ton	
Fuel Price Escalation Rate					%	
Water Cost					$/1,000 gal	
Limestone Cost					$/ton	
Lime Cost					$/ton	
Ammonia Cost					$/ton	
Fully Loaded Labor Rate (per person)					$/year	
Fly Ash Sales					$/ton	
Bottom Ash Sales					$/ton	
FGD Byproduct Sales					$/ton	
Waste Disposal Cost						
Fly Ash					$/ton	
Bottom Ash					$/ton	
Scrubber Waste					$/ton	

Trimble County

Black & Veatch AQCS Information Needs

Power Plant: Trimble Owner:
Unit TC1 and TC2 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)

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			

Black & Veatch AQCS Information Needs

Power Plant: Trimble
Unit TC1 and TC2
Owner:
Project:

Plant Size and Operation Data: (provide for each unit)		Unit 1	Unit 2	Unit X	Unit X		Notes
Maximum (Design) Fuel Burn Rate		B&V can determine some values from previous VISTA				MBtu/hr	
Boiler Type (e.g. wall-fired, tangential fired, cyclone)		Tangential	Wallfired				
Boiler Manufacturer		Combustion Engineering	Doosan				
Net MW Rating (specify plant or turbine MW)		turbine 512	760			MW	
Gross MW Rating		547	509			MW	
Net Unit Heat Rate		10372	8662 guarentteed			Btu/kWh	
Net Turbine Heat Rate		gross 8362.53	7066 turbine guarenteed			Btu/kWh	
Boiler SO2 to SO3 Conversion Rate (if known)		NA	0.068 lb/MMBtu less than this at Econ outlet			%	
Fly Ash/Bottom Ash Split		80/20	80/20			%	
Flue Gas Recirculation (FGR)							
Installed? (Y/N)		N	N				
In operation? (Y/N)		N	NA				
Flue Gas Recirculation (if installed)		NA	NA			%	
Type of Air Heater		Regenerative	Regenerative				
Air Heater Configuration (horizontal or vertical flow or shaft)		Vertical 2 layer	Vertical 2 layer				
Design Pressure/Vacuum Rating for Steam Generator	+/-	26.5	24/35 +/- 24 on continuous +/-35 on transient basis			in wg.	
Design Pressure/Vacuum Rating for Particulate Control	+/-	42 at 100%	25/-6 +/-35 for DESP, PJFF +25/-6			in wg.	
Electrical / Control							
DCS Manufacturer (e.g. Westinghouse, Foxboro, Honeywell, etc.)		Emerson	Emerson				
Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 3000, etc.)		Ovation	Ovation				
Neural Network Installed? (Y/N)		N	N				
Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)		N/A	N/A				
Extra Capacity available in DCS?		Y	Y				
Historian Manufacturer		Emerson	Emerson				
Additional Controls from DCS or local PLC w/tie-in		Y	Y				
Transformer Rating for Intermediate Voltage Switchgear		100.8 MVA? Need better definintion					
(SUS's) and Ratings of Equipment in These Cubicles		NA					
Auxiliary Electric Limited (Y/N)		N					
Operating Conditions							
Economizer Outlet Temperature		700	586			°F	
Economizer Outlet Pressure		-6				in wg.	
Excess Air or Oxygen at Economizer Outlet (full load/min load)		3	3.2/8.15 25%			%	
Economizer Outlet Gas Flow		N/A	3200333			acfm	
		N/A				lb/hr	
Air Heater Outlet Temperature		600	324			°F	
Air Heater Outlet Pressure		diff 6.5				in wg.	
Particulate Control Equipment Outlet Temperature		N/A	313			°F	
Particulate Control Equipment Outlet Pressure		-0.3				in wg.	
FGD Outlet Temperature (if applicable)		130	12.9 diff			°F	
FGD Outlet Pressure (if applicable)						in wg.	stack draft

Black & Veatch AQCS Information Needs

Power Plant: Trimble Owner:
Unit TC1 and TC2 Project:

NOx Emissions	Unit 1	Unit 2	Unit X	Unit X		Notes
Emissions Limit					lb/MBtu	
Type of NOx Control (if any) - LNB, OFA, etc.						
Current NOx Reduction with existing controls					%	
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					lb/MBtu	
Type of Emission Control - Hot Side ESP, Cold Side ESP or FF						
Oxygen Content of Flue Gas @ Air Heater Outlet					%	
Oxygen Content of Flue Gas @ ESP/FF Outlet					%	
Current Emissions					lb/MBtu	
Fly Ash Sold (Y/N) - See Economic Section						
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					lb/MBtu	
Type of Emission Control - wet or semi-dry FGD (if any)						
Current Emissions					lb/hr	
					ton/yr	
					lb/MBtu	
Byproduct Sold (Y/N) - See Economic Section						

Black & Veatch AQCS Information Needs

Power Plant: Trimble
Unit TC1 and TC2
Owner:
Project:

