

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF KENTUCKY UTILITIES)	
COMPANY FOR A CERTIFICATE OF PUBLIC)	CASE NO: 2017-00483
CONVENIENCE AND NECESSITY AND)	
APPROVAL OF AMENDMENT TO ITS 2016)	
COMPLIANCE PLAN FOR RECOVERY BY)	
ENVIRONMENTAL SURCHARGE)	

DIRECT TESTIMONY OF
ROBERT M. CONROY
VICE PRESIDENT, STATE REGULATION AND RATES
KENTUCKY UTILITIES COMPANY

Filed: January 26, 2018

1 **Q. Please state your name, position, and business address.**

2 A. My name is Robert M. Conroy. I am the Vice President of State Regulation and
3 Rates for Kentucky Utilities Company (“KU” or “Company”) and Louisville Gas and
4 Electric Company (“LG&E”) and an employee of LG&E and KU Services Company,
5 which provides services to LG&E and KU (collectively “Companies”). My business
6 address is 220 West Main Street, Louisville, Kentucky, 40202. A complete statement
7 of my education and work experience is attached to this testimony as Appendix A.

8 **Q. Have you previously testified before this Commission?**

9 A. Yes. I previously testified before this Commission in numerous proceedings,
10 including the Companies’ most recent base rate cases (Case Nos. 2016-00370 (KU)
11 and 2016-00371 (LG&E)) and the last eight environmental cost recovery (“ECR”)
12 compliance plan proceedings.¹

13 **Q. What are the purposes of your testimony?**

14 A. My testimony summarizes KU’s other witnesses’ testimony, the requested
15 amendment to KU’s 2016 Environmental Compliance Plan (“2016 ECR Plan”)
16 Project 36, and KU’s request for a certificate of public convenience and necessity
17 (“CPCN”) for the facility contained in Amended Project 36. I will also address
18 environmental surcharge recovery of Amended Project 36 through KU’s Rate
19 Schedule ECR tariff, return on equity, estimated bill impact on KU customers, and
20 the plan to finance the proposed construction of the facility requiring a CPCN.

21 **Q. Are you sponsoring any exhibits?**

¹ The last eight ECR compliance plan proceedings include 2016 (Case Nos. 2016-00026 (KU) and 2016-00027 (LG&E)), 2011 (Case Nos. 2011-00161 (KU) and 2011-00162 (LG&E)), 2009 (Case Nos. 2009-00197 (KU) and 2009-00198 (LG&E)), and 2006 (Case Nos. 2006-00206 (KU) and 2006-00207 (LG&E)).

1 A. Yes, I am sponsoring Exhibit RMC-1 – Current ES Form 2.01, Exhibit RMC-2 –
2 Modified ES Form 2.01, and Exhibit RMC-3 – Amendment to 2016 ECR Plan
3 Customer Bill Impact.

4 **Overview of Testimony**

5 **Q. Please provide an overview of the witnesses’ testimony supporting KU’s**
6 **application in this proceeding.**

7 A. In addition to my testimony, KU is presenting the testimony of three other witnesses
8 in this case in support of its application. These witnesses and the subjects of their
9 testimony are:

- 10 • R. Scott Straight, Vice President, Project Engineering, presents testimony that
11 describes the engineering and construction aspects of Amended Project 36 and
12 explains how the scope of the project that was approved as part of KU’s 2016
13 ECR Plan in Case No. 2016-00026 has changed. Mr. Straight also discusses how
14 Amended Project 36 continues to comply with the federal Hazardous and Solid
15 Waste Management System; Disposal of Coal Combustion Residuals from
16 Electric Utilities (“Federal CCR Rule”) and state environmental regulations.²
17 Finally, Mr. Straight describes the changes in the process-water system and
18 associated reduction in costs for KU Project 42, Brown CCR Rule Compliance
19 Construction and New Process-Water Systems.
- 20 • Gary H. Revlett, Director, Environmental Affairs, presents testimony discussing
21 the federal and state environmental requirements that necessitate Project 36 and
22 discusses how KU’s proposed amendment to Project 36 allows KU to comply
23 with the requirements.

² 40 C.F.R. §§ 257.50 – 257.107; 401 KAR 45 Special Waste

1 landfill at Brown (“Brown CCR Landfill”). The Brown CCR Landfill is necessary to
2 store the CCR that is produced at Brown and to comply with the Federal CCR Rule.

3 When KU applied for a permit for the Brown CCR Landfill, the Kentucky
4 Division of Waste Management issued a permit conditioned upon a phased-approach
5 and requiring that the height of CCR disposed in each phase be no more than 10 feet
6 higher than the adjacent phase(s) prior to proceeding with the next layer of disposal
7 across the landfill footprint. A copy of the permit is contained in Application Exhibit
8 3 and is discussed in detail in the testimony of Mr. Revlett.

9 KU sought and received approval of Phase II of the Brown CCR Landfill in its
10 2016 ECR Plan.⁵ Construction of Phase II was scheduled to start in late 2016 or early
11 2017, but decreased CCR production from the Brown generating units delayed the
12 need for Phase II.

13 KU noted in the direct testimony of Mr. Voyles in support of the approval of
14 the 2016 ECR Plan, that the Companies would continue to assess and evaluate the
15 need for Phase II of the Brown CCR Landfill. Particularly, Mr. Voyles stated: “If the
16 Commission grants a CPCN for Phase II and KU later determines it will not be
17 needed, KU would not construct it and would notify the Commission.”⁶ As KU
18 assessed the need for Phase II of the Brown CCR Landfill following the
19 Commission’s approval, KU did not commence constructing Phase II and allowed the
20 CPCN to lapse and further assessed the need for Brown Units 1 and 2.

21 **Q. Has KU reached a decision on whether to retire Brown Units 1 and 2?**

⁵ *In the Matter of: The Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of its 2016 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2016-00026, Order at 33 (Ky. PSC Aug. 8, 2016).

⁶ *In the Matter of: The Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of its 2016 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2016-00026, Direct Testimony of John N. Voyles, Jr. at 15 (Ky. PSC Jan. 29, 2016).

1 A. Yes. On November 14, 2017, KU announced its plans to retire Brown Units 1 and 2
2 by February 2019, which will significantly reduce the volume of CCR generated at
3 Brown Station. Given that Brown Units 1 and 2 are two of the oldest coal-fired units
4 in KU's system and are of a relatively small size as compared to the Companies'
5 other generating units, KU determined it would not be financially prudent to invest in
6 additional facilities to comply with environmental regulations.

7 **Q. Describe how Amended Project 36 differs from the Project 36 approved in the**
8 **2016 ECR Plan.**

9 A. Mr. Straight explains the changes in the scope of this project in his direct testimony.
10 Amended Project 36 includes both an amended Phase II CCR storage area, and cap
11 and closure costs for any remaining surface area of the Brown Main Ash Pond.
12 Based upon current CCR projections, KU has determined that a smaller Phase II
13 footprint will meet its CCR storage needs and Phase III will not need to be
14 constructed. Therefore, KU now proposes to modify the scope of the Brown CCR
15 Landfill's footprint and airspace, and to cap and close any remaining surface area of
16 the Brown Main Ash Pond in Amended Project 36.

17 **Q. Please explain why the modification to the size of the Brown CCR Landfill**
18 **requires capping and closing the remaining portions of the Main Ash Pond**
19 **differently than previously expected.**

20 A. As discussed more fully in the testimony of Gary H. Revlett, originally, the Brown
21 CCR Landfill was planned to act as the entire cap for the Main Ash Pond once Phase
22 III was constructed and placed in operation. However, with the reduction in the
23 overall footprint of the Brown CCR Landfill to account for the closing of Units 1 and
24 2, Phase III is no longer needed. The 2014 Special Waste Permit requires the full

1 closure of the Brown Main Ash Pond; thus, the cap and closure of the areas of the
2 Brown Main Ash Pond not within the footprint of the modified landfill or under
3 hardscaping are required. The method of cap and closure of the Brown CCR Landfill
4 will be similar to the closure plans at Green River, Pineville, and Tyrone in the 2016
5 ECR Plan.

