COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE 2014 JOINT INTEGRATED RESOURCE PLAN OF LOUISVILLE GAS AND ELECTRIC COMPANY AND KENTUCKY UTILITIES COMPANY	**)))))**	**CASE NO. 2014-00131**

RESPONSE OF
LOUISVILLE GAS AND ELECTRIC COMPANY
AND KENTUCKY UTILITIES COMPANY
TO WALLACE MCMULLEN AND SIERRA CLUB'S
SUPPLEMENTAL DATA REQUESTS
DATED DECEMBER 9, 2014

FILED: DECEMBER 22, 2014

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF JEFFERSON)

The undersigned, **Charles R. Schram**, being duly sworn, deposes and says that he is Director – Energy Planning, Analysis and Forecasting for LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Charles R. Schram (signature)
Charles R. Schram

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 29th day of December 2014.

Judy Schooler (signature) (SEAL)
Notary Public

My Commission Expires:

JUDY SCHOOLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **John N. Voyles, Jr.**, being duly sworn, deposes and says that he is the Vice President, Transmission and Generation Services for Louisville Gas and Electric Company and Kentucky Utilities Company and an employee of LG&E and KU Services Company, that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

John N. Voyles, Jr.

John N. Voyles, Jr.

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 19th day of September 2014.

Judy Schooler (SEAL)

Notary Public

My Commission Expires:

JUDY SCHOOLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) **SS:**
COUNTY OF JEFFERSON)

The undersigned, **Gary H. Revlett**, being duly sworn, deposes and says that he is Director – Environmental Affairs for LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Gary H. Revlett

Gary H. Revlett

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 29th day of December 2014.

Judy Schooler (SEAL)
Notary Public

My Commission Expires:

JUDY SCHOOLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.1

Witness: Charles R. Schram/Counsel

Q-2.1. Please refer to the response to Sierra Club DR 1-6. Please produce the Companies' 2014 Business Plan that is referenced in the response.

A-2.1. The Companies object to this request because it requests information irrelevant to this proceeding. The Commission's regulation concerning Integrated Resource Planning, 807 KAR 5:058, states in its Necessity, Function, and Conformity section, "This administrative regulation prescribes rules for regular reporting and commission review of load forecasts and resource plans of the state's electric utilities to meet future demand with an adequate and reliable supply of electricity at the lowest possible cost for all customers within their service areas, and satisfy all related state and federal laws and regulations." But the requested 2014 Business Plan contains data unrelated to the Companies' ability to provide adequate and reliable supplies of electricity at the lowest cost: human-resources data, information-technology data, natural-gas-utility data, financial-operations data, etc. As described in the Companies' response to Sierra Club Question No. 2.7(b) below, the Companies' annual business plan is a comprehensive guide to how the Companies plan to run the entirety of their business; it is not a resource-adequacy plan, and therefore is not relevant to this case. Indeed, the sole reason for the Companies' reference to the 2014 Business Plan in their response to Sierra Club DR 1-6 was to identify the vintage of the fixed O&M and capital data the Companies were providing, not because the 2014 Business Plan contains other relevant data. Moreover, as the Companies noted in their response to Sierra Club DR 1-6, the fixed O&M and capital data Sierra Club requested and the Companies provided is not data the Companies used in the IRP, so the data was already of doubtful relevance. This request takes the matter one step too far, clearly exceeding the bounds of plausible relevance to the subject matter of this proceeding; the Companies therefore object.

But in the interest of comity, the Companies are providing in the attached documents more detailed data underlying the previously provided fixed O&M and capital information in lieu of providing the requested irrelevant information. The information requested is confidential and proprietary, and is being provided under seal pursuant to a Joint Petition for Confidential Protection.

Sierra Club/NRDC Data Request
LKE 2014 BP - Power Generation & PE
$000's

75% Share of Trimble County (STEAM) is reflected in Capital; 100% in O&M; SCCT, NGCC, & Hydro Variable O&M is reflected in Fixed O&M

	Capital									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
STEAM										
Ghent	[redacted]									
Brown										
Green River										
Tyrone										
Pineville										
Mill Creek										
Cane Run										
Trimble County										
SCCT/NGCC										
Trimble County	[redacted]									
Cane Run										
Paddys Run										
Zorn										
Canal										
BR CTS										
Green River 5										
Haefling										
HYDRO										
Ohio Falls										
Dix Dam										
LGE Common										
KU Common										
Total Capital										

CONFIDENTIAL INFORMATION REDACTED

Sierra Club/NRDC Data Request
LKE 2014 BP - Power Generation & PE
$000's

75% Share of Trimble County (STEAM) is reflected in Capital; 100% in O&M; SCCT, NGCC, & Hydro Variable O&M is reflected in Fixed O&M

	Fixed Costs									
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
STEAM										
Ghent	[redacted]									
Brown										
Green River										
Tyrone										
Pineville										
Mill Creek										
Cane Run										
Trimble County										
SCCT/NGCC (including Variable O&M)										
Trimble County	[redacted]									
Cane Run										
Paddys Run										
Zorn										
Canal										
BR CTS										
Green River 5										
Haefling										
HYDRO (including Variable O&M)										
Ohio Falls	[redacted]									
Dix Dam										
LGE Common										
KU Common										
Total Fixed Costs										

CONFIDENTIAL INFORMATION REDACTED

Sierra Club/NRDC Data Request
LKE 2014 BP - Power Generation & PE
$000's

75% Share of Trimble County (STEAM) is reflected in Capital; 100% in O&M; SCCT, NGCC, & Hydro Variable O&M is reflected in Fixed O&M

Variable Costs										
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
STEAM										
Ghent	[redacted]									
Brown										
Green River										
Tyrone										
Pineville										
Mill Creek										
Cane Run										
Trimble County										
LGE Common	[redacted]									
KU Common										
Total Variable Costs										

CONFIDENTIAL INFORMATION REDACTED

Sierra Club/NRDC Data Request
LG&E 2014 BP - Power Generation & PE
$000's

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
LGE - *Capital*										
STEAM										
Mill Creek	[redacted]									
Cane Run	[redacted]									
Trimble County	[redacted]									
CTS										
Trimble County	[redacted]									
Cane Run	[redacted]									
Paddys Run	[redacted]									
Zorn	[redacted]									
Canal	[redacted]									
HYDRO										
Ohio Falls	[redacted]									
LGE Common	[redacted]									
Total LG&E Capital	[redacted]									

LGE - *Fixed Costs*										
STEAM										
Mill Creek	[redacted]									
Cane Run	[redacted]									
Trimble County	[redacted]									
CTS										
Trimble County	[redacted]									
Cane Run	[redacted]									
Paddys Run	[redacted]									
Zorn	[redacted]									
Canal	[redacted]									
HYDRO										
Ohio Falls	[redacted]									
LGE Common	[redacted]									
Total LGE Fixed Costs	[redacted]									

CONFIDENTIAL INFORMATION REDACTED

Sierra Club/NRDC Data Request

LG&E 2014 BP - Power Generation & PE

$000's

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
LG&E - *Variable Costs*										
STEAM										
Mill Creek	[redacted]									
Cane Run										
Trimble County										
CTS										
Trimble County	[redacted]									
Cane Run										
Paddys Run										
Zorn										
Canal										
HYDRO										
Ohio Falls	[redacted]									
LGE Common	[redacted]									
Total LGE Variable Costs										

Included in Variable Costs above										
CCR Costs										
Trimble County	[redacted]									

CONFIDENTIAL INFORMATION REDACTED

Sierra Club/NRDC Data Request
KU 2014 BP - Power Generation & PE
$000's

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
KU - *Capital*										
STEAM										
Ghent	[redacted]									
Brown	[redacted]									
Green River	[redacted]									
Tyrone	[redacted]									
Pineville	[redacted]									
CTS										
BR CTS	[redacted]									
Green River 5	[redacted]									
Haefling	[redacted]									
HYDRO										
Dix Dam	[redacted]									
KU Common	[redacted]									
Total KU Capital	[redacted]									

KU - *Fixed Costs*										
STEAM										
Ghent	[redacted]									
Brown	[redacted]									
Green River	[redacted]									
Tyrone	[redacted]									
Pineville	[redacted]									
CTS										
BR CTS	[redacted]									
Green River 5	[redacted]									
Haefling	[redacted]									
HYDRO										
Dix Dam	[redacted]									
KU Common	[redacted]									
Total KU	[redacted]									

CONFIDENTIAL INFORMATION REDACTED

Sierra Club/NRDC Data Request

KU 2014 BP - Power Generation & PE

$000's

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
KU - *Variable Costs*										
STEAM										
Ghent	[redacted]									
Brown										
Green River										
Tyrone										
Pineville										
CTS										
BR CTS	[redacted]									
Green River 5										
Haefling										
HYDRO	[redacted]									
Dix Dam										
KU Common	[redacted]									
Total KU Variable Costs	[redacted]									

Included in Variable Costs above										
CCR Costs										
Ghent	[redacted]									

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital
[redacted]														

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital
[redacted]														

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital
[redacted]														

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital
[redacted]														

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital
[redacted]														

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital
[redacted]														

CONFIDENTIAL INFORMATION REDACTED

location	budget_item	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Loc	Capital
[redacted]														

CONFIDENTIAL INFORMATION REDACTED

location	lob	account	acct_type_17	mechanism_15	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Location

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	lob	account	acct_type_17	mechanism_15	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Location

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	lob	account	acct_type_17	mechanism_15	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Location

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	lob	account	acct_type_17	mechanism_15	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Location

[redacted]

CONFIDENTIAL INFORMATION REDACTED

location	lob	account	acct_type_17	mechanism_15	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017	amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Location
[redacted]																

CONFIDENTIAL INFORMATION REDACTED

Location	Description	
0000	DEFAULT	LGEC
0001	SEVENTH & ORMSBY	
0002	ESC - EAST SERVICE CENTER	
0003	WATERSIDE MAINTENANCE	
0004	CRS - CANE RUN	
0005	SSC - SOUTH SERVICE CENTER	
0006	ELEC. PROD. MAINT. SUBSTATION	
0007	ET&D EQUIPMENT	
0008	MCS - MILL CREEK STATION	
0009	MILL CREEK GARAGE	
0010	JACKSON ST.	
0011	BOC - GAS & OIL	
0012	TCS - TRIMBLE CO. PLANT	
0013	MULDRAUGH STATION	
0014	MAGNOLIA COMPRESSOR ST.	
0015	CENTER KY. STORAGE FIELD	
0016	N.G. GILBERT CONTRACTOR	
0017	OVERHEAD CONSTRUCTION - 7TH & ORMSBY	
0018	OVERHEAD CONSTRUCTION - ESC	
0019	OVERHEAD CONSTRUCTION - SSC	
0020	UNDERGROUND - ESC	
0021	UNDERGROUND - 7TH & ORMSBY	
0022	UNDERGROUND - SSC	
0023	FISCHER CONTRACTOR	
0024	JOHN MEYERS CONTRACTOR	
0025	ARROW ELECTRIC	
0026	SPARE PARTS EQUIPMENT	
0027	DATA CENTER COMPUTER OPERATIONS	
0028	HIGHLANDS DOWNTOWN	
0029	AUBURNDALE SERVICE CENTER	

Location	Description		
0030	LGE PIKE TRUCK STOCK		
0031	BRN - BROWNSTOWN		
0032	LTD - LOUISVILLE TRANSMISSION & DISTRIBUTION		
0033	ATS - AUBURNDALE TRUCK STOCK		
0034	ETS - EAST TRUCK STOCK		
0035	TRF - TRANSFORMER DEPT.		
0036	PVF - PIPE VALVE FITTINGS DEPARTMENT		
0037	LIT - LGE JUST IN TIME DELIVERY		
0101	CANE RUN COMMON - GENERATION	CR	CR
0102	CANE RUN-LAND	CR	CR
0103	CANE RUN-LOCOMOTIVE	CR	CR
0104	CANE RUN-LOCOMOTIVE RAILCARS	CR	CR
0111	CLOSED 10/04 - CANE RUN 1 AND 2		CR
0112	CLOSED 12/04 - CANE RUN UNIT #1		CR
0121	CLOSED 12/04 - CANE RUN UNIT #2		CR
0131	CANE RUN 3 - GENERATION	CR3	CR
0141	CANE RUN 4 - GENERATION	CR4	CR
0142	CANE RUN-SO2 UNIT 4	CR4	CR
0151	CANE RUN 5 - GENERATION	CR5	CR
0152	CANE RUN-SO2 UNIT 5	CR5	CR
0161	CANE RUN 6 - GENERATION	CR6	CR
0162	CANE RUN-SO2 UNIT 6	CR6	CR
0171	CANE RUN GT11	CRGT11	CRGT11
0172	CANE RUN 7	CR7	CR7
0190	DISTRIBUTION DRIVE	DD	LGEC
0201	MILL CREEK COMMON - GENERATION	MC	MC
0202	MILL CREEK-LAND	MC	MC
0203	MILL CREEK-LOCOMOTIVE	MC	MC
0204	MILL CREEK-LOCOMOTIVE RAILCARS	MC	MC
0211	MILL CREEK 1 - GENERATION	MC1	MC
0212	MILL CREEK-SO2 UNIT 1	MC1	MC

Location	Description		
0221	MILL CREEK 2 - GENERATION	MC2	MC
0222	MILL CREEK-SO2 UNIT 2	MC2	MC
0231	MILL CREEK 3 - GENERATION	MC3	MC
0232	MILL CREEK-SO2 UNIT 3	MC3	MC
0241	MILL CREEK 4 - GENERATION	MC4	MC
0242	MILL CREEK-SO2 UNIT 4	MC4	MC
0301	TRIMBLE COUNTY COMMON-GENERATION	TC	TC
0310	TRIMBLE COUNTY-LAND	TC	TC
0311	TRIMBLE COUNTY 1 - GENERATION	TC1	TC
0312	TRIMBLE COUNTY-SO2 UNIT 1	TC1	TC
0321	TRIMBLE COUNTY 2 - GENERATION (CAPITAL ONLY)	TC2	TC
0322	TRIMBLE COUNTY - SO2 UNIT 2	TC2	TC
0351	TRIMBLE COUNTY - 25% PORTION N/A	TCP	TC
0352	TRIMBLE COUNTY - IMEA PORTION	IMEA	TC
0353	TRIMBLE COUNTY - IMPA PORTION	IMPA	TC
0399	TRIMBLE COUNTY CLEARING (ACCTNG)	TCC	TC
0401	LGE GENERATION - COMMON	LGEC	LGEC
0402	FUTURE BASE LOAD UNIT		GR5
0410	ZORN	ZORN	ZORN
0420	WATERSIDE COMMON	PR13	PR
0421	WATERSIDE GT 7		PR
0422	WATERSIDE GT 8		PR
0429	PADDY'S RUN COMMON	PR	PR
0430	PADDY'S RUN GT 11	PR11	PR
0431	PADDY'S RUN GT 12	PR12	PR
0432	PADDY'S RUN GT 13	PR13	PR
0440	CANAL	CANAL	CANAL
0441	PADDY'S RUN GENERATION STATION	PR	PR
0450	OHIO FALLS	OF	OF
0451	OHIO FALLS-PROJECT 289	OF	OF
0459	CLOSED 03/08 - BROWN COMBUSTION TURBINE #5		BR CT

Location	Description		
0460	BROWN COMBUSTION TURBINE #6	BRCT6	BR CT
0461	BROWN COMBUSTION TURBINE #7	BRCT7	BR CT
0470	TRIMBLE COUNTY #5 COMBUSTION TURBINE	TC5	TCCT
0471	TRIMBLE COUNTY #6 COMBUSTION TURBINE	TC6	TCCT
0472	TRIMBLE COUNTY #5 AND 6 COMBUSTION TURBINE - COMMON	TC5&6	TCCT
0473	TRIMBLE COUNTY CT PIPELINE - CAPITAL ONLY		TCCT
0474	TRIMBLE COUNTY #7 COMBUSTION TURBINE	TC7	TCCT
0475	TRIMBLE COUNTY #8 COMBUSTION TURBINE	TC8	TCCT
0476	TRIMBLE COUNTY #9 COMBUSTION TURBINE	TC9	TCCT
0477	TRIMBLE COUNTY #10 COMBUSTION TURBINE	TC10	TCCT
0478	TRIMBLE COUNTY #5 - #10 COMBUSTION TURBINE - COMMON	TCCTC	TCCT
0479	TRIMBLE COUNTY #7&#8 - COMMON	TC7&8	TCCT
0480	TRIMBLE COUNTY #9&#10 - COMMON	TC9&10	TCCT
0499	INDIANA TRANSMISSION SUBS-ELECTRIC		
0500	KENTUCKY TRANSMISSION SUBS-ELECTRIC		
0501	BLUE LICK		
0502	CANAL		
0503	CLIFTY CREEK		
0504	NORTHSIDE		
0505	PADDY'S RUN		
0549	TC COMMON		
0551	BRANDENBURG		
0552	CRESTWOOD		
0553	STANDIFORD		
0661	CLOSED 11/06 - SIMPSONVILLE CONTROL CENTER		
0665	DIX SYSTEM CONTROL CTR. - LGE		
0697	GENERAL PLANT-ELECTRIC		
0698	KENTUCKY DISTRIBUTION SUBS-ELECTRIC		
0699	DISTRIBUTION LINES		
0709	FLINT HILL		
0710	CANMER		

Location	Description		
0711	MAGNOLIA STORAGE FIELD		
0712	MAGNOLIA STORAGE FIELD - DEEP		
0713	MULDRAUGH STORAGE FIELD		
0714	DOE RUN STORAGE FIELD		
0715	DOE RUN STORAGE FIELD - DEEP		
0716	CENTER STORAGE FIELD		
0721	MAGNOLIA COMPRESSOR STATION		
0723	MULDRAUGH COMPRESSOR STATION		
0797	KENTUCKY TRANSMISSION LINES-GAS		
0811	EAST SERVICE CENTER		
0812	SOUTH SERVICE CENTER		
0813	SEVENTH & ORMSBY		
0814	WEST SERVICE CENTER		
0815	JACKSON STREET		
0816	PARK BOULEVARD		
0901	LG&E CORPORATE HEADQUARTERS	Corp	LGEC
0902	BROADWAY OFFICE COMPLEX	Corp	LGEC
0903	ST. MATTHEWS CUSTOMER SERVICE		
0904	SOUTHERN CUSTOMER SERVICE		
0905	WESTERN CUSTOMER SERVICE		
0906	GENERAL PLANT-COMMON		
0907	SIMPSONVILLE DATA CENTER		
0999	KENTUCKY ADMINISTRATIVE		
1001	WKE FUELS DEPT GATEWAY AIR TRAVEL		
1003	WKE CONSIGNMENTS AT AMERICAN MINING		
1004	WKE CONSIGNMENTS AT ENERGY DOCK (FCD)		
1011	WKE - REID WAREHOUSE		
1015	WKE - STATION II WAREHOUSE		
1016	WKE - CITY OF HENDERSON STATION II WAREHOUSE		
1017	WKE - WKE STATION II (HMPL ONLY)		
1021	WKE - COLEMAN WAREHOUSE		

Location	Description
1031	WKE - GREEN WAREHOUSE
1060	WKE - WILSON WAREHOUSE
1080	WKE CORP (CASH)
1081	WKE SII (CASH)
1101	GREEN STATION BUDGET ONLY
1110	GREEN COMMON - GENERATION
1120	GREEN 1 - GENERATION
1121	GREEN 2 - GENERATION
1201	WILSON STATION BUDGET ONLY
1210	WILSON COMMON - GENERATION
1220	WILSON 1 - GENERATION
1301	REID/STATION TWO BUDGET ONLY
1306	REID STATION BUDGET ONLY
1310	REID COMMON - GENERATION
1320	REID 1 - GENERATION
1351	REID GAS TURBINE BUDGET ONLY
1352	REID GAS TURBINE
1401	COLEMAN STATION BUDGET ONLY
1410	COLEMAN COMMON - GENERATION
1420	COLEMAN 1 - GENERATION
1421	COLEMAN 2 - GENERATION
1422	COLEMAN 3 - GENERATION
1506	STATION TWO COMMON BUDGET ONLY
1507	STATION TWO WKE PORTION BUDGET ONLY
1508	STATION TWO CITY PORTION BUDGET ONLY
1510	STATION TWO COMMON - O&M
1511	STATION TWO REAGENT PREP
1512	STATION TWO WASTE TREATMENT
1513	STATION TWO TOTAL SCR
1514	STATION TWO M&S INV RESERVE ACCRUAL
1515	STATION TWO COMMON - G&A

Location	Description
1520	STATION TWO 1 - GENERATION
1521	STATION TWO 2 - GENERATION
1550	TOTAL STATION TWO TOTAL BEFORE ALLC
1551	STATION TWO O&M WKE PORTION
1552	STATION TWO CITY PORTION
1555	STATION TWO G&A WKE PORTION
1601	REID/SII SHARED
1602	REID/GREEN/SII SHARED
1603	GREEN/SII SHARED REAGENT PREP
1604	GREEN/SII SHARED WASTE TREATMENT
1630	TOTAL SII NOX SHARED BREC/WKE/CITY
1700	WKE CORP. TRANSFER TO LEM
1701	WKEC TRANSFER TO LEM
1720	WKE SII TRANSFER TO LEM
1997	ELECTRIC DISTRIBUTION LAND & LAND RIGHTS
1998	ELECTRIC TRANSMISSION LAND & LAND RIGHTS
1999	INDIANA TRANSMISSION LINES-ELECTRIC
2000	KENTUCKY TRANSMISSION LINES-ELECTRIC
2298	GENERAL PLANT-GAS
2299	DISTRIBUTION MAINS
2578	VARIOUS LOCATIONS - BUDGET ONLY
2999	KENTUCKY DISTRIBUTION SUBS-GAS
3001	INDIANA
3002	LOUISVILLE/JEFFERSON CO.
3003	KENTUCKY (EXCL JEFFERSON CO.)
3004	OHIO
4001	KLM - LEXINGTON METER DEPT.
4002	KLS - LEXINGTON SUBSTATION DEPT.
4003	KBR - BROWN STATION
4004	KDM - DANVILLE METER DEPT.
4005	KDS - DANVILLE SUBSTATION DEPARTMENT

Location	Description
4006	KDV - DANVILLE FACILITY
4007	KEA - EARLINGTON FACILITY
4008	KET - ELIZABETHTOWN FACILITY
4009	KGH - GHENT STATION
4010	KGO - GENERAL OFFICE FACILITY
4011	KPF - GO PANEL FABRICATION FACILITY
4012	KPR - PRO FACILITY
4013	KTG - GO TRANSMISSION FACILITY
4014	KGR - GREEN RIVER STATION
4015	KGF - GREENVILLE FACILITY
4016	KLX - LEXINGTON SERVICE CENTER
4017	KLD - LONDON FACILITY
4018	KTS - TYRONE GENERATING STATION
4019	KPV - PINEVILLE GENERATING STATION
4020	KMV - MAYSVILLE FACILITY
4021	KMW - MIDWAY FACILITY
4022	KMS - MOUNT STERLING FACILITY
4023	KNR - NORTON FACILITY
4024	KPR - PARIS FACILITY
4025	KPN - PINEVILLE FACILITY
4026	KPS - PINEVILLE SUBSTATION DEPARTMENT
4027	KRC - RICHMOND FACILITY
4028	KSV - SHELBYVILLE FACILITY
4029	KSY - SYSTEMS LABORATORY
4030	KEM - EARLINGTON METER DEPT.
4031	KES - EARLINGTON SUBSTATION DEPARTMENT
4032	KCR - CARROLLTON FACILITY
4033	KCV - CAMBELLSVILLE FACILITY
4034	KTR - EARLINGTON TRANSMISSION FACILITY
4035	KHR - HARLAN FACILITY
4036	KPT - PINEVILLE TRANSMISSION FACILITY

Location	Description
4037	KSO - SOMERSET FACILITY
4038	KWN - WINCHESTER FACILITY
4039	KPG - PENNINGTON GAP FACILITY
4040	KMG - MORGANFIELD FACILITY
4041	KDX - DIXON FACILITY
4042	KED - EDDYVILLE FACILITY
4043	KBW - BARLOW FACILITY
4044	KGL - KU GENERAL OFFICE FACILITY
4045	KGT - GO TRANSMISSION FACILITY
4046	KDT - DANVILLE TRANSMISSION FACILITY
4047	KGL - KU GO GLOVE LAB
4048	KSF - KU SEBREE FACILITY
4049	KSS - SOUTH SERVICE CENTER
4050	KLT - LEXINGTON TRANSMISSION
4101	LRT - LGE - RETIREMENT
4102	LNS - LGE - NON STOCK
4103	KRT - KU RETIREMENT FACILITY
4104	KU GO PRODUCTION
4501	EW BROWN INVENTORY
4502	EW BROWN COMBUSTION TURBINE INVENTORY
4503	EW BROWN CT PIPELINE INVENTORY
4504	GHENT INVENTORY
4505	GHENT HIGH SULFUR INVENTORY
4506	GHENT COMPLIANCE INVENTORY
4507	GREEN RIVER INVENTORY
4508	HAEFLING INVENTORY
4509	PINEVILLE INVENTORY
4510	TYRONE INVENTORY
4511	KU COAL INVENTORY - WKE WILSON PLANT
5100	KY DISTRIBUTION SUBSTATIONS
5130	KY DISTRIBUTION LINES

Location	Description		
5150	KY TRANS SUBSTATIONS		
5190	KY ADMINISTRATIVE		
5195	KY NONUTILITY		
5200	KY TRANSMISSION LINES		
5252	GHENT SCRAPER-657/68K1073		
5253	GHENT SCRAPER-637/65M625		
5254	GHENT SCRAPER-657/90Z99		
5255	GHENT DOZER-D9G/66A13240		
5256	GHENT DOZER-D9H/90V8944		
5257	GH SCRAPER-637E/1FB00573		
5258	GHENT LOADER - LIMESTONE		
5300	VA DIST SUBSTATIONS		
5330	VA DISTRIBUTION LINES		
5350	VA TRANSMISSION LINES		
5380	VA TRANS SUBSTATIONS		
5390	VA ADMINISTRATIVE		
5395	VA NON UTILITY		
5400	TENNESSEE DISTRIBUTION SUBSTATION		
5430	TN DISTRIBUTION LINES		
5450	TENNESSEE DISTRIBUTION LINES		
5591	KU GENERATION - COMMON	KUC	KUC
5601	TYRONE UNIT 1	TY1	TY
5602	TYRONE UNIT 2	TY2	TY
5603	TYRONE UNIT 3	TY3	TY
5604	TYRONE UNITS 1 & 2	TY1&2	TY
5605	TYRONE COMMON	TY	TY
5611	CLOSED 01/05 - GREEN RIVER UNIT 1		GR
5612	CLOSED 01/05 - GREEN RIVER UNIT 2		GR
5613	GREEN RIVER UNIT 3	GR3	GR
5614	GREEN RIVER UNIT 4	GR4	GR
5615	GREEN RIVER UNITS 1 & 2	GR1&2	GR

Location	Description		
5616	GREEN RIVER COMMON	GR	GR
5619	EW BROWN COMMON EXP (ALLOC)	BR	BR
5620	E W BROWN COMMON - STEAM	BR	BR
5621	E W BROWN UNIT 1	BR1	BR
5622	E W BROWN UNIT 2	BR2	BR
5623	E W BROWN UNIT 3	BR3	BR
5624	E W BROWN UNITS 1 & 2	BR1&2	BR
5625	E W BROWN UNITS 2 & 3	BR2&3	BR
5626	E W BROWN UNITS 1 & 3	BR1&3	BR
5627	E W BROWN UNIT 1 SCRUBBER	BR1	BR
5628	E W BROWN UNIT 2 SCRUBBER	BR2	BR
5630	E W BROWN STEAM UNITS 1,2,3 SCRUBBER	BR	BR
5632	E W BROWN-EQUIP COM. COMBUSTION TURBINE UNITS 4, 5, 6 & 7	BR CTs	BR CT
5633	E W BROWN-EQUIP COM. COMBUSTION TURBINE UNITS 8, 9, 10 & 11	BR CTs	BR CT
5634	E W BROWN COMBUSTION TURBINE UNIT 4	BR CTs	BR CT
5635	E W BROWN COMBUSTION TURBINE UNIT 5	BR CTs	BR CT
5636	E W BROWN COMBUSTION TURBINE UNIT 6	BR CTs	BR CT
5637	E W BROWN COMBUSTION TURBINE UNIT 7	BR CTs	BR CT
5638	E W BROWN COMBUSTION TURBINE UNIT 8	BR CTs	BR CT
5639	E W BROWN COMBUSTION TURBINE UNIT 9	BR CTs	BR CT
5640	E W BROWN COMBUSTION TURBINE UNIT 10	BR CTs	BR CT
5641	E W BROWN COMBUSTION TURBINE UNIT 11	BR CTs	BR CT
5642	E W BROWN-EQUIP ALL COMBUSTION TURBINE UNITS	BR CTs	BR CT
5643	CLOSED 01/07 - PINEVILLE UNIT 3	PN	PN
5644	CLOSED 01/07 - PINEVILLE UNITS 1 & 2		
5645	E W BROWN CT UNIT 9 GAS PIPELINE	BR CTs	BR CT
5646	E W BROWN CT UNITS 5, 8, 9, 10, & 11	BR CTs	BR CT
5650	GHENT UNIT 1 SCRUBBER	GH1	GH
5651	GHENT UNIT 1	GH1	GH
5652	GHENT UNIT 2	GH2	GH
5653	GHENT UNIT 3	GH3	GH

Location	Description		
5654	GHENT UNIT 4	GH4	GH
5655	GHENT UNITS 1 & 2	GH1&2	GH
5656	GHENT UNITS 3 & 4	GH3&4	GH
5657	GHENT COMMON	GH	GH
5658	GHENT UNIT 2 SCRUBBER	GH2	GH
5659	GHENT UNIT 4 RAILROAD CARS		GH
5660	GHENT UNIT 3 SCRUBBER	GH3	GH
5661	GHENT UNIT 4 SCRUBBER	GH4	GH
5691	DIX DAM	DIX	DIX
5692	CLOSED 04/06 - LOCK #7		
5693	HAEFLING UNIT 1	HF1	HF
5694	HAEFLING UNIT 2	HF2	HF
5695	HAEFLING UNIT 3	HF3	HF
5696	HAEFLING UNITS 1, 2, & 3	HF	HF
5697	PADDY'S RUN GENERATOR 13	PR13	PR13

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.2

Witness: Charles R. Schram

Q-2.2. Please refer to the response to Sierra Club DR 1-7 and to page 39 of the Resource Assessment in Volume III of the IRP. With regards to the Strategist modeling that the Companies performed as part of this IRP process:

a. State whether the simulation of "system dispatch and operation" assumed a projected price of energy against which the model evaluated whether to dispatch the Companies' generating resources

i. If not, explain how Strategist determined whether to dispatch the Companies' generating units, and produce any documentation of the price against which the Companies' generating units were dispatched against in the Strategist modeling.

ii. If so:

1. Identify the projected price of energy (in hourly, on-peak and off-peak, and/or annual terms) used in the Strategist modeling

2. Identify the source or basis for such projected energy prices, and produce any analyses, studies, or other documents upon which that projection is based.

3. State whether the Companies ran any modeling scenarios in which a lower or higher energy price projection was used.

a. If so, identify each such lower or higher energy price projection and produce any analyses, studies, or other documents upon which that projection is based.

b. If not, explain why not.

b. State whether the Strategist modeling evaluated the dispatch of the Companies' generating units on an hourly, monthly, or annual basis.

c. State whether in any of the Strategist modeling runs performed as part of this IRP, the model was allowed to select early retirement of any of the Companies' generating units.

   i. If so, identify in which runs such options were allowed to be selected.

   ii. If not, explain why not.

d. State whether in any of the Strategist modeling runs performed as part of this IRP, the model was allowed to select additional demand side management resources beyond those input into the model.

   i. If so, identify in which runs such options were allowed to be selected.

   ii. If not, explain why not.

A-2.2.

a. See response to Sierra Club Question No. 1.7. The simulation of system dispatch and operation did not assume a projected market price of energy.

   i. Strategist dispatches the Companies' generating units to meet native load energy requirements in a least cost manner. Dispatch decisions are based primarily on the generating units' fuel and variable operating costs. In the IRP analysis, generating units were not dispatched against a projected market energy price.

   ii. Not applicable.

b. Strategist evaluates the dispatch of the Companies' generating units on a weekly basis.

c. The model was not allowed to select early retirement of any of the Companies' generating units.

   i. Not applicable.

   ii. Please see the Companies' response to Sierra Club Question No. 1.11c. The Companies chose to evaluate potential for retirement using a 10% capacity factor threshold under the criteria stated in Section 4.2.1 of the 2014 Resource Assessment at page 39.

d. No additional demand side management resources were considered in Strategist.

   i. Not applicable.

   ii. The analysis assumed all economic demand side resources were reflected in the Companies' load forecast.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.3

Witnesses: Charles R. Schram/John N. Voyles, Jr.

Q-2.3. Please refer to the response to Sierra Club DR 1-15 and 1-16.

a. State whether capital and fixed O&M costs for existing generating units were factored into the calculation of the revenue requirements for any of the scenarios modeled as part of this IRP.

  i. If so, explain how such capital and fixed O&M costs for existing units were factored in.

  ii. If not, explain why not.

b. State whether capital and fixed O&M costs for existing generating units were factored in to assessing whether to retire one or more of the existing such units should be assumed.

  i. If so, explain how such capital and fixed O&M costs for existing generating units were factored in.

  ii. If not, explain why not.

A-2.3.

a. See the Companies' response to Sierra Club Question No. 1.6. Fixed O&M and capital costs were not factored into the calculation of revenue requirements for any of the scenarios modeled as part of this IRP.

  i. Not applicable.

  ii. Capital and fixed O&M for existing generating units are not impacted by the scenarios evaluated; therefore, they were not considered in the analysis.

b. Fixed O&M and capital costs were not considered when assessing whether to retire existing units.

   i. Not applicable.

   ii. See the Companies' response to Sierra Club Question No. 1.27.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.4

Witness: Charles R. Schram

Q-2.4. Please refer to the response to Sierra Club DR 1-7 and 1-8. State whether capacity prices played any role in the IRP.

a. If so:

i. Explain what role capacity prices played in the IRP.

ii. Identify the projected annual capacity price assumed in the IRP for each year of the analysis.

iii. Identify the source and/or bases for such capacity price projection, and produce any analyses, studies, or other documents supporting such projection.

b. If not:

i. Explain why not.

ii. Explain whether the Companies' existing generating units were assumed to have any capacity value and, if so, please identify such value.

A-2.4.

See response to Sierra Club Question No. 1.7. Given the nature of the IRP analysis, capacity price assumptions were not needed.

a. Not applicable.

b. i. See response above.

ii. A capacity value for the Companies' existing units was not estimated or necessary for this analysis.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.5

Witness: Charles R. Schram

Q-2.5. Please refer to the response to Sierra Club DR 1-11, stating that Brown unit 3 was designated as must-run in the modeling performed for the IRP.

a. In the Strategist modeling conducted for the 2014 IRP, for what periods of time was Brown unit 3 designated as must-run? Please respond with the days, weeks, and/or months of each year in which Brown unit 3 was designated as must-run.

b. In the Strategist modeling conducted for the 2014 IRP, when Brown unit 3 was designated as must-run, what was input as the minimum segment or minimum capacity at which Brown unit 3 must run?

c. In the Strategist modeling conducted for the 2014 IRP, when Brown unit 3 was designated as must-run, was Brown unit 3 available to be dispatched on an economic basis above its minimum load?

d. Did the company perform any modeling runs in which Brown Unit 3 was not designated must run?

   i. If so, produce the results of such modeling, if not already provided.

A-2.5.

a. E.W. Brown Unit 3 was designated as must-run in all hours for all years.

b. The minimum capacity modeled at E.W. Brown Unit 3 is 155 MW.

c. Yes.

d. No.

   i. Not applicable.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.6

Witness: Gary H. Revlett

Q-2.6. Please refer to the Companies' response to Sierra Club DR 1-14.

a. Please provide any comments submitted by LG&E and/or KU on or about December 1, 2014 to EPA on the proposed Clean Power Plan for existing EGUs.

b. Please provide any comments submitted by PPL on or about December 1, 2014 to EPA on the proposed Clean Power Plan for existing EGUs.

A-2.6.

a. The Companies filed this information with the Commission on December 12, 2014 as a supplemental response to Sierra Club Question No. 1.14(e).

b. See attached.

Arundhati Khanwalkar
PPL Services Corporation
Environmental Management Department
Two North Ninth Street (GENTW20)
Allentown, PA 18101-1179
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Submitted via e-mail and Electronic Submission to www.regulations.gov

December 1, 2014

Attention Docket ID No. EPA-HQ-OAR-2013-0602

Environmental Protection Agency, EPA Docket Center (EPA/DC), Mail code 28221T
1200 Pennsylvania Avenue NW
Washington, DC 20460
Email: a-and-r-docket@epa.gov, Attn: Docket ID No. EPA-HQ-OAR-2013-0602

Comments of PPL Corporation's Merchant Generation and Energy Marketing Companies (Referred to as "PPL Energy Supply" Herein) on Proposed Existing Source Performance Standards for Greenhouse Gas Emissions from Electrical Generating Units

PPL Corporation's merchant generation and energy marketing companies (referred to as "PPL Energy Supply" herein) – PPL Generation, PPL EnergyPlus, LLC; LLC; PPL Lower Mount Bethel Energy, LLC; PPL Ironwood, LLC; PPL Martins Creek, LLC; PPL Brunner Island, LLC; PPL Montour, LLC; PPL Montana, LLC; PPL Holtwood, LLC; PPL Susquehanna, LLC; PPL Bell Bend, LLC; and PPL Nuclear Development, LLC submit these comments on the proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units (EGUs) issued by the Environmental Protection Agency (EPA or Agency) in Docket No. EPA-HQ-OAR-2013-0602. 79 Fed. Reg. 34,830 (June 18, 2014). PPL Energy Supply owns or controls merchant generation assets in two states with a total generating capacity of 10,045 megawatts, including 9 existing fossil power plants in Pennsylvania and Montana.

Where appropriate, these comments also address issues raised by EPA's subsequently issued Notice of Data Availability (NODA) and Mass Computation Technical Support Document (TSD) that provided additional information and solicited comments on several topics raised by stakeholders subsequent to the Proposed Rule (together referred to herein as "Supplemental Proposals"). Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Notice of Data Availability, 79 Fed. Reg. 64,534 (Oct. 30, 2014) (NODA), and Translation of the Clean Power Plan Emission Rate-Based CO2 Goals to Mass-Based Equivalents, 79 Fed. Reg. 67,406 (Nov. 13, 2014) (Mass Computation TSD).

PPL Energy Supply fully supports responsible environmental regulation aimed at protecting public health and the environment in a cost-effective manner that provides appropriate protection for the economic well-being of the states and customers served by PPL Energy Supply and respects differences and challenges of compliance in both fully integrated and restructured states and markets. As discussed in these comments, the proposed guidelines envision dramatic changes to the ways in which electricity is produced, transmitted and consumed. PPL Energy Supply is concerned that EPA's Final Rule would penalize the good faith efforts of companies, states and consumers over the past decade and beyond to reduce greenhouse gas (GHG) emissions and to comply with other environmental regulations. PPL Energy Supply respectfully submits the detailed comments below to assist EPA in developing a Final Rule that is legally defensible, grounded in sound policy, and designed to promote regulatory certainty, which is critical for the long-term investment decisions that will need to be made by PPL Energy Supply and its peers in the power sector to comply with CO2 standards, as well as other environmental requirements.

PPL appreciates the opportunity to submit comments on the proposed rule for EPA's consideration. If you have any questions regarding these comments, please feel free to contact me at (610) 774-5466 or at akhanwalkar@pplweb.com.

Sincerely,

Arundhati Khanwalkar

PPL Services Corp.
Environmental Management Department
Two North Ninth Street (GENTW-20)
Allentown, PA 18101

Proposed Existing Source Performance Standards for Greenhouse Gas Emissions from Electrical Generating Units
EPA-HQ-OAR-2013-0602

Comments by PPL Generation, LLC; PPL EnergyPlus, LLC; PPL Brunner Island, LLC; PPL Montour, LLC; PPL Montana, LLC; PPL Lower Mount Bethel Energy, LLC; PPL Ironwood, LLC; PPL Martins Creek, LLC; PPL Holtwood, LLC; PPL Susquehanna, LLC; PPL Bell Bend, LLC; PPL Nuclear Development, LLC;

economic impacts of Building Block 2

IV. THE PROPOSED INTERIM STANDARDS ARE UNWORKABLE FOR BUILDING BLOCKS 1 AND 2

A. The Stringency Of The Proposed Rule's Interim Standards Requires Forced Retirements Of Coal Units By 2020

B. EPA Should Allow States To Establish A Moderated Compliance Path To Achieve Compliance With The Final Compliance Standards

V. BUILDING BLOCKS 3 AND 4 PENALIZE STATES LIKE PENNSYLVANIA AND MONTANA; THESE MEASURES SHOULD NOT BE PART OF BSER

A. The Proposed Rule Improperly Places A Greater Burden On States That Have Invested In Renewable Energy, Zero-Emitting Energy Including Baseload Nuclear and Hydropower Generation, And Energy Efficiency

1. Problem 1: Using existing RE and EE to set targets
2. Problem 2: Requiring early actors to meet more stringent interim standards sooner than late actors
3. Problem 3: The regionalized approach to RE proposed in the NODA does not resolve many of the challenges identified in EPA's proposed and alternate approaches
4. Problem 4: Imposing Specific EE Standards in States with Merchant Generation Is Particularly Problematic

B. EPA Should Give Credit For Early Investments In Renewable Energy, Zero-Emitting Energy Including Baseload Nuclear And Hydropower Generation, And Energy Efficiency By Properly Adjusting The Baseline Period

C. EPA Should Provide Consistent Credit To All Forms Of Zero-Emitting Generation, Including Baseload Nuclear and Hydropower Generation, And Not Include Any Of Them In Standard-Setting

VI. IMPLEMENTATION ISSUES

A. States Do Not Have Sufficient Time To Draft And Implement Compliance Plans

1. EPA is not proposing enough time for states to develop their plans
2. Implementation of SIPs will take longer than the time allocated by EPA

B. EPA Must Defer To States' Determination Of A Satisfactory Compliance Plan

1. EPA should allow states the discretion to develop individualized plans that establish state-specific criteria and state-specific compliance paths

2. EPA must approve state plans unless they are arbitrary or capricious

VII. COMPLIANCE

A. EPA's Mass-Based Conversion TSD Should Clarify That The Examples Provided Are Not The Only Appropriate Methods States Can Adopt

B. EPA Should Use A Multi-Year Baseline To Address Anomalies

C. EPA Should Expressly Allow States To Use A Hybrid Approach And Count New NGCCs Towards Compliance

D. EPA Must Allow Time For Construction Of New Generation

VIII. CONCLUSIONS

I. INTRODUCTION & EXECUTIVE SUMMARY

A. Introduction

PPL Corporation's merchant generation and energy marketing companies (referred to as "PPL Energy Supply" herein) – PPL Generation, PPL EnergyPlus, LLC; LLC; PPL Lower Mount Bethel Energy, LLC; PPL Ironwood, LLC; PPL Martins Creek, LLC; PPL Brunner Island, LLC; PPL Montour, LLC; PPL Montana, LLC; PPL Holtwood, LLC; PPL Susquehanna, LLC; PPL Bell Bend, LLC; and PPL Nuclear Development, LLC submit these comments on the proposed *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units* (EGUs) issued by the Environmental Protection Agency (EPA or Agency) in Docket No. EPA-HQ-OAR-2013-0602. 79 Fed. Reg. 34,830 (June 18, 2014).[1] PPL Energy Supply owns or controls merchant generation assets in two states with a total generating capacity of 10,045 megawatts, including 9 existing fossil power plants in Pennsylvania and Montana.

Where appropriate, these comments also address issues raised by EPA's subsequently issued Notice of Data Availability (NODA) and Mass Computation Technical Support Document (TSD) that provided additional information and solicited comments on several topics raised by stakeholders subsequent to the Proposed Rule (together referred to herein as "Supplemental Proposals"). *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Notice of Data Availability*, 79 Fed. Reg. 64,534 (Oct. 30, 2014) (NODA), and *Translation of the Clean Power Plan Emission Rate-Based CO2*

[1] EPA subsequently extended the comment deadline to December 1, 2014. *See Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, 79 *Fed. Reg*. 57,492 (Sept. 25, 2014).

Goals to Mass-Based Equivalents, 79 Fed. Reg. 67,406 (Nov. 13, 2014) (Mass Computation TSD).

EPA's proposed §111(d) guidelines for existing steam EGUs and combustion turbines (CTs) set state-specific carbon dioxide (CO2) emission rate standards that must be achieved by 2030, with an interim emission rate standard that must be achieved over the period from 2020-2029. *See* 79 Fed. Reg. at 34,836-37. As required by the Clean Air Act (CAA), these standards must reflect the emission rates that are achievable through the use of the "Best System of Emission Reduction" (BSER) that has been "adequately demonstrated." *See* CAA §111(a)(1).

EPA's proposed BSER is the combination of four "Building Blocks." These building blocks, which form the basis of proposed state-specific interim and final emission rate standards, quantify reductions from affected fossil-based units, as well as emission reductions that could be achieved through increased dispatch of existing natural gas combined cycle units (NGCCs), use of existing and increased deployment of new renewable generating technologies, the preservation of some existing nuclear units and decreases in overall electricity usage and demand as a result of expanded end-use efficiency programs. *See* 79 Fed. Reg. at 34,836. EPA asserts that it is reasonable to base state standards on reductions beyond those that could be achieved at affected units because of the interconnected nature of the power system. *Id.* at 34,880.

EPA's novel "systems" approach to BSER in the proposed guidelines raises legal questions about EPA's authority to base standards for existing units on reductions that can only be achieved by including in the program units not regulated under the CAA and through changes in the end-use of a product. Because EGUs cannot, on their own, achieve the level of reductions necessary to comply, the proposed guidelines effectively require states, utilities owning EGUs, and, in many cases, consumers and organizations that are totally unrelated to an existing EGU, to undertake new programs and measures to meet EPA's proposed standards. Never before have the BSER provisions of the CAA been applied to authorize EPA to regulate states and markets in this way; EPA is, in effect, legislating these changes which they do not have the authority to do.

PPL Energy Supply fully supports responsible environmental regulation aimed at protecting public health and the environment in a cost-effective manner that provides appropriate protection for the economic well-being of the states and customers served by PPL Energy Supply and respects differences and challenges of compliance in both fully integrated and restructured states and markets. As discussed in these comments, the proposed guidelines envision dramatic changes to the ways in which electricity is produced, transmitted and consumed. PPL Energy Supply is concerned that EPA's Final Rule would penalize the good faith efforts of companies, states and consumers over the past decade and beyond to reduce greenhouse gas (GHG) emissions and to comply with other environmental regulations. PPL Energy Supply respectfully submits the detailed comments below to assist EPA in developing a Final Rule that is legally defensible, grounded in sound policy, and designed to promote regulatory certainty, which is critical for the long-term investment decisions that will need to be made by PPL Energy Supply and its peers in the power sector to comply with CO2 standards, as well as other environmental requirements.

B. Executive Summary

PPL Energy Supply's comments are premised on the following four principles:

1. States, not EPA, should determine BSER for the state, using a representative baseline period.
2. If EPA is to set BSER standards, EPA's proposed Building Blocks 3 and 4 (dealing with renewable energy (RE), existing nuclear capacity, and demand-side energy efficiency) should not be part of the standard-setting process, and early actors should not be penalized for their leadership in these areas.

3. If EPA is to set BSER standards, the interim standards should be eliminated and EPA must allow states, in concert with ISOs and RTOs, to develop their own moderated glide paths in order to avoid grid reliability and economic problems.

4. EPA's Final Rule should preserve compliance demonstration flexibility for rate- and mass-based plans, and single- or multi-state plans, as determined by states.

II. EPA'S PROPOSED STATE STANDARDS EXCEED ITS STATUTORY AUTHORITY UNDER §111(d)

PPL Energy Supply supports the comments filed by the Edison Electric Institute (EEI) and the Coalition for Innovative Climate Solutions (CICS) that explain in detail the limitations to EPA's authority under §111(d). Even if EPA could regulate power plants at all under this section,[2] it certainly cannot do so in the manner it has proposed. Fundamentally, EPA has usurped state authority to develop emission standards for existing sources, and instead is proposing to establish a standard for each state that EPA believes is reflective of the BSER in the state, and to include in the BSER calculation "anything that reduces the emissions of affected sources." 79 Fed. Reg. 34,886.

A. EPA's Proposed Emission Standards Usurp State Authority

Implementation of §111(d) is based on the principle of cooperative federalism that underlies §110 and many other aspects of the CAA. EPA does not and cannot set national emission standards or establish the standards of performance for individual sources under this section, which would effectively be legislation through regulation. Instead, EPA is tasked only with the assignment to "establish a procedure" that the states can then rely on to set performance standards for existing sources in their state. 42 USC 7411(d)(1). The states rely on EPA's

[2] As a threshold matter, EPA lacks any authority under §111(d) to regulate existing EGUs because that source category is subject to regulation under §112 pursuant to EPA's Mercury and Air Toxics Standards. Source categories subject to regulation under §112 are expressly precluded from regulation under §111(d).

emission guidelines in preparing a plan submission, but are specifically allowed to consider "among other factors, the remaining useful life of the existing source." *Id.* EPA's Proposed Rule illegally usurps this authority of the states and sets BSER standards without allowing the states to do so and consider the cost of achieving reductions, non-air quality health and environmental impacts, energy requirements, and the remaining useful life of existing units.

Had EPA followed the directives in §111(d) and allowed the states to determine BSER, including allowing the states to consider remaining useful life, the states could have adequately considered the impacts of forced closures of fossil-fired units in which substantial investments have recently been made in environmental controls and other plant improvements – beyond the millions of dollars spent to operate and address normal wear and tear.

For example, since 2005 PPL Energy Supply has invested more than $2 billion dollars in scrubbers and other environmental upgrades at its Pennsylvania facilities, and more than $45 million for its share of environmental controls at its generating plants in Montana to meet requirements of the CAA and other environmental regulations, some ahead of schedule. To comply with EPA's MATS Rule and other pending federal and state environmental requirements, PPL Energy Supply is expecting to spend approximately $100 million in additional controls at these plants through 2018.

EPA's factual premise for usurping the state's role is based on its belief "that the issue of remaining useful life will arise infrequently in the development of state plans to limit CO2 emissions from affected existing EGUs." 79 Fed. Reg. at 34,926. This presumption is inaccurate, primarily because EPA focuses only on whether EGUs may be required to make substantial capital investments late in the useful life of an EGU and fails to recognize that many owners made prior investment decisions based on expected future operations. PPL Energy

Supply's plants in Pennsylvania and Montana, and others like them operating in competitive power markets, are not nearing the end of their useful lives. EPA's proposal, if implemented, could result in premature plant shut downs, translating into millions of dollars of sunk costs.

The forced retirement of coal-fired units will have particularly severe consequences for merchant generators like PPL Energy Supply. Because coal-fired assets would have very little salvage value, forced retirement of coal-fired generation could well mean bankruptcy and dissolution for many merchant plants, generating companies and ancillary services. For PPL Energy Supply's plants, it would certainly mean the loss of hundreds of jobs in rural areas where alternative employment is not so readily available. EPA has failed to adequately assess these impacts for proper public analysis and input. Further, EPA is not in a position to do this as thoroughly as the states can with their more detailed understanding of local generators, economies, and impacts. It is precisely for this reason that §111(d) leaves the task of setting BSER to the states rather than to EPA.

B. Even If EPA Can Set BSER Standards, Its §111(d) Jurisdiction Is Limited To Establishing Emission Standards For *Applicable Existing Sources*

EPA's approach to determining what constitutes BSER for existing fossil fuel-fired EGUs involved evaluating three groups of strategies that could purportedly reduce GHG emissions from EGUs: (1) reductions achievable by existing EGUs; (2) reductions achievable through redispatch to natural gas combined cycle (NGCC) units; and (3) reductions achievable through "other actions underway in the industry." 79 Fed. Reg. 34,857-58. The third group of strategies – which includes energy efficiency (EE) measures by end users – is clearly unrelated to any measures existing power plant owners/operators can control or undertake to reduce emissions, and therefore cannot be used by EPA or states to establish BSER.

The second group of strategies is also problematic – particularly in markets like Pennsylvania and Montana where merchant fleet owners like PPL Energy Supply do not control power plant dispatch. By relying on activities that are not controlled by the owners/operators of the affected sources, EPA impermissibly seeks to expand its regulatory authority under §111(d). EPA has no legal authority to encompass non-jurisdictional activities or sources within its BSER standard-setting analysis, and its reliance on the "integrated nature" of the power sector cannot create such authority where none exists.

EPA is a "creature of statute" and has "only those authorities conferred upon it by Congress." *Michigan v. EPA*, 268 F.3d 1075, 1081 (D.C. Cir. 2001). As EPA correctly notes, Congress has expressly limited the applicability of §111(d) to existing sources to which a standard of performance would apply if the existing source were a new source.[3] This parallel structure, in which standards of performance are derived for both new or existing affected sources within the relevant source category, demonstrates §111's focus on controlling emissions from "sources."

EPA's reliance on non-jurisdictional activities, such as residential conservation and production of non-emitting renewable electricity, to impose state limits that are not achievable by individual EGUs finds no support in §111(d). In fact, EPA's definition of BSER to include non-jurisdictional activities imposes no principled limit on EPA's authority under §111(d); EPA would be free to effectively mandate changes in any aspect of the power sector, and the overall

[3] Consistent with this requirement, §111(b) rulemakings regulating GHG from new and modified fossil fuel-fired electric generating units must be in effect before EPA has the authority to promulgate regulations for existing fossil fuel-fired EGUs under §111(d). Although EPA has proposed §111(b) rulemakings, *see* 79 Fed. Reg. 1430 (Jan. 8, 2014); 79 Fed. Reg. 34960 (June 18, 2014), the rules have not been finalized and will almost certainly be subject to legal challenge, generating uncertainty on the status and applicability of any §111(d) rulemaking. If those rules have not been issued or remain subject to legal challenge at the time EPA seeks to issue its Final §111(d) Rule for EGUs, the rules must be held in abeyance pending completion of the jurisdictional prerequisite.

economy, if such changes would arguably reduce electricity demand. As the United States Supreme Court recently reiterated, an EPA interpretation that "would bring about an enormous and transformative expansion in EPA's regulatory authority without clear congressional authorization" is facially unreasonable. *Utility Air Regulatory Group v. EPA*, 134 S.Ct. 2427, 2444 (2014).

C. EPA's Approach To BSER Includes Measures That States Themselves Do Not Have The Authority To Implement

Many of the reductions assumed by EPA in setting BSER fail to account for limitations on states' authority under the Federal Power Act (FPA).

1. <u>States with restructured energy markets, in particular, cannot redispatch electricity as EPA assumes</u>

An example of EPA's failure to account for limitations on state authority is the approach it takes to Building Block 2. Here, EPA assumes an automatic 70% redispatch of power from coal-fired plants to existing and under construction NGCC plants. However, in many states – such as Pennsylvania and Montana – the scheduling and dispatch of electricity is controlled by regional transmission organizations (RTO) and independent system operators (ISO). Given that electricity is dispatched by these independent organizations in these states and regions, Pennsylvania and Montana cannot unilaterally implement the proposed emissions standards under Building Block 2 without impermissibly intruding upon the exclusive jurisdiction of the Federal Energy Regulatory Commission (FERC) under the FPA.

The regulatory scheme governing the transmission and sale of power is a complex combination of both state and federal law. The FPA embodies Congress' attempt "to reconcile the claims of federal and local authorities and to apportion federal and state jurisdiction over the industry."[4] Under the FPA, FERC has exclusive jurisdiction over "the transmission of electricity in interstate commerce and the sale of such energy at wholesale in interstate commerce."[5] States retain jurisdiction only over retail sales of electricity, generating facilities, facilities used for local distribution, and facilities used for transmission of energy wholly consumed by the transmitter.[6] The federal scheme thus "leaves no room either for direct state regulation of the prices of interstate wholesalers of [energy], or for state regulations which would indirectly achieve the same result."[7]

To promote open and competitive markets, FERC encouraged the formation of RTOs and ISOs (System Operators).[8] System Operators "manage the flow of electric energy through the regional power grid, 'dispatching' energy in real time to where it is needed."[9] System Operators also facilitate "the interstate sales of electricity products, including energy and capacity, by managing marketplaces where those products may be exchanged."[10] Because the energy and energy capacity auctions determine the rates for the transmission and sale of energy in interstate commerce, they are subject to FERC oversight.[11]

[4] *Conn. Light & Power Co. v. FPC*, 324 U.S. 515, 531 (1945).

[5] 16 U.S.C. § 824(a); *see also Nantahala Power & Light Co. v. Thornburg*, 476 U.S. 953, 966(1986) (quoting *FPC v. S. Cal. Edison Co.*, 376 U.S. 205, 215-216 (1964)).

[6] *Niagara Mohawk Power Corp. v. FERC*, 452 F.3d 822, 824 (D.C. Cir. 2006).

[7] *N. Natural Gas Co v. Kansas Corp. Comm'n.*, 372 U.S. 84, 91 (1963) (citation omitted); *see also Pub. Utils. Comm'n v. FERC*, 900 F.2d 269, 274 n.2 (D.C. Cir. 1990) (internal quotation marks omitted) ("Even where state regulation operates within its own field, it may not intrude indirectly on areas of exclusive federal authority").

[8] Order No. 888 at 31,655, 31,854-55

[9] *PPL Energyplus et al. v. FERC*, No. 13-4330 at 14 (3d Cir. 2014); *N.J. Bd. of Pub. Utils. v. FERC*, 744 F.3d 74, 82 (3d Cir. 2014).

[10] *Id.*

[11] *Id.*

EPA summarizes Building Block 2 as "emissions reductions achievable through redispatch from affected steam EGUs to affected NGCC units."[12] The goal of Building Block 2 is to "displac[e] coal-fired steam and oil/gas-fired steam generation in each state by increasing generation from existing NGCC in that state toward a 70% target utilization rate."[13] While states retain some authority to adopt laws and regulations that promote utilization of certain types of generation facilities over others (*e.g.*, renewable portfolio standards), federal courts have consistently found the FPA preempted state laws that directly or indirectly impact the rates charged in wholesale markets administered by System Operators, including direct rate subsidies.[14] As a result, states like Pennsylvania will be unable to achieve the EPA's estimates of possible reductions under Building Block 2 without adopting laws and regulations that impermissibly intrude upon the exclusive jurisdiction of FERC.

2. <u>States cannot force retirement of generation facilities if the facilities must run to ensure system reliability</u>

Even if states were to adopt laws completely prohibiting production by certain types of generation facilities, states could not guarantee that those facilities would retire or cease to dispatch. Section 215 of the FPA grants FERC jurisdiction to promulgate and enforce mandatory "reliability standards" for the bulk-power system, a power that FERC has delegated to the North American Electric Reliability Corporation (NERC).[15] Reliability standards are requirements designed to ensure reliable operation of the bulk-power system.[16] If a generation facility proposes to retire, the relevant RTO must determine whether the retirement of that facility will

[12] *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, 79 Fed. Reg. 34830, 34856 (Jun. 18, 2014).

[13] *Id.* at 34851

[14] *See, e.g., PPL EnergyPlus v. Nazarian*, Nos. 13-2419, 13-2424 (4th Cir. 2014).

[15] 16 U.S.C. § 824o(b).

[16] 16 U.S.C. § 824o(a)(3).

result in the violation of a NERC reliability standard or otherwise jeopardize the reliable operation of the bulk-power system.

If the RTO determines that retirement of a facility will jeopardize the reliable operation of the bulk-power system, the RTO may require that the facility continue to operate. For example, a RTO may determine that a facility must continue to run for reliability purposes due to regional transmission limitations within a region (*e.g.*, load or generation pockets and transmission constraints), even though the region would theoretically have sufficient energy to meet demand if the facility was to retire. Similarly, an RTO may require a facility to continue running if it determines that the facility's retirement will result in the overload of transmission facilities or unacceptable voltage levels. As a result, states' ability to actually force retirement of certain facilities would be severely limited.

3. <u>States cannot mandate the interstate purchase and sale of electricity</u>

Building Block 2 of the BSER assumes that states can "substitute" the electricity produced by coal-fired steam and oil/gas-fired steam units with electricity produced by NGCC units through, essentially, preferential dispatch of NGCC units. Building Block 2 fails to consider what percent of electricity produced by NGCC facilities is currently committed through long-term sales contracts and, therefore, not available for dispatch. Insofar as the capacity of a NGCC facility is already committed through a long-term contract, states lack the authority to mandate that those facilities break existing contracts in order to dispatch and sell into the wholesale markets.

The FPA permits utilities to set rates with individual electricity purchasers through bilateral contracts, though these contracts must be filed with FERC before going into effect.[17] Under the filed rate doctrine, "interstate power rates filed with FERC or fixed by FERC must be given binding effect by state utility commissions determining intrastate rates."[18] When the filed rate doctrine applies to state regulators, it does so as a matter of federal pre-emption through the Supremacy Clause of the United States Constitution.[19] The filed rate doctrine "is not limited to 'rates' per se,"[20] but rather extends to non-rate terms and conditions.[21] As a result, states have no authority to require that NGCC facilities abrogate any existing contracts. In calculating possible reductions from Building Block 2, the BSER fails to document or account for the number of facilities whose electricity is entirely committed through such contracts.

III. EPA'S ASSUMPTIONS IN SETTING BSER STANDARDS ARE INVALID FOR BUILDING BLOCKS 1 AND 2

Even if EPA had the authority to develop BSER regulations for existing sources under §111(d), the assumptions it has made in doing so are invalid.

A. EPA's Assumptions On Heat Rate Improvements For Building Block 1 Are Invalid

1. <u>EPA incorrectly assumes that all existing coal-fired power plants can achieve an additional 6% heat rate improvement</u>

EPA erroneously assumed that a national average heat rate improvement would be appropriate to impose upon states with diverse coal fleets and grossly underestimated the cost of

[17] 16 U.S.C. § 824d(c), (d); *see also Morgan Stanley Capital Grp., Inc. v. Pub. Util. Dist. No. 1 of Snohomish Cnty.*, 554 U.S. 527, 531 (2008).

[18] *Nantahala*, 476 U. S., at 962.

[19] *Arkansas Louisiana Gas Co. v. Hall*, 453 U. S. 571, 581-582 (1981).

[20] *Nantahala*, 476 U.S. at 966 (holding that, under filed rate doctrine, a FERC-approved allocation of power preempted the North Carolina Utilities Commission's subsequent reallocation of power incident to its retail rate-setting authority).

[21] *See Duke Energy Trading and Mktg., L.L.C. v. Davis*, 267 F.3d 1042 (9th Cir. 2001).

heat rate improvements at existing coal-fired power plants. Lacking "detailed information on the unit-level, fine-grained drivers of net generating efficiency," EPA incorporated a national rather than a state heat rate improvement target into state standards.[22] Then, relying principally on one study conducted in 2009 by Sargent & Lundy, EPA concluded that the potential for heat rate improvements at existing coal-fired power plants ranges from "less than 5% to greater than 15%."[23] Without providing a justification for why a 6% reduction is the appropriate target for all existing coal-fired power plants within the range of potential heat rate reductions at model plants, EPA factored in a 2% heat rate improvement from equipment upgrades and a 4% heat rate improvement from best operating practices into state CO2 emissions reduction standards.[24] Finally, EPA assumed that the cost of a 6% heat rate improvement will be $100 per kilowatt on average nationally without providing a detailed explanation of how the agency arrived at the figure.[25]

The use of a single study and application of its general conclusions to every coal-fired power plant in the country, irrespective of age, class, type, fuel, maintenance history, upgrades or any other relevant factors is, on its face, arbitrary and capricious. It also denies states the ability to undertake considered rulemaking to consider the four factors that Congress intended the states to consider in establishing performance standards.

[22] EPA v.5.13 Base Case Documentation Appendix: Heat Rate Improvement Option (2013).

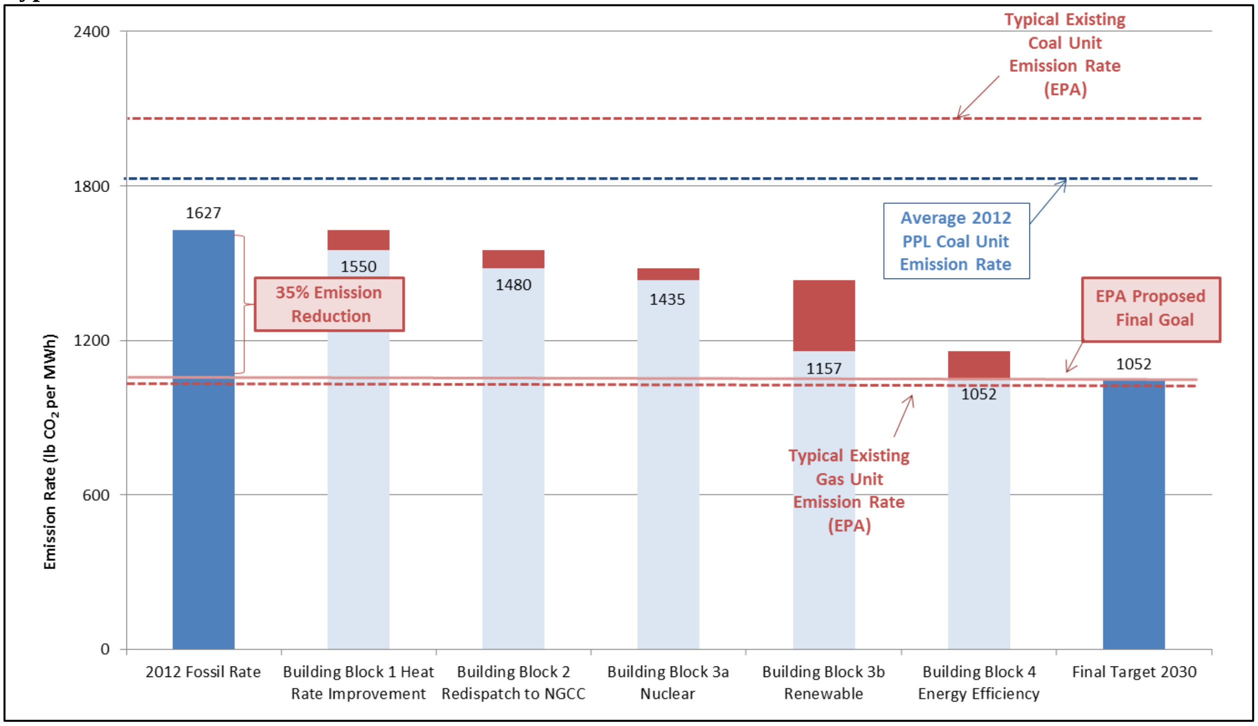
[23] *Id*.; Sargent & Lundy, Coal-fired Power Plant Heat Rate Reductions (2009), *available at* http://www.epa.gov/airmarkets/resource/docs/coalfired.pdf.

[24] EPA v.5.13 Base Case Documentation Appendix: Heat Rate Improvement Option (2013).

[25] EPA v5.13 Base Case Documentation Supplement to Support EPA's Proposed Carbon Pollution Guidelines for Existing Electric Generating Units 1 (2013); Regulatory Impact for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants 3-24 (2014).

EPA's assumptions on heat rate improvement are particularly flawed for plants in merchant markets like Pennsylvania's and Montana's. Over the past decade or so, PPL Energy Supply has already implemented all realistically achievable efficiency improvements at its coal-fired power plants in these states. We did so based on signals sent by the competitive market well before 2012. Without these improvements, our plants would have fallen lower on the dispatch order, which would have negatively impacted their profitability. Figure 1 below graphically demonstrates the point. PPL Energy Supply's coal fleet in Pennsylvania is substantially more efficient than most others in the industry. With those investments already made, very little additional improvement is available and only at a very high cost – significantly higher than the $100/MW assumed by EPA. Certainly such investment could not be justified in the current pricing environment in either Pennsylvania or Montana. Furthermore, the owners of existing coal-fired generation in restructured states would not find any such investment to be economic in light of the agency's assumed forced redispatch of coal plants in favor of more NGCC operation to achieve carbon emission targets.

Figure 1 - Pennsylvania Emission Rate Standard Calculation & Comparison to EPA and PPL Energy Supply Typical Coal Unit Emission Rate.



There is nothing in the docket or the proposal that allows us to conclude that EPA evaluated which, or how many, coal-fired power plants have already implemented best practices or have installed the types of equipment upgrades the EPA assumed can be installed to achieve a 6% improvement in heat rate. EPA should allow states to propose heat rate improvement targets that are appropriate for their coal-fired power plant fleets, taking into consideration the technological feasibility, cost and remaining useful life of each unit as §111(d) requires. Under no circumstance should EPA base the state emission rate standards on an arbitrary uniform heat rate improvement of 6% that is unsupported in practice or EPA's record.

2. <u>EPA incorrectly assumes that coal-fired power plants will maintain a heat rate improvement of 6%</u>

Another problem with EPA's use of a 6% heat rate improvement as part of its standard-setting process is that EPA incorrectly assumes that coal-fired power plants will maintain that level of heat rate improvement over the course of the 10-plus year performance period. The heat rate improvements that coal-fired power plants can achieve through the installation of new turbines, rotors, economizers, fans, and other such equipment necessarily will decline over time. Such declines are due to natural degradation of new equipment, installation of new pollution control technologies that impose parasitic loads, and changes in the way that the power plant operates in response to market evolution and changing customer demands.

The heat rate at coal-fired generating units will gradually increase over time due to natural degradation of key steam and generation components. EPA assumes in its Proposed Rule that routine maintenance will offset natural degradation.[26] This assumption is unsubstantiated. The heat rate of coal power plants naturally deteriorates over time and is not fully offset by routine maintenance and cannot be addressed economically with new equipment.

Adding to the natural degradation of heat rate due to aging equipment is the significant degradation resulting from the installation of emissions control technologies. For example, the installation of wet limestone scrubbers at several of PPL Energy Supply's plants recently resulted in a parasitic load penalty of approximately 20 MW per station.

Finally, cycling coal-fired power plants erodes heat rate improvements and increases CO2 emissions rates. PPL Energy Supply is already experiencing this at its merchant coal plants as a result of low gas prices and market dynamics. See Table 1 below. By means of example, Pennsylvania's coal plants operated 14.7% less during 2012 than in 2005 at a CO2 emission rate that was approximately 13.5% greater. On average, Pennsylvania's coal plant heat rate rose by 10% as a result of the degradation and cycling discussed herein.

[26] *See* Documentation for EPA Base Case v.5.13 for the Integrated Planning Model 3-21 (2013).

Table 1 – Pennsylvania Generation & CO2 EmissionsData from Affected Sources in 2005 and 2012.

				Generation (MWh)		CO_2 Emissions (tons)		CO_2 Rate (lbs/MWh)		Capacity Factor	
PA	Generation (MWh)	CO_2 Emissions (tons)	CO_2 Rate (lbs/MWh)	NGCC	Coal	NGCC	Coal	NGCC	Coal	NGCC	Coal
2005	133,157,461	121,521,628	1,825	8,526,197	120,235,417	4,451,960	113,029,090	1,044	1,880	12.7%	73.6%
2012	139,212,406	116,966,573	1,680	50,028,719	87,052,562	22,552,383	92,863,656	902	2,134	59.6%	58.9%
	4.5%	-3.7%	-7.9%	486.8%	-27.6%	406.6%	-17.8%	-13.7%	13.5%		

*Note an additional 2,500 MW of coal retired from 2013-2014

EPA's Proposed Rule will materially exacerbate this phenomenon. Load-following units experience much higher heat rates as is evident by their typical heat rate curves (e.g., the best heat rate is at the top end of a unit's output).[27] Cycling of coal power plants reduces their efficiency, thereby increasing their heat rate and equipment wear and tear. Coal-fired power plants are more efficient when run at steady, high capacities than when cycled at low capacities. One reason that coal-fired power plants are more efficient running at high loads is that the same amount of electricity is required to run auxiliary equipment at high loads as low loads.[28] Another major reason that coal-fired power plants are more efficient at steady, high capacities than when cycled is that the plant operators have the opportunity to balance and optimize the equipment when the plant remains at a steady capacity. Operators must adjust the oxygen, temperature and pressure to achieve optimal heat rates.[29] Finally, coal-fired power plant equipment was not designed to handle the stress of the large temperature swings that occur during cold starts. Cycling at low capacities can lead to fatigue and creep, resulting in increased maintenance and repair. Load-following operation also creates more opportunities for component failure because of the thermal, mechanical, and electrical cycling of equipment and

[27] *See* EPA, Analysis of the Proposed Clean Power Plan, IPM Run Files, http://www.epa.gov/airmarkets/powersectormodeling/cleanpowerplan.html.

[28] *See* International Energy Agency, Power Generation from Coal 20 (2010).

[29] *See* János Beér, High Efficiency Electric Power Generation; The Environmental Role (Massachusetts Institute of Technology 2006), *available at* http://mitei.mit.edu/system/files/beer-combustion.pdf.

systems. For these reasons, the increase in heat rate caused by cycling will likely offset any heat rate improvement from equipment upgrades and best operating practices that may be realized directly following commissioning. EPA should recognize heat rate degradation and swings in this rulemaking as it has done in other rulemakings and analyses, such as the development of EPA Base Case v.4.10 for the Integrated Planning Model (IPM).

3. EPA's premise that these issues can be addressed in a state plan through "compensating" emission reductions is incorrect

EPA concludes that "even if relief is due a particular facility, the state has an available toolbox of emission reduction methods that it can use to develop a §111(d) plan that meets its emission performance goal on time." 79 Fed. Reg. at 34,926. However, there are not sufficient "compensating" reductions that would allow states to both consider potential adjustments for remaining useful life and the cost of compliance to meet their emission standards on schedule. In Pennsylvania, for example, the stringency of each Building Block leaves no cushion to overachieve in any of them to compensate for fewer reductions under Building Block 1. This problem is further exacerbated by EPA's development of state standards, which fail to recognize that electric transmission does not respect state boundaries. Both Pennsylvania and Montana, for example, are net exporters of electricity in regional power markets. Neither state has control over the demand for power from other states.

B. EPA'S Approach To Building Block 2 Is Seriously Flawed

Under Building Block 2, EPA requires states like Pennsylvania to redispatch up to 70% of their existing and under construction NGCC capacity, but provides no clear explanation for this capacity factor's selection or the methodology for operationalizing this capacity factor. EPA then determined each state's megawatts of NGCC capacity and applied the 70% capacity factor to these megawatts to determine the extent of the redispatch. PPL Energy Supply has two issues with EPA's approach to Building Block 2: 1) the use of a 70% capacity factor for existing and under construction NGCC is unsubstantiated; and 2) states operating in competitive energy markets cannot increase utilization without supporting market mechanisms and signals. If EPA left the standard-setting approach up to each state, and allowed time for market mechanisms to be developed and implemented, it is possible that Building Block 2 principles could be captured in state plans. However, EPA should recognize that such a coordinated state and regional power market redesign would be significantly complex and would require materially more time than the agency affords in the proposed compliance timeline.

EPA's suggestions advanced in the NODA with respect to Building Block 2 fail to address these issues and instead create additional problems. In the NODA, EPA proposed to expand the definition of the NGCC fleet to include co-firing or new NGCC units in a state's baseline. *See,* generally, 79 Fed. Reg. at 64,549-50. Doing so will only make state baselines even tighter and the ultimate standard even harder to achieve. Further, EPA proposed to modify the way it calculates state standards by imposing a minimum level of redispatch or redefining Building Block 2 by calculating it on a regional basis. To do so ignores the fact that every state and region has unique generation portfolio's that reflect specific energy demand requirements and resource availability.

1. <u>EPA overstates the amount of existing NGCC capacity available for redispatch</u>

The Proposed Rule overstates megawatts of NGCC capacity by determining the extent of redispatch based on nameplate/gross capacity. Generators cannot achieve nameplate capacity in real world conditions due to parasitic load. In addition, high and low ambient temperatures can further limit existing units' actual capacity during summer and winter months.

EPA acknowledges that capacity data accounting for weather/temperature conditions would be preferable, but states that it relied on nameplate capacity because "adjusted capacity by the hour/minute" was unavailable across the affected NGCC fleet.[30] This is not correct as EIA Form 860 reports summer and winter capacity and EPA's IPM model uses the data from Form 860.[31] EPA should utilize Forms 860 and 411 data to determine state NGCC capacity. Because the Proposed Rule inappropriately relies on nameplate capacity, it overestimates actual available net summer NGCC capacity for Pennsylvania by 1,374MW and net winter NGCC capacity by 999MW[32].

In determining the extent of the redispatch, EPA must also account for NGCC units that may be unavailable for redispatch because they are contractually committed to out-of-state service or availability. Plants with 10- to 15-year out-of-state power purchase agreements (PPA) would not be available for in-state redispatch as EPA presumes. Even where merchant units have not presently committed to out-of-state service or availability, such units have no obligation to serve in-state load. For these reasons, it is inappropriate to assume that capacity from merchant NGCC units will be available for redispatch.[33]

EPA's redispatch analysis must further consider the need for NGCC availability to support existing renewable energy (RE), as well as the new RE envisioned by the proposal.

[30] GHG Abatement TSD, at 3-6.

[31] *See* Documentation for EPA Base Case v.5.13 Using the Integrated Planning Model, at 4-2 (Nov. 2013), *available at* http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v513/Documentation.pdf.

[32] Nameplate and net summer/winter capacity data are obtained from 2012 EIA Form 860 reporting. *See* http://www.eia.gov/electricity/data/eia860/.

[33] As described above, forcing PPAs be to be dishonored would run afoul of the Contracts Clause. Further, where compliance would require PPA abandonment, credit markets would tighten causing economic impacts that EPA has not analyzed. *See* Ross Levine, *The Legal Environment, Banks and Long-Run Economic Growth*, 30 J. Money, Credit and Banking 596, 598 (1998) (discussing credit market consequences from dishonored contracts).

NGCC units are, and will continue to be needed to operate for peaking and intermediate load following to support intermittent renewable generation.[34] Gas-fired power plants are best suited to support variable renewable energy given their quick start-up times and high ramping capabilities. By failing to consider that much of the NGCC generation EPA presumes for redispatch is or must be committed to supporting existing and presumed renewable energy, EPA has overestimated available NGCC capacity.

EPA should adjust the megawatts of NGCC capacity it presumes are available for redispatch to account for the shortcomings in its capacity calculations. EPA should conservatively determine capacity based on net dependable summer NGCC capacity, and determine a metric to do so for the few instances where net summer capacity information is unavailable. EPA should then further reduce presumed NGCC capacity by accounting for permitting restrictions on operation, merchant NGCC capacity, and NGCC that is or must be available to support existing or future renewable energy.

2. EPA has not demonstrated that reliability constraints permit redispatch

EPA should consider whether state's NGCC fleets can reliably operate at a 70% capacity factor. EPA's justification that the current NGCC fleet is designed for and is demonstrably capable of reliable operation at 70% capacity is based on the NGCC fleet's average availability.[35] Such an analysis says nothing of the reliability during operation of units currently operating at a 70% or greater capacity factor for prolonged periods. A 70% capacity factor would change the purpose and design of the nation's NGCC fleet at large, and EPA must

[34] *See* 79 Fed. Reg. at 34,862–63.

[35] GHG Abatement Measures, at 3-14.

consider whether fleets by state or NERC reliability zones can operate reliably at such a capacity factor.

EPA should also analyze the reliability hurdles posed by the extensive NGCC reliance that the Agency contemplates. As NERC has pointed out in its recent Preliminary Reliability Assessment[36], EPA's proposal will result in changes in the resource mix and new dispatch protocols that require comprehensive reliability assessments to identify changes in power flows and electric reliability services including: (1) load and resource balance; (2) voltage support; and (3) frequency support. EPA has not undertaken these assessments.

For example, as the system experienced this past January during the polar vortex, the existing gas infrastructure can be extremely challenged to meet home heating demands, as well as peak gas-fired generation requirements. This problem will become ever more challenging as demand from gas-fired generation increases in the future.

3. EPA failed to analyze the Proposed Rule's state-level employment and other economic impacts of Building Block 2

The retirements that Building Block 2 in particular precipitates could have dramatic local economic impacts. For example, if any of our coal-fired plants were forced to shut down it would mean the loss hundreds of high-wage jobs in rural areas where there are few or no alternative employment options, devastating the local economies. Further, these areas would remain hard hit even if new NGCC facilities were constructed close by as the siting, permitting, financing and construction of NGCCs would take several years and require less than a third of the staff required to operate coal-fired power plants. Coal mine and craft labor job losses should also be expected.

[36] *Potential Reliability Impacts of EPA's Proposed Clean Power Plan;* North American Reliability Corporation; November 2014

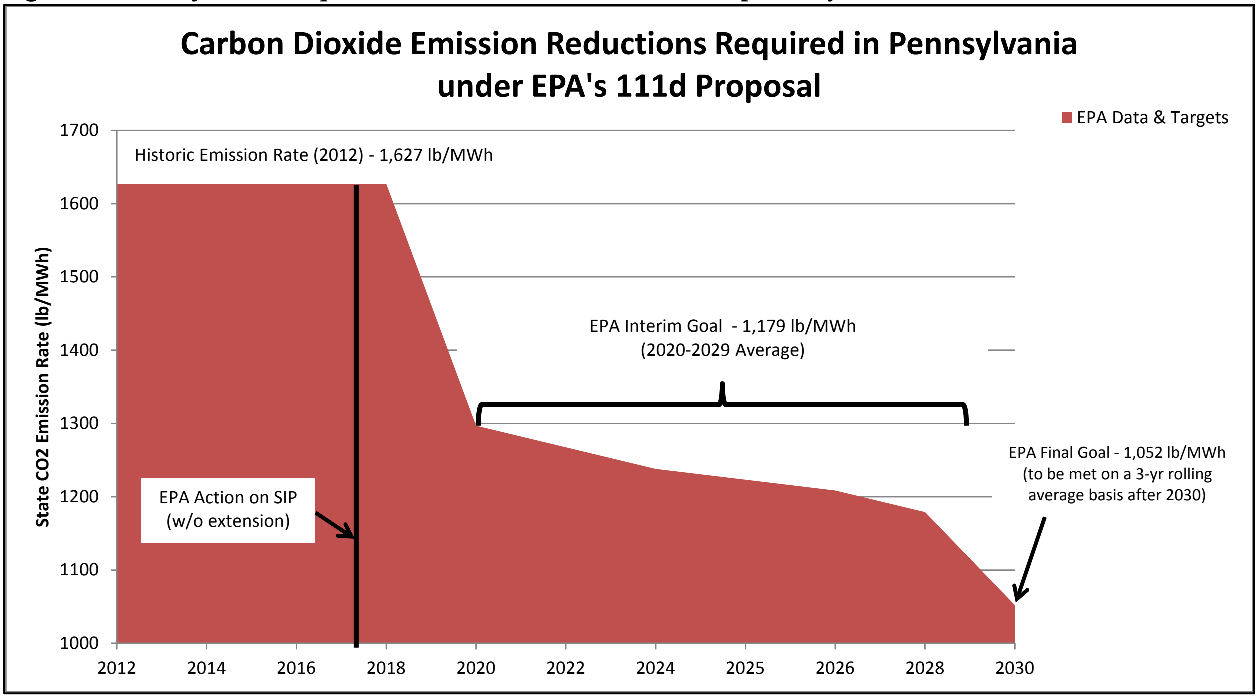
Despite the extensive local economic impacts caused by Building Block 2, EPA's Regulatory Impact Assessment (RIA) only analyzes national employment impacts. While the employment impacts from some aspects of the Proposed Rule may be felt across all states (e.g., demand-side energy efficiency), the employment impact from coal plant retirements assuredly would not. To appropriately analyze the Proposed Rule's economic impact, EPA should determine state-specific employment effects.

IV. THE PROPOSED INTERIM STANDARDS ARE UNWORKABLE FOR BUILDING BLOCKS 1 AND 2

A. The Stringency Of The Proposed Rule's Interim Standards Requires Forced Retirements Of Coal Units By 2020

To determine the interim standard for each state, EPA assumed that all emission rate reductions from Building Blocks 1 and 2 could be achieved at the start of the ten-year interim compliance period. As a consequence of this flawed assumption, for many states, almost all of the emission rate reductions that the Proposed Rule ultimately requires must be achieved in the first year of the ten-year interim compliance period as demonstrated by Figure 2 below.

Figure 2 – Pennsylvania Required CO2 Emission Reductions Proposed by EPA.



This demonstrates that Pennsylvania is left with little or no flexibility to determine a different compliance path to avoid the 2020 compliance cliff under EPA's proposed schedule for implementation. EPA intends to finalize the Proposed Rule in mid-2015, which means that the earliest state implementation plans would be approved by EPA is mid-2017. At most, this schedule leaves 2-and-a-half years for electric generating companies to achieve aggressive emission reductions and states to make sweeping changes to their existing regulations and electric generation, transmission, and distribution systems.[37] Given the stringency of the interim standards, the proposed implementation schedule will force states to rely on coal unit closures to achieve compliance. As discussed above, eliminating state's compliance flexibility runs afoul of §111(d)'s requirement that states be able to consider units' remaining useful life in complying

[37] States face numerous obstacles to making changes necessary to achieve compliance in such a short time frame. In particular, EPA has not provided adequate time for states to assess the adequacy of their resources and to permit and construct critical transmission and natural gas supply and transportation infrastructure.

with §111(d). Moreover, the constricted timeline will prevent states from cushioning economic impacts from retirements. All of this will have an adverse impact on grid reliability as discussed above.

B. EPA Should Allow States To Establish A Moderated Compliance Path To Achieve Compliance With The Final Compliance Standards

EPA should allow states to make the BSER determination of how much emission reduction is achievable through each building block over what time period. Under this approach, states would determine moderated compliance paths that achieve state-appropriate final emission rate goals by 2030 to be approved by EPA as required by the statute.

Allowing states to set tailored compliance paths would avoid the compliance cliff created by EPA's proposed interim standards. In most states, the resulting compliance trajectory would look like a series of steps—rather than a cliff—as states move toward compliance with their final standards. States have a strong economic incentive to implement emission rate reductions so as to avoid abrupt changes in their electric generating, transmission, and distribution systems. A smoother compliance path would be far less burdensome to state and local economies and still achieve the majority of the emission rate reductions targeted by the Proposed Rule.

