COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

INVESTIGATION OF KENTUCKY UTILITIES COMPANY'S AND LOUISVILLE GAS & ELECTRIC COMPANY'S RESPECTIVE NEED FOR AND COST OF MULTIPHASE LANDFILLS AT THE TRIMBLE COUNTY AND GHENT GENERATING STATIONS	**))))))**	**CASE NO. 2015-00194**

RESPONSE OF
KENTUCKY UTILITIES COMPANY AND
LOUISVILLE GAS AND ELECTRIC COMPANY

TO THE COMMISSION STAFF'S INITIAL REQUEST FOR INFORMATION
DATED JULY 2, 2015

FILED: JULY 16, 2015

VERIFICATION

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

The undersigned, **Robert M. Conroy**, being duly sworn, deposes and says that he is Director - Rates 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.

Robert M. Conroy

Robert M. Conroy

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 16th day of July 2015.

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 16th day of July 2015.

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, **David S. Sinclair**, being duly sworn, deposes and says that he is Vice President, Energy Supply and Analysis for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the foregoing application, and the information contained therein is true and correct to the best of his information, knowledge and belief.

David S. Sinclair

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 16th day of July 2015.

Notary Public (SEAL)

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, **R. Scott Straight**, being duly sworn, deposes and says that he is Director of Project Engineering 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.

R. Scott Straight

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 16th day of July 2015.

(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, 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.

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 16th day of July 2015.

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

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

Case No. 2015-00194

Question No. 1

Witness: Gary H. Revlett

Q-1. Refer to the Joint Application, page 8, paragraph 12, which states that the Companies have not yet applied for a revised Title V air permit. Explain what issues can arise in applying for such a permit and whether the Companies have a contingency plan if the permit is delayed and/or denied.

A-1. The Companies are not aware of any issues that might occur as part of the Title V permitting process which would create delays in receipt of an air permit. In fact, the Companies submitted similar Title V permit applications for the construction of the Ghent and E.W. Brown CCRT and Landfill facilities without any issues or concerns. Both of the previous two applications for CCRT dry handling systems were processed by the Kentucky Division for Air Quality as "minor revisions" under KAR 52:020 Section 14, which allowed for construction to commence upon submittal of a complete application. Submittal of the Title V application will occur once the Engineering, Procurement, and Construction (EPC) contractor is selected and they have progressed substantially through engineering design and identified the process and emission control equipment necessary to incorporate into the air permit application.

The Companies have alternatives should there be a delay in the permitting or construction process. The Companies would continue to engineer and construct the on-site CCRT facility as it is needed to condition the CCR regardless of where the CCR is stored. Simultaneously, the Companies will work with the air permitting agency to quickly resolve any permitting issue. Should the permit be denied in the short-term and the existing on-site storage capacities approach full capacity, then the Companies' contingency planning would involve one or more of the following options:

i) Excavate CCR from the BAP and/or GSP to gain additional capacity and transport the CCR material to another landfill permitted to store the CCR. The Companies would determine the most economical, viable choice.
ii) Seek permit modifications to utilize portions of Ghent's CCR landfill.
iii) Pursue agreements with Valley View's commercial landfill, which is permitted and designed to store CCR.

iv) Aggressively continue to search for additional opportunities to increase beneficial use permissible under the federal CCR Rule and beneficial reuse under the Kentucky Special Waste regulations.

If the delay is long-term or an appeal is denied, and there is no CCR on-site storage and no viable location for the CCRs to be transported off-site, energy production from the Trimble County coal-fired units would need to be reduced or in the extreme case, shutdown until the permit issues can be resolved. Alternative energy supplies would be pursued and secured to ensure electric reliability for the customers through the Companies' established energy procurement processes.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

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Question No. 2

Witness: Robert M. Conroy

Q-2. Refer to the Joint Application, page 9, paragraph 13, which states that the Companies have expended to date $24.4 million on the Trimble County Landfill project. Of this amount, provide the portion that has been recovered through the Environmental Cost Recovery mechanism to date.

A-2. The $24.4 million referenced in the Joint Application, page 9, paragraph 13 was the total amount included in the KU and LG&E monthly Environmental Surcharge Reports for the December 2014 expense month, as filed on January 20, 2015 (KU = $11.7 million; LG&E = $12.7 million). In KU and LG&E's most recent monthly Environmental Surcharge Reports for the expense month of May 2015, as filed on June 19, 2015, $25.6 million has been included in the Environmental Cost Recovery mechanism related to the Trimble County Landfill project (KU = $12.2 million; LG&E = $13.4 million). Please note that the amounts included in the Environmental Surcharge Reports related to the Trimble County Landfill project represent 75% of the total project costs with the remaining 25% allocated to IMEA and IMPA consistent with their ownership share of the coal units at the Trimble County Station.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

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Question No. 3

Witness: John N. Voyles/R. Scott Straight

Q-3. Refer to the Joint Application, page 10, paragraph 16. The Companies state they have experienced delays in permitting, and that the permit for the Trimble County Landfill is expected in the near future. In event of further delay, whether due to permitting, construction, or any other reason, provide the Companies' contingency plan once the U.S. Environmental Protection Agency's ("EPA") Disposal of Coal Combustion Residuals from Electric Utilities Final Rule ("CCR Rule") is in effect and the current bottom ash pond is not a viable option for disposal.

A-3. Please see the response to PSC 1-1.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

Case No. 2015-00194

Question No. 4

Witness: David S. Sinclair/John N. Voyles/R. Scott Straight/Gary H. Revlett

Q-4. Refer to the Joint Application, pages 13-14. The table on page 13 shows that the Trimble County Landfill Capital cost estimate has increased from the year 2009 to the present. Paragraph 22 at the top of page 14 states that the Trimble County Landfill remains the most economical means of disposing of the coal combustion residuals ("CCR") produced by the Trimble County units.

a. Have the Companies performed any updated present value revenue requirement ("PVRR") analysis for all alternatives that were analyzed in Case Nos. 2009-00197 and 2009-00198. If so, provide a copy of that analysis.

b. Provide the costs that have been spent to date on the Trimble County Landfill project that would be considered a sunk cost if a different option were selected.

c. Provide a detailed listing of the construction components of Phase I, comparing the 2009 and 2015 costs as shown in the table on page 13. Provide a detailed explanation for the cost increases for each line item.

d. Refer to footnote 13, on page 14, which states, "The Sterling Ventures proposal did not take into account the final CCR Rule requirements pertaining to the new CCR landfills, which Sterling Ventures' limestone mine would be if used to store CCR beginning after October 2015." State whether depositing CCR into the -3- Case No. 2015-00194 Sterling Ventures limestone mine prior to October 2015 would relieve the Companies' concerns regarding this issue. If not, explain.

A-4. a. Yes. In February 2015, the Companies updated the cost for the proposed onsite landfill and compared it to the Sterling Ventures proposal. This PVRR analysis showed that an offsite alternative is more costly. A summary of this analysis was provided in the June 19, 2015 Informal Conference and is attached to this response. In response to PSC 1-18, the Companies have further updated the Sterling Ventures analysis, which also shows that the Sterling option is more costly.

In May 2015, the Companies further updated the cost of the onsite landfill and compared the PVRR of building the landfill to the PVRR of retiring the Trimble

County coal units and replacing the capacity with new natural gas combined cycle units. Before this analysis was completed, the retirement alternative was the only alternative that had not been evaluated. A summary of this analysis was provided as Exhibit 5 to the Companies' Joint Application and demonstrates that the proposed landfill is the lower cost option. Based on these analyses, the Companies believe that the proposed landfill remains the least cost option for managing CCR at the Trimble County Station.

For the 2009 filings, the Companies also evaluated an option to truck CCR to an existing offsite commercial landfill. The cost of trucking CCR to an existing offsite commercial landfill was more than two times the cost of the proposed landfill. In addition, due to the high volume of truck traffic, the Companies did not and still do not believe that trucking CCR to an offsite landfill is a feasible long-term CCR management option. Therefore, no additional offsite trucking options have been evaluated since 2009.

The 2009 filing also evaluated multiple alternative configurations of the offsite landfill. Compared to the other landfill configurations, the proposed landfill had lower capital and operating costs. Given the nature of the cost increases described in part c of this response and the fact that these cost increases would also apply to the alternative landfill configurations, the Companies believe that the relative cost differences between the landfill configurations have not materially changed. For this reason, the Companies have not reevaluated the landfill configurations from the 2009 analysis that were not recommended.

b. Please see the response to the PSC 1-6d.

c. Please see the following chart.

Phase I Costs Category (See Table 2 B.)	**2009 Estimate ($M)**	**2015 Estimate ($M)**	**Delta (2015 - 2009) ($M)**	**Explanation**
Fencing/Utility Relocation	0.6	2.7	2.1	a) 2015 estimate based on a larger area. b) 2009 estimate did not include costs for utility relocations required for landfill construction activities.
345 kV	7.3	8.2	.9	Minimal change in routing.
LGE Overheads	3.1	6.1	2.9	Change as a percent of estimate.
Engr./Permitting	0.2	13.0	12.8	a) Additional engineering - evolution of design. b) Multiple landfill configurations due to permitting requirements. c) Additional studies required by permitting agencies (Supplemental AA, Notice Of Deficiency responses, etc.).
CCRT	47.1	233.0	185.9	Refinement of estimate, accounting or regulatory changes, and Ghent CCRT lessons learned - see response to PSC 1-6c.
Stream Mitigation	8.1	36.9	28.8	Permitting efforts required a change in landfill design from 2009 to 2014. The new landfill design increased the quantity of stream and wetland impacts. In addition, Corps fees have significantly increased for stream and wetland mitigation.
IN Bat Mitigation	0.0	4.3	4.3	Indiana Bat mitigation fees were not anticipated in 2009
Property Acquisition	0.0	5.8	5.8	2009 estimate did not include property acquisition for additional buffer and borrow.
Landfill Proper	27.7	119.1	91.4	a) 2009 estimate was based upon a preliminary conceptual design; whereas, the 2015 estimate is based upon a revised landfill design (permitting application design level ~ 50%). b) Landfill footprints and overall design changed for avoiding lime cave/karst features. c) 2009 estimate Phase I construction was in 2010-2011 period; whereas, 2015 estimate is in 2016-2018 period, thus escalation has been included.
TOTAL (GROSS)	**94.1**	**429.1**	**335.0**	
TOTAL (NET)	**70.5**	**321.9**	**251.2**	

d. The new federal CCR rule does not become effective until October 19, 2015. Thus prior to this date the potential for disposal or beneficial reuse is only subject to the state regulations. Sterling Ventures' limestone mine site has a "Registered Permit-by-rule" for the beneficial reuse of the KU Ghent facility gypsum and this CCR material could be beneficially reused in their site until the October 2015 effective date.

However, the new federal CCR rule definition for "beneficial use" is much more restrictive. The Companies determined the Sterling Ventures proposal to place all CCRs in its mine would not qualify as beneficial use of CCR materials under the federal rule. The federal rule is a self-implementing rule and the Companies have an obligation to determine for themselves that all CCR management and disposal activities comply with the federal standards as well as state regulations. As the CCR rule is self-implementing, State authorities cannot independently make compliance determinations and at present, have not adopted equivalent state standards. In addition, there is no grandfathering clause in the new CCR rule. Thus, post October 19, 2015, all new or additional requirements must be met. EPA explained in both the preamble to the Final CCR Rule and in a July 8, 2015 response to Frequently Asked Questions that even fully state permitted CCR landfills must comply with the federal requirements for New CCR Landfills for any disposal cells that have not yet received CCR as of October 19, 2015. Thus, disposal of CCR in the Sterling Ventures mine would be regulated as a new CCR landfill even if it obtained all necessary state permits and some CCR were disposed of there by October 2015.

Evaluation of Trimble County Coal Combustion Residual Storage Options

PPL companies

Generation Planning & Analysis
2015

Table of Contents

1 Executive Summary

The existing coal combustion residual ("CCR") storage facilities at the Trimble County Generating Station ("Trimble County Station") are nearing capacity. As a result, additional CCR storage capacity will be needed as early as 2018. To meet this need, the LG&E and KU (the "Companies") requested a permit to construct a new landfill in 2010. However, in 2013 the Kentucky Division of Waste Management denied the permit for the new landfill citing the Cave Protection Act and the existence of the "Wentworth Cave" within the footprint of the new landfill as the reason. In July and August 2014, the Companies received comments from the EPA regarding the alternatives analysis submitted to the U. S. Army Corps to support a Clean Water Act permit application for the redesigned landfill. Based on these comments, as an alternative to building the on-site landfill, the Companies evaluated an alternative to store CCRs produced by the Trimble County Station in depleted sections of an active underground limestone quarry owned by Sterling Ventures ("Sterling").

Based on information provided by Sterling, their quarry appears to have only about 5 million cubic yards of available capacity that can be used to store CCRs which is significantly less than the CCR production from the Trimble County Station over the next several decades. For purposes of this analysis, the Companies assumed that additional capacity would be created at the quarry (from mining limestone) at a rate that would exceed Trimble County Station's need for CCR storage capacity. As a result of this assumption, the Sterling alternative is assumed to completely eliminate the need for an onsite landfill for the purposes of this analysis.

It should also be noted that the Sterling site, as understood by the Companies, is an unlined quarry. Based on the Companies' understanding of EPA's CCR Rule, the Sterling site is not likely to be a permitted alternative for storing CCRs. However, for purposes of this analysis, the Companies' assumed that the Sterling site could be permitted to store all forms of CCRs produced by the Trimble County Station.

In reality, both the assumption that additional space will be created and that the site will be a legal long-term repository for CCRs would create significant risk for the Companies and their customers. While this analysis does not explicitly address either of these risks, a prudent long-term CCR storage plan would require some amount of on-site storage capability in order to avoid the potential for the need to curtail generation from the Trimble County Station.