6 **Certificate of Public Convenience and Necessity**

7 **Q. Is KU requesting a CPCN in this proceeding?**

8 A. Yes. KU is seeking a CPCN for (1) construction of an amended Phase II of the
9 landfill at Brown and (2) cap and closure of any remaining surface area of the Brown
10 Main Ash Pond.

11 **Q. Did KU previously receive a CPCN for Project 36?**

12 A. Yes. As I previously discussed, KU requested and received a CPCN for Project 36 in
13 Case No. 2016-00026.⁷ The 2016 CPCN expired in August 2017 before construction
14 of Phase II began. KU notified the Commission through its quarterly status reports
15 that it was evaluating the need for Phase II of the Brown CCR Landfill and
16 construction had not yet begun.⁸

17 **Q. Describe the Companies' practice of evaluating the need for and timing of ECR
18 projects.**

19 A. Certainly. For many years, the Companies have continuously reevaluated the need
20 for and timing of ECR projects after receiving authority to construct the facilities and
21 recover the cost through their ECR mechanisms. If changing circumstances lead to

⁷ *In the Matter of: The Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of its 2016 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2016-00026, Order at 33 (Ky. PSC Aug. 8, 2016).

⁸ 2016 ECR Plan Status Update Report Quarterly Report – Update #5 at 4 (Oct. 30, 2017); 2016 ECR Plan Status Update Report Quarterly Report – Update #4 at 3 (July 28, 2017). All quarterly reports are filed in the “Post-Case Filing” of Case No. 2016-00026.

1 an ECR project no longer being necessary, the Companies will adjust their plans
2 accordingly. The Commission has recognized the Companies' historical practice of
3 continuously evaluating ECR projects and notifying the Commission when changes
4 occur to the scope or cost of approved ECR projects.⁹

5 **Q. Does the decision to retire Brown 1 and 2 affect the CCR forecast for Brown**
6 **Station?**

7 A. Yes. The Companies continuously evaluate the long-term generation needs of their
8 fleet given the current and projected load forecast and compliance costs with
9 environmental regulations. This evaluation process determined that KU should cease
10 operating Brown Units 1 and 2 in February 2019. In connection with this evaluation,
11 the Companies also assessed the long-term forecast for CCR and associated storage
12 capacity at Brown Station and concluded that the originally proposed size of the
13 Brown CCR Landfill (i.e., Phases I, II, and III) was no longer necessary at this time.
14 CCR projections impacted by the retirement of Units 1 and 2 and the reduced
15 generating forecast for Unit 3 indicate that only a moderate expansion to the already
16 constructed Phase I Landfill is necessary. KU's proposed Amended Project 36
17 considers the updated projected capacity needs of the Brown CCR Landfill and
18 accordingly adjusts the scope of its Phase II proposal.

19 **Q. Does KU also propose to cap and close any remaining surface area of the Brown**
20 **Main Ash Pond?**

⁹ *In the Matter of: The Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of its 2016 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2016-00026, Order at 33 (Ky. PSC Aug. 8, 2016); *see also* Rebuttal Testimony of Robert M. Conroy at 14 (noting that KU has clearly demonstrated that it routinely reevaluates approved ECR projects to ensure they remain prudent).

1 A. Yes. In addition to proposing a modified Phase II, KU also proposes in Amended
2 Project 36 the cap and closure of any remaining surface area of the Brown Main Ash
3 Pond. The cap and closure is necessary because the original design of the Brown
4 CCR Landfill was to cap in place the Main Ash Pond as each phase of the landfill
5 was built. Because the CCR forecast shows that Phase III of the Brown CCR Landfill
6 will not be needed, as discussed in the testimony of Mr. Revlett, KU must cap and
7 close any remaining surface area of the Brown Main Ash Pond to comply with state
8 environmental regulations.

9 **Q. How does KU plan to finance the amendment to Project 36 of the 2016 ECR**
10 **Plan?**

11 A. KU expects to finance the costs of the new facility with a combination of new debt
12 and equity. The mix of debt and equity used to finance the amended project will be
13 determined so as to allow KU to maintain its strong investment-grade credit rating.
14 To the extent that tax-exempt financing may be available for these projects, KU
15 anticipates using such opportunities to the extent that they are reasonably cost-
16 effective. KU's proposed financing of such costs is comparable to the proposed
17 financing of its 2016 ECR Plan.

18 **Environmental Surcharge Cost Recovery**

19 **Q. How does KU propose to recover the cost of Amended Project 36?**

20 A. KU proposes to recover the cost of Amended Project 36 through KU's Rate Schedule
21 ECR filed with this application and proposed to be effective for bills that reflect the
22 expense month July 2018. In other words, KU proposes to recover the cost of
23 Amended Project 36 beginning six months after the filing of the application in this

1 proceeding, in accordance with KRS 278.183(2). KU does not propose any changes
2 to its existing Rate Schedule ECR.

3 **Q. Please explain why it is appropriate for KU to recover the costs of Amended**
4 **Project 36 through its ECR mechanism.**

5 A. The relevant part of Kentucky’s ECR statute states:

6 [A] utility shall be entitled to the current recovery of its
7 costs of complying with the Federal Clean Air Act as
8 amended and those federal, state, or local
9 environmental requirements which apply to coal
10 combustion wastes and by-products from facilities
11 utilized for production of energy from coal in
12 accordance with the utility's compliance plan¹⁰

13 Concerning Amended Project 36, the project is required to dispose of CCR from coal-
14 fired generation in a manner consistent with the Federal CCR Rule and state
15 environmental requirements, and it is therefore appropriate to recover its costs
16 through the ECR mechanism. Moreover, the Commission previously approved ECR
17 recovery of the costs of Phase I¹¹ and the originally proposed Phase II¹² of the Brown
18 CCR Landfill. Since Project 36 was approved in KU’s 2016 ECR Plan, the need for
19 the project to comply with the Federal CCR Rule and state environmental regulations
20 has not changed and the Commission should approve recovery of Amended Project
21 36 through KU’s ECR mechanism.

22 **Q. Is KU requesting authority to amortize the cap and closure costs for any**
23 **remaining surface area of the Brown Main Ash Pond over a certain number of**
24 **years?**

¹⁰ KRS 278.183(1).

¹¹ *In the Matter of: Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of Its 2011 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2011-00161, Order at 21-22 (Dec. 15, 2011).

¹² *In the Matter of: The Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of its 2016 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2016-00026, Order at 33 (Ky. PSC Aug. 8, 2016).

1 A. Yes, KU requests authority to amortize the actual cap and closure cost for any
2 remaining surface area of the Brown Main Ash Pond on a non-levelized basis over
3 eight years. As KU incurs costs on a monthly basis for the surface-impoundment
4 closure at Brown, those actual costs will become part of the total amount to be
5 amortized and collected through the ECR mechanism. In Case No. 2016-00026, the
6 Commission approved the amortization of the actual incurred costs for Project 39, the
7 closed Green River, Pineville, and Tyrone Generating Stations' surface-impoundment
8 closures, on a non-levelized basis over ten years.¹³ The eight-year amortization
9 period KU is proposing for the cap and closure costs for any remaining surface area
10 of the Brown Main Ash Pond is consistent with the ten-year period less two years of
11 elapsed time and will avoid a third amortization period from those approved in Case
12 No. 2016-00026. The approved ES Form 2.01 reflects the amortization approach and
13 shows the Amortization of Monthly CCR Closure Costs by Project and Station. The
14 current approved ES Form 2.01, attached as Exhibit RMC-1 to my testimony, was
15 recently approved in Case No. 2017-00266.¹⁴ Attached to my testimony as Exhibit
16 RMC-2, is ES Form 2.01, modified to include "Amended Project 36 – Brown Station
17 (Main Pond)" to the form. To avoid confusion, the description of Project 42 has also
18 been modified to read "Project 42 – Brown Station (Aux. Pond)."