This approach also would be more consistent with the text of §111(d), which places the responsibility for identifying and achieving reductions on the states— taking into consideration the cost of achieving reductions, non-air quality health and environmental impacts, energy requirements, and the remaining useful life of existing units. Further, §111(d) instructs EPA to establish a procedure for states to submit implementation plans similar to the procedure in §110, which instructs states to establish schedules and timetables for compliance. Potential objective criteria that EPA could use to evaluate state glidepath plans is included in Section VI.B.1 of these comments.

V. BUILDING BLOCKS 3 AND 4 PENALIZE STATES LIKE PENNSYLVANIA AND MONTANA; THESE MEASURES SHOULD NOT BE PART OF BSER

A. The Proposed Rule Improperly Places A Greater Burden On States That Have Invested In Renewable Energy, Zero-Emitting Energy Including Baseload Nuclear and Hydropower Generation, And Energy Efficiency

EPA's approach penalizes the significant efforts that states and companies have made over the past decade or more to reduce GHG emissions. As written, the Proposed Rule penalizes these states by: (1) using existing RE and zero-emitting generation, including a portion of each states existing baseload nuclear capacity, along with EE, to set more stringent standards; (2) requiring early-acting states to meet their more stringent interim standards sooner; (3) mandating out-of-market utilization of NGCC that was constructed to replace retired coal and legacy oil and gas units and to support higher levels of RE; and (4) requiring states that invested in EE to continue investing in these programs at a higher cost. This approach will impose greater costs on customers who already are paying for early reductions -- since their states already have harvested some of the lower-cost reduction opportunities -- while asking less of states where such opportunities still exist.

1. <u>Problem 1: Using existing RE and EE to set targets</u>

Based on EPA's calculations, both a lower baseline emission rate and high levels of RE and EE in the baseline year cause a state's ultimate performance standard to be more stringent. This is because EPA does not account for the coal-fired megawatts that already have been displaced by RE. For example, in Montana hydropower generation accounted for more than 40% of the state's total production in 2012. To the extent that such hydropower generation displaced fossil generation, the baseline emissions for Montana were already materially lowered.

2. Problem 2: Requiring early actors to meet more stringent interim standards sooner than late actors

EPA's proposed calculation methodology also requires early-acting states to meet more stringent interim standards, and on a faster timeline than they otherwise would have been required to meet.

Under the Proposed Rule, EPA determined a 2029 RE target for each state by averaging the 2020 renewable portfolio standards (RPS) of states in the same region.[38] 79 Fed. Reg. at 34,867. For example, Pennsylvania's RE target for 2030 was set at 16% based on existing RPS goals for 2020 in the East Central region as defined by EPA. In order to achieve that target, EPA applied an annual growth factor of 17% to Pennsylvania's RE capacity in 2012 each year starting in 2017, such that the 2018 RE goal would be the 2017 RE multiplied by 17%, the 2019 RE goal would be the 2018 goal multiplied by 17%, and so on.[39] *Id.* at 4-19.

The result of EPA's methodology for using regional annual growth factors to set interim and final standards is that states that had high levels of RE during the baseline period (*i.e.*, those that had taken early action to institute an RE program) are required to meet *more* stringent interim standards on a *faster* timeline. Therefore, Pennsylvania's reward for early action on RE is a more stringent final performance standard that must be reached in 2020.

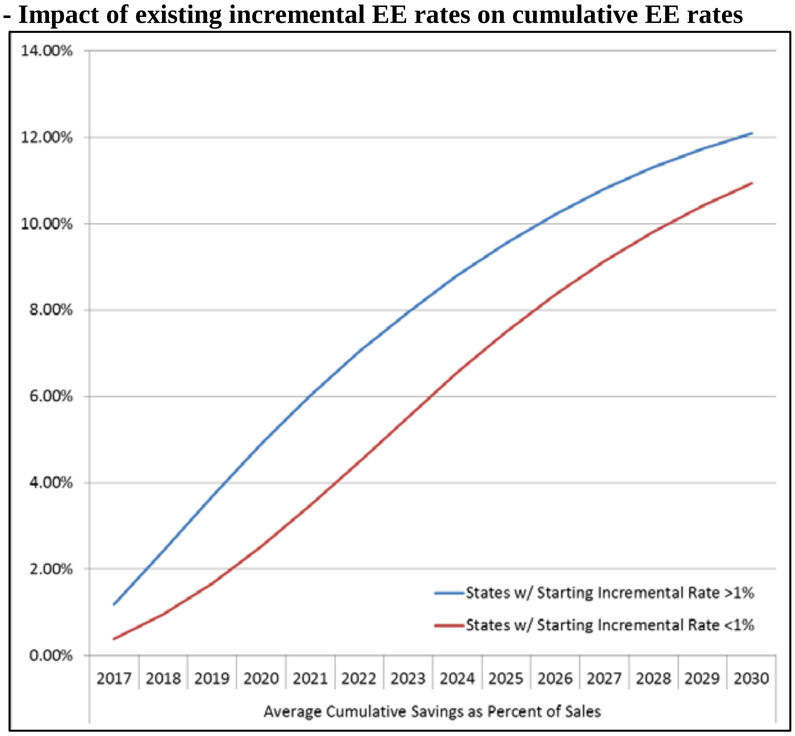
Similarly, existing EE is used to determine states' incremental and cumulative EE targets and the rate at which those targets are achieved. Specifically, existing EE determines: (1) how

[38] EPA's use of "regions" to determine RE targets is unreasonable. The methodology does not result in standards that logically reflect the amount of renewable resources in each state. For example, the South Central Region's standard is based on Kansas's RPS. No other states in the region have RPSs. If Kansas were not included in the region, the other states in the region would have an RE target of zero percent, or ten percent (using the methodology applied for Hawaii and Alaska).

[39] EPA incorrectly assumes that RE displaces all affected fossil generation in proportion to that generation's relative emission contribution. In fact, RE largely displaces only gas because coal does not follow load as closely. A megawatt of RE does not equal a megawatt of replaced coal because RE has a much lower and more variable capacity factor.

quickly a state will reach the proposed 1.5% annual EE improvement rate; and (2) a state's cumulative EE targets (because the cumulative EE targets depend on how quickly a state reaches the proposed EE improvement rate). *See* 79 Fed. Reg. at 34,872-73. EPA assumes that states with higher historic annual incremental EE levels will reach the proposed 1.5% incremental improvement rate sooner than states with lower historic annual incremental EE levels, resulting in higher cumulative EE savings levels for early-acting states. 79 Fed. Reg. at 34,872. See Table 2 below comparing the average cumulative EE savings levels of states with an existing EE incremental rate greater than 1% with the average cumulative EE savings levels of states with an existing EE incremental rate lower than 1%.

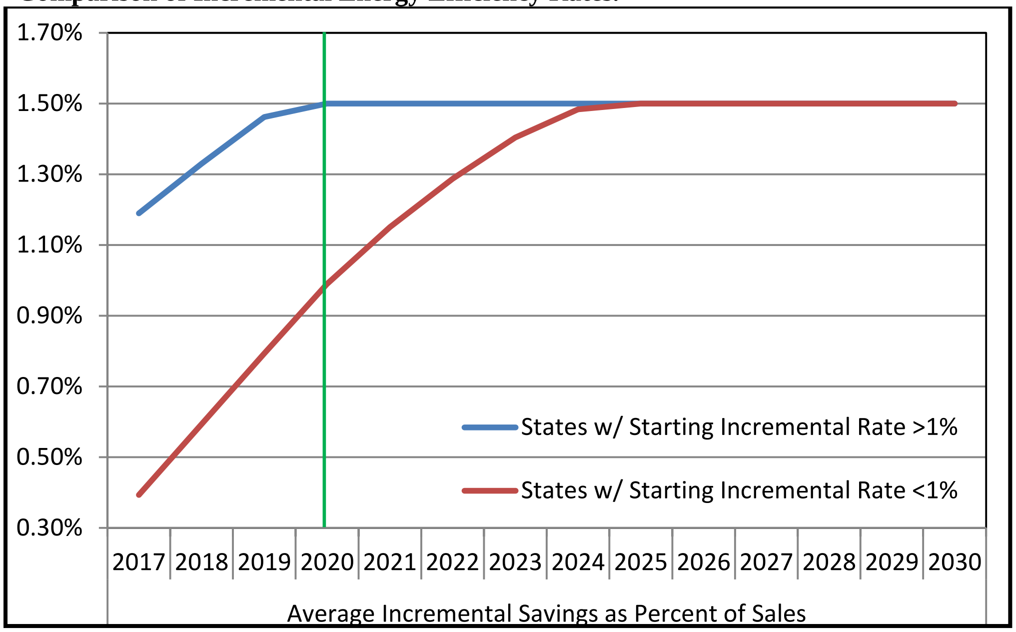
Table 2 - Impact of existing incremental EE rates on cumulative EE rates



Under Building Block 4, EPA adds the cumulative EE savings levels to the state's BSER calculation denominators. *See* Abatement TSD at 5-39. A higher cumulative savings level therefore results in a more stringent performance standard. This means that states that have historically high incremental EE levels are faced with more stringent final standards.

Imposing more stringent final standards on states that have historically high incremental EE levels means that these states will be faced with more stringent interim standards, which they will be unable to meet if they cannot attain the ever-increasing incremental EE savings that EPA assumes are achievable. Furthermore, the cost to achieve these higher levels of EE will be significantly higher for the early acting states as the less expensive options have already been captured. As explained above, EPA assumes that states with higher historic annual incremental EE levels will reach the proposed 1.5% incremental improvement rate sooner than states with lower historic annual incremental EE levels. 79 Fed. Reg. at 34,872. See Table 3 below comparing the average incremental EE savings levels of states with an existing EE incremental rate greater than 1% with the average incremental EE savings levels of states with an existing EE incremental rate lower than 1%. States with existing EE incremental savings rates greater than 1% begin the performance period with a 1.5% incremental savings rate, while states with lower starting EE incremental savings rates have a longer ramp-up period. If early-acting states are unable to continue increasing their EE savings by 1.5% per year, for the many reasons explained herein, they will be unable to meet their interim standards.

Table 3 - Comparison of Incremental Energy Efficiency Rates.



Moreover, there are limited opportunities for low-cost EE with existing technology. Utilities and states that have been leaders in harvesting energy savings historically are left with higher cost options to achieve additional savings; despite this, EPA assumes these states will continue to outperform states in which the "low hanging" efficiency opportunities still exist. Pennsylvania, for example, has already taken advantage of the most cost-effective EE measures, so the more stringent standards require it to spend materially more money on additional EE measures than states that have not already invested in EE. Not only does the Proposed Rule fail to reward Pennsylvania's investments, it punishes Pennsylvania by making Pennsylvania's standards more stringent.

3. Problem 3: The regionalized approach to RE proposed in the NODA does not resolve many of the challenges identified in EPA's proposed and alternate approaches

In the NODA, EPA recognizes the challenges associated with developing state RE targets, given the interstate exchanges of RE. See 79 Fed. Reg. 64,551-52. In response to these challenges, the NODA outlines an additional approach to calculating RE targets. The new approach establishes regional targets based on the renewable potential within a given region and apportions the responsibility of meeting that target to individual states in the region based on a criterion, such as 2012 retail sales of electricity. This approach would provide some additional flexibility within a region by allowing the apportionment of the targets in a manner that accounts for the fact that renewables may be built in one state, but serve load in another state. Challenges remain to implementing such an approach, however.

First, concerns regarding the regional nature of electricity would remain an issue with the NODA approach. EPA assumes that there will be regional compliance efforts and that states will be willing to engage in multi-state planning. However, the amount of time required to develop a regional approach is likely longer than what is afforded under the Proposed Rule. In addition, some states will have more of an incentive to participate in a regional approach than others. A state that is a net importer of RE will benefit from a regional approach that allows it to take credit for RE built in another state, but serves load within the importer state. In contrast, a net RE exporting state has little to no incentive to allow renewables produced in the exporting state to be counted elsewhere. While the regionalized approach attempts to recognize the interstate nature of electricity, individual state targets create complications. Individual states may find themselves winners or losers depending on if they are net importers or net exporters of RE.

Second, basing a target on technical potential evokes the same concerns whether the technical potential being calculated and used is state-specific or regional. Technical potential is not a suitable basis for establishing a target, as it has not been demonstrated that any state or region can actually achieve its assigned technical potential. Using technical potential in the target calculation fails to consider a number of critical factors including cost, permitting delays, lack of transmission, lack of firming generation, endangered species and other environmental concerns, competing land uses, local opposition to projects, etc.

Finally, it is difficult to assess how this approach would work without knowing what each state's RE target would be. The viability of a regionalized approach will depend on how the requirements for each state are apportioned. The NODA suggests that 2012 retail electricity sales could be one such criterion for apportioning state targets. See 79 Fed. Reg. at 64,551, n.12. While using this metric attempts to account for renewables built in one state to serve load in another, the problems described above remain. A net importer of RE will benefit from the apportionment, while a net exporter may not be able to take credit for generation that it has permitted, sited and built within its borders. These challenges must be addressed for any regional approach to be viable.

4. Problem 4: Imposing Specific EE Standards in States with Merchant Generation Is Particularly Problematic

EPA's approach penalizes, rather than rewards, states for their EE programs. It also fails to recognize that a standard that assumes achievement of a required level of EE is particularly problematic in states in which power generation, transmission and delivery are not all provided by a vertically integrated utility. In Pennsylvania, for example, the EE programs are implemented through funding provided to the utilities and administered by the Pennsylvania Public Utilities Commission under Act 129. However, the state implementation plan under §111(d) would be developed by the Pennsylvania Department of Environmental Protection (PA DEP) for the generators, and the PUC has no authority under Act 129 over these generators. The PA DEP cannot therefore require the utilities to undertake EE programs; it can, however, take credit for such programs when making Pennsylvania's compliance demonstration.

The marginal cost of expanding EE programs in states with existing EE programs will be much greater than the historic average program costs. Relying on the historic average cost of existing EE programs, EPA estimates that the net cost impacts for EE programs in 2020, 2025, and 2030 will range from $16-$24 per metric ton of CO_2 emissions. 79 Fed. Reg. at 34,875, 34,858. EPA assumes that containing the costs of EE programs is simply a matter of implementing best practices. 79 Fed. Reg. at 34,874. EPA fails to recognize that the marginal costs of expanding EE in states with existing EE programs will be much higher than historic costs because states and utilities have already taken advantage of the most cost-effective EE options. The major regulated state utility in Montana recently stated that their portfolio is at maximum capacity for RE and EE[40], so adding such resources will burden customers with additional costs for resources that are not even needed.

B. EPA Should Give Credit For Early Investments In Renewable Energy, Zero-Emitting Energy Including Baseload Nuclear And Hydropower Generation, And Energy Efficiency By Properly Adjusting The Baseline Period

EPA's failure to give appropriate credit for early action creates a harmful precedent. A program that fails to recognize efforts by states and companies to show leadership in reducing emissions will have the long-term "chilling" effect of discouraging states and companies from implementing beneficial environmental measures unless and until mandated by EPA. Equally important, consumers—the ratepayers and customers—of those companies, along with owners, already are paying for those investments. EPA could correct this by utilizing an earlier baseline period, or by explicitly giving states credit for early actions to reduce GHG emissions when they demonstrate compliance with their interim and final standards. Further, EPA could provide

[40] Northwestern Energy Company, Public Testimony at meeting discussing Montana Department of Environmental Quality 111(d) whitepaper, October 29, 2014

credit for early investments in EE by employing the same baseline electricity savings rate for all states. Finally, EPA should allow hydropower generation to be credited towards compliance.

An earlier baseline period would recognize and reward state and company leadership in reducing emissions. Displacement of fossil-fuel fired generation by early investments in RE, EE, and natural gas generation would not be "built in" to the standard calculation, so states that made these investments will not be assigned overly restrictive reduction standards and compressed compliance periods.

Finally, EPA should clarify that hydroelectric facilities under construction and hydroelectric uprates that occurred after the baseline period can count toward compliance. As written, the Proposed Rule could be interpreted to prohibit states from counting this hydroelectric generation toward compliance. The section of the preamble to the Proposed Rule that explains that RE, regardless of its installation date, can count toward compliance, expressly excludes hydropower. 79 Fed. Reg. at 34,869. The preamble later states that emissions reductions achieved after the date of the proposal pursuant to existing state programs can count towards future compliance. Id. at 34,918. That section excludes RE from this limitation (the "RE exception") such that all RE pursuant to an existing state program can count towards future compliance. Id., n.292. The justification for the exception is that existing RE was included in the BSER calculation. But EPA did not consider hydropower generation in the RE calculation. Id. at 34,867. This could be interpreted to mean that, since nothing expressly says that hydropower generation investments that were made between the baseline and the date of the proposal can count towards compliance, and the fact that the Proposed Rule is "forward looking" generally, hydropower generation that was produced during this period cannot count toward compliance.

However, this hydropower generation should be counted toward compliance to eliminate the disparate treatment of states and companies that invested in hydroelectric power.

C. EPA Should Provide Consistent Credit To All Forms Of Zero-Emitting Generation, Including Baseload Nuclear and Hydropower Generation, And Not Include Any Of Them In Standard-Setting

Renewable energy, nuclear energy and hydropower generation receive vastly different treatment under EPA's Proposed Rule. There is no logical reason to treat these zero-emission generation sources differently. EPA's proposal should be structured around the following two basic principles with respect to zero-emitting generation:

1. Avoided emissions from nuclear, renewables or hydro should have the same compliance value as emission reductions;

2. All zero-emission generation (nuclear, renewables, and hydro) should receive comparable treatment in that none of them should be included in the standard-setting process but can all be used to demonstrate compliance with the standard.

These principles are particularly important for nuclear power plants, which are uniquely valuable among carbon-free sources of electricity because they provide reliable baseload generation, producing very large quantities of carbon-free electricity compared to other carbon-free sources. EPA's proposal does not provide incentive for the preservations of a state's existing nuclear fleet, as EPA intended, because it has included a portion of that fleet in the state's emission reduction target. This presents a major challenge when/if the owner's of one or more of those plants decides to suspend its operation during the compliance period as a result of economic conditions or market dynamics. In this event, the state or generating companies would be forced to replace this generation with great or equivalent quantities of other zero-emitting resources on short order. These efforts would be further challenged by the siting, permitting, and infrastructure challenges discussed herein to bring new capacity online, thereby further stressing the grid.

The nation's nuclear generating capacity is licensed for an original 40-year license term, with an option (under the Atomic Energy Act) for license renewal for additional 20-year periods. Approximately three-quarters of the reactors operating today have received Nuclear Regulatory Commission (NRC) approval to operate to 60 years. Starting in approximately 2030, the existing nuclear generating capacity reaches the end of 60 years of operation. Although the industry and the NRC are now developing the framework for an additional 20-year license renewal (past 60 years), it is not certain that all of today's nuclear power plants will take advantage of this option.[41] Some of this capacity will likely seek a second license renewal to operate past 60 years, but some will not. (In fact, some of today's capacity will almost certainly not reach 60 years.) Additional capital investment will almost certainly be required to operate past 60 years and, in some cases, market conditions or other factors may not justify that capital investment.

This situation places a high premium on (1) preserving existing nuclear generating capacity by ensuring workable regulatory requirements for second license renewal (i.e., past 60 years), and (2) building new nuclear generating capacity to maintain, at a minimum, nuclear energy's current 20% share of the U.S. electricity supply.

The electric power industry and the federal and state governments must work cooperatively to put in place the policy instruments and financing support necessary to modernize the nation's electricity infrastructure, increase the use of zero-carbon or low-carbon resources, replace the nuclear reactors that do not reach 60 years or retire at the end of 60 years

[41] See Appendix I for a list of the nuclear reactors operating today, organized according to when they reach 60 years of operation.

of operation, and expand the size of the U.S. nuclear fleet beyond today's 100 gigawatts (GW) of capacity.

Absent such cooperation, nuclear energy's share of U.S. electricity supply will gradually decline, and U.S. energy and environmental goals will be seriously compromised. A continuing, growing contribution from nuclear energy is essential to produce baseload electricity at stable prices and to sustain reductions in emissions of carbon and other criteria pollutants.

These challenges require an integrated, internally consistent energy and environmental policy, involving both federal and state governments. The federal government could provide the leadership necessary to develop such an integrated policy, but energy policy and environmental policy remain balkanized, scattered among several Executive Branch agencies, each pursuing separate – and not necessarily consistent – objectives. EPA's Proposed Rule to reduce carbon emissions from existing power plants continues that pattern. If it is appropriate to reduce the electric power sector's carbon footprint, that objective should be part of a larger set of energy and environmental policy initiatives that provide the policy conditions necessary to achieve those carbon reductions.

VI. IMPLEMENTATION ISSUES

A. States Do Not Have Sufficient Time To Draft And Implement Compliance Plans

1. <u>EPA is not proposing enough time for states to develop their plans</u>

The Proposal requires states to submit plans to EPA by June 30, 2016, with the possibility of a one-year extension, to demonstrate how they will comply with the proposed interim and final CO2 emission rate standards. 79 Fed. Reg. at 34,838.[42] If the Final Rule is

[42] Where a multi-state plan is involved, the proposed deadline for submittal of the state plans to EPA is June 1, 2017. 79 Fed. Reg. at 34,838.

promulgated by June 1, 2015, as EPA has indicated, *see id*., this provides states with only 13 months to develop their plans. The 13 months between anticipated promulgation of the Final Rule and the deadline for submittal of a state plan is simply not enough time for a state to develop a plan for such a comprehensive and complex program that is expected to cover not only jurisdictional sources but all aspects of the electricity sector. EPA is requiring states to develop plans that, at the least, will be complicated, and, in many instances, will be controversial within the state and may require legislation to authorize and fund the appropriate regulatory agencies to undertake the needed analyses and develop the requisite regulations.

State legislatures simply will not be able to approve state plans that have such far-reaching impacts on their electricity sectors and economies within 13 months, particularly if additional authority must be granted to the state environmental agency or public service commission to implement the elements of the plan or where there is resistance to action. This is compounded by the fact that many state legislatures only meet for a few months during the year and still others do not even meet every year. For example, the state legislature of Montana only meets biennially.

Third, the state plan deadline does not provide states with sufficient time to engage with neighboring states and resolve issues that may affect the development of their state plans. For example, states will need to coordinate on which state receives credit for renewable generation when RE credits have been sold out-of-state. States may also wish to develop regional mass-based reduction programs and will need time to engage in the needed discussions.

Fourth, states will need to complete a public hearing as EPA requires, and satisfy any state requirements for public comments, hearings and other administrative processes. It likely will take a state several months to facilitate public comment on a draft plan, review the comments, and revise its state plan, all before the plan can be submitted to EPA, where there will be another round of public review and comment.

EPA's proposal to allow states to seek a one-year extension of the deadline to submit the plan will not provide sufficient relief to states. Under the Proposal, states granted a one-year extension would still be required to make an "initial submittal" by the June 30, 2016 deadline. 79 Fed. Reg. at 34,915-16. The option of making an initial submittal would not alleviate the burden on states to develop a plan quickly because EPA is proposing that the initial submittal be almost as substantial as a final plan. The "initial submittal" "must address all components of a complete plan, including identifying which components are not complete." *Id*. at 34,915. The plan should be a "comprehensive roadmap outlining the path to completion, including milestones and dates." *Id*. at 34,915-16. States must hold a public hearing on an initial submittal, the same as would be required for a final plan. *Id*. at 34,900, 34,915. An initial submittal also must be approved by EPA, although it is unclear from the Proposal what standards EPA would use to evaluate initial submittals. *Id*. at 34,916. Based on the requirements for an initial submittal, it does not appear to be a viable option to allow states more time to develop the elements of their final state plan. Further, even if EPA were to provide simplified requirements for initial submittals to make it a viable option, states taking advantage of this option would then have even less time between approval of a final plan by EPA and the 2020 interim standard deadline to implement the requirements of the final plan. As a result, the ability to submit an initial plan would do nothing to alleviate the disruption expected from the interim standard requirements.

EPA can provide states with more time to develop their state plans if it eliminates the interim standards so that measures do not have to be in place and enforceable by 2020. Instead, as discussed in Section III, EPA should allow states to develop interim plans to achieve incremental CO2 emissions reductions that are designed to lead to achievement of the final state standards and establish a deadline for submittal of state plans for final state standards that offers sufficient time for states to enact all required legislation, meet state administrative processes and avoid any disruptions in the state's electricity sector or economy.

2. Implementation of SIPs will take longer than the time allocated by EPA

Assuming that EPA approves state plans within 12 months of their submittal, between June 30, 2016, at the earliest, and June 30, 2017, at the latest, states must begin implementing their approved plans in mid-2017 or mid-2018. At that point, states would have, at most, only two-and-a-half years to fully implement their approved plans before the performance period begins in 2020.[43] This is simply insufficient time to implement the emissions reductions measures that will need to be included in state plans to achieve the steep reductions required by 2020 (i.e., the compliance cliff; see Figure 2), due to the magnitude of the changes needed and the implementation barriers states will encounter.

States that choose to develop a mass-based program also need significant time to devise and implement the program. Determining what the emissions cap should be and, where appropriate, how to allocate allowances and potential revenue from a cap-and-trade program will take a substantial amount of time. Then, it will take an additional period of time to allocate the allowances and to set up an emissions tracking and trading platform. Power plants will need sufficient time to determine their compliance strategy by adjusting their operations to meet their allowance allocations or identifying likely sellers of allowances. For example, even though

[43] Delays in approving state plans would allow states even less time to implement their plans. Given EPA's record on approval of SIPs under §110 of the CAA, it is doubtful whether EPA will be able to approve §111(d) plans within 12 months. EPA has taken years to take final action on some §110 SIPs. For example, in 2011, EPA had failed to act on 69 §110 SIPs within 12 months. *See* ECOS-SIP Reform. http://www.epa.gov/reg3artd/presentations/sad2014/plenary/SIP_Backlog_Present_SAD_Meeting_May_2014.pptx.

California signed a cap-and-trade program into law in 2006, the program did not take effect until 2012 – six years after the program was conceived. The few years between approval of state plans and the beginning of the interim standard compliance period provides insufficient time to develop and implement such complex programs.

B. EPA Must Defer To States' Determination Of A Satisfactory Compliance Plan

To be consistent with the delegation of authorities under the CAA as described in Section II above, EPA must provide states with broad discretion in developing plans that establish performance standards based on the unique characteristics of the states and sources within each state. This is particularly the case where, as here, EPA proposes to impose emission rate limitations on states that have wide ranging energy and economic implications that could result in significant loss of employment, and that force significant reallocation of resources. States are in the best position to develop state-based implementation plans, taking into account state-specific economic, energy, and environmental considerations. Indeed, only by giving the state's such discretion will the Proposed Rule be consistent with the congressional direction under §111(d).

1. <u>EPA should allow states the discretion to develop individualized plans that establish state-specific criteria and state-specific compliance paths</u>

As discussed in Section IV above, EPA has proposed interim emissions standards that are so stringent that many states will be required to achieve most of their CO2 emissions reductions by 2020. Given EPA's proposed timetable for the approval of state plans, this would leave states with, at most, approximately two-and-a-half years to implement required CO2 reduction measures; a task that will be extremely difficult or impossible to achieve without severe economic disruption and reliability concerns in many regions – including those in which PPL

Energy Supply operates. Rather than mandating enforceable interim standards, EPA should give states discretion to develop individualized plans for the 2020-2029 time period that establish programs and measures that set a state on a compliance path that will achieve compliance with their 2030 emission standards. In particular, EPA must allow each state to make its own determination as to which measures can be implemented on a time table that is manageable for the state, but leads to achievement of the 2030 standards.

In evaluating such interim state plans, EPA should consider certain procedural and substantive criteria. The procedural criteria would ensure that the plans are credible and enforceable, and the substantive criteria would ensure that the plans consider factors important to controlling CO2 emissions from the power sector. The criteria should serve as the basis for an inquiry into whether a state plan adequately demonstrates that it will lead to compliance, but should not be considered required elements for every state plan due to each state's different circumstances and the individualized nature of each state's final CO2 standards.

For example, in evaluating state plans, EPA should consider the following procedural criteria:

- Whether the plan was considered and approved in a public process allowing for comment from interested parties.
- Whether the plan includes proper BSER–based standards that are enforceable on existing sources.
- Whether the plan has an appropriate tracking and monitoring system in place and a mechanism to reopen or amend the plan at appropriate intervals.

- Whether the plan considered and took into account the retirement of EGUs prior to the baseline, and whether the state plan includes a mechanism to account for additional retirements.
- Whether the plan includes reasonable projections of future mass emissions from the covered units and/or reasonable projections of future emission rates for the state considering both covered and non-covered units. For example, does the plan project the construction of new, low-carbon or zero carbon generation? Does the state plan address what impact this new construction would have on the total mass emissions or emission rate for the state?
- Whether the plan requires monitoring and reporting of emissions from jurisdictional units on a periodic basis and the calculation of state progress toward the 2030 goal.

Substantive criteria that EPA could consider include:

- Whether the state Public Service Commission (PSC), or other entity, requires the electric distribution company to support, or achieve, certain levels of energy efficiency from retail customers, and whether the level or cost threshold for such programs is appropriate.
- Whether the state has a RPS, capacity standard, tax incentives or other renewable promotional programs; whether the state plan appropriately seeks to establish or expand such programs; whether the renewable portfolio standard is enforceable.
- Whether the state has adopted a mass emissions cap or goal applicable to existing fossil-fuel fired EGUs.

- Whether the state is participating in a multi-state emissions trading program designed to achieve CO2 emission reductions over the applicable time period and, if so, whether the plan is structured in a way that will allow it to achieve emission reductions or emission rate improvements.
- Whether other elements of the plan will help reduce CO2 emissions or the carbon intensity of the electricity supply.

Although PPL Energy Supply is not advocating that a state be required to include all of these criteria in its plan, nor is it advocating that EPA evaluate state plans using all of these criteria, a selection of these or similar substantive or procedural criteria will allow EPA to determine that a state is taking the appropriate, state-specific measures and steps to achieve reductions in CO2 emissions from existing EGUs. Importantly, using such an approach is consistent with the structure and intent of §111(d) to allow the states to set the performance standards for its own sources based on the unique circumstances of each state.

2. <u>EPA must approve state plans unless they are arbitrary or capricious</u>

Section 111(d) directs EPA to approve a state plan if it is "satisfactory." 79 Fed. Reg. 34,830; EPA, *Clean Power Plan Proposed Legal Memorandum* 3-4. EPA proposes to use a combination of four general criteria and twelve specific plan components set forth in the Proposal to determine whether a state plan is "satisfactory."[44] 79 Fed. Reg. at 34,909. Although

[44] The general criteria are: (1) enforceable measures; (2) emission performance; (3) quantifiable and verifiable emission performance; and (4) reporting and corrective actions. 79 Fed. Reg. at 34,909–11. The twelve specific plan components are: (1) identification of affected entities; (2) description of plan approach and geographic scope; (3) identification of state emission performance level; (4) demonstration that the plan is projected to achieve the state's emission performance level; (5) milestones; (6) corrective measures; (7) identification of emission standards and any other measures; (8) demonstration that each emission standard is quantifiable, non-duplicative, permanent, verifiable, and enforceable; (9) identification of monitoring, reporting, and recordkeeping requirements; (10) description of state reporting; (11) certification of state plan hearing; and (12) supporting material. 79 Fed. Reg. 34,830, 34,911-14.

EPA can use these criteria to judge the adequacy of state plans, EPA cannot second-guess state decisions on how to reduce CO2 emissions. *See* 40 Fed. Reg. 53,340, 53,343 (Nov. 17, 1975).

EPA must have a reasoned basis for disapproving a state plan in whole or in part. *See North Dakota v. EPA*, 730 F.3d 750 (8th Cir. 2013) (holding that EPA's refusal to consider existing pollution control technology in use at a plant because it had been voluntarily installed was arbitrary and capricious). EPA should not be able to disapprove a state plan because EPA would have chosen different measures or applied the building blocks in a different way.

VII. COMPLIANCE

A. EPA's Mass-Based Conversion TSD Should Clarify That The Examples Provided Are Not The Only Appropriate Methods States Can Adopt

Like EEI and CICS, PPL Energy Supply appreciates the release of EPA's TSD entitled "Translation of the Clean Power Plan Emission Rate-Based CO2 Goals to Mass-Based Equivalents," which provides examples of the ways in which a state may translate its rate-based standard into a mass-based standard. However, EPA should state explicitly in its Final Rule that these examples are not the only ways in which the conversion may be performed. The TSD states, "The concepts and considerations presented in this section should not be viewed as prescriptive; rather, these concepts represent one particular way of constructing an approach that is capable of translating the form of the rate-based goal to a mass-based equivalent." TSD at 3. While this conveys EPA's intent that states may use other methods to translate its rate-based standard to a mass-based equivalent, PPL Energy Supply requests that EPA state clearly in the Final Rule that the examples included in the TSD are not the sole options for mass-based emission limits, should not be interpreted as a cap on emissions if a state adopts a mass-based approach, and that states retain the authority to adopt other methods to translate their rate-based standards into mass-based limits. *See* Computation TSD, at 27 n.1, 30.

B. EPA Should Use A Multi-Year Baseline To Address Anomalies

In order to set realistic and equitable state goals, EPA must start with a baseline period for each state that is representative of actual generation and GHG emission levels in that state. The 2012 baseline period in the Proposed Rule is not necessarily representative in each state, in part because EPA did not correct for anomalous events that impacted total GHG emissions in that single year. A better approach would be to expand the baseline period from one year to five years in order to minimize the impact of anomalies that inevitably arise during a one-year period. Indeed, EPA must address certain anomalies that arose in 2012 to avoid the unfair and arbitrary impacts that penalize some states and/or companies.

Montana is a good example of this. Figure 3 and Table 4 below show a sudden spike in hydropower generation in 2011, and slightly less in 2012 but still substantially higher than the average of the previous 5 years.

The unusually high hydropower production experienced in the Pacific Northwest during 2012 resulted in unusually low fossil power generation. In that region, fossil resources dispatch only after all hydropower and wind resources have been fully allocated. Because of historically high hydropower available in 2012 along with reduced demand, Montana's coal fleet ran approximately 20% less in 2012 than the average from 2005-2010. By mandating emission reductions from the 2012 baseline, EPA's proposal unfairly lowers the baseline for Montana. Around the country, there are other examples of such anomalies in 2012, as would be the case for any single-year baseline.

Figure 3 – Montana Hydropower Generation from 2005 to 2012.

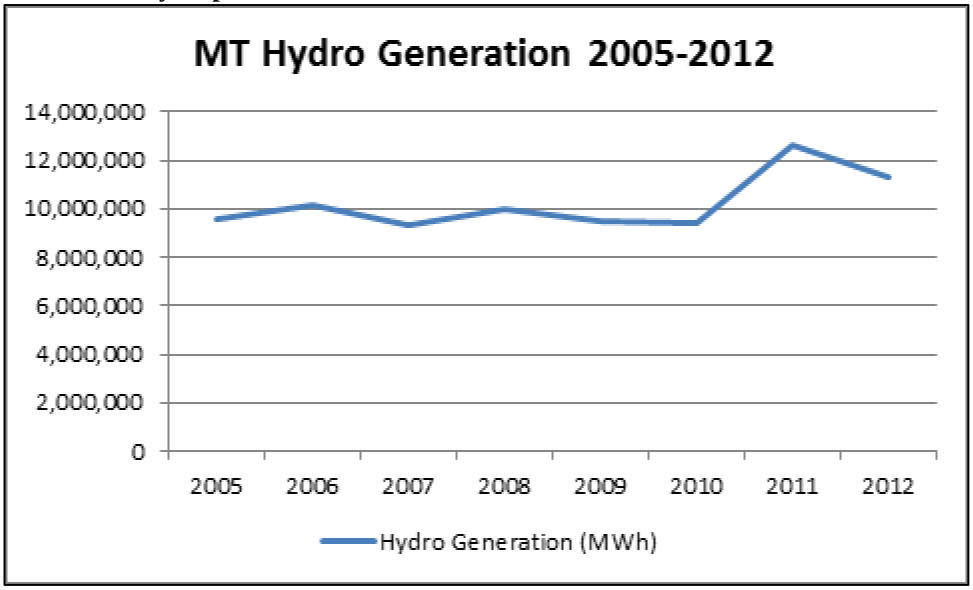


Table 4 – Montana Hydropower and Coal Generation form 2005 to 2012.

	2005	2006	2007	2008	2009	2010	2011	2012
Hydro Generation (MWh)	9,587,349	10,130,161	9,364,336	9,999,557	9,505,940	9,414,662	12,595,881	11,283,465
Coal Generation (MWh)	18,292,752	17,576,318	18,930,602	18,846,108	16,183,831	19,093,008	15,498,639	14,441,518
Total	27,938,778	28,243,536	28,931,493	29,637,137	26,712,735	29,791,181	30,128,543	27,804,783
Hydro % of Total Generation	34.3%	35.9%	32.4%	33.7%	35.6%	31.6%	41.8%	40.6%

A multi-year baseline period would smooth out these anomalies and accurately represent the natural variations inherent in the electric industry. While anomalous events occur every year, these events do not all have the same impact on operations and emissions. As a result, any single-year baseline period will not accurately represent normal operations of the energy industry. A multi-year baseline would better represent the natural yearly variation and, thus, better depict normal operations.

C. EPA Should Expressly Allow States To Use A Hybrid Approach And Count New NGCCs Towards Compliance

EPA should clearly and expressly allow states to use a hybrid approach that can include both mass-based and rate-based standards, in addition to allowing states to use new natural gas capacity in compliance demonstrations. An example of this approach could be as follows.

In Step One, a mass-based cap-and-trade program could be developed for existing fossil-fueled plants. The cap for this program could be based on annual average emissions from existing fossil-fueled plants from 2007 through 2012 reduced by an amount that reflects BSER for those plants, taking into account any heat rate improvements available to them (considering the cost of making such improvements, the remaining life of the plant, etc.) as more fully discussed in Section III. The cap-and-trade approach would allow those plant owners/operators to decide whether to make the heat rate improvements or simply run less (or shut down) if doing so would make an equivalent level of reduction at a lower rate.

In Step 2, the state would calculate an emission rate (in pounds per megawatt-hour) that the state would commit to achieve starting in 2030. The rate would be established by calculating the numerator to be the annual CO2 cap discussed above plus the projected annual emissions from new natural gas plants starting in 2030 and the denominator would be the projected annual megawatt-hours of generation in the state from all of these plants. When making its compliance demonstration, the state would also be allowed to include all forms of carbon-free generation (i.e. wind, solar, hydropower, and nuclear) in the denominator as an incentive to encourage investments.

Such an approach would provide states with an incentive to move to cleaner generation without either EPA or the state running afoul of the jurisdictional limitations discussed in Section II above.

D. EPA Must Allow Time For Construction Of New Generation

As described above, some state's emission rate standards can only be met through significant coal and oil/gas-fired steam plant retirements because of the building blocks stringency and implementation timeline. In such instances, additional NGCC resources will be needed to cover state electricity demand. For example, if PPL Energy Supply's Colstrip power plant were to retire to help Montana meet its CO2 reduction limits, significant reliability problems could be experienced without sufficient time to replace its generation. The major grid operator in Montana, Northwestern Energy Company, recently stated, "If we're going to significantly decrease or close portions or all of Colstrip, there's going to be significant reliability issues in Montana[45]". In addition to these reliability concerns, EPA and states must take into account associated local economy impacts, such as in this example where Colstrip is responsible for approximately 3,700 jobs, \$360MM of net income, and \$638MM of net output[46].

For states or regions requiring new generation to comply with Building Block 2, EPA must provide adequate time for the siting, planning, design, permitting, and construction of new generation resources and supporting infrastructure (e.g., new electricity transmission and gas pipeline). Siting and permitting transmission or pipeline on federal land can take 10 years or more. Moreover, nonattainment constraints close to load pockets can further limit NGCC facility citing. Emissions offsets, which are not readily available, are required to construct NGCC in nonattainment areas. Such projects are often delayed to allow for development of needed offsets through air quality control projects.

EPA has not provided states with sufficient time to comply with the proposed standards and meet demand through new generation. Despite the significant obstacles to developing new generation, at best states will have -two-and-a-half years to implement their compliance plans. Many states could have as little as 6 months to shift massive amounts of coal and oil/gas-fired steam generation to NGCC generation in order to satisfy the Proposed Rule's Building Block 2-

[45] *Testimony Before the Montana Public Service Commission of John Hines, Northwestern Vice President for Supply, November 13. 2014*.

[46] According to a 2010 report entitled *The Economic Contribution of Colstrip Steam Electric Station Units 1-4,* prepared by Patrick M Barkey, Ph.D and Paul E. Polzin, Ph.D.

focused interim standards. EPA must provide states with sufficient time to site, plan, design, permit, and construct the new generation and infrastructure required to comply with Building Block 2.

VIII. CONCLUSIONS

As previously stated, PPL Energy Supply's comments contained herein are premised on the following four principles:

1. States, not EPA, should determine BSER for the state, using a representative baseline period.
2. If EPA is to set BSER standards, EPA's proposed Building Blocks 3 and 4 (dealing with renewable energy (RE), existing nuclear capacity, and demand-side energy efficiency) should not be part of the standard-setting process, and early actors should not be penalized for their leadership in these areas.
3. If EPA is to set BSER standards, the interim standards should be eliminated and EPA must allow states, in concert with ISOs and RTOs, to develop their own moderated glide paths in order to avoid grid reliability and economic problems.
4. EPA's Final Rule should preserve compliance demonstration flexibility for rate- and mass-based plans, and single- or multi-state plans, as determined by states.

PPL Energy Supply appreciates the opportunity to submit comments on the Proposed Rule for EPA's consideration, and looks forward to continuing to work with EPA on this rulemaking.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.7

Witness: Charles R. Schram/John N. Voyles, Jr./Counsel

Q-2.7. Please refer to the Companies' response to Sierra Club DR 1-15.

a. Please provide the 2015 Business Plan referenced in the response to DR 1-15.

b. Please explain the purpose of the 2015 Business Plan.

c. Please identify the individual(s) who prepared the 2015 Business Plan.

A-2.7.

a. The Companies object to this request because it requests information irrelevant to this proceeding. The Commission's regulation concerning Integrated Resource Planning, 807 KAR 5:058, states in its Necessity, Function, and Conformity section, "This administrative regulation prescribes rules for regular reporting and commission review of load forecasts and resource plans of the state's electric utilities to meet future demand with an adequate and reliable supply of electricity at the lowest possible cost for all customers within their service areas, and satisfy all related state and federal laws and regulations." But the requested 2015 Business Plan contains data unrelated to the Companies' ability to provide adequate and reliable supplies of electricity at the lowest cost: human-resources data, information-technology data, natural-gas-utility data, financial-operations data, etc. As described in the Companies' response to part (b) below, the Companies' annual business plan is a comprehensive guide to how the Companies plan to run the entirety of their business; it is not a resource-adequacy plan, and therefore is not relevant to this case. Indeed, the sole reason for the Companies' reference to the 2015 Business Plan in their response to Sierra Club DR 1-15 was to identify the vintage of the fixed O&M and capital data the Companies were providing, not because the 2015 Business Plan contains other relevant data. Moreover, as the Companies noted in their response to Sierra Club DR 1-15, the fixed O&M and capital data Sierra Club requested and the Companies provided is not data the Companies used in the IRP, so the data was already of doubtful relevance. This request takes the matter one step too far, clearly exceeding the bounds of plausible relevance to the subject matter of this proceeding; the Companies therefore object.

But in the interest of comity, the Companies are providing in the attached documents more detailed data underlying the previously provided fixed O&M and capital information in lieu of providing the requested irrelevant information.

b. The business planning process allows us to:
- Provide managers a tool for the ongoing control of costs and responding to changes in operating conditions;
- Project earnings, which are used to evaluate the financial viability of the Company and to determine whether modifications to plans are needed to meet market expectations;
- Provide management with a platform to present estimated costs of meeting key performance indicators and other departmental goals through the operating plan review process;
- Provide a plan for accumulating financial resources to fund the operational plans;
- Provide management a tool for internal control that provides a base against which actual results can be compared and performance measured; and
- Provide management a tool to help ensure the Companies serve their customers efficiently.

c. The Company's business planning process is a "bottom-up" process, with each business unit preparing detailed plans addressing its individual areas of responsibility. These plans are reviewed by successive levels of management to ensure not only that they are in line with the Company's objectives, but also make efficient and productive use of the Company's resources to serve customers. The development and review of this process involves numerous Company personnel.

Project Engineering 2015 Business Plan
Budget - Investment Accrual (Removal Included)
8/6/2014

DRAFT

2014-2023 Business Plan
2015-2024 Business Plan

$ in Millions	In Service Date	Total Project Forecast	Total Projected LTP	Before 2014 Spend	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Brown CCR - Ash Pond (Ph I) - Elevation 902	2010	38.2	38.2	38.2	-	-	-	-	-	-	-	-	-	-	-
Brown CCR - Ash Pond (Ph I) - Elevation 902	2010	38.2	38.2	38.2	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brown CCR - Aux Pond Phase II	2012	20.0	20.0	19.6	0.4	-	-	-	-	-	-	-	-	-	-
Brown CCR - Aux Pond Phase II	2012	20.0	20.0	19.7	0.3	-	-	-	-	-	-	-	-	-	-
Variance		(0.0)	(0.0)	(0.1)	0.0	-	-	-	-	-	-	-	-	-	-
Brown CCR - Landfill Phase I	2014	36.8	36.8	23.7	10.0	3.1	-	-	-	-	-	-	-	-	-
Brown CCR - Landfill Phase I	2015	39.9	39.9	28.1	4.5	7.3	-	-	-	-	-	-	-	-	-
Variance		(3.1)	(3.1)	(4.5)	5.5	(4.2)	-	-	-	-	-	-	-	-	-
Brown CCR - Main AP Closure Plan	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brown CCR - Main AP Closure Plan	2017	18.7	18.7	-	1.5	6.4	10.8	-	-	-	-	-	-	-	-
Variance		(18.7)	(18.7)	-	(1.5)	(6.4)	(10.8)	-	-	-	-	-	-	-	-
Brown CCR - Ash & Gypsum Transport	2014	72.1	72.1	11.0	32.5	28.6	-	-	-	-	-	-	-	-	-
Brown CCR - Ash & Gypsum Transport	2016	68.9	68.9	0.8	35.6	32.3	0.3	-	-	-	-	-	-	-	-
Variance		3.1	3.1	10.2	(3.0)	(3.7)	(0.3)	-	-	-	-	-	-	-	-
Brown CCR - Landfill Phase II & III		28.0	28.0	-	-	2.2	9.6	3.2	13.1	-	-	-	-	-	-
Brown CCR - Landfill Phase II & III	2017/2019	28.0	28.0	-	-	2.2	9.6	3.2	13.1	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Brown CCR - Ash Pond/Landfill (includes Ph I)		**195.1**	**195.1**	**92.4**	**42.9**	**33.8**	**9.6**	**3.2**	**13.1**	**-**	**-**	**-**	**-**	**-**	**-**
Total Brown CCR - Ash Pond/Landfill (includes Ph I)		**213.8**	**213.8**	**86.8**	**41.9**	**48.2**	**20.6**	**3.2**	**13.1**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		(18.7)	(18.7)	5.6	1.0	(14.3)	(11.0)	-	-	-	-	-	-	-	-
Cane Run MSE Wall	2014	4.8	4.8	4.1	0.7	-	-	-	-	-	-	-	-	-	-
Cane Run MSE Wall	2014	5.1	5.1	3.0	2.1	-	-	-	-	-	-	-	-	-	-
Variance		(0.3)	(0.3)	1.1	(1.4)	-	-	-	-	-	-	-	-	-	-
Cane Run Ashpond Cap & Closure		14.7	14.7	3.9	2.9	3.2	3.5	1.2	-	-	-	-	-	-	-
Cane Run Ashpond and Landfill Cap & Closure	2016	16.6	16.6	5.8	2.5	5.3	3.0	-	-	-	-	-	-	-	-
Variance		(1.9)	(1.9)	(1.9)	0.4	(2.1)	0.5	1.2	-	-	-	-	-	-	-
Total Cane Run CCR - Landfill (w/CCGT CR 2015)		**19.5**	**19.5**	**8.0**	**3.7**	**3.2**	**3.5**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total Cane Run CCR - Landfill (w/CCGT CR 2015)		**21.7**	**21.7**	**8.8**	**4.6**	**5.3**	**3.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		(2.2)	(2.2)	(0.7)	(1.0)	(2.1)	0.5	1.2	-	-	-	-	-	-	-
Ghent CCR - Landfill Phase I (Scenario 37)	2013	67.6	67.6	53.9	7.9	2.3	-	-	-	0.8	0.9	1.8	-	-	-
Ghent CCR - Landfill Phase I (Scenario 37)	2013/2015	58.9	58.9	45.2	2.6	7.7	-	-	-	0.8	0.9	1.8	-	-	-
Variance		8.7	8.7	8.7	5.3	(5.3)	-	-	-	(0.0)	(0.0)	(0.0)	-	-	-
Ghent CCR - Fines & Transport	2013	255.0	255.0	234.5	20.5	-	-	-	-	-	-	-	-	-	-
Ghent CCR - Fines & Transport	2014	282.4	282.4	251.3	21.2	10.0	-	-	-	-	-	-	-	-	-
Variance		(27.5)	(27.5)	(16.8)	(0.7)	(10.0)	-	-	-	-	-	-	-	-	-
Ghent CCR - Landfill Phase II (Scenario 37)	2019	30.6	24.3	-	-	-	-	-	-	-	-	-	10.2	14.1	-
Ghent CCR - Landfill Phase II (Scenario 37)	2025	30.6	25.1	-	-	-	-	-	-	-	-	-	10.2	14.1	0.9
Variance		-	(0.9)	-	-	-	-	-	-	-	-	-	0.0	(0.0)	(0.9)
Ghent CCR - Landfill Ph III & Capping (Scenario 37)	2028	104.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Ghent CCR - Landfill Ph III & Capping (Scenario 37)	2028	104.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ghent CCR - Landfill Close & Cap (Now in PH III)	2040	-	-		-	-	-	-	-	-	-	-	-	-	-
Ghent CCR - Landfill Close & Cap (Now in PH III)	2040	-	-		-	-	-	-	-	-	-	-	-	-	-
Variance		-	-		-	-	-	-	-	-	-	-	-	-	-
Total Ghent CCR - Landfill		**457.4**	**346.9**	**288.3**	**28.4**	**2.3**	**-**	**-**	**-**	**0.8**	**0.9**	**1.8**	**10.2**	**14.1**	**-**
Total Ghent CCR - Landfill		**476.2**	**366.5**	**296.5**	**23.8**	**17.6**	**-**	**-**	**-**	**0.8**	**0.9**	**1.8**	**10.2**	**14.1**	**0.9**
Variance		(18.8)	(19.7)	(8.1)	4.6	(15.3)	-	-	-	(0.0)	(0.0)	(0.0)	0.0	(0.0)	(0.9)
Mill Creek CCR - Landfill Expansion		88.5	42.6	-	-	0.6	7.5	1.6	13.7	19.2	-	-	-	-	-
Mill Creek CCR - Landfill Expansion	2019	91.8	54.7	-	0.5	6.6	1.4	8.7	19.2	7.0	-	-	-	-	11.3
Variance		(3.4)	(12.1)	-	(0.5)	(6.0)	6.1	(7.2)	(5.5)	12.2	-	-	-	-	(11.3)
Mill Creek CCR - Transport		82.2	82.2	-	-	-	-	5.1	42.9	34.1	-	-	-	-	-
Mill Creek CCR - Transport	2019	80.2	80.2	-	-	-	-	29.9	41.4	8.9	-	-	-	-	-
Variance		2.0	2.0	-	-	-	-	(24.8)	1.5	25.3	-	-	-	-	-
Total Mill Creek CCR - Landfill Expansion		**170.7**	**124.8**	**-**	**-**	**0.6**	**7.5**	**6.7**	**56.6**	**53.3**	**-**	**-**	**-**	**-**	**-**
Total Mill Creek CCR - Landfill Expansion	2019	**172.1**	**134.9**	**-**	**0.5**	**6.6**	**1.4**	**38.7**	**60.6**	**15.8**	**-**	**-**	**-**	**-**	**11.3**
Variance		(1.4)	(10.2)	-	(0.5)	(6.0)	6.1	(32.0)	(4.0)	37.5	-	-	-	-	(11.3)

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$ in Millions	In Service Date	Total Project Forecast	Total Projected LTP	Before 2014 Spend	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
TC CCR - Ponds (Net) BAP/GSP	2010	28.6	28.6	28.6	-	-	-	-	-	-	-	-	-	-	-
TC CCR - Ponds (Net) BAP/GSP	2010	28.3	28.3	28.3	-	-	-	-	-	-	-	-	-	-	-
Variance		0.3	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-
TC CCR - Landfill (PH I) (Net) Project	2018	91.6	112.3	10.4	2.2	19.3	27.7	32.3	8.4	10.0	0.5	0.4	0.7	0.4	-
TC CCR - Landfill (PH I) (Net) Project	2018	148.1	148.1	12.3	3.1	5.1	44.0	37.7	42.2	0.7	0.7	0.7	0.5	0.7	0.5
Variance		(56.6)	(35.9)	(1.9)	(0.9)	14.2	(16.3)	(5.4)	(33.8)	9.3	(0.2)	(0.3)	0.1	(0.3)	(0.5)
TC CCR - CCR Treatment (Net)	2017	139.3	139.3	1.3	0.5	22.3	74.2	40.9	0.1	-	-	-	-	-	-
TC CCR - CCR Treatment (Net)	2017	152.3	152.3	-	-	20.2	68.1	41.4	22.6	-	-	-	-	-	-
Variance		(13.0)	(13.0)	1.3	0.5	2.1	6.0	(0.4)	(22.5)	-	-	-	-	-	-
TC CCR - CCR Transport (Net)	2017	25.9	25.9	7.2	-	6.5	11.4	0.8	-	-	-	-	-	-	-
TC CCR - CCR Transport (Net)	2017	21.5	21.5	7.2	-	-	11.7	2.3	0.3	-	-	-	-	-	-
Variance		4.5	4.5	-	-	6.5	(0.2)	(1.5)	(0.3)	-	-	-	-	-	-
TC CCR - Landfill PH II (Net) Project	2027	29.2	29.2	-	-	-	-	-	-	-	-	-	19.0	10.2	-
TC CCR - Landfill PH II (Net) Project	2027	60.4	60.4	-	-	-	-	-	-	-	-	-	28.7	26.2	5.6
Variance		(31.2)	(31.2)	-	-	-	-	-	-	-	-	-	(9.7)	(16.0)	(5.6)
TC CCR - Landfill (PH III/IV) (Net) Project	2034/2045	119.2	-	-	-	-	-	-	-	-	-	-	-	-	-
TC CCR - Landfill (PH III/IV) (Net) Project	2034/2045	119.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
TC CCR - River Flyash Barge Loading (Net)	2012	9.0	9.0	9.0	-	-	-	-	-	-	-	-	-	-	-
TC CCR - River Flyash Barge Loading (Net)	2012	8.9	8.9	8.9	-	-	-	-	-	-	-	-	-	-	-
Variance		0.1	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-
Total TC CCR - Ponds/Landfill (Net)		**442.8**	**344.3**	**56.5**	**2.7**	**48.1**	**113.3**	**74.0**	**8.5**	**10.0**	**0.5**	**0.4**	**19.7**	**10.6**	**-**
Total TC CCR - Ponds/Landfill (Net)		**538.7**	**419.5**	**56.7**	**3.1**	**25.3**	**123.8**	**81.3**	**65.1**	**0.7**	**0.7**	**0.7**	**29.2**	**26.9**	**6.0**
Variance		(95.9)	(75.2)	(0.2)	(0.4)	22.8	(10.5)	(7.4)	(56.6)	9.3	(0.2)	(0.3)	(9.5)	(16.3)	(6.0)
Total All CCR Projects (TC Net)		**1,285.4**	**1,030.5**	**445.3**	**77.7**	**88.1**	**133.8**	**85.1**	**78.3**	**64.1**	**1.4**	**2.2**	**29.9**	**24.7**	**-**
Total All CCR Projects (TC Net)		**1,422.4**	**1,156.4**	**448.7**	**73.9**	**103.0**	**148.8**	**123.2**	**138.8**	**17.3**	**1.6**	**2.5**	**39.4**	**41.0**	**18.2**
Variance		(137.0)	(125.9)	(3.4)	3.8	(15.0)	(15.0)	(38.1)	(60.6)	46.8	(0.2)	(0.3)	(9.5)	(16.3)	(18.2)
Total Trimble County 2 (Net)	2010	884.5	884.5	880.8	0.8	3.0	-	-	-	-	-	-	-	-	-
Total Trimble County 2 (Net)	2011	887.0	887.0	882.5	1.5	3.0	-	-	-	-	-	-	-	-	-
Variance		(2.5)	(2.5)	(1.7)	(0.7)	-	-	-	-	-	-	-	-	-	-
Trimble Co.2 DSI (Net)	2013	5.5	5.5	2.6	2.9	-	-	-	-	-	-	-	-	-	-
Trimble Co.2 DSI (Net)	2014	6.7	6.7	2.7	3.9	-	-	-	-	-	-	-	-	-	-
Variance		(1.2)	(1.2)	(0.2)	(1.0)	-	-	-	-	-	-	-	-	-	-
Ohio Falls Redevelopment	2016	138.0	138.0	94.8	16.9	16.3	9.9	-	-	-	-	-	-	-	-
Ohio Falls Redevelopment	2017	139.0	139.0	92.8	11.1	15.3	16.0	3.8	-	-	-	-	-	-	-
Variance		(1.0)	(1.0)	2.0	5.8	1.1	(6.1)	(3.8)	-	-	-	-	-	-	-
Cane Run 7	2015	549.0	549.0	387.3	125.5	36.2	-	-	-	-	-	-	-	-	-
Cane Run 7	2015	562.5	562.5	407.7	124.4	30.4	-	-	-	-	-	-	-	-	-
Variance		(13.5)	(13.5)	(20.4)	1.1	5.8	-	-	-	-	-	-	-	-	-
Green River 5	2018	683.0	683.0	2.5	1.0	84.9	394.4	155.3	44.9	-	-	-	-	-	-
Green River 5	2021	816.5	816.5	3.6	2.0	0.3	0.4	2.9	97.2	496.1	169.6	44.5	-	-	-
Variance		(133.5)	(133.5)	(1.1)	(1.0)	84.6	394.0	152.4	(52.2)	(496.1)	(169.6)	(44.5)	-	-	-
Combined Cycle GT 2022	2025	913.1	856.6	2.5	-	-	-	-	-	-	-	4.8	135.1	502.6	211.5
Combined Cycle GT 2031	2031	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		913.1	856.6	2.5	-	-	-	-	-	-	-	4.8	135.1	502.6	211.5

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Brown Solar		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brown Solar	2016	35.0	35.0	0.0	0.3	9.9	24.7	-	-	-	-	-	-	-	-
Variance		(35.0)	(35.0)	(0.0)	(0.3)	(9.9)	(24.7)	-	-	-	-	-	-	-	-
TC New Main Gate (Net)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
TC New Main Gate (Net)	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Paddy's Run 1 - 6 Demolition		17.4	17.4	1.4	0.5	8.3	7.3	-	-	-	-	-	-	-	-
Paddy's Run 1 - 6 Demolition	2016	17.4	17.4	1.4	0.3	6.5	9.3	-	-	-	-	-	-	-	-
Variance		(0.0)	(0.0)	0.0	0.3	1.8	(2.1)	-	-	-	-	-	-	-	-
Canal Demolition		13.1	13.1	0.1	0.5	-	-	6.8	5.8	-	-	-	-	-	-
Canal Demolition	2017	14.0	14.0	0.0	0.3	-	7.0	6.8	-	-	-	-	-	-	-
Variance		(0.9)	(0.9)	0.1	0.3	-	(7.0)	-	5.8	-	-	-	-	-	-
Pineville Demolition		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pineville Demolition	2021	12.3	12.3	-	-	-	-	-	-	0.3	6.0	6.0	-	-	-
Variance		(12.3)	(12.3)	-	-	-	-	-	-	(0.3)	(6.0)	(6.0)	-	-	-
Tyrone Demolition		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tyrone Demolition	2022	12.3	12.3	-	-	-	-	-	-	-	0.3	6.0	6.0	-	-
Variance		(12.3)	(12.3)	-	-	-	-	-	-	-	(0.3)	(6.0)	(6.0)	-	-
PE Vehicle Purchases		0.3	0.3	0.2	0.1	-	-	-	-	-	-	-	-	-	-
PE Vehicle Purchases		0.4	0.4	0.2	0.1	0.1	-	-	-	-	-	-	-	-	-
Variance		(0.1)	(0.1)	-	-	(0.1)	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC Admin Bldg Non ECR		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC Admin Bldg Non ECR	2015	4.9	4.9	0.8	4.1	-	-	-	-	-	-	-	-	-	-
Variance		(4.9)	(4.9)	(0.8)	(4.1)	-	-	-	-	-	-	-	-	-	-
25 MW Black Start Trimble Co (Gen Services 2013BP)		34.3	34.3	-	-	3.8	14.0	16.5	-	-	-	-	-	-	-
25 MW Black Start Trimble County	2017	34.3	34.3	-	-	3.8	14.0	16.5	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
25 MW Black Start (Gen Services 2013BP - Paddys)		35.3	35.3	-	-	-	3.9	13.7	17.7	-	-	-	-	-	-
25 MW Black Start Cane Run	2018	35.3	35.3	-	-	-	3.9	13.7	17.7	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project Engineering Projects Subtotal Before Env. Compl.		**4,573.5**	**4,262.1**	**1,832.1**	**225.8**	**240.6**	**563.2**	**277.3**	**146.7**	**64.1**	**1.4**	**7.0**	**165.0**	**527.3**	**211.5**
Project Engineering Projects Subtotal Before Env Compl.		**4,014.6**	**3,748.6**	**1,855.1**	**221.9**	**172.4**	**224.0**	**166.8**	**253.7**	**513.7**	**177.5**	**59.0**	**45.4**	**41.0**	**18.2**
Variance		**558.9**	**513.5**	(23.1)	**3.9**	**68.2**	**339.2**	**110.5**	**(107.1)**	**(449.5)**	**(176.1)**	**(52.0)**	**119.6**	**486.3**	**193.3**
Env. Compliance - Air - BR 1 - FF	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 1 - FF	2016	0.0	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-
Variance		(0.0)	(0.0)		-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 1 - SAM Mitigation	2014	4.9	4.9	-	0.5	2.2	2.2	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 1 - SAM Mitigation		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		4.9	4.9	-	0.5	2.2	2.2	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 1 Total		**4.9**	**4.9**	**-**	**0.5**	**2.2**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Env. Compliance - Air - BR 1 Total		**0.0**	**0.0**	**0.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		4.9	4.9	(0.0)	0.5	2.2	2.2	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 2 - SAM Mitigation	2015	4.9	4.9	-	0.5	2.2	2.2	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 2 - SAM Mitigation		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		4.9	4.9	-	0.5	2.2	2.2	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 2 Total		**4.9**	**4.9**	**-**	**0.5**	**2.2**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Env. Compliance - Air - BR 2 Total		**0.0**	**0.0**	**0.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		4.9	4.9	(0.0)	0.5	2.2	2.2	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 3 - FF	2016	92.3	92.3	18.2	35.9	38.2	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - BR 3 - FF	2016	91.8	91.8	18.2	41.0	32.5	-	-	-	-	-	-	-	-	-
Variance		0.5	0.5	0.0	(5.1)	5.6	-	-	-	-	-	-	-	-	-
Environmental Compliance - Air - Brown Total		**102.0**	**102.0**	**18.2**	**36.9**	**42.5**	**4.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Environmental Compliance - Air - Brown Total		**91.8**	**91.8**	**18.2**	**41.0**	**32.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		10.2	10.2	(0.0)	(4.1)	10.0	4.4	-	-	-	-	-	-	-	-

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$ in Millions	In Service Date	Total Project Forecast	Total Projected LTP	Before 2014 Spend	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Env. Compliance - Air - GH 1 - FF	2016	144.9	144.9	58.4	59.6	26.8	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 1 - FF	2015	178.3	178.3	58.6	82.6	37.1	-	-	-	-	-	-	-	-	-
Variance		(33.5)	(33.5)	(0.2)	(23.0)	(10.2)	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 1 - SAM Mitigation	2011	1.5	1.5	1.5	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 1 - SAM Mitigation	2012	1.5	1.5	1.5	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 1 Total		**146.4**	**146.4**	**59.9**	**59.6**	**26.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Env. Compliance - Air - GH 1 Total		**179.8**	**179.8**	**60.2**	**82.6**	**37.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		(33.5)	(33.5)	(0.2)	(23.0)	(10.2)	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 2 - SCR/FF	2016	128.9	128.9	32.4	34.9	57.6	4.0	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 2 - FF	2015	137.5	137.5	30.5	38.6	64.3	4.0	-	-	-	-	-	-	-	-
Variance		(8.5)	(8.5)	1.9	(3.7)	(6.7)	(0.0)	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 2 - SAM Mitigation	2011	8.5	8.5	8.2	0.3	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 2 - SAM Mitigation	2012	8.5	8.5	8.2	0.3	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 2 Total		**137.5**	**137.5**	**40.6**	**35.2**	**57.6**	**4.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Env. Compliance - Air - GH 2 Total		**146.0**	**146.0**	**38.8**	**38.9**	**64.3**	**4.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		(8.5)	(8.5)	1.9	(3.7)	(6.7)	(0.0)	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 3 - FF	2015	169.3	169.3	118.4	50.0	0.8	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 3 - FF	2014	171.8	171.8	119.8	51.2	0.8	-	-	-	-	-	-	-	-	-
Variance		(2.5)	(2.5)	(1.4)	(1.1)	0.0	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 3 - SAM Mitigation	2012	1.2	1.2	1.2	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 3 - SAM Mitigation	2012	1.2	1.2	1.2	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 3 Total		**170.4**	**170.4**	**119.6**	**50.0**	**0.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Env. Compliance - Air - GH 3 Total		**172.9**	**172.9**	**120.9**	**51.2**	**0.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		(2.5)	(2.5)	(1.4)	(1.1)	0.0	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 4 - FF	2015	143.6	143.6	79.2	57.6	6.8	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 4 - FF	2014	150.8	150.8	83.6	58.4	8.8	-	-	-	-	-	-	-	-	-
Variance		(7.2)	(7.2)	(4.4)	(0.8)	(2.0)	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 4 - SAM Mitigation	2012	1.2	1.2	1.2	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 4 - SAM Mitigation	2012	1.2	1.2	1.2	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - GH 4 Total		**144.8**	**144.8**	**80.4**	**57.6**	**6.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Env. Compliance - Air - GH 4 Total		**152.0**	**152.0**	**84.8**	**58.4**	**8.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		(7.2)	(7.2)	(4.4)	(0.8)	(2.0)	-	-	-	-	-	-	-	-	-
Environmental Compliance - Air - Ghent Total		**599.1**	**599.1**	**300.6**	**202.5**	**92.0**	**4.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Environmental Compliance - Air - Ghent Total		**650.7**	**650.7**	**304.7**	**231.1**	**111.0**	**4.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		(51.7)	(51.7)	(4.1)	(28.6)	(18.9)	(0.0)	-	-	-	-	-	-	-	-

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$ in Millions	In Service Date	Total Project Forecast	Total Projected LTP	Before 2014 Spend	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Env. Compliance - Air - MC 1 - WFGD/FF	2015	171.4	171.4	66.2	60.1	32.1	13.0	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC 1 - WFGD/FF	2015	163.7	163.7	63.1	61.0	33.7	5.4	0.5	-	-	-	-	-	-	-
Variance		7.7	7.7	3.1	(0.9)	(1.6)	7.5	(0.5)	-	-	-	-	-	-	-
Env. Compliance - Air - MC 1 Total		**171.4**	**171.4**	**66.2**	**60.1**	**32.1**	**13.0**	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC 1 Total		**163.7**	**163.7**	**63.1**	**61.0**	**33.7**	**5.4**	**0.5**	-	-	-	-	-	-	-
Variance		7.7	7.7	3.1	(0.9)	(1.6)	7.5	(0.5)	-	-	-	-	-	-	-
Env. Compliance - Air - MC 2 - WFGD/FF	2015	168.1	168.1	64.9	53.7	35.8	13.8	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC 2 - WFGD/FF	2015	176.8	176.8	46.8	90.7	32.0	6.9	0.5	-	-	-	-	-	-	-
Variance		(8.7)	(8.7)	18.1	(37.1)	3.8	6.9	(0.5)	-	-	-	-	-	-	-
Env. Compliance - Air - MC 2 Total		**168.1**	**168.1**	**64.9**	**53.7**	**35.8**	**13.8**	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC 2 Total		**176.8**	**176.8**	**46.8**	**90.7**	**32.0**	**6.9**	**0.5**	-	-	-	-	-	-	-
Variance		(8.7)	(8.7)	18.1	(37.1)	3.8	6.9	(0.5)	-	-	-	-	-	-	-
Env. Compliance - Air - MC 3 - FF/WFGD	2015	287.2	287.2	46.2	35.4	129.7	72.8	3.1	-	-	-	-	-	-	-
Env. Compliance - Air - MC 3 - FF/WFGD	2016	289.8	289.8	47.6	27.5	164.3	49.2	1.2	-	-	-	-	-	-	-
Variance		(2.6)	(2.6)	(1.4)	8.0	(34.6)	23.6	1.9	-	-	-	-	-	-	-
Env. Compliance - Air - MC3 CEMS Evaluation		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC3 CEMS Evaluation	2015	1.0	1.0	-	-	1.0	-	-	-	-	-	-	-	-	-
Variance		(1.0)	(1.0)	-	-	(1.0)	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC 3 Total		**287.2**	**287.2**	**46.2**	**35.4**	**129.7**	**72.8**	**3.1**	-	-	-	-	-	-	-
Env. Compliance - Air - MC 3 Total		**290.8**	**290.8**	**47.6**	**27.5**	**165.3**	**49.2**	**1.2**	-	-	-	-	-	-	-
Variance		(3.6)	(3.6)	(1.4)	8.0	(35.6)	23.6	1.9	-	-	-	-	-	-	-
Env. Compliance - Air - MC 4 - WFGD/FF	2014	272.4	272.4	131.2	98.3	25.2	17.4	0.2	-	-	-	-	-	-	-
Env. Compliance - Air - MC 4 - WFGD/FF	2014	311.6	311.6	139.0	142.4	21.5	7.4	1.3	-	-	-	-	-	-	-
Variance		(39.2)	(39.2)	(7.8)	(44.1)	3.7	10.0	(1.1)	-	-	-	-	-	-	-
Env. Compliance - Air - MC 4 - SCR Upgrade		2.2	2.2	2.2	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC 4 - SCR Upgrade	2012	2.2	2.2	2.2	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC 4 Total		**274.6**	**274.6**	**133.5**	**98.3**	**25.2**	**17.4**	**0.2**	-	-	-	-	-	-	-
Env. Compliance - Air - MC 4 Total		**313.9**	**313.9**	**141.3**	**142.4**	**21.5**	**7.4**	**1.3**	-	-	-	-	-	-	-
Variance		(39.2)	(39.2)	(7.8)	(44.1)	3.7	10.0	(1.1)	-	-	-	-	-	-	-
Mill Creek Distribution Drive		3.2	3.2	3.2	-	-	-	-	-	-	-	-	-	-	-
Mill Creek Distribution Drive		3.2	3.2	3.2	-	-	-	-	-	-	-	-	-	-	-
Variance		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC Admin Bldg ECR		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Air - MC Admin Bldg ECR		3.3	3.3	-	3.3	-	-	-	-	-	-	-	-	-	-
Variance		(3.3)	(3.3)	-	(3.3)	-	-	-	-	-	-	-	-	-	-
Environmental Compliance - Air - Mill Creek Total		**904.5**	**904.5**	**314.0**	**247.5**	**222.8**	**116.9**	**3.3**	-	-	-	-	-	-	-
Environmental Compliance - Air - Mill Creek Total		**951.7**	**951.7**	**301.9**	**324.9**	**252.5**	**68.9**	**3.5**	-	-	-	-	-	-	-
Variance		(47.1)	(47.1)	12.0	(77.4)	(29.7)	48.1	(0.2)	-	-	-	-	-	-	-
Env. Compliance - Air - TC 1 - FF (Net)	2015	118.0	118.0	15.1	38.9	58.8	5.1	-	-	-	-	-	-	-	-
Env. Compliance - Air - TC 1 - FF (Net)	2015	114.4	114.4	14.3	37.5	60.3	2.3	-	-	-	-	-	-	-	-
Variance		3.6	3.6	0.8	1.4	(1.4)	2.8	-	-	-	-	-	-	-	-
Total Environmental Compliance - Air		**1,723.6**	**1,723.6**	**647.8**	**525.9**	**416.2**	**130.4**	**3.3**	-	-	-	-	-	-	-
Total Environmental Compliance - Air		**1,808.6**	**1,808.6**	**639.1**	**634.6**	**456.2**	**75.2**	**3.5**	-	-	-	-	-	-	-
Variance		(85.0)	(85.0)	8.7	(108.7)	(40.0)	55.2	(0.2)	-	-	-	-	-	-	-

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$ in Millions	In Service Date	Total Project Forecast	Total Projected LTP	Before 2014 Spend	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Environmental Compliance - CCR Ruling - Brown	2016/2031	33.5	33.5	-	-	-	1.5	1.6	16.4	14.0	-	-	-	-	-
Environmental Compliance - CCR Ruling - Brown	2020	33.3	33.3	-	-	0.4	7.3	4.5	4.6	7.9	8.5	-	-	-	-
Variance		0.2	0.2	-	-	(0.4)	(5.8)	(3.0)	11.7	6.1	(8.5)	-	-	-	-
Environmental Compliance - CCR Ruling - Ghent	2016/2041	322.5	322.5	-	1.0	3.0	34.3	97.5	106.6	80.3	-	-	-	-	-
Environmental Compliance - CCR Ruling - Ghent	2020	291.6	291.6	-	0.2	1.7	70.6	37.3	37.9	70.9	73.0	-	-	-	-
Variance		31.0	31.0	-	0.8	1.3	(36.2)	60.2	68.6	9.4	(73.0)	-	-	-	-
Environmental Compliance - CCR Ruling - Green River	2018/2031	13.4	13.4	-	0.6	0.6	6.4	5.8	-	-	-	-	-	-	-
Environmental Compliance - CCR Ruling - Green River	2020	38.2	38.2	-	-	-	0.8	9.0	20.4	0.7	7.3	-	-	-	-
Variance		(24.8)	(24.8)	-	0.6	0.6	5.6	(3.2)	(20.4)	(0.7)	(7.3)	-	-	-	-
Environmental Compliance - CCR Ruling - Pineville	2011	4.6	4.6	-	-	-	0.2	0.2	2.3	2.0	-	-	-	-	-
Environmental Compliance - CCR Ruling - Pineville	2019	4.5	4.5	-	-	-	0.2	2.9	0.2	1.3	-	-	-	-	-
Variance		0.1	0.1	-	-	-	0.0	(2.7)	2.1	0.6	-	-	-	-	-
Environmental Compliance - CCR Ruling - Tyrone	2018	5.1	5.1	-	-	-	0.2	0.3	2.5	2.1	-	-	-	-	-
Environmental Compliance - CCR Ruling - Tyrone	2019	5.0	5.0	-	-	-	0.2	3.0	0.2	1.6	-	-	-	-	-
Variance		0.1	0.1	-	-	-	0.0	(2.7)	2.4	0.5	-	-	-	-	-
Environmental Compliance - CCR Ruling - Cane Run	2016/2031	1.2	1.2	-	0.1	0.6	0.5	-	-	-	-	-	-	-	-
Environmental Compliance - CCR Ruling - Cane Run	2016	0.5	0.5	-	-	-	0.5	-	-	-	-	-	-	-	-
Variance		0.7	0.7	-	0.1	0.6	(0.0)	-	-	-	-	-	-	-	-
Environmental Compliance - CCR Ruling - Mill Creek	2016/2041	46.5	46.5	-	0.8	0.4	5.4	20.6	16.7	2.7	-	-	-	-	-
Environmental Compliance - CCR Ruling - Mill Creek	2020	46.3	46.3	-	0.1	0.7	7.1	4.8	6.9	13.3	13.5	-	-	-	-
Variance		0.2	0.2	-	0.7	(0.3)	(1.8)	15.8	9.8	(10.6)	(13.5)	-	-	-	-
Environmental Compliance - CCR Ruling - Trimble	2016/2051	95.2	95.2	-	-	0.4	1.3	6.7	45.5	41.2	-	-	-	-	-
Environmental Compliance - CCR Ruling - Trimble (Net)	2020	103.6	103.6	-	0.1	0.8	18.7	15.5	15.9	25.3	27.4	-	-	-	-
Variance		(8.4)	(8.4)	-	(0.1)	(0.4)	(17.4)	(8.7)	29.6	15.9	(27.4)	-	-	-	-
Total Environmental Compliance - CCR Ruling		**522.0**	**522.0**	**-**	**2.4**	**5.0**	**49.9**	**132.6**	**189.9**	**142.2**	**-**	**-**	**-**	**-**	**-**
Total Environmental Compliance - CCR Ruling		**522.9**	**522.9**	**-**	**0.4**	**3.6**	**105.5**	**76.8**	**86.0**	**120.9**	**129.6**	**-**	**-**	**-**	**-**
Variance		(0.9)	(0.9)	-	2.0	1.4	(55.6)	55.7	103.9	21.3	(129.6)	-	-	-	-
Env. Compliance - Water Ruling - Brown		42.7	42.7	-	-	-	2.0	20.7	20.0	-	-	-	-	-	-
Env. Compliance - Effluent Water - Brown	2018/2021	200.5	200.5	-	-	0.5	-	25.0	45.0	50.0	50.0	30.0	-	-	-
Variance		(157.8)	(157.8)	-	-	(0.5)	2.0	(4.3)	(25.0)	(50.0)	(50.0)	(30.0)	-	-	-
Env. Compliance - Water Ruling - Ghent		62.7	62.7	-	-	-	2.0	30.7	30.0	-	-	-	-	-	-
Env. Compliance - Effluent Water - Ghent	2018/2021	225.5	225.5	-	-	0.5	-	25.0	50.0	50.0	50.0	50.0	-	-	-
Variance		(162.8)	(162.8)	-	-	(0.5)	2.0	5.7	(20.0)	(50.0)	(50.0)	(50.0)	-	-	-
Env. Compliance - Water Ruling - Green River		11.2	11.2	-	-	-	0.5	5.7	5.0	-	-	-	-	-	-
Env. Compliance - Effluent Water - Green River		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		11.2	11.2	-	-	-	0.5	5.7	5.0	-	-	-	-	-	-
Env. Compliance - Water Ruling - Cane Run		11.2	11.2	-	-	-	0.5	5.7	5.0	-	-	-	-	-	-
Env. Compliance - Effluent Water - Cane Run		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variance		11.2	11.2	-	-	-	0.5	5.7	5.0	-	-	-	-	-	-
Env. Compliance - Water Ruling - Mill Creek		62.7	62.7	-	-	-	2.0	30.7	30.0	-	-	-	-	-	-
Env. Compliance - Effluent Water - Mill Creek	2020	209.0	209.0	-	-	-	-	-	74.0	75.0	60.0	-	-	-	-
Variance		(146.3)	(146.3)	-	-	-	2.0	30.7	(44.0)	(75.0)	(60.0)	-	-	-	-
Env. Compliance - Water Ruling - Mill Creek KPDES		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Water Ruling - Mill Creek KPDES	2018	121.5	121.5	-	0.5	1.0	25.0	50.0	45.0	-	-	-	-	-	-
Variance		(121.5)	(121.5)	-	(0.5)	(1.0)	(25.0)	(50.0)	(45.0)	-	-	-	-	-	-
Env. Compliance - Water Ruling - Trimble (Net)		16.2	16.2	-	-	-	0.5	8.2	7.5	-	-	-	-	-	-
Env. Compliance - Effluent Water - Trimble (Net)	2018/2020	220.5	220.5	-	-	0.5	25.0	50.0	50.0	50.0	45.0	-	-	-	-
Variance		(204.3)	(204.3)	-	-	(0.5)	(24.5)	(41.8)	(42.5)	(50.0)	(45.0)	-	-	-	-
Env. Compliance - Water Ruling - Studies		-	-	1.0	2.0	1.0	-	(4.0)	-	-	-	-	-	-	-
Env. Compliance - Effluent Water - Studies Prelim Surv		-	-	0.1	2.0	1.0	-	(3.1)	-	-	-	-	-	-	-
Variance		-	-	0.9	-	-	-	(0.9)	-	-	-	-	-	-	-
Total Env. Compliance - Water Ruling		**206.5**	**206.5**	**1.0**	**2.0**	**1.0**	**7.5**	**97.5**	**97.5**	**-**	**-**	**-**	**-**	**-**	**-**
Total Env. Compliance - Effluent Water		**977.0**	**977.0**	**0.1**	**2.5**	**3.5**	**50.0**	**146.9**	**264.0**	**225.0**	**205.0**	**80.0**	**-**	**-**	**-**
Variance		**(770.5)**	**(770.5)**	**0.9**	(0.5)	(2.5)	(42.5)	(49.4)	(166.5)	(225.0)	(205.0)	(80.0)	-	-	-

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Env. Compliance - Water Intake 316b - Brown		3.0	3.0	-	-	1.5	1.5	-	-	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Brown	2018	3.0	3.0	-	-	-	-	1.5	1.5	-	-	-	-	-	-
Variance		-	-	-	-	1.5	1.5	(1.5)	(1.5)	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Ghent		3.0	3.0	-	-	1.5	1.5	-	-	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Ghent	2018	3.0	3.0	-	-	-	-	1.5	1.5	-	-	-	-	-	-
Variance		-	-	-	-	1.5	1.5	(1.5)	(1.5)	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Mill Creek		3.0	3.0	-	-	1.5	1.5	-	-	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Mill Creek	2018	3.0	3.0	-	-	-	-	1.5	1.5	-	-	-	-	-	-
Variance		-	-	-	-	1.5	1.5	(1.5)	(1.5)	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Trimble (Net)		2.3	2.3	-	-	1.1	1.1	-	-	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Trimble (Net)	2018	2.3	2.3	-	-	-	-	1.1	1.1	-	-	-	-	-	-
Variance		-	-	-	-	1.1	1.1	(1.1)	(1.1)	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Studies		0.5	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-
Env. Compliance - Water Intake 316b - Studies		0.5	0.5	-	-	-	0.5	-	-	-	-	-	-	-	-
Variance		-	-	-	0.5	-	(0.5)	-	-	-	-	-	-	-	-
Total Env. Compliance - Water Intake 316b		**11.8**	**11.8**	**-**	**0.5**	**5.6**	**5.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total Env. Compliance - Water Intake 316b		**11.8**	**11.8**	**-**	**-**	**-**	**0.5**	**5.6**	**5.6**	**-**	**-**	**-**	**-**	**-**	**-**
Variance		-	-	-	0.5	5.6	5.1	(5.6)	(5.6)	-	-	-	-	-	-
TOTAL Project Engineering Projects		**7,037.4**	**6,726.0**	**2,480.9**	**756.7**	**668.4**	**756.6**	**510.7**	**434.1**	**206.3**	**1.4**	**7.0**	**165.0**	**527.3**	**211.5**
TOTAL Project Engineering Projects		**7,334.8**	**7,068.9**	**2,494.3**	**859.4**	**635.7**	**455.2**	**399.7**	**609.4**	**859.6**	**512.1**	**139.0**	**45.4**	**41.0**	**18.2**
Variance		**(297.4)**	**(342.9)**	**(13.4)**	**(102.7)**	**32.7**	**301.4**	**111.1**	**(175.3)**	**(653.2)**	**(510.7)**	**(132.0)**	**119.6**	**486.3**	**193.3**
Subtotal Project Engineering ECR Projects		**3,999.5**	**3,744.7**	**1,354.8**	**605.1**	**513.6**	**323.8**	**317.3**	**365.7**	**206.3**	**1.4**	**2.2**	**29.9**	**24.7**	**-**
Subtotal Project Engineering ECR Projects		**4,990.4**	**4,724.5**	**1,348.3**	**707.2**	**560.9**	**377.0**	**356.1**	**494.5**	**363.2**	**336.2**	**82.5**	**39.4**	**41.0**	**18.2**
Variance		**(990.9)**	**(979.8)**	**6.5**	**(102.1)**	**(47.3)**	**(53.2)**	**(38.8)**	**(128.8)**	**(156.9)**	**(334.8)**	**(80.3)**	**(9.5)**	**(16.3)**	**(18.2)**
Subtotal Project Engineering Non-ECR Projects		**3,037.9**	**2,981.4**	**1,126.1**	**151.6**	**154.8**	**432.8**	**193.4**	**68.4**	**-**	**-**	**4.8**	**135.1**	**502.6**	**211.5**
Subtotal Project Engineering Non-ECR Projects		**2,344.4**	**2,344.4**	**1,146.0**	**152.2**	**74.8**	**78.2**	**43.6**	**114.9**	**496.3**	**175.9**	**56.5**	**6.0**	**-**	**-**
Variance		**693.5**	**637.0**	**(19.9)**	**(0.6)**	**80.0**	**354.6**	**149.9**	**(46.5)**	**(496.3)**	**(175.9)**	**(51.7)**	**129.1**	**502.6**	**211.5**
Total Project Engineering less 3rd Combined Cycle		**6,124.3**	**5,869.4**	**2,478.4**	**756.7**	**668.4**	**756.6**	**510.7**	**434.1**	**206.3**	**1.4**	**2.2**	**29.9**	**24.7**	**-**
Total Project Engineering less 3rd Combined Cycle		**7,334.8**	**7,068.9**	**2,494.3**	**859.4**	**635.7**	**455.2**	**399.7**	**609.4**	**859.6**	**512.1**	**139.0**	**45.4**	**41.0**	**18.2**
Variance		**(1,210.5)**	**(1,199.4)**	**(15.9)**	**(102.7)**	**32.7**	**301.4**	**111.1**	**(175.3)**	**(653.2)**	**(510.7)**	**(136.8)**	**(15.5)**	**(16.3)**	**(18.2)**
Project Engineering Sensitivities															
Total CCR Ruling from Above		522.9	522.9	-	0.4	3.6	105.5	76.8	86.0	120.9	129.6	-	-	-	-
Total CCR Ruling w/o CCR Beneficial Reuse		968.7	968.7	-	5.5	124.5	208.7	148.9	162.8	216.4	102.0	-	-	-	-
Variance		(445.8)	(445.8)		(5.1)	(120.9)	(103.2)	(72.1)	(76.8)	(95.4)	27.6	-	-	-	-
Cooling Tower - Mill Creek (2012 MTP)		12.3	12.3	6.0	6.3	-	-	-	-	-	-	-	-	-	-
Cooling Tower - Mill Creek		40.0	40.0	-	-	-	-	5.0	35.0	-	-	-	-	-	-
Variance		(27.7)	(27.7)		6.3	-	-	(5.0)	(35.0)	-	-	-	-	-	-
Total Project Engineering Sensitivities		**535.2**	**535.2**	**6.0**	**6.7**	**3.6**	**105.5**	**76.8**	**86.0**	**120.9**	**129.6**	**-**	**-**	**-**	**-**
Total Project Engineering Sensitivities		**1,008.7**	**1,008.7**	**-**	**5.5**	**124.5**	**208.7**	**153.9**	**197.8**	**216.4**	**102.0**	**-**	**-**	**-**	**-**
Variance		**(473.5)**	**(473.5)**	**6.0**	**1.2**	**(120.9)**	**(103.2)**	**(77.1)**	**(111.8)**	**(95.4)**	**27.6**	**-**	**-**	**-**	**-**