The costs of the onsite and Sterling CCR storage alternatives are summarized in Table 1.[1] The total capital cost for the onsite alternative is $99.4 million higher than the Sterling alternative, but $53.8 million more capital is required by 2018 for the Sterling alternative than the onsite alternative. All capital ($391.2 million) for the Sterling alternative is required by 2018; for the onsite alternative, only the capital for the CCR treatment and transport system ("CCRT"), pipe conveyor, and first landfill phase ($337.4 million) is required by 2018. Compared to the onsite storage alternative, the material handling costs in the Sterling storage alternative are much higher. As a result, fixed and variable operating and maintenance costs ("O&M") are much higher for the Sterling alternative.

[1] Typically, the Companies present cost data based on its 75 percent ownership share of the Trimble County coal units, but this project is applicable to 100 percent of the Trimble County CCRs. Unless otherwise stated, all of the data in this analysis is for 100 percent of the project.

Table 1 – CCR Storage Costs ($2014)

	Onsite Alternative	**Sterling Alternative**	**Difference (Onsite less Sterling)**
Capital Costs ($M)			
Spent by 2018	337.4	391.2	(53.8)
Spent after 2018	153.4	-	153.4
Total	490.8	391.2	99.4
Fixed O&M ($/Year)	1,210,000	2,525,000	(1,315,000)
Variable O&M ($/Ton)	1.59 – 1.98	15.42	(13.83) – (13.44)

The Companies evaluated the onsite and Sterling alternatives over six scenarios with annual CCR storage requirements ranging from 350 thousand cubic yards per year to 900 thousand cubic yards per year. In all six scenarios, the onsite storage alternative was lower cost than the Sterling alternative. The difference in present value of revenue requirements ("PVRR") between the onsite and Sterling alternatives ranged from $156 million to $217 million. This result is driven by several factors:

1. In all scenarios (and particularly in scenarios with higher CCR storage requirements), variable O&M costs for the Sterling alternative are significantly higher.
2. Due to the need to operate barge loading and unloading facilities, fixed O&M costs for the Sterling alternative are also higher.
3. The onsite alternative has higher capital costs overall, but more capital is required by 2018 in the Sterling alternative. This fact minimizes the Sterling alternative's capital cost advantage.

Without the ability to operate Trimble County Station units 1 and 2 beyond 2018, the Companies would need to replace 932 MW of their baseload capacity and associated energy from two of the lowest cost generating units in the Companies' system.

Based on the Companies' analysis, continuing with the onsite CCR storage alternative remains the least-cost alternative for the Trimble County Station compared to the Sterling alternative. In all scenarios considered, continuing with the onsite alternative is the least-cost alternative. Furthermore, these results do not address the risks associated with having no onsite CCR storage as well as the site specific risks inherent in the Sterling alternative. A prudent CCR plan for the Trimble County Station would address those risks which further supports continuing with the onsite storage project. Finally, regardless of which alternative is selected, the Companies will need to construct a CCRT system in order to dry and prepare the CCR's for storage.

2 Background

The Trimble County Station has two coal-fired generating units with a combined generating capacity of 1,260 megawatts. The station produces around 8 million MWh of energy annually (including IMPA and IMEA's share) and provides about 17 percent of the energy needs of the Companies' customers. The station consumes around 3.5 million tons of coal annually and produces approximately 700,000 to 900,000 cubic yards ("CY") of CCRs.[2] Approximately 27 percent of the station's CCRs were beneficially reused by the concrete, cement, and wallboard industries. Any CCRs not delivered to beneficial reuse markets are currently stored in onsite ponds.

In 2010, the Companies requested a permit to construct a new landfill. However, in 2013 the Kentucky Division of Waste Management denied the permit for the new landfill citing the Cave Protection Act and the existence of one karst feature known as the "Wentworth Cave" within the footprint of the new landfill as the reason. The Companies worked with GAI Consultants ("GAI") to redesign the landfill to exclude the karst feature. The initial siting study identified several potential alternatives based on combinations of a number of variables, including storage, transport methods, and site locations. The alternative that was chosen is more expensive than the 2009 design due in part to the modified footprint but also to increased cost estimates for the CCR treatment and transport system ("CCRT").[3]

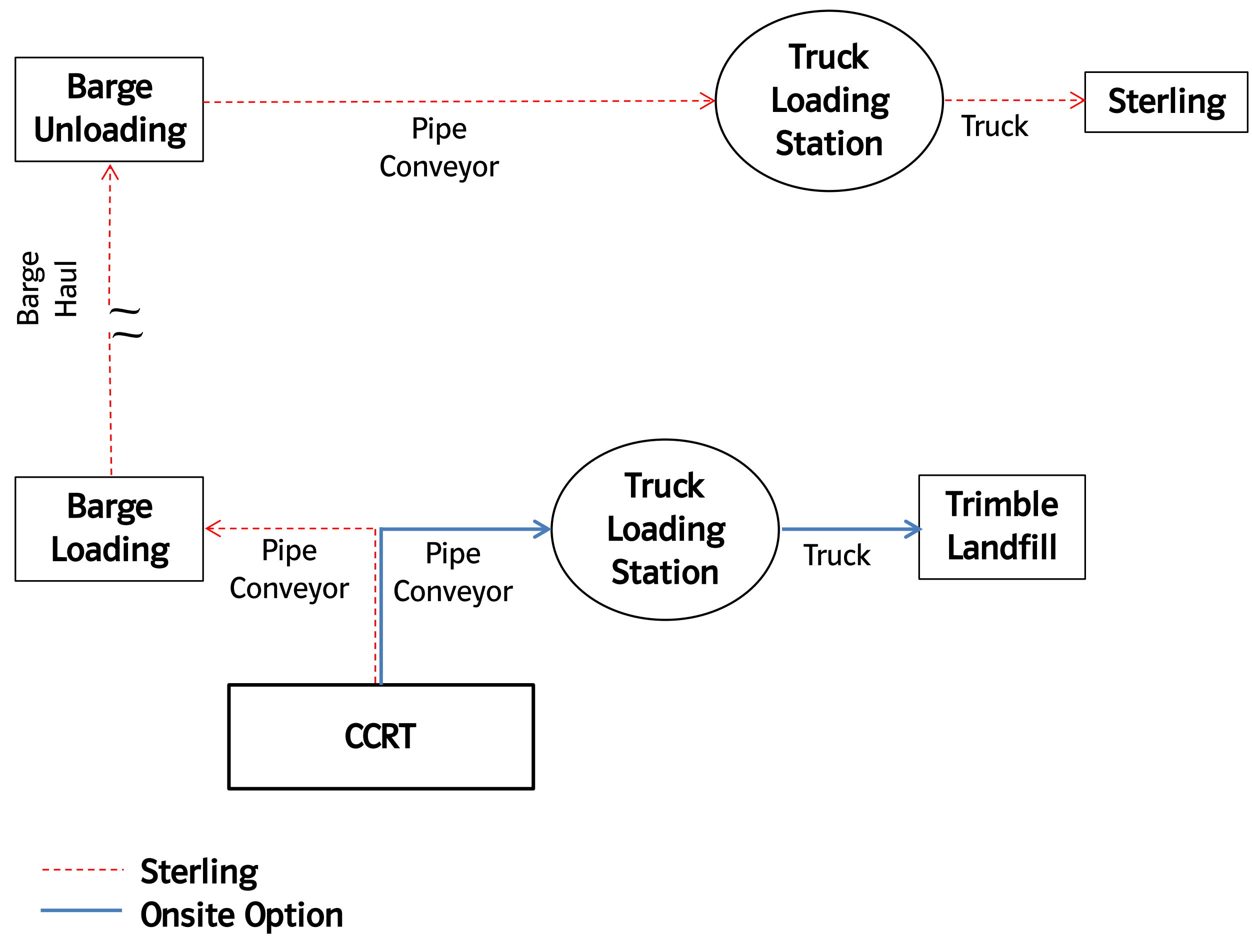
In July and August 2014, the Companies received comments from the EPA regarding the alternatives analysis submitted to the U. S. Army Corps of Engineers to support a Clean Water Act permit application for the redesigned landfill. Based on these comments, as an alternative to building the on-site landfill, the Companies evaluated an alternative to store CCRs produced by the Trimble County Station in depleted sections of an active underground limestone quarry owned by Sterling. The Sterling quarry is located in Gallatin County Kentucky near the Ohio River. This analysis compares the costs of the redesigned onsite landfill alternative to the cost of the Sterling alternative. The Sterling alternative consists of a tipping fee associated with disposing of CCRs at Sterling's facility plus the necessary capital and O&M costs to move CCRs from the Trimble County Station to the Sterling site. The Companies developed estimates for the infrastructure needed for handling and transporting the CCRs to the Sterling site.

3 Summary of Alternatives

Figure 1 contains a diagram of the CCR storage alternatives considered in this analysis. The least-cost onsite alternative consists of a CCRT, a pipe conveyor, a truck loading station, and a landfill. The CCRT conditions and prepares the CCRs to be transported by the pipe conveyor to the truck loading station where the CCRs are loaded into trucks. Then, trucks haul and place the CCRs in the landfill. The landfill will be constructed in four phases; the total storage capacity for all four phases is 33.4 million CY. The truck hauling distance from the truck loading station to the working face of the landfill varies between 0.5 and 1.25 miles depending on the landfill phase.

[2] CCRs are comprised of approximately 8% bottom ash, 30% fly ash, and 62% gypsum. The weighted average of CCR production results in a 1.2 tons per cubic yard average conversion factor for dry material.
[3] The increased cost estimates for the CCRT are based on actual costs for the CCRT that was recently installed at the Companies' Ghent Generating Station.

Figure 1 – Onsite and Sterling CCR Storage Alternatives



The Sterling alternative consists of the same CCRT, two pipe conveyors, barge loading and unloading facilities, a truck loading station, and the Sterling quarry. The first pipe conveyor transports the CCRs to the barge loading facility where the CCRs are loaded onto dedicated barges.[4] From there, the CCRs are barged approximately 47 miles up the Ohio River to a barge unloading facility located near the Sterling quarry. After the barges are unloaded, a second pipe conveyor, which is approximately three times longer than the first, transports the CCRs to a truck loading station where the CCRs are loaded onto trucks. Then, the trucks haul the CCRs to the quarry. The truck hauling distance is assumed to be 0.5 miles. Alternatives to the Companies' design for a least cost method of delivering the CCRs to the Sterling site that do not include the pipe conveyor systems would result in higher O&M costs associated with transporting the CCRs.

Based on information provided by Sterling, their quarry appears to have only about 5 million cubic yards of available capacity that can be used to store CCRs which is significantly less than the CCR production from the Trimble County Station over the next several decades. For purposes of this analysis, the Companies assumed that additional capacity would be created at the quarry (from mining limestone) at

[4] The length of the first pipe conveyor in the offsite option is assumed to be the same as the length of the pipe conveyor in the onsite option.

a rate that would exceed Trimble County Station's need for CCR storage capacity. As a result of this assumption, the Sterling alternative is assumed to completely eliminate the need for an onsite landfill for the purposes of this analysis.

It should also be noted that the Sterling site, as understood by the Companies, is an unlined quarry. Based on the Companies' understanding of EPA's CCR Rule, the Sterling site is not likely to be a permitted alternative for storing CCRs. However, for purposes of this analysis, the Companies' assumed that the Sterling site could be permitted to store all forms of CCRs produced by the Trimble County Station.

In reality, both the assumption that additional space will be created and that the site will be a legal long-term repository for CCRs would create significant risk for the Companies and their customers. While this analysis does not explicitly address either of these risks, a prudent long-term CCR storage plan would require some amount of on-site storage capability in order to avoid the potential for the need to curtail generation from the Trimble County Station.

3.1 Capital Costs

Table 2 summarizes the capital costs for the onsite and Sterling alternatives. The total capital cost for the onsite alternative is $99.4 million higher than the Sterling alternative, but $53.8 million more capital is required by 2018 for the Sterling alternative than the onsite alternative. All capital ($391.2 million) for the Sterling alternative is required by 2018; for the onsite alternative, only the capital for the CCRT, pipe conveyor, and first landfill phase ($337.4 million) is required by 2018. The capital cost for the CCRT and first pipe conveyor is the same for both alternatives. Based on its length, the second pipe conveyor in the Sterling alternative costs three times more than the pipe conveyor in the onsite alternative; this cost estimate is conservative since it does not account for the more rugged terrain through which the Sterling conveyor must pass. In addition, the Sterling alternative requires ten dedicated barges. With the exception of the cost of the barges, all capital cost estimates for both alternatives were developed by GAI. Not included in the Sterling alternative is the cost of a contingency plan for storing CCRs in the event that Sterling is unable to accept the material. A potential contingency plan would involve constructing Phase 1 of the landfill for the Sterling alternative ($135.3 million in the onsite alternative in Table 2).

Table 2 – Capital Cost ($2014, $M)

Onsite Alternative		Sterling Alternative	
CCRT	172.1	CCRT	172.1
Pipe Conveyor[5]	30.0	First Pipe Conveyor[5]	30.0
Landfill Phase 1[6]	135.3	Barge Loading/Unloading Facilities	43.0
Landfill Phase 2	79.5	Second Pipe Conveyor to Truck Loading	89.8
Landfill Phase 3	38.9	Site Preparation and Permitting	21.8
Landfill Phase 4	12.1	Haul Road	26.0
Intermediate & Final Soil Cover[7]	22.9	Barge Purchase	8.5
Total	**490.8**	**Total**	**391.2**

3.2 Fixed Operating and Maintenance Costs

Table 3 summarizes the annual fixed operating and maintenance costs ("O&M") for the onsite and Sterling alternatives. Compared to the onsite alternative, the annual fixed O&M for the Sterling alternative is more than $1 million higher. The fixed O&M estimates for the onsite alternative were developed by GAI. For the Sterling alternative, GAI developed the estimated road maintenance and dust control costs; the Companies developed the fleeting and barge operating costs based on existing contracts for similar services. The barge fleeting cost, which is the cost to secure and position the barges while loading and unloading, is the majority of the annual fixed O&M for the Sterling alternative. In addition to these costs, fixed O&M for the onsite alternative includes the cost of covering and closing landfill phases. Over the life of the project, these costs are less than $2 million in 2014 dollars.