19 KU will also include the unamortized balance of its actual costs incurred for
20 the cap and closure portions of this project in its ECR rate base, thereby allowing KU
21 to earn and recover the full rate of return applicable to ECR rate base on the

¹³ *In the Matter of: The Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of its 2016 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2016-00026, Order at 19 (Ky. PSC Aug. 8, 2016).
¹⁴ *In the Matter of: An Electronic Examination by the Public Service Commission of the Environmental Surcharge Mechanism of Kentucky Utilities Company for the Two-Year Billing Period Ending April 30, 2017*, Case No. 2017-00266, Order (Ky. PSC Dec. 19, 2017).

1 unamortized balance. This is consistent in principle with the amortization method for
2 and recovery period approved by the Commission for the Companies' other surface-
3 impoundment closures at Green River, Pineville and Tyrone generation stations in the
4 2016 ECR Plan cases and the amortization approach approved for LG&E's Mill
5 Creek Generating Station ash-pond dredging included in Project 10 of LG&E's 2004
6 ECR Plan.¹⁵

7 **Q. Is KU seeking to recover operation and maintenance costs through the ECR**
8 **mechanism for Amended Project 36?**

9 A. No. As explained in the testimony of Mr. Straight, operation and maintenance costs
10 related to amended Phase II are expected be similar to costs incurred in Phase I, but
11 are not distinguishable once the facility is placed into service. KU plans to continue
12 to recover its Brown CCR Landfill O&M costs through its environmental surcharge
13 as part of Project 29 in KU's 2011 ECR Plan. The absence of operation and
14 maintenance costs is shown on page 2 of Exhibit 1 to the Application, titled
15 Amendment to 2016 Environmental Compliance Plan.

16 **Q. Are any costs for Amended Project 36 already included in base rates?**

17 A. No. There are no costs for Amended Project 36 already included in base rates as a
18 result of the 2016 base rate case filing.¹⁶

¹⁵ *In the Matter of: The Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of its 2016 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2016-00026, Order at 18-19 (Ky. PSC Aug. 8, 2016); *In the Matter of: The Application of Louisville Gas and Electric Company for Approval of Its 2004 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2004-00421, Order at 9-10 (Ky. PSC June 20, 2005).

¹⁶ *In the Matter of: Electronic Application of Kentucky Utilities Company for an Adjustment of its Electric Rates and for Certificates of Public Convenience and Necessity*, Case No. 2016-00370, Direct Testimony of Christopher M. Garrett at 23-24 (Ky. PSC Nov. 23, 2016). KU proposed to remove from base rates approximately \$10.3 million of capital costs for environmental compliance (including Project 36), which intervenors did not contest.

1 **Q. Do any of the costs for Amended Project 36 or the recovery of such costs cause**
2 **any change to KU’s accounting?**

3 A. No. KU will continue to follow the same accounting practices used for many years
4 for recording the actual costs incurred for ECR projects like Amended Project 36.

5 **Q. Has KU estimated the impact of the amended project on the Environmental Cost**
6 **Recovery Surcharge?**

7 A. Yes. The table below shows the estimated annual impact on Total E(m),
8 Jurisdictional E(m), and the incremental billing factors for Group 1 and Group 2
9 associated with the Amended Project 36.¹⁷ As shown in the table, the estimated
10 impact on a Group 1 customer for Amended Project 36 is an increase of 0.05%
11 initially in 2018 and increasing to a maximum of 0.13% in 2020. For a Group 1
12 residential customer using an average of 1,122 kWh per month, the initial monthly
13 increase is expected to be \$0.06 in 2018, upon approval by the Commission. It is
14 estimated that this amount will increase to a maximum of \$0.15 per month in 2020.
15 For a Group 2 customer, the estimated impact is an increase of 0.08% in 2018 and
16 increasing to a maximum of 0.19% in 2020. Exhibit RMC-3 shows the details of the
17 impact on the calculation of the environmental surcharge and all rate schedules for
18 2018 through 2021. The estimated bill impact for Amended Project 36 reflects
19 changes resulting from the Tax Cuts and Jobs Act (“Tax Act”), namely the reduction
20 in the corporate tax rate from 35% to 21% and the elimination of bonus tax
21 depreciation for utilities beginning in 2018.

¹⁷ Group 1 includes Rate Schedules RS, AES, and all Lighting Rates. Group 2 includes Rate Schedules GS, PS-Secondary, PS-Primary, Time of Day Secondary, Time of Day Primary, Retail Transmission Service, Fluctuating Load Service, School Power Service, School Time of Day Service, and Outdoor Sports Lighting Service.

Environmental Cost Recovery Surcharge Summary

	2018	2019	2020	2021
<u>Amended Project 36</u>				
Total E(m) - (\$000)	\$834	\$1,992	\$2,126	\$2,039
12 Month Average Jurisdictional Ratio	88.08%	88.08%	88.08%	88.08%
Jurisdictional E(m) - (\$000)	\$734	\$1,754	\$1,872	\$1,719
Forecasted Jurisdictional R(m) - (million)	\$1,415	\$1,400	\$1,399	\$1,424
Incremental Billing Factor Group 1	0.05%	0.13%	0.13%	0.13%
Residential Customer Impact				
Monthly bill (1,122 kWh per month)	\$0.06	\$0.14	\$0.15	\$0.14
Incremental Billing Factor Group 2	0.08%	0.18%	0.19%	0.19%

1 **Q. How do the estimated capital costs for Amended Project 36 compare to the**
 2 **original Project 36?**

3 **A.** The estimated capital costs associated with the original Project 36 was \$11.9 million
 4 for Phase II of the Brown Landfill. By comparison, the estimated capital costs for
 5 Amended Project 36, which includes (1) Phase II of the landfill with a smaller
 6 footprint and capacity compared to the original Project 36; and (2) capping and
 7 closing the remaining areas in the Main Ash Pond at Brown that are outside the
 8 footprint of the modified Brown CCR Landfill (i.e., Phase I, amended Phase II, and
 9 hardscaped areas that have concrete or asphalt covering the Main Ash Pond), is \$14.7
 10 million. The incremental difference in the estimated capital costs of the original
 11 Project 36 and the Amended Project 36 is an increase of \$2.8 million. The estimated
 12 capital cost of Phase II of the landfill with a smaller footprint is \$8.4 million and the
 13 capping and closing of the remaining areas of the Main Ash Pond at Brown is \$6.3

1 million. Comparing the original Project 36 to construct Phase II of the landfill to
2 Amended Project 36 to construct the Phase II landfill with a smaller footprint, the
3 incremental difference is a decrease in the estimated capital cost of \$3.5 million.

4 **Q. Please describe the reduction in current capital costs estimates for Project 42 -**
5 **Brown CCR Rule Compliance Construction and New Process-Water Systems.**

6 A. Certainly. Project 42 was part of KU's 2016 ECR Plan and involves closure of the
7 auxiliary ash impoundment and the construction of process-water systems at Brown.
8 KU is not proposing the amendment of Project 42 in this proceeding, but seeks to
9 apprise the Commission of updates to the cost of Project 42. As discussed more fully
10 in the testimony of Mr. Straight, based on refined engineering studies and taking into
11 account the retirement of Units 1 and 2, KU has determined that it can significantly
12 reduce the scale of Brown's process-water systems to comply with state discharge
13 regulations. In so doing, the capital costs associated with the process-water systems
14 have been reduced from \$71.7 million¹⁸ to \$25.1 million, for an estimated total
15 reduction in expense of \$46.6 million. In addition, with the retirement of Units 1 and
16 2, the capital cost (approximately \$10 million) to convert their fly ash conveyance
17 systems from wet to dry is also avoided.¹⁹

18 **Return on Equity**

19 **Q. What return on equity (“ROE”) is KU requesting in this proceeding?**

¹⁸ In KU's 2016 ECR Plan filing, the estimated capital costs provided were \$68.6 million. The difference between the \$68.6 million reported in the 2016 ECR Plan and the \$71.7 million reported here is timing. The \$68.6 million was in the 2016 business plan and the \$71.7 million was in the 2017 business plan.