Includes
Actuals

2013-2022 MTP/LTP

Investment	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024						BA
TC 2 (Net) Before Fuel & Power Credit	$9.5	$4.1	$14.2	$0.4	$1.5	$3.0															
TC 2 Commission & Start Up Consumables (Net)	$8.1																				
TC 2 Power Credit (Net)	($1.3)																				
Trimble County 2 Spares	$2.4	$2.2	$0.2	$0.2																	
Trimble Co.2 DSI (Net)			$0.0	$2.7	$3.9	$0.00															
Brown FGD Program	$65.7	$4.9	$1.6	($0.0)																	
Ghent 1 & 2 FGD	$6.8	$0.2																			
Ghent 3 FGD	$4.0	$0.3																			
Ghent 4 FGD	$14.8	$0.6	($0.0)																		
Ghent Common FGD	$1.0	$0.9	$0.0																		
Brown 3 SCR	$23.1	$34.8	$34.7	$3.1																	
Brown 1, 2 & 3 Temp SAM Systems (Moved to BR FGD)		$0.0	$0.0																		
Brown CCR - Ash Pond (Ph I) - Elevation 902	$6.5	($16.5)	$0.0																		
Brown CCR - Aux Pond Phase II	$1.7	$12.9	$2.0	$3.0	$0.3																
Brown CCR - Landfill Phase I	$0.0	$14.3	$4.3	$9.6	$4.5	$7.3															
Brown CCR - Main AP Closure Plan					$1.5	$6.4	$10.8														
Brown CCR - Ash & Gypsum Transport		$0.000000	$0.7	$0.0	$35.6	$32.3	$0.3														
Brown CCR - Landfill Phase II & III						$2.2	$9.6	$3.2	$13.1					$0.0							
Cane Run CCR - Landfill PH I (w/ CCGT CR 2015)	$0.5	$0.7	($2.4)																		
Cane Run CCR - Landfill PH II (w/ CCGT CR 2016)																					
Cane Run CCR - Landfill PH III (w/ CCGT CR 2016)																					
Cane Run CCR - Landfill PH IV (w/ CCGT CR 2016)																					
Cane Run MSE Wall			$2.0	$1.0	$2.1																
Cane Run Ashpond and Landfill Cap & Closure			$0.233	$5.519	$2.541	$5.312	$3.004		$0.0												
Ghent CCR - Landfill Phase I (Scenario 37)	$2.7	$20.1	$11.5	$9.9	$2.60	$7.7	$0.0	$0.0	$0.0	$0.8	$0.9	$1.8									
Ghent CCR - Fines & Transport	$5.0	$39.7	$119.0	$79.1	$21.16	$10.0															
Ghent CCR - Landfill Phase II (Scenario 37)	$0.0		$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$10.2	$14.1	$0.9	$0.9	$0.9	$1.0	$1.0	$1.6	
Ghent CCR - Landfill Ph III & Capping (Scenario 37)			$0.0																		
Mill Creek CCR - Landfill Expansion			$0.0		$0.5	$6.6	1.40	$8.7	$19.2	$7.0					$11.3						
Mill Creek CCR - Transport			$0.0					$29.9	$41.4	$8.9											
TC CCR - Ponds (Net) BAP/GSP	$9.5	$7.6	($0.0)	($0.0)																	
TC CCR - Landfill (PH I) (Net) Project	$2.0	$3.9	$2.9	$3.6	$3.1	$5.09	$44.0	$37.7	$42.2	$0.7	$0.7	$0.7	$0.5	$0.7	$0.5						
TC CCR - CCR Treatment (Net)				$0.0	$0.0	$20.20	$68.1	$41.4	$22.6												
TC CCR - CCR Transport (Net)	$0.4		$6.8	$0.0	$0.0	$0.00	$11.7	$2.3	$0.3												
TC CCR - Landfill PH II (Net) Project													$28.7	$26.2	$5.6						
TC CCR - River Flyash Barge Loading (Net)	$0.5	$1.6	$6.8	$0.1																	
Env. Compliance - Air - GH 1 - SAM Mitigation	$0.2	$1.2	$0.1	($0.4)																	
Env. Compliance - Air - GH 2 - SAM Mitigation	$0.0	$1.3	$7.3	$0.0																	
Env. Compliance - Air - GH 3 - SAM Mitigation	$0.1	$1.0	$0.1																		
Env. Compliance - Air - GH 4 - SAM Mitigation	$0.2	$0.8	$0.2																		
SAM Mitigation - MC3	$0.0	$0.0	$0.0																		
SAM Mitigation - MC4	$0.0	$0.0	$0.0																		
Mill Creek Limestone Mill	$3.4	$5.0	$2.0	$0.0																	
Mercury Compliance Strategy Development	($0.2)	$0.0																			
Ohio Falls Redevelopment	$10.9	$17.3	$18.5	$13.9	11.1	15.3	16.03	3.8													
Cane Run 7	$0.24638668	$1.94858966	$66.41251702	$339.05860862	$124.38444398	$30.44945413															
Green River 5			$0.2	$3.4	2.0	0.3	0.4	2.9	97.2	496.1	169.6	44.5									
Combined Cycle GT 2023		$2.697762	($0.190167)	($2.506046)				$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0					
Simple Cycle CT 300 MW (1/16)	$0.0	$0.0	$0.00																		
Simple Cycle CT 300 MW (6/18)																					
Black Start - Paddy's Run	$0.0	$0.0	$0.00																		
Black Start - Brown	$0.0	$0.0	$0.00																		
Black Start - Trimble (Net)	$0.0	$0.0	$0.00																		
Brown Solar				$0.0	$0.3	$9.9	$24.7														
TC New Main Gate (Net)						$0.0															
Paddy's Run 1 - 6 Demolition			$1.10	$0.3	$0.3	$6.5000	$9.3000														
Canal Demolition		$0.0	$0.0	$0.0	$0.3		$7.0	$6.8	$0.000												
Paddy's Run Chimney Demolition		$0.0	$0.0																		
Pineville Demolition										$0.3	$6.0	$6.0									
Tyrone Demolition											$0.3	$6.0	$6.0								
PE Vehicle Purchases		$0.0	$0.1	$0.1	$0.1	$0.1	$0.0														
25 MW Black Start Trimble County					$0.0	$3.8	$14.0	$16.5													
25 MW Black Start Cane Run					$0.0		$3.9	$13.7	$17.7												
Cane Run Retirement/Demolition																					
Env. Compliance - Air - Studies	$0.8	$1.9	($2.7)	$0.0																	
Env. Compliance - Air - BR 1 - FF		$0.0	$0.2	($0.2)	$0.00	$0.00	$0.00														
Env. Compliance - Air - BR 1 - SAM Mitigation		$0.0	$0.0	$0.0	$0.00	$0.00	$0.00														
Env. Compliance - Air - BR 2 - FF		$0.0	$0.2	($0.2)	$0.0	$0.0	$0.0														
Env. Compliance - Air - BR 2 - SAM Mitigation		$0.0	$0.0	$0.0	$0.0	$0.0	$0.0														
Env. Compliance - Air - BR 3 - FF		$0.0	$5.0	$13.2	$41.04865100	$32.5430240															
Env. Compliance - Air - GH 1 - FF		$0.0	$10.2	$48.4	$82.6	$37.1	$0.0														
Env. Compliance - Air - GH 1 - SCR Turn-Down		$0.09	($0.1)																		
Env. Compliance - Air - GH 2 - FF		$0.0	$9.7	$20.8	$38.61	$64.32	$4.01														
Env. Compliance - Air - GH 3 - FF		$0.0	$23.6	$96.1	$51.2	$0.8	$0.0														
Env. Compliance - Air - GH 3 - SCR Turn-Down		$0.1	($0.1)																		
Env. Compliance - Air - GH 4 - FF		$0.0	$10.4	$73.2	$58.39	$8.78	$0.00														
Env. Compliance - Air - GH 4 - SCR Turn-Down		$0.1	($0.1)																		
Env. Compliance - Air - GR 3 - DFGD/FF/SCR/SAM Mit																					
Env. Compliance - Air - GR 4 - DFGD/FF/SCR/SAM Mit																					
Environmental Compliance - Air - SAM Mit. - GR 3&4			$0.00																		
Env. Compliance - Air - CR 4 - FGD/SCR/FF/SAM Mit																					
Env. Compliance - Air - CR 5 - FGD/SCR/FF/SAM Mit																					
Env. Compliance - Air - CR 6 - FGD/SCR/FF/SAM Mit																					
Environmental Compliance - Air - SAM Mit. - CR 4-6			$0.00																		
Env. Compliance - Air - MC 1 - WFGD/FF		$0.031	$14.066	$49.0	$60.96	$33.69	$5.44	$0.470													DAD
Env. Compliance - Air - MC 1 - SAM Mitigation																					
Mill Creek Distribution Drive			$1.361	$1.8																	
Env. Compliance - Air - MC Admin Bldg Non ECR				$0.8	$4.133	$0.000	$0.000	$0.000													DAD
Env. Compliance - Air - MC Admin Bldg ECR				$0.4	$3.293	$0.000	$0.000	$0.000													DAD
Env. Compliance - Air - MC 2 - WFGD/FF		$0.031	$13.566	$33.2	$90.74	$31.98	$6.86	$0.470													DAD
Env. Compliance - Air - MC 2 - SAM Mitigation																					
Mill Creek Unit 2 CEM Shelter																					
Env. Compliance - Air - MC 3 - FF/WFGD		$0.223	$8.833	$38.5	$27.47	$164.33	$49.18	$1.239													DAD
Env. Compliance - Air - MC 3 - FF																					
Env. Compliance - Air - MC 3 - SCR Turn-Down			$0.000																		
Env. Compliance - Air - MC3 CEMS Evaluation						$1.0															Dad
Env. Com- Air - MC 3 - SAM Mitigation (in FF Scope)	$0.2	$0	($0.20)																		
Env. Compliance - Air - MC3 CEMS Evaluation																					
Env. Com-Air - MC 4 - SAM Mitigation (In FF Scope)	$0.24	$0.00	($0.24)																		
Env. Compliance - Air - MC 4 - SCR Upgrade		$0.313	$1.92																		
Env. Compliance - Air - MC 4 - WFGD/FF		$0.032	$26.58	$112.4	$142.43	$21.45	$7.41	$1.308													DAD
Env. Compliance - Air - MC 4 - SCR Turn-Down		$0.0																			
Mill Creek Unit 4 CEM Shelter																					
Env. Compliance - Air - TC 1 - FF (Net)		$0.0060	$4.4883	$9.8	$37.524	$60.254	$2.325														
Environmental Compliance - CCR Ruling - Brown			$0.00	$0.0		$0.425	$7.309	$4.539	$4.636	$7.851	$8.491										
Environmental Compliance - CCR Ruling - Cane Run							$0.521														
Environmental Compliance - CCR Ruling - Ghent			$0.00		$0.183	$1.708	$70.587	$37.278	$37.924	$70.891	$73.019										
Environmental Compliance - CCR Ruling - Green River			$0.00				$0.837	$8.956	$20.375	$0.706	$7.289										
Environmental Compliance - CCR Ruling - Mill Creek			$0.00		$0.090	$0.653	$7.149	$4.777	$6.902	$13.280	$13.471										
Environmental Compliance - CCR Ruling - Pineville			$0.00				$0.196	$2.875	$0.152	$1.302											
Environmental Compliance - CCR Ruling - Trimble (Net)			$0.00		$0.131	$0.779	$18.689	$15.457	$15.881	$25.268	$27.359										
Environmental Compliance - CCR Ruling - Tyrone							$0.220	$2.954	$0.170	$1.620											
Environmental Compliance - CCR Ruling - Studies																					
Renewables - Solar																					
Renewables - Wind	$0.4																				
Renewables - Bio Mass (Co-firing 500 MW Nominal)	$0.2	$0.0	$0.00	$19.0	$38.00	$9.30	$18.50	$6.60													
Renewables - LFG	$0.1	$0.0	$0.00	$35.3																	
50 MW CCS Demonstration	$0.1	$0.2	$0.00	$12.5	$70.00	$62.50	$12.50														
Ghent 2 SCR	$0.0	$0.0	$0.00	$80.5	$109.70	$73.00															
Cooling Tower - Cane Run	$0.0	$0.0	$0.00	$9.0	$9.48																
Cooling Tower - Mill Creek	$0.0	$0.0	$0.00	$0.0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.0	$0.0	$0.0	$0.0								
Cane Run CCR - Landfill Phase I (w/out CCGT)	$0.0	$0.0	$0.00																		
Cane Run CCR - Landfill Phase II (w/out CCGT)	$0.0	$0.0	$0.00	$0.0	$0.0	$0.0	$0.0														
Cane Run CCR - Landfill Phase III (w/out CCGT)	$0.0	$0.0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0										

Includes Actuals

2013-2022 MTP/LTP												
Cane Run CCR - Landfill Phase IV (w/out CCGT)	$0.0	$0.0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
Cane Run CCR - CCGT No Landfill				$0.0	$0.0	$0.0	$0.0					
Brown CCR - ATB to Landfill Phase I	$0.0	$0.0	$0.00	$0.0								
Brown CCR - ATB to Landfill Phase II									$0.0	$0.0		
Brown CCR - ATB to Landfill Phase III												
Ghent CCR - Revised Footprint Phase I	$0.0	$0.0	$0.00	$0.0	$0.0	$0.0						
Ghent CCR - Revised Footprint Phase II							$0.0	$0.0	$0.0	$0.0	$0.0	
Ghent CCR - Revised Footprint Phase III												
Ghent CCR - Composite Liner			$0.00	$0.0	$0.0					$0.0		
TC CCR - Landfill (PH I) (Net) - 1 Year Delay	$0.0	$0.0	$0.00	$0.0								
TC CCR - CCR Transport (Net) - 1 Year Delay			$0.00	$0.0								
TC CCR - Landfill (PH I) (Net) - PH I Reduced Life	$0.0	$0.0	$0.00									
TC CCR - CCR Transport (Net) - PH I Reduced Life			$0.00									
TC CCR - Landfill (PH II/III/IV) (Net) - PH I Reduced Life									$0.0	$0.0		
Env. Compliance - Effluent Water - Studies Prelim Surv			$0.00	$0.1	$2.0	$1.0		($3.1)				
Env. Compliance - Effluent Water - Brown						$0.5		$25.0	$45.0	$50.0	$50.0	$30.0
Env. Compliance - Effluent Water - Ghent						$0.5		$25.0	$50.0	$50.0	$50.0	$50.0
Env. Compliance - Effluent Water - Green River												
Env. Compliance - Effluent Water - Cane Run												
Env. Compliance - Effluent Water - Mill Creek									$74.0	$75.0	$60.0	
Env. Compliance - Water Ruling - Mill Creek KPDES					$0.5	$1.0	$25.0	$50.0	$45.0			
Env. Compliance - Effluent Water - Trimble (Net)			$0.00			$0.5	$25.0	$50.0	$50.0	$50.0	$45.0	
Env. Compliance - Water Intake 316b - Studies			$0.00				$0.5					
Env. Compliance - Water Intake 316b - Brown								$1.5	$1.5			
Env. Compliance - Water Intake 316b - Ghent								$1.5	$1.5			
Env. Compliance - Water Intake 316b - Mill Creek								$1.5	$1.5			
Env. Compliance - Water Intake 316b - Trimble (Net)								$1.1	$1.1			
.	179.63	166.562573	427.20	$1,125.8	1,086.26	780.52	486.26	406.26	609.38	859.57	512.10	
.	2010	2011	2012	$2,013.0	2014	2015	2016	2017	2018	2019	2020	
.	$0.0											
.	$4.7											
.	$2.8											
.	$0.0											
.	$2.6	$4.2	$0.5	$0.0								
.	$0.0											
.	$0.2	$1.2	$1.3	$1.2					$0.5			
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.											$0.0	
.	$1.4	$1.0	$0.6	$0.5	$0.1	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$5.0	$2.0	$5.9	$4.0	$1.1	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.		$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.											$0.0	
.											#REF!	
.	$0.7											
.	$0.2	$0.2	$0.1	$0.2	$0.2	$0.3						
.	$0.0	$0.0	$0.0	$0.0	$0.0	$1.0						
.	$0.175	$0.1	$0.0	$0.0								
.	$0.175	$0.1	$0.0	$0.0								
.		$0.1	$0.0	$0.0								
.		$0.1	$0.0	$0.0								
.	$0.5											
.	$0.5											
.	$0.6	$0.4	$0.2									
.	$1.8	$1.4	$1.5	$1.2	$0.5	$1.3	$1.3	$0.0	$0.0	$0.0	$0.0	
.	$0.1	$0.2	$5.5	$28.3	$10.4	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.5	$0.0	($0.2)	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.4	$1.1	$3.4	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.8	$4.0	$6.9	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.8	$1.7	$3.2	$5.4	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$2.0	$8.0	$4.3	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.9	$6.1	$4.9	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$1.2	$4.1	$5.1	$2.8	$0.5	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$1.1	$2.8	$7.6	$2.7	$0.6	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.7	$3.2	$2.3	$13.7	$4.1	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$2.2	$9.4	$11.9	$1.8	$0.6	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.4	$0.8	$3.1	$5.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.4	$0.2	$0.2	$0.4	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	$3.5	$1.9	$1.9	$3.5	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.4	$1.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.4	$0.2	$0.3	$0.7	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.9	$0.8	$0.8	$1.3	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	$0.0	$0.0	$0.0	
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0					
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0					
.	$0.0	$0.0	$0.0	$1.6	$3.2	$0.8	$1.5					
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0					

			Includes Actuals								
2013-2022 MTP/LTP											
.	$0.0	$0.0	$0.0	$1.0	$5.8	$5.2	$0.0				
.	$0.0	$0.0	$0.0	$6.7	$9.1	$0.0	$0.0				
.	$0.0	$0.0	$0.0	$0.8	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.											
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1.3	$2.3	$2.5	$2.5
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1.3	$2.5	$2.5	$2.5
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	$1.3	$2.5	$0.0	$0.0	$0.0
.	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1.3	$2.5	$2.5	$2.5	$2.3
.											
.	$21.8	$10.9	$26.1	$86.6	$83.0	$40.1	$16.4	$11.3	$12.0	$13.4	#REF!
.											
Removal	**2010**	**2011**	**2012**	**$2,013.0**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**

.

TC 2 (Net) Before Fuel & Power Credit
TC 2 Commission & Start Up Consumables (Net)
TC 2 Power Credit (Net)
Trimble County 2 Spares
Brown FGD Program
Ghent 1 & 2 FGD
Ghent 3 FGD
Ghent 4 FGD
Ghent Common FGD
Brown 3 SCR
Brown 1, 2 & 3 Temp SAM Systems (Moved to BR FGD)
Brown CCR - Ash Pond (Ph I) - Elevation 902
Brown CCR - Aux Pond Phase II
Brown CCR - Landfill Phase I
Brown CCR - Landfill Phase II & III
Cane Run CCR - Landfill PH I (w/ CCGT CR 2015)
Cane Run CCR - Landfill PH II (w/ CCGT CR 2016)
Cane Run CCR - Landfill PH III (w/ CCGT CR 2016)
Cane Run CCR - Landfill PH IV (w/ CCGT CR 2016)
Cane Run MSE Wall
Cane Run Ashpond Cap & Closure
Ghent CCR - Landfill Phase I (Scenario 37)
Ghent CCR - Fines & Transport
Ghent CCR - Landfill Phase II (Scenario 37)
Ghent CCR - Landfill Ph III & Capping (Scenario 37)
Mill Creek CCR - Landfill Expansion
TC CCR - Ponds (Net) BAP/GSP
TC CCR - Landfill (PH I) (Net) Project
TC CCR - CCR Treatment (Net)
TC CCR - Landfill PH II (Net) Project
TC CCR - River Flyash Barge Loading (Net)
Env. Compliance - Air - GH 1 - SAM Mitigation
Env. Compliance - Air - GH 2 - SAM Mitigation
Env. Compliance - Air - GH 3 - SAM Mitigation
Env. Compliance - Air - GH 4 - SAM Mitigation
SAM Mitigation - MC3
SAM Mitigation - MC4
Mill Creek Limestone Mill
Mercury Compliance Strategy Development
Ohio Falls Redevelopment
Cane Run 7
Green River 5
Combined Cycle GT 2023
Simple Cycle CT 300 MW (1/16)
Simple Cycle CT 300 MW (6/18)
Black Start - Paddy's Run
Black Start - Brown
Black Start - Trimble (Net)
Paddy's Run 1 - 6 Demolition
Canal Demolition
Paddy's Run Chimney Demolition
PE Vehicle Purchases
Cane Run Retirement/Demolition
Env. Compliance - Air - Studies
Env. Compliance - Air - BR 1 - FF
Env. Compliance - Air - BR 1 - SAM Mitigation
Env. Compliance - Air - BR 2 - FF
Env. Compliance - Air - BR 2 - SAM Mitigation
Env. Compliance - Air - BR 3 - FF
Env. Compliance - Air - GH 1 - FF
Env. Compliance - Air - GH 1 - SCR Turn-Down
Env. Compliance - Air - GH 2 - FF
Env. Compliance - Air - GH 3 - FF
Env. Compliance - Air - GH 3 - SCR Turn-Down
Env. Compliance - Air - GH 4 - FF
Env. Compliance - Air - GH 4 - SCR Turn-Down
Env. Compliance - Air - GR 3 - DFGD/FF/SCR/SAM Mit
Env. Compliance - Air - GR 4 - DFGD/FF/SCR/SAM Mit
Environmental Compliance - Air - SAM Mit. - GR 3&4
Env. Compliance - Air - CR 4 - FGD/SCR/FF/SAM Mit
Env. Compliance - Air - CR 5 - FGD/SCR/FF/SAM Mit
Env. Compliance - Air - CR 6 - FGD/SCR/FF/SAM Mit
Environmental Compliance - Air - SAM Mit. - CR 4-6
Env. Compliance - Air - MC 1 - WFGD/FF
Env. Compliance - Air - MC 1 - SAM Mitigation
Mill Creek Distribution Drive
Env. Compliance - Air - MC Admin Bldg Non ECR
Env. Compliance - Air - MC Admin Bldg ECR
Env. Compliance - Air - MC 2 - WFGD/FF
Env. Compliance - Air - MC 2 - SAM Mitigation
Mill Creek Unit 2 CEM Shelter
Env. Compliance - Air - MC 3 - FF/WFGD
Env. Compliance - Air - MC 3 - FF
Env. Compliance - Air - MC 3 - SCR Turn-Down
Env. Compliance - Air - MC3 CEMS Evaluation
Env. Com- Air - MC 3 - SAM Mitigation (in FF Scope)
Env. Com-Air - MC 4 - SAM Mitigation (In FF Scope)
Env. Compliance - Air - MC 4 - SCR Upgrade
Env. Compliance - Air - MC 4 - WFGD/FF
Env. Compliance - Air - MC 4 - SCR Turn-Down
Mill Creek Unit 4 CEM Shelter
Env. Compliance - Air - TC 1 - FF (Net)
Environmental Compliance - CCR Ruling - Brown

	Includes Actuals										
2013-2022 MTP/LTP											
Environmental Compliance - CCR Ruling - Cane Run											
Environmental Compliance - CCR Ruling - Ghent											
Environmental Compliance - CCR Ruling - Green River											
Environmental Compliance - CCR Ruling - Mill Creek											
Environmental Compliance - CCR Ruling - Pineville											
Environmental Compliance - CCR Ruling - Trimble (Net)											
Environmental Compliance - CCR Ruling - Tyrone											
Environmental Compliance - CCR Ruling - Studies											
Renewables - Solar											
Renewables - Wind											
Renewables - Bio Mass (Co-firing 500 MW Nominal)											
Renewables - LFG											
50 MW CCS Demonstration											
Ghent 2 SCR											
Cooling Tower - Cane Run											
Cooling Tower - Mill Creek											
Cane Run CCR - Landfill Phase I (w/out CCGT)											
Cane Run CCR - Landfill Phase II (w/out CCGT)											
Cane Run CCR - Landfill Phase III (w/out CCGT)											
Cane Run CCR - Landfill Phase IV (w/out CCGT)											
Cane Run CCR - CCGT No Landfill											
Brown CCR - ATB to Landfill Phase I											
Brown CCR - ATB to Landfill Phase II											
Brown CCR - ATB to Landfill Phase III											
Ghent CCR - Revised Footprint Phase I											
Ghent CCR - Revised Footprint Phase II											
Ghent CCR - Revised Footprint Phase III											
Ghent CCR - Composite Liner											
TC CCR - Landfill (PH I) (Net) - 1 Year Delay											
TC CCR - CCR Transport (Net) - 1 Year Delay											
TC CCR - Landfill (PH I) (Net) - PH I Reduced Life											
TC CCR - CCR Transport (Net) - PH I Reduced Life											
TC CCR - Landfill (PH II/III/IV) (Net) - PH I Reduced Life											
Env. Compliance - Effluent Water - Studies Prelim Surv											
Env. Compliance - Effluent Water - Brown											
Env. Compliance - Effluent Water - Ghent											
Env. Compliance - Effluent Water - Green River											
Env. Compliance - Effluent Water - Cane Run											
Env. Compliance - Water Ruling - Mill Creek KPDES											
Env. Compliance - Effluent Water - Trimble (Net)											
Env. Compliance - Water Intake 316b - Studies											
Env. Compliance - Water Intake 316b - Brown											
Env. Compliance - Water Intake 316b - Ghent											
Env. Compliance - Water Intake 316b - Mill Creek											
Env. Compliance - Water Intake 316b - Trimble (Net)											
	$0.0	$0.0000	$0.000	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Fixed O&M to Comply with Regulations ($ Millions)
2015 Business Plan

(a) Mercury and Air Toxics Standards

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Brown 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Brown 3	0.0	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6
Cane Run 7	0.0	11.9	17.5	18.4	17.7	21.4	17.3	18.7	18.2	23.0
Ghent 1	0.1	1.9	2.7	2.7	2.6	2.7	2.9	3.0	3.0	3.1
Ghent 2	0.0	0.2	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.6
Ghent 3	1.5	2.1	2.1	2.3	2.3	2.4	2.4	2.5	2.5	2.6
Ghent 4	0.3	2.3	2.2	2.3	2.3	2.4	2.4	2.5	2.5	2.6
Mill Creek 1	0.0	1.5	2.5	2.4	2.5	2.5	2.5	2.5	2.6	2.6
Mill Creek 2	0.0	1.5	2.4	2.5	2.4	2.6	2.6	2.6	2.7	2.7
Mill Creek 3	0.0	0.2	2.0	2.8	2.9	2.7	2.9	2.9	3.0	3.1
Mill Creek 4	0.2	2.9	3.1	3.2	3.2	3.4	3.3	3.4	3.5	3.6
Trimble 1	0.0	0.3	2.8	2.6	3.1	2.9	2.8	2.8	2.8	2.9
Trimble 2	1.2	2.9	3.0	3.2	3.0	3.3	3.4	3.5	3.6	3.7

(b) Coal Combustion Residuals Rule

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Ghent	0.4	2.2	2.5	2.6	2.6	2.7	0.5	0.5	0.6	0.6
Mill Creek	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Trimble	-0.1	1.1	1.2	1.5	3.8	4.3	4.5	4.6	4.7	4.7

(f) Cross State Air Pollution Rule

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
LG&E/KU	0.45	0.19	0.07	0.04	0.04	0.04	0.04	0.04	0.04	0.04

KU Power Generation

Selected Data for Sierra Club IRP question
2015 BP
$$$

NON MECHANISM	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
MATS	$ 1,054	$ 2,365	$ 2,450	$ 2,628	$ 2,410	$ 2,688	$ 2,788	$ 2,845	$ 2,902	$ 2,960
CCR	-	-		-	-	-	-	-	-	-
Emission Allowances	-	-		-	-	-	-	-	-	-
New FGD	-	-		-	-	-	-	-	-	-
MECHANISM										
MATS	1,850	6,684	9,658	10,049	10,108	10,308	10,664	10,877	11,095	11,317
CCR	(206)	2,212	2,465	2,774	3,892	4,214	2,086	2,133	2,181	2,230
Emission Allowances	198	103	55	30	30	30	32	32	33	34
New FGD	(4)	-	-	-	-	-	-	-	-	-

LG&E Power Generation

Selected Data for Sierra Club IRP question
2015 BP
$$$

NON MECHANISM	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
MATS	$ 234	$ 555	$ 575	$ 616	$ 565	$ 630	$ 654	$ 667	$ 681	$ 694
CCR	-	-		-	-	-	-	-	-	-
Emission Allowances	-	-		-	-	-	-	-	-	-
New FGD	-	-		-	-	-	-	-	-	-

MECHANISM										
MATS	231	4,929	10,388	10,956	11,834	11,695	11,736	11,859	12,097	12,339
CCR	(661)	-	-	200	1,372	1,659	1,693	1,726	1,761	1,796
Emission Allowances	247	82	15	5	5	5	5	5	6	6
New FGD	-	1,457	2,440	2,577	2,239	2,296	2,355	2,416	2,478	2,542

Activated Carbon
BAG HOUSE

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
CRC	-	-	-	-	-	-	-	-	-	-
CR4	-	-	-	-	-	-	-	-	-	-
CR5	-	-	-	-	-	-	-	-	-	-
CR6	-	-	-	-	-	-	-	-	-	-
MCC	-	-	-	-	-	-	-	-	-	-
MC1	-	-	-	-	-	-	-	-	-	-
MC2	-	-	-	-	-	-	-	-	-	-
MC3	-	-	-	-	-	-	-	-	-	-
MC4	-	-	-	-	-	-	-	-	-	-
TCC	-	-	-	-	-	-	-	-	-	-
TC1	-	-	-	-	-	-	-	-	-	-
TC2	1,221	2,920	3,025	3,245	2,976	3,318	3,443	3,512	3,582	3,654
LOC	2	-	-	-	-	-	-	-	-	-
PR13	-	-	-	-	-	-	-	-	-	-
TC5	-	-	-	-	-	-	-	-	-	-
TCCTC	-	-	-	-	-	-	-	-	-	-
GR3	-	-	-	-	-	-	-	-	-	-
GR4	-	-	-	-	-	-	-	-	-	-
GRC	-	-	-	-	-	-	-	-	-	-
BRC	-	-	-	-	-	-	-	-	-	-
BR1	-	-	-	-	-	-	-	-	-	-
BR2	-	-	-	-	-	-	-	-	-	-
BR3	-	-	-	-	-	-	-	-	-	-
BRCTC	-	-	-	-	-	-	-	-	-	-
GH1	-	-	-	-	-	-	-	-	-	-
GH2	-	-	-	-	-	-	-	-	-	-
GH3	-	-	-	-	-	-	-	-	-	-
GH4	-	-	-	-	-	-	-	-	-	-
GHC	-	-	-	-	-	-	-	-	-	-
KOC	65	-	-	-	-	-	-	-	-	-
Total	1,288	2,920	3,025	3,245	2,976	3,318	3,443	3,512	3,582	3,654
LGE	234	555	575	616	565	630	654	667	681	694
KU	1,054	2,365	2,450	2,628	2,410	2,688	2,788	2,845	2,902	2,960

CRC	-	-	-	-	-	-	-	-	-	-
CR4	-	-	-	-	-	-	-	-	-	-
CR5	-	-	-	-	-	-	-	-	-	-
CR6	-	-	-	-	-	-	-	-	-	-
MCC	9	-	-	-	-	-	-	-	-	-
MC1	-	1,159	1,905	1,841	2,005	1,954	1,954	1,993	2,033	2,073
MC2	-	1,204	1,856	1,924	1,953	2,050	2,042	2,083	2,125	2,167
MC3	-	-	1,482	2,145	2,320	2,127	2,276	2,322	2,368	2,416
MC4	187	2,256	2,358	2,487	2,506	2,685	2,639	2,692	2,746	2,801
TCC	-	-	-	-	-	-	-	-	-	-
TC1	-	309	2,787	2,558	3,051	2,879	2,824	2,769	2,825	2,881
TC2	-	-	-	-	-	-	-	-	-	-
LOC	36	-	-	-	-	-	-	-	-	-
PR13	-	-	-	-	-	-	-	-	-	-
TC5	-	-	-	-	-	-	-	-	-	-
TCCTC	-	-	-	-	-	-	-	-	-	-
GR3	-	-	-	-	-	-	-	-	-	-
GR4	-	-	-	-	-	-	-	-	-	-
GRC	-	-	-	-	-	-	-	-	-	-
BRC	-	-	-	-	-	-	-	-	-	-
BR1	-	-	-	-	-	-	-	-	-	-
BR2	-	-	-	-	-	-	-	-	-	-
BR3	-	274	479	489	499	509	519	529	540	551
BRCTC	-	-	-	-	-	-	-	-	-	-
GH1	57	1,908	2,657	2,732	2,787	2,842	2,899	2,957	3,016	3,077
GH2	-	173	2,219	2,276	2,322	2,368	2,415	2,464	2,513	2,563
GH3	1,538	2,075	2,084	2,276	2,322	2,368	2,415	2,464	2,513	2,563
GH4	255	2,254	2,219	2,276	2,322	2,368	2,415	2,464	2,513	2,563
GHC	-	-	-	-	(141)	(147)	-	-	-	-
KOC	-	-	-	-	-	-	-	-	-	-
Total	2,081	11,613	20,045	21,005	21,942	22,003	22,400	22,736	23,192	23,656
LGE	231	4,929	10,388	10,956	11,834	11,695	11,736	11,859	12,097	12,339
KU	1,850	6,684	9,658	10,049	10,108	10,308	10,664	10,877	11,095	11,317

ECR CCP SYSTEM MAINTENANCE
ECR LANDFILL MAINTENANCE

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
CRC	-	-	-	-	-	-	-	-	-	-
CR4	-	-	-	-	-	-	-	-	-	-
CR5	-	-	-	-	-	-	-	-	-	-
CR6	-	-	-	-	-	-	-	-	-	-
MCC	236	200	200	200	204	208	212	216	221	225
MC1	-	-	-	-	-	-	-	-	-	-
MC2	-	-	-	-	-	-	-	-	-	-
MC3	-	-	-	-	-	-	-	-	-	-
MC4	-	-	-	-	-	-	-	-	-	-
TCC	(1,271)	-	-	384	2,638	3,191	3,255	3,320	3,386	3,454
TC1	544	412	448	412	420	428	437	446	455	464
TC2	606	738	702	738	730	722	783	799	815	831
LOC	-	-	-	-	-	-	-	-	-	-
PR13	-	-	-	-	-	-	-	-	-	-
TC5	-	-	-	-	-	-	-	-	-	-
TCCTC	-	-	-	-	-	-	-	-	-	-
GR3	-	-	-	-	-	-	-	-	-	-
GR4	-	-	-	-	-	-	-	-	-	-
GRC	-	-	-	-	-	-	-	-	-	-
BRC	-	-	-	-	-	-	-	-	-	-
BR1	-	-	-	-	-	-	-	-	-	-
BR2	-	-	-	-	-	-	-	-	-	-
BR3	-	-	-	-	-	-	-	-	-	-
BRCTC	-	-	-	-	-	-	-	-	-	-
GH1	-	-	-	-	-	-	-	-	-	-
GH2	-	-	-	-	-	-	-	-	-	-
GH3	-	-	-	-	-	-	-	-	-	-
GH4	-	-	-	-	-	-	-	-	-	-
GHC	404	2,212	2,465	2,589	2,625	2,683	524	539	555	572
KOC	-	-	-	-	-	-	-	-	-	-
Total	519	3,562	3,815	4,323	6,617	7,232	5,211	5,320	5,432	5,546
LGE	(661)	-	-	200	1,372	1,659	1,693	1,726	1,761	1,796
KU	(206)	2,212	2,465	2,774	3,892	4,214	2,086	2,133	2,181	2,230

EMISSION ALLOWANCES

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
CRC	47	0	-	-	-	-	-	-	-	-
CR4	-	-	-	-	-	-	-	-	-	-
CR5	-	-	-	-	-	-	-	-	-	-
CR6	-	-	-	-	-	-	-	-	-	-
MCC	188	82	15	5	5	5	5	5	6	6
MC1	-	-	-	-	-	-	-	-	-	-
MC2	-	-	-	-	-	-	-	-	-	-
MC3	-	-	-	-	-	-	-	-	-	-
MC4	-	-	-	-	-	-	-	-	-	-
TCC	22	-	-	-	-	-	-	-	-	-
TC1	-	-	-	-	-	-	-	-	-	-
TC2	-	-	-	-	-	-	-	-	-	-
COC	-	-	-	-	-	-	-	-	-	-
PR13	-	-	-	-	-	-	-	-	-	-
TC5	-	-	-	-	-	-	-	-	-	-
TCCTC	-	-	-	-	-	-	-	-	-	-
GR3	10	-	-	-	-	-	-	-	-	-
GR4	43	-	-	-	-	-	-	-	-	-
GRC	5	73	25	-	-	-	-	-	-	-
BRC	20	-	-	-	-	-	-	-	-	-
BR1	-	-	-	-	-	-	-	-	-	-
BR2	-	-	-	-	-	-	-	-	-	-
BR3	-	-	-	-	-	-	-	-	-	-
BRCTC	-	-	-	-	-	-	-	-	-	-
GH1	-	-	-	-	-	-	-	-	-	-
GH2	-	-	-	-	-	-	-	-	-	-
GH3	-	-	-	-	-	-	-	-	-	-
GH4	-	-	-	-	-	-	-	-	-	-
GHC	109	30	30	30	30	30	32	32	33	34
	445	185	70	35	35	35	37	38	39	39
LGE	247	82	15	5	5	5	5	5	6	6
KU	198	103	55	30	30	30	32	32	33	34

New FGD
512055

MW		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
563	CRC	-	-	-	-	-	-	-	-	-	-
155	CR4	-	-	-	-	-	-	-	-	-	-
168	CR5	-	-	-	-	-	-	-	-	-	-
240	CR6	-	-	-	-	-	-	-	-	-	-
1472	MCC	-	769	1,219	1,248	1,291	1,329	1,369	1,410	1,453	1,496
303	MC1	-	168	328	328	233	237	242	247	252	257
301	MC2	-	168	328	328	233	237	242	247	252	257
391	MC3	-	-	237	333	238	242	247	252	257	262
477	MC4	-	352	328	340	245	250	255	260	265	270
932	TCC	-	-	-	-	-	-	-	-	-	-
383	TC1	-	-	-	-	-	-	-	-	-	-
549	TC2	-	-	-	-	-	-	-	-	-	-
	LOC	-	-	-	-	-	-	-	-	-	-
	PR13	-	-	-	-	-	-	-	-	-	-
	TC5	-	-	-	-	-	-	-	-	-	-
	TCCTC	-	-	-	-	-	-	-	-	-	-
68	GR3	-	-	-	-	-	-	-	-	-	-
93	GR4	-	-	-	-	-	-	-	-	-	-
161	GRC	-	-	-	-	-	-	-	-	-	-
682	BRC	-	-	-	-	-	-	-	-	-	-
106	BR1	-	-	-	-	-	-	-	-	-	-
166	BR2	-	-	-	-	-	-	-	-	-	-
410	BR3	(3)	-	-	-	-	-	-	-	-	-
	BRCTC	-	-	-	-	-	-	-	-	-	-
479	GH1	-	-	-	-	-	-	-	-	-	-
495	GH2	-	-	-	-	-	-	-	-	-	-
489	GH3	(1)	-	-	-	-	-	-	-	-	-
469	GH4	-	-	-	-	-	-	-	-	-	-
1932	GHC	-	-	-	-	-	-	-	-	-	-
	KOC	-	-	-	-	-	-	-	-	-	-
		(4)	1,457	2,440	2,577	2,239	2,296	2,355	2,416	2,478	2,542
	LGE	-	1,457	2,440	2,577	2,239	2,296	2,355	2,416	2,478	2,542
	KU	(4)	-	-	-	-	-	-	-	-	-

budget_description	category	code	account	account_description	compute_0006	exp_category	location	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017
BR ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5623	-2729.43	0	0	0
BR ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5623	13458.71	0	0	0
BR ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5623	16456.33	0	0	0
BR FGD Misc Plant Equipment	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5630	0	0	0	0
BR SO3 Mitigation System	GEN MTC: ENVIRONMENTAL	SO3 MITIGATION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5630	75000	76500	78036	79596
BR SO3 Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5620	281695.57	0	0	0
BR SO3 Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5620	0	0	0	0
BR SO3 Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506112	SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5621	0	288396	678528	329820
BR SO3 Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506112	SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5622	0	585540	1377612	669636
BR SO3 Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5623	395834	2588444	1458438	2672262
BR SO3 Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506159	ECR SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5620	0	349959.51	360774.88	368601.65
BR SO3 Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506159	ECR SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5620	360000	368088	375456	382956
BR STM-AIR QLTY CTRL EQUIP	GEN OPS: ENVIRONMENTAL	ENVIRONMENTAL-OTHER	506001	STEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	5620	18509	18879	19257	19642
BR.Air Quality-Other	GEN MTC: ENVIRONMENTAL	EMISSION MONITORING	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5620	0	0	0	0
BR3 Annual Baghouse Maint	GEN O M: COST OF SALES	BAG HOUSE	512156	ECR BAGHOUSE MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5623	0	274001	479004	489000
BR3 SCR Ammonia	GEN O M: COST OF SALES	SCR AMMONIA	506154	ECR NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5623	849141	465153	477077	523291
Brown Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5620	9.17	0	0	0
Brown Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	506154	ECR NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5620	-89000	0	0	0
Brown Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	506154	ECR NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5620	-198012.63	0	0	0
Brown Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5620	7559.12	0	0	0
Brown Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5620	12916.48	0	0	0
Brown Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5620	91000	0	0	0
Brown allowance	GEN O M: COST OF SALES	EMISSIONS	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5621	0	0	0	0
Brown allowance	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5621	0	0	0	0
Brown allowance	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5622	0	0	0	0
Brown allowance	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5623	0	0	0	0
Brown allowance	GEN O M: COST OF SALES	EMISSIONS	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5620	0	0	0	0
CCP SYS MAINT	GEN MTC: CCP DISPOSAL	CCP REMOVAL SYSTEMS	512108	ECR CCP SYSTEM MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	0	0	0	384000
CR Emissions allowances	GEN O M: COST OF SALES	EMISSIONS	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	181	181	0	0
CR Emissions allowances	GEN O M: COST OF SALES	EMISSIONS	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0141	0	0	0	0
CR Emissions allowances	GEN O M: COST OF SALES	EMISSIONS	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0151	0	0	0	0
CR Emissions allowances	GEN O M: COST OF SALES	EMISSIONS	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0161	0	0	0	0
CR Emissions allowances	GEN O M: COST OF SALES	EMISSIONS	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	47	47	0	0
CR Emissions allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	0	0	0	0
CR Emissions allowances	GEN O M: COST OF SALES	EMISSIONS	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	0	0	0	0
CR Fcst OCOS	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	-98266	0	0	0
CR Fcst OCOS	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	-105	0	0	0
CR Fcst OCOS	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	14531	0	0	0
CR Fcst OCOS	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	30	0	0	0
CR Fcst OCOS	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	32762	0	0	0
Cane Run Fixation Lime	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	0	0	0	0
Cane Run Fixation Lime	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0141	130817	33543	0	0
Cane Run Fixation Lime	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0151	183790	56792	0	0
Cane Run Fixation Lime	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0161	71859	0	0	0
Cane Run Fuelworx Charges	GEN O M: COST OF SALES	SCRUBBER REACTANT	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0141	0	0	0	0
Cane Run Fuelworx Charges	GEN O M: COST OF SALES	SCRUBBER REACTANT	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0151	0	0	0	0
Cane Run Fuelworx Charges	GEN O M: COST OF SALES	SCRUBBER REACTANT	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0161	0	0	0	0
Company Labor	GEN OPS: PLANT OPERATION	OPERATIONS - GEN PLANT	506001	STEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	PPLETO: TOTAL OPERATING EXPENSE	CLAB: CORE LABOR	0321	0	0	0	0
Company Labor	GEN OPS: PLANT OPERATION	OPERATIONS - GEN PLANT	506105	OPERATION OF SCR/NOX REDUCTION EQUIP	PPLETO: TOTAL OPERATING EXPENSE	CLAB: CORE LABOR	0301	0	0	0	0
Company Labor	GEN OPS: PLANT OPERATION	OPERATIONS - GEN PLANT	506105	OPERATION OF SCR/NOX REDUCTION EQUIP	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	0301	0	0	0	0
GH ASH DISPOSAL	GEN O M: COST OF SALES	ECR CCP DISPOSAL	512107	ECR LANDFILL MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	695932.71	791630.96	836034.86
GH Activated Carbon	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5651	0	1500457	2212760	2275984
GH Activated Carbon	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5652	0	172892	2219212	2275985
GH Activated Carbon	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5653	1537690	2074706	2083737	2275985
GH Activated Carbon	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5654	255191	2253772	2219212	2275984
GH Baghouse	GEN O M: COST OF SALES	BAG HOUSE	512156	ECR BAGHOUSE MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5651	56926.01	408001.2	443994	455994
GH ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5653	-1281.44	0	0	0
GH ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5652	9949.04	0	0	0
GH ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5652	624.66	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	-753799.39	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	-2109850.5	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506159	ECR SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	18362.93	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	60444.57	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5657	-367087.97	0	0	0
GH Forecast Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	-251492.73	0	0	0
GH GYPSUM DISPOSAL	GEN O M: COST OF SALES	ECR CCP DISPOSAL	512107	ECR LANDFILL MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	695932.71	791630.96	836034.86
GH SO3 Operations	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506159	ECR SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5654	488000	0	0	0
GH SO3 Operations	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506159	ECR SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	688704	710848	733532
GH.Absorber	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5650	0	0	0	0
GH.SO3 Mitigation Equip	GEN MTC: ENVIRONMENTAL	SO3 MITIGATION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5657	0	0	0	0
GH.SO3 Mitigation Equip	GEN MTC: ENVIRONMENTAL	SO3 MITIGATION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	413040.23	347996.4	410001.8	422003.2
GH.STM OPER - SO3 MITIGATION	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5651	3934639	2485772	2962700	3081731
GH.STM OPER - SO3 MITIGATION	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5652	591321	1358326	1708517	1771995
GH.STM OPER - SO3 MITIGATION	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5653	3199376	1382815	1394973	1540868
GH.STM OPER - SO3 MITIGATION	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5654	3725926	2253248	2228500	2311298
GH.STM OPER-SCR	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5651	1685240.65	1112927	1319874	1375097
GH.STM OPER-SCR	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5653	1415629.3	1291379	1359645	1419079
GH.STM OPER-SCR	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5654	1494315.95	1401607	1338181	1443869
GH.STM OPER-SCR	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0
GH3 2014 Outage	GEN O M: OUTAGES	GHENT 3	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5653	0	0	0	0
GR Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5616	23816	0	0	0
GR Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5616	-25948	0	0	0
GR Fcst Cost of Sales	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5616	916	0	0	0
GR.STM-AIR QLTY CTRL EQUIP	GEN OPS: PLANT OPERATION	OPERATIONS - GEN PLANT	506001	STEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	PPLETO: TOTAL OPERATING EXPENSE	CLAB: CORE LABOR	5616	0	0	0	0
GR.STM-AIR QLTY CTRL EQUIP	GEN OPS: PLANT OPERATION	OPERATIONS - GEN PLANT	506001	STEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	5616	253.11	0	0	0
GS LGE Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0401	-23800	0	0	0
GS LGE Gross Margin	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5591	-23800	0	0	0
Ghent CCR Maintenance	GEN O M: COST OF SALES	ECR CCP DISPOSAL	512107	ECR LANDFILL MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	347965.8	395815.52	418017.33
Ghent Maintenance Labor	GEN MTC: ALL OTHER MAINT.	OTHER MAINTENANCE	512107	ECR LANDFILL MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5657	404107.88	472181.94	486358.8	499143.4
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	30000	0	0	0
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0

budget_description	category	code	account	account_description	compute_0006	exp_category	location	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5651	0	0	0	0
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5652	0	0	0	0
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5653	0	0	0	0
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5654	0	0	0	0
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	30000	30000	30000
Ghent allowances	GEN O M: COST OF SALES	EMISSIONS	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5657	0	0	0	0
Green River allowances	GEN O M: COST OF SALES	EMISSIONS	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5616	1632.15	72876	24780	0
Green River allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5613	9665.09	0	0	0
Green River allowances	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5614	43410.96	0	0	0
Green River allowances	GEN O M: COST OF SALES	EMISSIONS	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5616	4364.2	0	0	0
Gypsum	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5650	-440000	-440000	-440000	-440000
Gypsum Handling	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	1500000	1380000	1416000	1452000
Gypsum Handling	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502011	ECR OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	0	0	0	0
Hydrated Lime System	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506112	SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	1082454	4701802	4782732.32	5208870.5
Hydrated Lime System	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	1538916	3112655	3600710.99	3275011.56
Incremental Ash Hauling	GEN O M: COST OF SALES	ECR CCP DISPOSAL	502011	ECR OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	200000	200000	200000	200000
Landfill Maintenance	GEN MTC: CCP DISPOSAL	CCP REMOVAL SYSTEMS	512107	ECR LANDFILL MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	0	0	0	0
MC Ammonia System	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0231	1300669	1057998	928868	1064877
MC Ammonia System	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0241	1316275	1189664	1305837	1426125
MC Ash Pond Rim Ditch	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	252000	264000	276000	286000
MC BY PRODUCTS	GEN OPS: PLANT OPERATION	BY-PRODUCTS	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	0	0	0	0
MC Hydrated Lime	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0211	0	250548	439340	423643
MC Hydrated Lime	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0221	0	264753	420277	451527
MC Hydrated Lime	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0231	0	0	706719	1307773
MC Hydrated Lime	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0241	98005	1310234	1430106	1567800
MC WFGD Maintenance	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	0201	0	769109.94	1218636.25	1248310.59
MC WFGD Maintenance	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0212	0	167999.52	227997.6	227997.6
MC WFGD Maintenance	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0222	0	167999.52	227997.6	227997.6
MC WFGD Maintenance	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0232	0	0	136998.6	232997.6
MC WFGD Maintenance	GEN MTC: ENVIRONMENTAL	FGDS	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0242	0	251999.28	227997.6	239997.6
MC1 Spring 2016 FGD Outage	GEN O M: OUTAGES	MILL CREEK 1	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0212	0	0	100000.22	0
MC1 Spring 2017 FGD Outage	GEN O M: OUTAGES	MILL CREEK 1	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0212	0	0	0	99999.04
MC2 Spring 2016 FGD Outage	GEN O M: OUTAGES	MILL CREEK 2	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0222	0	0	99999.04	0
MC2 Spring 2017 FGD Outage	GEN O M: OUTAGES	MILL CREEK 2	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0222	0	0	0	100000.43
MC3 Fall 2016 FGD Outage	GEN O M: OUTAGES	MILL CREEK 3	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0232	0	0	100000.22	0
MC3 Fall 2017 FGD Outage	GEN O M: OUTAGES	MILL CREEK 3	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0232	0	0	0	100000.22
MC4 Fall 2015 FGD Outage	GEN O M: OUTAGES	MILL CREEK 4	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0242	0	100000.22	0	0
MC4 Fall 2016 FGD Outage	GEN O M: OUTAGES	MILL CREEK 4	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0242	0	0	100000.22	0
MC4 Fall 2017 FGD Outage	GEN O M: OUTAGES	MILL CREEK 4	512055	ECR MAINTENANCE-SDRS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0242	0	0	0	100000.22
MCACTCAR	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0211	0	727166	1255948	1180000
MCACTCAR	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0221	0	771888	1206910	1263381
MCACTCAR	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0231	0	0	808715	1458116
MCACTCAR	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0241	120281	1556233	1673101	1787127
MCPJFF	GEN O M: COST OF SALES	BAG HOUSE	512156	ECR BAGHOUSE MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0211	0	431995.68	648993.52	660993.52
MCPJFF	GEN O M: COST OF SALES	BAG HOUSE	512156	ECR BAGHOUSE MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0221	0	431995.68	648993.52	660993.52
MCPJFF	GEN O M: COST OF SALES	BAG HOUSE	512156	ECR BAGHOUSE MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0231	0	0	672993.52	686993.52
MCPJFF	GEN O M: COST OF SALES	BAG HOUSE	512156	ECR BAGHOUSE MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0241	66254.72	699993.52	684993.52	699993.52
Mercury Monitoring Ops - LGE	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	5591	3933.64	0	0	0
Mercury Monitoring Ops - LGE	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0401	26295.07	0	0	0
Mercury Monitoring Ops - LGE	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5591	84735.55	0	0	0
Mercury Monitoring Ops - LGE	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506150	ECR MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	0401	2283.71	0	0	0
Mercury Monitoring Ops - LGE	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506150	ECR MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0401	33765.31	0	0	0
Mercury Monitoring Ops - LGE	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506150	ECR MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	5591	0	0	0	0
Mill Creek Emissions Allow	GEN O M: COST OF SALES	EMISSIONS	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	1000	82000	15000	5000
Mill Creek Emissions Allow	GEN O M: COST OF SALES	EMISSIONS	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	0	0	0	0
Mill Creek Emissions Allow	GEN O M: COST OF SALES	EMISSIONS	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	0	0	0	0
Mill Creek Emissions Allow	GEN O M: COST OF SALES	EMISSIONS	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	92000	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	-408010	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	502011	ECR OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	35660	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	-1141832	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	-34629	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	103035	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	5915	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	-13517	0	0	0
Mill Creek Forecast OCOS	GEN O M: COST OF SALES	SCRUBBER REACTANT	512153	ECR MERCURY MONITORS MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0201	8534	0	0	0
Poz-o-tec hauling	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0101	941776	212494	0	0
Pulse Jet Fabric Filter	GEN MTC: ENVIRONMENTAL	BAG HOUSE	512011	INSTR/CNTRL-ENVRNL	PPLETO: TOTAL OPERATING EXPENSE	CLAB: CORE LABOR	0311	0	0	0	0
Pulse Jet Fabric Filter	GEN MTC: ENVIRONMENTAL	BAG HOUSE	512011	INSTR/CNTRL-ENVRNL	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	0311	0	0	0	0
Pulse Jet Fabric Filter	GEN MTC: ENVIRONMENTAL	BAG HOUSE	512011	INSTR/CNTRL-ENVRNL	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	0321	54453	55543.95	113309.81	115576.08
SCR Maint / Oper	GEN MTC: ENVIRONMENTAL	SCR	506105	OPERATION OF SCR/NOX REDUCTION EQUIP	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	0301	0	0	0	0
SCR Systems - MC	GEN MTC: ENVIRONMENTAL	SCR	506105	OPERATION OF SCR/NOX REDUCTION EQUIP	PPLETO: TOTAL OPERATING EXPENSE	CLAB: CORE LABOR	0201	0	0	0	0
SCR Systems - MC	GEN MTC: ENVIRONMENTAL	SCR	506105	OPERATION OF SCR/NOX REDUCTION EQUIP	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	0201	0	0	0	0
SO2 emission allowances	GEN O M: COST OF SALES	EMISSION ALLOWANCES	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	0	0	0
SO2 emission allowances	GEN O M: COST OF SALES	EMISSION ALLOWANCES	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	0	0	0
SO2 emission allowances	GEN O M: COST OF SALES	EMISSION ALLOWANCES	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	0	0	0	0
SO2 emission allowances	GEN O M: COST OF SALES	EMISSION ALLOWANCES	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	0	0	0
SO2 emission allowances	GEN O M: COST OF SALES	EMISSION ALLOWANCES	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	0	0	0	0
SO3 Hydrated Lime System	GEN MTC: ENVIRONMENTAL	SO3 MITIGATION	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	0	0	0	0
SO3 Hydrated Lime System	GEN MTC: ENVIRONMENTAL	SO3 MITIGATION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	0301	0	0	0	0
SO3 Hydrated Lime System	GEN MTC: ENVIRONMENTAL	SO3 MITIGATION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	0	0	0	0
Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0231	0	0	38003.36	39003.36
Sorbent Injection	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0241	3000	44003.36	39003.36	39003.36
TC AMMONIA FORECAST	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	-514404	0	0	0
TC ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	-98131.44	0	0	0
TC ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	0	0	0
TC ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	0	0	0	0
TC ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	506150	ECR MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	0	0	0
TC ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	506150	ECR MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	0	0	0	0
TC ECR TRANSFER	GEN MTC: ENVIRONMENTAL	FGDS	506159	ECR SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	98131.44	0	0	0

budget_description	category	code	account	account_description	compute_0006	exp_category	location	amt_1_1_2014	amt_2_1_2015	amt_3_1_2016	amt_4_1_2017
TC FERC FORECAST	GEN MTC: ALL OTHER MAINT.	OTHER MAINTENANCE	512152	ECR SORBENT INJECTION MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	28000	0	0	0
TC Hydrated Lime Operations	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	0	0	0	0
TC Hydrated Lime Operations	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	310908	239508	244446.48	249529.56
TC Hydrated Lime Operations	GEN O M: COST OF SALES	SO3 SORBENT INJECTION	506159	ECR SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	239508	244446.48	249529.56
TC NOX Emmision allowances	GEN O M: COST OF SALES	EMISSION ALLOWANCES	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	0	0	0
TC OCOS FCST	GEN O M: COST OF SALES	SCRUBBER REACTANT	506109	SORBENT INJECTION OPERATION	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	-297860	0	0	0
TC OCOS FCST	GEN O M: COST OF SALES	SCRUBBER REACTANT	506155	ECR OPERATION OF SCR/NOX REDUCTION EQUIP	PPLCTL: TOTAL COST OF SALES	CLAB: CORE LABOR	0301	6721	0	0	0
TC OCOS FCST	GEN O M: COST OF SALES	SCRUBBER REACTANT	509002	SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	2	0	0	0
TC OCOS FCST	GEN O M: COST OF SALES	SCRUBBER REACTANT	509003	NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	1529	0	0	0
TC OCOS FCST	GEN O M: COST OF SALES	SCRUBBER REACTANT	509052	ECR SO2 EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	9	0	0	0
TC OCOS FCST	GEN O M: COST OF SALES	SCRUBBER REACTANT	509053	ECR NOX EMISSION ALLOWANCES	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	20522	0	0	0
TC PAC FCST	GEN O M: COST OF SALES	ACTIVATED CARBON	506111	ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	-2333400	0	0	0
TC SO3 FCST	GEN O M: COST OF SALES	SO3 REACTANT	506112	SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	846144	0	0	0
TC SO3 FCST	GEN O M: COST OF SALES	SO3 REACTANT	506152	ECR SORBENT REACTANT - REAGENT ONLY	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	784584	0	0	0
TC WASTE DISP FCST	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	161382	0	0	0
TC WASTE DISP FCST	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502011	ECR OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	-1270931	0	0	0
TC-WASTE	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502001	OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	85236	87792	90423.36	93136.08
TC1 ACTIVATED CARBON	GEN O M: COST OF SALES	ACTIVATED CARBON	506151	ECR ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	273493	2348930.28	2112498.9
TC1 ACTIVATED CARBON	GEN O M: COST OF SALES	ACTIVATED CARBON	512156	ECR BAGHOUSE MAINTENANCE	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	36000	438000	446000.04
TC2 Activated Carbon	GEN O M: COST OF SALES	ACTIVATED CARBON	506111	ACTIVATED CARBON	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	3400654	2763341	2808193.4	3023754.2
TC2 ECR TRANSFER-KU	GEN MTC: ENVIRONMENTAL	FGDS	506110	MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	0	0	0	0
TC2 ECR TRANSFER-KU	GEN MTC: ENVIRONMENTAL	FGDS	506150	ECR MERCURY MONITORS OPERATIONS	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	0	0	0	0
TC2 Powder Activated Carbon System	GEN MTC: ENVIRONMENTAL	BAG HOUSE	512011	INSTR/CNTRL-ENVRNL	PPLETO: TOTAL OPERATING EXPENSE	CNLB: CORE NONLABOR	0321	99125	101110.02	103132.16	105194.85
TCAMMONIA	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	1451439	867938	1012089.87	936280.27
TCAMMONIA	GEN O M: COST OF SALES	SCR AMMONIA	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	1531386	1769362	1814218.02	2009663.44
TCGYPSUM	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502011	ECR OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0301	0	0	0	0
TCGYPSUM	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502011	ECR OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	544072	411630	448422.64	411840.37
TCGYPSUM	GEN O M: COST OF SALES	OTHER WASTE DISPOSAL	502011	ECR OTHER WASTE DISPOSAL	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0321	605931	738369	701577.38	738159.64
Trimbl County Fuelworx Charges	GEN O M: COST OF SALES	SCRUBBER REACTANT	506104	NOX REDUCTION REAGENT	PPLCTL: TOTAL COST OF SALES	CNLB: CORE NONLABOR	0311	0	0	0	0

amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Plant					
0	-	-	-	-	-	(2,729)	BR3	BR3FGDS	BR3ECR MAINTENANCE-SDRS	BR3CR MAINTENANCE-SD	BR3512055	BR3New FGD
0	-	-	-	-	-	13,459	BR3	BR3FGDS	BR3ECR SORBENT INJECTION MAINTENANCE	BR3JECTION MAINTENAN	BR3512152	BR3ESO3
0	-	-	-	-	-	16,456	BR3	BR3FGDS	BR3ECR SORBENT INJECTION MAINTENANCE	BR3JECTION MAINTENAN	BR3512152	BR3ESO3
0	-	-	-	-	-	-	BRC	BRCFGDS	BRCECR MAINTENANCE-SDRS	BRCCR MAINTENANCE-SD	BRC51205	BRCNew FGD
81187.92	82,812	84,467	86,155	87,882	89,641	821,277	BRC	BRCSO3 MITIGATION	BRCECR SORBENT INJECTION MAINTENANCE	BRCJECTION MAINTENAN	BRC51215	BRCESO3
0	-	-	-	-	-	281,696	BRC	BRCSO3 SORBENT INJECTION	BRCSORBENT INJECTION OPERATION	BRCINJECTION OPERATIC	BRC50610	BRCSO3
0	-	-	-	-	-	-	BRC	BRCSO3 SORBENT INJECTION	BRCSORBENT INJECTION OPERATION	BRCINJECTION OPERATIC	BRC50610	BRCSO3
280347	257,359	350,005	356,997	364,154	371,443	3,277,049	BR1	BR1SO3 SORBENT INJECTION	BR1SORBENT REACTANT - REAGENT ONLY	BR1TANT - REAGENT ONL	BR1506112	BR1SO3
578731.6	566,319	484,787	519,695	556,529	595,435	5,934,285	BR2	BR2SO3 SORBENT INJECTION	BR2SORBENT REACTANT - REAGENT ONLY	BR2TANT - REAGENT ONL	BR2506112	BR2SO3
2351517.8	2,289,787	2,308,867	2,413,847	2,523,872	2,639,183	21,642,051	BR3	BR3SO3 SORBENT INJECTION	BR3ECR SORBENT REACTANT - REAGENT ONLY	BR3TANT - REAGENT ONL	BR3506152	BR3ESO3
378077.1	419,342	431,922	444,880	458,215	471,970	3,683,742	BRC	BRCSO3 SORBENT INJECTION	BRCECR SORBENT INJECTION OPERATION	BRCINJECTION OPERATIC	BRC50615	BRCESO3
390615.12	398,427	406,393	414,512	422,822	431,285	3,950,554	BRC	BRCSO3 SORBENT INJECTION	BRCECR SORBENT INJECTION OPERATION	BRCINJECTION OPERATIC	BRC50615	BRCESO3
20034.84	20,436	20,844	21,261	21,687	22,121	202,670	BRC	BRCENVIRONMENTAL-OTHER	BRCSTEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	BRCD CONTROL EQUIPME	BRC50600	BRCOTHER
0	-	-	-	-	-	-	BRC	BRCEMISSION MONITORING	BRCECR SORBENT INJECTION MAINTENANCE	BRCJECTION MAINTENAN	BRC51215	BRCESO3
498780	508,756	518,927	529,294	539,905	550,712	4,388,378	BR3	BR3BAG HOUSE	BR3ECR BAGHOUSE MAINTENANCE	BR3AGHOUSE MAINTENA	BR3512156	BR3EMATS
590285.94	533,792	534,165	544,848	555,745	566,860	5,640,359	BR3	BR3SCR AMMONIA	BR3ECR NOX REDUCTION REAGENT	BR3X REDUCTION REAGE	BR3506154	BR3ESCR
0	-	-	-	-	-	9	BRC	BRCOTHER WASTE DISPOSAL	BRCNOX REDUCTION REAGENT	BRCX REDUCTION REAGE	BRC50610	BRCSCR
0	-	-	-	-	-	(89,000)	BRC	BRCOTHER WASTE DISPOSAL	BRCECR NOX REDUCTION REAGENT	BRCX REDUCTION REAGE	BRC50615	BRCESCR
0	-	-	-	-	-	(198,013)	BRC	BRCOTHER WASTE DISPOSAL	BRCECR NOX REDUCTION REAGENT	BRCX REDUCTION REAGE	BRC50615	BRCESCR
0	-	-	-	-	-	7,559	BRC	BRCOTHER WASTE DISPOSAL	BRCNOX EMISSION ALLOWANCES	BRCEMISSION ALLOWAN	BRC50900	BRCEEA
0	-	-	-	-	-	12,916	BRC	BRCOTHER WASTE DISPOSAL	BRCECR NOX EMISSION ALLOWANCES	BRCEMISSION ALLOWAN	BRC50905	BRCEEA
0	-	-	-	-	-	91,000	BRC	BRCOTHER WASTE DISPOSAL	BRCECR SORBENT INJECTION MAINTENANCE	BRCJECTION MAINTENAN	BRC51215	BRCESO3
0	-	-	-	-	-	-	BR1	BR1EMISSIONS	BR1NOX EMISSION ALLOWANCES	BR1EMISSION ALLOWANC	BR1509003	BR1EEA
0	-	-	-	-	-	-	BR1	BR1EMISSIONS	BR1ECR SO2 EMISSION ALLOWANCES	BR1EMISSION ALLOWANC	BR1509052	BR1EEA
0	-	-	-	-	-	-	BR2	BR2EMISSIONS	BR2ECR SO2 EMISSION ALLOWANCES	BR2EMISSION ALLOWANC	BR2509052	BR2EEA
0	-	-	-	-	-	-	BR3	BR3EMISSIONS	BR3ECR SO2 EMISSION ALLOWANCES	BR3EMISSION ALLOWANC	BR3509052	BR3EEA
0	-	-	-	-	-	-	BRC	BRCEMISSIONS	BRCECR NOX EMISSION ALLOWANCES	BRCEMISSION ALLOWAN	BRC50905	BRCEEA
1187000	1,210,000	1,234,200	1,258,884	1,284,062	1,309,743	7,867,889	TCC	TCCCCP REMOVAL SYSTEMS	TCCECR CCP SYSTEM MAINTENANCE	TCC SYSTEM MAINTENAN	TCC51210	TCCECCP
0	-	-	-	-	-	362	CRC	CRCEMISSIONS	CRCSO2 EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50900	CRCEEA
0	-	-	-	-	-	-	CR4	CR4EMISSIONS	CR4SO2 EMISSION ALLOWANCES	CR4EMISSION ALLOWANC	CR4509002	CR4EEA
0	-	-	-	-	-	-	CR5	CR5EMISSIONS	CR5SO2 EMISSION ALLOWANCES	CR5EMISSION ALLOWANC	CR5509002	CR5EEA
0	-	-	-	-	-	-	CR6	CR6EMISSIONS	CR6SO2 EMISSION ALLOWANCES	CR6EMISSION ALLOWANC	CR6509002	CR6EEA
0	-	-	-	-	-	94	CRC	CRCEMISSIONS	CRCNOX EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50900	CRCEEA
0	-	-	-	-	-	-	CRC	CRCEMISSIONS	CRCECR SO2 EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50905	CRCEEA
0	-	-	-	-	-	-	CRC	CRCEMISSIONS	CRCECR NOX EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50905	CRCEEA
0	-	-	-	-	-	(98,266)	CRC	CRCOTHER WASTE DISPOSAL	CRCOTHER WASTE DISPOSAL	CRCTHER WASTE DISPOS	CRC50200	CRCCCP
0	-	-	-	-	-	(105)	CRC	CRCOTHER WASTE DISPOSAL	CRCSO2 EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50900	CRCEEA
0	-	-	-	-	-	14,531	CRC	CRCOTHER WASTE DISPOSAL	CRCNOX EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50900	CRCEEA
0	-	-	-	-	-	30	CRC	CRCOTHER WASTE DISPOSAL	CRCECR SO2 EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50905	CRCEEA
0	-	-	-	-	-	32,762	CRC	CRCOTHER WASTE DISPOSAL	CRCECR NOX EMISSION ALLOWANCES	CRCEMISSION ALLOWAN	CRC50905	CRCEEA
0	-	-	-	-	-	-	CRC	CRCOTHER WASTE DISPOSAL	CRCOTHER WASTE DISPOSAL	CRCTHER WASTE DISPOS	CRC50200	CRCCCP
0	-	-	-	-	-	164,360	CR4	CR4OTHER WASTE DISPOSAL	CR4OTHER WASTE DISPOSAL	CR4THER WASTE DISPOS	CR4502001	CR4CCP
0	-	-	-	-	-	240,582	CR5	CR5OTHER WASTE DISPOSAL	CR5OTHER WASTE DISPOSAL	CR5THER WASTE DISPOS	CR5502001	CR5CCP
0	-	-	-	-	-	71,859	CR6	CR6OTHER WASTE DISPOSAL	CR6OTHER WASTE DISPOSAL	CR6THER WASTE DISPOS	CR6502001	CR6CCP
0	-	-	-	-	-	-	CR4	CR4SCRUBBER REACTANT	CR4OTHER WASTE DISPOSAL	CR4THER WASTE DISPOS	CR4502001	CR4CCP
0	-	-	-	-	-	-	CR5	CR5SCRUBBER REACTANT	CR5OTHER WASTE DISPOSAL	CR5THER WASTE DISPOS	CR5502001	CR5CCP
0	-	-	-	-	-	-	CR6	CR6SCRUBBER REACTANT	CR6OTHER WASTE DISPOSAL	CR6THER WASTE DISPOS	CR6502001	CR6CCP
0	-	-	-	-	-	-	TC2	TC2OPERATIONS - GEN PLANT	TC2STEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	TC2D CONTROL EQUIPME	TC2506001	TC2OTHER
0	-	-	-	-	-	-	TCC	TCCOPERATIONS - GEN PLANT	TCCOPERATION OF SCR/NOX REDUCTION EQUIP	TCCNOX REDUCTION EQU	TCC50610	TCCSCR
0	-	-	-	-	-	-	TCC	TCCOPERATIONS - GEN PLANT	TCCOPERATION OF SCR/NOX REDUCTION EQUIP	TCCNOX REDUCTION EQU	TCC50610	TCCSCR
852754.99	869,810	-	-	-	-	4,046,164	GHC	GHCECR CCP DISPOSAL	GHCECR LANDFILL MAINTENANCE	GHCANDFILL MAINTENAN	GHC51210	GHCECCP
2321503.68	2,367,934	2,415,274	2,463,525	2,512,914	2,563,213	20,633,565	GH1	GH1ACTIVATED CARBON	GH1ECR ACTIVATED CARBON	GH1CR ACTIVATED CARB	GH1506151	GH1EMATS
2321504.7	2,367,935	2,415,275	2,463,526	2,512,915	2,563,214	19,312,459	GH2	GH2ACTIVATED CARBON	GH2ECR ACTIVATED CARBON	GH2CR ACTIVATED CARB	GH2506151	GH2EMATS
2321504.7	2,367,935	2,415,275	2,463,526	2,512,915	2,563,214	22,616,488	GH3	GH3ACTIVATED CARBON	GH3ECR ACTIVATED CARBON	GH3CR ACTIVATED CARB	GH3506151	GH3EMATS
2321503.68	2,367,934	2,415,274	2,463,525	2,512,914	2,563,213	21,648,523	GH4	GH4ACTIVATED CARBON	GH4ECR ACTIVATED CARBON	GH4CR ACTIVATED CARB	GH4506151	GH4EMATS
465113.88	474,416	483,901	493,568	503,463	513,540	4,298,917	GH1	GH1BAG HOUSE	GH1ECR BAGHOUSE MAINTENANCE	GH1AGHOUSE MAINTENA	GH151215	GH1EMATS
0	-	-	-	-	-	(1,281)	GH3	GH3FGDS	GH3ECR MAINTENANCE-SDRS	GH3CR MAINTENANCE-SD	GH351205	GH3New FGD
0	-	-	-	-	-	9,949	GH2	GH2FGDS	GH2ECR SORBENT INJECTION MAINTENANCE	GH2JECTION MAINTENAN	GH2512152	GH2ESO3
0	-	-	-	-	-	625	GH2	GH2FGDS	GH2ECR SORBENT INJECTION MAINTENANCE	GH2JECTION MAINTENAN	GH251215	GH2ESO3
8800	17,776	-	-	-	-	26,576	GHC	GHCSO3 SORBENT INJECTION	GHCOTHER WASTE DISPOSAL	GHCTHER WASTE DISPO	GHC50200	GHCCCP
-383010	(466,041)	-	-	-	-	(1,602,850)	GHC	GHCSO3 SORBENT INJECTION	GHCNOX REDUCTION REAGENT	GHCX REDUCTION REAGE	GHC50610	GHCSCR
-141441	(147,173)	-	-	-	-	(288,614)	GHC	GHCSO3 SORBENT INJECTION	GHCECR ACTIVATED CARBON	GHCCR ACTIVATED CARB	GHC50615	GHCEMATS
-101938	14,430	-	-	-	-	(2,197,359)	GHC	GHCSO3 SORBENT INJECTION	GHCECR SORBENT REACTANT - REAGENT ONLY	GHCTANT - REAGENT ONI	GHC50615	GHCESO3
-220397	(208,185)	-	-	-	-	(428,582)	GHC	GHCSO3 SORBENT INJECTION	GHCECR SORBENT INJECTION OPERATION	GHCINJECTION OPERATI	GHC50615	GHCESO3
0	-	-	-	-	-	18,363	GHC	GHCSO3 SORBENT INJECTION	GHCNOX EMISSION ALLOWANCES	GHCEMISSION ALLOWAN	GHC50900	GHCEEA
-600	(1,212)	-	-	-	-	(1,812)	GHC	GHCSO3 SORBENT INJECTION	GHCECR SO2 EMISSION ALLOWANCES	GHCEMISSION ALLOWAN	GHC50905	GHCEEA
0	-	-	-	-	-	60,445	GHC	GHCSO3 SORBENT INJECTION	GHCECR NOX EMISSION ALLOWANCES	GHCEMISSION ALLOWAN	GHC50905	GHCEEA
0	-	-	-	-	-	34,116	GHC	GHCSO3 SORBENT INJECTION	GHCECR MAINTENANCE-SDRS	GHCCR MAINTENANCE-SD	GHC51205	GHCNew FGD
0	-	-	-	-	-	(367,088)	GHC	GHCSO3 SORBENT INJECTION	GHCECR SORBENT INJECTION MAINTENANCE	GHCJECTION MAINTENAN	GHC51215	GHCESO3
0	-	-	-	-	-	(251,493)	GHC	GHCSO3 SORBENT INJECTION	GHCECR SORBENT INJECTION MAINTENANCE	GHCJECTION MAINTENAN	GHC51215	GHCESO3
852754.99	869,810	-	-	-	-	4,046,164	GHC	GHCECR CCP DISPOSAL	GHCECR LANDFILL MAINTENANCE	GHCANDFILL MAINTENAN	GHC51210	GHCECCP
0	-	-	-	-	-	488,000	GH4	GH4SO3 SORBENT INJECTION	GH4ECR SORBENT INJECTION OPERATION	GH4INJECTION OPERATIC	GH450615	GH4ESO3
748202.64	763,167	778,424	793,975	809,893	826,104	6,852,849	GHC	GHCSO3 SORBENT INJECTION	GHCECR SORBENT INJECTION OPERATION	GHCINJECTION OPERATI	GHC50615	GHCESO3
0	-	-	-	-	-	-	GH1	GH1FGDS	GH1ECR MAINTENANCE-SDRS	GH1CR MAINTENANCE-SD	GH151205	GH1New FGD
0	-	-	-	-	-	-	GHC	GHCSO3 MITIGATION	GHCECR SORBENT INJECTION MAINTENANCE	GHCJECTION MAINTENAN	GHC51215	GHCESO3
430443.28	439,052	447,830	456,776	465,934	475,260	4,308,337	GHC	GHCSO3 MITIGATION	GHCECR SORBENT INJECTION MAINTENANCE	GHCJECTION MAINTENAN	GHC51215	GHCESO3
3143365.62	3,206,233	3,270,333	3,335,666	3,402,539	3,470,645	32,293,624	GH1	GH1SO3 SORBENT INJECTION	GH1ECR SORBENT REACTANT - REAGENT ONLY	GH1TANT - REAGENT ONL	GH150615	GH1ESO3
1807434.9	1,843,584	1,880,441	1,918,007	1,956,460	1,995,621	16,831,706	GH2	GH2SO3 SORBENT INJECTION	GH2ECR SORBENT REACTANT - REAGENT ONLY	GH2TANT - REAGENT ONL	GH250615	GH2ESO3
1571685.36	1,603,119	1,635,169	1,667,836	1,701,272	1,735,326	17,432,439	GH3	GH3SO3 SORBENT INJECTION	GH3ECR SORBENT REACTANT - REAGENT ONLY	GH3TANT - REAGENT ONL	GH350615	GH3ESO3
2357523.96	2,404,674	2,452,749	2,501,749	2,551,904	2,602,984	25,390,557	GH4	GH4SO3 SORBENT INJECTION	GH4ECR SORBENT REACTANT - REAGENT ONLY	GH4TANT - REAGENT ONL	GH450615	GH4ESO3
1402598.94	1,430,651	1,459,253	1,488,405	1,518,245	1,548,634	14,340,925	GH1	GH1SCR AMMONIA	GH1NOX REDUCTION REAGENT	GH1X REDUCTION REAGE	GH150610	GH1SCR
1447460.58	1,476,410	1,505,927	1,536,011	1,566,805	1,598,167	14,616,512	GH3	GH3SCR AMMONIA	GH3NOX REDUCTION REAGENT	GH3X REDUCTION REAGE	GH350610	GH3SCR
1472746.38	1,502,201	1,532,234	1,562,844	1,594,176	1,626,085	14,968,259	GH4	GH4SCR AMMONIA	GH4NOX REDUCTION REAGENT	GH4X REDUCTION REAGE	GH450610	GH4SCR
0	-	-	-	-	-	-	GHC	GHCSCR AMMONIA	GHCNOX REDUCTION REAGENT	GHCX REDUCTION REAGE	GHC50610	GHCSCR
0	-	-	-	-	-	-	GH3	GH3GHENT 3	GH3ECR SORBENT INJECTION MAINTENANCE	GH3JECTION MAINTENAN	GH351215	GH3ESO3
0	-	-	-	-	-	23,816	GRC	GRCOTHER WASTE DISPOSAL	GRCNOX EMISSION ALLOWANCES	GRCEMISSION ALLOWAN	GRC50900	GRCEEA
0	-	-	-	-	-	(25,948)	GRC	GRCOTHER WASTE DISPOSAL	GRCECR SO2 EMISSION ALLOWANCES	GRCEMISSION ALLOWAN	GRC50905	GRCEEA
0	-	-	-	-	-	916	GRC	GRCOTHER WASTE DISPOSAL	GRCECR NOX EMISSION ALLOWANCES	GRCEMISSION ALLOWAN	GRC50905	GRCEEA
0	-	-	-	-	-	-	GRC	GRCOPERATIONS - GEN PLANT	GRCSTEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	GRCD CONTROL EQUIPME	GRC50600	GRCOTHER
0	-	-	-	-	-	253	GRC	GRCOPERATIONS - GEN PLANT	GRCSTEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	GRCD CONTROL EQUIPME	GRC50600	GRCOTHER
0	-	-	-	-	-	(23,800)	LOC	LOCSO3 SORBENT INJECTION	LOCMERCURY MONITORS OPERATIONS	LOCMONITORS OPERATI	LOC50611	LOCMATS
0	-	-	-	-	-	(23,800)	KOC	KOCSO3 SORBENT INJECTION	KOCMERCURY MONITORS OPERATIONS	KOCMONITORS OPERATI	KOC50611	KOCMATS
426378.1	434,906	-	-	-	-	2,023,083	GHC	GHCECR CCP DISPOSAL	GHCECR LANDFILL MAINTENANCE	GHCANDFILL MAINTENAN	GHC51210	GHCECCP
493478.88	508,259	523,507	539,212	555,374	572,045	5,053,667	GHC	GHCOTHER MAINTENANCE	GHCECR LANDFILL MAINTENANCE	GHCANDFILL MAINTENAN	GHC51210	GHCECCP
0	-	-	-	-	-	30,000	GHC	GHCEMISSIONS	GHCSO2 EMISSION ALLOWANCES	GHCEMISSION ALLOWAN	GHC50900	GHCEEA
0	-	-	-	-	-	-	GHC	GHCEMISSIONS	GHCNOX EMISSION ALLOWANCES	GHCEMISSION ALLOWAN	GHC50900	GHCEEA

amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Plant					
0	-	-	-	-	-	-	GH1	GH1EMISSIONS	GH1ECR SO2 EMISSION ALLOWANCES	GH1EMISSION ALLOWANC	GH150905	GH1EEA
0	-	-	-	-	-	-	GH2	GH2EMISSIONS	GH2ECR SO2 EMISSION ALLOWANCES	GH2EMISSION ALLOWANC	GH250905	GH2EEA
0	-	-	-	-	-	-	GH3	GH3EMISSIONS	GH3ECR SO2 EMISSION ALLOWANCES	GH3EMISSION ALLOWANC	GH350905	GH3EEA
0	-	-	-	-	-	-	GH4	GH4EMISSIONS	GH4ECR SO2 EMISSION ALLOWANCES	GH4EMISSION ALLOWANC	GH450905	GH4EEA
30600	31,212	31,836	32,472	33,123	33,786	283,029	GHC	GHCEMISSIONS	GHCECR SO2 EMISSION ALLOWANCES	GHCEMISSION ALLOWANC	GHC50905	GHCEEA
0	-	-	-	-	-	-	GHC	GHCEMISSIONS	GHCECR NOX EMISSION ALLOWANCES	GHCEMISSION ALLOWANC	GHC50905	GHCEEA
0	-	-	-	-	-	99,288	GRC	GRCEMISSIONS	GRCNOX EMISSION ALLOWANCES	GRCEMISSION ALLOWANC	GRC50900	GRCEEA
0	-	-	-	-	-	9,665	GR3	GR3EMISSIONS	GR3ECR SO2 EMISSION ALLOWANCES	GR3EMISSION ALLOWANC	GR350905	GR3EEA
0	-	-	-	-	-	43,411	GR4	GR4EMISSIONS	GR4ECR SO2 EMISSION ALLOWANCES	GR4EMISSION ALLOWANC	GR450905	GR4EEA
0	-	-	-	-	-	4,364	GRC	GRCEMISSIONS	GRCECR NOX EMISSION ALLOWANCES	GRCEMISSION ALLOWANC	GRC50905	GRCEEA
-448800	(457,776)	(466,928)	(476,256)	(485,804)	(495,528)	(4,591,092)	GH1	GH1OTHER WASTE DISPOSAL	GH1OTHER WASTE DISPOSAL	GH1THER WASTE DISPOS	GH1502001	GH1CCP
1481040	1,510,661	1,540,862	1,571,645	1,603,153	1,635,242	15,090,604	MCC	MCCOTHER WASTE DISPOSAL	MCCOTHER WASTE DISPOSAL	MCCTHER WASTE DISPOS	MCC50200	MCCCCP
0	-	-	-	-	-	-	MCC	MCCOTHER WASTE DISPOSAL	MCCECR OTHER WASTE DISPOSAL	MCCTHER WASTE DISPOS	MCC50201	MCCECCP
4732223.02	5,365,147	5,527,653	5,638,081	5,751,114	5,866,230	48,656,308	TC2	TC2SO3 SORBENT INJECTION	TC2SORBENT REACTANT - REAGENT ONLY	TC2TANT - REAGENT ONL	TC2506112	TC2SO3
4018999.79	3,774,322	3,475,442	3,544,873	3,615,940	3,688,318	33,645,188	TC1	TC1SO3 SORBENT INJECTION	TC1ECR SORBENT REACTANT - REAGENT ONLY	TC1TANT - REAGENT ONL	TC1506152	TC1ESO3
204000	208,080	212,240	216,480	220,820	225,240	2,086,860	MCC	MCCECR CCP DISPOSAL	MCCECR OTHER WASTE DISPOSAL	MCCTHER WASTE DISPOS	MCC50201	MCCECCP
1451000	1,981,000	2,020,620	2,061,032	2,102,253	2,144,298	11,760,203	TCC	TCCCCP REMOVAL SYSTEMS	TCCECR LANDFILL MAINTENANCE	TCCANDFILL MAINTENAN	TCC512107	TCCECCP
1116642	942,623	1,130,047	1,152,623	1,175,731	1,199,265	11,069,343	MC3	MC3SCR AMMONIA	MC3NOX REDUCTION REAGENT	MC3X REDUCTION REAGE	MC350610	MC3SCR
1350310	1,427,203	1,513,404	1,543,638	1,574,585	1,606,102	14,253,142	MC4	MC4SCR AMMONIA	MC4NOX REDUCTION REAGENT	MC4X REDUCTION REAGE	MC450610	MC4SCR
291720	297,554	303,503	309,566	315,773	322,093	2,918,210	MCC	MCCOTHER WASTE DISPOSAL	MCCOTHER WASTE DISPOSAL	MCCTHER WASTE DISPOS	MCC50200	MCCCCP
0	-	-	-	-	-	-	MCC	MCCBY-PRODUCTS	MCCOTHER WASTE DISPOSAL	MCCTHER WASTE DISPOS	MCC50200	MCCCCP
491896	468,130	449,570	458,551	467,744	477,107	3,926,529	MC1	MC1SO3 SORBENT INJECTION	MC1ECR SORBENT REACTANT - REAGENT ONLY	MC1TANT - REAGENT ONL	MC150615	MC1ESO3
470562	501,465	479,160	488,733	498,531	508,510	4,083,518	MC2	MC2SO3 SORBENT INJECTION	MC2ECR SORBENT REACTANT - REAGENT ONLY	MC2TANT - REAGENT ONL	MC250615	MC2ESO3
1495355	1,304,535	1,387,809	1,415,534	1,443,912	1,472,814	10,534,450	MC3	MC3SO3 SORBENT INJECTION	MC3ECR SORBENT REACTANT - REAGENT ONLY	MC3TANT - REAGENT ONL	MC350615	MC3ESO3
1618698	1,768,089	1,663,749	1,696,987	1,731,008	1,765,656	14,650,332	MC4	MC4SO3 SORBENT INJECTION	MC4ECR SORBENT REACTANT - REAGENT ONLY	MC4TANT - REAGENT ONL	MC450615	MC4ESO3
1291336.17	1,329,362	1,369,243	1,410,321	1,452,594	1,496,197	11,585,111	MCC	MCCFGDS	MCCECR MAINTENANCE-SDRS	MCCCR MAINTENANCE-SD	MCC51205	MCCNew FGD
232557.6	237,209	241,951	246,785	251,732	256,771	2,091,000	MC1	MC1FGDS	MC1ECR MAINTENANCE-SDRS	MC1CR MAINTENANCE-SD	MC151205	MC1New FGD
232557.6	237,209	241,951	246,785	251,732	256,771	2,091,000	MC2	MC2FGDS	MC2ECR MAINTENANCE-SDRS	MC2CR MAINTENANCE-SD	MC251205	MC2New FGD
237657.6	242,411	247,257	252,197	257,253	262,402	1,869,173	MC3	MC3FGDS	MC3ECR MAINTENANCE-SDRS	MC3CR MAINTENANCE-SD	MC351205	MC3New FGD
244797.6	249,693	254,685	259,773	264,981	270,285	2,264,211	MC4	MC4FGDS	MC4ECR MAINTENANCE-SDRS	MC4CR MAINTENANCE-SD	MC451205	MC4New FGD
0	-	-	-	-	-	100,000	MC1	MC1MILL CREEK 1	MC1ECR MAINTENANCE-SDRS	MC1CR MAINTENANCE-SD	MC151205	MC1New FGD
0	-	-	-	-	-	99,999	MC1	MC1MILL CREEK 1	MC1ECR MAINTENANCE-SDRS	MC1CR MAINTENANCE-SD	MC151205	MC1New FGD
0	-	-	-	-	-	99,999	MC2	MC2MILL CREEK 2	MC2ECR MAINTENANCE-SDRS	MC2CR MAINTENANCE-SD	MC251205	MC2New FGD
0	-	-	-	-	-	100,000	MC2	MC2MILL CREEK 2	MC2ECR MAINTENANCE-SDRS	MC2CR MAINTENANCE-SD	MC251205	MC2New FGD
0	-	-	-	-	-	100,000	MC3	MC3MILL CREEK 3	MC3ECR MAINTENANCE-SDRS	MC3CR MAINTENANCE-SD	MC351205	MC3New FGD
0	-	-	-	-	-	100,000	MC3	MC3MILL CREEK 3	MC3ECR MAINTENANCE-SDRS	MC3CR MAINTENANCE-SD	MC351205	MC3New FGD
0	-	-	-	-	-	100,000	MC4	MC4MILL CREEK 4	MC4ECR MAINTENANCE-SDRS	MC4CR MAINTENANCE-SD	MC451205	MC4New FGD
0	-	-	-	-	-	100,000	MC4	MC4MILL CREEK 4	MC4ECR MAINTENANCE-SDRS	MC4CR MAINTENANCE-SD	MC451205	MC4New FGD
0	-	-	-	-	-	100,000	MC4	MC4MILL CREEK 4	MC4ECR MAINTENANCE-SDRS	MC4CR MAINTENANCE-SD	MC451205	MC4New FGD
1330409	1,266,129	1,252,216	1,277,232	1,302,838	1,328,916	10,920,854	MC1	MC1ACTIVATED CARBON	MC1ECR ACTIVATED CARBON	MC1CR ACTIVATED CARB	MC150615	MC1EMATS
1278488	1,362,446	1,340,700	1,367,484	1,394,899	1,422,820	11,409,015	MC2	MC2ACTIVATED CARBON	MC2ECR ACTIVATED CARBON	MC2CR ACTIVATED CARB	MC250615	MC2EMATS
1618952	1,412,359	1,547,353	1,578,265	1,609,906	1,642,130	11,675,796	MC3	MC3ACTIVATED CARBON	MC3ECR ACTIVATED CARBON	MC3CR ACTIVATED CARB	MC350615	MC3EMATS
1791677	1,957,031	1,896,499	1,934,386	1,973,167	2,012,662	16,702,165	MC4	MC4ACTIVATED CARBON	MC4ECR ACTIVATED CARBON	MC4CR ACTIVATED CARB	MC450615	MC4EMATS
674213.4	687,698	701,446	715,459	729,803	744,411	5,995,014	MC1	MC1BAG HOUSE	MC1ECR BAGHOUSE MAINTENANCE	MC1AGHOUSE MAINTENA	MC151215	MC1EMATS
674213.4	687,698	701,446	715,459	729,803	744,411	5,995,014	MC2	MC2BAG HOUSE	MC2ECR BAGHOUSE MAINTENANCE	MC2AGHOUSE MAINTENA	MC251215	MC2EMATS
700733.4	714,748	729,038	743,602	758,510	773,692	5,780,310	MC3	MC3BAG HOUSE	MC3ECR BAGHOUSE MAINTENANCE	MC3AGHOUSE MAINTENA	MC351215	MC3EMATS
713993.4	728,273	742,833	757,673	772,863	788,333	6,655,204	MC4	MC4BAG HOUSE	MC4ECR BAGHOUSE MAINTENANCE	MC4AGHOUSE MAINTENA	MC451215	MC4EMATS
0	-	-	-	-	-	3,934	KOC	KOCSO3 SORBENT INJECTION	KOCMERCURY MONITORS OPERATIONS	KOCMONITORS OPERATIO	KOC50611	KOCMATS
0	-	-	-	-	-	26,295	LOC	LOCSO3 SORBENT INJECTION	LOCMERCURY MONITORS OPERATIONS	LOCMONITORS OPERATIO	LOC50611	LOCMATS
0	-	-	-	-	-	84,736	KOC	KOCSO3 SORBENT INJECTION	KOCMERCURY MONITORS OPERATIONS	KOCMONITORS OPERATIO	KOC50611	KOCMATS
0	-	-	-	-	-	2,284	LOC	LOCSO3 SORBENT INJECTION	LOCECR MERCURY MONITORS OPERATIONS	LOCMONITORS OPERATIO	LOC50615	LOCEMATS
0	-	-	-	-	-	33,765	LOC	LOCSO3 SORBENT INJECTION	LOCECR MERCURY MONITORS OPERATIONS	LOCMONITORS OPERATIO	LOC50615	LOCEMATS
0	-	-	-	-	-	-	KOC	KOCSO3 SORBENT INJECTION	KOCECR MERCURY MONITORS OPERATIONS	KOCMONITORS OPERATIO	KOC50615	KOCEMATS
5100	5,202	5,306	5,412	5,521	5,631	135,172	MCC	MCCEMISSIONS	MCCSO2 EMISSION ALLOWANCES	MCCEMISSION ALLOWANC	MCC50900	MCCEEA
0	-	-	-	-	-	-	MCC	MCCEMISSIONS	MCCNOX EMISSION ALLOWANCES	MCCEMISSION ALLOWANC	MCC50900	MCCEEA
0	-	-	-	-	-	-	MCC	MCCEMISSIONS	MCCECR SO2 EMISSION ALLOWANCES	MCCEMISSION ALLOWANC	MCC50905	MCCEEA
0	-	-	-	-	-	92,000	MCC	MCCEMISSIONS	MCCECR NOX EMISSION ALLOWANCES	MCCEMISSION ALLOWANC	MCC50905	MCCEEA
0	-	-	-	-	-	(408,010)	MCC	MCCSCRUBBER REACTANT	MCCOTHER WASTE DISPOSAL	MCCTHER WASTE DISPOS	MCC50200	MCCCCP
0	-	-	-	-	-	35,660	MCC	MCCSCRUBBER REACTANT	MCCECR OTHER WASTE DISPOSAL	MCCTHER WASTE DISPOS	MCC50201	MCCECCP
0	-	-	-	-	-	(1,141,832)	MCC	MCCSCRUBBER REACTANT	MCCNOX REDUCTION REAGENT	MCCX REDUCTION REAGE	MCC50610	MCCSCR
0	-	-	-	-	-	(34,629)	MCC	MCCSCRUBBER REACTANT	MCCSORBENT INJECTION OPERATION	MCCINJECTION OPERATIO	MCC50610	MCCSO3
0	-	-	-	-	-	103,035	MCC	MCCSCRUBBER REACTANT	MCCSO2 EMISSION ALLOWANCES	MCCEMISSION ALLOWANC	MCC50900	MCCEEA
0	-	-	-	-	-	5,915	MCC	MCCSCRUBBER REACTANT	MCCNOX EMISSION ALLOWANCES	MCCEMISSION ALLOWANC	MCC50900	MCCEEA
0	-	-	-	-	-	(13,517)	MCC	MCCSCRUBBER REACTANT	MCCECR NOX EMISSION ALLOWANCES	MCCEMISSION ALLOWANC	MCC50905	MCCEEA
0	-	-	-	-	-	8,534	MCC	MCCSCRUBBER REACTANT	MCCECR MERCURY MONITORS MAINTENANCE	MCCONITORS MAINTENAN	MCC51215	MCCEMATS
0	-	-	-	-	-	1,154,270	CRC	CRCOTHER WASTE DISPOSAL	CRCOTHER WASTE DISPOSAL	CRCTHER WASTE DISPOS	CRC50200	CRCCCP
0	-	-	-	-	-	-	TC1	TC1BAG HOUSE	TC1INSTR/CNTRL-ENVRNL	TC1INSTR/CNTRL-ENVRNI	TC1512011	TC1MATS
0	-	-	-	-	-	-	TC1	TC1BAG HOUSE	TC1INSTR/CNTRL-ENVRNL	TC1INSTR/CNTRL-ENVRNI	TC1512011	TC1MATS
117887.55	120,245	122,649	125,100	127,608	130,162	1,082,534	TC2	TC2BAG HOUSE	TC2INSTR/CNTRL-ENVRNL	TC2INSTR/CNTRL-ENVRNI	TC2512011	TC2MATS
0	-	-	-	-	-	-	TCC	TCCSCR	TCCOPERATION OF SCR/NOX REDUCTION EQUIP	TCCNOX REDUCTION EQU	TCC50610	TCCSCR
0	-	-	-	-	-	-	MCC	MCCSCR	MCCOPERATION OF SCR/NOX REDUCTION EQUIP	MCCNOX REDUCTION EQU	MCC50610	MCCSCR
0	-	-	-	-	-	-	MCC	MCCSCR	MCCOPERATION OF SCR/NOX REDUCTION EQUIP	MCCNOX REDUCTION EQU	MCC50610	MCCSCR
0	-	-	-	-	-	-	TC1	TC1EMISSION ALLOWANCES	TC1SO2 EMISSION ALLOWANCES	TC1EMISSION ALLOWANC	TC1509002	TC1EEA
0	-	-	-	-	-	-	TC1	TC1EMISSION ALLOWANCES	TC1ECR SO2 EMISSION ALLOWANCES	TC1EMISSION ALLOWANC	TC1509052	TC1EEA
0	-	-	-	-	-	-	TC2	TC2EMISSION ALLOWANCES	TC2ECR SO2 EMISSION ALLOWANCES	TC2EMISSION ALLOWANC	TC2509052	TC2EEA
0	-	-	-	-	-	-	TC1	TC1EMISSION ALLOWANCES	TC1ECR NOX EMISSION ALLOWANCES	TC1EMISSION ALLOWANC	TC1509053	TC1EEA
0	-	-	-	-	-	-	TC2	TC2EMISSION ALLOWANCES	TC2ECR NOX EMISSION ALLOWANCES	TC2EMISSION ALLOWANC	TC2509053	TC2EEA
0	-	-	-	-	-	-	TCC	TCCSO3 MITIGATION	TCCSORBENT INJECTION OPERATION	TCCINJECTION OPERATIO	TCC50610	TCCSO3
0	-	-	-	-	-	-	TCC	TCCSO3 MITIGATION	TCCECR SORBENT INJECTION MAINTENANCE	TCCJECTION MAINTENAN	TCC51215	TCCESO3
0	-	-	-	-	-	-	TCC	TCCSO3 MITIGATION	TCCECR SORBENT INJECTION MAINTENANCE	TCCJECTION MAINTENAN	TCC51215	TCCESO3
39783.48	40,579	41,390	42,217	43,064	43,926	327,966	MC3	MC3SO3 SORBENT INJECTION	MC3ECR SORBENT INJECTION MAINTENANCE	MC3JECTION MAINTENAN	MC351215	MC3ESO3
39783.48	40,579	41,390	42,217	43,064	43,926	375,970	MC4	MC4SO3 SORBENT INJECTION	MC4ECR SORBENT INJECTION MAINTENANCE	MC4JECTION MAINTENAN	MC451215	MC4ESO3
0	-	-	-	-	-	(514,404)	TCC	TCCSCR AMMONIA	TCCNOX REDUCTION REAGENT	TCCX REDUCTION REAGE	TCC50610	TCCSCR
0	-	-	-	-	-	(98,131)	TC1	TC1FGDS	TC1SORBENT INJECTION OPERATION	TC1INJECTION OPERATIO	TC1506109	TC1SO3
0	-	-	-	-	-	-	TC1	TC1FGDS	TC1MERCURY MONITORS OPERATIONS	TC1MONITORS OPERATIO	TC1506110	TC1MATS
0	-	-	-	-	-	-	TC2	TC2FGDS	TC2MERCURY MONITORS OPERATIONS	TC2MONITORS OPERATIO	TC2506110	TC2MATS
0	-	-	-	-	-	-	TC1	TC1FGDS	TC1ECR MERCURY MONITORS OPERATIONS	TC1MONITORS OPERATIO	TC1506150	TC1EMATS
0	-	-	-	-	-	-	TC2	TC2FGDS	TC2ECR MERCURY MONITORS OPERATIONS	TC2MONITORS OPERATIO	TC2506150	TC2EMATS
0	-	-	-	-	-	98,131	TC1	TC1FGDS	TC1ECR SORBENT INJECTION OPERATION	TC1INJECTION OPERATIO	TC1506159	TC1ESO3

amt_5_1_2018	amt_6_1_2019	amt_7_1_2020	amt_8_1_2021	amt_9_1_2022	amt_10_1_2023	amt_11_1_total	Plant				
0	-	-	-	-	-	28,000	TCC	TCCOTHER MAINTENANCE	TCCECR SORBENT INJECTION MAINTENANCE	TCCJECTION MAINTENAN	TCC51215	TCCESO3
0	-	-	-	-	-	-	TCC	TCCSO3 SORBENT INJECTION	TCCSORBENT INJECTION OPERATION	TCCINJECTION OPERATIO	TCC50610	TCCSO3
254520	259,611	529,602	540,182	551,012	562,041	3,741,359	TC2	TC2SO3 SORBENT INJECTION	TC2SORBENT INJECTION OPERATION	TC2INJECTION OPERATIO	TC2506109	TC2SO3
254520	259,611	-	-	-	-	1,247,615	TC1	TC1SO3 SORBENT INJECTION	TC1ECR SORBENT INJECTION OPERATION	TC1INJECTION OPERATIO	TC1506159	TC1ESO3
0	-	-	-	-	-	-	TC1	TC1EMISSION ALLOWANCES	TC1NOX EMISSION ALLOWANCES	TC1EMISSION ALLOWANC	TC1509003	TC1EEA
0	-	-	-	-	-	(297,860)	TCC	TCCSCRUBBER REACTANT	TCCSORBENT INJECTION OPERATION	TCCINJECTION OPERATIO	TCC50610	TCCSO3
0	-	-	-	-	-	6,721	TCC	TCCSCRUBBER REACTANT	TCCECR OPERATION OF SCR/NOX REDUCTION EQUIP	TCCNOX REDUCTION EQU	TCC50615	TCCESCR
0	-	-	-	-	-	2	TCC	TCCSCRUBBER REACTANT	TCCSO2 EMISSION ALLOWANCES	TCCEMISSION ALLOWANC	TCC50900	TCCEEA
0	-	-	-	-	-	1,529	TCC	TCCSCRUBBER REACTANT	TCCNOX EMISSION ALLOWANCES	TCCEMISSION ALLOWANC	TCC50900	TCCEEA
0	-	-	-	-	-	9	TCC	TCCSCRUBBER REACTANT	TCCECR SO2 EMISSION ALLOWANCES	TCCEMISSION ALLOWANC	TCC50905	TCCEEA
0	-	-	-	-	-	20,522	TCC	TCCSCRUBBER REACTANT	TCCECR NOX EMISSION ALLOWANCES	TCCEMISSION ALLOWANC	TCC50905	TCCEEA
0	-	-	-	-	-	(2,333,400)	TC2	TC2ACTIVATED CARBON	TC2ACTIVATED CARBON	TC2ACTIVATED CARBON	TC2506111	TC2MATS
0	-	-	-	-	-	846,144	TC2	TC2SO3 REACTANT	TC2SORBENT REACTANT - REAGENT ONLY	TC2TANT - REAGENT ONL	TC2506112	TC2SO3
0	-	-	-	-	-	784,584	TC1	TC1SO3 REACTANT	TC1ECR SORBENT REACTANT - REAGENT ONLY	TC1TANT - REAGENT ONL	TC1506152	TC1ESO3
0	-	-	-	-	-	161,382	TCC	TCCOTHER WASTE DISPOSAL	TCCOTHER WASTE DISPOSAL	TCCTHER WASTE DISPOS	TCC50200	TCCCCP
0	-	-	-	-	-	(1,270,931)	TCC	TCCOTHER WASTE DISPOSAL	TCCECR OTHER WASTE DISPOSAL	TCCTHER WASTE DISPOS	TCC50201	TCCECCP
94998.84	96,899	98,836	100,810	102,832	104,890	955,853	TCC	TCCOTHER WASTE DISPOSAL	TCCOTHER WASTE DISPOSAL	TCCTHER WASTE DISPOS	TCC50200	TCCCCP
2596000.29	2,415,000	2,351,041	2,286,569	2,332,410	2,379,096	19,095,039	TC1	TC1ACTIVATED CARBON	TC1ECR ACTIVATED CARBON	TC1CR ACTIVATED CARB	TC1506151	TC1EMATS
454920	464,018	473,295	482,750	492,429	502,285	3,789,698	TC1	TC1ACTIVATED CARBON	TC1ECR BAGHOUSE MAINTENANCE	TC1AGHOUSE MAINTENA	TC1512156	TC1EMATS
2750603.01	3,088,609	3,208,223	3,272,912	3,338,527	3,405,352	31,060,168	TC2	TC2ACTIVATED CARBON	TC2ACTIVATED CARBON	TC2ACTIVATED CARBON	TC2506111	TC2MATS
0	-	-	-	-	-	-	TC2	TC2FGDS	TC2MERCURY MONITORS OPERATIONS	TC2MONITORS OPERATIO	TC2506110	TC2MATS
0	-	-	-	-	-	-	TC2	TC2FGDS	TC2ECR MERCURY MONITORS OPERATIONS	TC2MONITORS OPERATIO	TC2506150	TC2EMATS
107298.73	109,445	111,633	113,863	116,146	118,470	1,085,417	TC2	TC2BAG HOUSE	TC2INSTR/CNTRL-ENVRNL	TC2INSTR/CNTRL-ENVRNL	TC2512011	TC2MATS
955005.87	924,943	993,581	1,013,430	1,033,747	1,054,439	10,242,892	TC1	TC1SCR AMMONIA	TC1NOX REDUCTION REAGENT	TC1X REDUCTION REAGE	TC1506104	TC1SCR
1815062.61	1,812,400	2,132,655	2,175,260	2,218,869	2,263,283	19,542,159	TC2	TC2SCR AMMONIA	TC2NOX REDUCTION REAGENT	TC2X REDUCTION REAGE	TC2506104	TC2SCR
0	-	-	-	-	-	-	TCC	TCCOTHER WASTE DISPOSAL	TCCECR OTHER WASTE DISPOSAL	TCCTHER WASTE DISPOS	TCC50201	TCCECCP
420077.19	428,479	437,045	445,776	454,713	463,815	4,465,870	TC1	TC1OTHER WASTE DISPOSAL	TC1ECR OTHER WASTE DISPOSAL	TC1THER WASTE DISPOS	TC1502011	TC1ECCP
729997.09	721,627	783,335	798,984	815,002	831,315	7,464,297	TC2	TC2OTHER WASTE DISPOSAL	TC2ECR OTHER WASTE DISPOSAL	TC2THER WASTE DISPOS	TC2502011	TC2ECCP
0	-	-	-	-	-	-	TC1	TC1SCRUBBER REACTANT	TC1NOX REDUCTION REAGENT	TC1X REDUCTION REAGE	TC1506104	TC1SCR

0101	CRC	ACTIVATED CARBON	MATS
0141	CR4	ECR ACTIVATED CARBON	EMATS
0151	CR5	ECR BAGHOUSE MAINTENANCE	EMATS
0161	CR6	ECR CCP SYSTEM MAINTENANCE	ECCP
0201	MCC	ECR LANDFILL MAINTENANCE	ECCP
0211	MC1	ECR MAINTENANCE-SDRS	New FGD
0212	MC1	ECR MERCURY MONITORS MAINTENANCE	EMATS
0221	MC2	ECR MERCURY MONITORS OPERATIONS	EMATS
0222	MC2	ECR NOX EMISSION ALLOWANCES	EEA
0231	MC3	ECR NOX REDUCTION REAGENT	ESCR
0232	MC3	ECR OPERATION OF SCR/NOX REDUCTION EQUIP	ESCR
0241	MC4	ECR OTHER WASTE DISPOSAL	ECCP
0242	MC4	ECR SO2 EMISSION ALLOWANCES	EEA
0301	TCC	ECR SORBENT INJECTION MAINTENANCE	ESO3
0311	TC1	ECR SORBENT INJECTION OPERATION	ESO3
0321	TC2	ECR SORBENT REACTANT - REAGENT ONLY	ESO3
0401	LOC	INSTR/CNTRL-ENVRNL	MATS
0432	PR13	MERCURY MONITORS OPERATIONS	MATS
0470	TC5	NOX EMISSION ALLOWANCES	EEA
0478	TCCTC	NOX REDUCTION REAGENT	SCR
5591	KOC	OPERATION OF SCR/NOX REDUCTION EQUIP	SCR
5613	GR3	OTHER WASTE DISPOSAL	CCP
5614	GR4	SO2 EMISSION ALLOWANCES	EEA
5616	GRC	SORBENT INJECTION OPERATION	SO3
5620	BRC	SORBENT REACTANT - REAGENT ONLY	SO3
5621	BR1	STEAM OPERATION-AIR QUALITY MONITORING AND CONTROL EQUIPMENT	OTHER
5622	BR2		
5623	BR3		
5630	BRC		
5642	BRCTC		
5650	GH1		
5651	GH1		
5652	GH2		
5653	GH3		
5654	GH4		
5657	GHC		

Variable O&M ($/MWh)
2015 Business Plan

1.90% Escalation Rate

	1/2015	2/2015	3/2015	4/2015	5/2015	6/2015	7/2015	8/2015	9/2015	10/2015	11/2015	12/2015	1/2016	2/2016
Brown 1	1.47	1.47	1.47	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	2.82	2.82
Brown 2	1.42	1.42	1.42	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.76	2.76
Brown 3	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	2.34	3.32	3.32	3.66	3.66
Cane Run 4	4.39	4.39	4.39	4.39										
Cane Run 5	4.09	4.09	4.09	4.09										
Cane Run 6	5.98	5.98	5.98	5.98										
Ghent 1	2.51	2.51	2.51	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.35	3.35
Ghent 2	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	1.76	2.31	2.31	2.73	2.73
Ghent 3	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.44	3.44
Ghent 4	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.37	3.44	3.44
Mill Creek 1	0.78	0.78	0.78	0.78	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.65	1.65
Mill Creek 2	0.78	0.78	0.78	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.58	1.68	1.68
Mill Creek 3	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.39	1.39
Mill Creek 4	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.28	2.39	2.39
Trimble 1	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	1.93	2.63	2.63	2.74	2.74
Trimble 2	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.25	2.25

Variable O&M ($/MWh)
2015 Business Plan

	3/2016	4/2016	5/2016	6/2016	7/2016	8/2016	9/2016	10/2016	11/2016	12/2016	1/2017	2/2017	3/2017	4/2017
Brown 1	2.82	2.82	2.82	2.82	2.82	2.82	2.82	2.82	2.82	2.82	2.59	2.59	2.59	2.59
Brown 2	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.78	2.78	2.78	2.78
Brown 3	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.58	3.58	3.58	3.58
Cane Run 4														
Cane Run 5														
Cane Run 6														
Ghent 1	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.63	3.63	3.63	3.63
Ghent 2	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.92	2.92	2.92	2.92
Ghent 3	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.77	3.77	3.77	3.77
Ghent 4	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.44	3.82	3.82	3.82	3.82
Mill Creek 1	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.68	1.68	1.68	1.68
Mill Creek 2	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.70	1.70	1.70	1.70
Mill Creek 3	1.39	1.39	1.39	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.45	2.45	2.45	2.45
Mill Creek 4	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.45	2.45	2.45	2.45
Trimble 1	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.74	2.89	2.89	2.89	2.89
Trimble 2	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.39	2.39	2.39	2.39

Variable O&M ($/MWh)
2015 Business Plan

	5/2017	6/2017	7/2017	8/2017	9/2017	10/2017	11/2017	12/2017	1/2018	2/2018	3/2018	4/2018	5/2018	6/2018
Brown 1	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.93	2.93	2.93	2.93	2.93	2.93
Brown 2	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.90	2.90	2.90	2.90	2.90	2.90
Brown 3	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	4.05	4.05	4.05	4.05	4.05	4.05
Cane Run 4														
Cane Run 5														
Cane Run 6														
Ghent 1	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.94	3.94	3.94	3.94	3.94	3.94
Ghent 2	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	3.23	3.23	3.23	3.23	3.23	3.23
Ghent 3	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	4.11	4.11	4.11	4.11	4.11	4.11
Ghent 4	3.82	3.82	3.82	3.82	3.82	3.82	3.82	3.82	4.23	4.23	4.23	4.23	4.23	4.23
Mill Creek 1	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.74	1.74	1.74	1.74	1.74	1.74
Mill Creek 2	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.77	1.77	1.77	1.77	1.77	1.77
Mill Creek 3	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.52	2.52	2.52	2.52	2.52	2.52
Mill Creek 4	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.52	2.52	2.52	2.52	2.52	2.52
Trimble 1	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	3.17	3.17	3.17	3.17	3.17	3.17
Trimble 2	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.39	2.66	2.66	2.66	2.66	2.66	2.66

Variable O&M ($/MWh)
2015 Business Plan

	7/2018	8/2018	9/2018	10/2018	11/2018	12/2018	1/2019	2/2019	3/2019	4/2019	5/2019	6/2019	7/2019	8/2019
Brown 1	2.93	2.93	2.93	2.93	2.93	2.93	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12
Brown 2	2.90	2.90	2.90	2.90	2.90	2.90	3.04	3.04	3.04	3.04	3.04	3.04	3.04	3.04
Brown 3	4.05	4.05	4.05	4.05	4.05	4.05	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43
Cane Run 4														
Cane Run 5														
Cane Run 6														
Ghent 1	3.94	3.94	3.94	3.94	3.94	3.94	4.11	4.11	4.11	4.11	4.11	4.11	4.11	4.11
Ghent 2	3.23	3.23	3.23	3.23	3.23	3.23	3.51	3.51	3.51	3.51	3.51	3.51	3.51	3.51
Ghent 3	4.11	4.11	4.11	4.11	4.11	4.11	4.59	4.59	4.59	4.59	4.59	4.59	4.59	4.59
Ghent 4	4.23	4.23	4.23	4.23	4.23	4.23	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
Mill Creek 1	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74	1.74
Mill Creek 2	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
Mill Creek 3	2.52	2.52	2.52	2.52	2.52	2.52	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
Mill Creek 4	2.52	2.52	2.52	2.52	2.52	2.52	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51
Trimble 1	3.17	3.17	3.17	3.17	3.17	3.17	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33
Trimble 2	2.66	2.66	2.66	2.66	2.66	2.66	2.73	2.73	2.73	2.73	2.73	2.73	2.73	2.73

Variable O&M ($/MWh)
2015 Business Plan

	9/2019	10/2019	11/2019	12/2019	1/2020	2/2020	3/2020	4/2020	5/2020	6/2020	7/2020	8/2020	9/2020	10/2020
Brown 1	3.12	3.12	3.12	3.12	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18
Brown 2	3.04	3.04	3.04	3.04	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
Brown 3	4.43	4.43	4.43	4.43	4.51	4.51	4.51	4.51	4.51	4.51	4.51	4.51	4.51	4.51
Cane Run 4														
Cane Run 5														
Cane Run 6														
Ghent 1	4.11	4.11	4.11	4.11	4.19	4.19	4.19	4.19	4.19	4.19	4.19	4.19	4.19	4.19
Ghent 2	3.51	3.51	3.51	3.51	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58	3.58
Ghent 3	4.59	4.59	4.59	4.59	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68
Ghent 4	4.67	4.67	4.67	4.67	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76	4.76
Mill Creek 1	1.74	1.74	1.74	1.74	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78
Mill Creek 2	1.77	1.77	1.77	1.77	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Mill Creek 3	2.51	2.51	2.51	2.51	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
Mill Creek 4	2.51	2.51	2.51	2.51	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56	2.56
Trimble 1	3.33	3.33	3.33	3.33	3.39	3.39	3.39	3.39	3.39	3.39	3.39	3.39	3.39	3.39
Trimble 2	2.73	2.73	2.73	2.73	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78

Variable O&M ($/MWh)
2015 Business Plan

	11/2020	12/2020	1/2021	2/2021	3/2021	4/2021	5/2021	6/2021	7/2021	8/2021	9/2021	10/2021	11/2021	12/2021
Brown 1	3.18	3.18	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24	3.24
Brown 2	3.10	3.10	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15
Brown 3	4.51	4.51	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60
Cane Run 4														
Cane Run 5														
Cane Run 6														
Ghent 1	4.19	4.19	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27	4.27
Ghent 2	3.58	3.58	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64	3.64
Ghent 3	4.68	4.68	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77
Ghent 4	4.76	4.76	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85
Mill Creek 1	1.78	1.78	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81
Mill Creek 2	1.80	1.80	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
Mill Creek 3	2.55	2.55	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Mill Creek 4	2.56	2.56	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Trimble 1	3.39	3.39	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46	3.46
Trimble 2	2.78	2.78	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83

Variable O&M ($/MWh)
2015 Business Plan

	1/2022	2/2022	3/2022	4/2022	5/2022	6/2022	7/2022	8/2022	9/2022	10/2022	11/2022	12/2022	1/2023	2/2023
Brown 1	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.36	3.36
Brown 2	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.28	3.28
Brown 3	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.77	4.77
Cane Run 4														
Cane Run 5														
Cane Run 6														
Ghent 1	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.43	4.43
Ghent 2	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.71	3.78	3.78
Ghent 3	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.95	4.95
Ghent 4	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	5.04	5.04
Mill Creek 1	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.88	1.88
Mill Creek 2	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.91	1.91
Mill Creek 3	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.70	2.70
Mill Creek 4	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.70	2.70
Trimble 1	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.59	3.59
Trimble 2	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.89	2.94	2.94

Variable O&M ($/MWh)
2015 Business Plan

	3/2023	4/2023	5/2023	6/2023	7/2023	8/2023	9/2023	10/2023	11/2023	12/2023
Brown 1	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36
Brown 2	3.28	3.28	3.28	3.28	3.28	3.28	3.28	3.28	3.28	3.28
Brown 3	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77	4.77
Cane Run 4										
Cane Run 5										
Cane Run 6										
Ghent 1	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43
Ghent 2	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78
Ghent 3	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95
Ghent 4	5.04	5.04	5.04	5.04	5.04	5.04	5.04	5.04	5.04	5.04
Mill Creek 1	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88
Mill Creek 2	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91	1.91
Mill Creek 3	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Mill Creek 4	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Trimble 1	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59
Trimble 2	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.8

Witness: John N. Voyles. Jr.

Q-2.8. Please refer to Attachment 1-15(1), which the Companies provided in response to Sierra Club's discovery request 1-15.

a. For the purposes of calculating the capital costs in the attachment, which option is EPA assumed to select in the final CCR Rule? Please provide all supporting analyses and documents.

b. For the purposes of calculating the capital costs in the attachment, which option is EPA assumed to select in the final ELG Rule? Please provide all supporting analyses and documents.

c. For the purposes of calculating the capital costs in the attachment, which technologies and equipment are assumed to be installed on each unit and/or at each plant to comply with the final CCR rule? Please provide all supporting analyses and documents.

d. For the purposes of calculating the capital costs in the attachment, which technologies and equipment are assumed to be installed on each unit and/or at each plant to comply with the final ELG rule? Please provide all supporting analyses and documents.

e. For the purposes of calculating the capital costs in the attachment, which technologies and equipment are assumed to be installed on each unit and/or at each plant to comply with the final 316(b) rule? Please provide all supporting analyses and documents.

A-2.8.

a. Capital estimates were based on EPA selecting a Subtitle "D" option. Subtitle "D" was chosen as the basis of the estimate due to feedback from industry sources familiar with the ongoing CCR Rule development and EPA's indication within their ELG proposal. There were no supporting analyses or documents performed to develop the assumed option.

b. Of the eight options in the proposed ELG rule, EPA indicated a preference for four of the proposed options. From those four EPA preferred options, the Companies chose the two most prescriptive options (Option 3 and Option 4a) for purposes of developing a preliminary pre-conceptual level estimate. There were no supporting analyses or documents performed to develop the assumed option.

   Since the Companies were already engaged in conversion of CCR storage facilities to special waste landfills at all operating stations, the capital costs for the CCR Rule included in Attachment to Response to Sierra Club Question No. 1-15(1) are focused on wet impoundments of CCR materials. For the Companies' capital cost estimates, compliance is based on station-wide common CCR storage impoundments and is not unit specific. There are no technologies or equipment specifically needed to close the existing CCR storage impoundments as the capital cost estimates are projects that essentially involve the placement of fill material and capping of the impoundment ponds. For estimating purposes, it was assumed that the existing CCR impoundments would be taken out of service and capped per Subtitle "D" requirements. The attached report from Stantec shows the scope and conceptual estimates used to develop the capital plan.

c. The capital costs are based on preliminary pre-conceptual level estimates. To date, no reports with engineering level estimates exist for any station. The final ELG rules from the EPA are not expected until September 30, 2015. Given this time table, the capital costs budgeted in 2015 for each station will continue the preliminary engineering initially started in 2014. The engineering in 2015 is expected to focus on more thorough analyses in conjunction with the expected September release of the EPA rules that will allow the Companies to proceed with identification and selection of each station's technology for the compliance plan. The specific compliance plans for each station are not expected to be fully estimated until 2016, after the final rules have been assessed. The capital costs for each station are simply mathematical averages of a varying number of pre-conceptual level estimates for the options identified in the response to item b. above (the estimates are attached for reference for each station).

d. The 316(b) capital costs were initially developed at the time of the IRP as place holders prior to the EPA's release of the final rules which became effective on October 14, 2014. Preliminary review of the final rules indicates that all existing units planned for operation post-2016 will be in compliance with the rule with the exception of Mill Creek Unit 1. Relative to Mill Creek Unit 1, the rule requires two years of impingement and entrainment studies to determine what, if any, technologies will be required for compliance with the final rules.

Attachment to Response to Sierra Club Question No. 2.8
Voyles

CCR Impoundment Closure

Cost Estimate Development
Various Locations, Kentucky

Stantec Consulting Services Inc.
One Team. Infinite Solutions
1409 North Forbes Road
Lexington, KY 40511-2050
Tel: (859) 422-3000 • Fax: (859) 422-3100
www.stantec.com

Prepared for:
Louisville Gas and Electric
Louisville, Kentucky

August 2013

Stantec

Stantec Consulting Services Inc.
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Fax: (859) 422-3100

August 2013 rpt_001_175663013

Mr. Jeff Heun
Louisville Gas and Electric
820 West Broadway
Louisville, Kentucky 40202

Re: CCR Impoundment Closure
Cost Estimate Development
Various Locations, Kentucky

Dear Mr. Heun:

Stantec Consulting Services Inc. (Stantec) is pleased to submit the above referenced report for your review and comment. This report describes the development of the conceptual design and cost analysis for various LG&E and KU sites.

Stantec appreciates the opportunity to provide these services. If you have any questions, please feel free to contact our office.

Sincerely,

STANTEC CONSULTING SERVICES INC.

Michelle M. Meehan, PE
Water Resource Engineer

Darrell E. Herron, PE
Senior Associate

/rdr

LEX

CCR Impoundment Closure

Cost Estimate Development
Various Locations, Kentucky

Prepared for:
Louisville Gas and Electric
Louisville, Kentucky

August 2013

CCR Impoundment Closure

Cost Estimate Development
Various Locations, Kentucky

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CCR Impoundment Closure

Cost Estimate Development
Various Locations, Kentucky

1. Background

In the aftermath of the Kingston Dredge Cell Ash failure, the EPA and other agencies have looked at further regulation of coal ash facilities. In light of impending Coal Combustion Residuals (CCR) regulations and the likelihood of ash ponds being phased out of operation at power plants, Louisville Gas and Electric (LG&E) and Kentucky Utilities (KU), both subsidiaries of PPL Corporation, requested that Stantec perform a conceptual design and cost analysis to close all of the CCR impoundments at their generating stations. LG&E and KU have 21 CCR impoundments at eight generating stations for which they have not recently performed closure studies or design. LG&E and KU performed an internal costing study shortly after the Kingston incident for forecasting future budgets. The current study is an update for budget planning purposes.

2. Methodology

In order to prepare the conceptual cost opinions, the data available for the ponds was reviewed and used to create basemapping. A conceptual design and grading surface was developed that could be compared to the basemap in order to obtain quantities. These quantities were utilized in the development of cost opinions for the various ponds.

As part of this study, the following sites and ponds were reviewed:

- Cane Run
  - Dead Storage Pond
  - Clearwell Pond
  - Stormwater Pond
- E. W. Brown
  - Auxiliary Pond
- Ghent
  - Ash Treatment Basin No. 1
  - Ash Treatment Basin No. 2
  - Reclaim Pond
  - Gypsum Stack
  - Secondary Ash Treatment Basin

- Green River
    - Main Pond
    - SO_2 Pond
    - Ash Treatment Basin No. 2
- Mill Creek
    - Dead Storage Pond
    - Construction Pond
    - Clearwell Pond
    - Ash Treatment Basin
    - Emergency Pond
- Pineville
    - Ash Pond
- Trimble
    - Ash Treatment Basin
    - Gypsum Stack Pond
- Tyrone
    - Ash Pond

Details of the methodology for developing the conceptual designs and cost opinions are presented in the following sections.

2.1. Review of Existing Data

Topographic data was provided to Stantec by LG&E/KU in May, 2013 for each of the sites. Where data was limited or not available, publicly available data was used. The data used for the basemapping for each site is listed below.

Aerial photography and mapping were reviewed for each pond to determine locations of existing discharge structures, potential for surface water run-on and look at existing slopes. Design assumptions, discussed in Section 2.2.2, were based on these observations. The aerial mapping was photography previously provided by LG&E/KU for another project and is shown in Appendix A.

Cane Run

Mapping that is being used as part of another project at Cane Run was utilized as the basemap for this study. This data included topographic data from aerial surveys provided by LG&E in 2000, 2005, 2007 and 2008. This mapping was supplemented with ground surveys performed by Vaughan Engineering (October 13, 2010, October 7, 2011 and October 5, 2012), ground surveys performed by Stantec (2008 and March 21-22, 2013), and hydrographic surveys by Stantec (June 27-28, 2012 and March 13-14, 2013).

E. W. Brown

A hydrographic survey dated 2012 was provided by KU. The survey was performed by Photo Science and verified by HDR and includes the Auxiliary Pond.

Ghent

Mapping was generated for this site from an aerial survey performed on December 12, 2012 by Photo Science, Inc. This mapping covered the Gypsum Stack, Ash Treatment Basin No. 1 and Ash Treatment Basin No. 2. The mapping was supplemented with 2-foot contour data generated from publicly available 5-foot DEMs from the Kentucky Aerial Photography and Elevation Data Program (KYAPED) dated 2012.

Green River

A surface based on topographic data dated 2012 was provided by KU in an XML format for the site. In addition, PDF files of hydrographic surveys for the Main Ash Pond, SO_2 Pond, and Ash Treatment Basin No. 2 were provided along with a stage-storage report for the ponds. The hydrographic survey was performed by Photo Science and verified by HDR.

Mill Creek

Hydrographic survey data dated 2012 was provided by LG&E covering the area of the Ash Treatment Basin. The survey was performed by Photo Science and verified by HDR. The mapping was supplemented with 2-foot contour data generated from publicly available 5-foot DEMs from KYAPED dated 2012.

Pineville

A surface based on topographic data dated 2012 was provided by KU in an XML format for the site.

Trimble

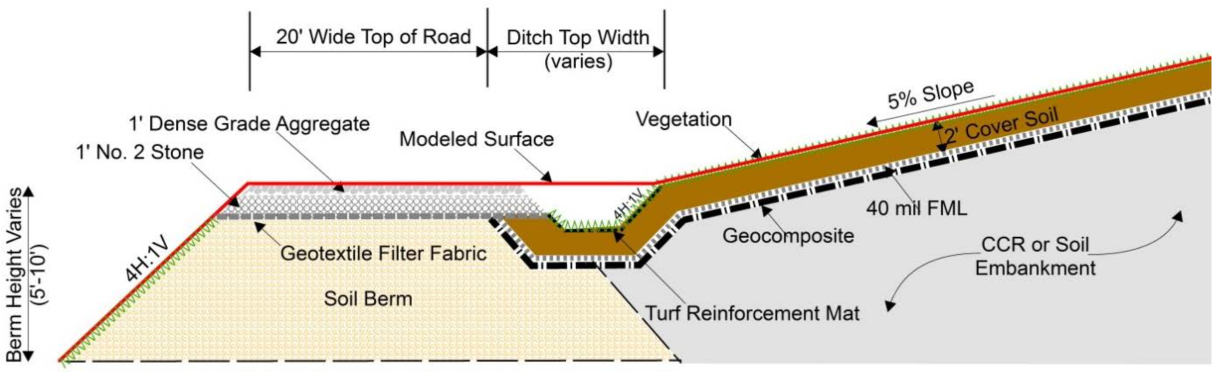
A hydrographic survey of the Gypsum Stack Pond and the Ash Treatment Basin dated 2012 was provided by LG&E. The survey was performed by Photo Science and verified by HDR. The mapping was supplemented with 2-foot contour data generated from publicly available 5-foot DEMs from KYAPED dated 2012.

Tyrone

A surface based on topographic data dated 2012 was provided by KU in an XML format for the site. In addition, a hydrographic survey for the Ash Pond was provided which included a stage-storage table. The hydrographic survey was performed by Photo Science and verified by HDR.

2.2. Development of Conceptual Grading and Drainage Plans

The conceptual closure designs generally consist of a basic convex or "tent" configuration with perimeter drainage. A typical section of the pond closure design is shown in Figure 1.



This section was used to develop grading for the closure of the ponds. Note that the red line indicated as the Modeled Surface represents the contours that appear on the drawings in Appendix B as the proposed grade.

Figure 1. Typical Concept Cross Section

2.2.1. H&H Calculations

For the conceptual design, ditches were not included in the grading for the ponds. Rather, the ditches were sized and the dimensions were used to calculate quantities. In order to size the ditches, the Natural Resources Conservation Service (NRCS) Win-TR-55 Small Watershed Hydrology program (version 1.00.09) was used to estimate a 100-year flow. Inputs into this program include the watershed drainage area, curve number, and time of concentration. The watershed area was calculated as the area around the current pond including run-on areas. A curve number of 79 was assumed for the closure configuration (representing "open space in fair condition; grass cover 50% to 75%, hydrologic soil group C"). The time of concentration was estimated using an assumed 5% slope over the capped area and a 1% slope in the ditches. The ditch geometry was assumed to consist of a trapezoidal channel with 4H:1V side slopes. A depth and bottom width were chosen for the ditch that could convey the estimated 100-year flow.

2.2.2. General Design Assumptions

Several design assumptions were common to the development of the conceptual pond closure configurations. As shown in Figure 1, the perimeter berm was assumed to be between five and 10 feet tall with 4H:1V outslopes and a 20-foot top width. It was assumed that the top of the berm would be used as a perimeter road with one foot of dense grade aggregate and one foot of No. 2 Stone underlain by geotextile filter fabric. As noted in Section 2.2.1, the ditches were not graded, however quantities were computed by using the geometry of the ditch and the length. It was assumed that the ditches would have two feet of cover soil and be lined with turf reinforcement mat. A 5% slope was used for the slope of the embankment which was assumed to consist of either CCR or imported soil. The use of CCR versus soil for each site was based on conversations with LG&E/KU. The cap was assumed to consist of 40 mil linear low density polyethylene liner (LLDPE) placed directly on the subgrade (either CCR or imported soil) and covered with geocomposite and two feet of soil cover.

It was assumed for the larger ponds that a portion of the pond would need to be reserved for backwater detention. In addition, LG&E/KU noted sites that would require new process water ponds. It was assumed that process water and runoff from the closed pond would be directed towards a single pond. For the purposes of this project, the ponds were assumed to be located at the current outlet of the pond and the existing outlet was assumed to be adequate to route the drainage. These ponds were assumed to have 4H:1V side slopes and be lined with 40 mil LLDPE liner and two feet of cover soil. The ponds were sized to have a storage volume less than 50 acre-feet.

For some sites, pond cleanout was evaluated in addition to pond closure. For these sites, it was assumed that the pond cleanout depth was 10 feet below the water surface and that the volume of water to be pumped out of the pond is equivalent to the pond cleanout volume. The slopes of the resulting pond were assumed to be 4H:1V.

For each site, the basemapping described in Section 2.1 was used to calculate quantities. It was assumed that this basemapping adequately reflects site conditions prior to pond closure or pond cleanout.

Specific assumptions for each site are described in Sections 2.2.2.1 through 2.2.2.9.

2.2.2.1. Cane Run

For Cane Run, two scenarios were considered. The first scenario included cleaning out the Clearwell Pond and the Stormwater Pond, using the Stormwater Pond as a process water pond and closing the Dead Storage Pond. A pump station was assumed to be installed in the Stormwater Pond. This is the scenario depicted in the drawing shown in Appendix B. In addition, a high-level look at filling the Stormwater Pond and Clearwell Pond was also considered. This option is included in the cost opinions, but drawings were not created. For closure options, the ponds were assumed to be filled with on-site CCR material.

2.2.2.2. E. W. Brown

Closure of the Auxiliary Pond at E. W. Brown was evaluated. Due to the size of the impoundment, a portion of the pond was left as a backwater detention pond near the current outfall structure. The pond was assumed to be filled with on-site CCR material.

2.2.2.3. Ghent

Closure of the Gypsum Stack, Ash Treatment Basin No. 1 and Ash Treatment Basin No. 2 was considered. In addition, cleaning out the Secondary Pond and using it as a process water pond and cleaning out the Reclaim Pond and installing pump stations at both ponds was evaluated. For the cleanout of the Secondary Pond, a depth of only four feet below the water surface was assumed to be cleaned out in order to keep the volume of the pond less than 50 acre-feet. For the Reclaim Pond, the cleanout depth was assumed to be one foot above the original design liner system elevation. It was assumed that the existing liner would not need to be replaced. This scenario is depicted on the drawing shown in Appendix B.   A portion of Ash Treatment Basin No. 1 and 2 and the Gypsum Stack were left as ponded areas for backwater detention. In addition, a high-level look at filling the Secondary Pond and the Reclaim Pond was evaluated and included in the cost opinion. All fill was assumed to be CCR available on-site.

2.2.2.4. Green River

At Green River, closure of the Main Pond, SO_2 Pond and Ash Treatment Basin No. 2 were reviewed. A portion of the Main Ash Pond was left as a process water pond with a pump station. Because the process water pond would be within the footprint of the existing pond, excavation costs were not considered. It was assumed that CCR material was not available and instead imported soil would be utilized as fill.

2.2.2.5. Mill Creek

For Mill Creek, cleaning out the Dead Storage Pond, Construction Pond, Clearwell Pond, and Emergency Pond was evaluated. It was assumed that the Clearwell Pond and Dead Storage Pond would be used as new process water ponds with pump stations. The slope for the ponds was assumed at 4H:1V except for the Emergency Pond, where a 3H:1V slope was assumed since the 4H:1V would not result in sufficient cleanout depth due to the shape of the pond. This scenario is depicted in the drawings in Appendix B. Also depicted is the closure of the Ash Treatment Basin with a portion of the pond left as a backwater detention basin. For costing purposes, both filling in the Ash Treatment Basin with CCR material and imported soil were evaluated. Also, a high-level look at filling in the Clearwell Pond, Emergency Pond, Dead Storage Pond, and Construction Pond was considered and is included in the cost opinion. For the Clearwell Pond, Dead Storage Pond, Construction Pond and Emergency Pond it was assumed that the sediment level is approximately five feet below the water surface. For the Emergency Pond, no temporary revegetation was assumed to be required.

2.2.2.6. Pineville

Closure of the Ash Pond was reviewed for Pineville using imported soil. The conceptual design included a run-off pond near the existing outfall structure which is assumed to act as backwater detention as well as collect runoff from other areas of the site. Because this pond is assumed to be within the footprint of the existing pond, excavation quantities associated with the pond were not considered.

2.2.2.7. Trimble

Closure of the Gypsum Stack Pond and the Ash Treatment Basin was considered using CCR as fill. A portion of the existing pond was left as a process water pond for the Gypsum Stack Pond and as a backwater detention basin for the Ash Treatment Basin, each with a pump station. Excavation costs were not considered for these ponds because it is anticipated that the ponds would be within the footprint of the current ponds.

2.2.2.8. Tyrone

For Tyrone, closure of the Ash Pond was evaluated. Due to the small size of the pond, it was assumed that a backwater detention basin would not be required and that the existing outfall structure would be sufficient to route the runoff from the closed pond. It was also assumed that the stockpiled CCR on site would be sufficient to fill in the pond.

2.3. Quantity Takeoffs

For each site, a proposed grade surface was created and compared to an existing grade surface created from the available mapping described in Section 2.1 to estimate quantities. The quantities were computed as follows:

- Erosion Control – Silt fencing was assumed for erosion control of the site during construction. To develop quantities, the length around the perimeter of the pond was added to the length of the ditch.

- Temporary Soil Cover – The total surface area for the site was estimated and then the surface area for the berm was subtracted out. The resulting surface area for the cap was multiplied by a depth of 12 inches in order to estimate a volume for the temporary cover soil.

- Embankment - Embankment quantities were estimated by comparing the surface created for the proposed grade to the basemap surface and subtracting the quantities for the perimeter berm, perimeter road and cover soil. If the basemap surface was created by topographic mapping that did not include below-water contours, the below-water storage volume was taken from hydrographic survey data (or estimated if hydrographic survey data was not available) and added to the embankment quantity. This quantity represents the amount of CCR fill or imported soil fill required to close the pond.

- Perimeter Berm – The perimeter berm quantity was computed by comparing the berm portion of the proposed grade surface to the basemapping surface and subtracting the perimeter road material quantities.

- Road – The top of the perimeter berm was assumed to be used as a road with one foot of Dense Grade Aggregate underlain by one foot of No. 2 Stone. Geotextile filter fabric was assumed for the base of the road. Quantities were calculated by assuming a 20-foot top width and 4H:1V side slopes for the road surface.

- Ditches – Ditches were not included in the proposed grading surface. However, quantities were estimated based on the ditch size computed (See Section 2.2.1) and the length. It was assumed that the ditches would be lined with Turf Reinforcement Mat (TRM). The surface area for the TRM was estimated by multiplying the ditch length by the cross-sectional width of the ditch. This surface area was multiplied by the cover soil depth (assumed to be two feet) in order to estimate the cover soil volume for the ditch.

- Cap – Quantities for the cap described in Section 2.2.2 and shown in Figure 1 were calculated based on the total surface area of the cap. For the geocomposite, FML, and Hydro Seeding quantities the surface area of the cap was used. To estimate the amount of cover soil needed, this surface area was multiplied by two feet.

- Backwater Detention Pond / Process Water Pond – For ponds where it was assumed a portion of the pond would remain as a backwater detention or a process water pond, it was assumed that a 40 mil, textured linear low density polyethylene liner or flexible membrane liner (FML) would be installed. The surface area of the pond was used as the quantity of the liner needed. This surface area was multiplied by two feet in order to estimate the cover soil needed over the liner in the area of the pond. These volumes were subtracted from the cover soil and FML for the cap so that they were not double counted.

- Pond Dewatering / Cleanout – For ponds where an option to clean out the pond was reviewed, quantities for dewatering the pond and removing material were computed. The pond cleanout volume was estimated by multiplying the area of the pond by an assumed depth of 10 feet, except where the resulting storage volume would have been greater than 50 acre-feet. The dewatering time was estimated in days using the cleanout volume and assuming a 1,500 gallon per minute pump running for eight hours per day.

2.4. Development of Closure Cost Opinions

Cost opinions were developed using the quantities computed as described in Section 2.3. Cost spreadsheets were developed with key assumptions as follows:

- Escalation is 4% with 50% of the work completed in 2014 and 50% of the work completed in 2015.

- LG&E and KU Overheads = 3.5%

- Contingency = 20%

- Unit Cost for excavation, hauling, placement and compaction of CCR material is $6.85 per cubic yard.

- Unit cost for excavation, hauling, placement and compaction of imported soil is $16.51 per cubic yard.

- Siting Study, Conceptual Design, and Final Design/Permitting were assumed to be a fixed percentage of the total cost.

The cost spreadsheets are arranged such that these assumptions can be changed by overriding the corresponding cell on the cover sheet which will automatically recalculate the total costs.

Other unit costs were determined from previous discussions with LG&E, recent construction bids for Stantec projects, or using RS Means (2013). The source of the assumed unit cost is listed in the cost opinion spreadsheet.

3. Disclaimer

The costs developed in Appendix C are based on the assumptions described in Section 2 and the assumptions listed on the cost opinion sheets. These costs were computed in order to aid LG&E in planning for the facilities. Actual costs will vary once a final design scenario is selected and the design is further refined.

Please note that no geotechnical analyses were performed for the configurations shown. There were no additional considerations of environmental risk, changes in law or regulatory feasibility examined. The concept designs did not attempt to maximize storage or minimize the import of materials as a design goal. Only rudimentary hydrologic and hydraulic analyses were performed and existing outfall structures may not be sufficiently sized. Also, please note that mapping in many cases is dated and may not reflect conditions as of this time.

4. Conclusions

Total costs for the design scenarios evaluated (as described in Section 2.2.2) are summarized below in Table 1. Details of these costs can be found on the cost opinion sheets included in Appendix C. The costs are listed by pond and broken out into both closure and new construction costs. Costs associated with cleaning out ponds or with creating backwater detention or process water ponds were assumed to be new construction costs, while costs associated with pond closures (embankment, erosion control, berm/road, cap and cover) are included in the closure costs. These costs represent Stantec's opinion of probable cost based on information available at the time of this study and are subject to the assumptions stated herein.

Table 1. Summary of Costs by Pond

Site	Pond Name	Scenario Description	Closure Costs	New Construction Costs	Total Cost
Cane Run	Dead Storage Pond	fill with CCR and Cap	$1,360,000	-----	$1,360,000
	Stormwater Pond	clean out and use as process water pond	-----	$397,000	$397,000
		fill with CCR & cap	$640,000	-----	$640,000
	Clearwell Pond	clean out	-----	$30,000	$30,000
		fill with CCR & cap	$107,000	-----	$107,000
E.W. Brown	Auxiliary Pond	fill with CCR & cap	$28,510,000	$320,000	$28,830,000
Ghent	Ash Treatment Basin No. 1	fill with CCR & cap	$75,350,000	-----	$75,350,000
	Ash Treatment Basin No. 2	fill with CCR & cap	$175,920,000	-----	$175,920,000
	Gypsum Stack	fill with CCR & cap	$28,910,000	-----	$28,910,000
	Secondary Pond	clean out and use as process water pond	-----	$1,320,000	$1,320,000
		fill with CCR & cap	$3,420,000	-----	$3,420,000
	Reclaim Pond	clean out	-----	$890,000	$890,000
		fill with CCR & cap	$4,050,000	-----	$4,050,000
Green River	Main Ash Pond	fill with soil & cap	$9,070,000	$400,000	$9,470,000
	Ash Treatment Basin No. 2	fill with soil & cap	$1,240,000	-----	$1,240,000
	SO_2 Pond	fill with soil & cap	$1,740,000	-----	$1,740,000
Mill Creek	Ash Treatment Basin	fill with CCR & cap	$38,070,000	-----	$38,070,000
		fill with soil & cap	$62,490,000	-----	$62,490,000
	Clearwell Pond	clean out and use as process water pond	-----	$585,000	$585,000
		fill with CCR & cap	$1,240,000*	-----	$620,000
	Dead Storage Pond	clean out and use as process water pond	-----	$521,000	$521,000
		fill with CCR & cap	$1,240,000*	-----	$620,000
	Construction Pond	clean out	-----	$270,000	$270,000
		fill with CCR & cap	$1,140,000	-----	$1,140,000

Table 1. Summary of Costs by Pond

Site	Pond Name	Scenario Description	Closure Costs	New Construction Costs	Total Cost
	Emergency Pond	clean out	-----	$242,000	$242,000
		fill with CCR & cap	$630,000	-----	$630,000
Pineville	Ash Pond	fill with soil & cap	$3,920,000	$70,000	$3,990,000
Trimble	Ash Treatment Basin	fill with CCR & cap	$87,610,000	$640,000	$88,250,000
	Gypsum Stack Pond	fill with CCR & cap	$26,370,000	$800,000	$27,170,000
Tyrone	Ash Pond	fill with CCR & cap	$4,400,000	$0	$4,400,000

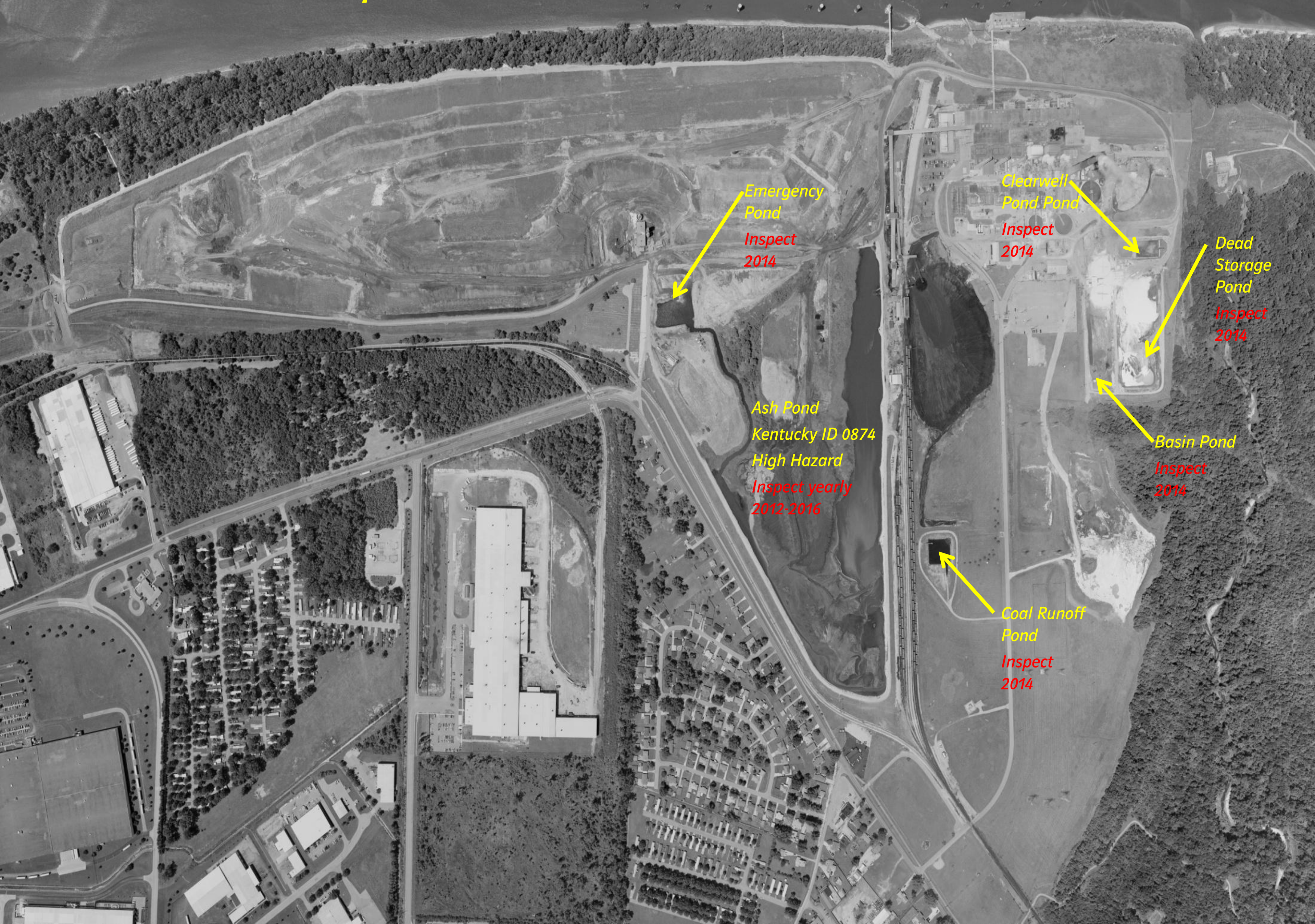
*Cost was developed for combined Clearwell / Dead Storage Pond

Appendix A

Aerial Mapping

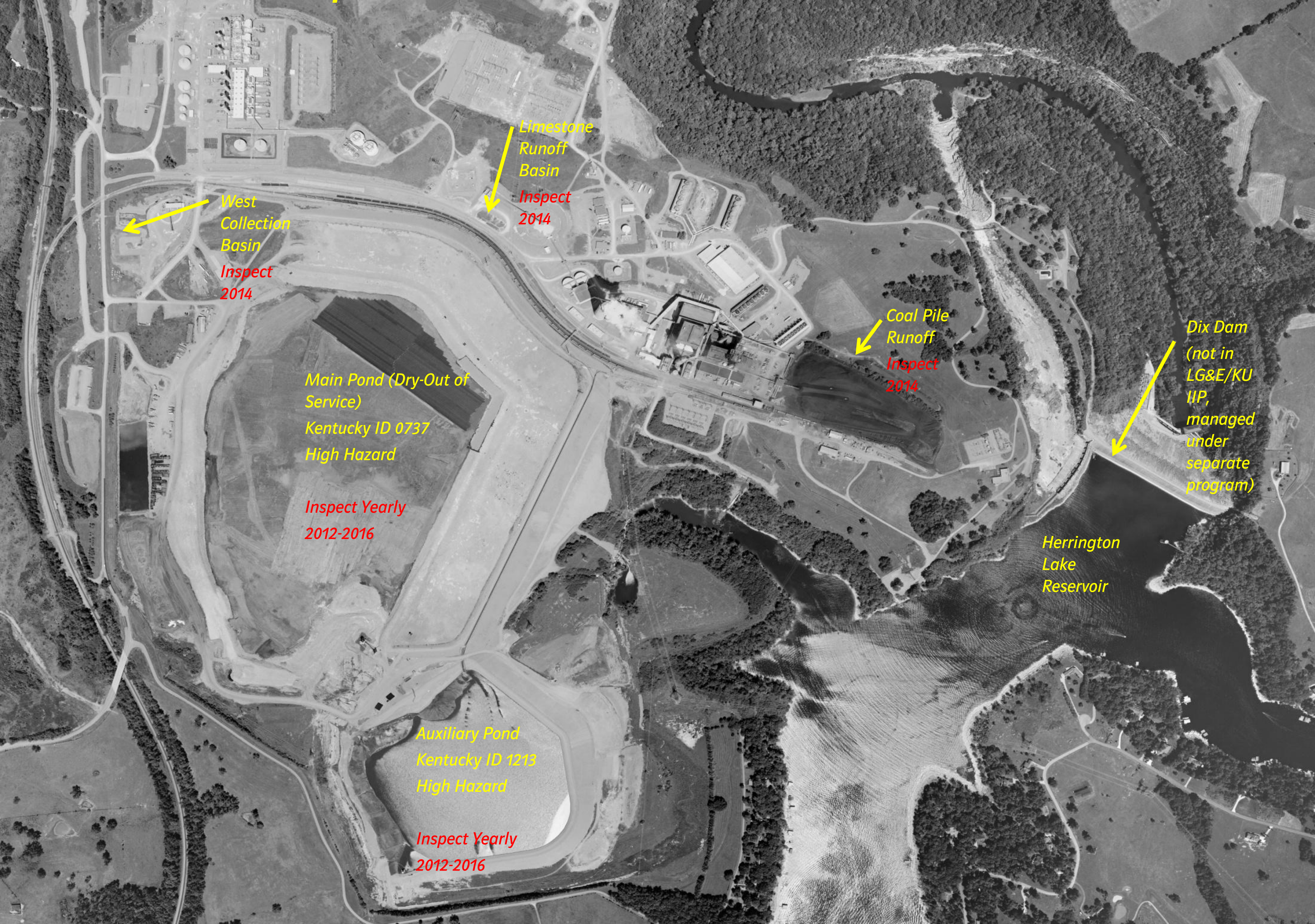
Cane Run

LG&E Cane Run Impoundments (6)



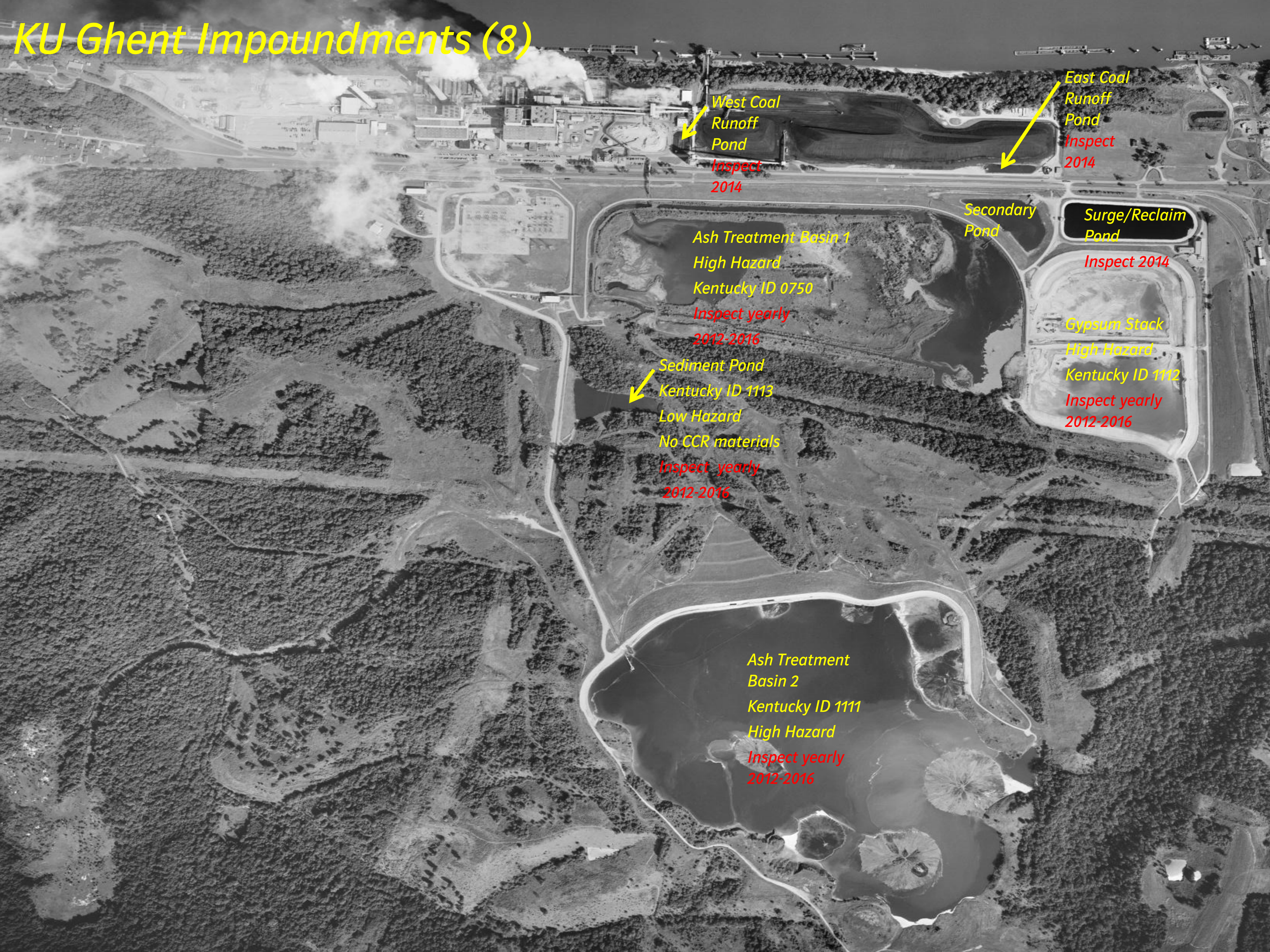
E.W. Brown

KU EW Brown Impoundments (5)



Ghent

KU Ghent Impoundments (8)



Green River


KU Green River Impoundments (5)
North
Water Pond
Inspect
2014
Main Pond
Kentucky ID 803
Low Hazard
Inspect yearly
2012-2016
Coal
Runoff
Pond
Inspect
yearly
2012-2016
Number 2
Pond
Low Hazard
Inspect
yearly
2012-2016
Scrubber Pond
Kentucky ID 804
Low Hazard
Inspect yearly
2012-2016

Mill Creek

LG&E Mill Creek Impoundments (9)

Pineville

KU Pineville Impoundment (1)

Trimble

LG&E/KU Trimble County Impoundments (4)

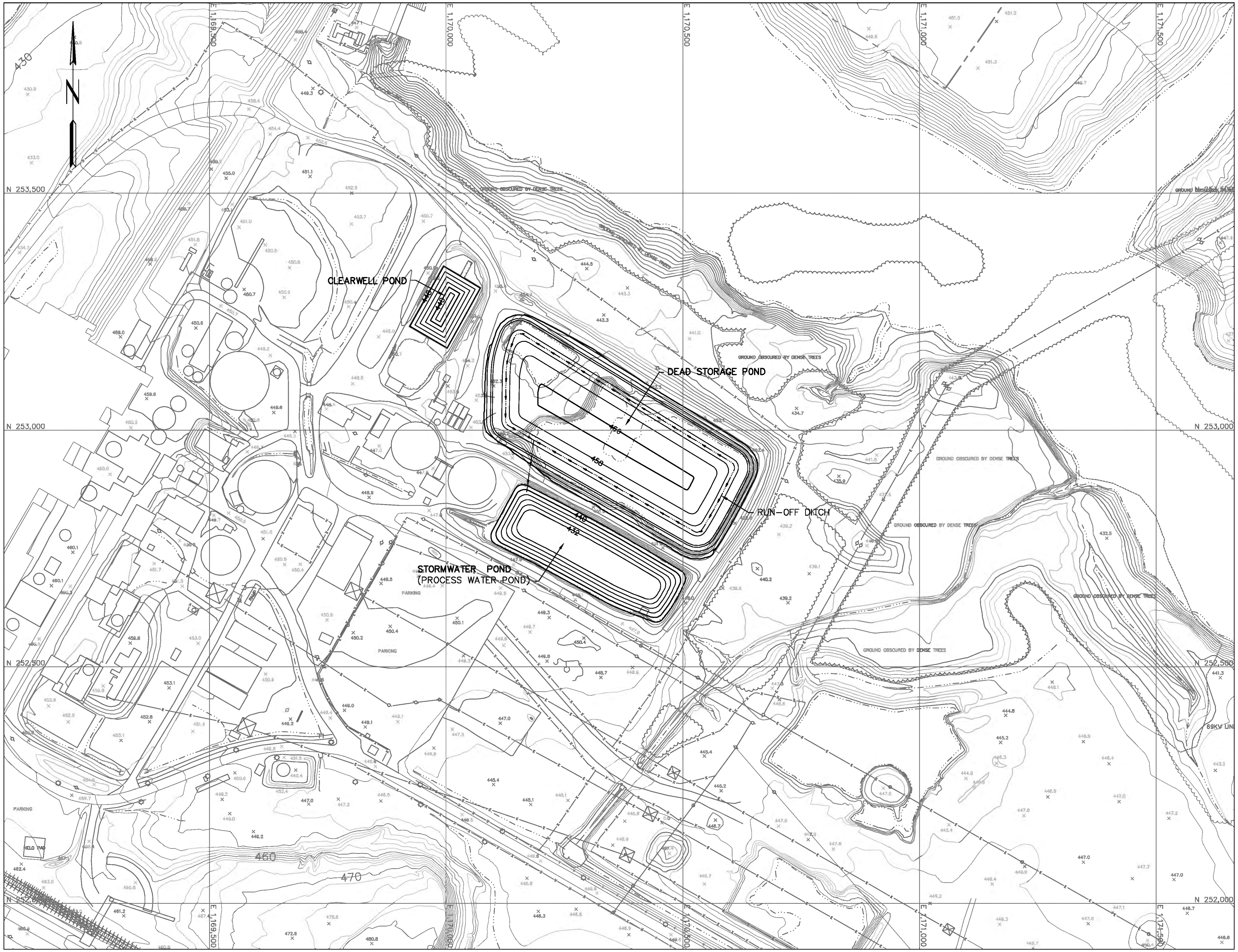
Tyrone

KU Tyrone Impoundments (3)

Appendix B

Drawings

Cane Run



Revisions

NOTE:
TOPOGRAPHIC INFORMATION WAS OBTAINED FROM AERIAL SURVEYS PROVIDED BY LG&E IN 2000, 2005, 2006, 2007 AND 2008. THIS MAPPING WAS SUPPLEMENTED WITH GROUND SURVEYS PERFORMED BY VAUGHAN ENGINEERING IN OCTOBER 13, 2010, OCTOBER 7, 2011 AND OCTOBER 5, 2012; GROUND SURVEYS BY STANTEC IN 2008 AND MARCH 21–22, 2013; AND HYDROGRAPHIC SURVEYS BY STANTEC IN JUNE 27–28, 2012 AND MARCH 13–14, 2013. THE INFORMATION IS BELIEVED TO BE CORRECT BUT IS NOT TO BE USED BY THE CONTRACTOR FOR CONSTRUCTION OF THE PROJECT. IN ADDITION, THE FEATURES SHOWN ON THIS DRAWING (PROPERTY BOUNDARY, PERMIT BOUNDARY, WELLS, ETC.) IN RELATION TO THE TOPOGRAPHIC INFORMATION ARE APPROXIMATE.

50 0 100 200 FEET
GRAPHIC SCALE: 1"=100'
CONTOUR INTERVAL = 2 FEET

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

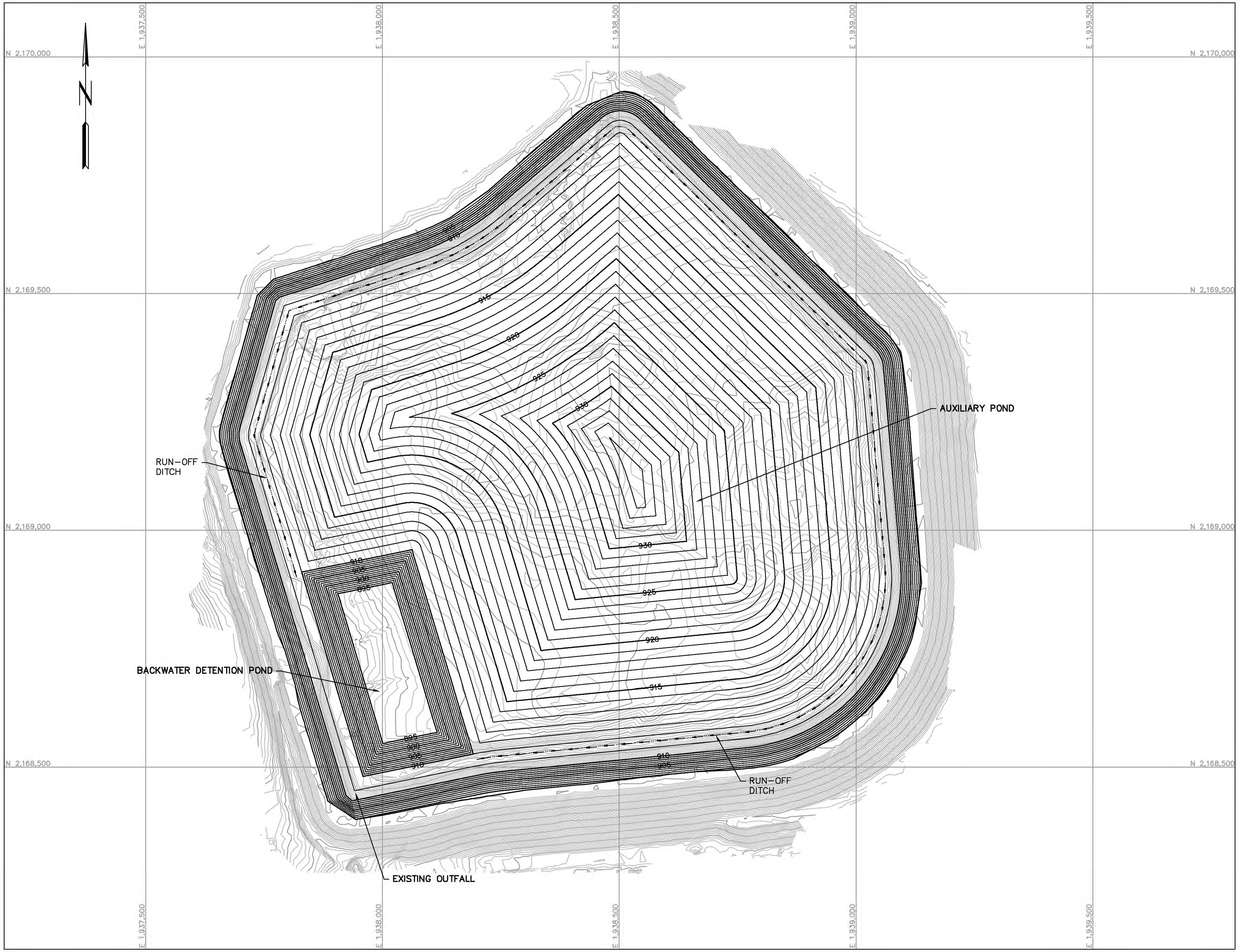
Location and Unit:	CANE RUN
Scale:	1"= 100'
Contract No.	n/a
Engineering discipline:	C
Drawn:	JUNE, 2013
Checked:	JUNE, 2013
Released for:	REVIEW
Originator:	STANTEC
Job or Project No:	175663013
Drawing No:	–
Rev.	0

LG&E Generation Services
LOUISVILLE GAS & ELECTRIC COMPANY

Title
CANE RUN – CONCEPTUAL CLOSURE PLAN
CLEARWELL POND, DEAD STORAGE POND
AND STORMWATER POND

PLOT DATE: 06/12/2013 USER: CLINKENBEARD, ADAM

E.W. Brown



NOTE:
TOPOGRAPHIC MAPPING WAS GENERATED FROM A HYDROGRAPHIC SURVEY PROVIDED BY LG&E DATED 2012.

Revisions

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GRAPHIC SCALE: 1"=100'
CONTOUR INTERVAL = 1 FOOT

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: E.W. BROWN	LG&E® Generation Services LOUISVILLE GAS & ELECTRIC COMPANY	Drawn: PJB JUNE, 2013
Scale: 1"= 100' / Contract No. n/a		Checked: KBL JUNE, 2013
Engineering discipline: C / Drawing type:		Approved: DEK
Title: E.W. BROWN – CONCEPTUAL CLOSURE PLAN AUXILIARY POND		Released for: REVIEW
		Alternate Drawing No:
Originator: STANTEC	Job or Project No: 175663013	Drawing No: – Rev. 0

DMS Version 2.0

PLOT DATE: 06/28/2013 USER: BOND, PJ
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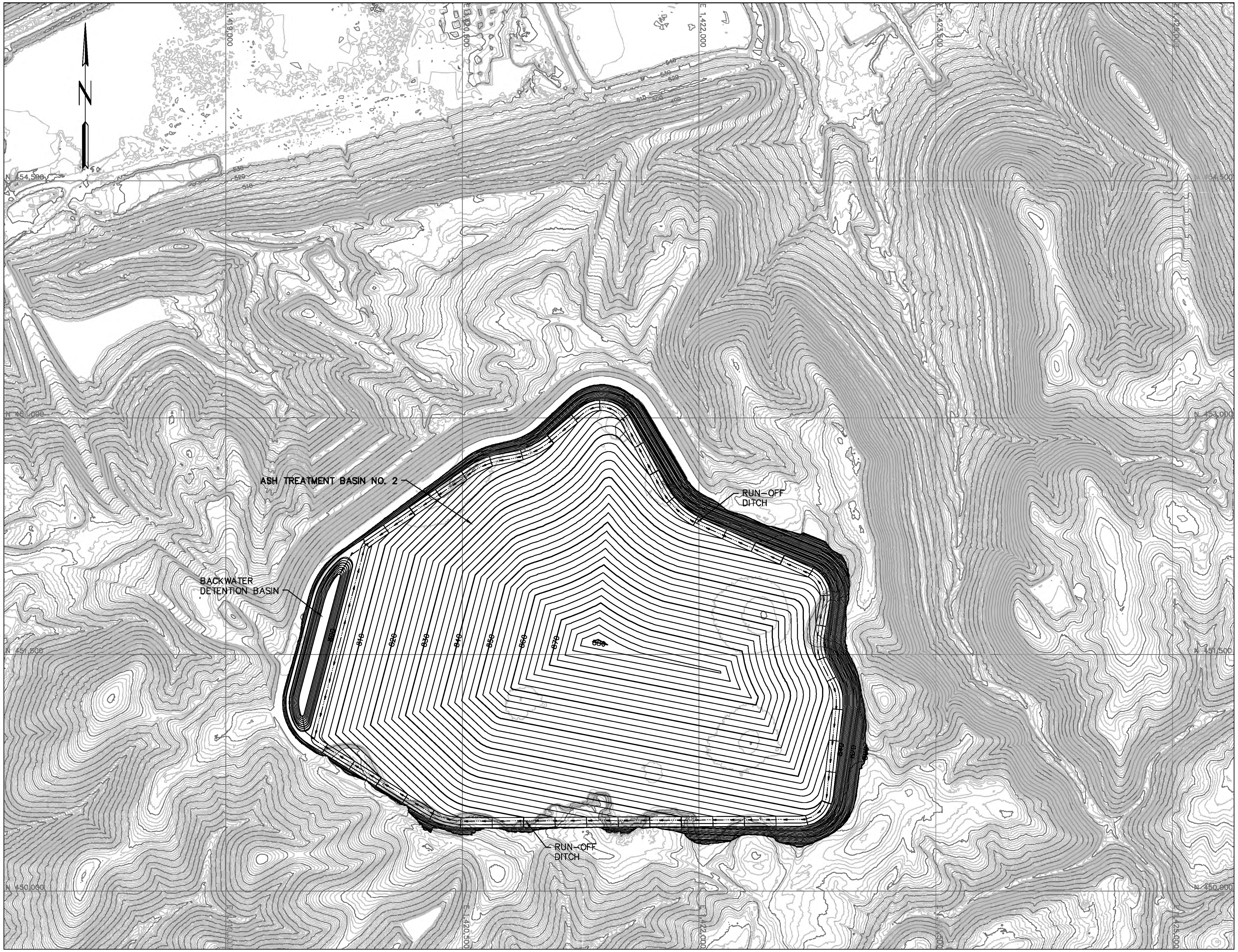
Ghent



NOTE:
TOPOGRAPHIC MAPPING WAS GENERATED FROM AN AERIAL SURVEY PERFORMED ON DECEMBER 12, 2012 BY PHOTO SCIENCE, INC. AND SUPPLEMENTED WITH SURVEY INFORMATION FROM KENTUCKY AERIAL PHOTOGRAPHY AND ELEVATION DATE PROGRAM (KYAPED) DATED 2012.