Table 3 – Annual Fixed Operating and Maintenance Costs ($2014, $/year)

Onsite Alternative		Sterling Alternative	
Road Maintenance and Dust Control	420,000	Road Maintenance and Dust Control	390,000
Leachate System O&M	330,000	Fleeting for Barge Loading	485,000
Landfill Maintenance	460,000	Fleeting for Barge Unloading	970,000
		Barge Operating Cost	680,000
Total	**1,210,000**	**Total**	**2,525,000**

3.3 Variable Operating and Maintenance Costs

Table 4 summarizes the variable O&M for the onsite and Sterling alternatives. Compared to the onsite alternative, variable O&M for the Sterling alternative is approximately $14/ton higher. The variable O&M for the pipe conveyor and truck hauling is the same for both alternatives. The barge loading and unloading cost estimates are based on the Companies' experience operating their existing barge loading facility at the Trimble County Station. The CCRs are in a paste-like form that result in more difficult handling that other solids. Due to this consistency of the CCRs, unloading barges is assumed to be 50% more costly than loading barges. The truck hauling cost estimates are based on KU's contract for similar services at the Ghent Generating Station. Sterling Ventures provided the estimate for the tipping fee, which includes the cost of transporting the CCR by off-road trucks into the quarry.

[5] The capital cost for the CCRT includes the cost for a haul road which is needed in case the pipe conveyor is out of service.
[6] The Landfill Phase 1 cost includes site preparation and permitting costs as well as the cost of the haul road from the truck loading station to the landfill.
[7] The capital for intermediate and final soil cover are incurred as the phases are filled.

Table 4 – Variable Operating and Maintenance Cost ($2014, $/Ton)[8]

Onsite Alternative		Sterling Alternative	
Pipe Conveyor ("PC") Operating Costs	0.04	First Pipe Conveyor	0.04
Truck Hauling to Landfill (0.5 Miles)	0.99	Barge Loading	0.68
Truck Hauling to Landfill (0.75 Miles)	1.13	Barge Transport	2.50
Truck Hauling to Landfill (1.25 Miles)	1.38	Barge Unloading	1.02
CCR Placement & Compaction at Landfill	0.56	Second Pipe Conveyor	0.04
		Truck Hauling to Mineshaft (0.5 Miles)	0.99
		Sterling Tipping Fee	10.15
Total	1.59 – 1.98	Total	15.42

3.4 Other Inputs

Table 5 lists the other input assumptions for this analysis.

Table 5 – Other Inputs

Input	Value
Analysis Period	2015-2044
Return on Equity	10.25%
Cost of Debt	3.53%
Capital Structure	
Debt	47.4%
Equity	52.6%
Tax Rate	38.9%
Revenue Requirement Discount Rate	6.41%
O&M Cost Escalation Rate	3%
Capital Cost Escalation Rate	4%

4 Analysis of Alternatives

The need for additional CCR storage capacity varies with the level of coal generation at the Trimble County Station and the amount of CCRs that are beneficially reused. As coal generation increases or as beneficial reuse volumes decrease, the need for additional storage capacity increases. To capture the full range of possible CCR storage needs, three coal generation cases were considered: base, high, and low. The base generation case is taken from the Companies' 2015 Business Plan. The average annual capacity factor for the Trimble County coal units in the base generation scenario is 73%. In the high generation case, the average capacity factor is 80%. In the low generation case, the average capacity factor is 50%. The low generation case is an extreme scenario. The Trimble County coal units are two of the Companies' most efficient coal units; a 50% capacity factor for the Trimble County coal units implies that other coal units in the Companies' generating portfolio are operating at even lower capacity factors.

Because the Companies cannot reasonably assume a continuous and constant level of beneficial reuse moving forward, the analysis considered two beneficial reuse cases in addition to the generation cases. In the first case, no CCR volumes are beneficially reused. In the second case, beneficial reuse continues

[8] On average, to convert a $/ton of CCR to $/CY, divide by 1.2.

at current levels (approximately 250,000 CY/year). In total, the analysis considered six CCR storage scenarios (three generation cases times two beneficial reuse cases; see Table 6). With these scenarios, the analysis considers a wide range of annual CCR storage requirements. This is important for properly evaluating the onsite and Sterling storage alternatives.

Table 6 – CCR Generation and Beneficial Reuse Scenarios

Scenarios	Avg. Capacity Factor: Trimble County Coal Units	Beneficial Reuse (000s CY)	Annual CCR Storage (000s CY)
High Generation; No Beneficial Reuse	80%	0	900
High Generation; Beneficial Reuse	80%	250	650
Base Generation; No Beneficial Reuse	73%	0	725
Base Generation; Beneficial Reuse	73%	250	475
Low Generation; No Beneficial Reuse	50%	0	600
Low Generation; Beneficial Reuse	50%	250	350

Annual revenue requirements were computed for the onsite and Sterling storage alternatives over a 30-year analysis period for each of the six generation-beneficial reuse scenarios. For the onsite storage alternative, the annual CCR storage requirement impacts the timing of second, third, and fourth landfill phases. For each of the scenarios considered, Table 7 lists the in-service year for each landfill phase, the total nominal capital cost for the project, and the life of the landfill.

Table 7 – Timing of Onsite Landfill Phases

Scenarios	No Beneficial Reuse			With Beneficial Reuse		
	High Generation	Base Generation	Low Generation	High Generation	Base Generation	Low Generation
Phase 1	2018	2018	2018	2018	2018	2018
Phase 2	2024	2026	2028	2027	2029	2033
Phase 3	2032	2036	2039	2035	2040	2045
Phase 4	2044	2050	2057	2047	2055	2063
Final Cover	2055	2064	2074	2058	2068	2078
Total Project Nominal Capital Cost ($M)[9]	663	689	782	701	773	879
Landfill Life (years)	37	46	56	40	50	60

The results of the analysis are summarized in Table 8. Over all scenarios, the onsite storage alternative is lower cost than the Sterling alternative. The difference in present value of revenue requirements ("PVRR") between the onsite and Sterling alternatives ranges from $156 million to $217 million. The difference in levelized cost between the two options ranges from $14/ton to $22/ton.

[9] The total nominal capital cost excludes $26.4 million that has been spent on the project through 2/28/2014.

Table 8 – Analysis Results, All Scenarios (30-year study period)[10]

Scenarios	CCRs Stored (MCY)	Present Value Revenue Requirement ($2014, 2015-2044, $M)			Levelized Cost ($/Ton Stored)		
		Onsite	Sterling	Diff (Onsite less Sterling)	Onsite	Sterling	Diff (Onsite less Sterling)
High Generation; No Beneficial Reuse	32.7	637	854	(217)	42	57	(14)
High Generation; Beneficial Reuse	28.2	614	811	(197)	50	66	(16)
Base Generation; No Beneficial Reuse	26.0	614	795	(181)	51	66	(15)
Base Generation; Beneficial Reuse	21.5	589	752	(164)	64	82	(18)
Low Generation; No Beneficial Reuse	21.3	595	754	(159)	61	77	(16)
Low Generation; Beneficial Reuse	16.8	556	711	(156)	79	101	(22)

Table 9 lists the PVRR for the onsite and Sterling alternatives by cost item. Several factors drive the results of this analysis:

1. In all scenarios (and particularly in scenarios with higher CCR storage requirements), variable O&M costs for the Sterling alternative are significantly higher.
2. Due to the need to operate barge loading and unloading facilities, fixed O&M costs for the Sterling alternative are also higher.
3. The onsite alternative has higher capital costs overall on a PVRR basis, but this is more than offset by the lower fixed and variable O&M costs. Furthermore, inclusion of the capital ($135 million in 2014 dollars) associated with a potential contingency storage plan for the Sterling alternative would result in the Sterling alternative's capital costs exceeding those of the onsite alternative.

[10] To highlight the cost differences between the onsite and offsite alternatives, the cost of beneficial reuse projects are not reflected in these results. Beneficial reuse costs are the same for both alternatives.

Table 9 – PVRR by Cost Item[11]

Scenarios	Present Value Revenue Requirement ($2014, 2015-2044, $M) Capital Cost	Fixed O&M	Variable O&M	Total Cost
Onsite Alternative				
High Generation; No Beneficial Reuse	580	23	34	637
High Generation; Beneficial Reuse	563	23	29	614
Base Generation; No Beneficial Reuse	564	23	27	614
Base Generation; Beneficial Reuse	544	23	22	589
Low Generation; No Beneficial Reuse	550	23	22	595
Low Generation; Beneficial Reuse	516	23	17	556
Sterling Alternative				
High Generation; No Beneficial Reuse	523	44	287	854
High Generation; Beneficial Reuse	523	44	244	811
Base Generation; No Beneficial Reuse	523	44	228	795
Base Generation; Beneficial Reuse	523	44	185	752
Low Generation; No Beneficial Reuse	523	44	187	754
Low Generation; Beneficial Reuse	523	44	144	711
Difference (Onsite Less Sterling)				
High Generation; No Beneficial Reuse	57	(21)	(253)	(217)
High Generation; Beneficial Reuse	40	(21)	(215)	(197)
Base Generation; No Beneficial Reuse	41	(21)	(201)	(181)
Base Generation; Beneficial Reuse	21	(21)	(163)	(164)
Low Generation; No Beneficial Reuse	24	(21)	(165)	(159)
Low Generation; Beneficial Reuse	(7)	(21)	(127)	(156)

5 Conclusion

Based on the Companies' analysis, continuing with the onsite CCR storage alternative remains the least-cost alternative for the Trimble County Station compared to the Sterling alternative. In all scenarios considered, continuing with the onsite alternative is the least-cost alternative. Furthermore, these results do not address the risks associated with having no onsite CCR storage as well as the site specific risks inherent in the Sterling alternative. A prudent CCR plan for the Trimble County Station would address those risks which further supports continuing with the onsite storage project. Finally, regardless of which alternative is selected, the Companies will need to construct a CCRT system in order to dry and prepare the CCR's for storage.

[11] To highlight the cost differences between the onsite and offsite alternatives, the cost of beneficial reuse projects are not reflected in these results. Beneficial reuse costs are the same for both alternatives.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

Case No. 2015-00194

Question No. 5
Witness: John N. Voyles/R. Scott Straight

Q-5. Refer to the Joint Application, page 15, paragraph 25. Provide the length of time that will be required to construct the CCR Treatment facility.

A-5. Based on the construction for the CCR treatment facility at the Ghent station, the Companies estimate it will take approximately 30 months to construct the facilities at Trimble County. Final engineering and procurement activities are expected to add six months, making the total construction time approximately three years.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

Case No. 2015-00194

Question No. 6

Witness: David S. Sinclair/John N. Voyles/R. Scott Straight

Q-6. Refer to the Joint Application, Exhibit 4, the November 4, 2010 Update to Environmental Compliance Plans.

a. Refer to page 55 of 85. State whether a copy of all studies and analyses referred to in section E have been filed with the Commission. If not, provide a copy.

b. Refer to page 57 of 85. Section E states that the Companies have purchased 250 acres around the perimeter of the Trimble County landfill site for soil borrow and buffer and are exploring the purchase of another 200-250 acres.

(1) Provide the cost of the 250 acres purchased.

(2) Provide the cost and number of additional acres purchased since November 4, 2010.

c. Refer to pages 58, 64, 65, and 70 of 85. The Companies reference "lessons learned" related to the Ghent and Brown CCR treatment projects. Explain in detail the lessons learned and how these lessons influenced the new estimates.

d. Refer to page 61 of 85. Provide a revision of this schedule with activities and amounts updated through the date of the response.

e. Refer to page 67 of 85. Section C on this page states that the Trimble County storage facilities are forecasted to reach capacity by the end of 2018 with no beneficial reuse, and 2021 with current levels beneficial reuse. Provide the current forecasted dates the Trimble County storage facilities will reach capacity with no beneficial reuse and with current levels of beneficial reuse.

f. Refer to page 79 of 85. Explain the reason for the large increase in beneficial use beginning in 2003.

g. Refer to page 79 of 85. Provide a schedule of all beneficial reuse transactions including gypsum for 2013, 2014, and year to date 2015. Include in the schedule the following information: vendor/customer, material, quantity and the cost of disposal or the amount of revenue generated.

A-6. a. See attached for the permitting studies and analysis. Please also refer to the response to PSC 1-4a.

b. (1) The Companies have spent $ 2.1 Million (Gross) for 252.8 acres and improvements.

(2) All of the land purchases in part b.(1) above were purchased since November 4, 2010.

c. Since the 2010 ECR update to the Commission, the Companies have continued to refine design and cost estimates resulting in both increases and decreases in different phases of the Project. Increases in general items are the result of lessons learned from KU's Ghent and E. W. Brown design, engineering, and construction and include:

i. Development of the CCRT flow diagrams and general arrangements to include equipment redundancies typical of a utility operation which were not included in the 2009 conceptual estimate. The 2009 estimate included the assumption of utilizing a "Eurosilo" system for gypsum and fly ash that was later determined to be infeasible. After that option was eliminated, a more traditional gypsum drying and storage facility was chosen as the basis of future estimates.
ii. In the 2009 estimate, it was assumed bottom ash and pyrites would continue to be sluiced to the BAP. This assumption was changed due to the proposed CCR Rule resulting in adding bottom ash treatment equipment which was anticipated to require future BAP closure.
iii. Added conveyors for interconnection of equipment.
iv. Added an electrical building, transformers, and switchgear.
v. Final sizing of equipment and actual cost of equipment for Ghent CCRT was used for the revised estimates.
vi. Added platforms for maintenance and operational access to equipment as was determined necessary by the Ghent construction experience.
vii. Added an elevator for fly ash silo equipment access.
viii. Updated owners engineering cost to coincide with expected studies, permitting and engineering services.
ix. Added paving and enclosures around buildings and under conveyors to mitigate CCR contact water impacts for updated water runoff requirements.
x. Added a maintenance building to the CCRT facility.
xi. Added a service water line to landfill for road watering dust control requirements.
xii. Added mobile equipment for on-site CCR handling.

d. Please see the following table.