¹⁹ These costs were not included in any previously approved ECR Plan or in base rates.

1 A. The Commission recently authorized a 9.70% ROE in its December 19, 2017 final
2 order in Case No. 2017-00266, KU's most recent two-year ECR review proceeding.²⁰
3 In lieu of a formal and full-blown cost of equity analysis, in the interest of comity, the
4 Company is proposing to continue to use the 9.70% ROE in the calculation of the
5 environmental surcharge until the outcome of KU's next base rate case.

6 **Conclusion and Recommendation**

7 **Q. What is your conclusion and recommendation to the Commission?**

8 A. I recommend that the Commission issue an order on or before July 25, 2018 granting
9 KU a Certificate of Public Convenience and Necessity to construct Amended Project
10 36, approving the amendment to Project 36 in KU's 2016 ECR Plan for purposes of
11 recovering the costs of this project through the environmental surcharge mechanism,
12 approving the proposed environmental surcharge tariff for recovery of the costs of
13 Amended Project 36 in KU's 2016 ECR Plan effective for bills rendered on and after
14 August 2018 (i.e., beginning with the expense month of July 2018), the continuing
15 use of the 9.70% ROE for ECR calculation purposes and the use of the revised
16 monthly ES Form 2.01 beginning with the expense month of July 2018.

17 **Q. Does this conclude your testimony?**

18 A. Yes, it does.

²⁰ *In the Matter of: Electronic Examination by the Public Service Commission of the Environmental Surcharge Mechanism of Kentucky Utilities Company for the Two-Year Billing Period Ending April 30, 2017*, Case No. 2017-00266, Order at 5 (Ky. PSC Dec. 19, 2017).

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Robert M. Conroy**, being duly sworn, deposes and says that he is Vice President, State Regulation and Rates 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 testimony, and that the answers contained therein are true and correct to the best of his information, knowledge and belief.


Robert M. Conroy

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 26th day of January 2018.

 (SEAL)
Notary Public

My Commission Expires:
JUDY SCHOLLER
Notary Public, State at Large, KY
My commission expires July 11, 2018
Notary ID # 512743

APPENDIX A

Robert M. Conroy

Vice President, State Regulation and Rates
LG&E and KU Services Company
220 West Main Street
Louisville, Kentucky 40202
Telephone: (502) 627-3324

Previous Positions

Director, Rates	Feb. 2008 – Feb. 2016
Manager, Rates	April 2004 – Feb 2008
Manager, Generation Systems Planning	Feb. 2001 – April 2004
Group Leader, Generation Systems Planning	Feb. 2000 – Feb. 2001
Lead Planning Engineer	Oct. 1999 – Feb. 2000
Consulting System Planning Analyst	April 1996 – Oct. 1999
System Planning Analyst III & IV	Oct. 1992 - April 1996
System Planning Analyst II	Jan. 1991 - Oct. 1992
Electrical Engineer II	Jun. 1990 - Jan. 1991
Electrical Engineer I	Jun. 1987 - Jun. 1990

Professional/Trade Memberships

Registered Professional Engineer in Kentucky, 1995.
Financial Research Institutes Advisory Board
Edison Electric Institute - Rates and Regulatory Affairs Committee
Southeastern Energy Exchange - Rates and Regulation Committee

Education

Essentials of Leadership, London Business School, 2004

Masters of Business Administration

Indiana University (Southeast campus), December 1998

Center for Creative Leadership, Foundations in Leadership program, 1998.

Bachelor of Science in Electrical Engineering;

Rose Hulman Institute of Technology, May 1987

KENTUCKY UTILITIES COMPANY
ENVIRONMENTAL SURCHARGE REPORT
Amortization of Monthly CCR Closure Costs

For the Month Ended:

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Description	Accumulated CCR Closure Costs	Accumulated Amortization (Prior Month)	Current Month Amortization	Accumulated Amortization (Current Month)	Accumulated Deferred Income Taxes (ADIT)	Unamortized CCR Closure Cost Balance (Net of ADIT)
			[(2)-(3)]/ Remaining Amort Months	(3)+(4)	[(2)-(5)]*.257	(2)-(5)-(6)
2016 Plan:						
Project 39 - Green River Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 39 - Pineville Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 39 - Tyrone Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 40 - Ghent Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 41 - Trimble County Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 42 - Brown Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Net Total - All Projects:	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

**KENTUCKY UTILITIES COMPANY
ENVIRONMENTAL SURCHARGE REPORT
Amortization of Monthly CCR Closure Costs**

For the Month Ended:

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Description	Accumulated CCR Closure Costs	Accumulated Amortization (Prior Month)	Current Month Amortization	Accumulated Amortization (Current Month)	Accumulated Deferred Income Taxes (ADIT)	Unamortized CCR Closure Cost Balance (Net of ADIT)
			$[(2)-(3)] / \text{Remaining Amort Months}$	(3)+(4)	$[(2)-(5)] * .257$	(2)-(5)-(6)
2016 Plan:						
Amended Project 36 - Brown Station (Main Pond)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 39 - Green River Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 39 - Pineville Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 39 - Tyrone Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 40 - Ghent Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 41 - Trimble County Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Project 42 - Brown Station (Aux. Pond)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Net Total - All Projects:	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

Kentucky Utilities Company
Environmental Cost Recovery Surcharge Summary

	2018	2019	2020	2021	2022
Total E(m) - (\$000)	\$834	\$1,992	\$2,126	\$2,039	\$1,952
12 Month Average Jurisdictional Ratio	88.05%	88.05%	88.05%	88.05%	88.05%
Jurisdictional E(m) - (\$000)	\$734	\$1,754	\$1,872	\$1,795	\$1,719
Forecasted Jurisdictional R(m) - (million)	1,415	1,400	1,399	1,405	1,424
Incremental Billing Factor Group 1	0.05%	0.13%	0.13%	0.13%	0.12%
Residential Customer Impact					
Monthly bill (1,122 kWh per month)	\$0.06	\$0.14	\$0.15	\$0.14	\$0.13
Bill Impact for other Group 1 Rate Schedules					
All Electric Schools (Rate AES)	\$0.97	\$2.34	\$2.50	\$2.39	\$2.26
Lighting Energy	\$0.34	\$0.82	\$0.87	\$0.83	\$0.79
Traffic Energy	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02
Lighting Service and Restricted Lighting	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02
Incremental Billing Factor Group 2	0.08%	0.18%	0.19%	0.19%	0.18%
Bill Impact for Group 2 Rate Schedules					
General Service (Rate GS)	\$0.13	\$0.32	\$0.34	\$0.33	\$0.32
Power Service Secondary (Rate PSS)	\$1.85	\$4.48	\$4.78	\$4.60	\$4.40
Power Service Primary (Rate PSP)	\$3.92	\$9.50	\$10.14	\$9.75	\$9.34
Time of Day Secondary (Rate TODS)	\$8.76	\$21.23	\$22.67	\$21.79	\$20.87
Time of Day Primary (Rate TODP)	\$35.48	\$85.96	\$91.81	\$88.25	\$84.50
Retail Transmission Service (Rate RTS)	\$106.75	\$258.66	\$276.26	\$265.54	\$254.26
Fluctuating Load Service (Rate FLS)	\$1,033.18	\$2,503.32	\$2,673.67	\$2,569.96	\$2,460.79