Revisions

150 0 300 600 FEET
GRAPHIC SCALE: 1"=300'
CONTOUR INTERVAL = 2 FEET

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: GHENT	LG&E® Generation Services LOUISVILLE GAS & ELECTRIC COMPANY	Drawn: JMB JUNE, 2013
Scale: 1"= 300' / Contract No. n/a		Checked: KBL JUNE, 2013
Engineering discipline: C / Drawing type:		Approved: DEV
Title: CONCEPTUAL CLOSURE PLAN GHENT ASH TREATMENT BASIN NO. 2		Released for: REVIEW / Alternate Drawing No:
Originator: STANTEC	Job or Project No: 175663013	Drawing No: – / Rev. 0

DMS Version.2.0

PLOT DATE: 06/12/2013 USER: GRAHAM, DAVE
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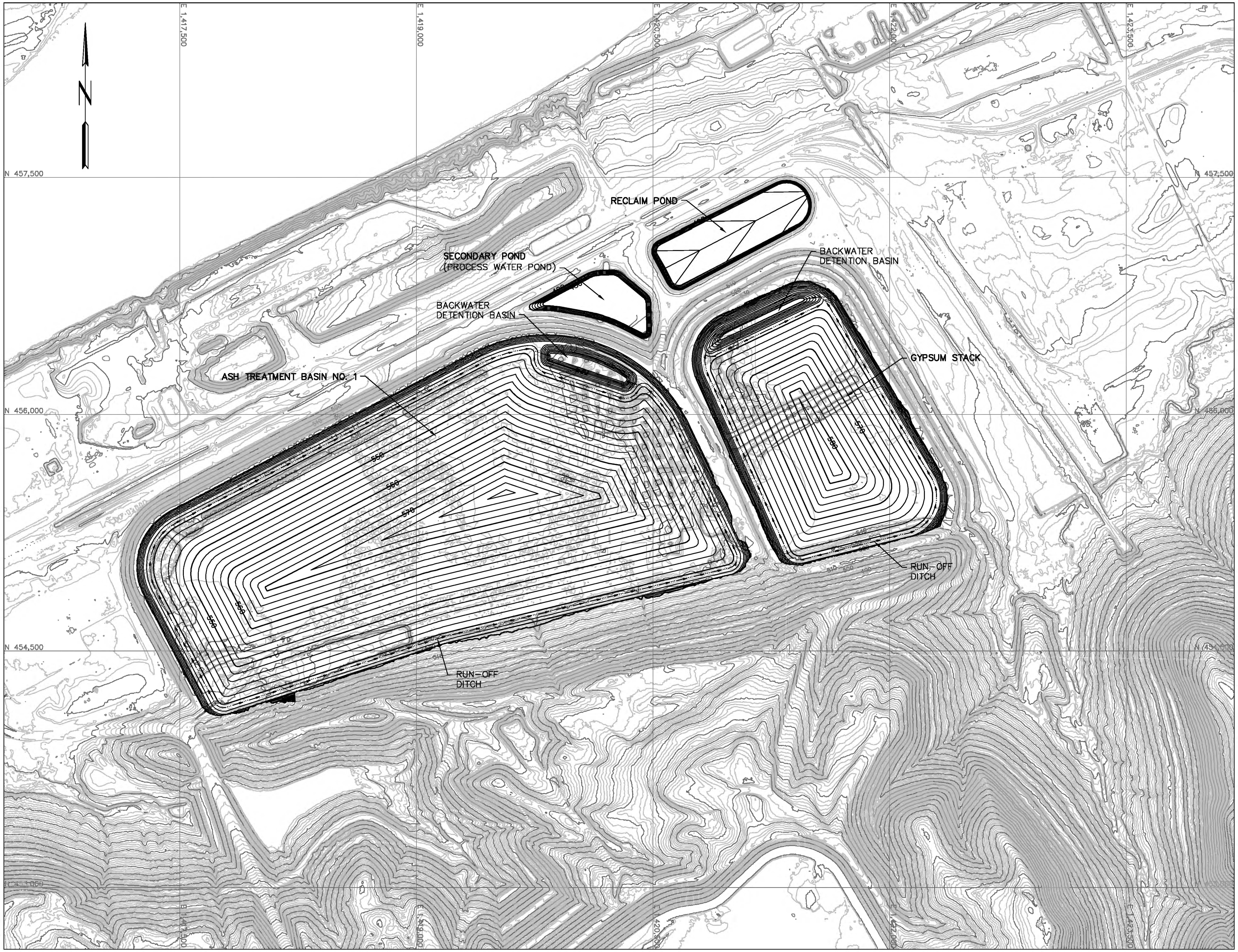
Revisions



NOTE:
TOPOGRAPHIC MAPPING WAS GENERATED FROM AN AERIAL SURVEY PERFORMED ON DECEMBER 12, 2012 BY PHOTO SCIENCE, INC. AND SUPPLEMENTED WITH SURVEY INFORMATION FROM KENTUCKY AERIAL PHOTOGRAPHY AND ELEVATION DATE PROGRAM (KYAPED) DATED 2012.

150 0 300 600 FEET
GRAPHIC SCALE: 1"=300'
CONTOUR INTERVAL = 2 FEET

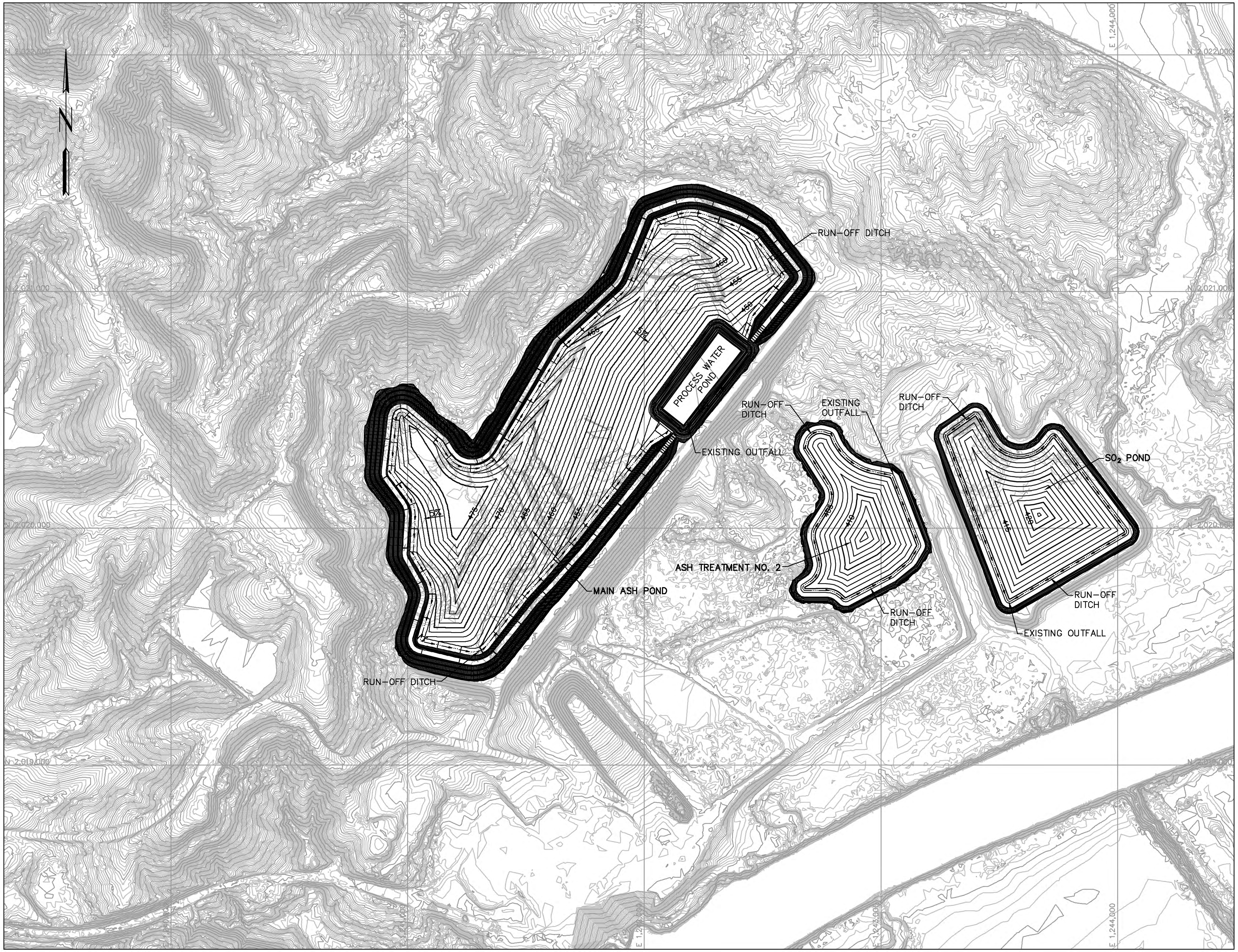
ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: GHENT	LG&E® Generation Services LOUISVILLE GAS & ELECTRIC COMPANY	Drawn: BMB JUNE, 2013
Scale: 1"= 300' / Contract No. n/a		Checked: KBL JUNE, 2013
Engineering discipline: C / Drawing type:		Approved: DEK
Title: GHENT -CONCEPTUAL CLOSURE PLAN ASH TREATMENT BASIN NO. 1, RECLAIM POND, SECONDARY POND AND GYPSUM STACK		Released for: REVIEW
		Alternate Drawing No:
Originator: STANTEC	Job or Project No: 175663013	Drawing No: – Rev. 0

DMS Version.2.0

PLOT DATE: 06/12/2013 USER: GRAHAM, DAVE

Green River



NOTE:
TOPOGRAPHIC MAPPING WAS GENERATED FROM GROUND SURFACE DATA PROVIDED BY LG&E DATED 2012.

Revisions

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GRAPHIC SCALE: 1"=200'
CONTOUR INTERVAL = 1 FOOT

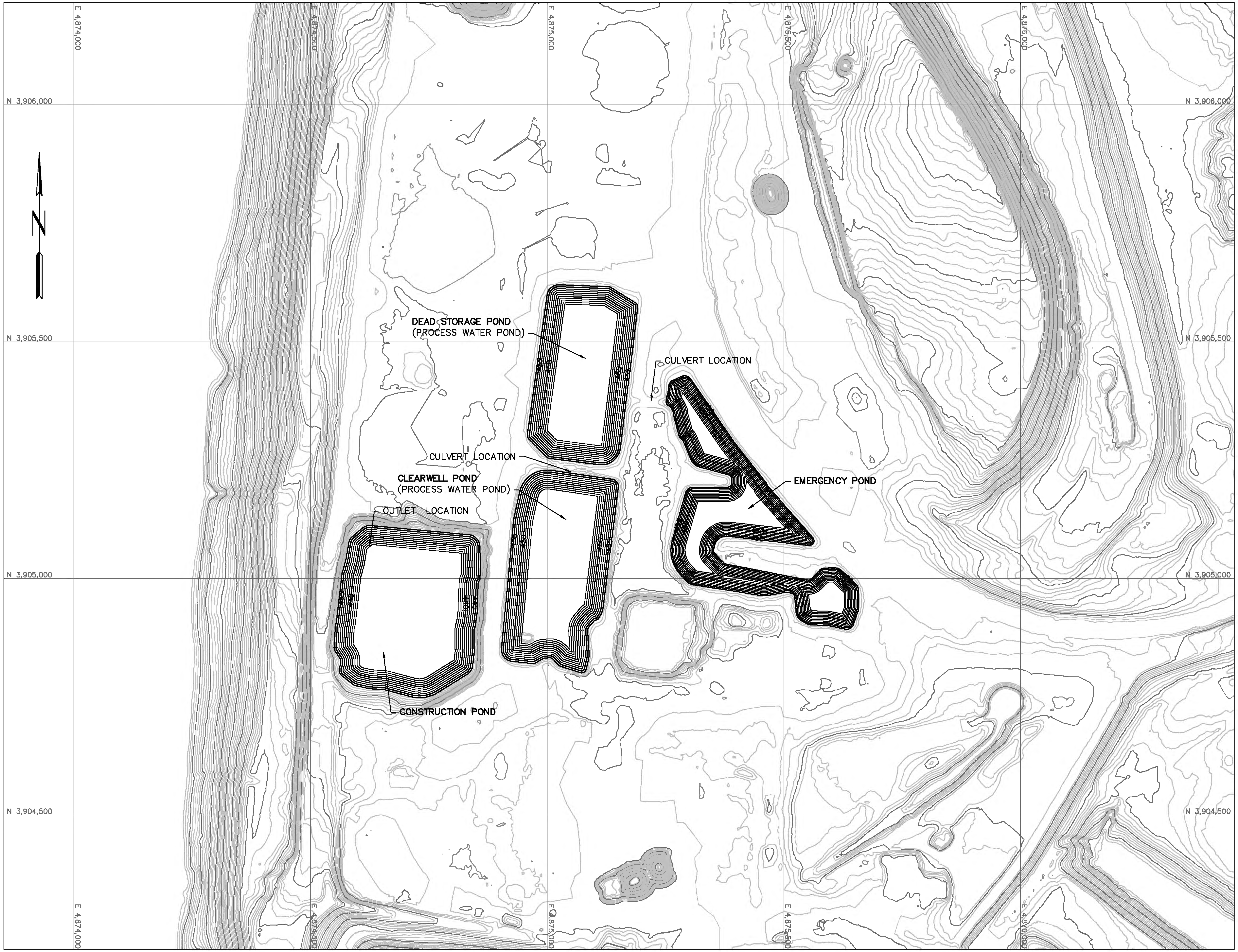
ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: GREEN RIVER	LG&E® Generation Services LOUISVILLE GAS & ELECTRIC COMPANY		Drawn: BMB MAY, 2013
Scale: 1"=200'	Contract No. n/a		Checked: MMM MAY, 2013
Engineering discipline: C	Drawing type:		Approved: DEK
Title: CONCEPTUAL CLOSURE PLAN GREEN RIVER MAIN ASH POND			Released for: REVIEW
			Alternate Drawing No:
Originator: STANTEC	Job or Project No: 175663013	Drawing No: –	Rev. 0

DMS Version 2.0

PLOT DATE: 06/12/2013 USER: CLINKENBEARD, ADAM

Mill Creek



NOTES:

1. TOPOGRAPHIC MAPPING WAS GENERATED FROM 2012 5-FOOT DEMS FROM THE KENTUCKY AERIAL PHOTOGRAPHY AND ELEVATION DATA PROGRAM (KYAPED).
2. FOR COST ESTIMATING PURPOSES, THE CLEARWELL AND DEAD STORAGE PONDS WERE ASSUMED TO ACT AS PROCESS WATER PONDS.

Revisions

50 0 100 200 FEET

GRAPHIC SCALE: 1"=100'

CONTOUR INTERVAL = 1 FOOT

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: MILL CREEK	LG&E® Generation Services LOUISVILLE GAS & ELECTRIC COMPANY	Drawn: SMB JUNE, 2013
Scale: 1"= 100' / Contract No. n/a		Checked: KBL JUNE, 2013
Engineering discipline: C / Drawing type:		Approved: DEK
Title: MILL CREEK CONCEPTUAL CLOSURE PLAN CONSTRUCTION POND AND SURROUNDING PONDS		Released for: REVIEW / Alternate Drawing No:
Originator: STANTEC	Job or Project No: 175663013	Drawing No: – / Rev. 0

DMS Version.2.0

PLOT DATE: 06/12/2013 USER: CLINKENBEARD, ADAM
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Revisions

NOTE:
TOPOGRAPHIC MAPPING WAS PROVIDED BY LG&E AND DATED NOVEMBER, 2012.

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GRAPHIC SCALE: 1"=200'
CONTOUR INTERVAL = 1 FOOT

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: MILL CREEK	LG&E Generation Services LOUISVILLE GAS & ELECTRIC COMPANY		Drawn: JUNE, 2013
Scale: 1"= 200'	Contract No. n/a		Checked: JUNE, 2013
Engineering discipline: C	Drawing type:		Approved:
Title: MILL CREEK CONCEPTUAL CLOSURE PLAN ASH TREATMENT BASIN			Released for: REVIEW
Originator: STANTEC	Job or Project No: 175663013	Drawing No: –	Rev: 0

PLOT DATE: 06/18/2013 USER: CLINKENBEARD, ADAM

Pineville

Revisions

NOTE:
TOPOGRAPHIC MAPPING WAS GENERATED FROM GROUND SURFACE DATA PROVIDED BY LG&E DATED 2012.

50 0 100 200 FEET
GRAPHIC SCALE: 1"=100'
CONTOUR INTERVAL = 1 FOOT

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: PINEVILLE	LG&E® Generation Services LOUISVILLE GAS & ELECTRIC COMPANY		Drawn: JML JUNE, 2013
Scale: 1" = 200'	Contract No. n/a		Checked: mmm JUNE, 2013
Engineering discipline: C	Drawing type:		Approved: DEX
Title: CONCEPTUAL CLOSURE PLAN PINEVILLE ASH POND			Released for: REVIEW
			Alternate Drawing No:
Originator: STANTEC	Job or Project No: 175663013	Drawing No: –	Rev. 0

DMS Version.2.0

PLOT DATE: 06/12/2013 USER: CLINKENBEARD, ADAM
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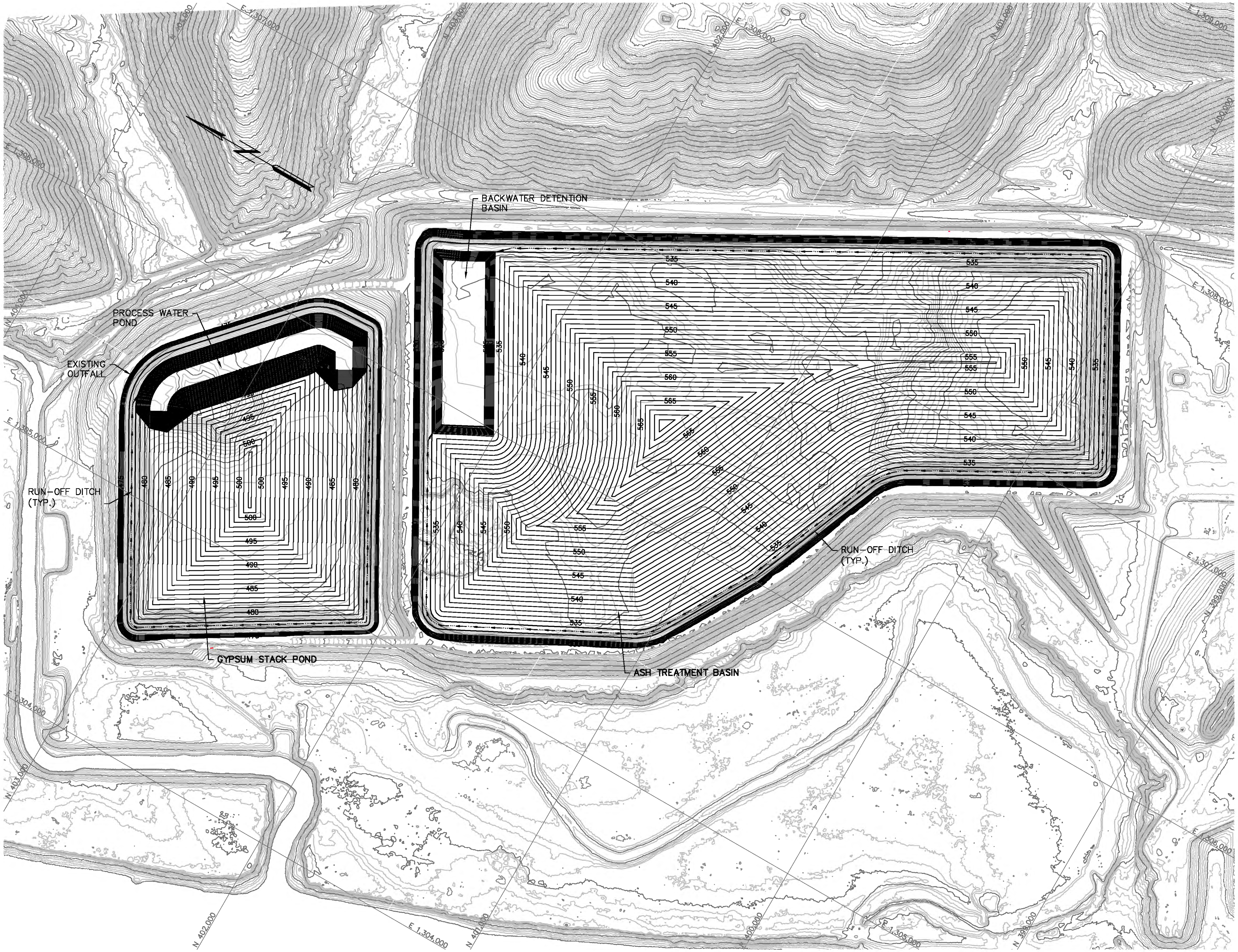
Trimble

NOTE:
TOPOGRAPHIC MAPPING WAS GENERATED FROM A SURVEY DATED NOVEMBER 29, 2012 PERFORMED BY HDR SUPPLEMENTED WITH SURVEY INFORMATION FROM THE KENTUCKY AERIAL PHOTOGRAPHY AND ELEVATION DATA PROGRAM (KYAPED) DATED 2012.



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GRAPHIC SCALE: 1"=200'
CONTOUR INTERVAL = 1 FOOT

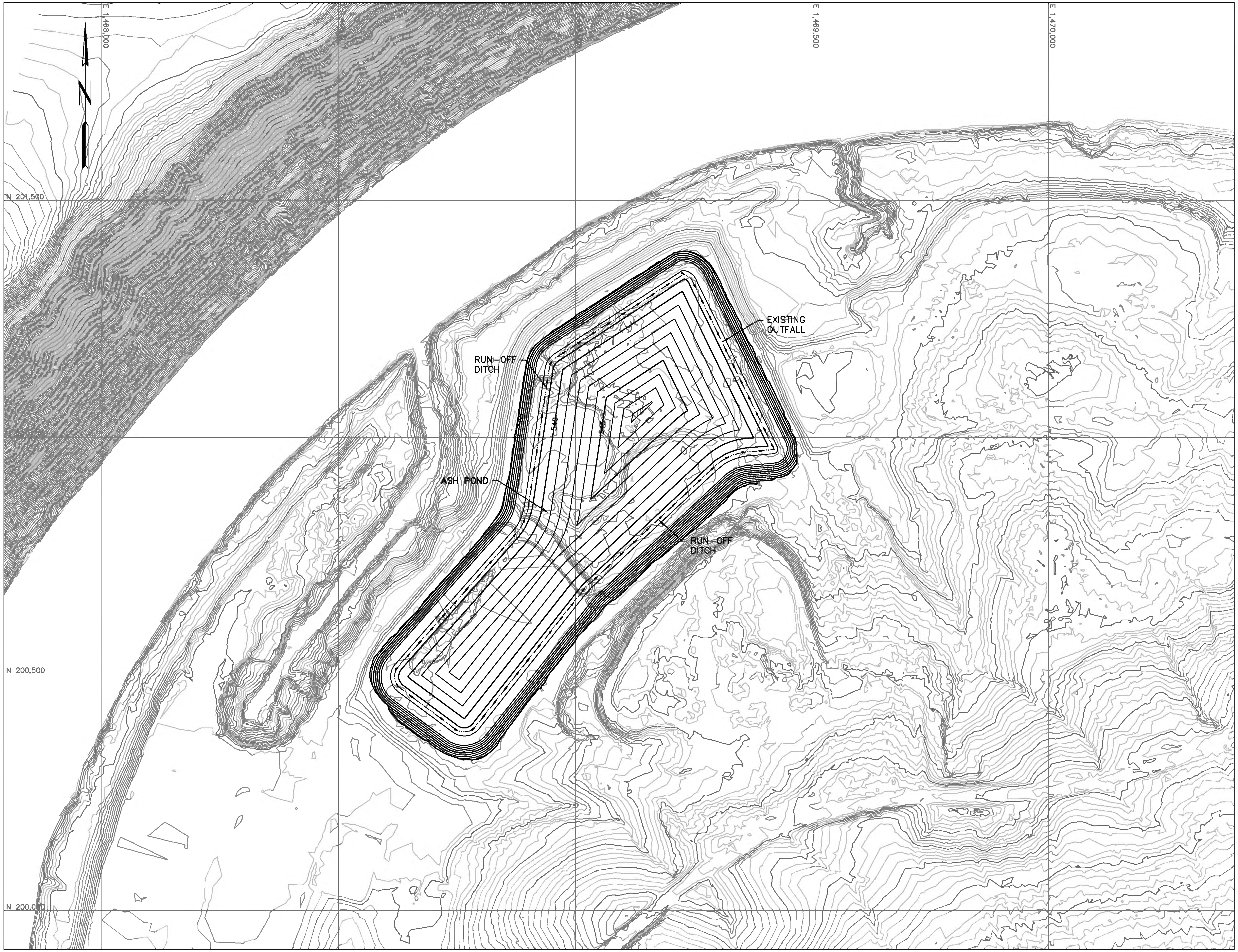
ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Revisions

Location and Unit: MILL CREEK	LG&E LOUISVILLE GAS & ELECTRIC COMPANY — Generation Services
Scale: 1"= 200' / Contract No. n/a	Drawn: ACC JUNE, 2013
Engineering discipline: C	Checked: JUNE, 2013
Title: TRIMBLE – CONCEPTUAL CLOSURE PLAN ASH TREATMENT BASIN AND GYPSUM STACK POND	Released for: REVIEW
Originator: STANTEC	Job or Project No: 175663013
Drawing No: –	Rev. 0

Tyrone

Revisions



NOTE:
TOPOGRAPHIC MAPPING WAS GENERATED FROM GROUND SURFACE DATA PROVIDED BY LG&E DATED 2012.

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GRAPHIC SCALE: 1"=100'
CONTOUR INTERVAL = 1 FOOT

ISSUED FOR REVIEW
NOT FOR CONSTRUCTION

Location and Unit: TYRONE	LG&E® Generation Services LOUISVILLE GAS & ELECTRIC COMPANY	Drawn: JMB JUNE, 2013
Scale: 1"= 100' / Contract No. n/a		Checked: MMM JUNE, 2013
Engineering discipline: C / Drawing type:		Approved: DEK
Title: CONCEPTUAL CLOSURE PLAN TYRONE ASH POND		Released for: REVIEW
		Alternate Drawing No:
Originator: STANTEC	Job or Project No: 175663013	Drawing No: – Rev. 0

DMS Version.2.0

PLOT DATE: 06/12/2013 USER: GRAHAM, DAVE
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Appendix C

Cost Opinions

Cane Run

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	5	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	5	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	10	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				**Type in numbers to Override Value**
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				

Cane Run - Dead Storage Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 171,592**	**$ 182,024**	**$ 89,228**	**$ 92,797**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 42,898*	*$ 45,506*	*$ 22,307*	*$ 23,199*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 42,898*	*$ 45,506*	*$ 22,307*	*$ 23,199*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 85,796*	*$ 91,012*	*$ 44,614*	*$ 46,398*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 276,573**	**$ 293,389**	**$ 143,818**	**$ 149,571**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 274,000*	*$ 290,659*	*$ 142,480*	*$ 148,179*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 2,573*	*$ 2,729*	*$ 1,338*	*$ 1,391*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 581,385**	**$ 616,733**	**$ 302,320**	**$ 314,413**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 175,155*	*$ 185,804*	*$ 91,081*	*$ 94,724*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 58,480*	*$ 62,036*	*$ 30,410*	*$ 31,626*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 42,317*	*$ 44,890*	*$ 22,005*	*$ 22,885*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 305,433*	*$ 324,003*	*$ 158,825*	*$ 165,178*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 1,029,550**	**$ 1,092,146**	**$ 535,366**	**$ 556,780**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 36,034**	**$ 38,225**	**$ 18,738**	**$ 19,487**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 213,117**	**$ 226,074**	**$ 110,821**	**$ 115,254**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 1,280,000**	**$ 1,360,000**	**$ 670,000**	**$ 700,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Dead Storage Pond considered a "smaller" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	5	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	5	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	10	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY			**Type in numbers to Override Value**	

Cane Run - Stormwater Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 80,394**	**$ 85,282**	**$ 41,805**	**$ 43,477**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 20,099*	*$ 21,320*	*$ 10,451*	*$ 10,869*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 20,099*	*$ 21,320*	*$ 10,451*	*$ 10,869*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 40,197*	*$ 42,641*	*$ 20,902*	*$ 21,739*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 97,560**	**$ 103,492**	**$ 50,731**	**$ 52,760**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 95,900*	*$ 101,731*	*$ 49,868*	*$ 51,863*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 1,660*	*$ 1,761*	*$ 863*	*$ 898*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 304,410**	**$ 322,918**	**$ 158,293**	**$ 164,625**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 100,860*	*$ 106,992*	*$ 52,447*	*$ 54,545*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 39,160*	*$ 41,541*	*$ 20,363*	*$ 21,178*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 25,060*	*$ 26,584*	*$ 13,031*	*$ 13,552*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 139,330*	*$ 147,801*	*$ 72,452*	*$ 75,350*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 482,364**	**$ 511,692**	**$ 250,829**	**$ 260,862**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 16,883**	**$ 17,909**	**$ 8,779**	**$ 9,130**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 99,849**	**$ 105,920**	**$ 51,922**	**$ 53,999**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 600,000**	**$ 640,000**	**$ 320,000**	**$ 330,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Stormwater Pond considered a "smaller" pond for cost purposes.

[2] Costs shown are for a closure option. Costs associated with cleaning out the ponds are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	5	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	5	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	10	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

Cane Run - Clearwell Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 13,496**	**$ 14,317**	**$ 7,018**	**$ 7,299**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 3,374*	*$ 3,579*	*$ 1,755*	*$ 1,825*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 3,374*	*$ 3,579*	*$ 1,755*	*$ 1,825*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 6,748*	*$ 7,158*	*$ 3,509*	*$ 3,649*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 17,872**	**$ 18,959**	**$ 9,293**	**$ 9,665**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 17,125*	*$ 18,166*	*$ 8,905*	*$ 9,261*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 747*	*$ 792*	*$ 388*	*$ 404*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 49,610**	**$ 52,626**	**$ 25,797**	**$ 26,829**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 12,815*	*$ 13,594*	*$ 6,664*	*$ 6,930*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 36,795*	*$ 39,032*	*$ 19,133*	*$ 19,899*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 80,978**	**$ 85,902**	**$ 42,109**	**$ 43,793**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 2,834**	**$ 3,007**	**$ 1,474**	**$ 1,533**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 16,763**	**$ 17,782**	**$ 8,717**	**$ 9,065**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 101,000**	**$ 107,000**	**$ 53,000**	**$ 55,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Clearwell Pond considered a "smaller" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion Details - Closure Costs
Cane Run - Dead Storage Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	40,000	CY	$ 2.50	$ 100,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	40,000	CY	$ 4.35	$ 174,000.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	3,100	LF	$ 0.83	$ 2,573.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	0	AC	$ 1,800.00	$ -	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	10,500	CY	$ 10.00	$ 105,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	10,500	CY	$ 4.36	$ 45,780.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	10,500	CY	$ 2.15	$ 22,575.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	1	AC	$ 1,800.00	$ 1,800.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	700	CY	$ 35.00	$ 24,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	800	CY	$ 35.00	$ 28,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	4,600	SY	$ 1.30	$ 5,980.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	1,700	CY	$ 10.00	$ 17,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	1,700	CY	$ 4.36	$ 7,412.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	1,700	CY	$ 2.15	$ 3,655.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	2,500	SY	$ 5.70	$ 14,250.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap (includes the Backwater Detention Basin)					
1. 40 mil FML (includes materials and installation)	131,000	SF	$ 1.00	$ 131,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	32,000	SF	$ 1.00	$ 32,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	8,300	CY	$ 10.00	$ 83,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	8,300	CY	$ 4.36	$ 36,188.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	8,300	CY	$ 2.15	$ 17,845.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	3	AC	$ 1,800.00	$ 5,400.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 857,958**	

Raw Quantities	
Perimeter Length (feet)	1,662
Road Length (feet)	1,475
Ditch Length (feet)	1,349
Ditch Cross-Sectional Wetted Perimeter Length (feet)	17
Surface Area of Berm (sq. ft.)	32,728
Total Surface Area (sq. ft.)	133,226
Total Fill Quantity (cubic yards)	61,561
Berm Fill Quantity (cubic yards)	11,497

Assumptions:
1. Currently being closed per Joe Watson of LG&E.
2. Berm is 20 feet wide with 4H:1V side slopes.
3. Road is 20 feet wide with 4H:1V side slopes and consist of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Cane Run - Stormwater Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	14,000	CY	$ 2.50	$ 35,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	14,000	CY	$ 4.35	$ 60,900.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	2,000	LF	$ 0.83	$ 1,660.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	0	AC	$ 1,800.00	$ -	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	6,000	CY	$ 10.00	$ 60,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	6,000	CY	$ 4.36	$ 26,160.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	6,000	CY	$ 2.15	$ 12,900.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	1	AC	$ 1,800.00	$ 1,800.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	500	CY	$ 35.00	$ 17,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	500	CY	$ 35.00	$ 17,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	3,200	SY	$ 1.30	$ 4,160.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	1,000	CY	$ 10.00	$ 10,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	1,000	CY	$ 4.36	$ 4,360.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	1,000	CY	$ 2.15	$ 2,150.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	1,500	SY	$ 5.70	$ 8,550.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	44,000	SF	$ 1.00	$ 44,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	44,000	SF	$ 1.00	$ 44,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	3,000	CY	$ 10.00	$ 30,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	3,000	CY	$ 4.36	$ 13,080.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	3,000	CY	$ 2.15	$ 6,450.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	1	AC	$ 1,800.00	$ 1,800.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 401,970**	

Raw Quantities	
Perimeter Length (feet)	1,200
Road Length (feet)	1,000
Ditch Length (feet)	800
Ditch Cross-Sectional Wetted Perimeter Length (feet)	17
Surface Area of Berm (sq. ft.)	22,000
Total Surface Area (sq. ft.)	50,000
Total Fill Quantity (cubic yards)	25,000
Berm Fill Quantity (cubic yards)	7,000

Assumptions:
1. Costs computed for closure option.
2. Berm is 20 feet wide with 4H:1V side slopes.
3. Road is 20 feet wide with 4H:1V side slopes and consist of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
4. Cap slopes are 5%.
5. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
6. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
7. Existing outlet structure is sufficient to route flow from capped area.
8. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Cane Run - Clearwell Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	2,500	CY	$ 2.50	$ 6,250.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	2,500	CY	$ 4.35	$ 10,875.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	900	LF	$ 0.83	$ 747.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	0	AC	$ 1,800.00	$ -	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	0	AC	$ 1,800.00	$ -	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	0	CY	$ 35.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	0	CY	$ 35.00	$ -	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	0	SY	$ 1.30	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	500	CY	$ 10.00	$ 5,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	500	CY	$ 4.36	$ 2,180.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	500	CY	$ 2.15	$ 1,075.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	800	SY	$ 5.70	$ 4,560.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	14,000	SF	$ 1.00	$ 14,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	14,000	SF	$ 1.00	$ 14,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	500	CY	$ 10.00	$ 5,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	500	CY	$ 4.36	$ 2,180.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	500	CY	$ 2.15	$ 1,075.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	0.3	AC	$ 1,800.00	$ 540.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 67,482**	

Raw Quantities	
Perimeter Length (feet)	500
Road Length (feet)	0
Ditch Length (feet)	400
Ditch Cross-Sectional Wetted Perimeter Length (feet)	17
Surface Area of Berm (sq. ft.)	0
Total Surface Area (sq. ft.)	13,000
Total Fill Quantity (cubic yards)	3,500
Berm Fill Quantity (cubic yards)	0

Assumptions:
1. No perimeter berm, road or perimeter ditches required.
2. Sediment level approximately 5 feet below the water surface.
3. No temporary cover or revegetation required.
4. Cap Slopes are 5%.
5. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
6. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions			
Escalation	4	%	
LG&E and KU Overheads	3.5	%	
Contingency	20	%	
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY	
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY	**Type in numbers to Override Value**

Cane Run - Stormwater Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
O&M Costs	**$ 123,685**	**$ 131,205**	**$ 64,316**	**$ 66,889**	**$ -**	**$ -**	**$ -**	**$ -**	
Stormwater Pond Dewatering	*$ 3,125*	*$ 3,315*	*$ 1,625*	*$ 1,690*	*$ -*	*$ -*	*$ -*	*$ -*	
Stormwater Pond Cleanout	*$ 120,560*	*$ 127,890*	*$ 62,691*	*$ 65,199*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ 176,899**	**$ 187,654**	**$ 91,987**	**$ 95,667**	**$ -**	**$ -**	**$ -**	**$ -**	
Stormwater (Process Water) Pond Liner	*$ 146,899*	*$ 155,830*	*$ 76,387*	*$ 79,443*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ 30,000*	*$ 31,824*	*$ 15,600*	*$ 16,224*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 300,584**	**$ 318,860**	**$ 156,304**	**$ 162,556**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 10,520**	**$ 11,160**	**$ 5,471**	**$ 5,689**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 62,221**	**$ 66,004**	**$ 32,355**	**$ 33,649**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 374,000**	**$ 397,000**	**$ 195,000**	**$ 202,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions			
Escalation	4	%	
LG&E and KU Overheads	3.5	%	
Contingency	20	%	
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY	
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY	Type in numbers to Override Value

Cane Run - Clearwell Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
O&M Costs	**$ 22,545**	**$ 23,916**	**$ 11,723**	**$ 12,192**	**$ -**	**$ -**	**$ -**	**$ -**	
Clearwell Pond Dewatering	*$ 625*	*$ 663*	*$ 325*	*$ 338*	*$ -*	*$ -*	*$ -*	*$ -*	
Clearwell Pond Cleanout	*$ 21,920*	*$ 23,253*	*$ 11,398*	*$ 11,854*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
Clearwell Pond Liner	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 22,545**	**$ 23,916**	**$ 11,723**	**$ 12,192**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 789**	**$ 837**	**$ 410**	**$ 427**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 4,667**	**$ 4,951**	**$ 2,427**	**$ 2,524**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 29,000**	**$ 30,000**	**$ 15,000**	**$ 16,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion Details - New Construction
Cane Run - Stormwater Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Stormwater Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	5	DAY	$ 341.40	$ 1,707.00	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	40	HR	$ 35.45	$ 1,418.00	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Stormwater Pond Cleanout[2]					
1. Excavation and Load-out	17,600	CY	$ 2.50	$ 44,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	17,600	CY	$ 4.35	$ 76,560.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs					
A. Stormwater (Process Water) Pond Liner[3]					
1. 40 mil FML (includes materials and installation)	66,000	SF	$ 1.00	$ 66,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	4,900	CY	$ 10.00	$ 49,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	4,900	CY	$ 4.36	$ 21,364.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	4,900	CY	$ 2.15	$ 10,535.00	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 300,584**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth of 10 feet below the water surface.
3. The Stormwater Pond is cleaned out and lined for use as the new Process Water Pond.
4. Pond slopes are 4H:1V.
5. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - New Construction
Cane Run - Clearwell Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Clearwell Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	1	DAY	$ 341.40	$ 341.40	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	8	HR	$ 35.45	$ 283.60	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Clearwell Pond Cleanout[2]					
1. Excavation and Load-out	3,200	CY	$ 2.50	$ 8,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	3,200	CY	$ 4.35	$ 13,920.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs[3]					
A. Clearwell Pond Liner					
1. 40 mil FML (includes materials and installation)	0	SF	$ 1.00	$ -	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	0	LS	$ 30,000.00	$ -	Estimated
			Total (Derived in 2013 $)	**$ 22,545**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth of 10 feet below the water surface.
3. A liner and pump station are not required.
4. Pond slopes are 4H:1V.
5. Quantities based on base topographic mapping shown in drawing.

E.W. Brown

Conceptual Cost Opinion - CLOSURE
25-Jun-13

Assumptions

				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	N/A	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	N/A	0.5	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	N/A	1	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

E.W. BROWN - Auxiliary Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
% of Work Carried out each year:			50	50	0	0	0	0	100
Engineering/Permitting[1]	**$ 527,776**	**$ 559,864**	**$ 274,443**	**$ 285,421**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 211,110*	*$ 223,946*	*$ 109,777*	*$ 114,168*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 105,555*	*$ 111,973*	*$ 54,889*	*$ 57,084*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 211,110*	*$ 223,946*	*$ 109,777*	*$ 114,168*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 14,873,696**	**$ 15,778,017**	**$ 7,734,322**	**$ 8,043,695**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 14,056,200*	*$ 14,910,817*	*$ 7,309,224*	*$ 7,601,593*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 7,636*	*$ 8,100*	*$ 3,971*	*$ 4,130*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 809,860*	*$ 859,099*	*$ 421,127*	*$ 437,972*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 6,237,329**	**$ 6,616,559**	**$ 3,243,411**	**$ 3,373,148**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 2,107,719*	*$ 2,235,868*	*$ 1,096,014*	*$ 1,139,854*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 161,700*	*$ 171,531*	*$ 84,084*	*$ 87,447*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 217,737*	*$ 230,975*	*$ 113,223*	*$ 117,752*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 3,750,173*	*$ 3,978,184*	*$ 1,950,090*	*$ 2,028,094*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 21,638,801**	**$ 22,954,440**	**$ 11,252,176**	**$ 11,702,263**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 757,358**	**$ 803,405**	**$ 393,826**	**$ 409,579**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 4,479,232**	**$ 4,751,569**	**$ 2,329,200**	**$ 2,422,369**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 26,880,000**	**$ 28,510,000**	**$ 13,980,000**	**$ 14,540,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Auxiliary Pond considered a "larger" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion Details - Closure Costs
E.W. Brown - Auxiliary Pond
Mercer County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	2,052,000	CY	$ 2.50	$ 5,130,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	2,052,000	CY	$ 4.35	$ 8,926,200.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	9,200	LF	$ 0.83	$ 7,636.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	46,000	CY	$ 10.00	$ 460,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	46,000	CY	$ 4.36	$ 200,560.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	46,000	CY	$ 2.15	$ 98,900.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	28	AC	$ 1,800.00	$ 50,400.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	126,900	CY	$ 10.00	$ 1,269,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	126,900	CY	$ 4.36	$ 553,284.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	126,900	CY	$ 2.15	$ 272,835.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,900	CY	$ 35.00	$ 66,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	2,200	CY	$ 35.00	$ 77,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	14,000	SY	$ 1.30	$ 18,200.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	8,700	CY	$ 10.00	$ 87,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	8,700	CY	$ 4.36	$ 37,932.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	8,700	CY	$ 2.15	$ 18,705.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	13,000	SY	$ 5.70	$ 74,100.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap (includes the Backwater Detention Basin)					
1. 40 mil FML (includes materials and installation)	1,220,000	SF	$ 1.00	$ 1,220,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	1,121,000	SF	$ 1.00	$ 1,121,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	82,300	CY	$ 10.00	$ 823,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	82,300	CY	$ 4.36	$ 358,828.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	82,300	CY	$ 2.15	$ 176,945.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	28	AC	$ 1,800.00	$ 50,400.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 21,111,025**	

Raw Quantities	
Perimeter Length (feet)	4,806
Road Length (feet)	4,496
Ditch Length (feet)	4,341
Ditch Cross-Sectional Wetted Perimeter Length (feet)	27
Surface Area of Berm (sq. ft.)	287,751
Total Surface Area (sq. ft.)	1,504,893
Total Fill Quantity (cubic yards)	2,319,464
Berm Fill Quantity (cubic yards)	130,379

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion - NEW CONSTRUCTION
25-Jun-13

Assumptions		
Escalation	4	%
LG&E and KU Overheads	3.5	%
Contingency	20	%
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY

Type in numbers to Override Value

E.W. BROWN -Auxiliary Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Capital Costs[1]	**$ 242,731**	**$ 257,489**	**$ 126,220**	**$ 131,269**	**$ -**	**$ -**	**$ -**	**$ -**	
Backwater Detention Pond Liner	*$ 242,731*	*$ 257,489*	*$ 126,220*	*$ 131,269*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 242,731**	**$ 257,489**	**$ 126,220**	**$ 131,269**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 8,496**	**$ 9,012**	**$ 4,418**	**$ 4,594**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 50,245**	**$ 53,300**	**$ 26,128**	**$ 27,173**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 310,000**	**$ 320,000**	**$ 160,000**	**$ 170,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion Details - New Construction
E.W. Brown - Auxiliary Pond
Mercer County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. Capital Costs					
A. Backwater Detention Pond Liner					
1. 40 mil FML (includes materials and installation)	109,000	SF	$ 1.00	$ 109,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	8,100	CY	$ 10.00	$ 81,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	8,100	CY	$ 4.36	$ 35,316.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	8,100	CY	$ 2.15	$ 17,415.00	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	0	LS	$ 30,000.00	$ -	Estimated
			Total (Derived in 2013 $)	**$ 242,731**	

Assumptions:
1. Pond slopes are 4H:1V.
2. Quantities based on base topographic mapping shown in drawing.

Ghent

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	2	0.5	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	1	0.25	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	2	0.5	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

Ghent - Ash Treatment Basin No. 1									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 706,036**	**$ 748,963**	**$ 367,139**	**$ 381,824**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 282,415*	*$ 299,585*	*$ 146,856*	*$ 152,730*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 141,207*	*$ 149,793*	*$ 73,428*	*$ 76,365*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 282,415*	*$ 299,585*	*$ 146,856*	*$ 152,730*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 34,519,325**	**$ 36,618,100**	**$ 17,950,049**	**$ 18,668,051**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 30,996,250*	*$ 32,880,822*	*$ 16,118,050*	*$ 16,762,772*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 16,185*	*$ 17,169*	*$ 8,416*	*$ 8,753*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 3,506,890*	*$ 3,720,109*	*$ 1,823,583*	*$ 1,896,526*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 21,963,577**	**$ 23,298,962**	**$ 11,421,060**	**$ 11,877,902**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 3,937,027*	*$ 4,176,398*	*$ 2,047,254*	*$ 2,129,144*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 367,490*	*$ 389,833*	*$ 191,095*	*$ 198,739*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 779,651*	*$ 827,054*	*$ 405,419*	*$ 421,635*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 16,879,409*	*$ 17,905,677*	*$ 8,777,293*	*$ 9,128,384*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 57,188,938**	**$ 60,666,026**	**$ 29,738,248**	**$ 30,927,778**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 2,001,613**	**$ 2,123,311**	**$ 1,040,839**	**$ 1,082,472**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 11,838,110**	**$ 12,557,867**	**$ 6,155,817**	**$ 6,402,050**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 71,030,000**	**$ 75,350,000**	**$ 36,940,000**	**$ 38,420,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Ash Treatment Basin No. 2 considered a "larger" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	2	0.5	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	1	0.25	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	2	0.5	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY			Type in numbers to Override Value	

Ghent - Ash Treatment Basin No. 2									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 1,648,430**	**$ 1,748,655**	**$ 857,184**	**$ 891,471**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 659,372*	*$ 699,462*	*$ 342,873*	*$ 356,588*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 329,686*	*$ 349,731*	*$ 171,437*	*$ 178,294*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 659,372*	*$ 699,462*	*$ 342,873*	*$ 356,588*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 88,826,607**	**$ 94,227,265**	**$ 46,189,836**	**$ 48,037,429**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 84,474,200*	*$ 89,610,231*	*$ 43,926,584*	*$ 45,683,647*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 17,347*	*$ 18,402*	*$ 9,020*	*$ 9,381*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 4,335,060*	*$ 4,598,632*	*$ 2,254,231*	*$ 2,344,400*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 43,047,798**	**$ 45,665,104**	**$ 22,384,855**	**$ 23,280,249**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 20,930,758*	*$ 22,203,348*	*$ 10,883,994*	*$ 11,319,354*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 403,150*	*$ 427,662*	*$ 209,638*	*$ 218,024*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 809,153*	*$ 858,350*	*$ 420,760*	*$ 437,590*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 20,904,737*	*$ 22,175,745*	*$ 10,870,463*	*$ 11,305,282*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 133,522,835**	**$ 141,641,023**	**$ 69,431,874**	**$ 72,209,149**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 4,673,299**	**$ 4,957,436**	**$ 2,430,116**	**$ 2,527,320**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 27,639,227**	**$ 29,319,692**	**$ 14,372,398**	**$ 14,947,294**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 165,840,000**	**$ 175,920,000**	**$ 86,240,000**	**$ 89,690,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Ash Treatment Basin No. 2 considered a "larger" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	2	0.5	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	1	0.25	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	2	0.5	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

Ghent - Gypsum Stack

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
Engineering/Permitting[1]	**$ 270,809**	**$ 287,275**	**$ 140,821**	**$ 146,454**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 108,324*	*$ 114,910*	*$ 56,328*	*$ 58,581*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 54,162*	*$ 57,455*	*$ 28,164*	*$ 29,291*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 108,324*	*$ 114,910*	*$ 56,328*	*$ 58,581*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 10,774,360**	**$ 11,429,441**	**$ 5,602,667**	**$ 5,826,774**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 9,514,650*	*$ 10,093,141*	*$ 4,947,618*	*$ 5,145,523*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 8,300*	*$ 8,805*	*$ 4,316*	*$ 4,489*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 1,251,410*	*$ 1,327,496*	*$ 650,733*	*$ 676,763*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 10,890,389**	**$ 11,552,525**	**$ 5,663,002**	**$ 5,889,522**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 4,466,849*	*$ 4,738,433*	*$ 2,322,761*	*$ 2,415,672*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 161,700*	*$ 171,531*	*$ 84,084*	*$ 87,447*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 245,018*	*$ 259,915*	*$ 127,409*	*$ 132,506*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 6,016,822*	*$ 6,382,645*	*$ 3,128,747*	*$ 3,253,897*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 21,935,558**	**$ 23,269,240**	**$ 11,406,490**	**$ 11,862,750**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 767,745**	**$ 814,423**	**$ 399,227**	**$ 415,196**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 4,540,661**	**$ 4,816,733**	**$ 2,361,144**	**$ 2,455,589**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 27,250,000**	**$ 28,910,000**	**$ 14,170,000**	**$ 14,740,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Gypsum Stack considered a "larger" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions

				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	2	0.5	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	1	0.25	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	2	0.5	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY			**Type in numbers to Override Value**	

Ghent - Secondary Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019
% of Work Carried out each year:			50	50	0	0	0	0
Engineering/Permitting[1]	**$ 123,399**	**$ 130,902**	**$ 64,168**	**$ 66,734**	**$ -**	**$ -**	**$ -**	**$ -**
Initial Siting Study	*$ 49,360*	*$ 52,361*	*$ 25,667*	*$ 26,694*	*$ -*	*$ -*	*$ -*	*$ -*
Conceptual Design	*$ 24,680*	*$ 26,180*	*$ 12,834*	*$ 13,347*	*$ -*	*$ -*	*$ -*	*$ -*
Final Design/Permitting	*$ 49,360*	*$ 52,361*	*$ 25,667*	*$ 26,694*	*$ -*	*$ -*	*$ -*	*$ -*
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
O&M Costs	**$ 815,751**	**$ 865,349**	**$ 424,191**	**$ 441,158**	**$ -**	**$ -**	**$ -**	**$ -**
CCR Embankment	*$ 548,000*	*$ 581,318*	*$ 284,960*	*$ 296,358*	*$ -*	*$ -*	*$ -*	*$ -*
Erosion Control	*$ 3,901*	*$ 4,138*	*$ 2,029*	*$ 2,110*	*$ -*	*$ -*	*$ -*	*$ -*
Temporary Soil Cover and Revegetation	*$ 263,850*	*$ 279,892*	*$ 137,202*	*$ 142,690*	*$ -*	*$ -*	*$ -*	*$ -*
Capital Costs (Closure)[2]	**$ 1,652,238**	**$ 1,752,694**	**$ 859,164**	**$ 893,530**	**$ -**	**$ -**	**$ -**	**$ -**
Perimeter Berm	*$ 246,148*	*$ 261,114*	*$ 127,997*	*$ 133,117*	*$ -*	*$ -*	*$ -*	*$ -*
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*
Roads	*$ 86,360*	*$ 91,611*	*$ 44,907*	*$ 46,703*	*$ -*	*$ -*	*$ -*	*$ -*
Ditches	*$ 65,156*	*$ 69,117*	*$ 33,881*	*$ 35,236*	*$ -*	*$ -*	*$ -*	*$ -*
Cap	*$ 1,254,574*	*$ 1,330,852*	*$ 652,378*	*$ 678,474*	*$ -*	*$ -*	*$ -*	*$ -*
Project Subtotal	**$ 2,591,388**	**$ 2,748,945**	**$ 1,347,522**	**$ 1,401,423**	**$ -**	**$ -**	**$ -**	**$ -**
LG&E & KU Overheads (3.5)%	**$ 90,699**	**$ 96,213**	**$ 47,163**	**$ 49,050**	**$ -**	**$ -**	**$ -**	**$ -**
Contingency (20%)	**$ 536,417**	**$ 569,032**	**$ 278,937**	**$ 290,095**	**$ -**	**$ -**	**$ -**	**$ -**
Project Total (rounded)	**$ 3,220,000**	**$ 3,420,000**	**$ 1,680,000**	**$ 1,750,000**	**$ -**	**$ -**	**$ -**	**$ -**

100

[1] Gypsum Stack considered a "smaller" pond for cost purposes.

[2] Costs shown are for a closure option. Costs associated with cleaning out the ponds are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions

				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	2	0.5	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	1	0.25	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	2	0.5	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

Ghent - Reclaim Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
Engineering/Permitting[1]	**$ 146,037**	**$ 154,916**	**$ 75,939**	**$ 78,977**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 58,415*	*$ 61,966*	*$ 30,376*	*$ 31,591*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 29,207*	*$ 30,983*	*$ 15,188*	*$ 15,795*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 58,415*	*$ 61,966*	*$ 30,376*	*$ 31,591*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 1,363,762**	**$ 1,446,679**	**$ 709,156**	**$ 737,522**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 1,130,250*	*$ 1,198,969*	*$ 587,730*	*$ 611,239*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 4,482*	*$ 4,755*	*$ 2,331*	*$ 2,424*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 229,030*	*$ 242,955*	*$ 119,096*	*$ 123,859*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 1,556,976**	**$ 1,651,640**	**$ 809,628**	**$ 842,013**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 294,176*	*$ 312,062*	*$ 152,972*	*$ 159,090*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 94,920*	*$ 100,691*	*$ 49,358*	*$ 51,333*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 77,401*	*$ 82,107*	*$ 40,249*	*$ 41,858*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 1,090,479*	*$ 1,156,780*	*$ 567,049*	*$ 589,731*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 3,066,775**	**$ 3,253,235**	**$ 1,594,723**	**$ 1,658,512**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 107,337**	**$ 113,863**	**$ 55,815**	**$ 58,048**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 634,822**	**$ 673,420**	**$ 330,108**	**$ 343,312**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 3,810,000**	**$ 4,050,000**	**$ 1,990,000**	**$ 2,060,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Gypsum Stack considered a "smaller" pond for cost purposes.

[2] Costs shown are for a closure option. Costs associated with cleaning out the ponds are reported separately.

Conceptual Cost Opinion Details - Closure Costs
Ghent - Ash Treatment Basin No. 1
Carroll County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	4,525,000	CY	$ 2.50	$ 11,312,500.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	4,525,000	CY	$ 4.35	$ 19,683,750.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	19,500	LF	$ 0.83	$ 16,185.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	199,000	CY	$ 10.00	$ 1,990,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	199,000	CY	$ 4.36	$ 867,640.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	199,000	CY	$ 2.15	$ 427,850.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	123	AC	$ 1,800.00	$ 221,400.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	237,700	CY	$ 10.00	$ 2,377,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	237,700	CY	$ 4.36	$ 1,036,372.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	237,700	CY	$ 2.15	$ 511,055.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	4,300	CY	$ 35.00	$ 150,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	5,000	CY	$ 35.00	$ 175,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	32,300	SY	$ 1.30	$ 41,990.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	31,100	CY	$ 10.00	$ 311,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	31,100	CY	$ 4.36	$ 135,596.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	31,100	CY	$ 2.15	$ 66,865.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	46,700	SY	$ 5.70	$ 266,190.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap (includes the Backwater Detention Basin)					
1. 40 mil FML (includes materials and installation)	5,358,000	SF	$ 1.00	$ 5,358,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	5,259,000	SF	$ 1.00	$ 5,259,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	365,900	CY	$ 10.00	$ 3,659,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	365,900	CY	$ 4.36	$ 1,595,324.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	365,900	CY	$ 2.15	$ 786,685.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	123	AC	$ 1,800.00	$ 221,400.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 56,482,902**	

Raw Quantities		
Perimeter Length (feet)		10,074
Road Length (feet)		10,381
Ditch Length (feet)		9,389
Ditch Cross-Sectional Wetted Perimeter Length (feet)		45
Surface Area of Berm (sq. ft.)		286,157
Total Surface Area (sq. ft.)		5,375,876
Total Fill Quantity (cubic yards)		5,367,426
Berm Fill Quantity (cubic yards)		246,594

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Ghent - Ash Treatment Basin No. 2
Carroll County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	12,332,000	CY	$ 2.50	$ 30,830,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	12,332,000	CY	$ 4.35	$ 53,644,200.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	20,900	LF	$ 0.83	$ 17,347.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	246,000	CY	$ 10.00	$ 2,460,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	246,000	CY	$ 4.36	$ 1,072,560.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	246,000	CY	$ 2.15	$ 528,900.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	152	AC	$ 1,800.00	$ 273,600.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	1,265,800	CY	$ 10.00	$ 12,658,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	1,265,800	CY	$ 4.36	$ 5,518,888.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	1,265,800	CY	$ 2.15	$ 2,721,470.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	18	AC	$ 1,800.00	$ 32,400.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	4,700	CY	$ 35.00	$ 164,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	5,500	CY	$ 35.00	$ 192,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	35,500	SY	$ 1.30	$ 46,150.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	32,300	CY	$ 10.00	$ 323,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	32,300	CY	$ 4.36	$ 140,828.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	32,300	CY	$ 2.15	$ 69,445.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	48,400	SY	$ 5.70	$ 275,880.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap (includes the Backwater Detention Basin)					
1. 40 mil FML (includes materials and installation)	6,622,000	SF	$ 1.00	$ 6,622,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	6,436,000	SF	$ 1.00	$ 6,436,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	458,700	CY	$ 10.00	$ 4,587,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	458,700	CY	$ 4.36	$ 1,999,932.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	458,700	CY	$ 2.15	$ 986,205.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	152	AC	$ 1,800.00	$ 273,600.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 131,874,405**	

Raw Quantities	
Perimeter Length (feet)	11,105
Road Length (feet)	11,408
Ditch Length (feet)	9,733
Ditch Cross-Sectional Wetted Perimeter Length (feet)	45
Surface Area of Berm (sq. ft.)	762,821
Total Surface Area (sq. ft.)	7,376,399
Total Fill Quantity (cubic yards)	14,344,405
Berm Fill Quantity (cubic yards)	1,275,754

1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Ghent - Gypsum Stack
Carroll County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	1,389,000	CY	$ 2.50	$ 3,472,500.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	1,389,000	CY	$ 4.35	$ 6,042,150.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	10,000	LF	$ 0.83	$ 8,300.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	71,000	CY	$ 10.00	$ 710,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	71,000	CY	$ 4.36	$ 309,560.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	71,000	CY	$ 2.15	$ 152,650.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	44	AC	$ 1,800.00	$ 79,200.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	269,900	CY	$ 10.00	$ 2,699,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	269,900	CY	$ 4.36	$ 1,176,764.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	269,900	CY	$ 2.15	$ 580,285.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	6	AC	$ 1,800.00	$ 10,800.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,900	CY	$ 35.00	$ 66,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	2,200	CY	$ 35.00	$ 77,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	14,000	SY	$ 1.30	$ 18,200.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	9,800	CY	$ 10.00	$ 98,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	9,800	CY	$ 4.36	$ 42,728.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	9,800	CY	$ 2.15	$ 21,070.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	14,600	SY	$ 5.70	$ 83,220.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap (includes the Backwater Detention Basin)					
1. 40 mil FML (includes materials and installation)	1,917,000	SF	$ 1.00	$ 1,917,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	1,838,000	SF	$ 1.00	$ 1,838,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	132,200	CY	$ 10.00	$ 1,322,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	132,200	CY	$ 4.36	$ 576,392.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	132,200	CY	$ 2.15	$ 284,230.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	44	AC	$ 1,800.00	$ 79,200.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 21,664,749**	

Raw Quantities	
Perimeter Length (feet)	5,352
Road Length (feet)	4,495
Ditch Length (feet)	4,623
Ditch Cross-Sectional Wetted Perimeter Length (feet)	28
Surface Area of Berm (sq. ft.)	246,077
Total Surface Area (sq. ft.)	1,764,584
Total Fill Quantity (cubic yards)	1,875,861
Berm Fill Quantity (cubic yards)	273,540

1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Ghent - Secondary Pond
Carroll County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	80,000	CY	$ 2.50	$ 200,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	80,000	CY	$ 4.35	$ 348,000.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	4,700	LF	$ 0.83	$ 3,901.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	15,000	CY	$ 10.00	$ 150,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	15,000	CY	$ 4.36	$ 65,400.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	15,000	CY	$ 2.15	$ 32,250.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	9	AC	$ 1,800.00	$ 16,200.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	14,800	CY	$ 10.00	$ 148,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	14,800	CY	$ 4.36	$ 64,528.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	14,800	CY	$ 2.15	$ 31,820.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	1	AC	$ 1,800.00	$ 1,800.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,000	CY	$ 35.00	$ 35,000.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	1,200	CY	$ 35.00	$ 42,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	7,200	SY	$ 1.30	$ 9,360.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	2,600	CY	$ 10.00	$ 26,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	2,600	CY	$ 4.36	$ 11,336.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	2,600	CY	$ 2.15	$ 5,590.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	3,900	SY	$ 5.70	$ 22,230.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	393,000	SF	$ 1.00	$ 393,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	393,000	SF	$ 1.00	$ 393,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	27,400	CY	$ 10.00	$ 274,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	27,400	CY	$ 4.36	$ 119,464.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	27,400	CY	$ 2.15	$ 58,910.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	9	AC	$ 1,800.00	$ 16,200.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 2,467,989**	

Raw Quantities		
Perimeter Length (feet)		2,600
Road Length (feet)		2,300
Ditch Length (feet)		2,100
Ditch Cross-Sectional Wetted Perimeter Length (feet)		17
Surface Area of Berm (sq. ft.)		41,000
Total Surface Area (sq. ft.)		277,000
Total Fill Quantity (cubic yards)		142,000
Berm Fill Quantity (cubic yards)		17,000

1. Costs computed for closure option.
2. Berm is 20 feet wide with 4H:1V side slopes.
3. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
4. Cap slopes are 5%.
5. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
6. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
7. Existing outlet structure is sufficient to route flow from capped area.
8. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Ghent - Reclaim Pond
Carroll County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	165,000	CY	$ 2.50	$ 412,500.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	165,000	CY	$ 4.35	$ 717,750.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	5,400	LF	$ 0.83	$ 4,482.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	13,000	CY	$ 10.00	$ 130,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	13,000	CY	$ 4.36	$ 56,680.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	13,000	CY	$ 2.15	$ 27,950.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	8	AC	$ 1,800.00	$ 14,400.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	17,600	CY	$ 10.00	$ 176,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	17,600	CY	$ 4.36	$ 76,736.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	17,600	CY	$ 2.15	$ 37,840.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	2	AC	$ 1,800.00	$ 3,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,100	CY	$ 35.00	$ 38,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	1,300	CY	$ 35.00	$ 45,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	8,400	SY	$ 1.30	$ 10,920.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	3,100	CY	$ 10.00	$ 31,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	3,100	CY	$ 4.36	$ 13,516.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	3,100	CY	$ 2.15	$ 6,665.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	4,600	SY	$ 5.70	$ 26,220.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	349,000	SF	$ 1.00	$ 349,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	349,000	SF	$ 1.00	$ 349,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	22,900	CY	$ 10.00	$ 229,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	22,900	CY	$ 4.36	$ 99,844.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	22,900	CY	$ 2.15	$ 49,235.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	8	AC	$ 1,800.00	$ 14,400.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 2,920,738**	

Raw Quantities	
Perimeter Length (feet)	2,900
Road Length (feet)	2,700
Ditch Length (feet)	2,500
Ditch Cross-Sectional Wetted Perimeter Length (feet)	17
Surface Area of Berm (sq. ft.)	56,000
Total Surface Area (sq. ft.)	400,000
Total Fill Quantity (cubic yards)	224,000
Berm Fill Quantity (cubic yards)	20,000

1. Costs computed for closure option.
2. Berm is 20 feet wide with 4H:1V side slopes.
3. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
4. Cap slopes are 5%.
5. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
6. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
7. Existing outlet structure is sufficient to route flow from capped area.
8. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions				
Escalation	4	%		
LG&E and KU Overheads	3.5	%		
Contingency	20	%		
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY		
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY		Type in numbers to Override Value

Ghent - Secondary Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
O&M Costs	**$ 407,925**	**$ 432,727**	**$ 212,121**	**$ 220,606**	**$ -**	**$ -**	**$ -**	**$ -**	
Secondary Pond Dewatering	*$ 10,625*	*$ 11,271*	*$ 5,525*	*$ 5,746*	*$ -*	*$ -*	*$ -*	*$ -*	
Secondary Pond Cleanout	*$ 397,300*	*$ 421,456*	*$ 206,596*	*$ 214,860*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ 588,086**	**$ 623,842**	**$ 305,805**	**$ 318,037**	**$ -**	**$ -**	**$ -**	**$ -**	
Secondary (Process Water) Pond Liner	*$ 558,086*	*$ 592,018*	*$ 290,205*	*$ 301,813*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ 30,000*	*$ 31,824*	*$ 15,600*	*$ 16,224*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 996,011**	**$ 1,056,568**	**$ 517,926**	**$ 538,643**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 34,860**	**$ 36,980**	**$ 18,127**	**$ 18,852**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 206,174**	**$ 218,710**	**$ 107,211**	**$ 111,499**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 1,240,000**	**$ 1,320,000**	**$ 650,000**	**$ 670,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions			
Escalation	4	%	
LG&E and KU Overheads	3.5	%	
Contingency	20	%	
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY	
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY	Type in numbers to Override Value

Ghent - Reclaim Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
O&M Costs	**$ 639,600**	**$ 678,488**	**$ 332,592**	**$ 345,896**	**$ -**	**$ -**	**$ -**	**$ -**	
Reclaim Pond Dewatering	*$ 16,250*	*$ 17,238*	*$ 8,450*	*$ 8,788*	*$ -*	*$ -*	*$ -*	*$ -*	
Reclaim Pond Cleanout	*$ 623,350*	*$ 661,250*	*$ 324,142*	*$ 337,108*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ 30,000**	**$ 31,824**	**$ 15,600**	**$ 16,224**	**$ -**	**$ -**	**$ -**	**$ -**	
Reclaim Pond Liner	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ 30,000*	*$ 31,824*	*$ 15,600*	*$ 16,224*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 669,600**	**$ 710,312**	**$ 348,192**	**$ 362,120**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 23,436**	**$ 24,861**	**$ 12,187**	**$ 12,674**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 138,607**	**$ 147,035**	**$ 72,076**	**$ 74,959**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 840,000**	**$ 890,000**	**$ 440,000**	**$ 450,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion Details - New Construction
Ghent - Secondary Pond
Carroll County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Secondary Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	17	DAY	$ 341.40	$ 5,803.80	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	136	HR	$ 35.45	$ 4,821.20	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Secondary Pond Cleanout[2]					
1. Excavation and Load-out	58,000	CY	$ 2.50	$ 145,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	58,000	CY	$ 4.35	$ 252,300.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs					
A. Secondary (Process Water) Pond Liner[3]					
1. 40 mil FML (includes materials and installation)	251,000	SF	$ 1.00	$ 251,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	18,600	CY	$ 10.00	$ 186,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	18,600	CY	$ 4.36	$ 81,096.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	18,600	CY	$ 2.15	$ 39,990.00	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 996,011**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth of only 4 feet below the water surface (to keep the pond less than 50 acre-ft in size).
3. The Secondary Pond is cleaned out and lined for use as the new Process Water Pond.
4. Pond slopes are 4H:1V.
5. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - New Construction
Ghent - Reclaim Pond
Carroll County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Reclaim Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	26	DAY	$ 341.40	$ 8,876.40	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	208	HR	$ 35.45	$ 7,373.60	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Reclaim Pond Cleanout[2]					
1. Excavation and Load-out	91,000	CY	$ 2.50	$ 227,500.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	91,000	CY	$ 4.35	$ 395,850.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs					
A. Reclaim Pond Liner[3]					
1. 40 mil FML (includes materials and installation)	0	SF	$ 1.00	$ -	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 669,600**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth is to approximately 1 foot above the original design liner system elevation.
3. The existing Reclaim Pond liner system is intact and not damage during cleanout operations.
4. Pond slopes are 4H:1V.
5. Quantities based on base topographic mapping shown in drawing.

Green River

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
Escalation	4	%		Smaller Ponds	Larger Ponds	
			Siting Study	4	2	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	2	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	4	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY			Type in numbers to Override Value	

GREEN RIVER - Main Ash Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 327,520**	**$ 347,433**	**$ 170,310**	**$ 177,123**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 131,008*	*$ 138,973*	*$ 68,124*	*$ 70,849*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 65,504*	*$ 69,487*	*$ 34,062*	*$ 35,425*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 131,008*	*$ 138,973*	*$ 68,124*	*$ 70,849*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 63,794**	**$ 67,673**	**$ 33,173**	**$ 34,500**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 9,794*	*$ 10,389*	*$ 5,093*	*$ 5,297*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 54,000*	*$ 57,283*	*$ 28,080*	*$ 29,203*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 6,486,608**	**$ 6,880,994**	**$ 3,373,036**	**$ 3,507,958**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 3,250,360*	*$ 3,447,982*	*$ 1,690,187*	*$ 1,757,795*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 197,360*	*$ 209,359*	*$ 102,627*	*$ 106,732*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 370,888*	*$ 393,438*	*$ 192,862*	*$ 200,576*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 2,668,000*	*$ 2,830,214*	*$ 1,387,360*	*$ 1,442,854*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 6,877,922**	**$ 7,296,100**	**$ 3,576,519**	**$ 3,719,580**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 240,727**	**$ 255,363**	**$ 125,178**	**$ 130,185**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 1,423,730**	**$ 1,510,293**	**$ 740,340**	**$ 769,953**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 8,550,000**	**$ 9,070,000**	**$ 4,450,000**	**$ 4,620,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Main Ash Pond considered a "larger" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	4	2	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	2	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	4	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				Type in numbers to Override Value

GREEN RIVER - ATB#2									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 85,363**	**$ 90,553**	**$ 44,389**	**$ 46,165**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 34,145*	*$ 36,221*	*$ 17,756*	*$ 18,466*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 17,073*	*$ 18,111*	*$ 8,878*	*$ 9,233*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 34,145*	*$ 36,221*	*$ 17,756*	*$ 18,466*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 12,818**	**$ 13,597**	**$ 6,665**	**$ 6,932**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 3,818*	*$ 4,050*	*$ 1,985*	*$ 2,065*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 9,000*	*$ 9,547*	*$ 4,680*	*$ 4,867*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 840,816**	**$ 891,938**	**$ 437,224**	**$ 454,713**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 251,250*	*$ 266,526*	*$ 130,650*	*$ 135,876*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 78,840*	*$ 83,633*	*$ 40,997*	*$ 42,637*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 65,726*	*$ 69,722*	*$ 34,178*	*$ 35,545*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 445,000*	*$ 472,056*	*$ 231,400*	*$ 240,656*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 938,997**	**$ 996,088**	**$ 488,279**	**$ 507,810**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 32,865**	**$ 34,863**	**$ 17,090**	**$ 17,773**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 194,372**	**$ 206,190**	**$ 101,074**	**$ 105,117**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 1,170,000**	**$ 1,240,000**	**$ 610,000**	**$ 640,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] ATB#2 considered a "smaller" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	4	2	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	2	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	4	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				Type in numbers to Override Value

GREEN RIVER - SO_2 Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
Engineering/Permitting[1]	**$ 119,530**	**$ 126,797**	**$ 62,156**	**$ 64,642**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*47,812*	*$ 50,719*	*$ 24,862*	*$ 25,857*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*23,906*	*$ 25,359*	*$ 12,431*	*$ 12,928*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*47,812*	*$ 50,719*	*$ 24,862*	*$ 25,857*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 16,999**	**$ 18,033**	**$ 8,839**	**$ 9,193**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 4,399*	*$ 4,666*	*$ 2,287*	*$ 2,379*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 12,600*	*$ 13,366*	*$ 6,552*	*$ 6,814*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 1,178,301**	**$ 1,249,942**	**$ 612,717**	**$ 637,225**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 383,330*	*$ 406,636*	*$ 199,332*	*$ 207,305*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 94,400*	*$ 100,140*	*$ 49,088*	*$ 51,052*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 77,971*	*$ 82,712*	*$ 40,545*	*$ 42,167*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 622,600*	*$ 660,454*	*$ 323,752*	*$ 336,702*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 1,314,830**	**$ 1,394,772**	**$ 683,712**	**$ 711,060**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 46,019**	**$ 48,817**	**$ 23,930**	**$ 24,887**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 272,170**	**$ 288,718**	**$ 141,528**	**$ 147,189**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 1,640,000**	**$ 1,740,000**	**$ 850,000**	**$ 890,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] SO_2 Pond considered a "smaller" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion Details - Closure Costs
Green River - Main Ash Pond
Muhlenberg County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	11,800	LF	$ 0.83	$ 9,794.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	30	AC	$ 1,800.00	$ 54,000.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	196,000	CY	$ 10.00	$ 1,960,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	196,000	CY	$ 4.36	$ 854,560.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	196,000	CY	$ 2.15	$ 421,400.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	8	AC	$ 1,800.00	$ 14,400.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	615,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	615,000	CY	$ -	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	615,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	2,300	CY	$ 35.00	$ 80,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	2,700	CY	$ 35.00	$ 94,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	17,200	SY	$ 1.30	$ 22,360.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	14,800	CY	$ 10.00	$ 148,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	14,800	CY	$ 4.36	$ 64,528.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	14,800	CY	$ 2.15	$ 31,820.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	22,200	SY	$ 5.70	$ 126,540.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	1,307,000	SF	$ 1.00	$ 1,307,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite(6) (includes materials and installation)	1,307,000	SF	$ 1.00	$ 1,307,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	82,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	82,000	CY	$ -	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	82,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	30	AC	$ 1,800.00	$ 54,000.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 6,550,402**	

Raw Quantities	
Perimeter Length (feet)	6,532
Road Length (feet)	5,516
Ditch Length (feet)	5,219
Ditch Cross-Sectional Wetted Perimeter Length	38
Surface Area of Berm outslope (sq. ft.)	344,545
Total Surface Area (sq. ft.)	1,618,700
Total Fill Quantity (cubic yards)	831,347
Berm Fill Quantity (cubic yards)	200,958
Below-Water Storage Volume (from Hydrographic Survey)	80,536

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing and hydrographic survey provided by LG&E.

Conceptual Cost Opinion Details - Closure Costs
Green River - ATB#2
Muhlenberg County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	4,600	LF	$ 0.83	$ 3,818.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	5	AC	$ 1,800.00	$ 9,000.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	15,000	CY	$ 10.00	$ 150,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	15,000	CY	$ 4.36	$ 65,400.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	15,000	CY	$ 2.15	$ 32,250.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	2	AC	$ 1,800.00	$ 3,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	106,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	106,000	CY	$ -	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	106,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	900	CY	$ 35.00	$ 31,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	1,100	CY	$ 35.00	$ 38,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	6,800	SY	$ 1.30	$ 8,840.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	2,600	CY	$ 10.00	$ 26,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	2,600	CY	$ 4.36	$ 11,336.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	2,600	CY	$ 2.15	$ 5,590.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	4,000	SY	$ 5.70	$ 22,800.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	218,000	SF	$ 1.00	$ 218,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite(6) (includes materials and installation)	218,000	SF	$ 1.00	$ 218,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	14,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	14,000	CY	$ -	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	14,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	5	AC	$ 1,800.00	$ 9,000.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 853,634**	

Raw Quantities	
Perimeter Length (feet)	2,467
Road Length (feet)	2,180
Ditch Length (feet)	2,050
Ditch Cross-Sectional Wetted Perimeter Length	17
Surface Area of Berm (sq. ft.)	51,292
Total Surface Area (sq. ft.)	269,610
Total Fill Quantity (cubic yards)	83,674
Berm Fill Quantity (cubic yards)	16,403
Below-Water Storage Volume (from Hydrographic Survey)	55,254

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing and hydrographic survey provided by LG&E.

Conceptual Cost Opinion Details - Closure Costs
Green River - SO_2 Pond
Muhlenberg County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	5,300	LF	$ 0.83	$ 4,399.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	23,000	CY	$ 10.00	$ 230,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	23,000	CY	$ 4.36	$ 100,280.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	23,000	CY	$ 2.15	$ 49,450.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	2	AC	$ 1,800.00	$ 3,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	170,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	170,000	CY	$ -	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	170,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,100	CY	$ 35.00	$ 38,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	1,300	CY	$ 35.00	$ 45,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	8,000	SY	$ 1.30	$ 10,400.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	3,100	CY	$ 10.00	$ 31,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	3,100	CY	$ 4.36	$ 13,516.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	3,100	CY	$ 2.15	$ 6,665.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	4,700	SY	$ 5.70	$ 26,790.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	305,000	SF	$ 1.00	$ 305,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite[6] (includes materials and installation)	305,000	SF	$ 1.00	$ 305,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	20,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	20,000	CY	$ -	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	20,000	CY	$ -	$ -	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 1,195,300**	

Raw Quantities	
Perimeter Length (feet)	2,765
Road Length (feet)	2,566
Ditch Length	2,443
Ditch Cross-Sectional Wetted Perimeter Length	17
Surface Area of Berm (sq. ft.)	63,179
Total Surface Area (sq. ft.)	389,984
Total Fill Quantity (cubic yards)	175,682
Berm Fill Quantity (cubic yards)	25,114
Below-Water Storage Volume (from Hydrographic Survey)	42,079

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing and hydrographic survey provided by LG&E.

Conceptual Cost Opinion - NEW CONSTRUCTION

26-Jun-13

Assumptions		
Escalation	4	%
LG&E and KU Overheads	3.5	%
Contingency	20	%
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY

Type in numbers to Override Value

GREEN RIVER - Main Ash Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019
	% of Work Carried out each year:		50	50	0	0	0	0
Capital Costs (New Construction)[1]	**$ 299,590**	**$ 317,805**	**$ 155,787**	**$ 162,018**	**$ -**	**$ -**	**$ -**	**$ -**
Process Water Pond Costs	*$ 269,590*	*$ 285,981*	*$ 140,187*	*$ 145,794*	*$ -*	*$ -*	*$ -*	*$ -*
Other Stormwater Costs (i.e. Pump Stations)	*$ 30,000*	*$ 31,824*	*$ 15,600*	*$ 16,224*	*$ -*	*$ -*	*$ -*	*$ -*
Project Subtotal	**$ 299,590**	**$ 317,805**	**$ 155,787**	**$ 162,018**	**$ -**	**$ -**	**$ -**	**$ -**
LG&E & KU Overheads (3.5)%	**$ 10,486**	**$ 11,123**	**$ 5,453**	**$ 5,671**	**$ -**	**$ -**	**$ -**	**$ -**
Contingency (20%)	**$ 62,015**	**$ 65,786**	**$ 32,248**	**$ 33,538**	**$ -**	**$ -**	**$ -**	**$ -**
Project Total (rounded)	**$ 380,000**	**$ 400,000**	**$ 200,000**	**$ 210,000**	**$ -**	**$ -**	**$ -**	**$ -**

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion Details - New Construction
Green River - Main Ash Pond
Muhlenberg County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. Capital Costs					
A Creation of Process Water Pond[1]					
1. Excavation and Load-out	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Process Water Pond Liner					
1. 40 mil FML (includes materials and installation)	121,000	SF	$ 1.00	$ 121,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	9,000	CY	$ 10.00	$ 90,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	9,000	CY	$ 4.36	$ 39,240.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	9,000	CY	$ 2.15	$ 19,350.00	Jeff Heun with LG&E (November 13, 2012)
C. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 299,590**	

Assumptions:
1. Process Water Pond assumed to be constructed within the footprint of the existing pond, therefore excavation costs were not considered.
2. Pond side slopes are 4H:1V.

Raw Quantities	
Pond Area (sq. ft)	120,744

Mill Creek

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	4	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	4	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	6	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

MILL CREEK - ATB (CCR Fill Option)

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
Engineering/Permitting[1]	**$ 1,111,284**	**$ 1,178,850**	**$ 577,868**	**$ 600,982**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 277,821*	*$ 294,712*	*$ 144,467*	*$ 150,246*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 277,821*	*$ 294,712*	*$ 144,467*	*$ 150,246*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 555,642*	*$ 589,425*	*$ 288,934*	*$ 300,491*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 15,162,328**	**$ 16,084,198**	**$ 7,884,411**	**$ 8,199,787**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 13,069,800*	*$ 13,864,444*	*$ 6,796,296*	*$ 7,068,148*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 12,948*	*$ 13,735*	*$ 6,733*	*$ 7,002*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 2,079,580*	*$ 2,206,018*	*$ 1,081,382*	*$ 1,124,637*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 12,619,770**	**$ 13,387,052**	**$ 6,562,280**	**$ 6,824,772**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 1,828,700*	*$ 1,939,885*	*$ 950,924*	*$ 988,961*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 276,200*	*$ 292,993*	*$ 143,624*	*$ 149,369*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 373,109*	*$ 395,794*	*$ 194,017*	*$ 201,777*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 10,141,761*	*$ 10,758,380*	*$ 5,273,716*	*$ 5,484,664*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 28,893,382**	**$ 30,650,100**	**$ 15,024,559**	**$ 15,625,541**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 1,011,268**	**$ 1,072,753**	**$ 525,860**	**$ 546,894**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 5,980,930**	**$ 6,344,571**	**$ 3,110,084**	**$ 3,234,487**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 35,890,000**	**$ 38,070,000**	**$ 18,670,000**	**$ 19,410,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] ATB considered a "larger" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions

				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	4	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	4	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	6	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				Type in numbers to Override Value

MILL CREEK - ATB (Soil Fill Option)

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
% of Work Carried out each year:			50	50	0	0	0	0	100
Engineering/Permitting[1]	**$ 1,211,284**	**$ 1,284,930**	**$ 629,868**	**$ 655,062**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*377,821*	*$ 400,792*	*$ 196,467*	*$ 204,326*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*277,821*	*$ 294,712*	*$ 144,467*	*$ 150,246*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*555,642*	*$ 589,425*	*$ 288,934*	*$ 300,491*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 144,348**	**$ 153,124**	**$ 75,061**	**$ 78,063**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 12,948*	*$ 13,735*	*$ 6,733*	*$ 7,002*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 131,400*	*$ 139,389*	*$ 68,328*	*$ 71,061*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 46,068,951**	**$ 48,869,943**	**$ 23,955,854**	**$ 24,914,088**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 1,828,700*	*$ 1,939,885*	*$ 950,924*	*$ 988,961*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ 33,449,181*	*$ 35,482,891*	*$ 17,393,574*	*$ 18,089,317*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 276,200*	*$ 292,993*	*$ 143,624*	*$ 149,369*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 373,109*	*$ 395,794*	*$ 194,017*	*$ 201,777*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 10,141,761*	*$ 10,758,380*	*$ 5,273,716*	*$ 5,484,664*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 47,424,583**	**$ 50,307,997**	**$ 24,660,783**	**$ 25,647,214**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 1,659,860**	**$ 1,760,780**	**$ 863,127**	**$ 897,652**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 9,816,889**	**$ 10,413,755**	**$ 5,104,782**	**$ 5,308,973**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 58,910,000**	**$ 62,490,000**	**$ 30,630,000**	**$ 31,860,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Engineering/Permitting Costs set equal to those computed for the ATB CCR Fill Option plus an additional $100,000 for a borrow study during the initial siting study.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions

				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	4	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	4	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	6	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

MILL CREEK -Clearwell/Dead Storage Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
Engineering/Permitting[1]	**$ 115,351**	**$ 122,364**	**$ 59,983**	**$ 62,382**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 32,957*	*$ 34,961*	*$ 17,138*	*$ 17,823*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 32,957*	*$ 34,961*	*$ 17,138*	*$ 17,823*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 49,436*	*$ 52,442*	*$ 25,707*	*$ 26,735*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 339,734**	**$ 360,390**	**$ 176,662**	**$ 183,728**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 301,400*	*$ 319,725*	*$ 156,728*	*$ 162,997*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 3,154*	*$ 3,346*	*$ 1,640*	*$ 1,706*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 35,180*	*$ 37,319*	*$ 18,294*	*$ 19,025*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 484,202**	**$ 513,641**	**$ 251,785**	**$ 261,856**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 221,532*	*$ 235,001*	*$ 115,197*	*$ 119,805*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 70,800*	*$ 75,105*	*$ 36,816*	*$ 38,289*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 52,341*	*$ 55,523*	*$ 27,217*	*$ 28,306*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 139,529*	*$ 148,012*	*$ 72,555*	*$ 75,457*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 939,287**	**$ 996,396**	**$ 488,429**	**$ 507,966**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 32,875**	**$ 34,874**	**$ 17,095**	**$ 17,779**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 194,432**	**$ 206,254**	**$ 101,105**	**$ 105,149**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 1,170,000**	**$ 1,240,000**	**$ 610,000**	**$ 640,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Clear/Dead Storage Pond considered a "smaller" pond for cost purposes.

[2] Costs shown are for a closure option. Costs associated with cleaning out the ponds are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions

				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	4	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	4	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	6	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

MILL CREEK - Construction Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
Engineering/Permitting[1]	**$ 106,161**	**$ 112,616**	**$ 55,204**	**$ 57,412**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 30,332*	*$ 32,176*	*$ 15,773*	*$ 16,403*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 30,332*	*$ 32,176*	*$ 15,773*	*$ 16,403*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 45,498*	*$ 48,264*	*$ 23,659*	*$ 24,605*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 371,975**	**$ 394,591**	**$ 193,427**	**$ 201,164**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 369,900*	*$ 392,390*	*$ 192,348*	*$ 200,042*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 2,075*	*$ 2,201*	*$ 1,079*	*$ 1,122*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 386,319**	**$ 409,807**	**$ 200,886**	**$ 208,921**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 132,589*	*$ 140,650*	*$ 68,946*	*$ 71,704*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 43,440*	*$ 46,081*	*$ 22,589*	*$ 23,492*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 32,863*	*$ 34,861*	*$ 17,089*	*$ 17,772*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 177,427*	*$ 188,215*	*$ 92,262*	*$ 95,953*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 864,455**	**$ 917,014**	**$ 449,517**	**$ 467,497**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 30,256**	**$ 32,095**	**$ 15,733**	**$ 16,362**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 178,942**	**$ 189,822**	**$ 93,050**	**$ 96,772**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 1,080,000**	**$ 1,140,000**	**$ 560,000**	**$ 590,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Construction Pond considered a "smaller" pond for cost purposes.