ID Fan Information (at Full Load):	Unit 1	Unit 2	Unit X	Unit X		Notes
ID Fan Inlet Pressure	-0.3	-23.08			in wg.	
ID Fan Discharge Pressure	-0.3	15.77			in wg.	
ID Fan Inlet Temperature	300	313			F	
Oxygen Content of Flue Gas @ ID Fan Inlet	3-6%	4.2-9.2			%	
ID Fan Motor Voltage (Rated)	6600	13200			volts	
ID Fan Motor Amps (Operating)	535	NA			A	
ID Fan Motor Amps (Rated)	740	790			A	
ID Fan Motor Power (Rated)	9000	20241			hp	
ID Fan Motor Service Factor (1.0 or 1.15)	1.15	1.15				
Chimney Information:						
Flue Liner Material	FRP	FRP				
Flue Diameter	18'	18' & 10'			ft	
Chimney Height	754'	754'			ft	
Number of Flues	1	2				

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
[illegible] air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of overfire air ports, number of overfire air levels, etc.)

Black & Veatch AQCS Information Needs

Power Plant: Trimble
Unit TC1 and TC2
Owner:
Project:

Economic Evaluation Factors:	Unit X	Unit X	Unit X	Unit X		Notes
Remaining Plant Life/Economic Life					years	
Annual Capacity Factor (over life of study/plant)					%	
Contingency Margin (can be determined by B&V)					%	
Owner Indirects Cost Margin					%	
Interest During Construction					%	
Levelized Fixed Charge Rate or Capital Recovery Factor					%	
Present Worth Discount Rate					%	
Capital Escalation Rate					%	
O&M Escalation Rate					%	
Energy Cost (energy to run in-house equipment)					$/MWh	
Replacement Energy Cost (required to be purchased during unit outage)					$/MWh	
Year-by-Year Fuel Prices (over life of study/plant)					$/MBtu	
					$/ton	
Base Fuel Price					$/MBtu	
					$/ton	
Fuel Price Escalation Rate					%	
Water Cost					$/1,000 gal	
Limestone Cost					$/ton	
Lime Cost					$/ton	
Ammonia Cost					$/ton	
Fully Loaded Labor Rate (per person)					$/year	
Fly Ash Sales					$/ton	
Bottom Ash Sales					$/ton	
FGD Byproduct Sales					$/ton	
Waste Disposal Cost						
Fly Ash					$/ton	
Bottom Ash					$/ton	
Scrubber Waste					$/ton	

Green River

Black & Veatch AQCS Information Needs

Power Plant: Green River 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)					
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					

Black & Veatch AQCS Information Needs

Power Plant: Green River Owner:
Unit Project:

Plant Size and Operation Data: (provide for each unit)		Unit 3	Unit 4	Unit X	Unit X		Notes
Maximum (Design) Fuel Burn Rate		880	1.2			MBtu/hr	Original Design
Boiler Type (e.g. wall-fired, tangential fired, cyclone)		Wall Fired	Wall Fired				
Boiler Manufacturer		B&W	B&W				
Net MW Rating (specify plant or turbine MW)		71	102			MW	
Gross MW Rating		75	109			MW	
Net Unit Heat Rate		11942	11278			Btu/kWh	
Net Turbine Heat Rate						Btu/kWh	
Boiler SO2 to SO3 Conversion Rate (if known)		Unknown	Unknown			%	
Fly Ash/Bottom Ash Split		80/20	80/20			%	
Flue Gas Recirculation (FGR)		NA	NA				
Installed? (Y/N)							
In operation? (Y/N)		NA	NA				
Flue Gas Recirculation (if installed)		NA	NA			%	
Type of Air Heater		Tubular	Lungstrom				
Air Heater Configuration (horizontal or vertical flow or shaft)		Vertical	Vertical				
Design Pressure/Vacuum Rating for Steam Generator	+/-	-18	-13.3			in wg.	
Design Pressure/Vacuum Rating for Particulate Control	+/-	-18	-13.3			in wg.	
Electrical / Control							
DCS Manufacturer (e.g. Westinghouse, Foxboro, Honeywell, etc.)		Honeywell	Honeywell				
Type of DCS (e.g. WDPF, Ovation, Net 90, Infi 90, Symphony, TDC 3000, etc.)		Experion	Experion				
Neural Network Installed? (Y/N)		N	N				
Neural Network Manufacturer (e.g. Pegasus, Westinghouse, etc.)		NA	NA				
Extra Capacity available in DCS?		Y	Y				
Historian Manufacturer		Honeywell	Honeywell				
Additional Controls from DCS or local PLC w/tie-in		Y Rockwell	Y Rockwell				
Transformer Rating for Intermediate Voltage Switchgear		7.5 MVA	9.375 MVA				
(SUS's) and Ratings of Equipment in These Cubicles		N/A	N/A				
Auxiliary Electric Limited (Y/N)		N	N				
Operating Conditions							
Economizer Outlet Temperature		475	610			°F	
Economizer Outlet Pressure		-5	-6			in wg.	
Excess Air or Oxygen at Economizer Outlet (full load/min load)		25%	25%			%	
Economizer Outlet Gas Flow						acfm	
		510	687			Klb/hr	
Air Heater Outlet Temperature		243	363			°F	
Air Heater Outlet Pressure		-9	-135			in wg.	
Particulate Control Equipment Outlet Temperature		230	600			°F	
Particulate Control Equipment Outlet Pressure		-11	-8.1			in wg.	
FGD Outlet Temperature (if applicable)		NA	NA			°F	
FGD Outlet Pressure (if applicable)		NA	NA			in wg.	