Revenue Requirements Summary

	2018	2019	2020	2021	2022
Project 36					
BR Landfill					
Revenue Requirement					
1 Eligible Plant	8,673,166	14,681,274	14,681,274	14,681,274	14,681,274
Less: Retired Plant	0	0	0	0	0
Less: Accumulated Depreciation	(89,816)	(985,271)	(2,093,750)	(3,202,228)	(4,310,707)
Plus: Accumulated Depreciation on retired plant	0	0	0	0	0
Less: Deferred Tax Balance	(160,042)	(1,431,230)	(1,303,203)	(1,163,603)	(1,013,327)
Plus: Deferred Tax Balance on retired plant	0	0	0	0	0
Environmental Compliance Rate Base	8,423,309	12,264,773	11,284,321	10,315,442	9,357,240
Rate of return	8.83%	8.83%	8.83%	8.83%	8.83%
	<u>\$744,139</u>	<u>\$1,083,506</u>	<u>\$996,890</u>	<u>\$911,296</u>	<u>\$826,646</u>
Operating expenses	0	0	0	0	0
Annual Depreciation expense	0	9,262	222,285	222,285	222,285
Less depreciation on retired plant	89,816	886,194	886,194	886,194	886,194
Annual Property Tax expense	0	12,875	20,544	18,881	17,219
Total OE	<u>\$89,816</u>	<u>\$908,331</u>	<u>\$1,129,023</u>	<u>\$1,127,360</u>	<u>\$1,125,697</u>
Total E(m)	833,955	1,991,836	2,125,912	2,038,656	1,952,343
12 Month Average Jurisdictional Ratio	88.05%	88.05%	88.05%	88.05%	88.05%
Jurisdictional Allocation	734,304	1,753,828	1,871,883	1,795,053	1,719,054
Forecasted 12-Month Retail Revenue	1,414,559,753	1,400,243,654	1,399,147,257	1,405,263,817	1,423,936,358
Forecasted 12-Month Retail Non-Fuel Revenue	586,214,872	577,868,467	577,471,019	576,115,837	576,201,113
Billing Factor - Group 1	0.05%	0.13%	0.13%	0.13%	0.12%
Billing Factor - Group 2	0.08%	0.18%	0.19%	0.19%	0.18%
KU Residential Bill Impact					
Customer Charge	\$12.25	\$12.25	\$12.25	\$12.25	\$12.25
Energy - 1122 kWh @ \$0.08795	\$98.68	\$98.68	\$98.68	\$98.68	\$98.68
FAC billings (Sep 17 factor - \$-0.00309/kWh)	-\$3.47	-\$3.47	-\$3.47	-\$3.47	-\$3.47
DSM billings (Sep 17 factor - \$0.0029/kWh)	\$3.25	\$3.25	\$3.25	\$3.25	\$3.25
ECR billings (Sep 17 factor: 3.22%)	\$3.57	\$3.57	\$3.57	\$3.57	\$3.57
Additional ECR factor	\$0.06	\$0.14	\$0.15	\$0.14	\$0.13

Revenue Requirements
Amended Project 36 - KU

In-Service	2018	December			
		2019	2020	2021	2022
		1	2	3	4
Brown 3					
Amended Project 36 - BR Landfill Phase II	\$7,954,641	\$433,460	\$0	\$0	\$0
Accumulated Expenditures	\$7,954,641	\$8,388,101	\$8,388,101	\$8,388,101	\$8,388,101
Book Depreciation rate, per year	0.000%	2.650%	2.650%	2.650%	2.650%
Tax Depreciation rate, per year	0.000%	3.750%	7.219%	6.677%	6.177%
Income tax rate	25.46%	25.46%	25.46%	25.46%	25.46%
Deferred Tax Balance	0	77,714	175,273	261,259	336,569
Book Accumulated Depreciation Balance	0	9,262	231,547	453,831	676,116
Unrecovered Investment -- Book	7,954,641	8,388,101	8,388,101	8,388,101	8,388,101
Book Depreciation	0	9,262	222,285	222,285	222,285
Unrecovered Investment -- Tax total	7,954,641	8,388,101	8,388,101	8,388,101	8,388,101
Bonus Tax Depreciation	0	0	0	0	0
MACRS Tax Depreciation	0	314,554	605,537	560,074	518,133
Allowed Rate of Return	8.83%	8.83%	8.83%	8.83%	8.83%
Book Depreciation expense total	0	9,262	222,285	222,285	222,285
Tax expense total	0	314,554	605,537	560,074	518,133
Annual Property Tax Rate	0.1500%	0.1500%	0.1500%	0.1500%	0.1500%
Deferred Tax Activity	0	77,714	97,559	85,986	75,310
Revenue Recovery on Capital Expenditure to date					
Eligible Plant, cumulative capital expenditures	7,954,641	8,388,101	8,388,101	8,388,101	8,388,101
Less: Retired Plant	0	0	0	0	0
Less: Accumulated Depreciation	0	(9,262)	(231,547)	(453,831)	(676,116)
Plus: Accumulated Depreciation on Retired Plant	0	0	0	0	0
Less: Deferred Tax Balance	0	(77,714)	(175,273)	(261,259)	(336,569)
Plus: Deferred Tax Balance on Retired Plant	0	0	0	0	0
Environmental Compliance Rate Base	7,954,641	8,301,126	7,981,282	7,673,011	7,375,416
Rate of return	8.83%	8.83%	8.83%	8.83%	8.83%
Return on Environmental Compliance Rate Base	\$702,736	\$733,345	\$705,090	\$677,856	\$651,566
Operating Expenses					
Annual Depreciation expense	0	9,262	222,285	222,285	222,285
Less depreciation on retired plant	0	0	0	0	0
Annual Property Tax expense	0	11,932	12,568	12,235	11,901
Total OE	\$0	\$21,194	\$234,853	\$234,520	\$234,186
Total E(m) - Project	\$702,736	\$754,539	\$939,942	\$912,376	\$885,752

Revenue Requirements
Amended Project 36 - KU

	2018	2019	2020	2021	2022
In-Service	1	2	3	4	5
Brown CCR					
Amended Project 36 - Cap and Closure (BR Main Ash Pond)	\$718,525	\$5,574,648	\$0	\$0	\$0
Accumulated Expenditures	\$718,525	\$6,293,173	\$6,293,173	\$6,293,173	\$6,293,173
Book Depreciation rate, per year	0.000%	0.000%	0.000%	0.000%	0.000%
Tax Depreciation rate, per year	100.000%	100.000%	100.000%	100.000%	100.000%
Income tax rate	25.46%	25.46%	25.46%	25.46%	25.46%
Deferred Tax Balance	160,042	1,353,516	1,127,930	902,344	676,758
Book Accumulated Depreciation Balance	89,816	976,009	1,862,203	2,748,397	3,634,591
Unrecovered Investment -- Book	0	0	0	0	0
Book Amortization	89,816	886,194	886,194	886,194	886,194
Unrecovered Investment -- Tax total	718,525	6,293,173	6,293,173	6,293,173	6,293,173
Bonus Tax Depreciation	0	0	0	0	0
MACRS Tax Depreciation	0	0	0	0	0
Allowed Rate of Return	8.83%	8.83%	8.83%	8.83%	8.83%
Book Amortization expense total	89,816	886,194	886,194	886,194	886,194
Tax expense total	718,525	5,574,648	0	0	0
Annual Property Tax Rate	0.1500%	0.1500%	0.1500%	0.1500%	0.1500%
Deferred Tax Activity	160,042	1,193,474	(225,586)	(225,586)	(225,586)
Revenue Recovery on Capital Expenditure to date					
Eligible Plant, cumulative capital expenditures	718,525	6,293,173	6,293,173	6,293,173	6,293,173
Less: Retired Plant	0	0	0	0	0
Less: Accumulated Amortization	(89,816)	(976,009)	(1,862,203)	(2,748,397)	(3,634,591)
Plus: Accumulated Depreciation on Retired Plant	0	0	0	0	0
Less: Deferred Tax Balance	(160,042)	(1,353,516)	(1,127,930)	(902,344)	(676,758)
Plus: Deferred Tax Balance on Retired Plant	0	0	0	0	0
Environmental Compliance Rate Base	468,667	3,963,647	3,303,039	2,642,432	1,981,824
Rate of return	8.83%	8.83%	8.83%	8.83%	8.83%
Return on Environmental Compliance Rate Base	\$41,403	\$350,160	\$291,800	\$233,440	\$175,080
Operating Expenses	0	0	0	0	0
Annual Depreciation expense	0	0	0	0	0
Less amortization on retired plant	89,816	886,194	886,194	886,194	886,194
Annual Property Tax expense	0	943	7,976	6,646	5,317
Total OE	\$89,816	\$887,137	\$894,170	\$892,840	\$891,511
Total E(m) - Project	\$131,219	\$1,237,297	\$1,185,970	\$1,126,280	\$1,066,591