Overall Spend through June 30, 2015

Note: All Categories of Spend are Sunk Costs

TC Landfill Project	Spend Through 6/30/2015 (net $M)
TC CCR Landfill Phase 1 KU	$11.6
TC CCR Landfill Phase 1 LG&E	$12.5
Land KU	$0.8
Land LG&E	$0.9
Total	$25.8

Categories of Spend	Spend Through 6/30/2015 (net $M)
Fly Ash System	$10.4
Engineering	$6.8
Permitting	$4.6
Fence	$2.6
Property Acquisition	$2.3
Overheads	$2.3
345 kV Tower	$2.0
Miscellaneous	$1.9
Road/Bridge	$0.6
Ash Line Extension	$0.4
Telecommunication Tower	$0.3
Helicopter Pad Relocation	$0.2
	$34.4

e. Nothing has materially changed with regard to timing. Notwithstanding, the Companies have concern with capacity (i.e., material and water) and how that capacity is developing. The Trimble County bottom ash pond is the only pond in the Companies' fleet of stations that cannot discharge water. The timeline estimate is also weather dependent.

f. On Page 79 of 85 of Exhibit 4 (of the Joint Application), the graph begins in 2003 so there was no large increase. If the question pertains to the increase in 2013, it is directly related to a new contract between Trimble County and Holcim Cement for Holcim to use Trimble County fly ash as raw kiln feed in their cement production process.

g. Please see the following table. The information requested is considered to be confidential and proprietary and is being filed under seal pursuant to a Petition for Confidential Protection.

CONFIDENTIAL INFORMATION REDACTED

Schedule of Beneficial Reuse Transactions

Plant: Trimble County Station

			Quantity (Tons)			$
Vendor/Customer	**Material/CCR**	**Use**	**2013**	**2014**	**Jan-May2015**	**Revenue/(Subsidy)**
Trans Ash	Bottom Ash	Shingle granules & Blasting grit	3,500	2,188		[redacted]
Trimble County Road Dept	Bottom Ash	Anti skid material	100	6,000		
Charah	Fly Ash	Concrete/Truck	21,539	14,129	4,340	
Charah	Fly Ash	Concrete/Barge			*	
Holcim	Fly Ash	Cement kiln feed	130,762	123,017	41,444	
Synthetic Materials	Gypsum	Wallboard/Truck	89,691	114,593	34,096	
Synthetic Materials	Gypsum	Agriculture/Barge	15,210	5,047	-	
Synthetic Materials	Gypsum	Wallboard/Barge			22,940	

*The first fly ash barges loaded in June

Due to the size of the attachment, it is being filed on CD or separate jump drive. Please see the Petition for Deviation.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

Case No. 2015-00194

Question No. 7

Witness: David S. Sinclair

Q-7. Refer to the Joint Application, Exhibit 5, which provides an analysis of keeping Trimble County as a coal-fired plant and building the landfill or converting the existing plant to natural gas with no landfill. Explain why this analysis did not also include an alternative site analysis.

A-7. See the response to PSC 1-4a. The analysis summarized in Exhibit 5 compares the cost of building the landfill to the cost of retiring the Trimble County coal units and replacing the capacity with new natural gas combined cycle units. Before this analysis was completed, the retirement alternative was the only alternative that had not been evaluated.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

Case No. 2015-00194

Question No. 8

Witness: David S. Sinclair/John N. Voyles/R. Scott Straight

Q-8. Refer to the Sterling Ventures Formal Complaint.

a. Refer to page 12, paragraph 33, which states that the MACTEC 2012 Analysis submitted to the Environmental Protection Agency did not include Sterling Venture's mine option, although it was submitted six months after Sterling Ventures submitted its proposal. State whether this paragraph is accurate, and if so, explain why the Sterling Ventures option was not included.

b. Refer to page 18, paragraph 48, which states that, in a Supplemental Analysis, the Companies abandoned the 30 percent beneficial reuse assumption used in GAI Consultant's January 2014 Alternatives Analysis.

(1) State whether this is accurate. If so, explain the reason for the change.

(2) Provide the details and terms of the current beneficial reuse contracts associated with the Trimble County station.

c. Refer to page 21, paragraph 54. This paragraph states that Sterling Ventures prepared a PVRR analysis of the Trimble County Landfill versus its underground mine alternative. Provide the changes the Companies believe would be necessary, if any, in order to make the analysis more accurate.

A-8. a. No, the paragraph is not accurate. The MACTEC 2012 Analysis was for the Trimble County Landfill project and the Sterling Ventures option was not specifically included for several reasons. First, the Sterling Ventures proposal referenced here was for Ghent and tied directly to a Ghent gypsum backhaul and a limestone supply proposal. Secondly, the Sterling Ventures site was not permitted to receive any of Trimble County's CCR material at the time of their proposal for Ghent (on one level of the mine only). In fact, even in 2015 their site is only permitted for gypsum materials from Ghent and not permitted to store Trimble County's CCR. Sterling Venture's proposal for Ghent was also not specifically included in the Trimble County analyses due to the unreasonableness of relying on future, unmined capacity as the sole, long-term storage site to store CCR for the entire Trimble County station.

It is important to note that while Sterling Ventures was not specifically identified in the Trimble County analysis for the reasons stated above, MACTEC did consider alternatives for sand and gravel quarries and limestone aggregate quarries. The MACTEC 2012 Analysis report covers Sand and Gravel Quarries (Alternative 6B, see Section 5.5.2.2 pages 5-14/5-15) and Limestone Aggregate Quarry (Alternative 6C, see Section 5.5.2.3 pages 5-15/5-16). This alternative assessed placement of CCR in an aggregate quarry owned by Mulzer Crushed Stone along the Ohio River and the availability of other quarries in the region. Facilities that required barging were deemed not practicable and were eliminated from further consideration. It should also be noted that for the Army Corp of Engineers submittals before the effective date of the new CCR disposal regulations, the Companies were aware that disposal of CCR at an underground mine may not be allowed under the final regulations, could be regulated as hazardous waste disposal, or would likely be subject to all design and operating standards of new CCR landfills. These concerns were supported by the preamble to EPA's June 2010 proposed CCR rule: see 7 Fed. Reg. 35148, 35154, 35161 (June 21, 2010) Thus, even if Sterling Ventures possessed a state permit by rule for beneficial reuse under state law for Trimble County CCR, that permit would not control under the new CCR Rule, which was scheduled to be finalized in the near term.

b. (1) The Companies evaluated both the 100% storage volume and the 30% beneficial use assumption in the January 2014 Alternative Analysis report. Beneficial reuse was considered in site screening and in the final least environmentally damaging practicable alternative (LEDPA) analysis. See January 2014 AA at pages 1-4 and 22-24. Therefore, the contention that the Companies "abandoned" the 30% beneficial use assumption is not true as the 30% beneficial use scenarios were considered in the analysis. The analysis in the December 2014 Supplement likewise incorporates the 30% beneficial reuse scenario. As explained in Appendix III.C-1, the Companies did not eliminate any alternatives based on a lack of capacity to dispose of 100% of the projected CCR volumes, even though it pointed out that the 30% beneficial reuse figure as a long-term projection is highly speculative. Instead, the Companies used a screening threshold that was based on the 30% beneficial reuse scenario and considered alternatives that met that threshold (such as Alternative G, the Connor Ridge Road ridge tops alternative), as well as combinations of sites that met the volume based upon a 30% beneficial use assumption while pointing out that the Companies prefer a landfill with greater capacity because it would result in a longer landfill life if the 30% beneficial reuse assumption proves to be accurate (which is important given that TC Station Unit 2 is currently expected to have a service life that extends beyond the 2055 date used for landfill planning purposes). The analysis determined the preferred site was LEDPA under the Army Corps 404 Guidelines. While the Companies aggressively pursue beneficial reuse opportunities, the overall design of the landfill is for 100 percent of the projected CCR produced at Trimble County. This ensures the design and the permit cover the potential storage requirements. It is important to note that the Companies' landfill projects are implemented in a phased approach whereby the initial necessary structures and facilities (i.e., the CCRT, pipe conveyor, landfill collection ponds, etc.), that have no dependency on the final landfill footprint size or future phases, are first constructed along with a portion of the landfill needed for the initial years of CCR placement. This phasing of the landfill proper allows the landfill to be expanded on a needed basis, thus delaying and minimizing expenditures on the landfill proper until, or if they are needed to account for both CCR production and the change in beneficial reuse as it actually occurs. The amount of CCR produced, less the beneficial reuse that occurs, thus changes the timing of subsequent landfill phases or could possibly eliminate a later phase or reduce the ultimate landfill height.

The reasoning to base the design on the assumption of zero beneficial reuse is provided in the attached Supplemental Alternative Analysis Appendix III.C-1, as highlighted text on pages 2, 3, and 4. In this Appendix, three issues are addressed concerning beneficial reuse:

i. Assured estimate of beneficial reuse volume (page 3),
ii. The 30% beneficial reuse (page 3), and
iii. The Companies preferred benefit from beneficial reuse (page 4).

(2) The contracts are being provided pursuant to a Petition for Confidential Protection.

c. The analysis referenced in paragraph 54 is summarized in Exhibit S to the Sterling Ventures Formal Complaint. For the underground mine alternative, Exhibit S inappropriately excludes the cost of the CCR treatment facility that is needed to prepare the CCR for transport (see response to SV 1-9). The analysis summarized in Exhibit U to the Sterling Ventures Formal Complaint includes this cost. Until the Companies receive the source spreadsheets for these exhibits, it is difficult to fully evaluate the analyses. Based on a review of the exhibits, the following changes are needed to make these analyses more accurate:

i. In preparing Exhibits S and U, Sterling Ventures assumed that CCR can be unloaded from barges in Warsaw, Kentucky and transported via truck approximately 9 miles to their limestone mine. Due primarily to the high volume of truck traffic that would be required, the Companies do not believe this is a viable alternative. Instead, the CCR would need to be barged further upriver to a barge unloading facility located closer to the mine. The analyses in Exhibits S and U exclude the cost of the pipe conveyor required to transport the CCR from this barge unloading facility to the mine as well as the cost of permitting and developing the property on which the pipe conveyor would be constructed.

ii. Exhibits S and U exclude the cost of a conveyor (for the underground mine alternative) to transport CCR from the CCR treatment facility to the barge loading facility.
iii. Exhibits S and U exclude barge fleeting costs (for the underground mine alternative) for positioning the barges during the loading and unloading process.
iv. For the landfill alternative in Exhibit S and both alternatives in Exhibit U, the assumed cost to operate the CCR treatment facility is $6/ton (gross). This assumption is taken from Appendix P to the Sterling Ventures Formal Complaint on page 117 of 183 and pertains to the capital cost of the CCR treatment facility. Since this capital cost is already included for the landfill alternative in Exhibit S and for both alternatives in Exhibit U, this cost is double-counted in Exhibit S for the landfill alternative and unnecessarily included in Exhibit U for both alternatives.

In February 2015, the Companies compared the cost of the underground mine alternative to the cost of the onsite landfill (see the handout "Evaluation of Trimble County Coal Combustion Residual Storage Options" from the June 19, 2015 Informal Conference; the cost information in the handout reflects 100 percent of the project costs). In that analysis, the following cost assumptions were updated based on the Companies' existing contracts for similar services and should be incorporated in Exhibits S and U:

i. Barge loading and unloading cost. The February 2015 analysis included a fixed cost to maintain the barge loading and unloading facilities (see "Barge Operating Cost" in Table 3 at page 7 of the handout) as well as a variable cost to load and unload the barges (see "Barge Loading" and "Barge Unloading" costs in Table 4 at page 8 of the handout).
ii. CCR transport cost. In the February 2015 analysis, the cost to transport CCR in both alternatives was updated based on the cost for similar services at the Companies' Ghent station (see Table 4 at page 8 of the handout).

APPENDIX III.C-1. METHODS FOR EVALUATION OF LOGISTICS

1. INTRODUCTION

Pursuant to 40 CFR 230.10(a)(2), an alternative is deemed practicable if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." The assessment of "logistics" addresses the physical, regulatory, management or other tangible factors that may bear upon the practicality of implementing a complex project such as a Coal Combustion Residual (CCR) disposal facility.

Logistical factors may rise to the point that an alternative is determined to be not practicable, as when the existing topography at a site will not physically accommodate a properly built CCR disposal facility, unworkable operational constraints are created, or unacceptable safety hazards are present. In other cases, logistical factors may add complications that bear on the schedule, cost and impact of the project, which in turn may influence whether an alternative is practicable.

For a public utility such as LG&E, a particularly important consideration is the need to avoid potentially significant risks to safe and efficient generation of electricity that could result from the failure to assure proper long-term management of CCRs.

2. APPROACH TO LOGISTICAL EVALUATIONS

In the prior January 2014 Alternatives Analysis Report (GAI, 2014, see Support Document 1A), LG&E and its consultant GAI evaluated many different logistical factors for each identified alternative. This Appendix III.C-1 identifies the factors and discusses the methods used to evaluate each. The results of the evaluations are presented in other parts of this Supplement and are essentially unchanged from those in the prior report, though for Lee Bottom Landfill and Valley View Municipal Solid Waste (MSW) Landfill, there is more detail in this Supplement.

The past and present approach to evaluating logistical issues is a stepped and iterative approach, which is presented here as follows.

- All evaluations begin with a common assumption about the volume of CCR that must be managed, and consequent area needed to accommodate the landfill footprint. The basis for this volume and area estimate is provided in Section 3 of this Appendix. Sites with insufficient volume individually were aggregated together in various combinations that collectively would have adequate volume to accommodate the required CCR disposal volume.
- To evaluate any alternative, an extensive effort is required to conceptually design the prospective project. This involves a combination of professional judgment assisted by computer software. It includes evaluating the site topography or landscape to identify a logical location for the landfill and associated support facilities (transportation, runoff and sediment management, leachate collection and treatment, soil borrow areas). It further involves determination of appropriate facility dimensions, earth movement requirements, and other attributes of these project

components. This conceptual design is the basis for other evaluations, including the estimation of costs and prediction of approximate environmental impacts. In addition, the conceptual design is used to confirm the availability of sufficient capacity at a potential site or group of sites. The procedures for preparing a conceptual design of a CCR landfill are outlined in Section 4.