[2] Costs shown are for a closure option. Costs associated with cleaning out the ponds are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions

				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	4	1	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	4	1	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	6	2	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

MILL CREEK - Emergency Pond

		% of Work Carried out each year:	50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 57,921**	**$ 61,442**	**$ 30,119**	**$ 31,323**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 16,549*	*$ 17,555*	*$ 8,605*	*$ 8,950*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 16,549*	*$ 17,555*	*$ 8,605*	*$ 8,950*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 24,823*	*$ 26,332*	*$ 12,908*	*$ 13,424*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 118,691**	**$ 125,907**	**$ 61,719**	**$ 64,188**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 116,450*	*$ 123,530*	*$ 60,554*	*$ 62,976*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 2,241*	*$ 2,377*	*$ 1,165*	*$ 1,212*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 295,027**	**$ 312,965**	**$ 153,414**	**$ 159,551**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 162,667*	*$ 172,557*	*$ 84,587*	*$ 87,970*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 51,220*	*$ 54,334*	*$ 26,634*	*$ 27,700*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 32,863*	*$ 34,861*	*$ 17,089*	*$ 17,772*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 48,277*	*$ 51,212*	*$ 25,104*	*$ 26,108*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 471,639**	**$ 500,314**	**$ 245,252**	**$ 255,062**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 16,507**	**$ 17,511**	**$ 8,584**	**$ 8,927**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 97,629**	**$ 103,565**	**$ 50,767**	**$ 52,798**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 590,000**	**$ 630,000**	**$ 310,000**	**$ 320,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Emergency Pond considered a "smaller" pond for cost purposes.

[2] Costs shown are for a closure option. Costs associated with cleaning out the ponds are reported separately.

Conceptual Cost Opinion Details - Closure Costs
Mill Creek - Ash Treatment Basin (CCR Fill Option)
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	1,908,000	CY	$ 2.50	$ 4,770,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	1,908,000	CY	$ 4.35	$ 8,299,800.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	15,600	LF	$ 0.83	$ 12,948.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	118,000	CY	$ 10.00	$ 1,180,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	118,000	CY	$ 4.36	$ 514,480.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	118,000	CY	$ 2.15	$ 253,700.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	73	AC	$ 1,800.00	$ 131,400.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	110,000	CY	$ 10.00	$ 1,100,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	110,000	CY	$ 4.36	$ 479,600.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	110,000	CY	$ 2.15	$ 236,500.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	3,200	CY	$ 35.00	$ 112,000.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	3,800	CY	$ 35.00	$ 133,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	24,000	SY	$ 1.30	$ 31,200.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	14,900	CY	$ 10.00	$ 149,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	14,900	CY	$ 4.36	$ 64,964.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	14,900	CY	$ 2.15	$ 32,035.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	22,300	SY	$ 5.70	$ 127,110.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	3,180,000	SF	$ 1.00	$ 3,180,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	3,180,000	SF	$ 1.00	$ 3,180,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	221,100	CY	$ 10.00	$ 2,211,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	221,100	CY	$ 4.36	$ 963,996.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	221,100	CY	$ 2.15	$ 475,365.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	73	AC	$ 1,800.00	$ 131,400.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 27,782,098**	

Raw Quantities	
Perimeter Length (feet)	8,042
Road Length (feet)	7,687
Ditch Length	7,500
Ditch Cross-Sectional Wetted Perimeter Length	27
Surface Area of Berm (sq. ft.)	279,169
Total Surface Area (sq. ft.)	3,309,188
Total Fill Quantity (cubic yards)	2,378,793
Berm Fill Quantity (cubic yards)	116,248

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Mill Creek - Ash Treatment Basin (Soil Fill Option)
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	15,600	LF	$ 0.83	$ 12,948.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	73	AC	$ 1,800.00	$ 131,400.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	110,000	CY	$ 10.00	$ 1,100,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	110,000	CY	$ 4.36	$ 479,600.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	110,000	CY	$ 2.15	$ 236,500.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	2,026,000	CY	$ 10.00	$ 20,260,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	2,026,000	CY	$ 4.36	$ 8,833,280.58	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	2,026,000	CY	$ 2.15	$ 4,355,900.00	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	3,200	CY	$ 35.00	$ 112,000.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	3,800	CY	$ 35.00	$ 133,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	24,000	SY	$ 1.30	$ 31,200.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	14,900	CY	$ 10.00	$ 149,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	14,900	CY	$ 4.36	$ 64,964.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	14,900	CY	$ 2.15	$ 32,035.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	22,300	SY	$ 5.70	$ 127,110.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	3,180,000	SF	$ 1.00	$ 3,180,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	3,180,000	SF	$ 1.00	$ 3,180,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	221,100	CY	$ 10.00	$ 2,211,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	221,100	CY	$ 4.36	$ 963,996.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	221,100	CY	$ 2.15	$ 475,365.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	73	AC	$ 1,800.00	$ 131,400.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 46,213,299**	

Raw Quantities	
Perimeter Length (feet)	8,042
Road Length (feet)	7,687
Ditch Length	7,500
Ditch Cross-Sectional Wetted Perimeter Length	27
Surface Area of Berm (sq. ft.)	279,169
Total Surface Area (sq. ft.)	3,309,188
Total Fill Quantity (cubic yards)	2,378,793
Berm Fill Quantity (cubic yards)	116,248

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Mill Creek - Clearwell/Dead Storage Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	44,000	CY	$ 2.50	$ 110,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	44,000	CY	$ 4.35	$ 191,400.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	3,800	LF	$ 0.83	$ 3,154.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	2,000	CY	$ 10.00	$ 20,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	2,000	CY	$ 4.36	$ 8,720.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	2,000	CY	$ 2.15	$ 4,300.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	1.2	AC	$ 1,800.00	$ 2,160.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	13,200	CY	$ 10.00	$ 132,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	13,200	CY	$ 4.36	$ 57,552.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	13,200	CY	$ 2.15	$ 28,380.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	2	AC	$ 1,800.00	$ 3,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	800	CY	$ 35.00	$ 28,000.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	1,000	CY	$ 35.00	$ 35,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	6,000	SY	$ 1.30	$ 7,800.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	2,100	CY	$ 10.00	$ 21,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	2,100	CY	$ 4.36	$ 9,156.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	2,100	CY	$ 2.15	$ 4,515.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	3,100	SY	$ 5.70	$ 17,670.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	53,000	SF	$ 1.00	$ 53,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	53,000	SF	$ 1.00	$ 53,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	1,900	CY	$ 10.00	$ 19,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	1,900	CY	$ 4.36	$ 8,284.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	1,900	CY	$ 2.15	$ 4,085.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	1.2	AC	$ 1,800.00	$ 2,160.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 823,936**	

Raw Quantities	
Perimeter Length (feet)	2,100
Road Length (feet)	1,900
Ditch Length (feet)	1,700
Ditch Cross-Sectional Wetted Perimeter Length (feet)	17
Surface Area of Berm (sq. ft.)	79,000
Total Surface Area (sq. ft.)	136,000
Total Fill Quantity (cubic yards)	65,000
Berm Fill Quantity (cubic yards)	15,000

Assumptions:

1. Sediment level approximately 5 feet below the water surface.
2. Costs computed for closure option.
3. Berm is 20 feet wide with 4H:1V side slopes.
4. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
5. Cap slopes are 5%.
6. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
7. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
8. Existing outlet structure is sufficient to route flow from capped area.
9. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Mill Creek - Construction Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	54,000	CY	$ 2.50	$ 135,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 002(
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	54,000	CY	$ 4.35	$ 234,900.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	2,500	LF	$ 0.83	$ 2,075.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 100(
C. Temporary Cover Soil (assume 12 inches)[2]					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ᵋ
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	0	AC	$ 1,800.00	$ -	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	7,900	CY	$ 10.00	$ 79,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	7,900	CY	$ 4.36	$ 34,444.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ᵋ
3. Placement and Compaction	7,900	CY	$ 2.15	$ 16,985.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	1.2	AC	$ 1,800.00	$ 2,160.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ᵋ
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	500	CY	$ 35.00	$ 17,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	600	CY	$ 35.00	$ 21,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	3,800	SY	$ 1.30	$ 4,940.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	1,300	CY	$ 10.00	$ 13,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	1,300	CY	$ 4.36	$ 5,668.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ᵋ
c. Placement and Compaction	1,300	CY	$ 2.15	$ 2,795.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	2,000	SY	$ 5.70	$ 11,400.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 012(
E. Cap					
1. 40 mil FML (includes materials and installation)	57,000	SF	$ 1.00	$ 57,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	57,000	SF	$ 1.00	$ 57,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	3,700	CY	$ 10.00	$ 37,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	3,700	CY	$ 4.36	$ 16,132.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ᵋ
c. Placement and Compaction	3,700	CY	$ 2.15	$ 7,955.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	1.3	AC	$ 1,800.00	$ 2,340.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 758,294**	

Raw Quantities	
Perimeter Length (feet)	1,400
Road Length (feet)	1,200
Ditch Length (feet)	1,100
Ditch Cross-Sectional Wetted Perimeter Length (feet)	17
Surface Area of Berm (sq. ft.)	50,000
Total Surface Area (sq. ft.)	106,000
Total Fill Quantity (cubic yards)	68,000
Berm Fill Quantity (cubic yards)	9,000

Assumptions:
1. Sediment level approximately 5 feet below the water surface.
2. Costs computed for closure option.
3. No temporary cover or revegetation.
4. Berm is 20 feet wide with 4H:1V side slopes.
5. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
6. Cap slopes are 5%.
7. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
8. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
9. Existing outlet structure is sufficient to route flow from capped area.
10. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Mill Creek - Emergency Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	17,000	CY	$ 2.50	$ 42,500.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 002(
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	17,000	CY	$ 4.35	$ 73,950.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	2,700	LF	$ 0.83	$ 2,241.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 100(
C. Temporary Cover Soil (assume 12 inches)[2]					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ℓ
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	0	AC	$ 1,800.00	$ -	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	9,700	CY	$ 10.00	$ 97,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	9,700	CY	$ 4.36	$ 42,292.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ℓ
3. Placement and Compaction	9,700	CY	$ 2.15	$ 20,855.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	1.4	AC	$ 1,800.00	$ 2,520.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ℓ
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	600	CY	$ 35.00	$ 21,000.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	700	CY	$ 35.00	$ 24,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	4,400	SY	$ 1.30	$ 5,720.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	1,300	CY	$ 10.00	$ 13,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	1,300	CY	$ 4.36	$ 5,668.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	1,300	CY	$ 2.15	$ 2,795.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	2,000	SY	$ 5.70	$ 11,400.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	18,000	SF	$ 1.00	$ 18,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	18,000	SF	$ 1.00	$ 18,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	700	CY	$ 10.00	$ 7,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	700	CY	$ 4.36	$ 3,052.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 001ℓ
c. Placement and Compaction	700	CY	$ 2.15	$ 1,505.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	0.4	AC	$ 1,800.00	$ 720.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 413,718**	

Raw Quantities	
Perimeter Length (feet)	1,600
Road Length (feet)	1,400
Ditch Length (feet)	1,100
Ditch Cross-Sectional Wetted Perimeter Length (feet)	17
Surface Area of Berm (sq. ft.)	58,000
Total Surface Area (sq. ft.)	75,000
Total Fill Quantity (cubic yards)	30,000
Berm Fill Quantity (cubic yards)	11,000

Assumptions:
1. Sediment level approximately 5 feet below the water surface.
2. Costs computed for closure option.
3. No temporary cover or revegetation.
4. Berm is 20 feet wide with 4H:1V side slopes.
5. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
6. Cap slopes are 5%.
7. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
8. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
9. Existing outlet structure is sufficient to route flow from capped area.
10. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions		
Escalation	4	%
LG&E and KU Overheads	3.5	%
Contingency	20	%
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY

Type in numbers to Override Value

Mill Creek - Clearwell Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
O&M Costs	**$ 211,125**	**$ 223,961**	**$ 109,785**	**$ 114,176**	**$ -**	**$ -**	**$ -**	**$ -**	
Clearwell Pond Dewatering	*$ 5,625*	*$ 5,967*	*$ 2,925*	*$ 3,042*	*$ -*	*$ -*	*$ -*	*$ -*	
Clearwell Pond Cleanout	*$ 205,500*	*$ 217,994*	*$ 106,860*	*$ 111,134*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ 232,456**	**$ 246,590**	**$ 120,877**	**$ 125,712**	**$ -**	**$ -**	**$ -**	**$ -**	
Clearwell (Process Water) Pond Liner	*$ 202,456*	*$ 214,766*	*$ 105,277*	*$ 109,488*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ 30,000*	*$ 31,824*	*$ 15,600*	*$ 16,224*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 443,581**	**$ 470,551**	**$ 230,662**	**$ 239,889**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 15,525**	**$ 16,469**	**$ 8,073**	**$ 8,396**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 91,821**	**$ 97,404**	**$ 47,747**	**$ 49,657**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 551,000**	**$ 585,000**	**$ 287,000**	**$ 298,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions		
Escalation	4	%
LG&E and KU Overheads	3.5	%
Contingency	20	%
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY

Type in numbers to Override Value

Mill Creek - Construction Pond										
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
O&M Costs	**$ 204,275**	**$ 216,695**	**$ 106,223**	**$ 110,472**	**$ -**	**$ -**	**$ -**	**$ -**	
Construction Pond Dewatering	*$ 5,625*	*$ 5,967*	*$ 2,925*	*$ 3,042*	*$ -*	*$ -*	*$ -*	*$ -*	
Construction Pond Cleanout	*$ 198,650*	*$ 210,728*	*$ 103,298*	*$ 107,430*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
Construction Pond Liner	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 204,275**	**$ 216,695**	**$ 106,223**	**$ 110,472**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 7,150**	**$ 7,584**	**$ 3,718**	**$ 3,867**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 42,285**	**$ 44,856**	**$ 21,988**	**$ 22,868**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 254,000**	**$ 270,000**	**$ 132,000**	**$ 138,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions			
Escalation	4	%	
LG&E and KU Overheads	3.5	%	
Contingency	20	%	
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY	
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY	**Type in numbers to Override Value**

Mill Creek - Dead Storage Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
O&M Costs	**$ 183,100**	**$ 194,232**	**$ 95,212**	**$ 99,020**	**$ -**	**$ -**	**$ -**	**$ -**	
Dead Storage Pond Dewatering	*$ 5,000*	*$ 5,304*	*$ 2,600*	*$ 2,704*	*$ -*	*$ -*	*$ -*	*$ -*	
Dead Storage Pond Cleanout	*$ 178,100*	*$ 188,928*	*$ 92,612*	*$ 96,316*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ 212,160**	**$ 225,059**	**$ 110,323**	**$ 114,736**	**$ -**	**$ -**	**$ -**	**$ -**	
Dead Storage (Process Water) Pond Liner	*$ 182,160*	*$ 193,235*	*$ 94,723*	*$ 98,512*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ 30,000*	*$ 31,824*	*$ 15,600*	*$ 16,224*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 395,260**	**$ 419,292**	**$ 205,535**	**$ 213,757**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 13,834**	**$ 14,675**	**$ 7,194**	**$ 7,481**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 81,819**	**$ 86,793**	**$ 42,546**	**$ 44,248**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 491,000**	**$ 521,000**	**$ 256,000**	**$ 266,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions			
Escalation	4	%	
LG&E and KU Overheads	3.5	%	
Contingency	20	%	
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY	
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY	**Type in numbers to Override Value**

Mill Creek - Emergency Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
O&M Costs	**$ 183,100**	**$ 194,232**	**$ 95,212**	**$ 99,020**	**$ -**	**$ -**	**$ -**	**$ -**	
Emergency Pond Dewatering	*$ 5,000*	*$ 5,304*	*$ 2,600*	*$ 2,704*	*$ -*	*$ -*	*$ -*	*$ -*	
Emergency Pond Cleanout	*$ 178,100*	*$ 188,928*	*$ 92,612*	*$ 96,316*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs[1]	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
Emergency Pond Liner	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 183,100**	**$ 194,232**	**$ 95,212**	**$ 99,020**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 6,409**	**$ 6,798**	**$ 3,332**	**$ 3,466**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 37,902**	**$ 40,206**	**$ 19,709**	**$ 20,497**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 228,000**	**$ 242,000**	**$ 119,000**	**$ 123,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion Details - New Construction
Mill Creek - Clearwell Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Clearwell Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	9	DAY	$ 341.40	$ 3,072.60	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	72	HR	$ 35.45	$ 2,552.40	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Clearwell Pond Cleanout[2]					
1. Excavation and Load-out	30,000	CY	$ 2.50	$ 75,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	30,000	CY	$ 4.35	$ 130,500.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs					
A. Clearwell Pond Liner[3]					
1. 40 mil FML (includes materials and installation)	90,000	SF	$ 1.00	$ 90,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	6,670	CY	$ 10.00	$ 66,700.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	6,670	CY	$ 4.36	$ 29,081.20	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	6,670	CY	$ 2.50	$ 16,675.00	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 443,581**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth of 10 feet below the water surface.
3. The Clearwell Pond is cleaned out and lined for use as the new Process Water Pond.
4. Pond slopes are 4H:1V.
5. Quantities based on base topographic mapping shown in drawing.

Raw Quantities		
Pond Cleanout Volume (cu. yds)		30,331
Total Surface Area (sq. ft)		90,084

Conceptual Cost Opinion Details - New Construction
Mill Creek - Construction Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Construction Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	9	DAY	$ 341.40	$ 3,072.60	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	72	HR	$ 35.45	$ 2,552.40	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Construction Pond Cleanout[2]					
1. Excavation and Load-out	29,000	CY	$ 2.50	$ 72,500.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	29,000	CY	$ 4.35	$ 126,150.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs					
A. Construction Pond Liner[3]					
1. 40 mil FML (includes materials and installation)	0	SF	$ 1.00	$ -	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	0	CY	$ 2.50	$ -	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	0	LS	$ 30,000.00	$ -	Estimated
			Total (Derived in 2013 $)	**$ 204,275**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth of 10 feet below the water surface.
3. No liner or pump station was assumed for the Construction Pond.
4. Pond slopes are 4H:1V.
5. Quantities based on base topographic mapping shown in drawing.

Raw Quantities	
Pond Cleanout Volume (cu. yds)	28,879

Conceptual Cost Opinion Details - New Construction
Mill Creek - Dead Storage Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Dead Storage Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	8	DAY	$ 341.40	$ 2,731.20	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	64	HR	$ 35.45	$ 2,268.80	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Dead Storage Pond Cleanout[2]					
1. Excavation and Load-out	26,000	CY	$ 2.50	$ 65,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	26,000	CY	$ 4.35	$ 113,100.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs					
A. Dead Storage Pond Liner[3]					
1. 40 mil FML (includes materials and installation)	81,000	SF	$ 1.00	$ 81,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	6,000	CY	$ 10.00	$ 60,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	6,000	CY	$ 4.36	$ 26,160.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	6,000	CY	$ 2.50	$ 15,000.00	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 395,260**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth of 10 feet below the water surface.
3. The Dead Storage Pond is cleaned out and lined for use as the new Process Water Pond.
4. Pond slopes are 4H:1V.
5. Quantities based on base topographic mapping shown in drawing.

Raw Quantities	
Pond Cleanout Volume (cu. yds)	26,136
Total Surface Area (sq. ft)	81,308

Conceptual Cost Opinion Details - New Construction
Mill Creek - Emergency Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Emergency Pond Dewatering[1]					
1. Pump (1,500 gpm at 8 hrs/day)	8	DAY	$ 341.40	$ 2,731.20	2013 RSMeans Site Work and Landscape Cost Data, 01 54 3340 4400 (Page 705)
2. Laborer (assume 8 hrs/day)	64	HR	$ 35.45	$ 2,268.80	2013 RSMeans Site Work and Landscape Cost Data, Crews (Page 715)
B. Emergency Pond Cleanout[2]					
1. Excavation and Load-out	26,000	CY	$ 2.50	$ 65,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	26,000	CY	$ 4.35	$ 113,100.00	Jeff Heun with LG&E (April 10, 2013)
II. Capital Costs					
A. Emergency Storage Pond Liner[3]					
1. 40 mil FML (includes materials and installation)	0	SF	$ 1.00	$ -	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	0	CY	$ 2.50	$ -	Jeff Heun with LG&E (November 13, 2012)
B. Pump Station	0	LS	$ 30,000.00	$ -	Estimated
			Total (Derived in 2013 $)	**$ 183,100**	

Assumptions:
1. The volume of water pumped out of the pond is equivalent to the pond cleanout volume.
2. Pond cleanout depth of 10 feet below the water surface.
3. No liner or pump station was assumed for the Emergency Pond.
4. 3H:1V side slopes were assumed for the cleanout because 4H:1V side slopes would not result in sufficient cleanout depth due to the pond shape.
5. Quantities based on base topographic mapping shown in drawing.

Raw Quantities		
Pond Cleanout Volume (cu. yds)		26,136

Pineville

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	3	N/A	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	3	N/A	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	5	N/A	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY			**Type in numbers to Override Value**	

PINEVILLE - Ash Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 294,621**	**$ 312,534**	**$ 153,203**	**$ 159,331**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 80,351*	*$ 85,237*	*$ 41,783*	*$ 43,454*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 80,351*	*$ 85,237*	*$ 41,783*	*$ 43,454*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 133,919*	*$ 142,061*	*$ 69,638*	*$ 72,423*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 12,956**	**$ 13,744**	**$ 6,737**	**$ 7,007**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 4,316*	*$ 4,578*	*$ 2,244*	*$ 2,334*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 8,640*	*$ 9,165*	*$ 4,493*	*$ 4,673*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 2,665,420**	**$ 2,827,478**	**$ 1,386,018**	**$ 1,441,459**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 432,860*	*$ 459,178*	*$ 225,087*	*$ 234,091*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ 1,386,840*	*$ 1,471,160*	*$ 721,157*	*$ 750,003*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 94,400*	*$ 100,140*	*$ 49,088*	*$ 51,052*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 75,180*	*$ 79,751*	*$ 39,094*	*$ 40,657*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 676,140*	*$ 717,249*	*$ 351,593*	*$ 365,657*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 2,972,997**	**$ 3,153,756**	**$ 1,545,959**	**$ 1,607,797**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 104,055**	**$ 110,381**	**$ 54,109**	**$ 56,273**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 615,410**	**$ 652,827**	**$ 320,013**	**$ 332,814**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 3,700,000**	**$ 3,920,000**	**$ 1,930,000**	**$ 2,000,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Ash Pond considered a "larger pond" for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion Details - Closure Costs
Pineville - Ash Pond
Bell County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	5,200	LF	$ 0.83	$ 4,316.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	5	AC	$ 1,800.00	$ 8,640.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	26,000	CY	$ 10.00	$ 260,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	26,000	CY	$ 4.36	$ 113,360.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	26,000	CY	$ 2.15	$ 55,900.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	2	AC	$ 1,800.00	$ 3,600.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	84,000	CY	$ 10.00	$ 840,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	84,000	CY	$ 4.36	$ 366,240.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	84,000	CY	$ 2.15	$ 180,600.00	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,100	CY	$ 35.00	$ 38,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	1,300	CY	$ 35.00	$ 45,500.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	8,000	SY	$ 1.30	$ 10,400.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	3,000	CY	$ 10.00	$ 30,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	3,000	CY	$ 4.36	$ 13,080.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	3,000	CY	$ 2.15	$ 6,450.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	4,500	SY	$ 5.70	$ 25,650.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	218,000	SF	$ 1.00	$ 218,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite[6] (includes materials and installation)	218,000	SF	$ 1.00	$ 218,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	14,000	CY	$ 10.00	$ 140,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	14,000	CY	$ 4.36	$ 61,040.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	14,000	CY	$ 2.15	$ 30,100.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	5	AC	$ 1,800.00	$ 9,000.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 2,678,376**	

Raw Quantities	
Perimeter Length (feet)	2,889
Road Length (feet)	2,559
Ditch Length (feet)	2,245
Ditch Cross-Sectional Wetted Perimeter Length	18
Surface Area of Berm outslope (sq. ft.)	81,011
Total Surface Area (sq. ft.)	295,217
Total Fill Quantity (cubic yards)	113,855
Berm Fill Quantity (cubic yards)	28,047
Below-Water Storage Volume (from Hydrographic Survey)	14,638

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing. Below-water storage volume was estimated by multiplying the pond area from aerial photograph by an assumed depth of 15 feet.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions			
Escalation	4	%	
LG&E and KU Overheads	3.5	%	
Contingency	20	%	
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY	
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY	**Type in numbers to Override Value**

PINEVILLE - Ash Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Capital Costs (New Construction)[1]	**$ 50,067**	**$ 53,111**	**$ 26,035**	**$ 27,076**	**$ -**	**$ -**	**$ -**	**$ -**	
Run-off Pond Costs	*$ 50,067*	*$ 53,111*	*$ 26,035*	*$ 27,076*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 50,067**	**$ 53,111**	**$ 26,035**	**$ 27,076**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 1,752**	**$ 1,859**	**$ 911**	**$ 948**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 10,364**	**$ 10,994**	**$ 5,389**	**$ 5,605**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 70,000**	**$ 70,000**	**$ 40,000**	**$ 40,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion Details - New Construction
Pineville - Ash Pond
Bell County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. Capital Costs					
A Creation of Run-Off Pond[1]					
1. Excavation and Load-out	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Run-Off Pond Liner					
1. 40 mil FML (includes materials and installation)	22,000	SF	$ 1.00	$ 22,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	1,700	CY	$ 10.00	$ 17,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	1,700	CY	$ 4.36	$ 7,412.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	1,700	CY	$ 2.15	$ 3,655.00	Jeff Heun with LG&E (November 13, 2012)
C. Pump Station	0	LS	$ 30,000.00	$ -	Estimated
			Total (Derived in 2013 $)	**$ 50,067**	

Assumptions:
1. Run-off Pond assumed to be constructed within the footprint of the existing pond, therefore excavation costs were not considered.
2. Pond slopes are 4H:1V
3. Quantities based on base topographic mapping shown in drawing.

Raw Quantities	
Pond Area (sq. ft)	21003

Trimble

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	1	0.5	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	1	0.25	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	2	0.5	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

TRIMBLE - Ash Treatment Basin									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 849,866**	**$ 901,538**	**$ 441,930**	**$ 459,608**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 339,946*	*$ 360,615*	*$ 176,772*	*$ 183,843*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 169,973*	*$ 180,308*	*$ 88,386*	*$ 91,922*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 339,946*	*$ 360,615*	*$ 176,772*	*$ 183,843*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 52,704,376**	**$ 53,422,892**	**$ 26,187,692**	**$ 27,235,200**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 50,347,500*	*$ 53,408,628*	*$ 26,180,700*	*$ 27,227,928*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 13,446*	*$ 14,264*	*$ 6,992*	*$ 7,272*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 2,343,430*	*$ 2,485,911*	*$ 1,218,584*	*$ 1,267,327*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 15,284,923**	**$ 16,214,246**	**$ 7,948,160**	**$ 8,266,086**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 3,152,653*	*$ 3,344,334*	*$ 1,639,380*	*$ 1,704,955*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 304,210*	*$ 322,706*	*$ 158,189*	*$ 164,517*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 473,349*	*$ 502,129*	*$ 246,141*	*$ 255,987*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 11,354,711*	*$ 12,045,077*	*$ 5,904,450*	*$ 6,140,628*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 68,839,165**	**$ 70,538,676**	**$ 34,577,782**	**$ 35,960,894**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 2,409,371**	**$ 2,468,854**	**$ 1,210,222**	**$ 1,258,631**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 14,249,707**	**$ 14,601,506**	**$ 7,157,601**	**$ 7,443,905**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 85,500,000**	**$ 87,610,000**	**$ 42,950,000**	**$ 44,670,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Ash Treatment Basin considered a "larger" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions						
				Smaller Ponds	Larger Ponds	
Escalation	4	%	Siting Study	1	0.5	% of Closure + Capital Costs
LG&E and KU Overheads	3.5	%	Conceptual Design	1	0.25	% of Closure + Capital Costs
Contingency	20	%	Final Design/Permitting	2	0.5	% of Closure + Capital Costs
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY				
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				**Type in numbers to Override Value**

TRIMBLE - Gypsum Stack Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 795,251**	**$ 843,602**	**$ 413,530**	**$ 430,072**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 198,813*	*$ 210,901*	*$ 103,383*	*$ 107,518*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 198,813*	*$ 210,901*	*$ 103,383*	*$ 107,518*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 397,625*	*$ 421,801*	*$ 206,765*	*$ 215,036*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 15,855,933**	**$ 16,110,532**	**$ 7,897,320**	**$ 8,213,212**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 15,179,600*	*$ 16,102,520*	*$ 7,893,392*	*$ 8,209,128*	*$ -*	*$ -*	*$ -*	*$ -*	
Erosion Control	*$ 7,553*	*$ 8,012*	*$ 3,928*	*$ 4,085*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 668,780*	*$ 709,442*	*$ 347,766*	*$ 361,676*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 4,025,339**	**$ 4,270,080**	**$ 2,093,176**	**$ 2,176,903**	**$ -**	**$ -**	**$ -**	**$ -**	
Perimeter Berm	*$ 499,049*	*$ 529,391*	*$ 259,505*	*$ 269,886*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 161,700*	*$ 171,531*	*$ 84,084*	*$ 87,447*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 237,785*	*$ 252,242*	*$ 123,648*	*$ 128,594*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 3,126,805*	*$ 3,316,915*	*$ 1,625,939*	*$ 1,690,976*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 20,676,523**	**$ 21,224,214**	**$ 10,404,026**	**$ 10,820,187**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 723,678**	**$ 742,847**	**$ 364,141**	**$ 378,707**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 4,280,040**	**$ 4,393,412**	**$ 2,153,633**	**$ 2,239,779**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 25,690,000**	**$ 26,370,000**	**$ 12,930,000**	**$ 13,440,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Gypsum Stack Pond considered a "smaller" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion Details - Closure Costs
Trimble - Ash Treatment Basin
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	7,350,000	CY	$ 2.50	$ 18,375,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	7,350,000	CY	$ 4.35	$ 31,972,500.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	16,200	LF	$ 0.83	$ 13,446.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	133,000	CY	$ 10.00	$ 1,330,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	133,000	CY	$ 4.36	$ 579,880.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	133,000	CY	$ 2.15	$ 285,950.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	82	AC	$ 1,800.00	$ 147,600.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	190,300	CY	$ 10.00	$ 1,903,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	190,300	CY	$ 4.36	$ 829,708.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	190,300	CY	$ 2.15	$ 409,145.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	6	AC	$ 1,800.00	$ 10,800.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	3,500	CY	$ 35.00	$ 122,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	4,200	CY	$ 35.00	$ 147,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	26,700	SY	$ 1.30	$ 34,710.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	18,900	CY	$ 10.00	$ 189,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	18,900	CY	$ 4.36	$ 82,404.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	18,900	CY	$ 2.15	$ 40,635.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	28,300	SY	$ 5.70	$ 161,310.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	3,572,000	SF	$ 1.00	$ 3,572,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	3,572,000	SF	$ 1.00	$ 3,572,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	246,100	CY	$ 10.00	$ 2,461,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	246,100	CY	$ 4.36	$ 1,072,996.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	246,100	CY	$ 2.15	$ 529,115.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	82	AC	$ 1,800.00	$ 147,600.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 67,989,299**	

Raw Quantities		
Perimeter Length (feet)		8791
Road Length (feet)		8561
Ditch Length		7324
Ditch Cross-Sectional Wetted Perimeter Length		35
Surface Area of Berm (sq. ft.)		230684
Total Surface Area (sq. ft.)		3830028
Total Fill Quantity (cubic yards)		7945294
Berm Fill Quantity (cubic yards)		197917
Below-Water Storage Volume (from Hydrographic Survey)		0

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion Details - Closure Costs
Trimble - Gypsum Stack Pond
Jefferson County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. CCR Embankment					
1. Excavation	2,216,000	CY	$ 2.50	$ 5,540,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	2,216,000	CY	$ 4.35	$ 9,639,600.00	Jeff Heun with LG&E (April 10, 2013)
B. Erosion Control					
1. Silt Fence	9,100	LF	$ 0.83	$ 7,553.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
C. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	38,000	CY	$ 10.00	$ 380,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	38,000	CY	$ 4.36	$ 165,680.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	38,000	CY	$ 2.15	$ 81,700.00	Jeff Heun with LG&E (November 13, 2012)
D. Temporary Revegetation	23	AC	$ 1,800.00	$ 41,400.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	29,900	CY	$ 10.00	$ 299,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	29,900	CY	$ 4.36	$ 130,364.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	29,900	CY	$ 2.15	$ 64,285.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	3	AC	$ 1,800.00	$ 5,400.00	Jeff Heun with LG&E (November 13, 2012)
B. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
C. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,900	CY	$ 35.00	$ 66,500.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	2,200	CY	$ 35.00	$ 77,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	14,000	SY	$ 1.30	$ 18,200.00	Jeff Heun with LG&E (November 13, 2012)
D. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	9,500	CY	$ 10.00	$ 95,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	9,500	CY	$ 4.36	$ 41,420.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	9,500	CY	$ 2.15	$ 20,425.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	14,200	SY	$ 5.70	$ 80,940.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
E. Cap					
1. 40 mil FML (includes materials and installation)	1,002,000	SF	$ 1.00	$ 1,002,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite (includes materials and installation)	1,002,000	SF	$ 1.00	$ 1,002,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	65,500	CY	$ 10.00	$ 655,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	65,500	CY	$ 4.36	$ 285,580.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	65,500	CY	$ 2.15	$ 140,825.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	23	AC	$ 1,800.00	$ 41,400.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 19,881,272**	

Raw Quantities	
Perimeter Length (feet)	4,700
Road Length (feet)	4,500
Ditch Length (feet)	4,400
Ditch Cross-Sectional Wetted Perimeter Length (feet)	29
Surface Area of Berm (sq. ft.)	93,000
Total Surface Area (sq. ft.)	1,108,000
Total Fill Quantity (cubic yards)	2,362,777
Berm Fill Quantity (cubic yards)	34,000

Assumptions:
1. Berm is 20 feet wide with 4H:1V side slopes.
2. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
3. Cap slopes are 5%.
4. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
5. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
6. Existing outlet structure is sufficient to route flow from capped area.
7. Quantities based on base topographic mapping shown in drawing.

Conceptual Cost Opinion - NEW CONSTRUCTION
24-Jun-13

Assumptions		
Escalation	4	%
LG&E and KU Overheads	3.5	%
Contingency	20	%
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY

Type in numbers to Override Value

TRIMBLE - Ash Treatment Basin

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
Capital Costs (New Construction)[1]	**$ 482,301**	**$ 511,625**	**$ 250,797**	**$ 260,828**	**$ -**	**$ -**	**$ -**	**$ -**	
Backwater Detention Basin Costs	*$ 482,301*	*$ 511,625*	*$ 250,797*	*$ 260,828*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 482,301**	**$ 511,625**	**$ 250,797**	**$ 260,828**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 16,881**	**$ 17,907**	**$ 8,778**	**$ 9,129**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 99,836**	**$ 105,906**	**$ 51,915**	**$ 53,991**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 600,000**	**$ 640,000**	**$ 320,000**	**$ 330,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

TRIMBLE - Gypsum Storage Pond

Item	Cost 2013 Dollars	Escalated Total	2014	2015	2016	2017	2018	2019	
	% of Work Carried out each year:		50	50	0	0	0	0	100
Capital Costs (New Construction)[1]	**$ 599,690**	**$ 636,151**	**$ 311,839**	**$ 324,312**	**$ -**	**$ -**	**$ -**	**$ -**	
Process Water Pond Costs	*$ 569,690*	*$ 604,327*	*$ 296,239*	*$ 308,088*	*$ -*	*$ -*	*$ -*	*$ -*	
Other Stormwater Costs (i.e. Pump Stations)	*$ 30,000*	*$ 31,824*	*$ 15,600*	*$ 16,224*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 599,690**	**$ 636,151**	**$ 311,839**	**$ 324,312**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 20,989**	**$ 22,265**	**$ 10,914**	**$ 11,351**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 124,136**	**$ 131,683**	**$ 64,551**	**$ 67,133**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 750,000**	**$ 800,000**	**$ 390,000**	**$ 410,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Costs associated with closure are reported separately.

Conceptual Cost Opinion Details - New Construction
Trimble - ATB Pond
Trimble County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. Capital Costs					
A Creation of Backwater Detention Basin[1]					
1. Excavation and Load-out	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Backwater Detention Basin Liner					
1. 40 mil FML (includes materials and installation)	203,000	SF	$ 1.00	$ 203,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	15,100	CY	$ 10.00	$ 151,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	15,100	CY	$ 4.36	$ 65,836.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	15,100	CY	$ 2.15	$ 32,465.00	Jeff Heun with LG&E (November 13, 2012)
C. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 482,301**	

Assumptions:
1. Backwater Detention Basin assumed to be constructed within the footprint of the existing pond, therefore excavation costs were not considered.
2. Pond slopes are 4H:1V
3. Quantities based on base topographic mapping shown in drawing.

Raw Quantities	
Pond Area (sq. ft)	202,605

Conceptual Cost Opinion Details - New Construction
Trimble - Gypsum Storage Pond
Trimble County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. Capital Costs					
A Creation of Process Water Pond[1]					
1. Excavation and Load-out	0	CY	$ 2.50	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle)	0	CY	$ 4.35	$ -	Jeff Heun with LG&E (April 10, 2013)
B. Process Water Pond Liner					
1. 40 mil FML (includes materials and installation)	256,000	SF	$ 1.00	$ 256,000.00	Recent Construction Bids from Stantec projects
2. Cover Soil (2 feet thick)					
i. Excavation and Load-out (from off-site borrow area)	19,000	CY	$ 10.00	$ 190,000.00	Jeff Heun with LG&E (November 13, 2012)
ii. Hauling (assume 2-mile cycle)	19,000	CY	$ 4.36	$ 82,840.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
iii. Placement & Compaction	19,000	CY	$ 2.15	$ 40,850.00	Jeff Heun with LG&E (November 13, 2012)
C. Pump Station	1	LS	$ 30,000.00	$ 30,000.00	Estimated
			Total (Derived in 2013 $)	**$ 599,690**	

Notes:
1. Process Water Pond assumed to be constructed within the footprint of the existing pond, therefore excavation costs were not considered.
2. Pond slopes are 4H:1V
3. Quantities based on base topographic mapping shown in drawing.

Raw Quantities	
Pond Area (sq. ft)	255,094

Tyrone

Conceptual Cost Opinion - CLOSURE
24-Jun-13

Assumptions							
				Smaller Ponds	Larger Ponds		
Escalation	4	%	Siting Study	3	N/A	% of Closure + Capital Costs	
LG&E and KU Overheads	3.5	%	Conceptual Design	3	N/A	% of Closure + Capital Costs	
Contingency	20	%	Final Design/Permitting	5	N/A	% of Closure + Capital Costs	
Unit Cost for excavation, hauling (assumes 0.5 mile cycle), placement, and compaction of CCR/on-site material	6.85	per CY					
Unit cost for excavation, hauling (assumes 2 mile cycle), placement and compaction of off-site borrow material	16.51	per CY				Type in numbers to Override Value	

Tyrone - Ash Pond									
	% of Work Carried out each year:		50	50	0	0	0	0	100
Item	**Cost 2013 Dollars**	**Escalated Total**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	
Engineering/Permitting[1]	**$ 330,408**	**$ 350,497**	**$ 171,812**	**$ 178,685**	**$ -**	**$ -**	**$ -**	**$ -**	
Initial Siting Study	*$ 90,111*	*$ 95,590*	*$ 46,858*	*$ 48,732*	*$ -*	*$ -*	*$ -*	*$ -*	
Conceptual Design	*$ 90,111*	*$ 95,590*	*$ 46,858*	*$ 48,732*	*$ -*	*$ -*	*$ -*	*$ -*	
Final Design/Permitting	*$ 150,186*	*$ 159,317*	*$ 78,097*	*$ 81,220*	*$ -*	*$ -*	*$ -*	*$ -*	
Property Acquisition	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	
O&M Costs	**$ 215,368**	**$ 228,462**	**$ 111,991**	**$ 116,471**	**$ -**	**$ -**	**$ -**	**$ -**	
Erosion Control	*$ 4,648*	*$ 4,931*	*$ 2,417*	*$ 2,514*	*$ -*	*$ -*	*$ -*	*$ -*	
Temporary Soil Cover and Revegetation	*$ 210,720*	*$ 223,532*	*$ 109,574*	*$ 113,957*	*$ -*	*$ -*	*$ -*	*$ -*	
Capital Costs (Closure)[2]	**$ 2,788,344**	**$ 2,957,875**	**$ 1,449,939**	**$ 1,507,936**	**$ -**	**$ -**	**$ -**	**$ -**	
CCR Embankment	*$ 1,000,100*	*$ 1,060,906*	*$ 520,052*	*$ 540,854*	*$ -*	*$ -*	*$ -*	*$ -*	
Perimeter Berm	*$ 654,094*	*$ 693,863*	*$ 340,129*	*$ 353,734*	*$ -*	*$ -*	*$ -*	*$ -*	
Off-Site Material Embankment	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	
Roads	*$ 102,180*	*$ 108,393*	*$ 53,134*	*$ 55,259*	*$ -*	*$ -*	*$ -*	*$ -*	
Ditches	*$ 87,425*	*$ 92,740*	*$ 45,461*	*$ 47,279*	*$ -*	*$ -*	*$ -*	*$ -*	
Cap	*$ 944,545*	*$ 1,001,973*	*$ 491,163*	*$ 510,810*	*$ -*	*$ -*	*$ -*	*$ -*	
Project Subtotal	**$ 3,334,120**	**$ 3,536,835**	**$ 1,733,743**	**$ 1,803,092**	**$ -**	**$ -**	**$ -**	**$ -**	
LG&E & KU Overheads (3.5)%	**$ 116,694**	**$ 123,789**	**$ 60,681**	**$ 63,108**	**$ -**	**$ -**	**$ -**	**$ -**	
Contingency (20%)	**$ 690,163**	**$ 732,125**	**$ 358,885**	**$ 373,240**	**$ -**	**$ -**	**$ -**	**$ -**	
Project Total (rounded)	**$ 4,150,000**	**$ 4,400,000**	**$ 2,160,000**	**$ 2,240,000**	**$ -**	**$ -**	**$ -**	**$ -**	

[1] Ash Pond considered a "smaller" pond for cost purposes.

[2] Costs associated with new construction are reported separately.

Conceptual Cost Opinion Details - Closure Costs
Tyrone - Ash Pond
Woodford County, Kentucky

Item	Estimated Quantity	Units	Unit Cost (2013 $)	Extended Cost (2013 $)	Source
I. O&M Costs					
A. Erosion Control					
1. Silt Fence	5,600	LF	$ 0.83	$ 4,648.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 1000
B. Temporary Cover Soil (assume 12 inches)					
1. Excavation and Load-out (from off-site borrow area)	12,000	CY	$ 10.00	$ 120,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	12,000	CY	$ 4.36	$ 52,320.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	12,000	CY	$ 2.15	$ 25,800.00	Jeff Heun with LG&E (November 13, 2012)
C. Temporary Revegetation	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
II. Capital Costs					
A. CCR Embankment					
1. Excavation	146,000	CY	$ 2.50	$ 365,000.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 1642 0250 and 0020
2. Hauling (assume 0.5-mile cycle), Placement, and Compaction	146,000	CY	$ 4.35	$ 635,100.00	Jeff Heun with LG&E (April 10, 2013)
B. Perimeter Berm					
1. Excavation and Load-out (from off-site borrow area)	39,400	CY	$ 10.00	$ 394,000.00	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	39,400	CY	$ 4.36	$ 171,784.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	39,400	CY	$ 2.15	$ 84,710.00	Jeff Heun with LG&E (November 13, 2012)
4. Revegetation	2	AC	$ 1,800.00	$ 3,600.00	Jeff Heun with LG&E (November 13, 2012)
C. Off-Site Material Embankment					
1. Excavation and Load-out (from off-site borrow area)	0	CY	$ 10.00	$ -	Jeff Heun with LG&E (November 13, 2012)
2. Hauling (assume 2-mile cycle)	0	CY	$ 4.36	$ -	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
3. Placement and Compaction	0	CY	$ 2.15	$ -	Jeff Heun with LG&E (November 13, 2012)
D. Roads					
1. Dense Grade Aggregate (materials, hauling and placement)	1,200	CY	$ 35.00	$ 42,000.00	Jeff Heun with LG&E (November 13, 2012)
2. No. 2 Stone (materials, hauling and placement)	1,400	CY	$ 35.00	$ 49,000.00	Jeff Heun with LG&E (November 13, 2012)
3. Geotextile Filter Fabric					
a. Materials and Installation	8,600	SY	$ 1.30	$ 11,180.00	Jeff Heun with LG&E (November 13, 2012)
E. Ditches					
1. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	3,500	CY	$ 10.00	$ 35,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	3,500	CY	$ 4.36	$ 15,260.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	3,500	CY	$ 2.15	$ 7,525.00	Jeff Heun with LG&E (November 13, 2012)
2. Turf Reinforcement Mat (materials and installation)	5,200	SY	$ 5.70	$ 29,640.00	2013 RSMeans Site Work and Landscape Cost Data, 31 25 1416 0120
F. Cap (includes liner for the Backwater Detention Basin)					
1. 40 mil FML (includes materials and installation)	305,000	SF	$ 1.00	$ 305,000.00	Recent Construction Bids from Stantec projects
2. Geocomposite(6) (includes materials and installation)	305,000	SF	$ 1.00	$ 305,000.00	Recent Construction Bids from Stantec projects
3. Cover Soil (2 feet thick)					
a. Excavation and Load-out (from off-site borrow area)	19,500	CY	$ 10.00	$ 195,000.00	Jeff Heun with LG&E (November 13, 2012)
b. Hauling (assume 2-mile cycle)	19,500	CY	$ 4.36	$ 85,020.00	2013 RSMeans Site Work and Landscape Cost Data, 31 23 2320 0018
c. Placement and Compaction	19,500	CY	$ 2.15	$ 41,925.00	Jeff Heun with LG&E (November 13, 2012)
4. Hydro Seeding, with Mulch and Fertilizer	7	AC	$ 1,800.00	$ 12,600.00	Jeff Heun with LG&E (November 13, 2012)
			Total (Derived in 2013 $)	**$ 3,003,712**	

Raw Quantities	
Perimeter Length (feet)	2,974
Road Length (feet)	2,747
Ditch Length (feet)	2,616
Ditch Cross-Sectional Wetted Perimeter Length (feet)	18
Surface Area of Berm (sq. ft.)	76,172
Total Surface Area (sq. ft.)	372,431
Total Fill Quantity (cubic yards)	215,557
Berm Fill Quantity (cubic yards)	41,815
Below-Water Storage Volume (from Hydrographic Survey)	6,906

Assumptions:
1. CCR material stockpiled is sufficient to close the pond.
2. Berm is 20 feet wide with 4H:1V side slopes.
3. Road is 20 feet wide with 4H:1V side slopes and consists of one foot of Dense Grade Aggregate and one foot of No. 2 Stone underlain by Geotextile Filter Fabric.
4. Cap slopes are 5%.
5. Closure design consists of 40 mil linear low density polyethylene liner placed directly on CCR subgrade and covered with geocomposite.
6. Perimeter ditches sized for the 100-year 24-hour storm event with a 1% slope using WIN TR-55 and estimated watershed areas, curve numbers, and times of concentration.
7. Existing outlet structure is sufficient to route flow from capped area.
8. Quantities based on base topographic mapping shown in drawing and hydrographic survey data provided by LG&E.

Appendix D

H&H Calculations

Cane Run

Michelle

Cane Run
Conceptual Hydrology
Jefferson County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.9	4.4	5.1	5.5	6.1	2.6

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

==

Michelle

Cane Run
Conceptual Hydrology
Jefferson County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
DSP	21.66
REACHES	
OUTLET	21.66

==

Michelle

Cane Run
Conceptual Hydrology
Jefferson County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
DSP	3.75	0.100	79	Outlet	Dead Storage Pond

Total Area: 3.75 (ac)

==

Michelle

Cane Run
Conceptual Hydrology
Jefferson County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
DSP							
SHEET	100	0.0500	0.000				
CHANNEL	680	0.0100	0.035	12.00	16.24	3.498	0.054
					Time of Concentration		0.1
							========

==

Michelle

Cane Run
Conceptual Hydrology
Jefferson County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
DSP	CN directly entered by user	-	3.75	79
	Total Area / Weighted Curve Number		3.75	79
			====	==

==

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

July 22, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	10.83
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	8.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	0.48
Flow Velocity (fps)	2.29
Froude Number	0.639
Velocity Head (ft)	0.08
Energy Head (ft)	0.56
Cross-Sectional Area of Flow (sq ft)	4.73
Top Width of Flow (ft)	11.82

E.W. Brown

Michelle EW Brown Auxiliary Pond
Rough Hydrology
Mercer County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.9	4.4	5.1	5.5	6.1	2.6

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

==

Michelle EW Brown Auxiliary Pond
Rough Hydrology
Mercer County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
Aux Pond	169.43
REACHES	
OUTLET	169.43

==

Michelle EW Brown Auxiliary Pond
Rough Hydrology
Mercer County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Aux Pond	38.00	0.280	79	Outlet	

Total Area: 38 (ac)

==

Michelle EW Brown Auxiliary Pond
Rough Hydrology
Mercer County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Aux Pond							
SHEET	100	0.0500	0.150				0.115
SHALLOW	500	0.0500	0.050				0.038
CHANNEL	2390	0.0100	0.035	36.00	26.50	5.227	0.127
					Time of Concentration		.28
							========

==

Michelle

EW Brown Auxiliary Pond
Rough Hydrology
Mercer County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Aux Pond	CN directly entered by user	-	38	79
	Total Area / Weighted Curve Number		38	79
			==	==

==

TRAPEZOIDAL CHANNEL ANALYSIS
CRITICAL DEPTH COMPUTATION

July 19, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	84.72
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	10.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Critical Depth (ft)	1.12
Critical Slope (ft/ft)	0.0192
Flow Velocity (fps)	5.24
Froude Number	1.0
Velocity Head (ft)	0.43
Energy Head (ft)	1.54
Cross-Sectional Area of Flow (sq ft)	16.17
Top Width of Flow (ft)	18.94

Ghent

D. Herron

Ghent ATB #1
Concept Hydrology
Carroll County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.8	4.3	5.1	5.5	6.1	2.6

Storm Data Source: Carroll County, KY (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

D. Herron

Ghent ATB #1
Concept Hydrology
Carroll County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
woods	71.71
ash pond	323.43
REACHES	
ash pond	71.71
Down	71.70
OUTLET	394.07

D. Herron

Ghent ATB #1
Concept Hydrology
Carroll County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
woods	15.00	0.191	77	ash pond	run-on
ash pond	62.50	0.169	79	Outlet	run-off

Total Area: 77.50 (ac)

Concept Hydrology
Carroll County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
woods							
SHEET	100	0.1000	0.400				0.191
					Time of Concentration		.191
							========
ash pond							
SHEET	100	0.0500	0.150				0.115
SHALLOW	700	0.0500	0.050				0.054
					Time of Concentration		.169
							========

==

D. Herron

Ghent ATB #1
Concept Hydrology
Carroll County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
woods	CN directly entered by user	-	15	77
	Total Area / Weighted Curve Number		15	77
			==	==
ash pond	CN directly entered by user	-	62.5	79
	Total Area / Weighted Curve Number		62.5	79
			====	==

==

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

May 28, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	394.07
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	20.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	2.25
Flow Velocity (fps)	6.03
Froude Number	0.811
Velocity Head (ft)	0.56
Energy Head (ft)	2.82
Cross-Sectional Area of Flow (sq ft)	65.36
Top Width of Flow (ft)	38.02

D. Herron Ghent ATB#2
Conceptual Design
Carroll County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.8	4.3	5.1	5.5	6.1	2.6

Storm Data Source: Carroll County, KY (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

===

D. Herron Ghent ATB#2
Conceptual Design
Carroll County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
Grass	24.02
Ash Pond	421.01
REACHES	
ash pond	24.02
Down	24.01
OUTLET	442.29

===

D. Herron Ghent ATB#2
Conceptual Design
Carroll County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Grass	5.00	0.127	74	ash pond	run-on
Ash Pond	90.00	0.246	79	Outlet	run-off

Total Area: 95 (ac)

===

Conceptual Design
Carroll County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Grass							
SHEET	100	0.1000	0.240				0.127
				Time of Concentration			.127
Ash Pond							
SHEET	100	0.0500	0.150				0.115
SHALLOW	1700	0.0500	0.050				0.131
				Time of Concentration			.246

D. Herron

Ghent ATB#2
Conceptual Design
Carroll County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Grass	Open space; grass cover > 75% (good)	C	5	74
	Total Area / Weighted Curve Number		5	74
Ash Pond	CN directly entered by user	-	90	79
	Total Area / Weighted Curve Number		90	79

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

May 28, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	442.29
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	20.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	2.4
Flow Velocity (fps)	6.24
Froude Number	0.818
Velocity Head (ft)	0.6
Energy Head (ft)	3.0
Cross-Sectional Area of Flow (sq ft)	70.89
Top Width of Flow (ft)	39.17

D. Herron Ghent Gypsum Stack
Concept Closure
Carroll County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.8	4.3	5.1	5.5	6.1	2.6

Storm Data Source: Carroll County, KY (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

===

D. Herron Ghent Gypsum Stack
Concept Closure
Carroll County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
Gyp Stack	115.78
REACHES	
OUTLET	115.78

===

D. Herron Ghent Gypsum Stack
Concept Closure
Carroll County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Gyp Stack	22.50	0.173	79	Outlet	Pond run-off

Total Area: 22.50 (ac)

===

D. Herron Ghent Gypsum Stack
Concept Closure
Carroll County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Gyp Stack							
SHEET	100	0.0500	0.150				0.115
SHALLOW	750	0.0500	0.050				0.058
					Time of Concentration		.173
							========

D. Herron

Ghent Gypsum Stack
Concept Closure
Carroll County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Gyp Stack	CN directly entered by user	-	22.5	79
	Total Area / Weighted Curve Number		22.5	79
			====	==

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

May 29, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	115.78
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	12.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	1.45
Flow Velocity (fps)	4.47
Froude Number	0.752
Velocity Head (ft)	0.31
Energy Head (ft)	1.76
Cross-Sectional Area of Flow (sq ft)	25.91
Top Width of Flow (ft)	23.63

Green River

Michelle 175663013

Green River Main Ash Pond Closure

Muhlenberg County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.4	4.3	4.8	5.5	6.2	6.7	2.9

Storm Data Source: Muhlenberg County, KY (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Michelle 175663013

Green River Main Ash Pond Closure

Muhlenberg County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
GR_MainAsh	270.99
GR_ATB2	40.29
GR_SO2	52.84
REACHES	
OUTLET	362.47

Michelle 175663013

Green River Main Ash Pond Closure

Muhlenberg County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
GR_MainAsh	50.00	0.234	79	Outlet	
GR_ATB2	7.00	0.188	79	Outlet	
GR_SO2	9.20	0.190	79	Outlet	

Total Area: 66.20 (ac)

Green River Main Ash Pond Closure
Muhlenberg County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
GR_MainAsh							
SHEET	100	0.0500	0.150				0.110
CHANNEL	2630	0.0100	0.035	50.00	30.61	5.892	0.124
				Time of Concentration			.234
GR_ATB2							
SHEET	100	0.0500	0.150				0.110
CHANNEL	1150	0.0100	0.035	16.50	17.40	4.095	0.078
				Time of Concentration			.188
GR_SO2							
SHEET	100	0.0500	0.150				0.110
CHANNEL	1350	0.0100	0.035	20.25	17.37	4.688	0.080
				Time of Concentration			.19

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
GR_MainAsh	CN directly entered by user	-	50	79
	Total Area / Weighted Curve Number		50	79
GR_ATB2	CN directly entered by user	-	7	79
	Total Area / Weighted Curve Number		7	79
GR_SO2	CN directly entered by user	-	9.2	79
	Total Area / Weighted Curve Number		9.2	79

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 6, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	135.5
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	10.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	1.7
Flow Velocity (fps)	4.76
Froude Number	0.763
Velocity Head (ft)	0.35
Energy Head (ft)	2.05
Cross-Sectional Area of Flow (sq ft)	28.47
Top Width of Flow (ft)	23.57

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 6, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	20.15
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	5.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	0.82
Flow Velocity (fps)	2.95
Froude Number	0.678
Velocity Head (ft)	0.14
Energy Head (ft)	0.96
Cross-Sectional Area of Flow (sq ft)	6.83
Top Width of Flow (ft)	11.59

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 6, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	26.42
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	5.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	0.95
Flow Velocity (fps)	3.18
Froude Number	0.691
Velocity Head (ft)	0.16
Energy Head (ft)	1.1
Cross-Sectional Area of Flow (sq ft)	8.3
Top Width of Flow (ft)	12.56

Mill Creek

J. Kopp LG&E Impoundment Closures

Mill Creek - Ash Treatment Pond

Jefferson County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.8	4.3	5.1	5.5	6.1	2.6

Storm Data Source: Carroll County, KY (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

==

J. Kopp LG&E Impoundment Closures

Mill Creek - Ash Treatment Pond

Jefferson County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
west	193.00
east	167.22
REACHES	
OUTLET	359.63

==

J. Kopp LG&E Impoundment Closures

Mill Creek - Ash Treatment Pond

Jefferson County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
west	38.50	0.194	79	Outlet	West half of ash pond
east	34.50	0.220	79	Outlet	East half of ash pond.

Total Area: 73 (ac)

==

J. Kopp LG&E Impoundment Closures

Mill Creek - Ash Treatment Pond
Jefferson County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
west							
User-provided							0.194
					Time of Concentration		0.194
							========
east							
User-provided							0.220
					Time of Concentration		0.220
							========

==

J. Kopp

LG&E Impoundment Closures
Mill Creek - Ash Treatment Pond
Jefferson County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
west	CN directly entered by user	-	38.5	79
	Total Area / Weighted Curve Number		38.5	79
			====	==
east	CN directly entered by user	-	34.5	79
	Total Area / Weighted Curve Number		34.5	79
			====	==

==

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

July 19, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	193.0
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	10.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	2.03
Flow Velocity (fps)	5.25
Froude Number	0.782
Velocity Head (ft)	0.43
Energy Head (ft)	2.46
Cross-Sectional Area of Flow (sq ft)	36.77
Top Width of Flow (ft)	26.24

Pineville

Michelle 175663013
Pineville
Bell County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.9	4.5	5.2	5.8	6.3	2.6

Storm Data Source: Bell County, KY (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

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Michelle 175663013
Pineville
Bell County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
Ash Pond	38.02
REACHES	
OUTLET	38.02

===

Michelle 175663013
Pineville
Bell County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Ash Pond	7.40	0.210	79	Outlet	

Total Area: 7.40 (ac)

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Michelle 175663013
Pineville
Bell County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Ash Pond							
SHEET	100	0.0500	0.150				0.115
CHANNEL	1400	0.0100	0.035	16.50	17.40	4.094	0.095
					Time of Concentration		.21
							========

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Michelle 175663013
Pineville
Bell County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Ash Pond	CN directly entered by user	-	7.4	79
	Total Area / Weighted Curve Number		7.4	79
			===	==

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TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 6, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	19.01
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	5.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	0.8
Flow Velocity (fps)	2.9
Froude Number	0.675
Velocity Head (ft)	0.13
Energy Head (ft)	0.93
Cross-Sectional Area of Flow (sq ft)	6.55
Top Width of Flow (ft)	11.39

Trimble

Tiffany Trimble ATB
Rough Hydrology
Trigg County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.9	4.4	5.1	5.5	6.1	2.6

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

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Tiffany Trimble ATB
Rough Hydrology
Trigg County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
GSP	406.89
REACHES	
OUTLET	406.89

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Tiffany Trimble ATB
Rough Hydrology
Trigg County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
GSP	99.60	0.343	79	Outlet	

Total Area: 99.60 (ac)

==

Tiffany Trimble ATB
Rough Hydrology
Trigg County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
GSP							
SHEET	100	0.0500	0.150				0.115
SHALLOW	500	0.0500	0.050				0.038
CHANNEL	4455	0.0100	0.035	66.00	34.74	6.513	0.190
					Time of Concentration		.343
							========

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Tiffany

Trimble ATB
Rough Hydrology
Trigg County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
GSP	CN directly entered by user	-	99.6	79
	Total Area / Weighted Curve Number		99.6	79
			====	==

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TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

July 19, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	203.4
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	10.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	2.08
Flow Velocity (fps)	5.33
Froude Number	0.785
Velocity Head (ft)	0.44
Energy Head (ft)	2.52
Cross-Sectional Area of Flow (sq ft)	38.19
Top Width of Flow (ft)	26.67

Tiffany — Trimble GSP
Rough Hydrology
Trigg County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.9	4.4	5.1	5.5	6.1	2.6

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

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Tiffany — Trimble GSP
Rough Hydrology
Trigg County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
GSP	82.18
REACHES	
OUTLET	82.18

==

Tiffany — Trimble GSP
Rough Hydrology
Trigg County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
GSP	19.50	0.319	79	Outlet	

Total Area: 19.50 (ac)

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Tiffany — Trimble GSP
Rough Hydrology
Trigg County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
GSP							
SHEET	100	0.0500	0.150				0.115
SHALLOW	500	0.0500	0.050				0.038
CHANNEL	2587	0.0100	0.035	21.00	20.40	4.329	0.166
					Time of Concentration		.319

Tiffany

Trimble GSP
Rough Hydrology
Trigg County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
GSP	Pasture, grassland or range	(poor)	B	19.5	79
	Total Area / Weighted Curve Number			19.5	79

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

July 19, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	82.18
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	8.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	1.42
Flow Velocity (fps)	4.21
Froude Number	0.74
Velocity Head (ft)	0.28
Energy Head (ft)	1.7
Cross-Sectional Area of Flow (sq ft)	19.52
Top Width of Flow (ft)	19.4

Tyrone

Michelle 175663013
Tyrone
Woodford County, Kentucky

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
3.1	3.9	4.4	5.1	5.6	6.2	2.6

Storm Data Source: Woodford County, KY (NRCS)
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Michelle 175663013
Tyrone
Woodford County, Kentucky

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period ANALYSIS: (cfs)
SUBAREAS	
Ash Pond	49.00
REACHES	
OUTLET	49.00

Michelle 175663013
Tyrone
Woodford County, Kentucky

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Ash Pond	9.75	0.210	79	Outlet	

Total Area: 9.75 (ac)

Michelle 175663013
Tyrone
Woodford County, Kentucky

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Ash Pond							
SHEET	100	0.0500	0.150				0.115
CHANNEL	1400	0.0100	0.035	16.50	17.40	4.094	0.095
				Time of Concentration			.21

Michelle 175663013

Tyrone

Woodford County, Kentucky

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Ash Pond	CN directly entered by user	-	9.75	79
	Total Area / Weighted Curve Number		9.75	79

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 6, 2013

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	24.5
Channel Bottom Slope (ft/ft)	0.01
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	4.0
Channel Right Side Slope (horizontal/vertical)	4.0
Channel Bottom Width (ft)	5.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	0.91
Flow Velocity (fps)	3.12
Froude Number	0.688
Velocity Head (ft)	0.15
Energy Head (ft)	1.06
Cross-Sectional Area of Flow (sq ft)	7.85
Top Width of Flow (ft)	12.27

Appendix E

Electronic Submittal

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.9

Witness: John N. Voyles, Jr.

Q-2.9. Please refer to Attachment 1-15(1), which the Companies provided in response to Sierra Club DR 1-15.

a. Please confirm that the Companies assume that they will incur $200 million in capital costs between 2017 and 2021 to bring the Brown plant into compliance with the final ELG rule.

b. Please provide a break-down of the $200 million in capital spending by item, listing the various pollution control technologies that in the aggregate cost $200 million.

c. Please indicate when the Companies expect to file a case with the Commission seeking approval for any spending necessary to comply with the ELG rule.

A-2.9.

a. The current capital costs in Attachment to Response to Sierra Club Question No. 1.15(1) includes $200 million to bring E.W. Brown Station into compliance with the ELG rule based on the assumptions utilized in the response to item 2.8(b) above. The $200 million capital cost in the attachment are mathematical averages of pre-conceptual level estimates for the various technology options listed in 2.8(d).

b. A breakdown of the pre-conceptual capital cost estimates is attached.

c. Until the final ELG rules are released and the compliance time tables are known, the Companies cannot determine if or when approval will be sought from the Commission.

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$164,385
FGD Sludge Pump		$221,905
FGD FBR		$4,472,252
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$952,827
FGD Sand Filtration		$888,140
FGD Waste Solids Sump		$28,559
FGD Equalization Tank (Concrete)		$907,416
FGD Influent Pump		$33,005
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$119,922
FGD pH Adjustment Tank (Steel)		$127,893
FGD Biological Influent Pump		$21,317
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$36,852
FGD Ammonium Chloride Chemical Feed System		$33,244
FGD Aerobic MBBR		$542,805
FGD Effluent Pump		$21,317
FGD Gravity Thickener		$168,187
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$121,785
Ash Low Pressure Transfer Pump		$42,953
Ash High Pressure Transfer Pump		$42,953
Ash Effluent Mix Tank (Steel)		$717,100
Other Wastewater Treatment		
Other Feed Pump		$38,234
Other Blower		$38,234
Other Effluent Pump		$38,234
Other Equalization Tank (Concrete)		$319,445
Other Influent Pump		$38,234
Other Clarifier		$311,702
Other Sludge Pump		$130,632
Other Mixed Tank Reactor (Steel)		$298,021
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$55,620
Common Acid Chemical Feed System		$77,930
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$69,470
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$11,416,023
Total Equipment Cost (TEC)		$24,024,000
Total Construction Material		$27,718,000
Sales Tax	1.0%	$812,000
Purchased Equipment Costs - Delivered (PEC_D)		$24,836,000
Civil Sitework		$6,854,000
Instrumentation and Controls		$2,807,000
Mechanical		$3,625,000
Electrical		$2,010,000
Finishes		$753,000
Building		$3,500,000
Other		$8,169,000
Total Direct Costs (TDC)		$52,554,000
Overall Sitework	10.0%	$5,177,000
Yard Electrical	18.0%	$9,318,000
Yard Piping	18.0%	$9,318,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Tank

Item		Total Installed Cost
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
Auger Cast Piles	Allowance	$941,000
TDC + Additional Project Costs		$81,958,000
Contractor Overhead	10.0%	$8,198,000
Subtotal		$172,114,000
Contractor Profit	5.0%	$4,509,000
Subtotal		$176,623,000
Contractor Mob/Bonds/Insurance	5.0%	$4,735,000
Subtotal		$181,358,000
Contingency	25.0%	$24,856,000
Subtotal		$206,214,000
Escalation	17.9%	$22,246,000
Total Construction, Indirects, and Escalation		$146,502,000
Engineering	15.0%	$21,979,000
Services During Construction	4.0%	$5,861,000
Commissioning and Startup	4.0%	$5,861,000
Total Capital Cost		**$180,203,000**

NOTE - Cost estimate is considered a Class V estimate (per Association for the Advancement of Cost Engineering International definition) with accuracy of +/-30%. This is only an estimate of possible costs, based on the draft Effluent Limitation Guideline, preliminary flow basis, and limited site information. This cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimate presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$164,385
FGD Sludge Pump		$221,905
FGD FBR		$4,472,252
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$952,827
FGD Sand Filtration		$888,140
FGD Waste Solids Sump		$28,559
FGD Equalization Tank (Concrete)		$907,416
FGD Influent Pump		$33,005
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$119,922
FGD pH Adjustment Tank (Steel)		$127,893
FGD Biological Influent Pump		$21,317
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$36,852
FGD Ammonium Chloride Chemical Feed System		$33,244
FGD Aerobic MBBR		$542,805
FGD Effluent Pump		$21,317
FGD Gravity Thickener		$168,187
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,721
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$121,786
Ash Transfer Pump		$97,974
Ash Equalization Tank (Concrete)		$332,892
Ash Mix Tank (Steel)		$311,764
Ash Clarifier		$334,044
Ash Sludge Pump		$157,201
Ash Effluent Pump		$38,234
Other Wastewater Treatment		
Other Feed Pump		$38,234
Other Blower		$38,234
Other Effluent Pump		$38,234
Other Equalization Tank (Concrete)		$319,445
Other Influent Pump		$38,234
Other Clarifier		$311,701
Other Sludge Pump		$130,632
Other Mixed Tank Reactor (Steel)		$298,021
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$55,620
Common Acid Chemical Feed System		$77,930
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$78,896
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$11,974,491
Total Equipment Cost (TEC)		$25,061,000
Total Construction Material		$31,386,000
Sales Tax	1.0%	$883,000
Purchased Equipment Costs - Delivered (PEC_D)		$25,944,000
Civil Sitework		$8,358,000
Instrumentation and Controls		$3,029,000
Mechanical		$3,998,000
Electrical		$2,213,000
Finishes		$835,000
Building		$4,750,000
Other		$8,203,000
Total Direct Costs (TDC)		$57,330,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Tank

Item		Total Installed Cost
Overall Sitework	10.0%	$5,647,000
Yard Electrical	18.0%	$10,165,000
Yard Piping	18.0%	$10,165,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
Auger Cast Piles	Allowance	$1,188,000
TDC + Additional Project Costs		$89,145,000
Contractor Overhead	10.0%	$8,917,000
Subtotal		$187,207,000
Contractor Profit	5.0%	$4,905,000
Subtotal		$192,112,000
Contractor Mob/Bonds/Insurance	5.0%	$5,150,000
Subtotal		$197,262,000
Contingency	25.0%	$27,035,000
Subtotal		$224,297,000
Escalation	17.9%	$24,197,000
Total Construction, Indirects, and Escalation		$159,349,000
Engineering	15.0%	$23,906,000
Services During Construction	4.0%	$6,375,000
Commissioning and Startup	4.0%	$6,375,000
Total Capital Cost		**$196,005,000**

NOTE - Cost estimate is considered a Class V estimate (per Association for the Advancement of Cost Engineering International definition) with accuracy of +/-30%. This is only an estimate of possible costs, based on the draft Effluent Limitation Guideline, preliminary flow basis, and limited site information. This cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimate presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$164,385
FGD Sludge Pump		$221,905
FGD FBR		$4,472,252
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$952,827
FGD Sand Filtration		$888,141
FGD Waste Solids Sump		$28,559
FGD Equalization Tank (Concrete)		$907,416
FGD Influent Pump		$33,006
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$119,922
FGD pH Adjustment Tank (Steel)		$127,893
FGD Biological Influent Pump		$21,317
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$36,852
FGD Ammonium Chloride Chemical Feed System		$33,244
FGD Aerobic MBBR		$542,805
FGD Effluent Pump		$21,317
FGD Gravity Thickener		$168,188
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$121,786
Ash Low Pressure Transfer Pump		$42,954
Ash High Pressure Transfer Pump		$42,954
Ash Effluent Mix Tank (Steel)		$717,101
Other Wastewater Treatment		
Other Feed Pump		$38,234
Other Blower		$38,234
Other Effluent Pump		$38,234
Other Mixed Tank Reactor (Steel)		$186,851
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$55,620
Common Acid Chemical Feed System		$77,930
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$69,470
Common Polymer Chemical Feed System		$79,662
Common Sludge Filter Press		$11,126,933
Total Equipment Cost (TEC)		$22,824,000
Total Construction Material		$25,311,000
Sales Tax	1.0%	$957,000
Purchased Equipment Costs - Delivered (PEC_D)		$23,781,000
Civil Sitework		$5,937,000
Instrumentation and Controls		$2,699,000
Mechanical		$3,323,000
Electrical		$1,797,000
Finishes		$669,000
Building		$2,750,000
Other		$8,136,000
Total Direct Costs (TDC)		$49,092,000
Overall Sitework	10.0%	$4,816,000
Yard Electrical	18.0%	$8,668,000
Yard Piping	18.0%	$8,668,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
Auger Cast Piles	Allowance	$743,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Pond

Item		Total Installed Cost
Dewatering and Conditioning of Pond	Allowance	$20,000,000
TDC + Additional Project Costs		$96,637,000
Contractor Overhead	10.0%	$9,666,000
Subtotal		$202,940,000
Contractor Profit	5.0%	$5,317,000
Subtotal		$208,257,000
Contractor Mob/Bonds/Insurance	5.0%	$5,582,000
Subtotal		$213,839,000
Contingency	25.0%	$29,305,000
Subtotal		$243,144,000
Escalation	17.9%	$26,228,000
Total Construction, Indirects, and Escalation		$172,735,000
Engineering	15.0%	$25,913,000
Services During Construction	4.0%	$6,911,000
Commissioning and Startup	4.0%	$6,911,000
Total Capital Cost		**$212,470,000**

NOTE - Cost estimate is considered a Class V estimate (per Association for the Advancement of Cost Engineering International definition) with accuracy of +/-30%. This is only an estimate of possible costs, based on the draft Effluent Limitation Guideline, preliminary flow basis, and limited site information. This cost estimate has been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors. As a result, the final project costs will vary from the estimate presented herein. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$164,385
FGD Sludge Pump		$221,905
FGD FBR		$4,472,252
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$952,827
FGD Sand Filtration		$888,140
FGD Waste Solids Sump		$28,559
FGD Equalization Tank (Concrete)		$907,416
FGD Influent Pump		$33,006
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$119,922
FGD pH Adjustment Tank (Steel)		$127,893
FGD Biological Influent Pump		$21,316
FGD Phosphoric Acid Chemical Feed System		$31,418
FGD MicroC 4100 Chemical Feed System		$36,851
FGD Ammonium Chloride Chemical Feed System		$33,245
FGD Aerobic MBBR		$542,805
FGD Effluent Pump		$21,316
FGD Gravity Thickener		$168,188
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$121,786
Ash Transfer Pump		$97,974
Ash Equalization Tank (Concrete)		$332,893
Ash Mix Tank (Steel)		$311,763
Ash Clarifier		$334,044
Ash Sludge Pump		$157,202
Ash Effluent Pump		$38,235
Other Wastewater Treatment		
Other Feed Pump		$38,235
Other Blower		$38,235
Other Effluent Pump		$38,235
Other Mixed Tank Reactor (Steel)		$186,851
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$55,620
Common Acid Chemical Feed System		$77,930
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$78,896
Common Polymer Chemical Feed System		$79,662
Common Sludge Filter Press		$11,685,401
Total Equipment Cost (TEC)		$23,861,000
Total Construction Material		$28,993,000
Sales Tax	1.0%	$1,028,000
Purchased Equipment Costs - Delivered (PEC_D)		$24,889,000
Civil Sitework		$7,456,000
Instrumentation and Controls		$2,921,000
Mechanical		$3,696,000
Electrical		$2,000,000
Finishes		$751,000
Building		$4,000,000
Other		$8,169,000
Total Direct Costs (TDC)		$53,882,000
Overall Sitework	10.0%	$5,288,000
Yard Electrical	18.0%	$9,518,000
Yard Piping	18.0%	$9,518,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Brown Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Pond

Item		Total Installed Cost
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
Auger Cast Piles	Allowance	$990,000
Dewatering and Conditioning of Pond	Allowance	$20,000,000
TDC + Additional Project Costs		$103,846,000
Contractor Overhead	10.0%	$10,387,000
Subtotal		$218,079,000
Contractor Profit	5.0%	$5,713,000
Subtotal		$223,792,000
Contractor Mob/Bonds/Insurance	5.0%	$5,999,000
Subtotal		$229,791,000
Contingency	25.0%	$31,492,000
Subtotal		$261,283,000
Escalation	17.9%	$28,186,000
Total Construction, Indirects, and Escalation		$185,623,000
Engineering	15.0%	$27,847,000
Services During Construction	4.0%	$7,426,000
Commissioning and Startup	4.0%	$7,426,000
Total Capital Cost		**$228,322,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,006
FGD Clarifier		$217,655
FGD Sludge Pump		$221,906
FGD FBR		$6,994,214
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,081,148
FGD Sand Filtration		$888,140
FGD Waste Solids Sump		$50,072
FGD Equalization Tank (Concrete)		$1,314,632
FGD Influent Pump		$65,316
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$113,739
FGD pH Adjustment Tank (Steel)		$102,947
FGD Biological Influent Pump		$14,936
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$42,671
FGD Ammonium Chloride Chemical Feed System		$33,244
FGD Aerobic MBBR		$697,269
FGD Effluent Pump		$14,936
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Low Pressure Transfer Pump		$28,635
Ash High Pressure Transfer Pump		$28,635
Ash Effluent Mix Tank (Steel)		$375,830
Other Wastewater Treatment		
Other Feed Pump		$31,782
Other Blower		$31,782
Other Effluent Pump		$31,782
Other Equalization Tank (Concrete)		$1,206,457
Other Influent Pump		$31,782
Other Clarifier		$561,297
Other Sludge Pump		$65,316
Other Effluent Storage Tank (Steel)		$378,122
Other Mixed Tank Reactor (Steel)		$569,490
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$65,239
Common Acid Chemical Feed System		$101,495
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$102,462
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$10,717,441
Total Equipment Cost (TEC)		$28,324,000
Total Construction Material		$24,669,000
Sales Tax	1.0%	$821,000
Purchased Equipment Costs - Delivered (PEC_D)		$29,145,000
Civil Sitework		$9,698,000
Instrumentation and Controls		$2,843,000
Mechanical		$3,505,000
Electrical		$1,916,000
Finishes		$775,000
Building		$1,750,000
Other		$4,182,000
Total Direct Costs (TDC)		$53,814,000
Overall Sitework	10.0%	$5,302,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Tank

Item		Total Installed Cost
Yard Electrical	18.0%	$9,544,000
Yard Piping	18.0%	$9,544,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$82,854,000
Contractor Overhead	10.0%	$8,288,000
Subtotal		$173,996,000
Contractor Profit	5.0%	$4,559,000
Subtotal		$178,555,000
Contractor Mob/Bonds/Insurance	5.0%	$4,787,000
Subtotal		$183,342,000
Contingency	25.0%	$25,128,000
Subtotal		$208,470,000
Escalation	17.9%	$22,490,000
Total Construction, Indirects, and Escalation		$148,106,000
Engineering	15.0%	$22,220,000
Services During Construction	4.0%	$5,926,000
Commissioning and Startup	4.0%	$5,926,000
Total Capital Cost		**$182,178,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,006
FGD Clarifier		$217,655
FGD Sludge Pump		$221,906
FGD FBR		$6,994,214
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,081,148
FGD Sand Filtration		$888,140
FGD Waste Solids Sump		$50,073
FGD Equalization Tank (Concrete)		$1,314,631
FGD Influent Pump		$65,316
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$113,739
FGD pH Adjustment Tank (Steel)		$102,947
FGD Biological Influent Pump		$14,936
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$42,671
FGD Ammonium Chloride Chemical Feed System		$33,245
FGD Aerobic MBBR		$697,268
FGD Effluent Pump		$14,936
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$107,648
Ash Equalization Tank (Concrete)		$610,340
Ash Influent Pump		$45,695
Ash Mix Tank (Steel)		$480,536
Ash Clarifier		$459,203
Ash Sludge Pump		$131,739
Ash Effluent Mix Tank (Steel)		$119,232
Ash Effluent Pump		$28,636
Other Wastewater Treatment		
Other Feed Pump		$31,782
Other Blower		$31,782
Other Effluent Pump		$31,782
Other Equalization Tank (Concrete)		$1,206,457
Other Influent Pump		$31,782
Other Clarifier		$561,296
Other Sludge Pump		$65,316
Other Effluent Storage Tank (Steel)		$378,122
Other Mixed Tank Reactor (Steel)		$569,490
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$65,239
Common Acid Chemical Feed System		$101,495
Common Organosulfide Chemical Feed System		$33,085
Common Ferric Chloride Chemical Feed System		$116,601
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$10,717,441
Total Equipment Cost (TEC)		$29,888,000
Total Construction Material		$27,408,000
Sales Tax	1.0%	$883,000
Purchased Equipment Costs - Delivered (PEC_D)		$30,771,000
Civil Sitework		$11,169,000
Instrumentation and Controls		$3,099,000
Mechanical		$4,134,000
Electrical		$2,141,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Tank

Item		Total Installed Cost
Finishes		$877,000
Building		$1,750,000
Other		$4,238,000
Total Direct Costs (TDC)		$58,179,000
Overall Sitework	10.0%	$5,733,000
Yard Electrical	18.0%	$10,318,000
Yard Piping	18.0%	$10,318,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$89,198,000
Contractor Overhead	10.0%	$8,923,000
Subtotal		$187,319,000
Contractor Profit	5.0%	$4,908,000
Subtotal		$192,227,000
Contractor Mob/Bonds/Insurance	5.0%	$5,153,000
Subtotal		$197,380,000
Contingency	25.0%	$27,053,000
Subtotal		$224,433,000
Escalation	17.9%	$24,212,000
Total Construction, Indirects, and Escalation		$159,447,000
Engineering	15.0%	$23,922,000
Services During Construction	4.0%	$6,379,000
Commissioning and Startup	4.0%	$6,379,000
Total Capital Cost		**$196,127,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,006
FGD Clarifier		$217,656
FGD Sludge Pump		$221,905
FGD FBR		$6,994,214
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,081,148
FGD Sand Filtration		$888,140
FGD Waste Solids Sump		$50,072
FGD Equalization Tank (Concrete)		$1,314,632
FGD Influent Pump		$65,316
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$113,739
FGD pH Adjustment Tank (Steel)		$102,947
FGD Biological Influent Pump		$14,936
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$42,671
FGD Ammonium Chloride Chemical Feed System		$33,244
FGD Aerobic MBBR		$697,269
FGD Effluent Pump		$14,936
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Low Pressure Transfer Pump		$28,635
Ash High Pressure Transfer Pump		$28,635
Ash Effluent Mix Tank (Steel)		$375,830
Other Wastewater Treatment		
Other Feed Pump		$31,782
Other Blower		$31,782
Other Effluent Pump		$31,782
Other Mixed Tank Reactor (Steel)		$377,995
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$65,239
Common Acid Chemical Feed System		$101,495
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$102,462
Common Polymer Chemical Feed System		$79,662
Common Sludge Filter Press		$10,717,441
Total Equipment Cost (TEC)		$25,889,000
Total Construction Material		$22,527,000
Sales Tax	1.0%	$754,000
Purchased Equipment Costs - Delivered (PEC_D)		$26,643,000
Civil Sitework		$8,356,000
Instrumentation and Controls		$2,728,000
Mechanical		$3,301,000
Electrical		$1,604,000
Finishes		$632,000
Building		$1,750,000
Other		$4,156,000
Total Direct Costs (TDC)		$49,170,000
Overall Sitework	10.0%	$4,844,000
Yard Electrical	18.0%	$8,719,000
Yard Piping	18.0%	$8,719,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Pond

Item		Total Installed Cost
TDC + Additional Project Costs		$76,102,000
Contractor Overhead	10.0%	$7,613,000
Subtotal		$159,817,000
Contractor Profit	5.0%	$4,187,000
Subtotal		$164,004,000
Contractor Mob/Bonds/Insurance	5.0%	$4,397,000
Subtotal		$168,401,000
Contingency	25.0%	$23,080,000
Subtotal		$191,481,000
Escalation	17.9%	$20,657,000
Total Construction, Indirects, and Escalation		$136,036,000
Engineering	15.0%	$20,409,000
Services During Construction	4.0%	$5,443,000
Commissioning and Startup	4.0%	$5,443,000
Total Capital Cost		**$167,331,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,006
FGD Clarifier		$217,655
FGD Sludge Pump		$221,906
FGD FBR		$6,994,214
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,081,148
FGD Sand Filtration		$888,140
FGD Waste Solids Sump		$50,072
FGD Equalization Tank (Concrete)		$1,314,631
FGD Influent Pump		$65,316
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$113,739
FGD pH Adjustment Tank (Steel)		$102,947
FGD Biological Influent Pump		$14,936
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$42,671
FGD Ammonium Chloride Chemical Feed System		$33,244
FGD Aerobic MBBR		$697,268
FGD Effluent Pump		$14,936
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$107,647
Ash Equalization Tank (Concrete)		$610,340
Ash Influent Pump		$45,695
Ash Mix Tank (Steel)		$480,536
Ash Clarifier		$459,203
Ash Sludge Pump		$131,739
Ash Effluent Mix Tank (Steel)		$119,232
Ash Effluent Pump		$28,635
Other Wastewater Treatment		
Other Feed Pump		$31,782
Other Blower		$31,782
Other Effluent Pump		$31,782
Other Mixed Tank Reactor (Steel)		$377,995
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$65,239
Common Acid Chemical Feed System		$101,495
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$116,601
Common Polymer Chemical Feed System		$79,662
Common Sludge Filter Press		$10,717,441
Total Equipment Cost (TEC)		$27,453,000
Total Construction Material		$25,265,000
Sales Tax	1.0%	$817,000
Purchased Equipment Costs - Delivered (PEC_D)		$28,270,000
Civil Sitework		$9,826,000
Instrumentation and Controls		$2,984,000
Mechanical		$3,930,000
Electrical		$1,829,000
Finishes		$734,000
Building		$1,750,000
Other		$4,212,000
Total Direct Costs (TDC)		$53,535,000
Overall Sitework	10.0%	$5,275,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Pond