Black & Veatch AQCS Information Needs

Power Plant: Green River Owner:
Unit Project:

NOx Emissions	Unit 3	Unit 4	Unit X	Unit X		Notes
Emissions Limit	0.46	0.5			lb/MBtu	
Type of NOx Control (if any) - LNB, OFA, etc.	LNB	LNB				
Current NOx Reduction with existing controls	NA	NA			%	
Type of Ammonia Reagent Used (Anhydrous or % H_2O or Urea)	NA	NA				
Reagent Cost	NA	NA			$/ton	
Current Emissions					lb/hr	
					ton/yr	
	0.398	0.384			lb/MBtu	
Particulate Emissions						
Emissions Limit	0.29	0.14			lb/MBtu	
Type of Emission Control - Hot Side ESP, Cold Side ESP or FF	Cold side	Hot side				
Oxygen Content of Flue Gas @ Air Heater Outlet	~5%	~5%			%	
Oxygen Content of Flue Gas @ ESP/FF Outlet	~5%	~5%			%	
Current Emissions	Compliance	Compliance			lb/MBtu	Indirectly measured by Opacity
Fly Ash Sold (Y/N) - See Economic Section	N	N				
ESP						
Specific Collection Area (SCA)					ft^2/1000 acfm	
Discharge Electrode Type	Weighted Wire	Weighted Wire				
Supplier	Buell	Buell				
Efficiency	98.50%	99%			%	
No. of Electrical Sections	6	7				
% of Fly Ash Sold	0	0			%	
Fabric Filter						
Air to Cloth Ratio (net)	NA	NA			ft/min	
Number of Compartments	NA	NA				
Number of Bags per Compartments	NA	NA				
Efficiency	NA	NA			%	
% of Fly Ash Sold	NA	NA			%	
SO_2 Emissions						
Emissions Limit	4.57	4.57			lb/MBtu	
Type of Emission Control - wet or semi-dry FGD (if any)	NA	NA				
Current Emissions					lb/hr	
	5448	9276			ton/yr	2009 data
					lb/MBtu	
Byproduct Sold (Y/N) - See Economic Section						

Black & Veatch AQCS Information Needs

Power Plant: Green River Owner:
Unit Project:

ID Fan Information (at Full Load):	Unit 3	Unit 4	Unit X	Unit X		Notes
ID Fan Inlet Pressure	-7	-15.5			in wg.	
ID Fan Discharge Pressure	0	-0.24			in wg.	
ID Fan Inlet Temperature	230	365			F	
Oxygen Content of Flue Gas @ ID Fan Inlet	~5%	~5%			%	
ID Fan Motor Voltage (Rated)	2300	2300			volts	
ID Fan Motor Amps (Operating)	105	230			A	
ID Fan Motor Amps (Rated)	98.3	224			A	
ID Fan Motor Power (Rated)	450	1000			hp	
ID Fan Motor Service Factor (1.0 or 1.15)	1	1				
Chimney Information:						
Flue Liner Material	Brick	Brick				
Flue Diameter	12	11			ft	
Chimney Height	198	247			ft	
Number of Flues	1	1				

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
[illegible] air ports arrangement (single wall, opposed fired, total number of burners, number of burner levels, number of overfire air ports, number of overfire air levels, etc.)

Black & Veatch AQCS Information Needs

Power Plant: Green River
Unit
Owner:
Project:

Economic Evaluation Factors:	Unit X	Unit X	Unit X	Unit X		Notes
Remaining Plant Life/Economic Life					years	
Annual Capacity Factor (over life of study/plant)					%	
Contingency Margin (can be determined by B&V)					%	
Owner Indirects Cost Margin					%	
Interest During Construction					%	
Levelized Fixed Charge Rate or Capital Recovery Factor					%	
Present Worth Discount Rate					%	
Capital Escalation Rate					%	
O&M Escalation Rate					%	
Energy Cost (energy to run in-house equipment)					$/MWh	
Replacement Energy Cost (required to be purchased during unit outage)					$/MWh	
Year-by-Year Fuel Prices (over life of study/plant)					$/MBtu	
					$/ton	
Base Fuel Price					$/MBtu	
					$/ton	
Fuel Price Escalation Rate					%	
Water Cost					$/1,000 gal	
Limestone Cost					$/ton	
Lime Cost					$/ton	
Ammonia Cost					$/ton	
Fully Loaded Labor Rate (per person)					$/year	
Fly Ash Sales					$/ton	
Bottom Ash Sales					$/ton	
FGD Byproduct Sales					$/ton	
Waste Disposal Cost						
Fly Ash					$/ton	
Bottom Ash					$/ton	
Scrubber Waste					$/ton	