- Additional steps in the logistical evaluation involve identification of site-specific conditions that could impact design, costs or schedules. These additional factors are discussed as follows: 100-year floodplain (Section 5); cemeteries (Section 6); wetlands and streams (Section 7); karst features (Section 8); other project features (Section 9); land access and acquisition (Section 10); permitting (Section 11), and risks (Section 12). In some cases consideration of these factors could result in modifications to the conceptual design (e.g., to avoid certain site features), hence the conceptual design is an iterative process.

3. VOLUME REQUIREMENT

The nominal volume of CCR that requires storage has been estimated at 910,000 cubic yards per year, which totals 33.4 million cubic yards over the nearly 37 years between landfill start-up (beginning of 2018) and the lifetime for TC Station assumed for planning purposes. (approximately 2055). The volume is dominated by gypsum (53%) and fly ash (38%). The other primary component is bottom ash (7%); there are minor amounts of economizer/duct ash and pyrites.

This value is approximate and subject to variation over time. The volume reflects knowledge of current rates of CCR generation at TC Station. Based on experience, the size of a landfill footprint required to provide this capacity is on the order of 200 acres if only one site is used. For multiple sites, the cumulative acreage is greater.

As discussed further below, for purposes of this analysis, in GAI (2014) LG&E also had assessed alternatives using a storage volume of 640,000 cubic yards per year (23.4 mcy total) based on speculative assumptions about beneficial reuse of CCR.

Minimization of waste volume through pre-treatment. Current CCR disposal at TC Station is "wet", and involves slurry to ponds. For any new CCR facility, the CCR generated at the station will be subject to dewatering and conditioning and will be considered "dry".

Moisture content of the CCR will be reduced from 100% in the wet form, to 10-20% for dry disposal. This change will benefit any CCR disposal alternative due to the ability to place the CCR material in a dry landfill that can be stacked in elevation, as opposed to storage in an ash pond. In the specific case of LG&E's proposed action, the plan to convert material from 'wet' to 'dry' has allowed LG&E to modify its initial CCR disposal facility design so as to avoid any disposal in Ravine A and substantially reduce the landfill footprint in Ravine B.

Overview of beneficial reuse issues. GAI (2014) assessed CCR disposal facility Site Alternatives using both the 910,000 cubic yards/year value, and a reduction of that value by 30% through assumed beneficial reuse of CCR materials. The lower value was used in response to a concern by EPA that LG&E had failed to account for beneficial reuse of CCR and had eliminated otherwise viable alternatives because they did not have capacity to accommodate 100% of the anticipated CCR volume (estimated at 34.6 mcy in the earlier report). The discussion below addresses three aspects of beneficial reuse:

- difficulty in obtaining an assured estimate of how much beneficial reuse will occur;
- an arbitrary and aggressive assumption of 30% beneficial reuse;
- LG&E's preferred benefit from beneficial reuse.

Assured estimate of beneficial reuse volume. It is difficult to determine how much if any volume reduction will be achieved in the future through beneficial reuse of CCR. Issues with beneficial reuse include the following.

- Under current conditions, there is no assurance of a future market for TC Station CCR. The site is relatively remote from potential markets and must compete with the growing supply of CCR being produced elsewhere in response to regulatory controls. Today, TC Station's few off-site customers are "sold" CCR for the cost of transport only.
- Historically the highest sustained rate of beneficial reuse of CCR materials has been about 30% of the total CCR volume. Designing a CCR disposal facility based on assuming substantial beneficial reuse has minimal economic benefits, and imposes substantial operational risk if a particular assumed beneficial reuse rate is not achieved and the landfill design proves inadequate.
- Decisions about whether an alternative is practicable cannot be based on speculation and must be based on current conditions, which do not support an assumption of any assured level of future beneficial reuse.
- While not likely, if the EPA ruling on treatment of CCR material deems CCR to be hazardous waste, the beneficial reuse markup would be all but eliminated. Additionally, the proposed regulations may impact CCR use in large structural fill projects, which could affect the beneficial reuse market as well.
- Current and future air pollution control systems designed to reduce air emissions could further change the characteristics of CCR material, making the product less desireable for use in beneficial reuse projects.

Arbitrary and aggressive assumption of 30% beneficial reuse. Despite the uncertainty about the assured level of future beneficial reuse, GAI (2014) assessed site capacity of various potential landfill sites under the assumption that a volume reduction of 30% could be sustained indefinitely. Thus sites were not considered impracticable on the basis of capacity alone if they had capacity for at least 23.4 mcy. Further, sites with even less capacity were still considered in combination with other sites. The same approach is used in this Supplement.

LG&E's preferred benefit from beneficial reuse. Operation of the TC Station may extend past 2055. For example, a recent study by the Kentucky Energy and Environment Cabinet indicates that if the plant is retrofitted to provide carbon capture and sequestration, TC Station Generating Unit #2 will be the "last plant standing" among Kentucky's coal-fired generating units, with a life expectancy to 2070 (if not beyond). With the same retrofit, Unit #1 is projected to operate until 2066. These estimates are documented in Table B.1 of the Cabinet report which can be found at:

http://eec.ky.gov/Documents/Economic%20Challenges%20Report%20FINAL%20with%20letter%2012-18b-13.pdf

For its own planning, LG&E considers that any volume reduction achieved through beneficial reuse of CCR will mean that in 2055 the landfill would not have filled to capacity. This would have the practical benefit of extending the lifetime of the CCR landfill, at whatever location it may occur. Ideally the volume reduction from beneficial reuse and the extended landfill lifetime would obviate the need for any additional landfill site ever being needed for TC Station.

4. CONCEPTUAL DESIGN

The CCR landfill options considered by LG&E fall into two categories: conventional and non-conventional. The latter are alternatives that do not require actual construction of a dedicated CCR landfill, such as disposal in an existing underground mine or permitted municipal landfill. For such alternatives, the disposal design does not follow a standard format but must be tailored to the site.

For conventional options, where a new landfill would be constructed, a conceptual design is needed to evaluate logistical issues, estimate project costs, and identify potential impacts. Elements of such designs include: the landfill proper; the transportation system; and support facilities such as borrow areas, leachate treatment, and runoff and sediment controls. The conceptual design process needs to be relatively simple to allow for analysis of a large number of alternatives in a reasonable amount of time, and consistently applied to all alternatives. The process often is iterative, with modifications to the original concept occurring in response to site-specific conditions of the type discussed beginning in Section 5 of this Appendix.

Landfill. Conceptual design of a prospective CCR landfill at each candidate site for new construction was performed by consultant GAI and involved the use of the computer software AutoCAD Civil 3D. This software is an industry standard solution for civil engineering design and documentation. Application of the software included the procedures outlined below. The procedures are consistent with KY Siting Requirements for Special Waste Landfills (401 KAR 45:130).

- Initial area. A topographic map of each area was reviewed for obvious areas to be avoided. A preliminary landfill footprint on the order of 200 acres was placed on the map at a location that professional judgment indicated would be potentially suitable. This footprint was adjusted as needed during the remaining design steps.

- Base topography. A digital "existing ground" surface was created based on the available topographic mapping (USGS or aerial flown topography) in the area of proposed landfill alternative.
- Subgrade. The terrain beneath and around the conceptual landfill was designed based on rock blasting and earth moving sufficient to create a subgrade, including a minimum 100 feet wide valley floor, and subgrade slopes with a minimum gradient of three percent and maximum side slopes of 3 horizontal to 1 vertical. Each design included a 60-foot-wide corridor around the perimeter of the landfill to provide room for diversion channels, collection channels, liner termination, and site access. This corridor was sloped such that water could effectively drain around the entire landfill footprint, and into sediment and/or storm water ponds. Earthwork volume estimates were approximated using AutoCAD software by comparing the elevation differences between existing ground topography surface and the subgrade surface after excavation/earthmoving.
- Liner. The conceptual design provides for placement of a composite liner system beneath the entire landfill footprint. The conceptual designs were based on a system consisting of, from bottom to top, 6 inches of prepared subgrade, a 24 inch low permeability compacted soil liner, linear low density polyethylene (LLDPE) geomembrane liner, cushion geotextile, 12 inches of leachate collection system drainage layer to effectively drain leachate water out of the landfill, and 24 inches of protective cover ballasting material to protect the liner system during operations.
- Landfill. Conceptually, the landfill design assumes a series of lifts with intermediate slopes, benches, and cover. Benches would be 15 feet wide separated 17.5 feet vertically. The maximum intermediate slope between benches would be 2.5H:1V. The overall effective slope would be 3.5H:1V. The footprint of the landfill was adjusted to ensure the upper surface or top of the landfill had room for final completion of the project if existing site topography permitted. The footprint was increased if necessary to provide such room, if possible. If the top surface had more room than needed, the footprint was adjusted to be smaller, if possible based on existing site topography, primarily to reduce the size and cost of the liner system.
- Cover. The landfill final cover is conceptually designed as 24 inches of soil material (minimum 12 inches of cohesive soil below a non-cohesive vegetated soil layer) which would account for 2 feet over the entire landfill's footprint.
- Capacity estimate. The capacity for CCR storage is calculated in Civil 3D by first computing the volume created between the subgrade land surface and final landfill surface. Unless more site specific information is available, this volume is reduced by 5% to account for the space expected to be taken up by the drainage system, liner, final cover, and future access/haul roads on the face of the landfill.

Transportation facilities. The design of transportation facilities begins with an initial selection of long haul transport to the site by pipe conveyor, barge, or truck, or some combination of these. Specific design elements then proceed as follows.

- Pipe conveyor. The pipe conveyor system is a reliable and environmentally friendly means of short range CCR transport. The pipe conveyor is similar to a conventional belt conveyor in that it utilizes belting which transports the CCR materials. However, the pipe conveyor belt is much wider, which allows it to be loaded with material and temporarily formed into a tube to completely surround the CCR material protecting it from the elements (like wind, rain, etc.), until the material is discharged at the landfill or CCR disposal facility. The pipe conveyor can be designed to negotiate curves horizontally and vertically, unlike a conventional conveyor. This greatly reduces the number of required transfer points, which can generate dust between the material loading end at the plant and the material unloading end at the disposal facility. Change of direction can be accomplished without an intermediate transfer point where dust would be generated. At the discharge end of the pipe conveyor is an enclosed termination building, where CCR material would be loaded onto haul trucks to be taken to the disposal facility, or transferred to a short-term storage building via enclosed telescopic chutes, if needed. This building will provide a few hours of covered storage. Material will be moved to the storage building when trucks are temporarily not available for short periods of time. Front end loaders will be used to recover the CCR material from the short-term storage building and load it into trucks. The entire process will take place indoors to reduce fugitive dust created during the loading process. CCR stockpiles and the roads that the trucks travel over to the working face will be watered as necessary to control dust. In line with LG&E's desire to provide redundant control systems in order to avoid costly stoppages of CCR material transport, a haul road will approximately parallel the pipe conveyor corridor for all alternatives. The haul road will be designed and constructed to withstand the full weight of trucks required to keep up with CCR production on a temporary basis, assuming the pipe conveyor is off-line or out of service and CCR must be hauled from the onsite treatment facility to the landfill temporarily via truck.
- Barge. Barge transport would require the construction of a conveyor system (either pipe conveyor or conventional conveyor) from the existing onsite storage at TC Station to a barge loading facility along the Ohio River. It is likely that the space available at the existing TC Station barge loading area would need to be expanded in order to handle the full capacity of CCR material production. It would also require a new barge unloading facility near the off site CCR disposal facility. While barging would be the primary mode of transportation for alternatives that are of long distance proximity to TC Station, the CCR material will still need to be unloaded onto a different mode of transportation (either pipe conveyor or directly onto truck) in order to move it from the river to the CCR disposal facility. During times where the barge transport system would be unable to be utilized due to adverse river conditions (i.e. flooding or freezing) or barge facility maintenance/downtime, the CCR material would need to be hauled via truck to either the

intended CCR disposal facility, or a different site (for example an existing municipal solid waste (MSW) facility).

- Truck. For some alternatives, truck hauling is the only means of feasible transportation, for example when the distance to a CCR disposal facility is too great for pipe conveyor and the CCR disposal facility is not located close enough to navigable water to utilize barging. Truck hauling is the least cost effective means of transportation but under some circumstances is the only option. As mentioned above, even the use of pipe conveyor as a primary mode of transportation will require the CCR material to be placed on a truck and hauled into the actual CCR landfill or other disposal facility (e.g., mine). In other instances, it may make more logistical and/or economical sense to place the CCR material on trucks (instead of pipe conveyor) and haul the material to the CCR disposal facility, avoiding an unnecessary transfer point and additional capital costs of pipe conveyor construction. This approach is most appropriate when the distance to the CCR disposal facility is relatively short, i.e. on the order of less than one mile.

Ancillary facilities. The other primary elements considered during conceptual design are leachate treatment, surface water management, and borrow areas.

- Leachate treatment. For landfill alternatives, water that contacts the working face of the landfill will be conveyed through the landfill material via infiltration or vertical chimney drains into a leachate collection system, a series of pipes and porous drainage media designed to limit the hydraulic head on the liner system and drain the leachate water to a lined leachate pond.

  The leachate pond would be lined with a geosynthetic and concrete fabric-formed lining. The pond would ideally be positioned at the toe of the landfill, where the main leachate collection system pipe leading from the landfill would discharge into the upper end of the pond. If necessary based on effluent requirements and chemical testing of the leachate, the leachate would need to be treated, by being a) transported to TC Station and treated at a planned treatment facility, b) transported to a existing Surface Water Treatment Facility (SWTF), or c) treated in a new leachate treatment facility that would need to be constructed locally.

  The leachate pond would be designed to store the maximum average 15-day leachate volume production based on simulated climatological data and calculations in the Hydrologic Evaluation of Landfill Performance (HELP) model, a widely used computer program that models various conditions of the landfill (slope, slope length, landfill material permeabilities, leachate collection system pipe spacing, etc) to determine the estimated leachate production for given climate and precipitation data.