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF KENTUCKY UTILITIES)	
COMPANY FOR A CERTIFICATE OF PUBLIC)	CASE NO: 2017-00483
CONVENIENCE AND NECESSITY AND)	
APPROVAL OF AMENDMENT TO ITS 2016)	
COMPLIANCE PLAN FOR RECOVERY BY)	
ENVIRONMENTAL SURCHARGE)	

DIRECT TESTIMONY OF
R. SCOTT STRAIGHT
VICE PRESIDENT, PROJECT ENGINEERING
KENTUCKY UTILITIES COMPANY

Filed: January 26, 2018

1 **Q. Please state your name, position, and business address.**

2 A. My name is R. Scott Straight. I am the Vice President of Project Engineering for
3 Kentucky Utilities Company (“KU” or “Company”) and Louisville Gas and Electric
4 Company (“LG&E”) and an employee of LG&E and KU Services Company, which
5 provides services to LG&E and KU (collectively “Companies”). My business
6 address is 220 West Main Street, Louisville, Kentucky, 40202. A complete statement
7 of my education and work experience is attached to this testimony as Appendix A.

8 **Q. Have you previously testified before this Commission?**

9 A. Yes. I have previously testified before this Commission in the most recent
10 environmental cost recovery (“ECR”) compliance plan proceedings (Case Nos. 2016-
11 00026 (KU) and 2016-00027 (LG&E)). I have also sponsored discovery responses in
12 numerous cases, and presented in the quarterly update meetings associated with the
13 Commission’s Construction Monitoring Review of the Companies’ 2011 ECR Plans.

14 **Q. What is the purpose of your testimony?**

15 A. The purpose of my testimony is to describe the Amended Project 36 that KU is
16 proposing in this proceeding, and explain how it differs from the project that was
17 approved as part of KU’s 2016 ECR Plan in Case No. 2016-00026 (“2016 ECR
18 Plan”). The scope of Project 36 is being amended to reflect actual coal combustion
19 residuals (“CCR”) production since Project 36 was approved, as well as forecasted
20 CCR production as a result of reduced coal-fired generation at the E.W. Brown
21 Generating Station (“Brown”). Amended Project 36 remains a necessary component
22 of KU’s compliance with the federal Hazardous and Solid Waste Management
23 System; Disposal of Coal Combustion Residuals from Electric Utilities (“Federal
24 CCR Rule”).

1 **Q. Please briefly describe the principal CCR storage facilities at Brown.**

2 A. The Brown Station has three principal facilities for the storage of CCR¹ produced
3 from the burning of coal to generate electricity: the main ash pond impoundment
4 facility (“Main Ash Pond”), the auxiliary CCR impoundment facility (“Auxiliary
5 CCR Impoundment”) and the special waste dry CCR landfill (“Brown CCR
6 Landfill”). The locations of these facilities are shown in the maps provided in
7 Application Exhibit 4. Project 36 in KU’s 2016 ECR Plan involved the construction
8 of Phase II of the Brown CCR Landfill.

9

10 **Background of Project 36 Approved in 2016 ECR Plan**

11 **Q. Please describe Project 36, as approved by the Commission in Case No. 2016-**
12 **00026.**

13 A. In Case No. 2016-00026, KU received the Commission’s approval to include Project
14 36 in the 2016 ECR Plan. As proposed in that case, KU planned to construct Phase II
15 of the Brown CCR Landfill in order to remain in compliance with the Special Waste
16 Landfill Permit issued by the Kentucky Division of Waste Management (“KDWM”)
17 and to store the CCR produced at Brown.² KU explained that because the permit
18 issued by KDWM for the Brown CCR Landfill set forth a 10-foot differential height
19 limit between each lateral expansion phase, and based on historical and forecast
20 production at Brown, capacity in Phase I to reach the 10-foot height permit restriction
21 could be exhausted as early as December of 2018. This phased approach has been a
22 foundational design philosophy by the Companies in its CCR landfill designs that has

¹ CCR is comprised of bottom ash, fly ash, pyrites and gypsum.

² Project 36 was discussed at length in the direct testimony of John N. Voyles in Case No. 2016-00026 at pages 13-16.

1 served the Companies and their customers well. Phased construction avoids the cost
2 to develop and construct the entire landfill footprint that may not be needed if
3 generation or regulations experience subsequent changes. Instead, the phased
4 approach allows the timing of the subsequent phases to be constructed only when, and
5 as, needed. In this application, the Amended Phase II is needed while the subsequent
6 Phase III will not be needed due to the retirement of Units 1 and 2.

7 **Q. Did KU also receive a certificate of public convenience and necessity (“CPCN”)**
8 **to construct Phase II of the Brown Landfill?**

9 A. Yes, the Commission also granted KU a CPCN for the construction of Phase II of the
10 Brown CCR Landfill as part of Case No. 2016-00026.³

11 **Q. Did KU construct Phase II of the Brown Landfill?**

12 A. No, it did not primarily because decreased CCR production from the Brown
13 generating units delayed the need for Phase II. As KU explained in Case No. 2016-
14 00026, KU would not construct Phase II if it later determined it was not needed, even
15 if a CPCN was granted.⁴ KU explained that it was continuing to assess and evaluate
16 beneficial use and other alternatives that could affect when Phase II or the subsequent
17 Phase III was required, and that KU was continuing to review conditions that may
18 affect the projected timing of when the 10-foot height storage capacity in Phase I
19 would be exhausted.⁵

20 **Q. Were there other reasons that contributed to the delay in Phase I reaching**
21 **capacity?**

³ *In the Matter of: Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of Its 2016 Compliance Plan for Recovery by Environmental Surcharge* (Case No. 2016-00026) (Ky. PSC. Aug. 8, 2016).

⁴ Direct testimony of John N. Voyles in Case No. 2016-00026 at pages 13-16.

⁵ *Id.*

1 A. Yes, after construction of Phase I, the KDWM operating permit for Phase I was
2 issued nine months later than anticipated. This shift in the timeframe caused KU to
3 place additional CCR into the Auxiliary CCR Impoundment at Brown, instead of into
4 Phase I of the Brown CCR Landfill.

5 **Amended Project 36**

6 **Q. Please describe the Amended Project 36 proposed in this case.**

7 A. There are two components to the Amended Project 36 proposed in this case: (1)
8 constructing an amended Phase II of the Brown CCR Landfill with a smaller footprint
9 and capacity compared to the original Project 36; and (2) capping and closing the
10 remaining areas in the Main Ash Pond at Brown that are outside the footprint of the
11 modified Brown CCR Landfill (i.e., Phase I, amended Phase II, and hardscaped areas
12 that have structures, concrete or asphalt covering the Main Ash Pond). Given the
13 decision to retire Units 1 and 2, KU does not expect to need additional CCR storage
14 capacity beyond the modified Brown CCR Landfill design proposed in this case.

15 Phase II, as amended, is now necessary in order for KU to have sufficient
16 capacity to store CCR for the projected remaining life of coal-fired generation at
17 Brown. The proposed modifications to the Brown CCR Landfill, which will
18 significantly decrease its overall footprint and airspace (due to not constructing all of
19 the original Phase II footprint and any of Phase III), prevents the Brown CCR
20 Landfill from ultimately serving as the required cap and closure for the entire Main
21 Ash Pond. As such, KU must cap in place the Main Ash Pond areas that are outside
22 of the modified landfill footprint and hardscaped areas as required by the KDWM
23 Special Waste permit.

1 **Q. Even with the forecasted reduction in CCR volumes, is an amended Phase II**
2 **required to comply with the Federal CCR Rule?**

3 A. Yes, as discussed in the testimony of Mr. Stuart A. Wilson, constructing the onsite
4 landfill for CCR storage for the remaining coal-fired generation at Brown remains the
5 least-cost alternative. As shown in SAW Exhibit 1, Phase I does not have the capacity
6 to store the CCR produced by the remaining forecasted coal-fired generation at
7 Brown. Therefore, Phase II is needed.