Item		Total Installed Cost
Yard Electrical	18.0%	$9,494,000
Yard Piping	18.0%	$9,494,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$82,448,000
Contractor Overhead	10.0%	$8,248,000
Subtotal		$173,144,000
Contractor Profit	5.0%	$4,536,000
Subtotal		$177,680,000
Contractor Mob/Bonds/Insurance	5.0%	$4,763,000
Subtotal		$182,443,000
Contingency	25.0%	$25,005,000
Subtotal		$207,448,000
Escalation	17.9%	$22,380,000
Total Construction, Indirects, and Escalation		$147,380,000
Engineering	15.0%	$22,111,000
Services During Construction	4.0%	$5,897,000
Commissioning and Startup	4.0%	$5,897,000
Total Capital Cost		**$181,285,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Discharge OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,006
FGD Equalization Tank (Concrete)		$1,314,631
FGD Influent Pump		$33,006
FGD Clarifier		$186,802
FGD Sludge Pump		$221,905
FGD Softening Reactor (Steel)		$184,296
FGD Antiscalant Chemical Feed System		$16,543
FGD Antifoam Chemical Feed System		$24,814
FGD Evaporator Feed Tank (Concrete)		$131,939
FGD Evaporator Feed Pump		$21,317
FGD Evaporator Package		$24,189,235
FGD Distillate Transfer Pump		$23,602
FGD Brine Tank (Concrete)		$118,431
FGD Brine Cooler		$262,819
FGD Brine Pump		$14,907
FGD Fly Ash Pug Mill		$321,897
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$107,647
Ash Equalization Tank (Concrete)		$610,340
Ash Influent Pump		$45,695
Ash Mix Tank (Steel)		$480,536
Ash Clarifier		$459,203
Ash Sludge Pump		$131,739
Ash Effluent Mix Tank (Steel)		$119,231
Ash Effluent Pump		$28,636
Other Wastewater Treatment		
Other Feed Pump		$31,782
Other Blower		$31,782
Other Effluent Pump		$31,782
Other Mixed Tank Reactor (Steel)		$377,995
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$55,621
Common Acid Chemical Feed System		$42,581
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$88,323
Common Polymer Chemical Feed System		$79,663
Common ZLD Press		$14,610,637
Common Lime Chemical Feed System		$287,431
Total Equipment Cost (TEC)		$45,677,000
Total Construction Material		$33,073,000
Sales Tax	1.0%	$1,197,000
Purchased Equipment Costs - Delivered (PEC_D)		$46,874,000
Civil Sitework		$10,397,000
Instrumentation and Controls		$4,245,000
Mechanical		$7,311,000
Electrical		$3,058,000
Finishes		$3,838,000
Building		$4,000,000
Other		$224,000
Total Direct Costs (TDC)		$79,947,000
Overall Sitework	10.0%	$7,878,000
Yard Electrical	18.0%	$14,180,000
Yard Piping	18.0%	$14,180,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Discharge OTHER - Pond

Item		Total Installed Cost
TDC + Additional Project Costs		$120,835,000
Contractor Overhead	10.0%	$12,086,000
Subtotal		$253,756,000
Contractor Profit	5.0%	$6,648,000
Subtotal		$260,404,000
Contractor Mob/Bonds/Insurance	5.0%	$6,980,000
Subtotal		$267,384,000
Contingency	25.0%	$36,643,000
Subtotal		$304,027,000
Escalation	17.9%	$32,796,000
Total Construction, Indirects, and Escalation		$215,988,000
Engineering	15.0%	$32,402,000
Services During Construction	4.0%	$8,641,000
Commissioning and Startup	4.0%	$8,641,000
Total Capital Cost		**$265,672,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Discharge OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,006
FGD Equalization Tank (Concrete)		$1,314,632
FGD Influent Pump		$33,006
FGD Clarifier		$186,801
FGD Sludge Pump		$221,906
FGD Softening Reactor (Steel)		$184,297
FGD Antiscalant Chemical Feed System		$16,543
FGD Antifoam Chemical Feed System		$24,814
FGD Evaporator Feed Tank (Concrete)		$131,939
FGD Evaporator Feed Pump		$21,317
FGD Evaporator Package		$24,189,235
FGD Distillate Transfer Pump		$23,602
FGD Brine Tank (Concrete)		$118,430
FGD Brine Cooler		$262,819
FGD Brine Pump		$14,907
FGD Fly Ash Pug Mill		$321,897
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$107,647
Ash Equalization Tank (Concrete)		$610,340
Ash Influent Pump		$45,695
Ash Mix Tank (Steel)		$480,536
Ash Clarifier		$459,203
Ash Sludge Pump		$131,739
Ash Effluent Mix Tank (Steel)		$119,232
Ash Effluent Pump		$28,635
Other Wastewater Treatment		
Other Feed Pump		$31,782
Other Blower		$31,782
Other Effluent Pump		$31,782
Other Equalization Tank (Concrete)		$1,206,457
Other Influent Pump		$31,782
Other Clarifier		$561,296
Other Sludge Pump		$65,316
Other Effluent Storage Tank (Steel)		$378,122
Other Mixed Tank Reactor (Steel)		$569,490
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$55,620
Common Acid Chemical Feed System		$42,581
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$88,322
Common Polymer Chemical Feed System		$79,662
Common ZLD Press		$14,610,637
Common Lime Chemical Feed System		$287,432
Total Equipment Cost (TEC)		$48,111,000
Total Construction Material		$35,215,000
Sales Tax	1.0%	$1,263,000
Purchased Equipment Costs - Delivered (PEC_D)		$49,374,000
Civil Sitework		$11,739,000
Instrumentation and Controls		$4,359,000
Mechanical		$7,515,000
Electrical		$3,371,000
Finishes		$3,981,000
Building		$4,000,000
Other		$250,000
Total Direct Costs (TDC)		$84,589,000
Overall Sitework	10.0%	$8,336,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Discharge OTHER - Tank

Item		Total Installed Cost
Yard Electrical	18.0%	$15,004,000
Yard Piping	18.0%	$15,004,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$127,583,000
Contractor Overhead	10.0%	$12,762,000
Subtotal		$267,928,000
Contractor Profit	5.0%	$7,019,000
Subtotal		$274,947,000
Contractor Mob/Bonds/Insurance	5.0%	$7,370,000
Subtotal		$282,317,000
Contingency	25.0%	$38,691,000
Subtotal		$321,008,000
Escalation	17.9%	$34,628,000
Total Construction, Indirects, and Escalation		$228,053,000
Engineering	15.0%	$34,213,000
Services During Construction	4.0%	$9,124,000
Commissioning and Startup	4.0%	$9,124,000
Total Capital Cost		**$280,514,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Recycle OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,005
FGD Equalization Tank (Concrete)		$1,314,631
FGD Influent Pump		$33,005
FGD Clarifier		$186,801
FGD Sludge Pump		$221,905
FGD Softening Reactor (Steel)		$184,296
FGD Antiscalant Chemical Feed System		$16,543
FGD Antifoam Chemical Feed System		$24,814
FGD Evaporator Feed Tank (Concrete)		$131,939
FGD Evaporator Feed Pump		$21,317
FGD Evaporator Package		$24,189,235
FGD Distillate Transfer Pump		$23,602
FGD Brine Tank (Concrete)		$118,431
FGD Brine Cooler		$262,819
FGD Brine Pump		$14,907
FGD Fly Ash Pug Mill		$321,897
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Low Pressure Transfer Pump		$28,636
Ash High Pressure Transfer Pump		$28,636
Ash Effluent Mix Tank (Steel)		$375,830
Other Wastewater Treatment		
Other Feed Pump		$31,782
Other Blower		$31,782
Other Effluent Pump		$31,782
Other Mixed Tank Reactor (Steel)		$377,995
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$55,620
Common Acid Chemical Feed System		$42,581
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$78,896
Common Polymer Chemical Feed System		$79,663
Common ZLD Press		$14,610,637
Common Lime Chemical Feed System		$287,432
Total Equipment Cost (TEC)		$44,117,000
Total Construction Material		$30,336,000
Sales Tax	1.0%	$1,134,000
Purchased Equipment Costs - Delivered (PEC_D)		$45,251,000
Civil Sitework		$8,926,000
Instrumentation and Controls		$3,989,000
Mechanical		$6,682,000
Electrical		$2,834,000
Finishes		$3,737,000
Building		$4,000,000
Other		$168,000
Total Direct Costs (TDC)		$75,587,000
Overall Sitework	10.0%	$7,448,000
Yard Electrical	18.0%	$13,406,000
Yard Piping	18.0%	$13,406,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$114,497,000
Contractor Overhead	10.0%	$11,452,000
Subtotal		$240,446,000
Contractor Profit	5.0%	$6,299,000
Subtotal		$246,745,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Recycle OTHER - Pond

Item		Total Installed Cost
Contractor Mob/Bonds/Insurance	5.0%	$6,614,000
Subtotal		$253,359,000
Contingency	25.0%	$34,721,000
Subtotal		$288,080,000
Escalation	17.9%	$31,075,000
Total Construction, Indirects, and Escalation		$204,658,000
Engineering	15.0%	$30,702,000
Services During Construction	4.0%	$8,188,000
Commissioning and Startup	4.0%	$8,188,000
Total Capital Cost		**$251,736,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Recycle OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$33,006
FGD Equalization Tank (Concrete)		$1,314,631
FGD Influent Pump		$33,006
FGD Clarifier		$186,801
FGD Sludge Pump		$221,906
FGD Softening Reactor (Steel)		$184,296
FGD Antiscalant Chemical Feed System		$16,543
FGD Antifoam Chemical Feed System		$24,814
FGD Evaporator Feed Tank (Concrete)		$131,939
FGD Evaporator Feed Pump		$21,316
FGD Evaporator Package		$24,189,235
FGD Distillate Transfer Pump		$23,602
FGD Brine Tank (Concrete)		$118,431
FGD Brine Cooler		$262,819
FGD Brine Pump		$14,907
FGD Fly Ash Pug Mill		$321,897
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,388
Ash Low Pressure Transfer Pump		$28,636
Ash High Pressure Transfer Pump		$28,636
Ash Effluent Mix Tank (Steel)		$375,830
Other Wastewater Treatment		
Other Feed Pump		$31,781
Other Blower		$31,781
Other Effluent Pump		$31,781
Other Equalization Tank (Concrete)		$1,206,457
Other Influent Pump		$31,781
Other Clarifier		$561,297
Other Sludge Pump		$65,316
Other Effluent Storage Tank (Steel)		$378,122
Other Mixed Tank Reactor (Steel)		$569,490
Common Equipment		
Common Solid Storage Tank (Steel)		$902,407
Common Caustic Chemical Feed System		$55,620
Common Acid Chemical Feed System		$42,582
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$78,896
Common Polymer Chemical Feed System		$79,663
Common ZLD Press		$14,610,637
Common Lime Chemical Feed System		$287,431
Total Equipment Cost (TEC)		$46,552,000
Total Construction Material		$32,479,000
Sales Tax	1.0%	$1,201,000
Purchased Equipment Costs - Delivered (PEC_D)		$47,753,000
Civil Sitework		$10,269,000
Instrumentation and Controls		$4,104,000
Mechanical		$6,886,000
Electrical		$3,146,000
Finishes		$3,880,000
Building		$4,000,000
Other		$194,000
Total Direct Costs (TDC)		$80,232,000
Overall Sitework	10.0%	$7,906,000
Yard Electrical	18.0%	$14,230,000
Yard Piping	18.0%	$14,230,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Ghent Generating Station
OPTION: FGD - ZLD ASH - Recycle OTHER - Tank

Item		Total Installed Cost
TDC + Additional Project Costs		$121,248,000
Contractor Overhead	10.0%	$12,127,000
Subtotal		$254,623,000
Contractor Profit	5.0%	$6,670,000
Subtotal		$261,293,000
Contractor Mob/Bonds/Insurance	5.0%	$7,004,000
Subtotal		$268,297,000
Contingency	25.0%	$36,768,000
Subtotal		$305,065,000
Escalation	17.9%	$32,908,000
Total Construction, Indirects, and Escalation		$216,725,000
Engineering	15.0%	$32,513,000
Services During Construction	4.0%	$8,670,000
Commissioning and Startup	4.0%	$8,670,000
Total Capital Cost		**$266,578,000**

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Class V - Estimated Capital Cost

Louisville Gas & Electric

Mill Creek Generating Station

OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$311,027
FGD Sludge Pump		$360,197
FGD FBR		$9,756,861
FGD Methanol Chemical Feed System		$50,558
FGD Ballasted Sand Clarifier		$1,400,567
FGD Sand Filtration		$1,194,711
FGD Waste Solids Sump		$50,073
FGD Equalization Tank (Concrete)		$1,314,632
FGD Influent Pump		$135,581
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$298,453
FGD pH Adjustment Tank (Steel)		$237,964
FGD Biological Influent Pump		$42,585
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$68,858
FGD Ammonium Chloride Chemical Feed System		$33,245
FGD Aerobic MBBR		$1,079,908
FGD Effluent Pump		$42,585
FGD Gravity Thickener		$739,593
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,721
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Low Pressure Transfer Pump		$109,617
Ash High Pressure Transfer Pump		$109,617
Ash Effluent Mix Tank (Steel)		$748,515
Other Wastewater Treatment		
Other Feed Pump		$47,673
Other Blower		$47,673
Other Effluent Pump		$47,673
Other Oil Water Separator		$315,000
Other Equalization Tank (Concrete)		$1,904,164
Other Influent Pump		$47,673
Other Clarifier		$725,932
Other Sludge Pump		$130,632
Other Effluent Storage Tank (Steel)		$672,416
Other Mixed Tank Reactor (Steel)		$690,934
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$89,285
Common Acid Chemical Feed System		$172,192
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$144,880
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$16,534,523
Total Equipment Cost (TEC)		$41,159,000
Total Construction Material		$41,400,000
Sales Tax	1.0%	$1,274,000
Purchased Equipment Costs - Delivered (PEC_D)		$42,433,000
Civil Sitework		$12,411,000
Instrumentation and Controls		$3,699,000
Mechanical		$6,744,000
Electrical		$3,003,000
Finishes		$1,221,000
Building		$2,000,000
Other		$12,322,000
Total Direct Costs (TDC)		$83,833,000
Overall Sitework	10.0%	$8,259,000

Yard Electrical	18.0%	$14,866,000
Yard Piping	18.0%	$14,866,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
Auger Cast Piles	Allowance	$2,178,000
TDC + Additional Project Costs		$128,652,000
Contractor Overhead	10.0%	$12,868,000
Subtotal		$270,172,000
Contractor Profit	5.0%	$7,078,000
Subtotal		$277,250,000
Contractor Mob/Bonds/Insurance	5.0%	$7,432,000
Subtotal		$284,682,000
Contingency	25.0%	$39,014,000
Subtotal		$323,696,000
Escalation	17.9%	$34,918,000
Total Construction, Indirects, and Escalation		$229,962,000
Engineering	15.0%	$34,499,000
Services During Construction	4.0%	$9,200,000
Commissioning and Startup	4.0%	$9,200,000
Total Capital Cost		**$282,861,000**

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Class V - Estimated Capital Cost

Louisville Gas & Electric

Mill Creek Generating Station

OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$311,027
FGD Sludge Pump		$360,197
FGD FBR		$9,756,862
FGD Methanol Chemical Feed System		$50,558
FGD Ballasted Sand Clarifier		$1,400,568
FGD Sand Filtration		$1,194,711
FGD Waste Solids Sump		$50,073
FGD Equalization Tank (Concrete)		$1,314,631
FGD Influent Pump		$135,581
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$298,452
FGD pH Adjustment Tank (Steel)		$237,963
FGD Biological Influent Pump		$42,584
FGD Phosphoric Acid Chemical Feed System		$31,418
FGD MicroC 4100 Chemical Feed System		$68,858
FGD Ammonium Chloride Chemical Feed System		$33,245
FGD Aerobic MBBR		$1,079,908
FGD Effluent Pump		$42,584
FGD Gravity Thickener		$739,592
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$199,486
Ash Equalization Tank (Concrete)		$2,395,835
Ash Influent Pump		$109,617
Ash Mix Tank (Steel)		$1,214,700
Ash Clarifier		$853,173
Ash Sludge Pump		$93,435
Ash Effluent Pump		$109,617
Other Wastewater Treatment		
Other Feed Pump		$47,673
Other Blower		$47,673
Other Effluent Pump		$47,673
Other Oil Water Separator		$315,000
Other Equalization Tank (Concrete)		$1,904,164
Other Influent Pump		$47,673
Other Clarifier		$725,932
Other Sludge Pump		$130,632
Other Effluent Storage Tank (Steel)		$672,416
Other Mixed Tank Reactor (Steel)		$690,933
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$89,286
Common Acid Chemical Feed System		$172,192
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$192,011
Common Polymer Chemical Feed System		$79,662
Common Sludge Filter Press		$22,862,676
Total Equipment Cost (TEC)		$51,543,000
Total Construction Material		$51,214,000
Sales Tax	1.0%	$1,583,000
Purchased Equipment Costs - Delivered (PEC_D)		$53,126,000
Civil Sitework		$17,502,000
Instrumentation and Controls		$4,515,000
Mechanical		$8,636,000
Electrical		$3,899,000
Finishes		$1,501,000

Building		$2,750,000
Other		$12,411,000
Total Direct Costs (TDC)		$104,340,000
Overall Sitework	10.0%	$10,279,000
Yard Electrical	18.0%	$18,501,000
Yard Piping	18.0%	$18,501,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
Auger Cast Piles	Allowance	$3,564,000
TDC + Additional Project Costs		$159,835,000
Contractor Overhead	10.0%	$15,986,000
Subtotal		$335,656,000
Contractor Profit	5.0%	$8,793,000
Subtotal		$344,449,000
Contractor Mob/Bonds/Insurance	5.0%	$9,232,000
Subtotal		$353,681,000
Contingency	25.0%	$48,468,000
Subtotal		$402,149,000
Escalation	17.9%	$43,379,000
Total Construction, Indirects, and Escalation		$285,693,000
Engineering	15.0%	$42,858,000
Services During Construction	4.0%	$11,429,000
Commissioning and Startup	4.0%	$11,429,000
Total Capital Cost		**$351,409,000**

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Class V - Estimated Capital Cost

Louisville Gas & Electric

Mill Creek Generating Station

OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$311,027
FGD Sludge Pump		$360,197
FGD FBR		$9,756,862
FGD Methanol Chemical Feed System		$50,558
FGD Ballasted Sand Clarifier		$1,400,567
FGD Sand Filtration		$1,194,711
FGD Waste Solids Sump		$50,072
FGD Equalization Tank (Concrete)		$1,314,632
FGD Influent Pump		$135,581
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$298,452
FGD pH Adjustment Tank (Steel)		$237,963
FGD Biological Influent Pump		$42,585
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$68,858
FGD Ammonium Chloride Chemical Feed System		$33,244
FGD Aerobic MBBR		$1,079,908
FGD Effluent Pump		$42,585
FGD Gravity Thickener		$739,593
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,721
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Low Pressure Transfer Pump		$109,617
Ash High Pressure Transfer Pump		$109,617
Ash Effluent Mix Tank (Steel)		$748,515
Other Wastewater Treatment		
Other Feed Pump		$47,673
Other Blower		$47,673
Other Effluent Pump		$47,673
Other Oil Water Separator		$315,000
Other Mixed Tank Reactor (Steel)		$672,155
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$89,286
Common Acid Chemical Feed System		$172,192
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$144,880
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$16,530,403
Total Equipment Cost (TEC)		$37,656,000
Total Construction Material		$38,238,000
Sales Tax	1.0%	$1,367,000
Purchased Equipment Costs - Delivered (PEC_D)		$39,023,000
Civil Sitework		$10,644,000
Instrumentation and Controls		$3,490,000
Mechanical		$6,353,000
Electrical		$2,470,000
Finishes		$1,008,000
Building		$2,000,000
Other		$12,273,000
Total Direct Costs (TDC)		$77,261,000
Overall Sitework	10.0%	$7,592,000
Yard Electrical	18.0%	$13,666,000
Yard Piping	18.0%	$13,666,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000

Auger Cast Piles	Allowance	$1,188,000
Dewatering and Conditioning of Pond	Allowance	$20,000,000
TDC + Additional Project Costs		$138,023,000
Contractor Overhead	10.0%	$13,805,000
Subtotal		$289,851,000
Contractor Profit	5.0%	$7,593,000
Subtotal		$297,444,000
Contractor Mob/Bonds/Insurance	5.0%	$7,973,000
Subtotal		$305,417,000
Contingency	25.0%	$41,855,000
Subtotal		$347,272,000
Escalation	17.9%	$37,460,000
Total Construction, Indirects, and Escalation		$246,709,000
Engineering	15.0%	$37,010,000
Services During Construction	4.0%	$9,870,000
Commissioning and Startup	4.0%	$9,870,000
Total Capital Cost		**$303,459,000**

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Class V - Estimated Capital Cost

Louisville Gas & Electric

Mill Creek Generating Station

OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Clarifier		$311,027
FGD Sludge Pump		$360,197
FGD FBR		$9,756,862
FGD Methanol Chemical Feed System		$50,558
FGD Ballasted Sand Clarifier		$1,400,567
FGD Sand Filtration		$1,194,711
FGD Waste Solids Sump		$50,073
FGD Equalization Tank (Concrete)		$1,314,631
FGD Influent Pump		$135,581
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$298,453
FGD pH Adjustment Tank (Steel)		$237,964
FGD Biological Influent Pump		$42,584
FGD Phosphoric Acid Chemical Feed System		$31,417
FGD MicroC 4100 Chemical Feed System		$68,858
FGD Ammonium Chloride Chemical Feed System		$33,245
FGD Aerobic MBBR		$1,079,908
FGD Effluent Pump		$42,584
FGD Gravity Thickener		$739,593
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,721
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$199,485
Ash Equalization Tank (Concrete)		$2,395,836
Ash Influent Pump		$109,617
Ash Mix Tank (Steel)		$1,214,700
Ash Clarifier		$853,173
Ash Sludge Pump		$93,436
Ash Effluent Pump		$109,617
Other Wastewater Treatment		
Other Feed Pump		$47,672
Other Blower		$47,672
Other Effluent Pump		$47,672
Other Oil Water Separator		$315,000
Other Mixed Tank Reactor (Steel)		$672,155
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$89,286
Common Acid Chemical Feed System		$172,192
Common Organosulfide Chemical Feed System		$33,086
Common Ferric Chloride Chemical Feed System		$192,011
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$22,858,556
Total Equipment Cost (TEC)		$48,039,000
Total Construction Material		$48,049,000
Sales Tax	1.0%	$1,675,000
Purchased Equipment Costs - Delivered (PEC_D)		$49,714,000
Civil Sitework		$15,735,000
Instrumentation and Controls		$4,307,000
Mechanical		$8,241,000
Electrical		$3,366,000
Finishes		$1,288,000
Building		$2,750,000
Other		$12,362,000
Total Direct Costs (TDC)		$97,763,000
Overall Sitework	10.0%	$9,612,000
Yard Electrical	18.0%	$17,301,000

Yard Piping	18.0%	$17,301,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
Auger Cast Piles	Allowance	$2,525,000
Dewatering and Conditioning of Pond	Allowance	$20,000,000
TDC + Additional Project Costs		$169,152,000
Contractor Overhead	10.0%	$16,918,000
Subtotal		$355,222,000
Contractor Profit	5.0%	$9,305,000
Subtotal		$364,527,000
Contractor Mob/Bonds/Insurance	5.0%	$9,770,000
Subtotal		$374,297,000
Contingency	25.0%	$51,293,000
Subtotal		$425,590,000
Escalation	17.9%	$45,907,000
Total Construction, Indirects, and Escalation		$302,345,000
Engineering	15.0%	$45,356,000
Services During Construction	4.0%	$12,095,000
Commissioning and Startup	4.0%	$12,095,000
Total Capital Cost		**$371,891,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$107,648
FGD Clarifier		$389,390
FGD Sludge Pump		$221,906
FGD FBR		$17,291,354
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,763,813
FGD Sand Filtration		$1,501,281
FGD Waste Solids Sump		$85,929
FGD Equalization Tank (Concrete)		$1,533,598
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$319,375
FGD pH Adjustment Tank (Steel)		$312,491
FGD Biological Influent Pump		$31,950
FGD Phosphoric Acid Chemical Feed System		$31,189
FGD MicroC 4100 Chemical Feed System		$59,215
FGD Ammonium Chloride Chemical Feed System		$33,533
FGD Aerobic MBBR		$1,316,732
FGD Effluent Pump		$28,636
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Low Pressure Transfer Pump		$23,602
Ash High Pressure Transfer Pump		$25,490
Ash Effluent Mix Tank (Steel)		$251,426
Other Wastewater Treatment		
Other Feed Pump		$28,636
Other Blower		$28,636
Other Effluent Pump		$28,636
Other Equalization Tank (Concrete)		$540,905
Other Influent Pump		$31,782
Other Clarifier		$455,253
Other Sludge Pump		$61,552
Other Effluent Storage Tank (Steel)		$307,272
Other Mixed Tank Reactor (Steel)		$314,076
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$104,771
Common Acid Chemical Feed System		$254,672
Common Organosulfide Chemical Feed System		$49,628
Common Ferric Chloride Chemical Feed System		$149,593
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$10,677,111
Total Equipment Cost (TEC)		$40,562,000
Sales Tax	1.0%	$1,004,000
Purchased Equipment Costs - Delivered (PEC_D)		$41,566,000
Civil Sitework		$8,648,000
Instrumentation and Controls		$2,958,000
Mechanical		$3,766,000
Electrical		$2,183,000
Finishes		$1,038,000
Building		$2,250,000
Other		$4,181,000
Total Direct Costs (TDC)		$66,590,000
Overall Sitework	10.0%	$6,561,000
Yard Electrical	18.0%	$11,810,000
Yard Piping	18.0%	$11,810,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Tank

Item		Total Installed Cost
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$101,421,000
Contractor Overhead	10.0%	$10,145,000
Subtotal		$212,987,000
Contractor Profit	5.0%	$5,580,000
Subtotal		$218,567,000
Contractor Mob/Bonds/Insurance	5.0%	$5,859,000
Subtotal		$224,426,000
Contingency	25.0%	$30,757,000
Subtotal		$255,183,000
Escalation	17.9%	$27,528,000
Total Construction, Indirects, and Escalation		$181,290,000
Engineering	15.0%	$27,197,000
Services During Construction	4.0%	$7,253,000
Commissioning and Startup	4.0%	$7,253,000
Total Capital Cost		**$222,993,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Tank

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$107,648
FGD Clarifier		$389,390
FGD Sludge Pump		$221,906
FGD FBR		$17,291,354
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,763,813
FGD Sand Filtration		$1,501,281
FGD Waste Solids Sump		$85,929
FGD Equalization Tank (Concrete)		$1,533,598
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$319,374
FGD pH Adjustment Tank (Steel)		$312,491
FGD Biological Influent Pump		$31,950
FGD Phosphoric Acid Chemical Feed System		$31,189
FGD MicroC 4100 Chemical Feed System		$59,215
FGD Ammonium Chloride Chemical Feed System		$33,534
FGD Aerobic MBBR		$1,316,732
FGD Effluent Pump		$28,635
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$65,316
Ash Equalization Tank (Concrete)		$659,696
Ash Influent Pump		$28,635
Ash Mix Tank (Steel)		$202,834
Ash Clarifier		$324,601
Ash Sludge Pump		$61,552
Ash Effluent Pump		$25,490
Other Wastewater Treatment		
Other Feed Pump		$28,635
Other Blower		$28,635
Other Effluent Pump		$28,635
Other Equalization Tank (Concrete)		$540,905
Other Influent Pump		$31,782
Other Clarifier		$455,252
Other Sludge Pump		$61,552
Other Effluent Storage Tank (Steel)		$307,271
Other Mixed Tank Reactor (Steel)		$314,076
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$104,772
Common Acid Chemical Feed System		$254,672
Common Organosulfide Chemical Feed System		$49,628
Common Ferric Chloride Chemical Feed System		$159,020
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$10,677,111
Total Equipment Cost (TEC)		$41,639,000
Sales Tax	1.0%	$1,053,000
Purchased Equipment Costs - Delivered (PEC_D)		$42,692,000
Civil Sitework		$10,089,000
Instrumentation and Controls		$3,160,000
Mechanical		$4,107,000
Electrical		$2,356,000
Finishes		$1,108,000
Building		$2,250,000
Other		$4,208,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Tank

Item		Total Installed Cost
Total Direct Costs (TDC)		$69,970,000
Overall Sitework	10.0%	$6,894,000
Yard Electrical	18.0%	$12,409,000
Yard Piping	18.0%	$12,409,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$106,332,000
Contractor Overhead	10.0%	$10,636,000
Subtotal		$223,300,000
Contractor Profit	5.0%	$5,850,000
Subtotal		$229,150,000
Contractor Mob/Bonds/Insurance	5.0%	$6,142,000
Subtotal		$235,292,000
Contingency	25.0%	$32,246,000
Subtotal		$267,538,000
Escalation	17.9%	$28,860,000
Total Construction, Indirects, and Escalation		$190,066,000
Engineering	15.0%	$28,514,000
Services During Construction	4.0%	$7,604,000
Commissioning and Startup	4.0%	$7,604,000
Total Capital Cost		**$233,788,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$107,647
FGD Clarifier		$389,390
FGD Sludge Pump		$221,905
FGD FBR		$17,291,354
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,763,813
FGD Sand Filtration		$1,501,281
FGD Waste Solids Sump		$85,929
FGD Equalization Tank (Concrete)		$1,533,598
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$319,375
FGD pH Adjustment Tank (Steel)		$312,491
FGD Biological Influent Pump		$31,950
FGD Phosphoric Acid Chemical Feed System		$31,188
FGD MicroC 4100 Chemical Feed System		$59,215
FGD Ammonium Chloride Chemical Feed System		$33,533
FGD Aerobic MBBR		$1,316,732
FGD Effluent Pump		$28,635
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,722
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Low Pressure Transfer Pump		$23,602
Ash High Pressure Transfer Pump		$25,490
Ash Effluent Mix Tank (Steel)		$251,427
Other Wastewater Treatment		
Other Feed Pump		$28,635
Other Blower		$28,635
Other Effluent Pump		$28,635
Other Mixed Tank Reactor (Steel)		$222,325
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$104,772
Common Acid Chemical Feed System		$254,672
Common Organosulfide Chemical Feed System		$49,628
Common Ferric Chloride Chemical Feed System		$149,593
Common Polymer Chemical Feed System		$79,662
Common Sludge Filter Press		$10,677,111
Total Equipment Cost (TEC)		$39,074,000
Sales Tax	1.0%	$955,000
Purchased Equipment Costs - Delivered (PEC_D)		$40,029,000
Civil Sitework		$7,486,000
Instrumentation and Controls		$2,858,000
Mechanical		$3,557,000
Electrical		$1,924,000
Finishes		$934,000
Building		$2,250,000
Other		$4,150,000
Total Direct Costs (TDC)		$63,188,000
Overall Sitework	10.0%	$6,226,000
Yard Electrical	18.0%	$11,206,000
Yard Piping	18.0%	$11,206,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$96,476,000
Contractor Overhead	10.0%	$9,650,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Recycle OTHER - Pond

Item		Total Installed Cost
Subtotal		$202,602,000
Contractor Profit	5.0%	$5,308,000
Subtotal		$207,910,000
Contractor Mob/Bonds/Insurance	5.0%	$5,573,000
Subtotal		$213,483,000
Contingency	25.0%	$29,257,000
Subtotal		$242,740,000
Escalation	17.9%	$26,185,000
Total Construction, Indirects, and Escalation		$172,449,000
Engineering	15.0%	$25,871,000
Services During Construction	4.0%	$6,899,000
Commissioning and Startup	4.0%	$6,899,000
Total Capital Cost		**$212,118,000**

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Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Pond

Item		Total Installed Cost
FGD Wastewater Treatment		
FGD Treatment Feed Pump		$107,648
FGD Clarifier		$389,390
FGD Sludge Pump		$221,905
FGD FBR		$17,291,354
FGD Methanol Chemical Feed System		$45,364
FGD Ballasted Sand Clarifier		$1,763,813
FGD Sand Filtration		$1,501,281
FGD Waste Solids Sump		$85,929
FGD Equalization Tank (Concrete)		$1,533,599
FGD Influent Heat Exchanger		$210,000
FGD Mixed Tank Reactor (Steel)		$319,374
FGD pH Adjustment Tank (Steel)		$312,491
FGD Biological Influent Pump		$31,950
FGD Phosphoric Acid Chemical Feed System		$31,189
FGD MicroC 4100 Chemical Feed System		$59,215
FGD Ammonium Chloride Chemical Feed System		$33,533
FGD Aerobic MBBR		$1,316,732
FGD Effluent Pump		$28,636
FGD Gravity Thickener		$716,810
FGD Filtrate Sump		$21,387
FGD Waste Solids Pump		$48,721
Ash Transport Water Treatment		
Ash Collection Pump (Sump)		$21,387
Ash Transfer Pump		$65,316
Ash Equalization Tank (Concrete)		$659,696
Ash Influent Pump		$28,636
Ash Mix Tank (Steel)		$202,834
Ash Clarifier		$324,601
Ash Sludge Pump		$61,552
Ash Effluent Pump		$25,490
Other Wastewater Treatment		
Other Feed Pump		$28,636
Other Blower		$28,636
Other Effluent Pump		$28,636
Other Mixed Tank Reactor (Steel)		$222,325
Common Equipment		
Common Solid Storage Tank (Steel)		$1,057,831
Common Caustic Chemical Feed System		$104,772
Common Acid Chemical Feed System		$254,672
Common Organosulfide Chemical Feed System		$49,628
Common Ferric Chloride Chemical Feed System		$159,020
Common Polymer Chemical Feed System		$79,663
Common Sludge Filter Press		$10,677,111
Total Equipment Cost (TEC)		$40,151,000
Sales Tax	1.0%	$1,004,000
Purchased Equipment Costs - Delivered (PEC_D)		$41,155,000
Civil Sitework		$8,928,000
Instrumentation and Controls		$3,060,000
Mechanical		$3,898,000
Electrical		$2,097,000
Finishes		$1,004,000
Building		$2,250,000
Other		$4,177,000
Total Direct Costs (TDC)		$66,569,000
Overall Sitework	10.0%	$6,559,000
Yard Electrical	18.0%	$11,806,000
Yard Piping	18.0%	$11,806,000
Electrical Feed (New or Retrofit)	Allowance	$3,500,000

Class V Estimated Capital Cost

Louisville Gas & Electric
Trimble County Generating Station
OPTION: FGD - FBR + Phys/Chem ASH - Discharge OTHER - Pond

Item		Total Installed Cost
Pipe Racks	Allowance	$750,000
Special Coatings	Allowance	$400,000
TDC + Additional Project Costs		$101,390,000
Contractor Overhead	10.0%	$10,141,000
Subtotal		$212,921,000
Contractor Profit	5.0%	$5,578,000
Subtotal		$218,499,000
Contractor Mob/Bonds/Insurance	5.0%	$5,857,000
Subtotal		$224,356,000
Contingency	25.0%	$30,747,000
Subtotal		$255,103,000
Escalation	17.9%	$27,519,000
Total Construction, Indirects, and Escalation		$181,232,000
Engineering	15.0%	$27,188,000
Services During Construction	4.0%	$7,251,000
Commissioning and Startup	4.0%	$7,251,000
Total Capital Cost		**$222,922,000**

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LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.10

Witness: John N. Voyles, Jr.

Q-2.10. Please refer to Attachment 1-15(1), which the Companies provided in response to Sierra Club DR 1-15.

a. Please produce all documents and analyses used by the Companies to determine the technologies they expect to use to comply with the CCR rule at each of their units and/or plants.

b. Please produce all documents and analyses used by the Companies to determine the technologies they expect to use to comply with the ELG rule at each of their units and/or plants.

c. Please produce all documents and analyses used by the Companies to determine the technologies they expect to use to comply with the 316(b) rule at each of their units and/or plants.

A-2.10

a. See response to Question No. 2.8(c).

b. See response to Question No. 2.8(d).

c. See response to Question No. 2.8(e).

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.11

Witness: John N. Voyles, Jr.

Q-2.11. Please refer to Attachment 1-15(1), which the Companies provided in response to Sierra Club DR 1-15.

a. Please confirm that, at all of their plants, the Companies intend to spend $2.5 million and $3.6 million on capital costs to comply with the ELG and CCR rules, respectively, in 2015.

b. Please provide a break-down, by item, of the $2.5 million and $3.6 million in capital spending.

c. Have the Companies secured Commission approval for the $2.5 million in capital spending for the ELG rule and/or the $3.6 million in capital spending for the CCR rule in 2015?

A-2.11.

a. Yes, the Companies intend to spend $2.5 million and $3.6 million respectively for the ELG and CCR rules in 2014. These capital costs estimates are to continue to assess potential compliance costs and initial engineering activities for these EPA rules.

b. There is no breakdown of these capital cost items. The budgeted amounts are included in the spending plans solely for engineering activities.

c. No. The Companies are not required to seek CPCN's related to these costs.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.12

Witness: John N. Voyles, Jr.

Q-2.12. Please confirm that the fixed O&M costs in Attachment 1-15(2) and capital costs calculated in Attachment 1-15(1) were calculated based on the same assumptions regarding the contents of the final rules and the technologies installed to satisfy the final rules. If that is not correct, please refer to Attachment 1-15(2), which the Companies provided in response to Sierra Club's discovery request 1-15.

a. For the purposes of calculating the fixed O&M costs in the attachment, what option is EPA assumed to select in the final CCR Rule?

b. For the purposes of calculating the fixed O&M costs in the attachment, what option is EPA assumed to select in the final ELG Rule?

c. For the purposes of calculating the fixed O&M costs in the attachment, what technologies and equipment are assumed to be installed to comply with the CCR rule?

d. For the purposes of calculating the fixed O&M costs in the attachment, what technologies and Equipment are assumed to be installed to comply with the ELG rule?

e. For the purposes of calculating the fixed O&M costs in the attachment, what technologies and equipment are assumed to be installed to comply with the 316(b) rule?

A-2.12 The fixed O&M costs in Attachment to Response to Sierra Club Question No. 1-15(2) and the capital costs calculated in Attachment to Response to Sierra Club Question No. 1-15(1) were based on the same assumptions and technologies as noted below.

a. The option used for the CCR capital costs is identified in the response to Question No. 2.8(a). See the response in item (c) below for fixed O&M costs.

b. The option used for the ELG capital costs is identified response to Question No. 2.8(b). See the response in item (d) below for fixed O&M costs.

c. There are no technologies or equipment included in the capital costs for the CCR rule as noted in the response to Question No. 2.8(c). The fixed O&M costs included in Attachment to Response to Sierra Club Question No. 1.15(2) are primarily associated with landfill operation systems for the special waste landfill. The fixed O&M costs shown are not associated with the capital costs provided in Attachment to Response to Sierra Club Question No. 1.15(1) as there is no technology or equipment associated with closing and capping the impoundments.

d. There were no fixed O&M costs included in Attachment to Response to Sierra Club Question No. 1.15(2) for the ELG rule.

e. There were no fixed O&M costs included in Attachment to Response to Sierra Club Question No. 1.15(2) for the 316(b) rule. As noted in the response to Question No. 2.8(e) above, until the required studies are completed, the Companies do not know what, if any, technologies would be required for Mill Creek Unit 1.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.13

Witness: Charles R. Schram

Q-2.13. Please refer to the Companies' response to Sierra Club DR 1-25, which indicates that from 2005-2013, actual total electric sales (weather normalized or not) were lower than budgeted sales in 7 of 9 years, and actual sales were on average 1.4% lower than budgeted sales and actual weather-normalized sales were on average 2.1% lower than budgeted sales.*

a. Have the Companies conducted any analysis of whether any aspect(s) of their load forecasting methodology are causing the Companies to consistently overestimate total electric sales?
   i. If yes, please explain, and provide all such analyses.
   ii. If not, why not?

b. Have the Companies taken any steps to adjust their load forecasting methodology to correct for the fact that in 7 of the last 9 years, actual electric sales have been below budgeted sales?
   i. If yes, please explain the steps taken.
   ii. If not, why not?

* Please note that this is not the mean absolute error. Also, the average excludes the 2006 weather-normalized deviation, as this number was not provided in the responses to 1-25.

A-2.13.

a. No, the Companies have not conducted a formal analysis to evaluate the accuracy of electric sales forecasts during the specific 2005-2013 period.

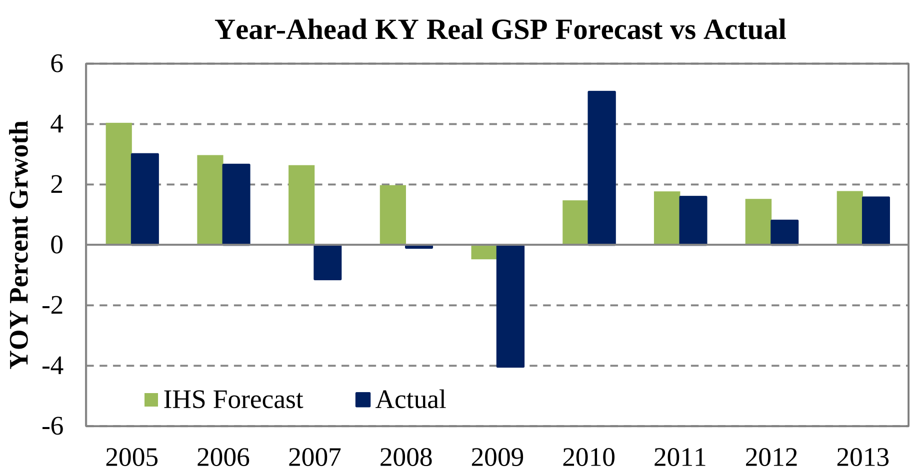
   i. Not applicable.

   ii. The load forecast is effectively reviewed monthly during the comparison of forecasted to actual results and also reevaluated and updated annually with the latest inputs including recent sales results and economic variables from IHS Global Insight.

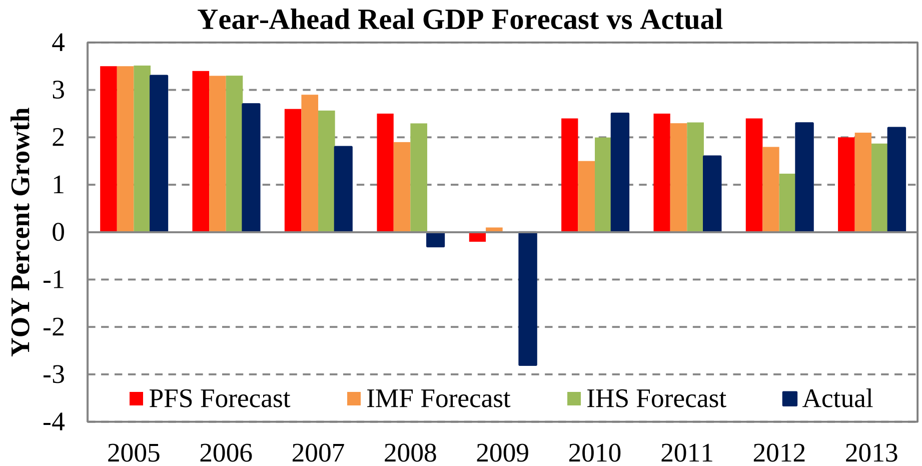
b. No, the Companies have not adjusted their load forecasting methodology.

i. Not applicable.

ii. A fundamental part of the Companies' electric load forecast methodology relies on quality forecasts of economic inputs to develop econometric models. The Companies' approach to electric load forecasting includes the use of these forecasts of future macroeconomic events, including economic inputs provided by IHS Global Insight. The Companies have observed that most economic forecasts, including those from IHS Global Insight, have been consistently higher than actual economic growth during most of the 2005-2013 period. For example, Real Gross State Product ("RGSP") for Kentucky is a broad measure that is representative of economic data used to develop the Companies' electric load forecasts. The following chart shows the annual RGSP forecasts from IHS Global Insight compared to actuals since 2005. With the exception of 2010, actual RGSP results have been lower than the IHS forecasts.



Furthermore, government forecasts for Real Gross Domestic Product ("RGDP"), a broad national measure of economic activity, followed a similar pattern of consistently overestimating forecasted growth. The following chart shows the International Monetary Fund ("IMF"), Philadelphia Fed Survey ("PFS"), and IHS Global Insight forecasts of RGDP compared to actuals. Overall, IHS has been less optimistic than the IMF and the PFS. In fact, the IHS RGDP forecasts for 2012-2013 have been somewhat below actual RGDP growth.



In summary, sluggish economic growth compared to expectations has been a principal driver of the Companies' lower sales results compared to forecasts. However, since the Companies are not experts in macroeconomic forecasting, their forecast methodology has not been modified by developing their own independent economic forecasts or adjusting the IHS economic forecasts to speculate on economic activity.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.14

Witness: Charles R. Schram

Q-2.14. Please refer to the Companies' response to Sierra Club DR 1-26, which states that if a unit had a capacity factor less than 10% for three consecutive years, the unit was assumed to retire in the first of the consecutive years in which its capacity factor was less than 10%.

a. Please confirm that in several scenarios with no carbon price or carbon emissions cap, Brown unit 1 has a capacity factor less than 10% for three consecutive years.
   i. In particular, please confirm that in the Appendix to Sections 8 & 9, Scenario Data, on page 5, that Table 8.(3)(b)12(a)-1 shows that Brown unit 1 has capacity factors less than 10% in the MG, BL, 0C scenario for the years 2018-2022.
   ii. Please confirm that in the Appendix to Sections 8 & 9, Scenario Data, on page 12, that Table 8.(3)(b)12(a)-1 shows that Brown unit 1 has capacity factors less than 10% in the LG, BL, 0C scenario for the years 2014-2028.

b. Please explain why the Companies did not assume that Brown unit 1 retires in the zero carbon scenarios referenced above, given the Companies' assumption that a unit is retired if it has three or more consecutive years in which its capacity factor is less than 10%.
   i. In particular, please explain why Table 6 on page 7 of the original Resource Assessment does not show Brown unit 1 retiring in the MG-BL-0C and LG-BL-0C scenarios, given that Brown unit 1 has three or more consecutive years of capacity factors below 10% in each of these scenarios.
   ii. In particular, please explain why Table 7 on page 11 of the Resource Assessment Addendum does not show Brown unit 1 retiring in the MG-BL-0C, MG-LL-0C, LG-BL-0C, and LG-LL-0C scenarios, given that Brown unit 1 has three or more consecutive years of capacity factors below 10% in each of these scenarios.

c. Please confirm that in several scenarios with no carbon price or carbon emissions cap, Brown unit 2 has a capacity factor less than 10% for three consecutive years.

i. In particular, please confirm that in the Appendix to Sections 8 & 9, Scenario Data, on page 12, that Table 8.(3)(b)12(a)-1 shows that Brown unit 2 has capacity factors less than 10% in the LG, BL, 0C scenario for the years 2014-2028.

d. Please explain why the Companies did not assume that Brown unit 2 retires in those zero carbon scenarios, given the Companies′ assumption that a unit is retired if it has three or more consecutive years in which its capacity factor is less than 10%.

   i. In particular, please explain why Table 6 on page 7 of the original Resource Assessment does not show Brown unit 2 retiring in the LG-BL-0C scenario, given that Brown unit 2 has three or more consecutive years of capacity factors below 10% in this scenario.

   ii. In particular, please explain why Table 7 on page 11 of the Resource Assessment Addendum does not show Brown unit 2 retiring in the MG-LL-0C, LG-BL-0C, and LG-LL-0C scenarios, given that Brown unit 2 has three or more consecutive years of capacity factors below 10% in each of these scenarios.

A-2.14.

a. Confirmed.

   i. Confirmed.

   ii. Confirmed.

b. The Companies' methodology for evaluating the retirement of existing units is discussed in Section 4.2.1 of the 2014 Resource Assessment at page 39. The IRP process does not include an explicit retirement analysis where existing units are iteratively removed from the Companies' generation portfolio to compare the costs of continued operation to the costs of capacity replacement across resource plans. However, in evaluating the Companies' 2014 IRP scenarios, capacity factors for existing coal units were averaged over the three gas price scenarios in each load-CO_2 price scenario. If an existing coal unit's (average) capacity factor was consistently less than 10 percent in a given load-CO_2 price scenario, the unit was assumed to be retired (in all three gas price scenarios) in the year when its capacity factor consistently dropped below 10 percent. For a given load-CO_2 price scenario, if the average capacity factor was not consistently less than 10 percent, the unit was not assumed to be retired in any of the associated gas prices scenarios. This explains why E.W. Brown Unit 1 was not retired in the scenarios referenced.

   The Companies believe that it is important to consider a range of gas prices, since, historically, gas prices have been volatile compared to coal prices. As a result, the IRP analysis assumed that the Companies would not make a decision to retire a coal unit based on a single gas price forecast. This approach is consistent with the Companies' practice of evaluating potential new units using multiple fuel price scenarios to ensure resource decisions are robust under a range of fuel prices.

c. Confirmed.

   i. Confirmed.

d. The response to part b. above also applies to E. W. Brown Unit 2.

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.15

Witness: Charles R. Schram

Q-2.15. Please refer to the attachment provided in response to Sierra Club DR 1-27(d), entitled "Brown 1-2 Baghouse Retrofit Analysis." Have the Companies prepared or caused to be prepared a comparable analysis comparing the economics of using chemical additives at Brown 1-2 to comply with the MATS rule versus retiring the 2 units?

a. If so, please produce such analyses.

b. If not, why not?

A-2.15 The Companies did not perform a comparable analysis.

a. Not applicable.

b. The use of chemical additives increases variable O&M by $1-2/MWh and requires minimal capital investment of $2.4 million. No further analysis was conducted because the investment of $2.4 million is significantly less than the previously estimated baghouse capital cost of $194 million and the replacement capacity cost of $203 million (assuming $747/kW for a 2x1 combined cycle unit and 272 MW for E.W. Brown Units 1-2).

LOUISVILLE GAS AND ELECTRIC COMPANY
KENTUCKY UTILITIES COMPANY

Response to Wallace McMullen and Sierra Club's
Supplemental Data Requests
Dated December 9, 2014

Case No. 2014-00131

Question No. 2.16

Witness: John N. Voyles. Jr.

Q-2.16. Please refer to the attachment provided in response to Sierra Club DR 1-27(d), which states on page 4 that, "However, a decision to retire Brown 1-2 has not been reached, as the Companies are currently testing chemical additives for Brown 1-2 that may enable the units to comply with EPA regulations at a much lower capital cost."

a. Please provide all documents containing or summarizing the results of the testing of chemical additives at Brown 1-2 referenced in the above statement.

b. Please identify any estimated or projected capital, fixed O&M, and variable O&M costs of using chemical additives at Brown 1-2 to comply with the MATS rule, and provide all analyses, studies, or other documentation of such cost projections.

c. Please identify the specific chemical additives, and the equipment, the Companies intend to use at Brown 1-2 to comply with the MATS rule.

d. State whether the Companies currently sell to third parties or beneficially reuse any of the coal ash from Brown units 1 and/or 2.
   a. If so:
      i. Identify the annual revenue from such sales or beneficial reuse in each of the years 2011 to the present.
      ii. Identify the projected annual revenue from such sales or beneficial reuse in each of the years of the IRP analysis.
      iii. State whether the Companies anticipate that the chemical additives used to comply with the MATS rule will negatively affect the ability to sell and/or beneficially reuse the coal ash?
         1. If so, provide all analyses the Companies have conducted on this issue.
         2. If not, explain why not.

A-2.16.

a. Please see attached documents. Only the relevant portions of the documents are provided, and any unresponsive portions of the provided document pages have been redacted. Certain information requested is confidential and proprietary, and is being provided under seal pursuant to a Joint Petition for Confidential Protection.

b. Capital cost to install a chemical injection system on E.W. Brown Units 1 and 2 is approximately $2.4M. O&M costs to maintain and operate the system are attached. Only the relevant portions of the documents are provided, and any unresponsive portions of the provided document pages have been redacted. Certain information requested is confidential and proprietary, and is being provided under seal pursuant to a Joint Petition for Confidential Protection.

c. The chemical additive system equipment consists of tanks, pumps and piping systems typical for chemical injection systems. Multiple chemical additive suppliers exist in the market. Additives from Nalco Company have been tested and found to be successful for compliance with the MATS rule on E.W. Brown Units 1 and 2. The Companies have not finalized a decision on which additive will be used to comply with the MATS rule. As with all EPA regulatory requirements, the Companies continually seek to find the lowest reasonable cost method for compliance.

d. The Companies do not currently sell to third parties or beneficially reuse any of the coal ash from E.W. Brown Units 1 and 2.

PPL company

Generation Services

DRAFT
Results of Mercury Control Technologies Testing

March, 2013

Primary Contact: Kyle Burns

Testing and Analysis Team:
Kyle Burns, Sam Carr, Ryan Duffy, Philip Imber, Ryan Feider, Glenn Gibian, Sarah Greenwell, Jen Laino, David Link, John Moffett, Pam Orlando, Carla Piening, Erin Rosenbaum, Eric Slack, Dave Smith, Haley Turner, Jason Wilkerson, Marr Woodson, and Angela Zevely.

PPL company

Generation Services

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PPL company
Generation Services

Executive Summary

[redacted] Of the mercury control technologies proposed [redacted] as "highly probable", only Coal additives to increase mercury oxidation[1] and Scrubber additives to reduce re-emissions[2] had not been previously evaluated by LKE and required short-term testing for enhanced mercury capture with existing air quality control (AQC) equipment.

Oxidizing elemental mercury into a more water soluble form is required for capture with wet-Flue Gas Desulfurization (WFGD) equipment. Baseline speciation[3] and past testing data indicate units without Selective Catalytic Reduction (SCR) have lower levels of oxidation and could benefit from mercury oxidizing Coal additives. Non-SCR units with Coal additives and units with an SCR, operational scenarios which have higher mercury oxidation, could potentially benefit from a WFGD additive to limit re-emission of already oxidized mercury to elemental while within the WFGD.

Coal additives

Steag (Alstom KNX) and Nalco (MerControl 7895) were tested separately in June and November 2012 respectively at the Brown Station. Brown Units 1 and 2 do not have SCRs and the Brown 3 SCR was not yet in service during initial testing, however, it was in service for subsequent long term testing in 2013. The goal of the coal additive testing at Brown was to demonstrate the maximum achievable level of mercury oxidation entering the WFGD on Units 1 and 2. Follow-up long term testing in 2013 is designed to optimize efficacy of mercury oxidation on Brown Units 1 and 2 to levels comparable to units with SCR's to allow for greater Mercury capture. The initial tests showed an increase in mercury oxidation with high additive flow rates that varied with unit load. The subsequent long term testing has resulted in similarly higher oxidation rates with lower feed rates. The potentially corrosive impacts to unit components of both additives could lead to significant replacement costs and is a concern on the life of installed technologies and infrastructures at the generating facilities. Additional testing to quantify corrosion issues, if any exist, is ongoing.

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[1] Oxidation – During combustion Hg is emitted as both oxidized and elemental. Oxidized Hg is soluble in water and therefore can be effectively removed from the flue gas by the presence of a WFGD. Elemental Hg cannot effectively be captured in the WFGD and is emitted through the stack.

[2] Re-emission – Sometimes oxidized Hg enters the WFGD and is reduced to elemental mercury which is not soluble, resulting in lower mercury capture efficiency and increased stack emissions. This phenomenon, known as Hg Re-emission, is defined as an increase in elemental mercury across the WFGD.

[3] Speciation – Because elemental and oxidized Hg react differently to various control technologies, the total Hg analysis alone cannot provide an adequate prediction of Hg capture. Mapping both elemental and oxidized Hg values pre-WFGD with stack emissions provides a complete picture of Hg behavior.

WFGD additives
Two supplier additives, Steag and Nalco, were tested at several units per Table 1-1 below:

WFGD Additive	BR 1	BR 2	[redacted]
Steag PAC	X	X	
Nalco 8034	X	X	

Table 1-1

Dates for testing are listed in Table 1-2 below:

Unit	Dates
[redacted]	
Brown U1 and U2	Nov. 9 to Nov. 20, 2012 Jan. 21 to Sept. 30, 2013*

* Extension to original test plan

Table 1-2

The Steag powdered activated carbon (PAC) WFGD additive test at Brown was considered inconclusive due to variations in test measurements. Based on test results the Steag additive was removed from further consideration as a viable mercury control technology.

The Nalco additive evaluation was conducted through both short and long term tests. The short term tests provided an indication of feasibility to control mercury emissions using Nalco WFGD 8034 additive at Brown units, [redacted] all demonstrated reduction in the re-emission of oxidized mercury across the wet WFGD. While the stack emissions were reduced below the proposed Mercury and Air Toxics Standard (MATS) limit a majority of the time, a number of operational impacts were noted along with uncontrolled spikes in mercury emissions.

Longer term 60 day testing is being conducted in an attempt to quantify how the following factors may impact efficacy of WFGD additives to control mercury emissions below the proposed MATS limit:.

- Load variability
- Ammonia and hydrated lime injection rates

- Bromine, chlorine and mercury levels in fuel
- WFGD oxidation reduction potential (ORP[4])
- WFGD pH

WFGD additives have the potential to concentrate Mercury in the wastewater stream and/or solids and could require design modifications of the plant water treatment facilities or permit changes. It is likely that current effluent limitation guidelines (ELGs) regulations will be modified and become more stringent. B&V has been engaged to assist in evaluating the migration of mercury to wastewater and/or solids.

Findings
Baseline mercury speciation testing was completed for Brown 1 and [redacted]. Additionally baseline data has been collected during the first one to two days of each FGD additive test.

The baseline testing revealed the following information:

- Attributed to increased coal burn, temperature, and flow; As load increases, total mercury increases.
- Due to the lack of oxidizing catalyst Non-SCR units have a lower mercury oxidation rate than SCR units

Including observed short disruptions to control, collectively, additive testing results to-date are promising and indicate the potential to maintain mercury compliance over a 30 day average using a combination of coal, where applicable, and WFGD additives. Data collection during the upcoming summer run will be a key factor in any final decision.

1.0 Introduction

[redacted] The purpose of this report is to provide results and analysis of the mercury control technologies tested and studied to meet the Mercury and Air Toxics Standard (MATS) requirements at KU's E.W. Brown [redacted] Stations. Specifically this report describes the results of mercury control trials using Nalco, Alstom and Steag Coal and WFGD additive products at E.W. Brown 1, 2 and 3, [redacted]. Nalco 8034 was also tested by [redacted] but those tests are outside the scope of this report.

[4] Oxidation reduction potential (ORP) represents the potential for a slurry to oxidize different chemical species such as dissolved metals. ORP is also an indicator of what state other chemical species are in which can change the effectiveness of the additive and can indicate the potential for re-emission of the dissolved metals.

2.0 Background

The United States Environmental Protection Agency (EPA) proposed the Electric Generation Units (EGU) Maximum Available Control Technology (MACT) rule on March 16, 2011. The rule established emissions limits and standards for hazardous air pollutants (HAP) from coal fired, oil fired, petroleum coke, and integrated gasification combined cycle boilers. Proposed regulations include mercury, particulate matter (PM) and/or metallic HAPs, total non-Mercury metals, hydrogen chloride (HCl), sulfur dioxide (SO_2), and dioxins/furans/organic HAPs. The EPA released the final EGU MACT Rule on December 21, 2011, renaming the rule Mercury and Air Toxics Standard, with a formal publication in the Federal Register date of February 16, 2012. The proposed and final compliance date for MATS is April 15, 2015. LKE Environmental Affairs group prepared a summary of the proposed versus the final MATS Rule in Table 2-1:

Table 2-1

		Particulate Limits		Acid Gas Limits		
	Mercury	**PM**	**Total Non-Mercury Metals**	**HCl**	**SO_2**	**Dioxins/Furans/Organic HAPs**
Proposed	1.2 lb/TBtu	Total (filterable + condensable) 0.030 lb/mmBtu	0.000040 lb/mmBtu	0.0020 lb/mm Btu	0.20 lb/mmBtu	Work Standards: Conduct an annual performance test + NOx and CO tune-ups
Final	1.2 lb/TBtu	Filterable Only 0.030 lb/mmBtu	0.000050 lb/mmBtu	0.0020 lb/mm Btu	0.20 lb/mmBtu	Work Standards: Conduct burner and combustion control at least each 36 months or 48 months if neural networks are used.

Some changes between the proposed MACT and the final MATS Rules include: elimination of condensable particulate matter from the PM limit, and work-practice standards for startup and shutdown periods which impact operational strategies of control devices.

[redacted]

Significant controls were recommended by B&V that include new WFGD systems at Mill Creek for SO_2 compliance and pulse jet fabric filters (PJFF) with PAC injection and dry sorbent injection (DSI) for PM and mercury compliance at Trimble County 1 and all units at E.W.

Brown, Ghent, and Mill Creek stations. The construction of this control equipment requires numerous years of planning, design, engineering and construction. Due to the short time period to comply with the proposed EGU MACT Rule, LKE petitioned the Kentucky Public Service Commission (KPSC) to determine if building control equipment for compliance with this Rule would qualify for Environmental Cost Recovery (ECR). LKE received KPSC ECR approval to purchase and install equipment for E.W. Brown 3, Ghent 1, 2, 3, 4, Mill Creek 1, 2, 3, 4 and Trimble County 1 during December 2011.

LKE Project Engineering has contracted for all ECR approved control equipment needed to comply with MATS for the units approved by the KPSC.

[redacted]

LKE is in the process of measuring total baseline mercury emissions and speciated mercury emissions at each stack and at the WFGD inlet to determine if re-emission occurs across the WFGD. This information serves as an indicator of the potential impact of WFGD additives on total mercury emissions. The oxidation of mercury at the WFGD inlet is indicative of the need for boiler or flue gas oxidation additives, primarily at non-SCR units. The potential impact of high mercury oxidizing catalyst in SCRs was evaluated based on the current SCR oxidation measured in the baseline testing.

2.1 Current Emissions

Listed below, are the 12 plant readings included in the [redacted], mercury and particulate emissions from selected units in the LKE fleet and the corresponding emission requirements. The source of this baseline mercury data varies by plant. Mercury emissions at the [redacted] and E.W. Brown Unit 2 were measured by an outside contractor using continuous mercury emissions measurement (CMM) equipment with periodic speciation analysis and support from Environmental Affairs. Environmental Affairs supported this effort with sorbent trap continuous emissions monitoring systems (CEMS) analysis for confirmation of data accuracy. Baseline mercury emissions listed for the remaining units is historic stack measurements from plant installed sorbent trap CEMS.

[redacted]

Emissions data is included in the Table 2-2 below. See Appendix C for baseline testing data and further detail.

TABLE 2-2

POLLUTANT	MATS LIMIT	EW BROWN			[redacted]
	Unit	1	2	3	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]		[redacted]	[redacted]	[redacted]	
Mercury, lb/Tbtu YTD (From Mercury CEMS) Sorbent Traps 10/2012	1.2	2.09*	2.09*	2.09*	
Most recent Mercury test data avg 10/2012	1.2	0.93	1.68	--	

*Combined Stack Results

--No Baseline Testing to date

3.0 Co-Benefits from Existing Equipment

While not a specific control technology, the mercury removal efficiency gained as a co-benefit of existing or newly installed SCRs, Dry- ESPs and WFGDs can provide a significant amount of mercury control during short -term testing. Long-term testing is needed to determine whether or not re-emissions occur over extended periods of time and over varying load conditions. Mercury removal rates through co-benefits primarily depend on mercury speciation: particulate, elemental or oxidized. Elemental mercury does not have a co-benefits capture mechanism. Particulate bound mercury can be captured in existing particulate matter control equipment. Oxidized mercury can be captured in wet WFGD equipment because oxidized mercury is soluble in water. Unfortunately, the complex chemistry in wet WFGD systems has the potential to convert oxidized mercury to elemental mercury leading to a "re-emission" of mercury to the flue gas and out the stack with no means of capture prior to being emitted to the environment.

3.1 Oxidized Mercury Requirements

As discussed above, co-benefit technologies are effective mainly with removal of oxidized mercury. [redacted] the following calculations performed to identify the mercury oxidation required to meet the proposed MATS rule through co-benefit technologies (Table 3-1). This calculation applies to all the units since the coal specification in the design basis is assumed the same for all LKE units. In reality the mercury in coal varies and the calculation is not a precise reflection of all coals or required oxidation rates nor does it account for unit efficiency variations. Although LKE test results did not show coal mercury content as high as 13.4 lb/Tbtu, the possibility exists that coal mercury content could increase.

TABLE 3-1

PARAMETER	CALCULATION
Mercury In the Fuel	0.15 ppm
Heating Value of the Fuel	11,200 Btu/lb
Mercury in the Fuel	13.4 lb/Tbtu
Mercury Emissions at the Stack	1.2 lb/Tbtu
Mercury Removal Required	91.0%
Oxidized Mercury Required	96%

3.2 Optimizing Co-Benefits Potential

Mercury is converted into an elemental gas at the high temperatures in the combustion process. As the flue gas temperature decreases the gaseous mercury can become particle bound to fly ash, it can react with halogens to become oxidized, or it can maintain its elemental state. As noted above, minimizing elemental mercury is imperative for successful co-benefit reduction.

Tbe mechanism for particulate binding is not well known, as such there is no technology driver for increasing particulate bound mercury.

Mercury can be oxidized by halogens such as chlorides and bromides. Eastern United States (US) bituminous coal used by LKE inherently contains mercury oxidizing halogens. Mercury oxidation via halogens can be catalytically enhanced and is impacted by temperature.

The LKE fleet has several units with Selective Catalytic Reactor (SCR) equipment that contain catalyst with the potential to oxidize mercury. Catalyst designed with high mercury oxidizing properties has recently entered the market and LKE has purchased a layer of this material to be installed in the Ghent 4 SCR as a demonstration test during the 2013 Fall outage.

3.3 Coal additives

Halogen products, such as calcium bromide, added to the fuel via coal feeders help oxidize mercury during combustion so that it can be captured in the WFGDW. These products are primarily marketed for units that do not utilize SCR equipment and EGU operating on low halogen fuels.

Nalco, Steag, B&W, Alstom and others market halogen chemical compounds that are combined in small amounts with the coal prior to combustion. This approach provides uniform distribution of the additive during the combustion process and should result in thorough oxidation of the mercury contained in the coal. Shaw Environmental' s process of injecting bromic acid in ductwork post boiler was also investigated, but eliminated from further consideration due to the difficulty in handling compared to coal additives and similar effectiveness on high halogen fuels.

The effectiveness of using boiler chemical additives for mercury oxidation has a strong theoretical basis and has been demonstrated to increase the oxidized to elemental mercury ratio in several full-scale pilot tests. Most successful tests have been on fuels with low halogen content (e.g. US western power river basin (PRB coal));) tests on fuels with higher halogen content (typical LKE fuels) have shown reduced benefit. Long term testing at Brown with calcium bromide has shown an increase in oxidation with an optimized feed rate. This approach also has some known and suspected long-term corrosive effects to the boiler, ductwork, and air heater, which are currently being evaluated as part of the LKE long term testing.

3.4 WFGD additives

WFGD additives are intended to promote mercury removal by utilizing co-benefits of existing air quality control technologies that oxidize mercury in the flue gas. However, current information shows that any slurry or WFGD liquor that contains Mercury has the potential to re-emit the captured mercury. It is believed that sulfate ions serve as the reducer in the reaction, and some factors that can influence total mercury capture by a WFGD include the liquid pH, chloride concentrations, sulfite concentrations and ORP. Higher re-emission rates correlate with higher WFGD ORP although the exact chemical mechanisms are not known at this time. When WFGD oxidation blower speed is not variable ORP cannot typically be controlled by the WFGD plant operators. Newer generation WFGDs at Ghent, E.W. Brown, and being built at Mill Creek could be modified to assist in controlling ORP.

Technologies are now developing and being marketed by Nalco, B&W and others that hold the captured mercury in the liquor or slurry and reduce the re-emission phenomena. Little is known about the partitioning of mercury species into the liquor or the slurry, but some additive suppliers purport to know how to better tune the fines of slurry to force the mercury content into the WFGD wastewater. This could result in higher Mercury wastewater stream as these additives help WFGD's water retain oxidized mercury. Little is known about the total effect the WFGD additives have on the balance of plant water cycles or any future treatment requirements that might result from changes to the effluent limitation guidelines being considered by the U.S. EPA. There are very few published results for long term use of WFGD additives as many of the firms developing these chemical additives have signed non-disclosure agreements with their clients and their long term testing is typically limited to 30 days.

3.5 Summary of Co-Benefits Enhancements

The above technologies are all dependent on various operational states of the existing control devices. Co-benefit technologies would be classified as "passive" controls. Passive control of mercury emissions would result in limited options for decreasing mercury emissions if, for instance, a plant was close to its monthly or annual rolling emissions limit. Load variability,

NH_3 injection rates, flue gas temperature, bromine, chlorine and mercury levels in fuel, and WFGD ORP control would all have to be finely tuned to help plant operating personnel meet MATS compliance using co-benefit technologies. Fuel and operational variability are the greatest risks to 100% MATS compliance using either passive or active type control technologies.

4.0 LKE Plant Testing

[redacted] LKE began a program in June 2012 to test baseline mercury emissions and speciation across certain units of the fleet and testing of coal and WFGD additives. Initially, short duration tests in 2012 were designed to provide an indication of the feasibility of controlling mercury emissions with enhanced co-benefits. Subsequent longer-longer duration tests in 2013 evaluated the efficacy of combining coal and WFGD additives to attain compliance. Only longer-term duration testing can determine the reliability of these additives for full-time compliance.

For reference the plant layout drawings are inserted in Appendix B. These drawings show the existing air quality control equipment for each plant (black). Shown in blue are locations where mercury control sorbents could be injected and shown in red are currently planned equipment additions.

4.1 E.W. Brown

The E.W. Brown Station is comprised of three pulverized coal fired electric generating units with a total nameplate capacity of 747 MW gross. All three (boilers) fire high sulfur bituminous coal. KU recently installed a common wet flue gas desulfurization module for SO_2 control. All three boilers emit to a common stack. The common stack arrangement increases the importance of understanding individual unit performance and could make station mercury compliance more difficult if enhanced co-benefit technologies (additives) are used for mercury control as each unit has different air pollution control equipment arrangements. E.W. Brown 1 and 2 have no SCR therefore oxidation of mercury for capture in the WFGD may require a coal additive, though WFGD re-emissions are dependent on the oxidation of mercury in all three units. Brown 3 SCR would be expected to provide high mercury oxidation, but as previously mentioned, this potential decreases with catalyst age.

4.1.1 E.W. Brown Unit 1

E.W. Brown Unit 1 has a gross capacity of 110 MW, fires high sulfur bituminous coal, and is equipped with low NO_x burners (LNBs) and cold-side dry electrostatic precipitator (ESP) for NO_x and PM control, respectively. Flue gas from Unit 1 joins flue gas from Unit 2 prior to the WFGD. Due to this common arrangement baseline testing for Unit 1 could only be conducted with Units 2 and 3 out of service.

Baseline testing was conducted over a four-day period. Environmental Affairs confirmed test results using portable sorbent traps. A full description of baseline test results for all units tested is provided in Appendix C. In summary the baseline testing (with no additives) showed a surprisingly high level of mercury oxidation at the WFGD inlet, particularly at low load. The oxidation level ranged between 27% and 85%. Re-emission from the WFGD was zero during the short-term testing that has been conducted. It is theorized that the absence of re-emission is due to the large volume of the WFGD relative to the rare operating situation with only Unit 1 in service. The average mercury removal rate during baseline testing was 78%. Stack emissions varied widely, between 2.0 lb/TBtu and 0.5 lb/TBtu.

4.1.2 E.W. Brown Unit 2

Brown Unit 2 has a gross capacity of 180 MW, fires high sulfur bituminous coal, and is equipped with LNBs, over-fire air (OFA), and a cold-side dry ESP.

Baseline testing for Unit 2 could only be conducted with Units 1 and 3 out of service. This testing took place over three days and was conducted by Brown staff in cooperation with Environmental Affairs and an outside contractor, using portable sorbent trap systems. In summary the oxidation rate at the WFGD inlet was steady around 80% with no re-emissions during the short-term testing that was conducted. Without additives the stack emission rate was consistently above the proposed MATS limit of 1.2 lb/TBtu with a maximum of ~2.6 lb/TBtu.

[redacted]

[redacted]

[redacted]

4.1.4 E.W. Brown Units 1, 2 and 3 Coal and WFGD Additive Testing

Steag markets PAC additive for WFGD re-emissions and has a number of installations of this technology in Germany. Problems with accurate measurement due to contamination of the samples with calcium bromide in the flue gas, and evident stratification of the flue gas which shifted with unit loading cast doubt on the accuracy of the test results. As a result Steag testing was considered inconclusive and eliminated from further consideration.

Nalco and Alstom market coal additives for mercury oxidation and WFGD additives for re-emission control. A test of both additives was conducted with Brown Unit 1 and Unit 2 in service simultaneously. Due to Brown 1 being out of service for a period of time a test of both additives on Brown 2 alone was also conducted.

The short term results of the Nalco coal additive and WFGD additive testing indicated the potential for compliance, but additional longer term testing is being conducted to evaluate an ability to comply with a rolling 30 day average. Initial data indicates a reduction in stack emissions below the proposed MATS limit 95% of the time with the addition of WFGD additive. The injection of coal additive shows an increase in oxidized mercury percent at the WFGD inlet.

During initial 2012 tests the Brown Unit 3 SCR was not yet in service, however for longer term 2013 testing the SCR was online.

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

Draft Results of Mercury Control Technologies Testing

[redacted]

[redacted]

[redacted]

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Draft Results of Mercury Control Technologies Testing

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

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[redacted] [redacted]

[redacted]

[redacted]

5.0 Technologies Tested

LKE analyzed additives that could be used for enhancing mercury capture co-benefits with existing technology. Both Electric Power Research Institute (EPRI) (facilitated by the LKE Research and Development group) and other peer utilities were consulted with the technologies identified below as those chosen and tested to date.

Table 5-1

Tested Technology/Sorbent			
Coal Additive	**BR 1**	**BR 2**	[redacted]
Calcium Bromide (Alstom) KNX Fuel Additive	X	X	
Tested Technology/Sorbent			
WFGD Additive	**BR 1**	**BR 2**	[redacted]
Nalco 8034	X	X	
Steag PAC	X	X	

5.1 Baseline Emissions Test Results

LKE completed Mercury speciation testing via sorbent traps for five units, Brown 1 and [redacted]. Additional baseline data has been collected during the first one to two days of each additive test. The speciation of mercury is crucial to capture and control of mercury. After the sorbent trap data was quality assured, some of the test data was invalid and has been eliminated from inclusion in this report.

The baseline testing revealed the following information:

- As load increases, total Mercury increases
- As boiler exit gas temperature increases, total Mercury increases
- Non-SCR units have a lower mercury oxidation rate than SCR units
- The mercury content of coal did not reach 13.4 lbs/Tbtu as shown in the B&V calculation

Results are detailed in Appendix C.

5.2 Sorbent Technologies Test Results

Coal additives
Coal additives were tested at the E.W. Brown Station for all three units simultaneously. Brown Units 1 and 2 do not have SCRs and Brown 3 SCR was only in service for the long term testing. The initial goal of the coal additive testing at Brown was to demonstrate the maximum achievable level of mercury oxidation entering the WFGD on Units 1 and 2 and simulate the SCR impact on Unit 3. Longer term testing was conducted to optimize efficacy of Mercury oxidation on Brown Units1 and 2 to levels comparable to those in SCR units to allow for greater Mercury capture.

The tests show an increase in mercury oxidation with increase in additive flow rate which varies with unit load. The increased oxidation alone was not enough to bring the units into MATS compliance. For long term use the potential corrosion impact of the coal additive on unit components is potentially an O&M/cost concern and is currently being evaluated.

WFGD additives
The Steag PAC additive test at Brown was considered inconclusive due to variations in test measurements. Stratification of the mercury across the ductwork was identified by observing variations in the sorbent trap results compared to the continuous monitor results. The unique arrangement of ductwork into the common WFGD is the presumed cause. Attempts to sample at alternative locations did not prove effective in improving repeatability of results. The presence of bromine in the flue gas interferes with sampling and testing. There were indications that the coal additive and WFGD additive combined to reduce the total stack emissions during the testing.

Nalco 8034 technology has demonstrated the potential to reduce mercury re-emissions across the WFGD. Questions remain regarding long-term viability and costs of MATS compliance using the Nalco or other WFGD additives. These concerns are:

- Observed mercury emission spikes when product injection is ceased
- Impact of WFGD conditions on efficacy of the product (ORP, pH)
- Total mercury entering the WFGD
- Mercury oxidation level entering WFGD. Elemental mercury entering WFGD must be below the MATS limit
- Uncertainty of future WFGD additive supply and cost
- Impact of additives on the WFGD wastewater streams and requirements under revised effluent limitation guidelines.

Additive test results are detailed in Appendix D.

6.0 Conclusions

Coal additives
Coal additives have little effect on already oxidized mercury and should only be considered for non-SCR Units. Recent testing has shown measurable increases in mercury oxidation with the use of additives. However the addition of mercury oxidizing chemicals has the potential to cause corrosion issues. Testing to evaluate corrosion is ongoing as part of a 2013 January to March 60 day test program at Brown Units 1 and 2.

WFGD additives
WFGD additives with highly oxidized mercury have the potential to provide significant periods of compliance with the proposed MATs limits, however LKE has not demonstrated an ability, or procured the tools (if available), to control mercury speciation. Without a demonstrated control of mercury speciation, changes in coal and/or unit derates could be necessary to maintain compliance if reliant solely upon WFGD additive technology. Including observed short disruptions to control, collectively, testing results to-date are trending towards an ability to maintain Mercury compliance over a 30 day average.

Currently, the still maturing mercury and SO_3 monitoring technologies are also vital to making good mercury control decisions. Mercury control WFGD additives will require continuous monitoring of mercury oxidation levels that cannot be obtained through sorbent traps on a long-term basis. Multiple permanent CMMS would be required on every unit to obtain the data necessary to attempt process control. Several different manufacturers of CMMS have been employed during the testing programs. All monitors demonstrate a variation from trap data, though all appear to track the relative changes in mercury concentration accurately. These CMMS can be used for trending mercury, but sorbent traps are more accurate and remain our compliance standard. The CMMS have also required a high level of maintenance.

By potentially increasing mercury in gypsum and flyash currently marketed as beneficial re-use the mercury additive control technology could have a negative impact on gypsum and flyash sales and may negatively affect the plant's water balance.

Nalco's current pricing was reduced through negotiations with the Commercial Operations team and indicates a comparable cost of operation for WFGD additives compared to PAC injection (Appendix E); however it is expected that future price points will fluctuate between the two technologies.

7.0 Summary

General
Environmental Affairs has chosen sorbent trap monitors as the LKE compliance technology because of their consistently reliable measurements. Experience with various CMMS during the test program support this decision based on persistent measurement difference compared to sorbent trap results. However, this may need to be re-evaluated as both the continuous mercury monitor technology advances and the need for near real-time information increases. If CMMS

are installed for trending and process control, additional staffing requirements must be evaluated due to a high level of maintenance required to maintain the equipment.

LKE should evaluate the value of installing WFGD additive technology with PAC injection systems to ensure mercury removal compliance and commercial flexibility in the future as prices between the technologies fluctuate.

Baseline testing for [redacted] should be completed before April 2015 to finalize the baseline fleet mercury profile.

E.W. Brown Station
Ongoing test results from Brown Station indicate the potential to attain mercury compliance across a rolling 30 day average on Brown 1, 2, with Brown 3 in service.

The testing scheduled to be completed by March 30 will identify any operational limitations required to maintain compliance during periods with Brown 3 out of service.

Coal and WFGD additive technology should be installed along with CMMS at Brown Station for testing WFGD alternatives to determine the most cost effective chemical prior to regulatory compliance. Concerns regarding WFGD additive impacts for Brown Station include:

- Primary concern regarding very limited data set regarding maintaining long term compliance (e.g. potential for sudden re-emission phenomenon)
- Scope of any operational limitations on Brown 1 and 2 with or without Brown 3 in service
- Effects of future effluent limitation guideline regulations on wastewater treatment systems

Testing regiments should be continued at Brown for the next several months to further understand the performance of the additives, including more data at full load on the station.

[redacted]

- [redacted]
- [redacted]
- [redacted]

- [redacted]
- [redacted]
- [redacted]

[redacted]

[redacted]

[redacted]

Appendix B – Plant Equipment Layout

See separate file in attached folder.

Appendix C – Baseline Mercury and PM Emissions Test Results

See separate files in attached folder.

Appendix D – Nalco Testing Summary

See separate files in attached folder.

Appendix E – Nalco 8034 Cost Analysis

See separate files in attached folder.

Appendix CII

Brown Baseline Test Results

EW Brown Unit 1

Baseline testing took place over the course of four (4) days, and the results are shown in Figures BR1-1 through BR1-6. Figure B1-1 shows that mercury emissions were above the proposed MATS limit of 1.2lb/TBtu for approximately the first 25% of the testing period, and below the proposed limit for the remainder of the testing. Based on the graph, no assumptions can be made regarding the relationship between load and mercury emissions. Although some of the trap data seen on the graph differs slightly from the CEMS data, it can be concluded that the continuous emissions monitoring system (CEMS) was working properly for the majority of the testing. Both the CEMS data and the trap data verify that mercury emissions were above the MATS limit for the first 25%-35% of the trial, and below the MATS limit for the last 65%-75% of the trial.

Figure BR1-2 displays the amount of mercury measured at the inlet of the FGD. The amount of mercury entering the FGD was not as consistent and only lasted a total of 2.5 days, compared to the total baseline testing period of four (4) days. The data is irregular and although two trap data points line up directly with the CEMS data, it cannot be concluded that the CEMS was working properly. Unlike the previous statement above, the trap data on this graph does not line up with the CEMS data. The information in this figure will be further used to calculate the total amount of mercury removal across the wet FGD.

Figure B1-3 represents the percentage of oxidized mercury at the inlet of the FGD system. The information seen in the figure depicts trap data taken from sixteen (16) 30-minute trials. The results show the percent of oxidized mercury ranged from 27.09% to 85.12%. It can be concluded that load and the percent of oxidized mercury are inversely related; as load increases, the percent of oxidized mercury decreases, and vice versa. Considering this unit does not have a baghouse or SCR, it is unknown what is contributing to the high mercury oxidation percentages. There is a possibility the long length of the ductwork leading from the backend of the plant to the FGD may be a contributing factor. The length of the ductwork may be providing a longer residence time, resulting in additional mercury speciation and mercury oxidation. Additional investigation regarding the high oxidation percentages needs to be conducted.

Figure B1-4 depicts the percent of mercury re-emission across the wet FGD system. The information seen in the figure depicts the same trap data as previously discussed. The results show the percent of mercury re-emission was 0%. If this data is correct, BR1 is operating optimally regarding mercury re-emission. However, it is seldom the situation that Brown 1 is the only unit in operation at the site. The FGD performance with all three units in service can be expected to differ somewhat from the unusual conditions of Brown 1 in service alone.

Figure B1-5 illustrates the percent of total mercury removal across the wet FGD system. The information depicted is CEMS data taken over the course of the testing period. As seen on the graph, total mercury removal was less consistent compared to the Mill Creek Units. With that said, the average removal was 78.26% with a minimum of 62.29% and a maximum of 96.74%.

Figure B1-6 shows the amount of mercury in various coal samples taken during the testing period as well as the total mercury in the stack. Each coal sample was analyzed to determine the amount of mercury on an 'as delivered' and 'dry basis'. As delivered simply means the data was taken from coal that had crushed and passed through a Number 60 (250 m) sieve. 'Dry basis' means without moisture; all moisture was removed from the sample prior to the analysis. The results show mercury levels in the coal ranged from 0.088ppm to 0.101ppm (as delivered), and from 0.094ppm to 0.108 ppm (dry basis). These numbers fall below the national average of 0.170 (remnant moisture, whole coal basis) according to the COALQUAL database for bituminous U.S. coal. There is no convincing evidence from the data that proves a relationship between total mercury in the coal and total mercury emissions coming out of the stack.