- Surface water management. For landfill alternatives, surface water will need to be controlled using a series of collection channels, diversion channels, waterbars, slope drains, culverts, and Erosion and Sediment / Stormwater Management (ES/SWM) Ponds. Surface water that does not come in contact with the active working area of the landfill will be isolated from the contact water and conveyed to an ES/SWM Pond(s). The ponds would be sized based on Kentucky Best Management Practices for Controlling Erosion, Sediment, and Pollutant Runoff from Construction Sites Manual guidance for Kentucky sites or similar regulatory guidance documents for Indiana sites.

- Borrow areas. Soil and clay material are used in the subgrade, liner, intermediate cover, and final cover systems at CCR landfills. The need for this material makes alternatives that are close in proximity to potential borrow areas more desirable, all other considerations being equal. For ridge top sites an additional logistical consideration is to account for the cost of double handling of borrow material if the material inside of the landfill footprint is to be used as borrow soil. Where CCR will be placed on the ridge tops, the soil must be removed prior to being needed for fill or cover, and therefore must be set aside in stockpiles for subsequent use. Double handing and stockpile construction are added components of the actual project to be considered in evaluating costs and impacts. For landfill alternatives, it is imperative to purchase property such that enough soil and clay borrow material needed for the landfill subgrade, liner, intermediate cover, and final cover systems can be obtained locally, as opposed to purchasing and importing the material from external locations/sellers. At a conceptual level (prior to subsurface investigations) standard planning is to identify areas for available soil and clay borrow material that exceeds the estimated required soil and clay by two to three times, i.e., a factor of safety in the range of 2 to 3. This takes into account that all material identified in a paper study as borrow material will either not exist or not be suitable. For alternatives located in proximity to Ravine B, existing soil investigations including boring and test pit data can be reliably counted on to quantify the amount of useable soil and clay borrow material available (i.e. the depth of soil and clay are reasonably known, therefore one can calculate the acreage needed to obtain a volume required to meet sufficient factors of safety). For alternatives that are located away from Ravine B, online and published county soil surveys were utilized to estimate the amount of useable soil and clay in the proximity of the proposed landfill.

5. 100-YEAR FLOODPLAIN

Regulatory standards strongly discourage if not preclude building a CCR landfill in a floodplain of a significant waterway (33 CFR Part 320.4(l)(3); 401 KAR 45:130; 401 KAR 30:031). In its letter of July 11, 2014 EPA stated that it "concurs with the position, taken in the LG&E's alternatives analysis that sites located within the 100-year floodplain of the Ohio River are impracticable alternatives". Thus any site at which a significant portion of the landfill would have to be located in the Ohio River floodplain is considered not to be practicable.

If a project requires barge facilities, these will of necessity be located in the floodplain and possibly the floodway, and will require additional agency coordination, including with the Federal Emergency Management Agency (FEMA). Depending on the fill amount, surrounding area, and adjacent property owners, FEMA may require a Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR) for the Project's disturbance. These letters are part of the administrative procedure by which

Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) reports are revised. Past experience indicates that following the initial contact made with FEMA, this process may take two years or more before construction is able to begin.

The 100-year floodplain boundary used in this analysis was sourced from online Geographic Information Systems (GIS) database, http://kygeonet.ky.gov.

6. CEMETERIES

The locations of cemeteries were identified based upon historical map research, SHPO cultural resources files, and information available from websites such as Findagrave.com. By law, any cemetery potentially impacted by a CCR disposal facility in Kentucky must be avoided or relocated. As discussed beginning on page 19 in GAI (2014), relocation is a practical impossibility for any cemetery that has more than a few graves or has graves for more than one family. This is because reburials require extensive and often impossible coordination efforts to satisfy state regulations concerning notification and disinterment agreements with next-of-kin. One denial by a single next-of-kin can delay or halt the relocation planning process indefinitely, making an alternative requiring cemetery relocation impracticable. Currently, the cemeteries in proximity to Site Alternatives analyzed in this Supplement appear to be well marked and thus cemeteries are assumed as being able to be avoided in the conceptual design process.

7. WETLANDS AND STREAMS

The evaluation and regulatory permitting of impacts to streams and wetlands that would result from the construction and operation of a given landfill project involves a multi-step process. The logistical efforts required depend largely on the ecological setting and land use in the location of a site alternative. The logistical efforts include the initial evaluation of the extent of streams and wetlands and aquatic quality within a defined study area, designing of the landfill project so as to avoid streams and wetlands where feasible, and coordination with the state and federal regulatory agencies on project-specific studies and application materials.

The impacts to streams and wetlands resulting from the construction of the various case studies was essentially evaluated by one of two approaches, dependent on whether a particular site footprint had been previously field-delineated for stream extents and classification (e.g., flow type and quality) as part of Ravine B vicinity studies. Streams within the Ravine B vicinity have been evaluated for stream quality through field surveys whereas other site alternatives were evaluated and estimated via desktop methods (published stream data such as U.S. Geological Survey's National Hydrography Data set, the National Wetland Inventory and other GIS mapping techniques based on topographic contour data).

The logistical effort required to obtain a Clean Water Act Section 401 and 404 individual permit is typically proportional to the linear feet or acreage of streams and wetlands, and the overall quality of each resource proposed as unavoidable impacts. However, a site alternative proposed to impact a large linear footage of ephemeral streams of poor quality could conceivably be a simpler permitting effort compare to a smaller amount of perennial and intermittent streams of high aquatic value and quality.

In terms of construction and operation of a landfill site, projects situated in settings having several high quality streams and wetlands within the impact area, or even downgradient of the impact area, will require more extensive efforts and cost to protect these areas from stormwater runoff in order to minimize adverse impacts to downstream water quality.

8. KARST FEATURES

On March 20, 2013 the KDWM sent an Intent to Deny application letter for a prior Ravine B alternative based upon the impact of the project on "Lime Cave.", which is also known as "Wentworth Cave." The letter stated "…that the excavation or destruction of the cave does not comply with the requirements of the Cave Protection Act in KRS 433.877(1)…" This letter also states, "…a final decision by the Division to deny the permit application would not preclude the submission of a new application for a similar facility in an alternate location." On May 2, 2013, the prior landfill application was denied on that basis. LG&E, GAI, and KDWM met on May 23, 2013 and discussed Site Alternatives to avoid the karst feature referred to as "Lime Cave" and sites that impact a large amount of karst features. Any site that has significant impacts to large karst features that could be caves as described in the Kentucky Cave Protection Act (such as the "Lime Cave") would be considered impracticable based on this precedent. Some Site Alternatives will require addressing the potential impact to other karst features. The construction costs to fill, grout, or otherwise avoid these karst features is not included in this analysis.

9. OTHER SITE FEATURES

Many aspects of a CCR site or project are not critical to determining if an alternative is feasible, but can impact practicability through their effect on costs. Those given consideration in the current Alternatives Analysis are briefly described below.

Utility Lines. The need to address electric, gas, water or sewer lines occurs when such lines are proximate to CCR facilities. Utilities will need to be abandoned if not needed subsequent to LG&E's project, or relocated if there is a need for them to continue to provide service. At the stage of evaluating alternatives, only major power or gas lines are considered to have potentially significant logistical effects. Aerial imagery, data from utility companies, and other available digital public information are used to determine locations and types of overhead and underground utility features.

Farmland. The Farmland Protection Policy Act requires the USACE to consider alternatives that would lessen the impact to prime farmlands. See 7 U.S.C. 4201 et seq. and 7 CFR Part 658. The USDA's Natural Resource Conservation Service (NRCS) soil surveys define prime farmland soils based on the specific mapped soil unit having certain soil qualities. The site alternatives were not quantitatively evaluated for the presence of prime farmland.

Cultural resources. Section 106 of the National Historic Preservation Act requires the USACE, as the lead federal permitting agency, evaluate a project's effects on cultural resources that may be eligible for listing to the National Register of Historic Places (NRHP) including archaeological sites and historical/ architectural resources. The work is conducted in phases. The initial Phase I survey identifies the Area of Potential Effect (APE). The APE for archaeological sites is typically limited to the footprint of ground disturbing activities while the APE for architectural resources is expanded to take into account impacts to the viewshed and other considerations. This is followed by background research that includes a review of previously recorded cultural resources and records on file at various state agencies. In this instance, cultural resources files maintained by Indiana Department of Nature Resources, Historic Preservation and Archaeology (DHPA), Indiana State Historic Architectural and Archaeological Research Database (SHAARD), Kentucky Office of State Archaeology (OSA), and Kentucky Heritage Counsel (KHC), aerial photographs, local histories, and historic maps were consulted to identify previously recorded cultural resources, locations of structures over 50 years of age, location of former buildings, and areas of special concern, such as cemeteries, schools, churches, and a historic airfield. Landform settings and areas of prior disturbance were also assessed to identify locations of moderate to high archaeological site potential and areas with low to no archaeological site potential. Locations with the potential for deeply buried archaeological sites were also evident.

The initial Phase 1 study and background research described above was completed as part of this report for the Case Study alternatives Lee Bottom and Sterling Ventures, and can be found in Appendix III.B-2 and III.B-3, respectively. More detailed research and additional phases of cultural resources work were previously completed for the Ravine B area. No cultural resources investigations were completed for Valley View MSW Landfill.

Background research would be followed by a Phase I field survey to identify archaeological sites and historical/architectural resources over 50 years of age within the APE. Preliminary NRHP evaluations are made of all identified cultural resources and recommendations are submitted to the USACE and State Historic Preservation Office (SHPO).

Depending on the results of the Phase I surveys, it may be necessary to conduct Phase II testing of archaeological sites or conduct a Criteria of Effects study of architectural resources to further evaluate potentially NRHP-eligible resources. This evaluation process typically includes extensive field work to recover and document the archaeological site and extensive historical research for historic eraq archaeological sites and architectural resources. Based on the results of the Phase II investigations, the USACE consults with the SHPO to determine effects of the project on NRHP-eligible historic resources. In cases where adverse impacts (by a CCR project for a site alternative) to a NRHP-eligible resource are unavoidable, it will be necessary to mitigate adverse impacts to this resource. This is a lengthy and expensive process.

<u>Threatened and endangered species</u>. All alternatives in the region of TC Station that would require any amount of forest clearing are assumed to have the potential to impact habitat for the federally endangered Indiana bat (*Myotis sodalis*). Typically LG&E would be required to mitigate for impacts in accordance with an existing Memorandum of Agreement (MOA) with the USFWS's Kentucky Field Office. Mitigation requirements would also apply to a site in Indiana. The process would require preparation of a Biological Assessment addressing the Project's effects on the Indiana bat and other protected species (mussels, fish, mammals, and other animals as well as plants), including for example endangered mussel

species in the Ohio River. The potential occurrence of species can be determined through coordination with regulatory agencies, but extensive field studies may be required to determine the actual presence or absence of specific species. In many cases surveys for species may be restricted to certain times of year, potentially affecting schedule. If sensitive species are present, construction schedules could be affected.

Mining/Quarry areas. LG&E understands that EPA would advise against using a closed sand or gravel pit for CCR disposal, especially if located within the floodplain and construction would require excavation below the groundwater table. Thus, alternatives that are within above ground mining or quarry areas are considered to be impracticable due to the logistical issues associated with these practices. LG&E is also concerned that EPA may not approve disposal in any type of mine, but pending issuance of an EPA rule on the matter, LG&E has not used this concern to reject CCR management in an underground limestone mine.

Travel route and distance. Barge and truck transport will have energy consumption, air emissions, noise effects, and accident potentials that are generally a function of the travel route, distance required, and equipment used. The route and distance are calculated based on the shortest distance from TC Station to a CCR site, using the Ohio River (barge) or government maintained highways. The traffic volume is calculated based on CCR generation rates and capacity of the barge or truck.

For barge transport, the assumption is that each barge has the capacity to transport approximately 1200 CY of material at a time. Assuming 910,000 CY of CCR material needs to be managed each year, that would equate to a total of 758 barge loads per year, or approximately 15 per week. Assuming a loading rate of 600 tons per hour, it will take approximately 2 hours to load each barge and therefore four barges could be loaded in a single eight-hour work day. Assuming a similar rate for unloading of 600 tons per hour, it would take another eight-hour work day to unload the material. It is assumed that the barge transport itself can be accomplished at night, taking advantage of daylight for loading/unloading operations. In order to meet the CCR production rate, it is assumed that one of two fleets of four barges each will need to be at the loading facility at all times.

For truck transport, the assumption is that each truck has the capacity to transport 18 cubic yards at a time. If 910,000 cubic yards need to be managed each year, that would equate to a total of 50,555 trucks per year one way, or more than 100,000 trips round trip. If trucking were limited to 6 days per week, and 12 hours per day, then except for the off day any location along the route would be passed by a loaded or unloaded truck on the average of just over one every two minutes. Loading and unloading facilities would be designed to each handle at least 15 trucks per hour.

Impacts from truck transportation can be qualitatively evaluated based upon the types of roads that must be used (e.g., local county or divided highway) and whether the road passes through populated areas. Impact considerations include the number of residences located close to the roadway, and the presence of schools or other facilities of particular concern.

Aesthetics. A CCR landfill constructed above an existing landscape could be visible and audible to nearby residents or passersby. To identify this potential impact, a conceptual landfill is assumed to raise aesthetic issues if its projected top elevation protrudes above the topographic mapped elevation of the surrounding terrain. Landfill design may be adjusted to minimize this impact. Further, LG&E has the general practice of purchasing land that is not needed directly for the project, if it would provide an aesthetic buffer for the surrounding population.

10. LAND ACCESS AND ACQUISITION

Alternatives using existing disposal sites may require land acquisition only for transportation and access, while other alternatives will also need land for the landfill and ancillary facilities. In either case, for LG&E to consider a candidate CCR site as potentially practicable, sufficient acreage must be reasonably available to allow for construction of all facilities with avoidance of critical features, provide for borrow material, and allow for buffer areas between the landfill and its neighbors.