8 **Q. How does the amended Phase II proposed in this case differ from the original**
9 **Phase II approved in Case No. 2016-00026?**

10 A. The original design of the Brown CCR Landfill, including all three phases, was to
11 provide approximately 8.5 million cubic yards (“MCY”) of capacity, and would serve
12 to cap in place the Main Ash Pond at Brown. With the retirement of Units 1 and 2,
13 and the reduced generating forecast for Unit 3, KU now estimates its CCR storage
14 needs in the Brown CCR Landfill to be 2.5 MCY.

15 Expanding the Brown CCR Landfill by constructing an amended Phase II will
16 secure the CCR storage capacity required for the remaining coal-fired generation at
17 Brown. The design of the amended Phase II will be similar to Phase I in utilizing a
18 bottom liner system, with a leachate collection system installed over top of the liner.
19 The overall design of the amended Phase II is consistent with Phase I other than the
20 footprint area. Drawings showing the location of Phase II of the Brown CCR Landfill
21 and the cap and closure of Main Ash Pond are contained in Application Exhibit 4.

22 Attached as Exhibit RSS-1 is a *Summary of Conceptual Design Modifications*
23 prepared by Amec-Foster Wheeler (“Amec”) regarding the modified footprint of the
24 Brown CCR Landfill and the closure of the remaining Main Ash Pond. Amec is

1 providing engineering services to KU in connection with this project. The details for
2 the construction cost for Amended Project 36 are contained in Exhibit RSS-1. A
3 comparison of the costs for amended Phase II proposed in this case with the costs
4 original Phase II approved in Case No. 2016-00026 is shown in Table 1 in Exhibit
5 SAW-1.

6 **Q. Please explain why the modification to the size of the Brown CCR Landfill**
7 **requires capping and closing the remaining portions of the Main Ash Pond**
8 **differently than previously expected.**

9 A. Originally, the Brown CCR Landfill was planned to serve as the entire cap for the
10 Main Ash Pond once Phase III was constructed and placed into operation. However,
11 with the reduction in the overall footprint of the Brown CCR Landfill to account for
12 the closing of Units 1 and 2, Phase III is no longer needed. The Special Waste permit
13 requires the full closure of the Main Ash Pond, thus the cap and closure of the area of
14 the Main Ash Pond not within the footprint of the modified landfill or under
15 hardscaping is required. The method of capping and closing will be similar to KU's
16 CCR impoundment closure plans at Green River, Pineville, and Tyrone as presented
17 in the 2016 ECR Plan.

18 **Q. When does KU propose to begin construction on the amended Phase II and the**
19 **cap and closure of the Main Ash Pond?**

20 A. With regard to the timing of when the amended Phase II is needed, and as shown in
21 SAW Exhibit 1, the Phase I 10-foot height permit limitation is likely to be depleted in
22 the next two to three years, and potentially as early as December 2018. KU proposes
23 to begin construction in the third quarter of 2018, with the amended Phase II work
24 completed in December 2018 and placed into operation during the first quarter of

1 2019. Work on the cap and closure of the remaining Main Ash Pond is planned to be
2 completed by December 2019.

3 **Q. How long is the amended Phase II expected to have usable space to store CCR**
4 **produced at Brown?**

5 A. The modified Brown CCR Landfill (Phase I and amended Phase II) is expected to
6 have usable space to store CCR through the remaining life of Unit 3 at Brown.

7 **Q. Is constructing an amended Phase II of the Brown Landfill and capping and**
8 **closing the Main Ash Pond the lowest reasonable cost for CCR storage for**
9 **Brown coal-fired generation?**

10 A. Yes, it is. The expected cost is \$14.7 million. As discussed in the testimony of Mr.
11 Wilson, Amended Project 36 is the lowest reasonable cost option. It is important to
12 note that the Main Ash Pond is required by permit to be fully capped and closed
13 regardless of Phase II being constructed or not. Not constructing the amended Phase
14 II would still require capping and closing all remaining areas of the Main Ash Pond
15 not under Phase I or hardscaping. The cost differential is relatively small between the
16 two scenarios.

17 **Q. Does KU expect to incur operation and maintenance costs for Amended Project**
18 **36?**

19 A. Yes. Operation and maintenance costs related to amended Phase II are expected be
20 similar to costs incurred in Phase I, but are not distinguishable when amended Phase
21 II is in service. The testimony of Mr. Robert M. Conroy describes KU's position on
22 the recovery of these costs through the ECR.

23 **Update Regarding Project 42**

24 **Q. Can you please provide an update regarding the status of Project 42 at Brown?**

1 A. Certainly. Project 42 was part of KU's 2016 ECR Plan. It involves closure of the
2 Auxiliary CCR Impoundment and construction of process water treatment systems at
3 Brown to treat the various station water processes. Based on refined engineering
4 studies and taking into account the retirement of Units 1 and 2, KU has determined
5 that it can significantly reduce the scale of Brown's process water treatment systems
6 to comply with state discharge regulations. The reduction in scope is primarily in two
7 areas. The largest decrease is in the sizing of the process water treatment system for
8 the wet flue gas desulphurization discharge caused by the elimination of treating flue
9 gas emissions from Units 1 and 2 once they are retired. In addition, smaller separate
10 process water systems can be installed for treating non-combustion related water
11 streams. In doing so, the estimated capital costs associated with the process water
12 systems have been reduced from \$71.7 million⁶ to \$25.1 million, for an estimated
13 total reduction of \$46.6 million. In addition to these savings, with the retirement of
14 Units 1 and 2, the capital cost (approximately \$10 million)⁷ to convert both Units' fly
15 ash conveyance systems from wet to dry is also avoided.

16 **Q. Is KU seeking any amendment to Project 42 in this case?**

17 A. No. The environmental regulations that require treatment of all process waters at
18 Brown to meet the CCR Rule and state water discharge requirements remain the
19 same. KU simply wants to apprise the Commission of its continued efforts to
20 perform the projects in its 2016 ECR Plan at the lowest reasonable cost, which
21 includes continued engineering refinements taking into account generation, fuel or
22 regulatory changes.

⁶ In Case No. 2016-00026, the estimated capital costs were \$68.6 million, but the costs were revised to \$71.7 million in KU's 2017 Business Plan.

⁷ These costs were not included in the 2016 ECR Plan, or as part of KU's most recent rate case (2016-00371).

1 **Q. What is your recommendation to the Commission?**

2 A. My recommendation is that the Commission approve Amended Project 36 in the 2016

3 ECR Plan for the reasons stated in my testimony.

4 **Q. Does this conclude your testimony?**

5 A. Yes, it does.

APPENDIX A

R. Scott Straight

Vice President, Project Engineering
LG&E and KU Services Company
220 West Main Street
Louisville, KY 40202
(502) 627-2701

Professional Memberships & Achievements:

KY Professional Engineer
IN Professional Engineer
Pinnacle Honor Society for Masters Degrees
Beta Sigma Gamma (National Honor Society for Business Graduates)
Member of SCOAR (Southeastern Construction Owners & Assoc. Roundtable)

Education:

Bachelor of Science in Mechanical Engineering – Purdue University (1983)
Master of Business Administration – Indiana University (*with honors* 1993)
Steven Covey's Lessons in Leadership (1996)

Recent Responsibilities (Project Engineering):

ECR Projects

2016 LG&E and KU including:

CCR Rule Compliance at Brown, Ghent, Mill Creek, and Trimble County
Impoundment Closures at Green River, Pineville, and Tyrone

Process Water Systems at Brown, Ghent, Mill Creek and Trimble County

2011 ECR Program (LG&E and KU) including:

PJFFs on Ghent 1-4, E.W. Brown 3, Mill Creek 1-4 and Trimble County 1
WFGDs on Mill Creek 1-4