Figure B1-1

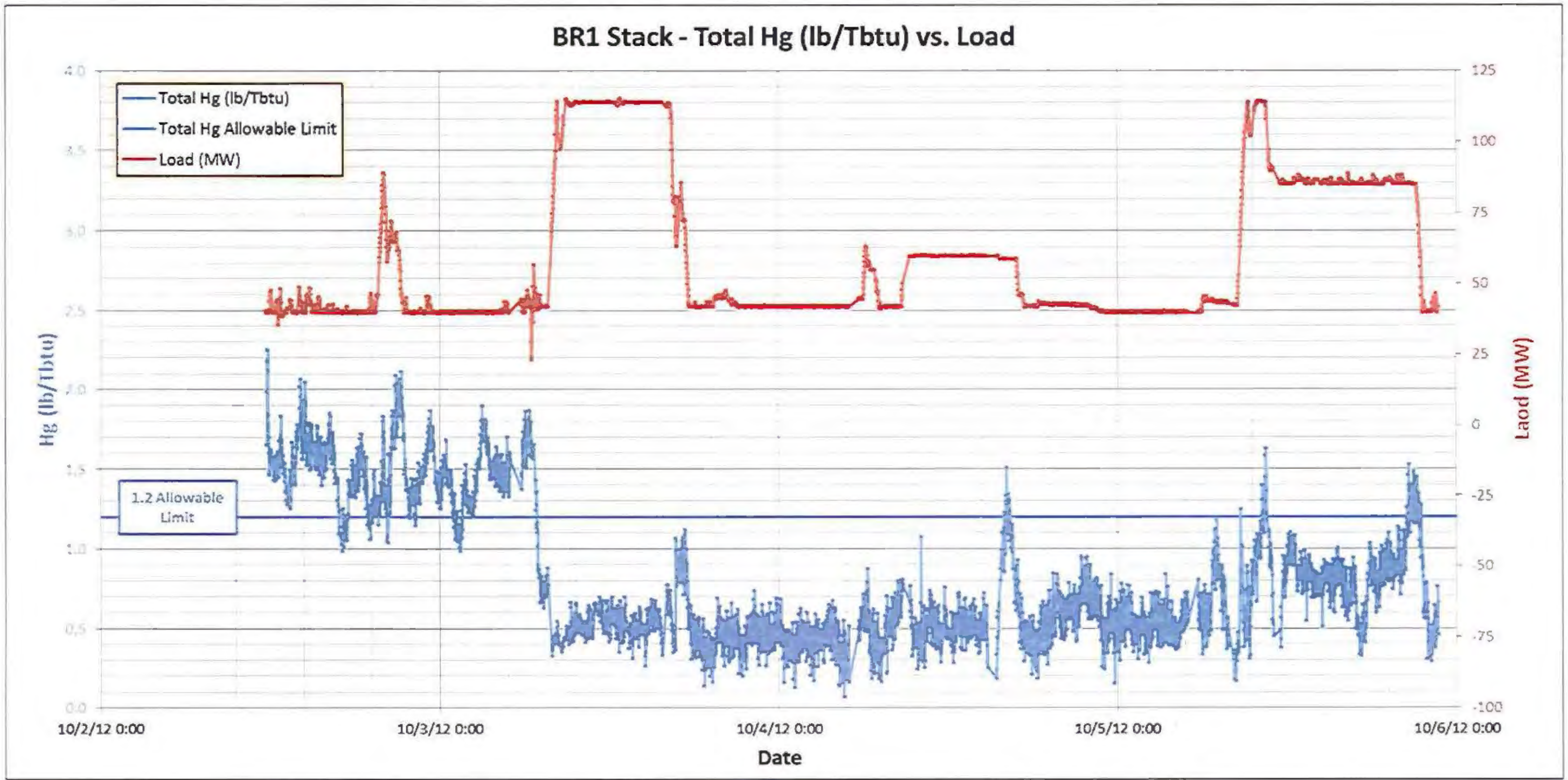

BR1 Stack - Total Hg (lb/Tbtu) vs. Load
Total Hg (lb/Tbtu)
Total Hg Allowable Limit
Load (MW)
1.2 Allowable Limit
Hg (lb/Tbtu)
Laod (MW)
Date
10/2/12 0:00
10/3/12 0:00
10/4/12 0:00
10/5/12 0:00
10/6/12 0:00
125
100
75
50
25
0
-25
-50
-75
-100

Figure B1-2

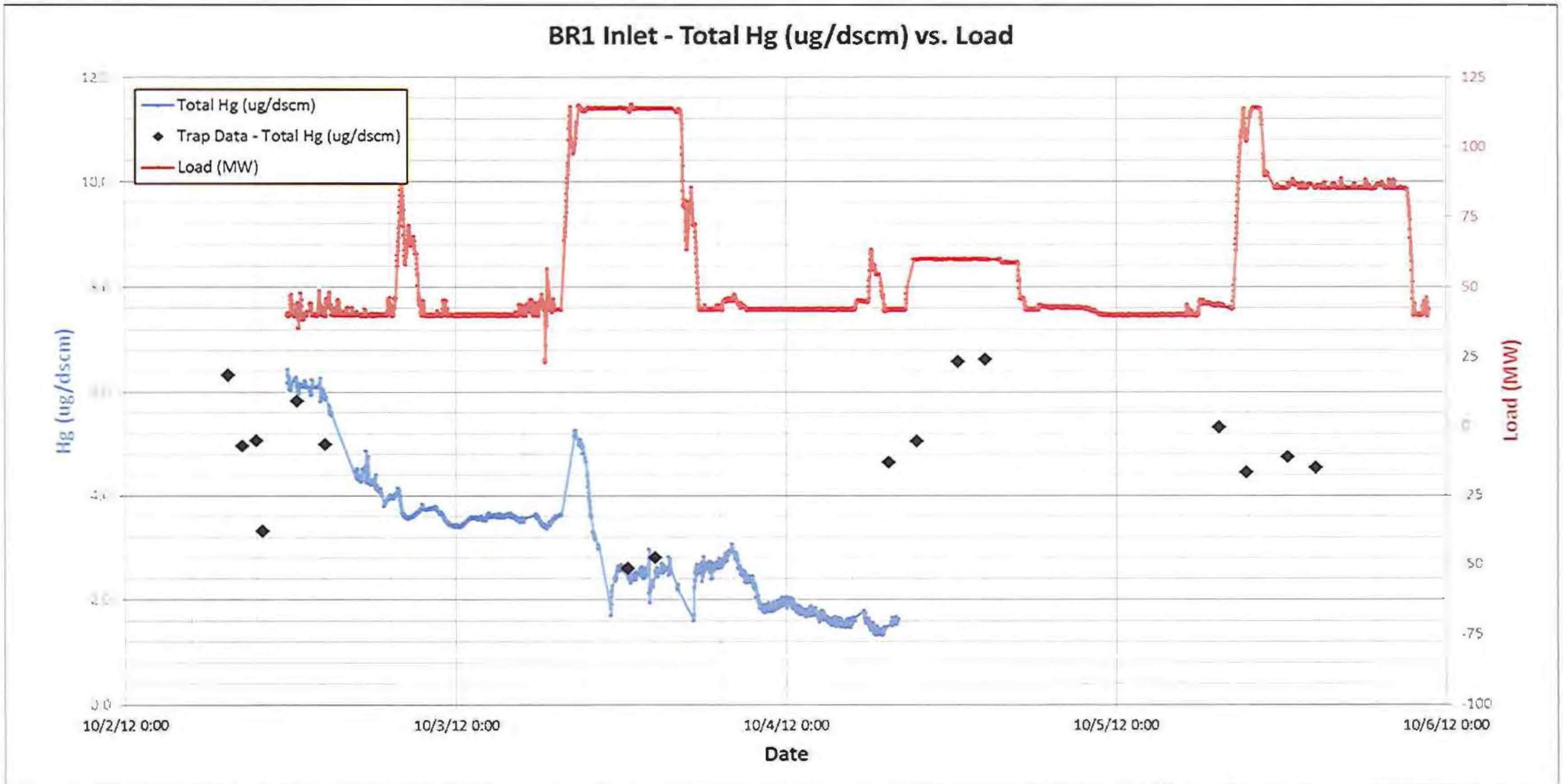

BR1 Inlet - Total Hg (ug/dscm) vs. Load
Total Hg (ug/dscm)
Trap Data - Total Hg (ug/dscm)
Load (MW)
Hg (ug/dscm)
Load (MW)
125
100
75
50
25
0
-100
10/2/12 0:00
10/3/12 0:00
10/4/12 0:00
10/5/12 0:00
10/6/12 0:00
Date

Figure B1-3

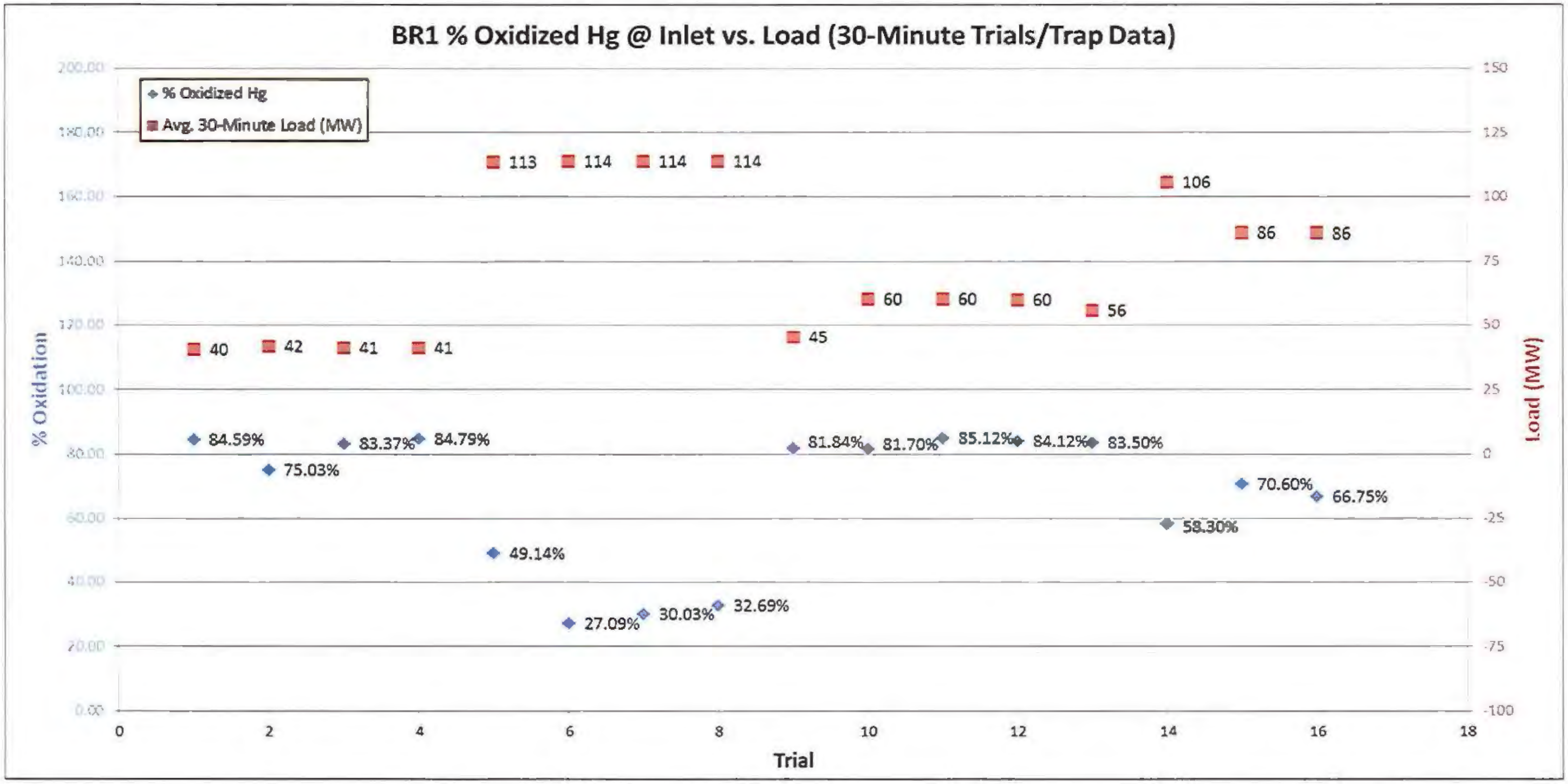

BR1 % Oxidized Hg @ Inlet vs. Load (30-Minute Trials/Trap Data)
% Oxidized Hg
Avg. 30-Minute Load (MW)
% Oxidation
Load (MW)
Trial
113
114
114
114
106
86
86
60
60
60
56
40
42
41
41
45
84.59%
75.03%
83.37%
84.79%
49.14%
27.09%
30.03%
32.69%
81.84%
81.70%
85.12%
84.12%
83.50%
70.60%
66.75%
58.30%

Figure B1-4

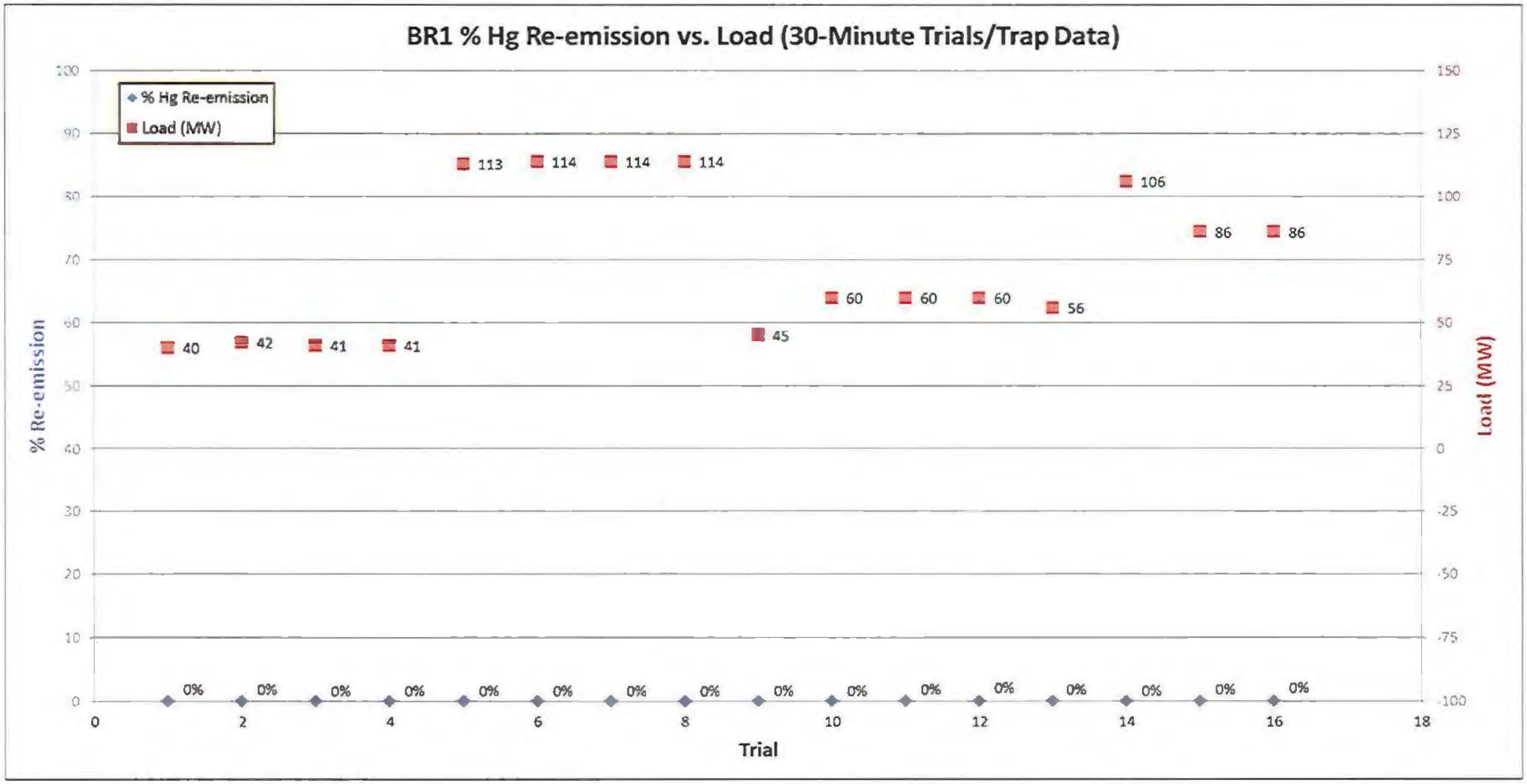

BR1 % Hg Re-emission vs. Load (30-Minute Trials/Trap Data)
% Hg Re-emission
Load (MW)
% Re-emission
Load (MW)
Trial
40
42
41
41
113
114
114
114
45
60
60
60
56
106
86
86
0%

Figure B1-5

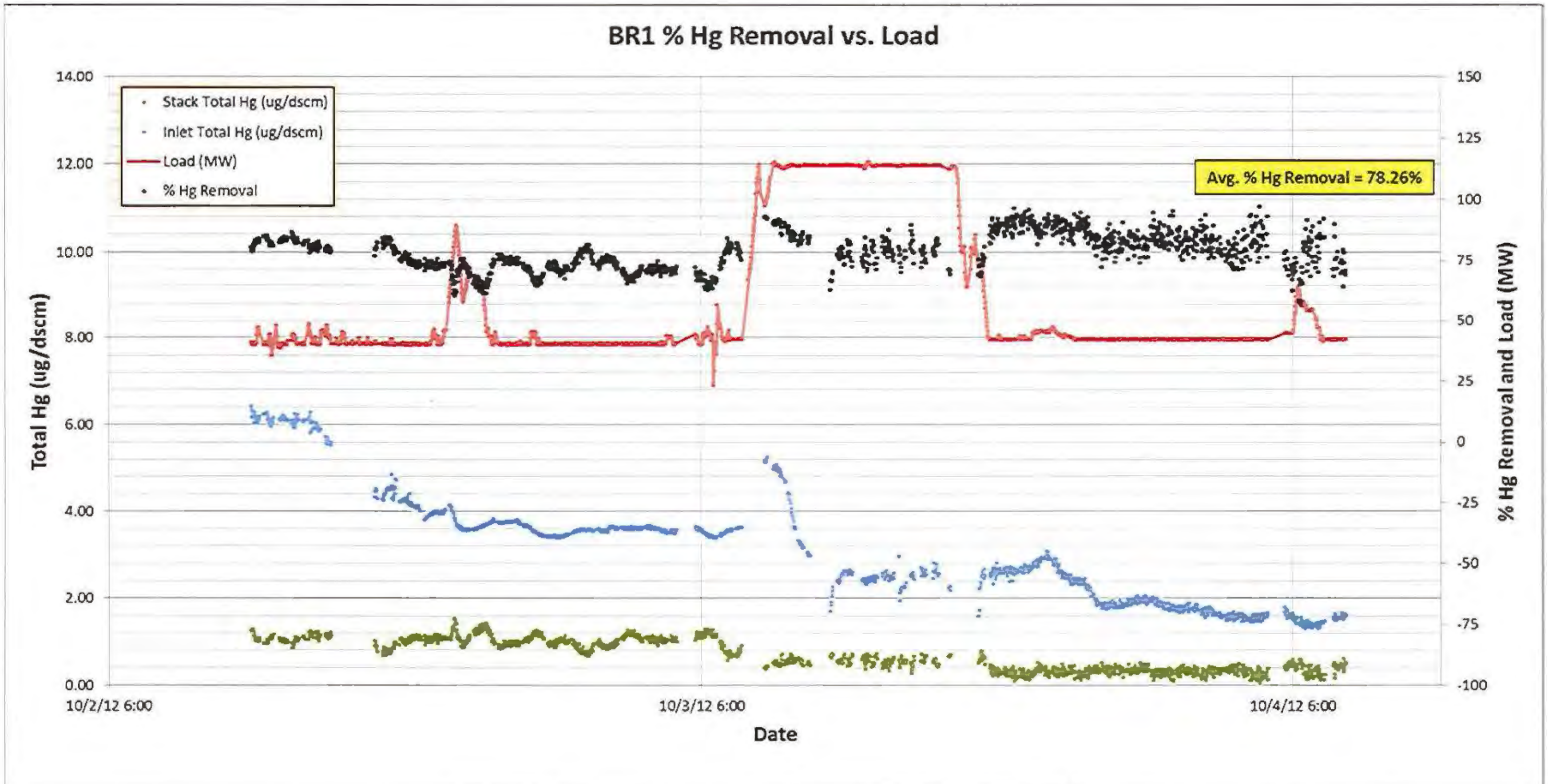
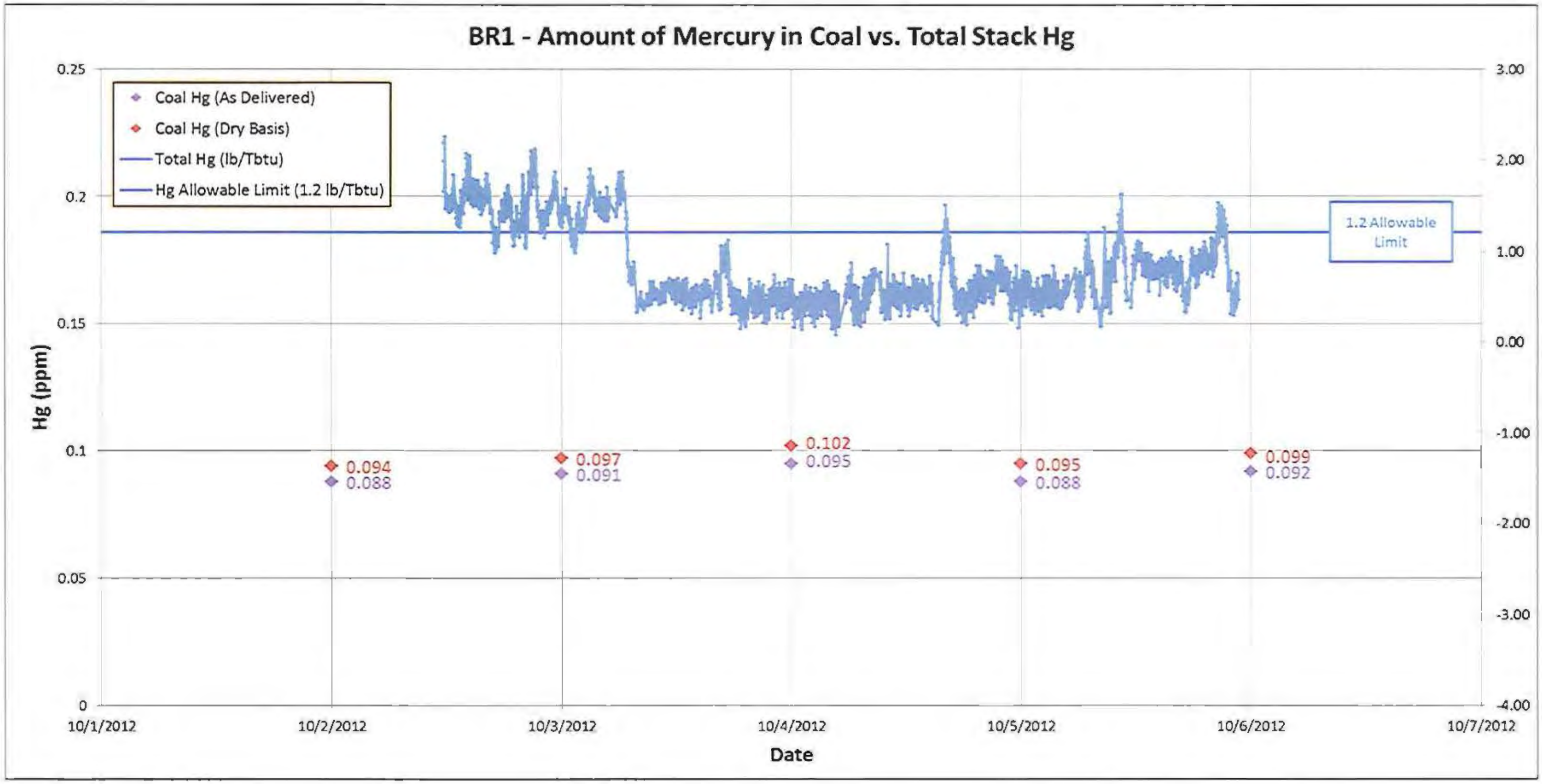

BR1 % Hg Removal vs. Load
Stack Total Hg (ug/dscm)
Inlet Total Hg (ug/dscm)
Load (MW)
% Hg Removal
Avg. % Hg Removal = 78.26%
Total Hg (ug/dscm)
% Hg Removal and Load (MW)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
150
125
100
75
50
25
0
-25
-50
-75
-100
10/2/12 6:00
10/3/12 6:00
10/4/12 6:00
Date

Figure B1-6


BR1 - Amount of Mercury in Coal vs. Total Stack Hg
Coal Hg (As Delivered)
Coal Hg (Dry Basis)
Total Hg (lb/Tbtu)
Hg Allowable Limit (1.2 lb/Tbtu)
1.2 Allowable Limit
Hg (ppm)
0.25
0.2
0.15
0.1
0.05
0
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
0.094
0.088
0.097
0.091
0.102
0.095
0.095
0.088
0.099
0.092
10/1/2012
10/2/2012
10/3/2012
10/4/2012
10/5/2012
10/6/2012
10/7/2012
Date

EW Brown Unit 2

Baseline testing took place over the course of three (3) days, and the results are shown in Figures BR2-1 through BR2-4. All data for BR2 was based off of trap data taken from eleven (11) 30-minute trials. Figure BR2-1 shows that mercury emissions were above the proposed MATS limit of 1.2lb/TBtu for the entirety of the testing period. Although it is difficult to decipher from this graph, it can be conclude that load and mercury emissions are directly related; as load increases, mercury emissions also increase, and vice versa. This relationship was evident in other baseline testing across the fleet.

Figure BR2-2 represents the percentage of oxidized mercury at the inlet of the FDG system. The results show the percent of oxidized mercury ranged from 76.70%% to 86.30%. It can be concluded that load and the percent of oxidized mercury are inversely related; as load increases, the percent of oxidized mercury decreases, and vice versa. Similar to BR1, it is unknown what is contributing to the high mercury oxidation percentages for this unit. As previously noted, there is a possibility the long length of the ductwork leading from the backend of the plant to the FGD may be a contributing factor.

Figure BR2-3 depicts the percent of mercury re-emission across the wet FGD system. The results show the percent of mercury re-emission was 0%. If this data is correct, BR1 is operating optimally regarding mercury re-emission. However, it is seldom the situation that Brown 2 is the only unit in operation at the site. The FGD performance with all three units in service can be expected to differ somewhat from the unusual conditions of Brown 2 in service alone.

Figure BR2-4 illustrates the percent of total mercury removal across the wet FGD system. The average removal was 75.41% with a minimum of 66.13% and a maximum of 81.85%.

Figure B2-1

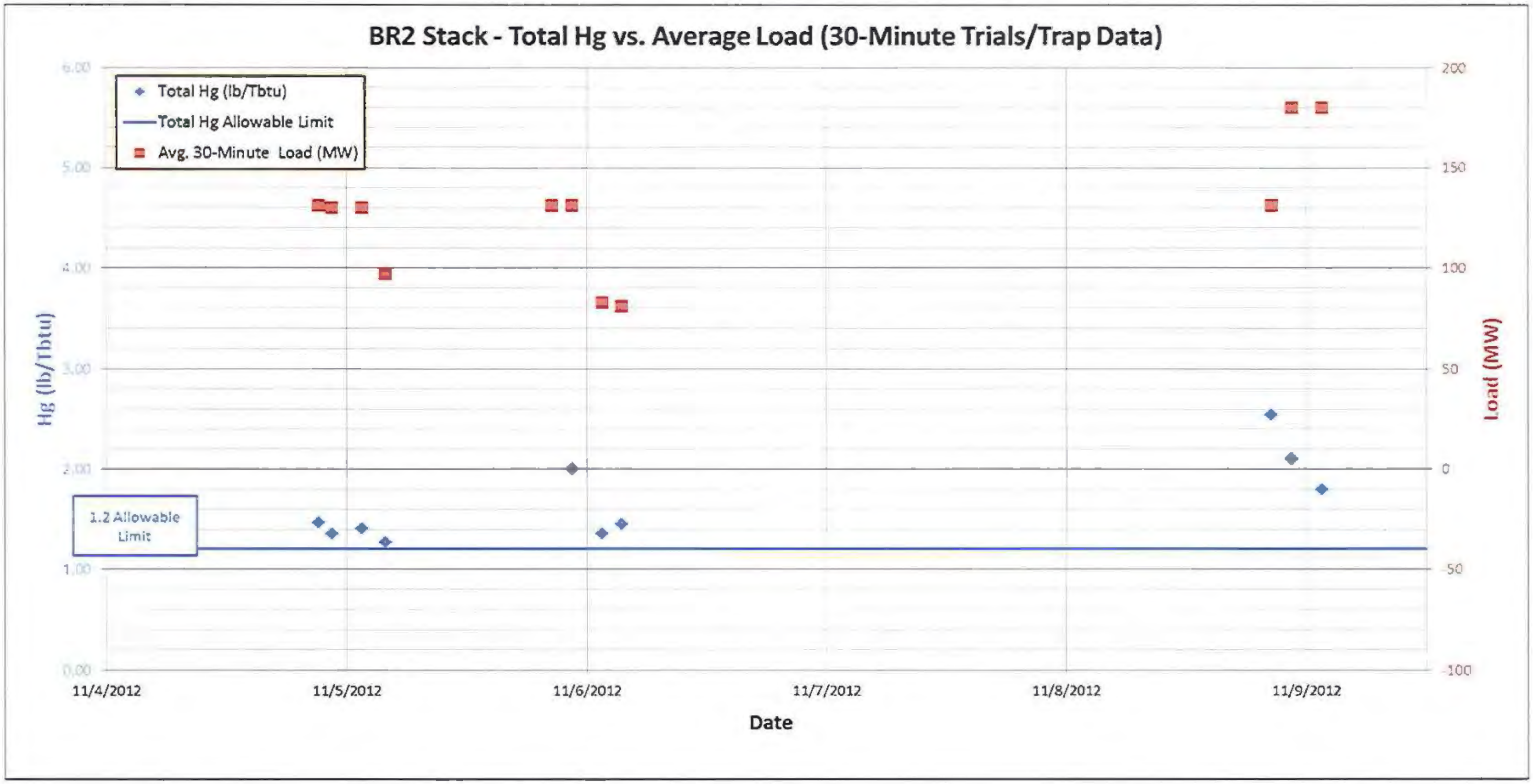

BR2 Stack - Total Hg vs. Average Load (30-Minute Trials/Trap Data)
Total Hg (lb/Tbtu)
Total Hg Allowable Limit
Avg. 30-Minute Load (MW)
1.2 Allowable Limit
Hg (lb/Tbtu)
Load (MW)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
200
150
100
50
0
-50
-100
11/4/2012
11/5/2012
11/6/2012
11/7/2012
11/8/2012
11/9/2012
Date

Figure B2-2

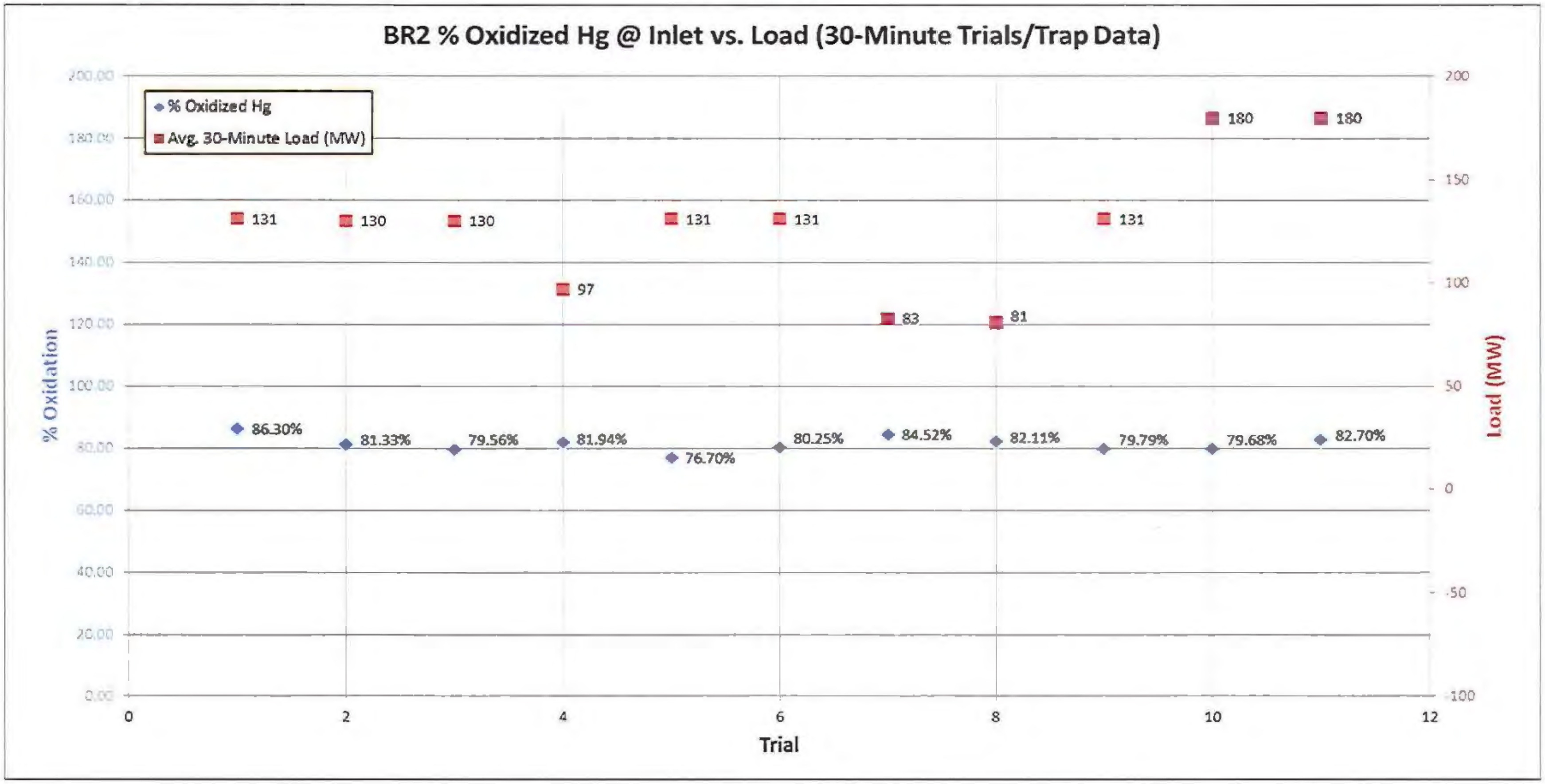

BR2 % Oxidized Hg @ Inlet vs. Load (30-Minute Trials/Trap Data)
% Oxidized Hg
Avg. 30-Minute Load (MW)
% Oxidation
Load (MW)
Trial
131
130
130
97
131
131
83
81
131
180
180
86.30%
81.33%
79.56%
81.94%
76.70%
80.25%
84.52%
82.11%
79.79%
79.68%
82.70%

Figure B2-3

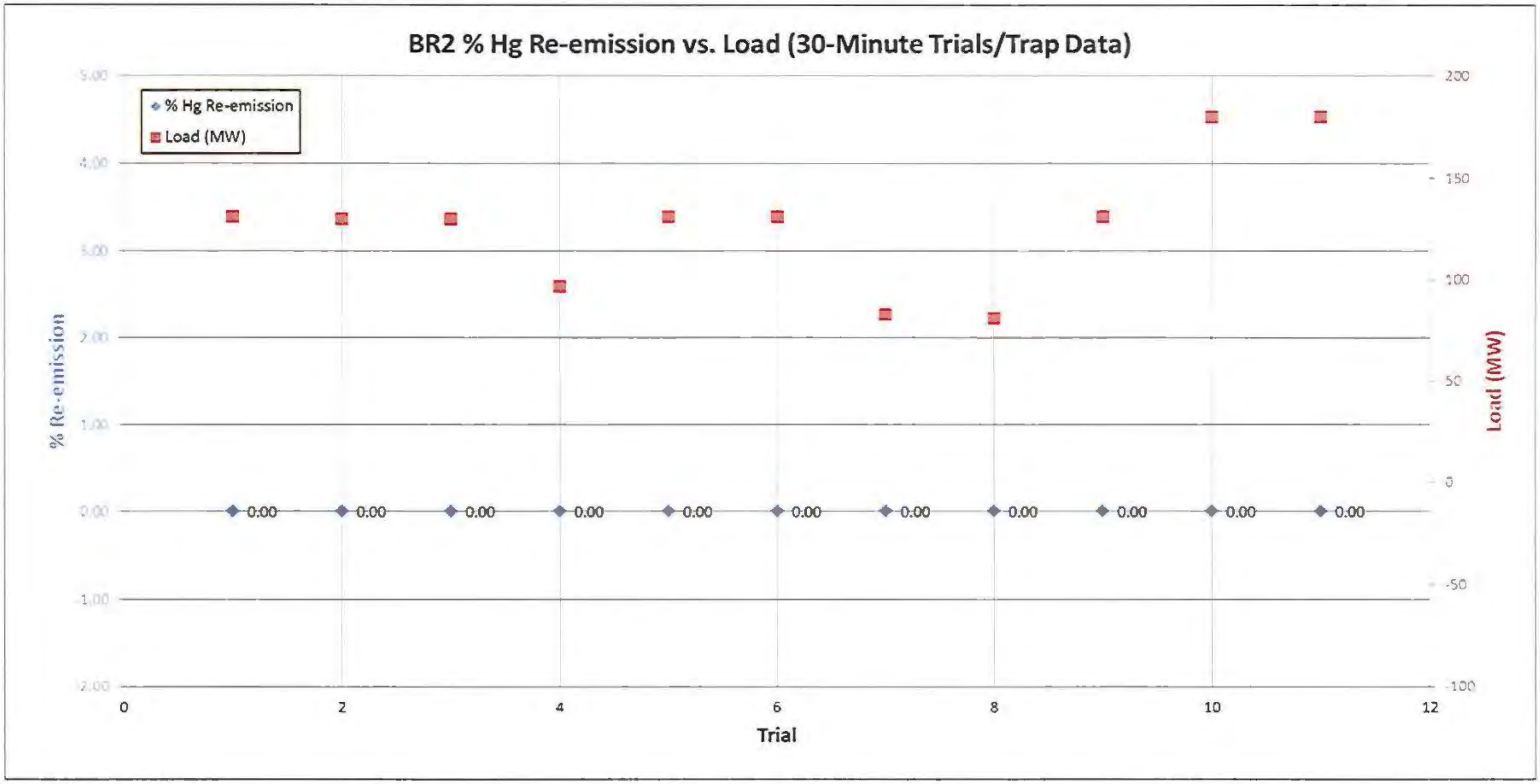
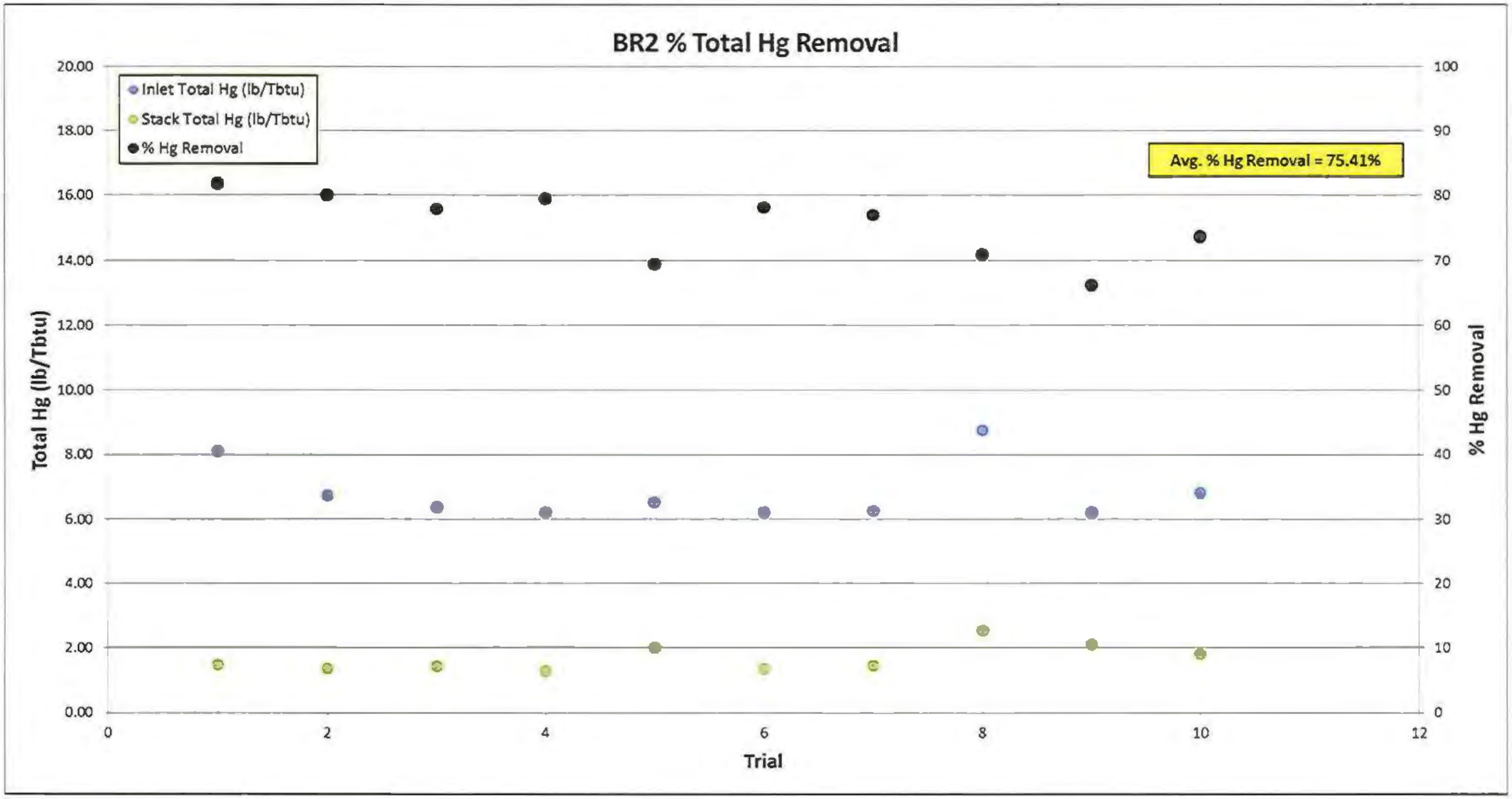

BR2 % Hg Re-emission vs. Load (30-Minute Trials/Trap Data)
% Hg Re-emission
Load (MW)
% Re-emission
Load (MW)
Trial
0.00
0
2
4
6
8
10
12
200
150
100
50
0
-50
-100

Figure B2-4


BR2 % Total Hg Removal
Inlet Total Hg (lb/Tbtu)
Stack Total Hg (lb/Tbtu)
% Hg Removal
Avg. % Hg Removal = 75.41%
Total Hg (lb/Tbtu)
% Hg Removal
Trial
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
100
90
80
70
60
50
40
30
20
10
0
0
2
4
6
8
10
12

Appendix D

Nalco Long-term Tests Summary

[redacted]

<u>Brown Plant</u>

At Brown the long-term test program involves injection of 7895 (calcium bromide) on Units 1 and 2 for mercury oxidation in conjunction with injection of 8034 in the FGD (common to all three units). The Unit 3 SCR is now operational as are the hydrated lime injection systems on all three units. Long-term testing of FGD additive 8034 and coal additive 7895 began on January 29, 2013.

Baseline testing conducted ten days prior showed stack emissions averaging 1.84 #/Tbtu and ranging from .78 to 3.65 #/Tbtu. The Units 1 & 2 combined flue gas entering the FGD demonstrated an average baseline oxidation rate of 83%. With Unit 1 & 2 at reduced load oxidation rates are high.

On January 29th addition of 7895 to Units 1 and 2 coal feeders was initiated and on January 31st injection of 8034 into the FGD was initiated. Stack emissions were reduced below the MATS limit to an average of ~0.75 #/Tbtu through February 13th. Unit 3 was taken out of service

February 10-13 and during this period the stack emissions increased above the 1.2 #/Tbtu. Unit 1 operated mostly at low load and Unit 2 load varied during this period. Some adjustments to the 8034 flow rate were also initiated during this time and therefore no conclusion can be drawn as to the impact of Unit 3 outage and 8034 flow. Unit 3 was taken out of service again February 16-19. Unit 1 operated mostly at low load and Unit 2 load varied with little time spent at high load during this period. Stack emissions remained below 1.2 #/Tbtu.

The amount of mercury in the fuel is fairly steady and ranges from 79 to 132 parts per billion. The mercury content in the fly ash is trending upwards. The mercury in the FGD solids is spiking up and down with a range of 596 to 1190. The mercury content in FGD liquor needs further evaluation as the numbers do not correlate to any other information we have.

Beginning February 25th Brown 3 was operated at full load for longer periods than previously during this test. Units 1 and 2 load patterns also changed with longer cycling periods and higher load on Unit 1. During this time stack mercury levels began to spike above the MATS limit. Nalco increased 8034 injection rate and made adjustments to the control scheme to perform better at full load. A small reduction in stack emissions resulted. LKE reduced ammonia flow to Unit 3 SCR and saw a small impact on stack mercury. Nalco expressed a desire to add 7895 to Unit 3 to troubleshoot the problem, theorizing that mercury oxidation on Unit 3 at full load was insufficient to permit the 8034 re-emission control to meet MATS. While the goal of this test program is to observe the potential to control Units 1 and 2 mercury emissions, not to evaluate additives for Unit 3, LKE agreed to use the 7895 addition to Unit 3 as a confirmation of the cause for increased stack emissions. Initial indication is that the addition of 7895 resulted in increased oxidation on Unit 3 and lower total stack emissions. This confirms Nalco's theory and supports the data showing mercury oxidation on Units 1 and 2 is optimal and re-emissions are being controlled by the 8034.

During the remainder of the Brown test Unit 3 will be taken out of service for a one week outage, with the possibility of extending to two weeks. This will provide data for Units 1 and 2 alone, which is a primary goal of the test program. Testing of 'best case' coal is also planned during the Unit 3 outage.

Nalco Short Tests Summary

The Nalco FGD additive (MerControl 8034) was tested at [redacted] and Brown 1and 2 combined. Nalco is in the process of issuing reports detailing the results of each test.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

<u>Brown 1&2</u>

Brown Units 1, 2 and 3 share a common FGD. Flue gas from Units 1 and 2 joins in a common duct which enters the FGD alongside the Unit 3 duct.

Baseline testing of Unit 1 was conducted by Ohio Lumex while Units 2 and 3 were offline. The tests demonstrated MATS compliance during the last three days of the test, however the emissions were consistently above MATS during the first day. No significant mercury re-emissions were measured. It is theorized that the low loading of Unit 1 flue gas on the FGD is the driver for low / no re-emissions.

Baseline testing of Unit 2 was conducted by LKE for a short period when Units 1 and 3 were out of service.

Prior to the addition of any additive baseline data was collected for Unit 2 showing an average 2.3 $\mu g/m^3$ (~1.72 lb/TBtu). High mercury oxidation at the FGD inlet (81%) and average 13% re-emission were observed.

Addition of MerControl 7895 (bromide compound) resulted in an average mercury emission rate of 0.43 lb/TBtu, a 67% reduction. Further analysis and final report from Nalco are pending

Appendix D

E.W. Brown STEAG Trial Summary

STEAG Trial Summary

LKE contracted with STEAG Energy Services to perform a test applying Alstom's KNX technology for mercury oxidation and STEAG's Mercury Control Process. In addition, STEAG was also contracted to provide the flue gas mercury measurements at the inlet of the scrubber and the stack. STEAG provided engineering and on site field support during the duration of the test and Ohio Lumex provided the equipment and site personnel to operate the CEMS.
The STEAG mercury control trial at EW Brown consisted of two process additives; an oxidizing pre-combustion coal additive and an oxidizing mercury capturing FGD slurry additive. Due to fluid distribution problems, the pre-combustion coal additive was not evenly dispersed to the coal feeders resulting in erratic data. The system also has many other inconsistencies including pump malfunctions, chemical spills, and general setup issues. The other portion of the testing consisted of PAC injection into the FGD slurry to capture the oxidized mercury. This testing did not go as planned and daily slurry samples confirmed that the product was not working properly. The data obtained from Ohio Lumex varied, including fluctuating oxidation readings and inconsistent CEMS data. The trail as a whole was not successful and no conclusions were drawn due to the inconsistency of the data.

June 4-29, 2012

The purpose of this report is to detail and evaluate the STEAG Mercury Control trial at EW Brown; which include two separate process additives: An oxidizing pre-combustion coal additive and oxidized mercury capturing FGD slurry additive. These controls are designed to enable units to meet the Mercury and Air Toxics Standard (MATS) requirements that will go into effect 2015.

Week one of the trial was dedicated to the ALSTOM coal additive "KNX." Due to scheduling conflicts the Alstom KNX distribution skid was unavailable and a substitute set up had to be implemented. The STEAG designed distribution system was very basic in design and required sustainable plant support in implementing the setup, due to lack of STEAG representation. The system relied on pump pressure to distribute the fluids evenly despite the unequal lengths of tubing between feeders. Screw valves where fitted on each feeder to try and regulate the flows to each, but did nothing to correct for the pressure differential between each header causing a very uneven and inconsistent distribution of chemical to each feeder. The system also had many other inconsistencies including pump malfunctions, chemical spills, and general setup problems.

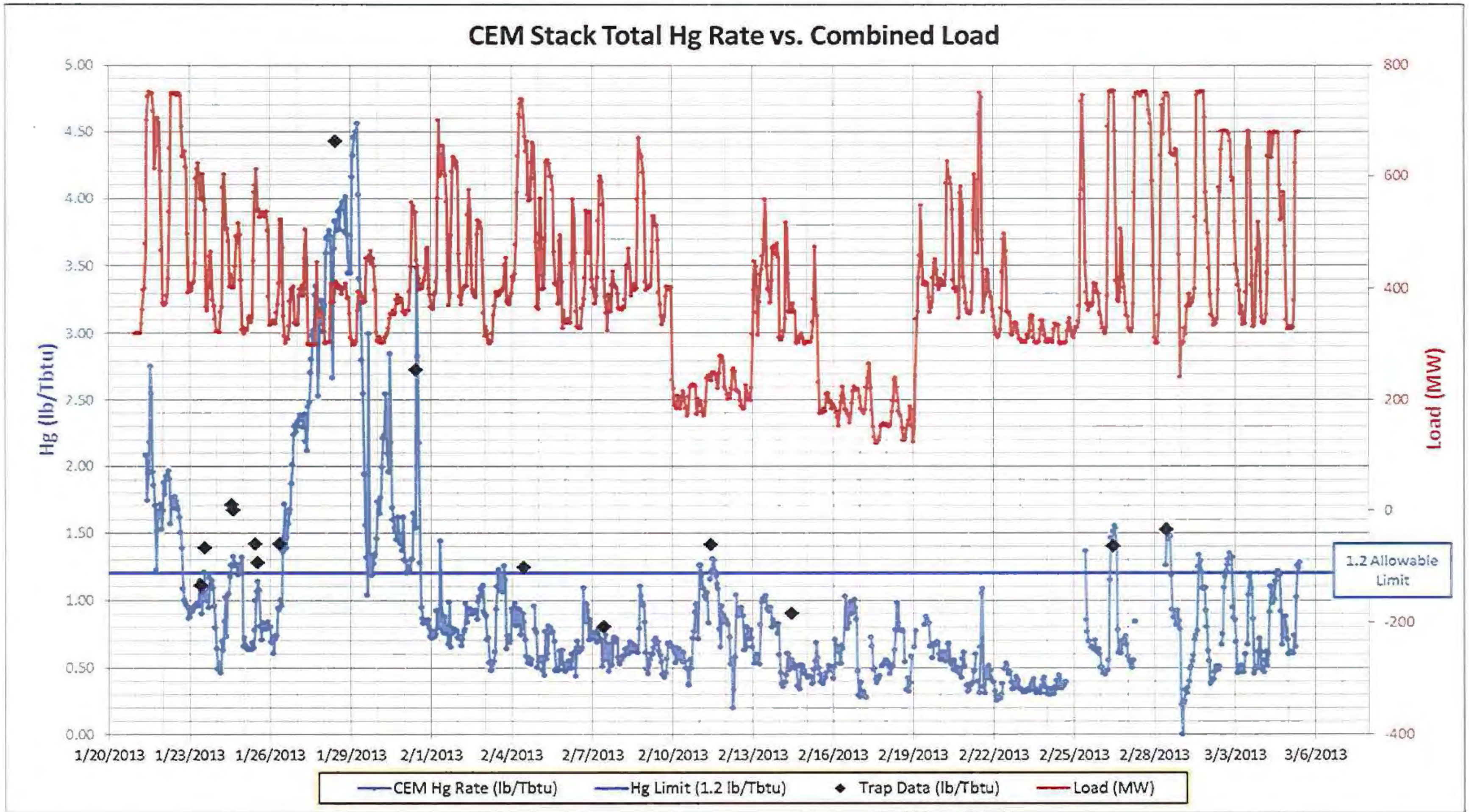
The remaining weeks of $CaBr_2$ injections the distribution system was reworked to provide a more consistent and even flow using a header system that relied on an elevated level reservoir. The secondary portion of the testing consisted of PAC injection into the FGD slurry to capture the oxidized mercury. The initial injection

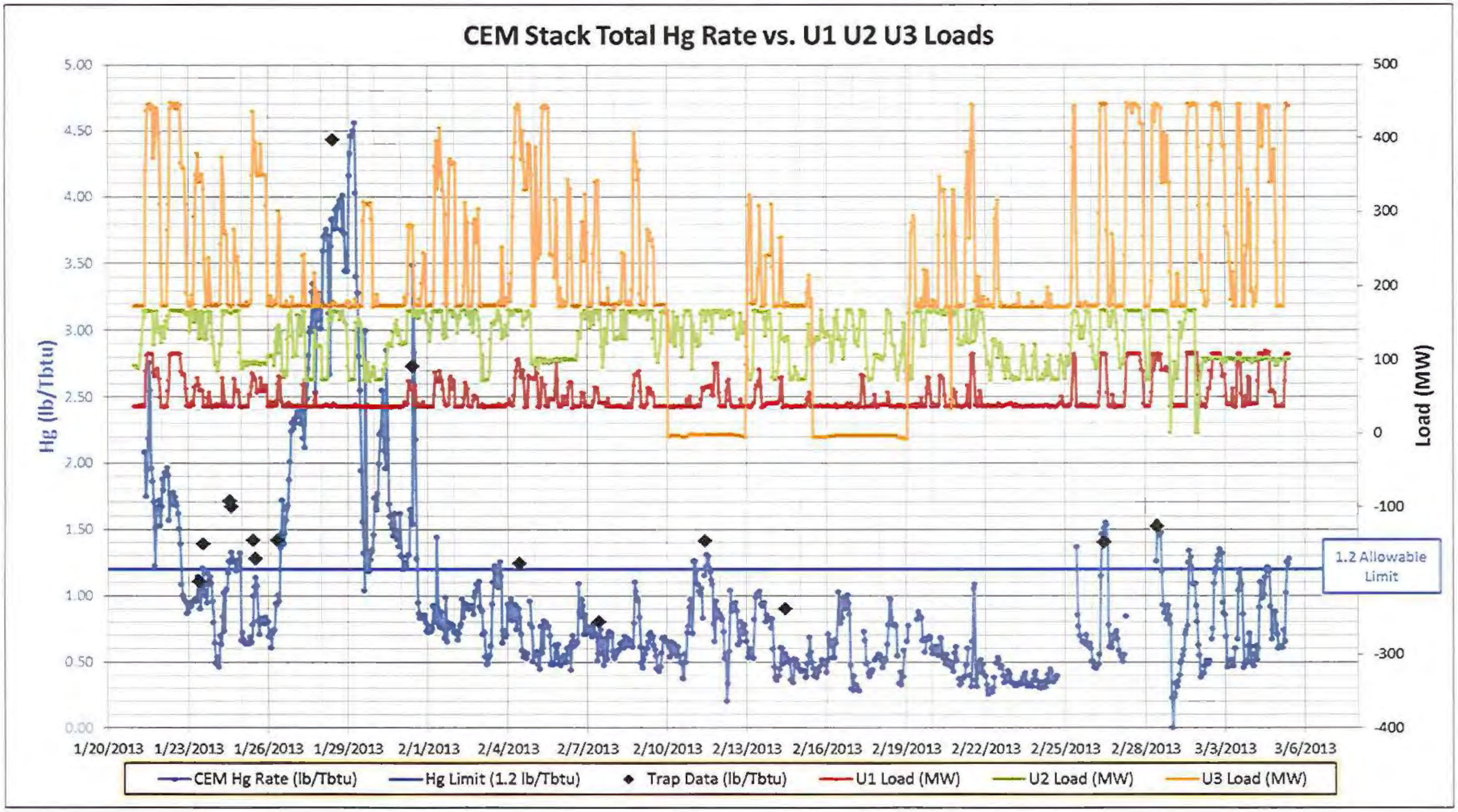
was based upon the tank capacity, and subsequent daily injections based upon the daily slurry blow down. The thought was that the slurry bleed off would contain a large portion of the PAC due to its location. Daily slurry samples suggested that the blow down did not contain large amounts of PAC, in fact hardly any PAC had escaped from the tank and as a consequence, the amount of PAC in the tank increased significantly from day to day.

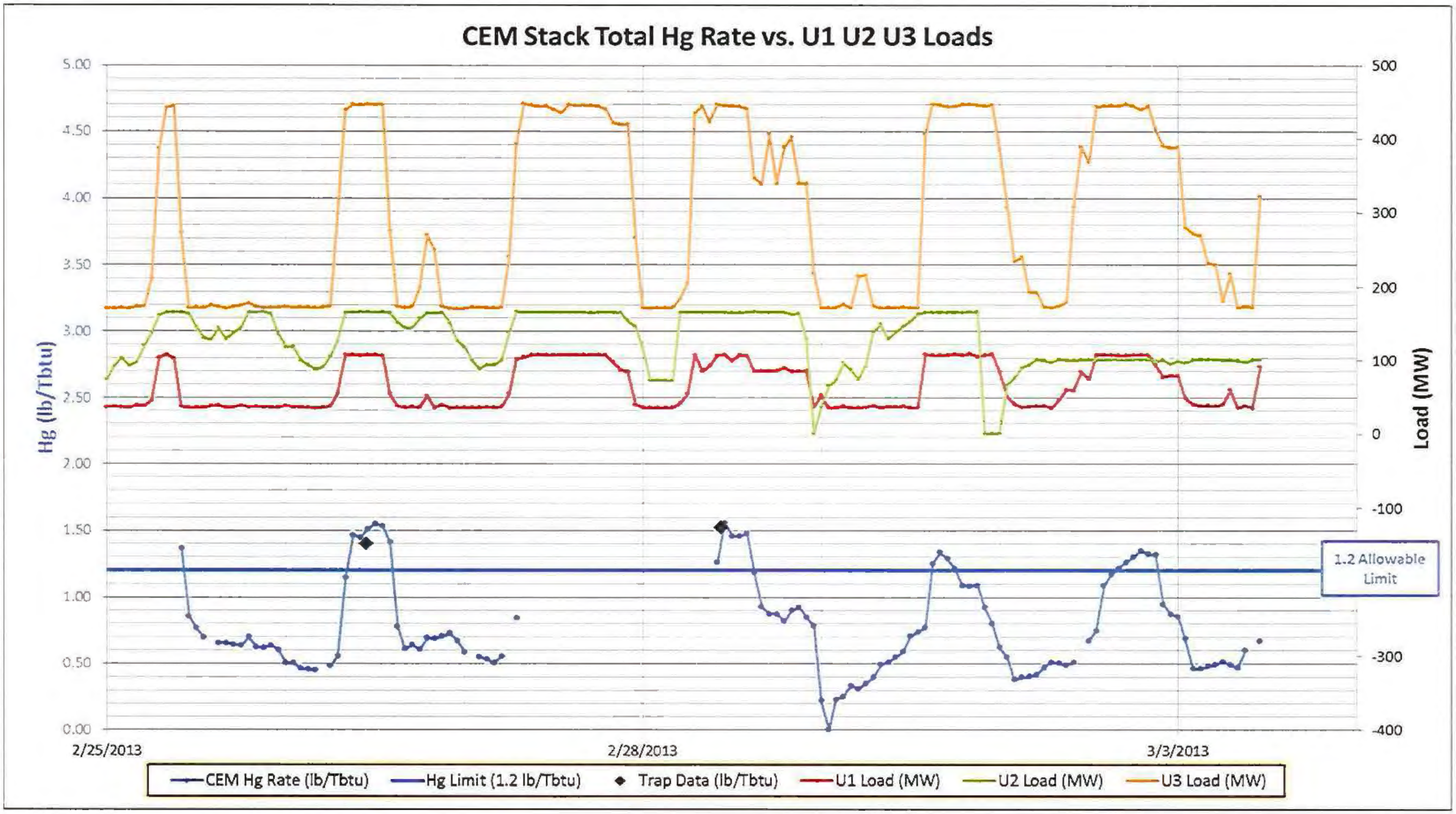
The speciated trap data obtained by Ohio Lumex contained fluctuating oxidized readings inconsistent with the plant obtained readings; this is likely due in part to the flue gas stratification. The data obtained from Ohio Lumex's traps also widely fluctuated from reading to reading, leading us to believe that the instrumentation (or operator) may have been malfunctioning. The CEMS stack data was consistent for each day, leading to a change in instrument arrangement towards the end of the trial to CEMS on individual duct access points. One monitor was placed on Unit 3 duct and another at Unit 1&2 conjunction.

The STEAG trial as a whole led to a vast learning experience for all involved parties. Unfortunately much of the data obtained was inconsistent.

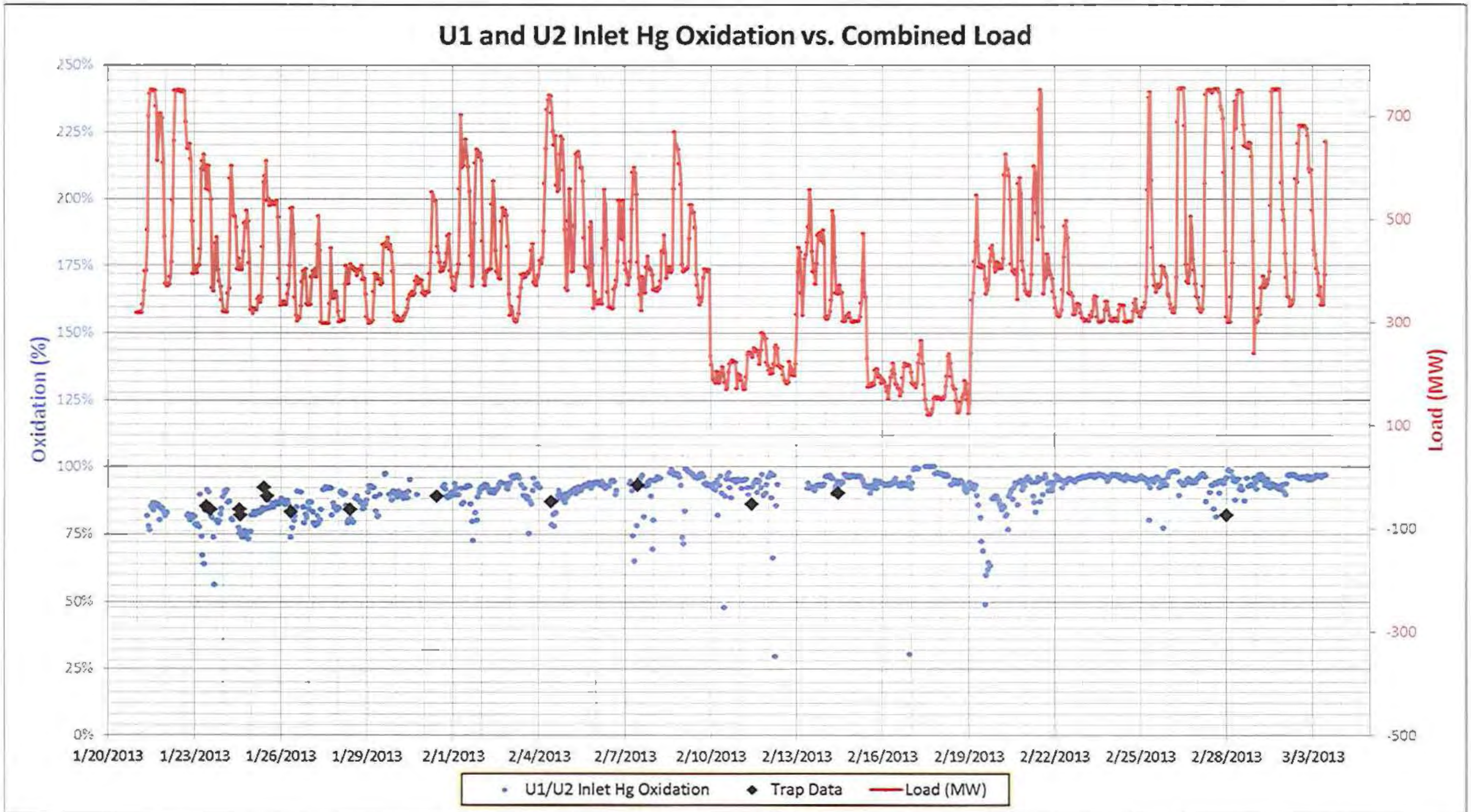
Appendix D – E.W. Brown




CEM Stack Total Hg Rate vs. U1 U2 U3 Loads
Hg (lb/Tbtu)
Load (MW)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
500
400
300
200
100
0
-100
-300
-400
1/20/2013 1/23/2013 1/26/2013 1/29/2013 2/1/2013 2/4/2013 2/7/2013 2/10/2013 2/13/2013 2/16/2013 2/19/2013 2/22/2013 2/25/2013 2/28/2013 3/3/2013 3/6/2013
1.2 Allowable Limit
CEM Hg Rate (lb/Tbtu)
Hg Limit (1.2 lb/Tbtu)
Trap Data (lb/Tbtu)
U1 Load (MW)
U2 Load (MW)
U3 Load (MW)



Attachment to Response to Sierra Club Question No. 2.16a - 5
Voyles



U1 and U2 Inlet Hg Oxidation vs. Combined Load
Oxidation (%)
250%
225%
200%
175%
150%
125%
100%
75%
50%
25%
0%
Load (MW)
700
500
300
100
-100
-300
-500
1/20/2013
1/23/2013
1/26/2013
1/29/2013
2/1/2013
2/4/2013
2/7/2013
2/10/2013
2/13/2013
2/16/2013
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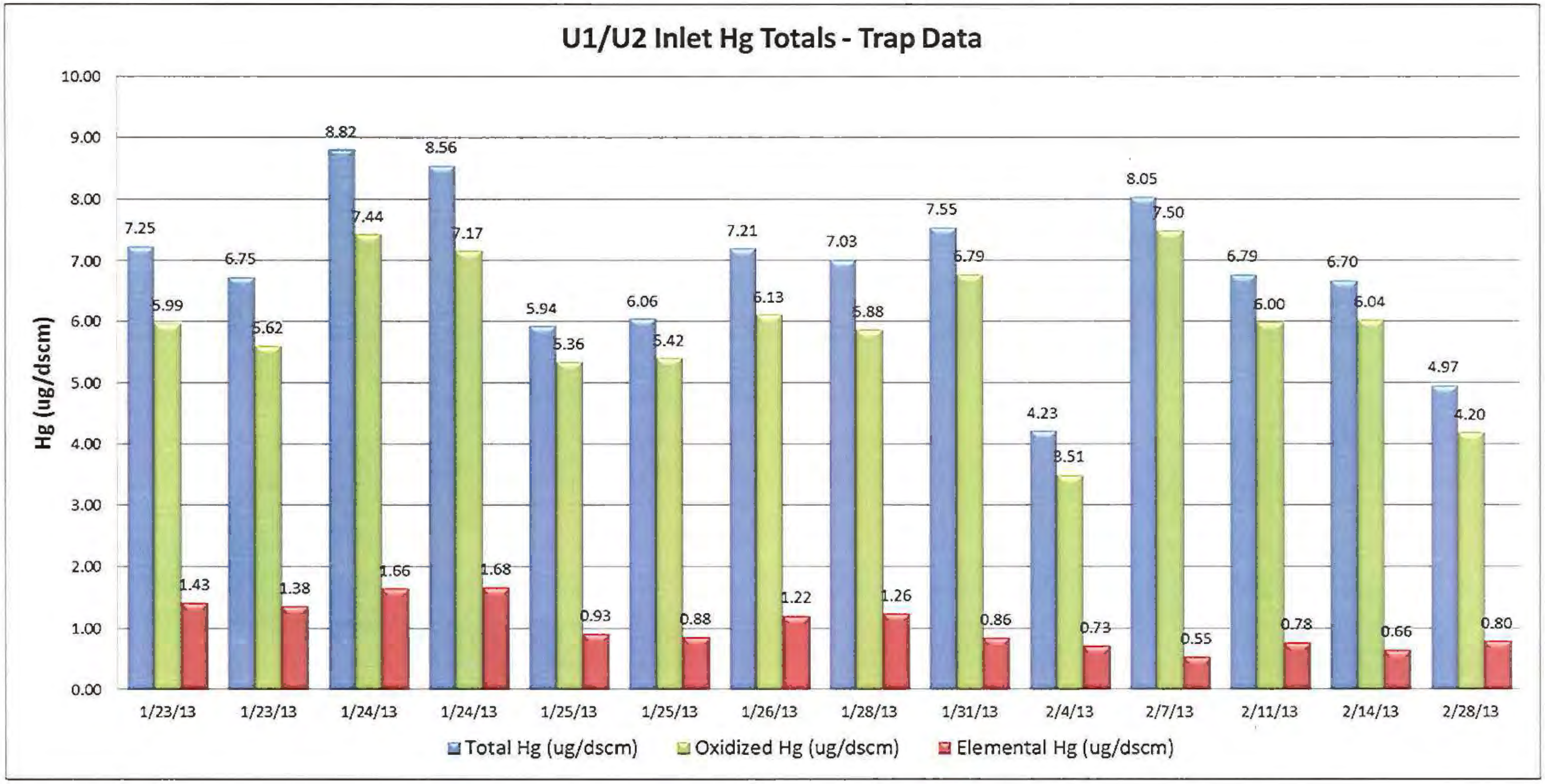
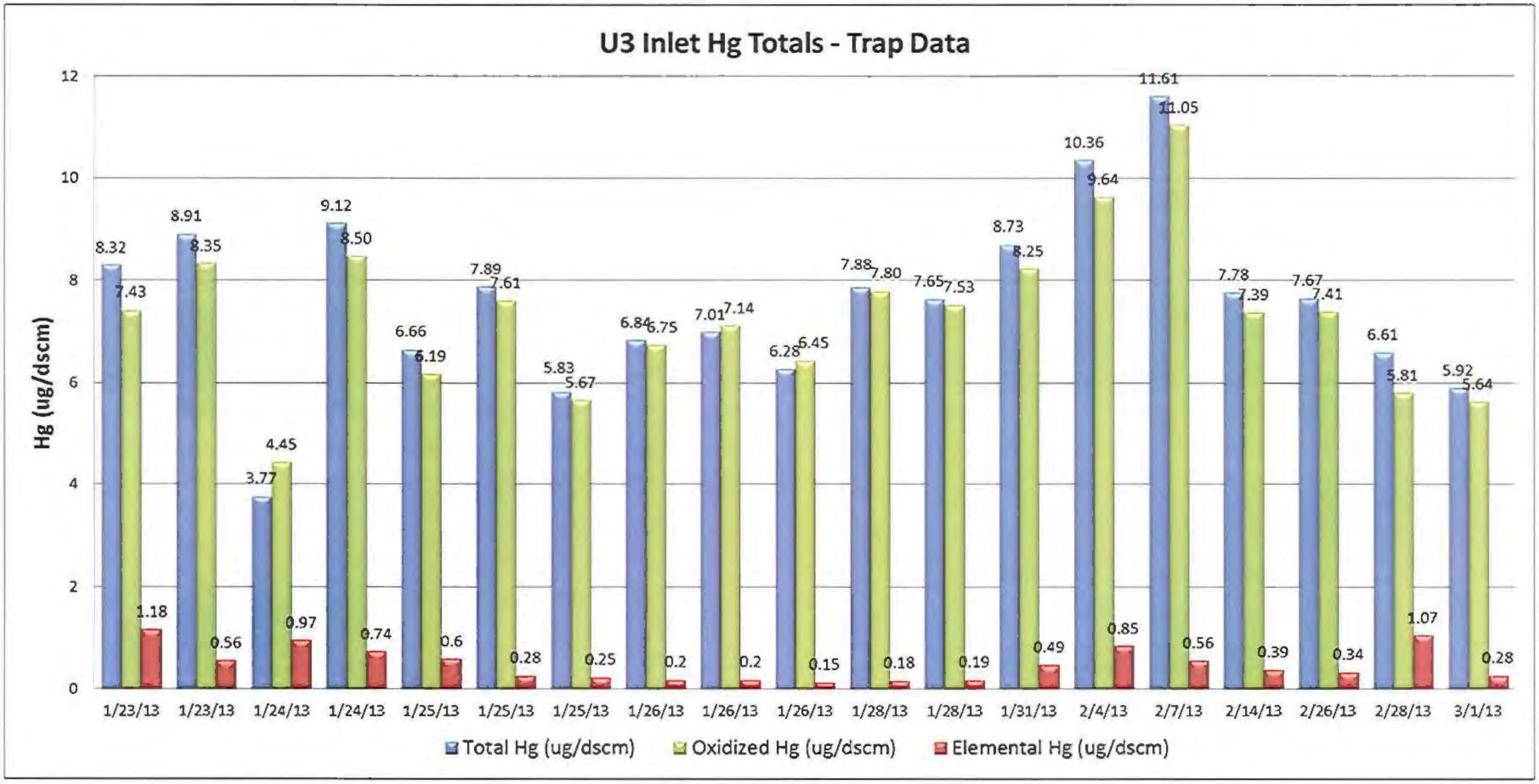
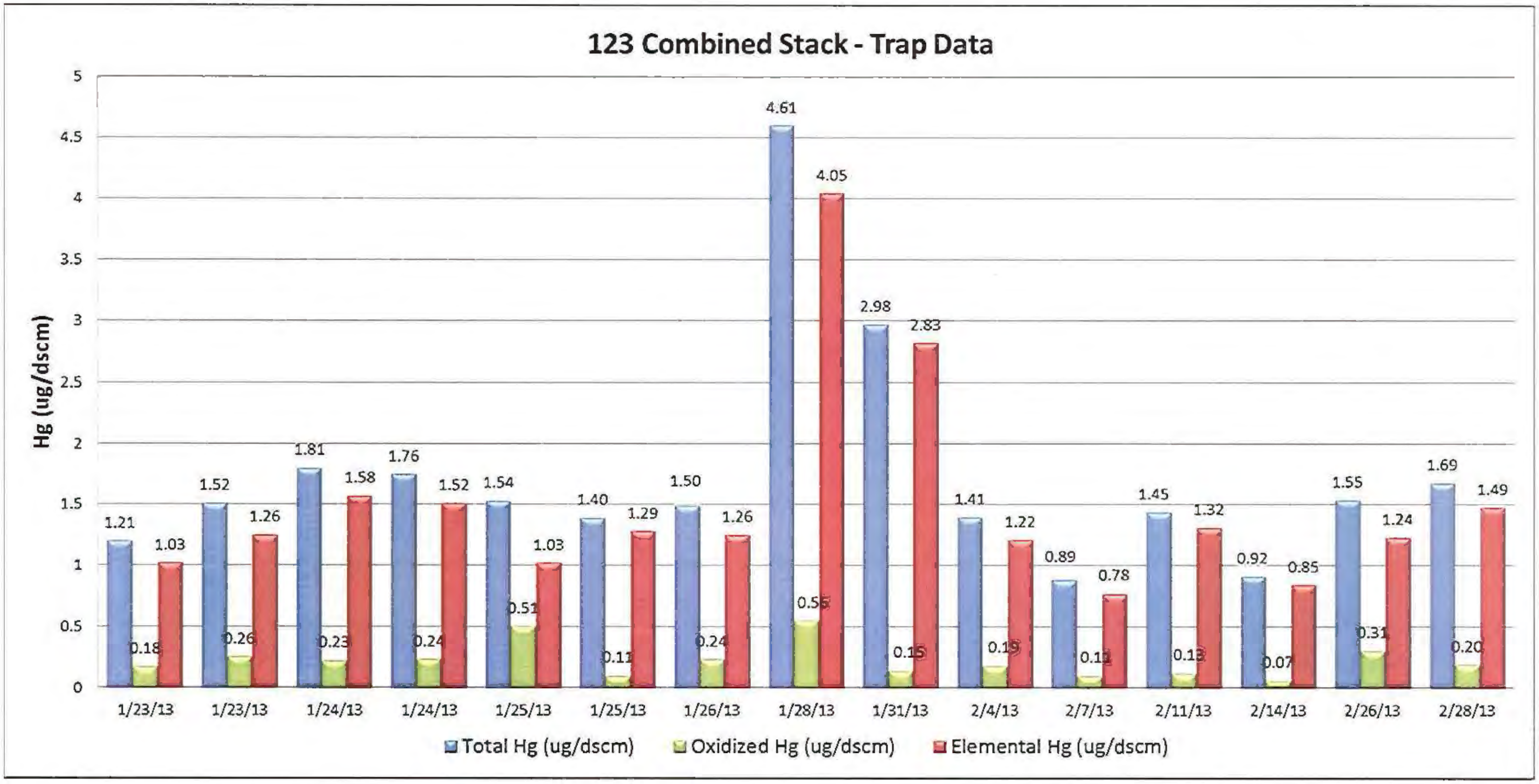
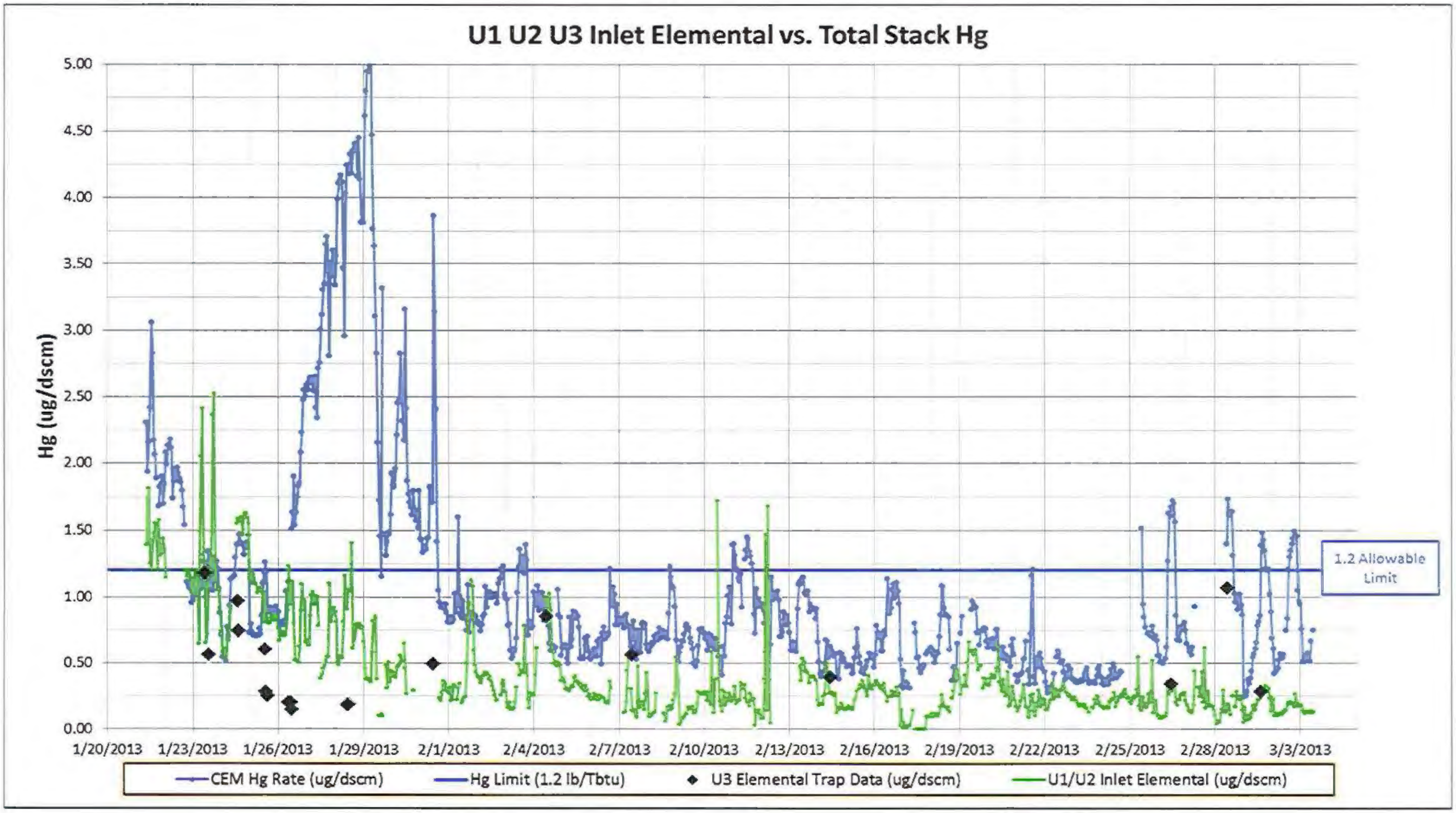
U1/U2 Inlet Hg Oxidation
Trap Data
Load (MW)

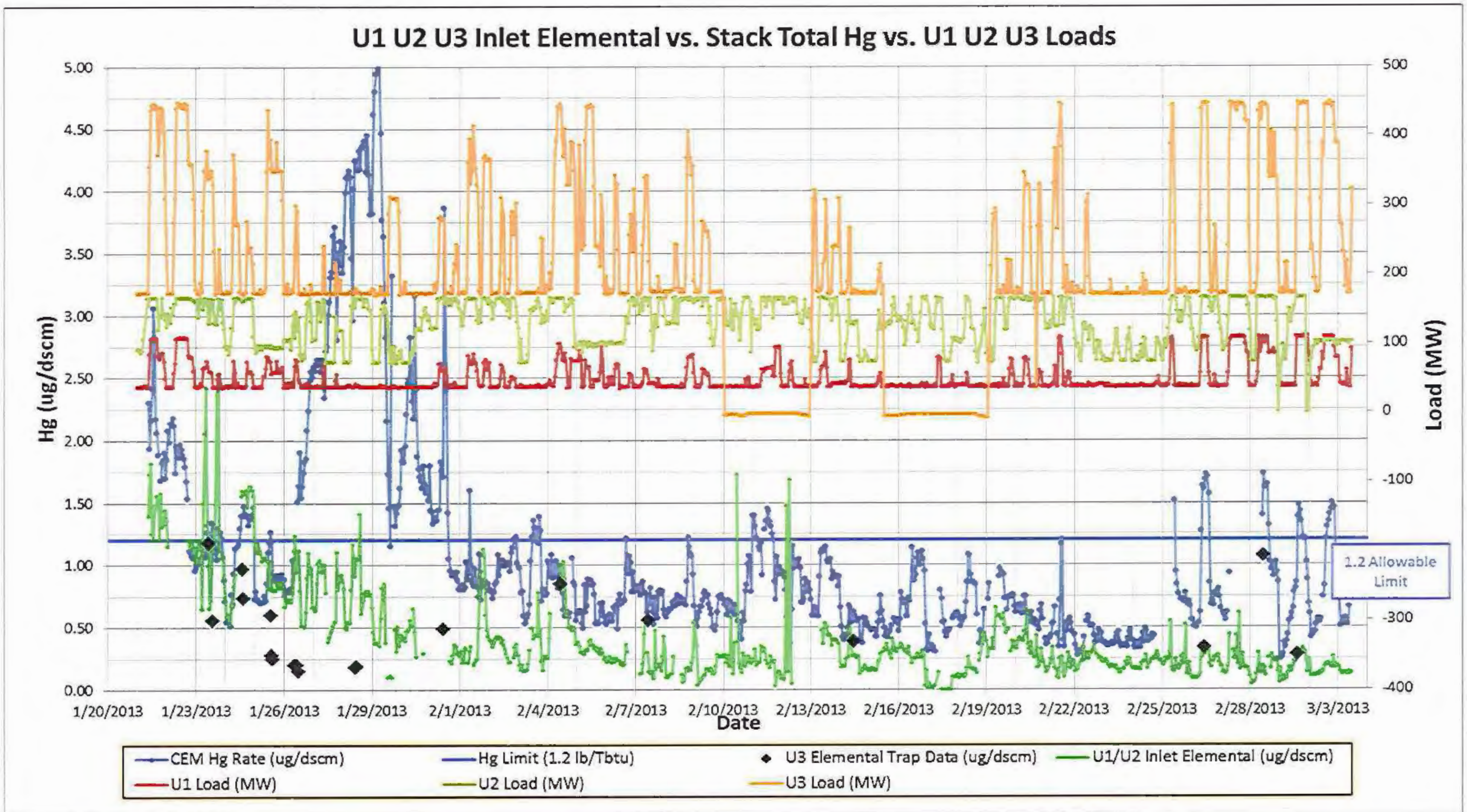


U1/U2 Inlet Hg Totals - Trap Data
Hg (ug/dscm)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
7.25
5.99
1.43
6.75
5.62
1.38
8.82
7.44
1.66
8.56
7.17
1.68
5.94
5.36
0.93
6.06
5.42
0.88
7.21
6.13
1.22
7.03
5.88
1.26
7.55
6.79
0.86
4.23
3.51
0.73
8.05
7.50
0.55
6.79
6.00
0.78
6.70
6.04
0.66
4.97
4.20
0.80
1/23/13
1/23/13
1/24/13
1/24/13
1/25/13
1/25/13
1/26/13
1/28/13
1/31/13
2/4/13
2/7/13
2/11/13
2/14/13
2/28/13
Total Hg (ug/dscm)
Oxidized Hg (ug/dscm)
Elemental Hg (ug/dscm)


U3 Inlet Hg Totals - Trap Data
Hg (ug/dscm)
Total Hg (ug/dscm)
Oxidized Hg (ug/dscm)
Elemental Hg (ug/dscm)


123 Combined Stack - Trap Data
Hg (ug/dscm)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1.21
1.03
1.52
1.26
1.81
1.58
1.76
1.52
1.54
1.03
1.40
1.29
1.50
1.26
4.61
4.05
2.98
2.83
1.41
1.22
0.89
0.78
1.45
1.32
0.92
0.85
1.55
1.24
1.69
1.49
0.18
0.26
0.23
0.24
0.51
0.11
0.24
0.15
0.13
0.07
0.31
0.20
1/23/13
1/23/13
1/24/13
1/24/13
1/25/13
1/25/13
1/26/13
1/28/13
1/31/13
2/4/13
2/7/13
2/11/13
2/14/13
2/26/13
2/28/13
Total Hg (ug/dscm)
Oxidized Hg (ug/dscm)
Elemental Hg (ug/dscm)


U1 U2 U3 Inlet Elemental vs. Total Stack Hg
Hg (ug/dscm)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1/20/2013
1/23/2013
1/26/2013
1/29/2013
2/1/2013
2/4/2013
2/7/2013
2/10/2013
2/13/2013
2/16/2013
2/19/2013
2/22/2013
2/25/2013
2/28/2013
3/3/2013
1.2 Allowable Limit
CEM Hg Rate (ug/dscm)
Hg Limit (1.2 lb/Tbtu)
U3 Elemental Trap Data (ug/dscm)
U1/U2 Inlet Elemental (ug/dscm)


U1 U2 U3 Inlet Elemental vs. Stack Total Hg vs. U1 U2 U3 Loads
Hg (ug/dscm)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Load (MW)
500
400
300
200
100
0
-100
-300
-400
1.2 Allowable Limit
1/20/2013
1/23/2013
1/26/2013
1/29/2013
2/1/2013
2/4/2013
2/7/2013
2/10/2013
2/13/2013
2/16/2013
2/19/2013
2/22/2013
2/25/2013
2/28/2013
3/3/2013
Date
CEM Hg Rate (ug/dscm)
Hg Limit (1.2 lb/Tbtu)
U3 Elemental Trap Data (ug/dscm)
U1/U2 Inlet Elemental (ug/dscm)
U1 Load (MW)
U2 Load (MW)
U3 Load (MW)

10

2015 - 2019 E.W. Brown Station Business Plan
Mercury Injection System O&M

Unit	2015	2016	2017	2018	2019
E.W. Brown Unit 1	$288,396	$678,528	$329,820	$280,347	$257,359
E.W. Brown Unit 2	$585,540	$1,377,612	$669,636	$578,732	$566,319
Total:	$873,936	$2,056,140	$999,456	$859,079	$823,678