Property line information was obtained from local Property Valuation Assessment (PVA) data or existing property mapping provided by LG&E. When the impact boundary encroached at all on a property, it was assumed that the property would need to be purchased in its entirety, with the exception of Sterling Ventures Mine, which assumes only portions of existing property encompassing the impact boundary needed to construct and operate barge unloading facility, pipe conveyor, and haul roads would be purchased due to these parcels being large (on the order of hundreds of acres each). Previous LG&E experience with property acquisition has shown that the timeline to purchase a single property from an owner willing to sell may take up to one year to complete negotiations and the purchase. Properties owned by unwilling sellers will cause even further delays, thus making the acquisition of the property unlikely without condemnation. At this time, LG&E has not confirmed it has effective powers of condemnation in Indiana.

11. PERMITTING

Even the simplest large-magnitude CCR project must comply with a considerable array of regulatory requirements and a permitting process that may take several years. Permitting requirements are expected to be greater than usual for any project that requires construction of barge terminals, or is sited on problematic terrain (e.g. due to factors such as steep slopes, karst features or cultural resources). The more complex a project, the more that permitting considerations will impact project costs and schedule. Where anticipated permitting issues could have the possibility to delay the Project schedule past the required CCR material placement date, LG&E assumes that emergency/temporary handling measures will need to be put in place.

12. RISKS

Utilities that provide a public service are exceptionally conscious of their obligation to ensure reliable service and thus are extremely sensitive to any condition that poses a risk to such reliability and service. This necessity to be risk adverse cannot always be reduced to economic or other terms, but is none the less critical to utility decision making and is a consideration of the Kentucky Public Service Commission "KPSC"). For management of CCR from TC Station, two risks have been given paramount consideration.

- Public safety. LG&E will be reluctant to implement any alternative that requires extensive trucking (e.g. the >100,000 trips per year noted previously) because of the essential certainty that there will be accidents with a probability of fatalities. This concern is over and above the expectation of public opposition to the quality of life impacts of such traffic on rural roadways. Additionally, the large amount of truck traffic on rural roads may be politically impracticable due to congestion, road damage safety issues, and disruption of residential life.
- Uncertainties and unknowns. LG&E will have serious concerns regarding any alternative that has unusual uncertainties and unknowns that cannot be resolved so as to assure the project purpose can be achieved. An example would be where the capacity of a site is speculative and determined by actions outside LG&E's control. Commitment of large capital sums where substantial uncertainties exist as to whether the project purpose can be achieved is not prudent, and is at substantial risk of being disallowed by the KPSC.

Any alternative with either of these risks will require close scrutiny if it otherwise is determined to be technically feasible, apparently competitive in cost, and otherwise potentially practicable.

For each alternative, comments on the fact sheets identify which considerations are the principal reasons for considering an alternative as not practicable or as having unacceptable adverse environmental impacts.

Site capacity. As discussed in Appendix III.C-1, LG&E considers it to be highly uncertain how much beneficial reuse of CCR might reduce the volume of CCR that must be managed over the nominal lifetime of the Trimble County station. Nonetheless, consistent with its prior analysis, GAI was asked to assume a potential 30% beneficial reuse rate, so that a site with at least 23.4 million cubic yards of capacity is considered as potentially practicable. Sites with less capacity were not rejected outright but assessed further in combination with other small capacity sites.

In many cases, the conceptual design shown in the fact sheet could be revised to increase site capacity and potentially allow an otherwise small site to be considered potentially practicable on its own. In such cases, notes on a fact sheet are used to explain site constraints that limited the conceptual design. In general, a change in design to provide additional capacity would encroach on site features that would greatly increase costs and/or environmental impacts.

Location in 100-year Floodplain. The logistical analysis of each site included identification of conditions that can be considered as a “fatal flaw” to siting of a large CCR disposal facility. As discussed in Appendix III.C-1, beyond site capacity one potentially important siting consideration is whether all or a substantial portion of the landfill would have to be located in the Ohio River 100-year floodplain. EPA’s letters indicate it has concurred with the conclusion that Ohio River floodplain sites are not practicable. LG&E anticipates that such a location – like the Dickey Farm site (Alternative A, and included in Alternatives M, O and W), the North River Terrace site (included in Alternatives D, O and T) or several of the South River Terrace sites (such as those included in Alternatives E, F, P and U) – would be extremely difficult, if not impossible, to permit given both safety and environmental concerns and regulatory prohibitions.

Other locational concerns. Location factors that are cited on some fact sheets include: use of a mine or quarry site, which may not be acceptable for CCR disposal (Alternative E); and location in Indiana, which raises permitting issues similar to those for Lee Bottom (e.g., Alternative J). These factors are considered sufficient to judge an alternative as not practicable.

Additional costs and uncertainties associated with land acquisition. Alternatives to Ravine B would require LG&E need to acquire significant acreage for siting of the landfill itself (including an appropriate buffer) and/or for ancillary facilities and borrow areas. Several hundred to more than a thousand acres may be required, adding $10 million or more to the cost of an alternative.

In addition, the property acquisition process is a highly uncertain one, both in terms of timing and the ability to find willing sellers. Negotiations can often be protracted and in some cases landowners may simply refuse to sell their property, rendering a site unavailable (and therefore impracticable) unless LG&E chooses to engage in the expensive and uncertain process of condemnation. This factor may be a particular concern for alternatives that would involve the displacement of existing residences, such as the Browning Branch Tributary Ravine alternative (Alternative H).

Attachment Confidential

The entire attachment is Confidential and provided separately under seal.

KENTUCKY UTILITIES COMPANY
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to the Commission Staff Initial Request for Information
Dated July 2, 2015

Case No. 2015-00194

Question No. 9

Witness: John N. Voyles/R. Scott Straight

Q-9. Refer to the 2014 GAI Report attached to the Sterling Ventures Formal Complaint, Exhibit P. Page 27 of 183 of that Exhibit states the Companies considered the Valley View alternative as a possible interim disposable site, but did not consider Sterling Ventures as a possible interim disposable site. According to the cost estimates on page 35 of 183 of Exhibit P, Sterling Ventures is $16.74/cu yd. less than Valley View. Given this large cost differential, explain why Sterling Ventures is not evaluated as an interim disposable site option.

A-9. First, it is important to note that the Sterling Ventures mine is not a feasible site since it is not permitted to take any CCR from Trimble County Station. Their mine is only permitted to take gypsum materials from Ghent. In addition to this critical fact, Sterling Ventures has not been evaluated as an interim disposable site for the following reasons:

i. With regards to the cost estimates from the Supplemental Alternative Analyses on page 35 of 183 of Exhibit P, Sterling Ventures estimated cost of $19.71//cu yd. was based on transport via barge and the estimated cost for Valley View landfill of $36.45/cu yd. was based on truck transport. Given that a barge loading facility with sufficient delivery capacities for all CCR materials does not exist at the Trimble County Station for all CCR materials and that a barge unloading facility near the Sterling Ventures mine does not exist, the cost of attempting to utilize Sterling Venture's facility on an interim basis would likely be significantly higher based on truck transport and would likely exceed Valley View's estimated cost due to much longer haul distance.
ii. Sterling Ventures has not submitted a short-term proposal for Trimble County Station's CCR.
iii. Shaft disposal into the mine is not available and serious questions exist as to the feasibility of hauling CCR into the mine via a steep slope entry.
iv. After October 19, 2015, Sterling Ventures would have to meet the new definition in the CCR Rule of beneficial reuse or fully comply with the requirements for a CCR landfill. As discussed in response to this request PSC 1-14, the Companies determined that disposal of CCR in Sterling Ventures' mine would not qualify as beneficial use under the new federal standards.

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Question No. 10

Witness: Gary H. Revlett

Q-10. State whether an off-site option would require the Companies to obtain any additional permits that would not be required at the on-site landfill.

A-10. An off-site facility would require many of the same permits as the proposed on-site landfill. However, the additional permits for an off-site option that includes transportation of CCR materials via barge would require additional permits associated with the construction of a barge load out facility on the river at the Trimble County Station (U.S. Army Corps of Engineers Section 404 Permit, Kentucky Stream Construction Permit, County Floodplain Permit, and Kentucky Water Quality Section 401 Permit), plus another set of the same listed permits for an unloading facility, such as the Warsaw site recently proposed by Sterling Ventures that has no barge unloading capabilities at present.

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Question No. 11

Witness: David S. Sinclair

Q-11. State at what point the Companies believe an off-site party should assume the liability for off-site CCR alternatives.

A-11. Absent unique or extraordinary circumstances, an off-site party should assume liability at the point of delivery of the CCR, which is typically when loaded onto a barge or truck used by the offsite party to transport the CCR.

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Question No. 12

Witness: John N. Voyles/R. Scott Straight

Q-12. Provide the capping and closure plans and time line for the current bottom ash and gypsum ponds.

A-12. The new CCR Rule was just published on April 17, 2015. The Companies are currently evaluating these facilities as required by the new CCR Rule. The rule specifies assessments that must be completed to determine the future of these impoundments. Each assessment has specific criteria that the impoundments must meet. Failure to meet a criterion can trigger the closure requirements and timelines in the CCR rule. The Companies have started the process to meet the assessment requirements for its CCR impoundments across the generating fleet. This evaluation is on-going and requires each impoundment to be evaluated through the installation of groundwater monitoring wells yet to be installed and sampled, as well as completing the required engineering evaluations of stability and capacities.

The Companies do not expect to have these evaluations completed for the Trimble County impoundments until the first quarter of 2016; however, based on our review of the CCR rule's criteria and prescribed closure time lines, we are planning at the conceptual design level should closing of these ponds be required. We currently anticipate the bottom ash pond will likely require closing. The gypsum storage pond will require additional analyses to determine if it might be allowed under the CCR Rule to remain in operation because it was just recently placed into operation with a liner system comprised of a flexible liner on top of a geo-synthetic clay liner.

Current plans, while very preliminary, reflect both ponds potentially being closed in the 2019 to 2024 timeframe. Specific closure plans have not been engineered and are not expected to be fully engineered until 2016-2017 timeframe with permitting (if required) to take place in the same timeframe.

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Question No. 13

Witness: John N. Voyles/R. Scott Straight

Q-13. Provide the estimates used to convert cubic yards of CCRs to tons.

A-13. For the purpose of this analysis, the following estimates were used to compute the tons of CCR per cubic yard in a landfill.

CCR	**Density (Compacted Tons/Yd^3)**
Bottom Ash	1.323
Fly Ash	1.15
Gypsum	1.215

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Question No. 14

Witness: Gary H. Revlett

Q-14. Refer to the Executive Summary, page 2 of the handout "Evaluation of Trimble County Coal Combustion Residual Storage Options" from the June 19, 2015 Informal Conference. The Companies state that based on their understanding of the CCR rule, the Sterling mine site would not likely be permitted to store CCRs. Provide an explanation for this statement.

A-14. As per the CCR regulation, disposal of CCR materials in the Sterling Ventures limestone mine would have to meet all of the requirements of a new landfill or be able to demonstrate that it meets all the new requirements associated with the federal definition of CCR “beneficial use”. Sterling Ventures has made no demonstration that meets the requirements of a new CCR landfill and we question their analysis that they meet the new federal CCR requirements for beneficial use.

The new federal beneficial use definition at 40 CFR 257.53 requires a four part test. These four requirements are:

1) The CCR must provide a functional benefit.
2) The CCR must substitute for the use of a virgin material, conserving natural resources that would otherwise need to be obtained through practices, such as extraction.
3) The use of CCR must meet relevant product specifications, regulatory standards or design standards when available, and when standards are not available, the CCR is not used in excess quantities.
4) When unencapsulated use of CCR involving placement on the land of 12,400 tons or more in non-roadway applications, the user must demonstrate and keep records, and provide such documentation upon request, that environmental releases to groundwater, surface water, soil and air are comparable to or lower than those from analogous products made without CCR, or that environmental releases to groundwater, surface water, soil and air will be at or below relevant regulatory and health-based benchmarks for human and ecological receptors during use.

In a letter dated June 25, 2015, to the U.S. Army Corps of Engineers, Sterling Ventures provides their basis for meeting all four criteria when transporting CCR materials from the Trimble County or Ghent site for the purpose of filling all the voids in their limestone mine. The Companies do not believe Sterling Ventures' basis for beneficial use meets all the new CCR rule requirements and therefore is not legitimate beneficial use under the new federal beneficial use definition.

For Criteria 1 Sterling Ventures justification is that eliminating air voids in the mine will effectively and efficiently direct air into the working areas of the mine. Sterling Ventures states in their letter that the CCR material would replace the use of concrete and steel to redirect air flow in the mine. However, unless they are already using concrete and steel to perform this function then it is unlikely there is a true functional need. If the CCR is not replacing a currently needed material, then it would more likely be considered sham disposal and not legitimate beneficial use. Their letter states that it will reduce electricity or energy use, but they do not consider the vast amount of energy and CO2 emissions associated with getting the CCR material to their mine site. When evaluating the reasonableness of using a material for beneficial use it important to consider how this need or function is currently being met. If the need or function is routinely being met with something significantly different in design (e.g. mine curtains) then once again it brings into question the illegitimacy of classifying the substitute material as beneficial use. If this were true legitimate beneficial use of CCR, then the use of CCR in this manner would be common in the underground mining industry, but it is not. Moreover, underground transport and management of CCR will require additional diesel transport equipment that will require ventilation and CCR management will also create dust that must be ventilated per MSHA requirements. Similarly, if material is dumped into the mine via a shaft, which LG&E believes is necessary due to the steep slope entry, the dumping will create significant dust underground that must be ventilated. Sterling Ventures has not explained how these additional ventilation needs result in lower ventilation costs.

For Criteria 2, Sterling Ventures justification was based on CCR material being a substitute for concrete and steel. However, neither of these materials are virgin materials or natural resources which are extracted. In the preamble of the new CCR rules (FR Vol. 80, No. 74 page 21349), EPA describes one of the benefits associated with using CCR instead of virgin natural resources is the energy savings. However, considering this material would need to be barged, conveyed and trucked considerable distances, there would be no energy savings over using local fill dirt or some more typical solution for mine ventilation, such as ventilation curtains, in amounts no greater that necessary to achieve the same desired results.

For Criteria 3, Sterling Ventures describes in their June 25th letter that since there is no product specifications for ventilation improvement they will ensure that excess quantities will not be used by only filling voids in the mine. Using CCR material to fill all voids is in itself using excess quantities, since not all voids would need to be filled to improve ventilation in the area where active mining is occurring or areas that have been worked out. To improve ventilation it would only be necessary to seal around certain areas, leaving the interior voids open. In fact as additional areas are mined, the simplest process would be to move or add to the area which is walled off. Ventilation improvements in this manner would only require minimum amounts of additional fill material. In sum, it does not appear necessary to accept and use the full CCR generated output of Trimble Station to achieve the goal of improved ventilation even if the activity would reduce ventilation costs and burdens as Sterling Ventures claims, which as discussed above, has not been demonstrated.

Finally, for Criteria 4 Sterling Ventures simply states that once the CCR is placed in the mine there is no impact to groundwater, surface water, soil or air. This does not begin to adequately address all the potential environmental concerns that would be associated with transporting the CCR material from either the Trimble County or Ghent facility. Their statement also does not properly address the air impacts to the employees in the mine during and after the placement of the CCR material in the mine. The 4th criterion does not limit the impact analysis to just ambient air, the requirement instead uses the general requirement to protect human health and the environment or demonstrate that its use is as safe as the material it replaces. Also, it does not limit the analysis to just the final location of use, but the analysis should be comprehensive addressing the complete process. Moving CCR by truck, and to some degree even by barge, comes with significant environmental and human health risk. Sterling Ventures has not begun to address these potential human health and environmental impacts or compare them to other alternatives. Moreover, Sterling Ventures has not provided any analysis as to how environmental impacts would be avoided over the project life for future mining areas. The fact that the mine is dry today does not guarantee it will remain dry as mining advances.

Based on the lack of a complete evaluation of the criteria or their inaccurate evaluation, Sterling Ventures has not and likely cannot demonstrate that the disposal of CCR in their limestone mine represents beneficial use. Thus, the disposal of CCR in the Sterling Ventures limestone mine must demonstrate that it meets all the requirements associated with a new CCR landfill.

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Question No. 15

Witness: David S. Sinclair

Q-15. Refer to Table 1 on page 3 of the handout "Evaluation of Trimble County Coal Combustion Residual Storage Options" from the June 19, 2015 Informal Conference.

a. The onsite capital costs do not reconcile with the landfill capital costs shown in Exhibit 5, page 6 of 13, Table 3 of the Joint Application. Explain the difference.

b. Explain why the totals of Table 1 on page 3 of 11 of the handout do not reconcile with the total cost estimate found in paragraph 20 of the Joint Application.

A-15. a. The majority of the difference is explained by the fact that the cost information in the handout reflects 100 percent of the project costs (see footnote 1 at page 2 of the handout), whereas the cost information in Exhibit 5 reflects the Companies' combined 75 percent ownership share of the Trimble County coal-fired units (see Exhibit 5 at page 3 of 13). In Table 3 of Exhibit 5, the total landfill cost ($374 million) is correct but the reported cost for landfill phase 4 has a typo; the value (in 2014 dollars) should be $14 million and not $134 million. This error was made only in the document and not in the associated analysis.

The difference between total capital costs in Exhibit 5 ($374 million) and the Companies' share of capital costs in the handout ($368 million) is $6 million. In preparing the analysis summarized in Exhibit 5, the Companies reallocated costs to reflect current project timelines and lessons learned from commissioning the Ghent landfill.

b. The total capital cost for the onsite alternative in Table 1 on page 3 of 11 of the handout ($490.8 million) is expressed in 2014 dollars and reflects 100 percent of the project costs. The total cost in paragraph 20 of the Joint Application ($501.5 million) is expressed in nominal (as-spent) dollars and reflects the Companies' 75 percent ownership share of the Trimble County coal-fired units.

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Question No. 16

Witness: David S. Sinclair

Q-16. Refer to the handout "Evaluation of Trimble County Coal Combustion Residual Storage Options," page 3, from the June 19, 2015 Informal Conference. Explain the Companies' reasoning behind the evaluation that the timeline for capital expenditures necessarily voids Sterling Ventures alternative's capital cost advantage over the life of the project.

A-16. Compared to the onsite alternative, the Sterling Ventures alternative has lower capital costs overall, but more capital is required in the Sterling Ventures alternative by 2018 for the development of barge loading and unloading facilities as well as pipe conveyor facilities. The handout states that this fact minimizes the Sterling alternative’s capital cost advantage. In a present value of revenue requirements analysis, the need to spend more capital sooner reduces the advantage that the Sterling Ventures alternative might have due to lower overall capital costs.

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Question No. 17

Witness: John N. Voyles/R. Scott Straight

Q-17. Refer to the Joint Application, Exhibit 5, page 6 of 13, Table 3.

a. Explain why the Capital Costs shown in this table differ from those shown in Table 2 on page 7 of the Informal Conference handout titled "Evaluation of Trimble County Coal Combustion Residual Storage Options."

b. Explain why the amounts in Table 3 do not sum to the $374 million shown in the total row of the table.

A-17. a. Please see the response to PSC 1-15a. In Exhibit 5, the costs of the CCR treatment and transport facilities are included in the landfill phase 1 line item. In addition, all landfill phase costs include the cost of intermediate and final soil cover. In Table 2 of the handout, the cost of intermediate and final soil cover for all landfill phases is listed separately. The first table below computes the Companies' 75 percent share of Table 2 costs and allocates the cost of intermediate and final soil cover to each landfill phase. The second table compares these results (February 2015 analysis) to the costs in Table 3 of Exhibit 5 (May 2015 Analysis). In preparing the analysis for Exhibit 5, the Companies reallocated costs to reflect current project timelines and lessons learned from commissioning the Ghent landfill. This explains the $6 million change in total costs. In the February 2015 analysis, with the exception of the last landfill phase, contingency costs for the current landfill phase were assumed to be spent immediately prior to the need for the subsequent landfill phase and therefore reported as part of the subsequent landfill phase. In the May 2015 analysis, contingency costs for each landfill phase were assumed to be spent as the phase was developed. This explains the majority of the cost differences between the landfill phases.

February 2015 Analysis (2014 $Million)

	Table 2 of Handout (100% Share)	**75% Share**	**Intermediate & Final Soil Cover Allocated to Landfill Phases**
CCRT	172.1	129	129
Pipe Conveyor	30	23	23
Landfill Phase 1	135.3	101	103
Landfill Phase 2	79.5	60	64
Landfill Phase 3	38.9	29	34
Landfill Phase 4	12.1	9	17
Intermediate & Final Soil Cover	22.9	17	0
Total	490.8	368	368

Landfill Capital Costs (75 Percent Share, 2014 $Million)

Phase	**February 2015 Analysis**	**May 2015 Analysis**	**Difference**
Landfill Phase 1 (includes CCRT and Pipe Conveyor)	254	282	28
Landfill Phase 2	64	42	(22)
Landfill Phase 3	34	37	3
Landfill Phase 4	17	14	(3)
Total	368	374	6

b. Please see the response to PSC 1-15a.

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Question No. 18

Witness: David S. Sinclair

Q-18. Provide a side-by-side comparison of the most current annual costs in 2014 dollars of the landfill option and the Sterling alternative. Also include a breakdown of the major components of the costs. The information should be provided in Excel format with all formulas intact.

A-18. The information requested to be provided in Excel format is considered to be confidential and proprietary and is being filed under seal pursuant to a Petition for Confidential Protection.

In the attached workbook, a comparison of annual revenue requirements is included for six "fuel burn-beneficial reuse" scenarios (see worksheets labeled "RR_..."). For the onsite landfill, all costs are taken from the Companies' May 2015 analysis. For Sterling, the following changes have been made to the cost assumptions in the February 2015 analysis:

1. The costs of the CCR treatment and transport facilities, which are the same for both Sterling and the onsite landfill, have been updated to match the May 2015 analysis.
2. For the Sterling alternative, capital cost spend profiles and depreciation life assumptions have been updated to match the capital cost spend profile for phase 1 of the landfill in the May 2015 analysis.
3. Site preparation and permitting costs were updated to include the cost of the Companies' overheads and engineering support, which were excluded from the February 2015 analysis.
4. For the purpose of this analysis, the cost of the pipe conveyor and haul roads from barge unloading to the Sterling Ventures mine has been reduced substantially to reflect conservative estimates of these costs.
5. Consistent with Exhibit S to Sterling Venture's Formal Complaint, Sterling Venture's tipping fee ($10.15/ton) has been modeled as a 2018 value. In the February analysis, this cost was modeled as a 2013 value.

The table below compares total capital costs for the two alternatives. Total capital costs for the onsite landfill are higher than Sterling, but the Sterling alternative continues to require more capital by 2018 despite the reduction in pipe conveyor and haul road cost assumptions.

Capital Cost Comparison (Mid Gas-Base Load Fuel Burn, Current Beneficial Reuse, 75% Share, 2014, $Million)

Onsite Alternative		Sterling Alternative	
CCR Treatment	138	CCR Treatment	138
Pipe Conveyor	13	Pipe Conveyor	13
Haul Road	13	Haul Road	13
Landfill Phase 1	119	Barge Loading/Unloading	32
Landfill Phase 2	42	SV Pipe Conveyor/Haul Road	46
Landfill Phase 3	37	Site Preparation/ Permitting	23
Landfill Phase 4	14	Barge Purchase	6
Total	374	Total	271
Spent by 2018	246	Spent by 2018	271
Spent after 2018	128	Spent after 2018	0

A summary of PVRR differences between the two options is included in the following table. Despite the reduction in capital costs and the favorable impact associated with the treatment of the tipping fee, the PVRR for the Sterling alternative is still $49 to $55 million unfavorable to the onsite alternative. Fixed and variable operating and maintenance costs for the Sterling alternative continue to be higher than the onsite alternative. These costs more than offset Sterling's lower total capital costs.

PVRR Results (2014, $Millions)

Fuel Burn	Beneficial Reuse	Onsite Landfill PVRR	Sterling PVRR	PVRR Difference (Onsite Less Sterling)
Low Gas-Base Load	None	445	498	(53)
	Current	415	464	(50)
Mid Gas-Base Load	None	445	498	(54)
	Current	416	465	(49)
High Gas-Base Load	None	445	500	(55)
	Current	415	467	(52)

Attachment
Confidential

The entire attachment is Confidential and provided separately under seal.

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Question No. 19

Witness: Gary H. Revlett

Q-19. State whether all wastes from the Trimble County plant are permitted to be stored in the mine. If not, explain how the other wastes are to be disposed.

A-19. No, none of the wastes from the Trimble County plant are permitted to be stored in the mine.

After October 19, 2015 when the new CCR rule becomes effective, since Sterling Ventures has not acceptably demonstrated that its proposal to transport and dispose of the CCR in its mine meets all the new federal requirements of a new landfill or all the requirements of beneficial use then it would not be permitted for disposal. Sterling Ventures has failed to demonstrate how it would comply with the requirements for a new CCR landfill under the federal regulations. The CCR materials will continue to be managed in the existing Trimble County Plant surface impoundments and after all permits are received, CCRs will be disposed in the proposed on-site landfill at Trimble County.

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Question No. 20

Witness: John N. Voyles/R. Scott Straight/Gary H. Revlett

Q-20. Refer to Sterling Ventures' comments filed in response to the Informal Conference memo on June 26, 2015, which stated that "Sterling proposed a meeting with representatives of LG&E/KU and Sterling with the EPA, US Army Corps of Engineers, and/or the Kentucky Division of Waste Management, Solid Waste Branch to discuss whether Sterling's mine can be considered as on option for Trimble County CCR, and that LG&E/KU declined." State whether the Companies agree with this statement and whether they would attend if such meetings were scheduled.

A-20. The Companies agree with the initial part of the statement which says, "Sterling proposed a meeting with representatives of LG&E/KU and Sterling with the EPA, US Army Corps of Engineers, and/or the Kentucky Division of Waste Management, Solid Waste Branch to discuss whether Sterling's mine can be considered as an option for Trimble County CCR…". The Companies disagree with the assertion that "LG&E/KU declined."

The Companies will attend any meetings scheduled by these environmental regulators, but have no reason to believe that these regulators would schedule such meetings. EPA's CCR rule is self-implementing and not a permit based program. As a result, by regulatory design, EPA cannot provide any legally binding determinations on this issue. KY DWM is expected to initiate a formal rule-making in the fall to adopt new state CCR standards. KY DWM may adopt a permit based program, in contrast to the EPA self-implementing approach (i.e., disputes are resolved through private citizens suites in federal court), but it is not known when KY DWM will complete its rule making and what the results will be. Under these circumstances, there is no reason to believe a meeting with regulators could provide the certainty that is necessary to resolve this issue.

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Question No. 21

Witness: John N. Voyles/R. Scott Straight

Q-21. Provide the current status of the request for quotations that the Companies planned to issue in the second quarter of 2015.

A-21 The request for quotation was issued to the market on July 2, 2015. Based on preliminary response from vendors in the market, the following is the current draft schedule for evaluating the responses and signing the engineering and procurement contracts:

1. July 2, 2015 – Send out RFQ (Completed)
2. July 21-22, 2015 – Hold Pre-bid Meeting
3. September 24, 2015 – Bid Due Date
4. October 2015 – Technical Presentations
5. November 2015 – Short-List Bidders
6. Mid-Nov through December 31, 2015 – Negotiations
7. January 1-15, 2016 – Execute EPC after Internal Approvals (No later than)

The RFQ requires the selected engineering and procurement firm to complete the construction of the CCRT in 2018. The Companies have received requests from bidders for additional time to bid which has been reflected in this current schedule. Because of the effort and considerable expense involved by the bidders to prepare a fixed price proposal for a construction project of this magnitude, bidders want as much time as possible to prepare their bids and have an expectation that the project will in fact go forward. Having the additional time in the bidding period at the front of this schedule enables receipt of better prepared bids with adequate details and less margins for more complete evaluations. An October order supports this schedule and supports detailed negotiations to proceed with the short listed bidders planned for November 2015. The Companies continue to desire to award the CCRT contract if possible by the end of this year.