2009 ECR Program (LG&E and KU)

Dry CCR Landfills at E.W. Brown, Trimble County and Ghent Landfills;
Brown 3's SCR

2004 ECR Program (LG&E and KU)

Ghent 1, 3 and 4 WFGD, Brown Station WFGD

2002 ECR Program

Ghent 1, 3 and 4 SCRs, Mill Creek 3 and 4 SCRs, Trimble County 1 SCR

Non-ECR Projects

2016 E.W. Brown 10 MWe Solar Station

2015 Cane Run 640 MW Natural Gas Combined Cycle Unit #7

2010 Trimble County 810 MW Supercritical Coal Unit #2

2012-2018 Ohio Falls Hydro-Station Units 1-8 Rehabilitation Program

History of Positions:

Director, Project Engineering (2004-2017)

Manager, NO_x Compliance Program Manager (2001-2004)
Manager, Generation Services (1998-2001)
Manager, Technical Services (1995-1998)
Sr. Engineer, Environmental Affairs (focused on Clean Air Act) (1990-1995)
Mechanical Engineer, Special Construction Department (1984-1990)
Design Engineer, Boeing Military Airplane Company (1983-1984)

Boards

Southeastern Construction Owners & Associates Roundtable (SCOAR)
OneWest

22 January 2018



Mr. Jeff Heun, PE
Senior Project Coordinator/Project Engineering
LG&E - KU Services
820 West Broadway
Louisville, KY 40202

Re: EW Brown Landfill
Request for Potential Modifications R2
Landfill Operating Permit - SW08400010

Dear Mr. Heun:

This document provides a brief summary of Amec Foster Wheeler's design efforts to provide KU alternatives in operating the subject CCR Landfill.

If you have any questions please don't hesitate to contact the undersigned.

Sincerely,
Amec Foster Wheeler

A circular professional engineer seal for the State of Kentucky, containing the name "NICHOLAS G. SCHMITT" and license number "10311". A handwritten signature in blue ink is written over the seal, and the date "1/27/18" is written below it.

Nicholas G. Schmitt, PE
Senior Principal

A handwritten signature in black ink that reads "Mark Peters".

Mark A Peters (PE Maine)
Senior Designer

Enclosures: Alternative Summary
Draft Conceptual Design Drawings

690 Commonwealth Center
11003 Bluegrass Parkway
Louisville, KY 40299
Tel: 1+ (502) 267-0700
amecfw.com

Amec Foster Wheeler Environment & Infrastructure, Inc.

Summary of Conceptual Design Alternatives & Modifications E.W. Brown Generating Station Landfill Operating Permit SW08400010

1.0 Background and Summary

1.1 Landfill Design and Operating Permit

In 2010, Kentucky Utilities Company (“KU”) retained Mactec Engineering and Environmental Services, Inc. (now known as Amec Foster Wheeler (“Amec”)) to design a coal combustion residual (“CCR”) landfill on top the old Main Ash Pond at the E.W. Brown Generating Station (“Brown”). In addition to serving as the storage facility for CCR produced at Brown, the landfill also would serve as the cap for the Main Ash Pond. Amec was also retained to support the preparation of the operating Landfill Permit Application submitted to Kentucky Division of Waste Management to request approval to operate the Landfill. Submittal of the operation permit application occurred in March 2015 and placement of CCR commenced immediately upon receipt of the operating permit in September 2016.

The Main Ash Pond had a surface area of 100+/- acres and the landfill was designed in three phases of nearly equal capacity with Phase 1 being the southernmost Phase.

1.2 Strategy Driving the Need for Modifications

The original permit design of the landfill was based on likely maximum production of CCR materials from the three coal-fired generating units at Brown for the expected life of the station. The following has occurred since the permit design process was completed:

- 1) Detailed design of Phase 1 of the Landfill was completed. Phase I was constructed, received an operation permit and was placed into operation;
- 2) A CCR Treatment and Transport Facility was constructed and became operational as part of the Phase I project;
- 3) EPA promulgated CCR Management Rules which require the cessation of sluicing of CCR to impoundments and the closing of all active unlined CCR impoundments; and
- 4) KU decided to retire Units 1 and 2 in early 2019.

Amec was retained to develop concepts for modifying the landfill permit design to optimize the landfill design to account for reduced CCR storage needs driven from the retirement of Units 1 and 2, including the need to cap and close the remaining Main Ash Pond that was not capped with Phase I and amended Phase II of the landfill. In order to meet regulations, KU has to cap the entire old Main Ash Pond surface either with a landfill bottom liner and final cover system or a “cap” that is similar to the Landfill bottom liner and final cover system. Amec developed three modification concepts (described in Section 2 below) which were reviewed with KU. Amec recommends Option 3. Amec believes Option 3 will provide KU a landfill with the flexibility to account for changes in CCR produced for the remaining life of Brown coal-fired generation, while allowing for the capping of the old Main Ash Pond and reducing the overall height of the landfill. Option 3 also provides the necessary airspace margin if additional CCR storage is required

beyond the forecasted amounts. As shown on the attached drawing set, Option 3 lowers the finished grade from the original permit design elevation of approximately 982 feet to an elevation of 936 feet. In addition, since a landfill will not cover the entire old Main Ash Pond, the remaining portion of the Main Ash Pond will be capped consistent with the CCR Rule closure plans KU is implementing on its other CCR impoundments. An additional benefit to Option 3 is that the two storm-water ponds and the leachate pond will have excess capacity now that Phase III of the landfill will not be needed. This additional capacity would allow the northern most storm-water/sedimentation pond (pond #2) to be repurposed should it be beneficial in the overall station process water design.

2.0 Conceptual design efforts

2.1 Modification Design Approaches

Three conceptual modification design approaches were developed. The first concept targeted a CCR storage volume of 2.5 million cubic yards compared to a total permitted storage volume of 8.5 million cubic yards for the total landfill. In addition, this option accounted for the existing permit differential height restriction between Phases which results in only 540,000 cubic yards of initial CCR placement in Phase 1. Thus the footprint to expand beyond the limits of Phase 1 into Phase 2 was required unless the top final grade slopes in Phase I were increased from 3% to 5%.

The second and third concepts also targeted a storage volume of 2.5 million cubic yards, and expanded beyond the limits of Phase 1 into Phase 2 with reduced side slopes to 4:1, but allowed top final grade slopes to be as flat as 3%.

The following Table provides a summary of the three concepts, including construction cost estimates. The attached cost estimates include construction of the amended Phase II of the landfill and capping the remaining surface area of the Main Ash Pond.

Summary Table of Concepts

No.	Criteria	Option 1	Option 2	Option 3	Notes
1	Phase I Landfill Expansion Area (AC)	14.0	30.4	28.8	Additional landfill area above the current Phase I limits
2	Total Modified Landfill Footprint Area (AC)	58.8	75.3	73.6	Includes 44.8 acres of existing Phase I limits
3	Remaining Main Ash Pond Area to be Capped (AC)	46.7	30.2	31.9	2-Foot cover soil (6-inches of topsoil and 18-inches protective cover) placed over a geomembrane and drainage composite
4	CCR Volume (MCY)	2.5	2.5	2.5	Phase I permit volume is ±2.8 MCY
5	High Point Final Elevation	947	935	936	Phase I permit final grade elevation is 981.
6	Height of High Point Final Grade above Existing Perimeter Road and Embankment Elevation (ft)	47	35	36	Existing perimeter road and embankment is at elevation 900.
7	Top Slope (%)	5	3	3	

8	4:1 Perimeter Slope Height (ft)	8 to 22 max	5 to 20 max	5 to 21 max	Phase I permit design had 3:1 perimeter slopes up to 40 feet high with an intermediate drainage bench
9	Ability to Allow re-purposing of Leachate and Stormwater Pond No. 2 (Y or N)	Y	Y	Y	All stormwater directed to Stormwater Pond No. 1
10	Estimated Construction Cost (M\$)	\$15.0	\$15.1	\$14.7	Construction of the amended Phase II of the Landfill and capping the remaining surface area of the Main Ash Pond.

2.2 Conceptual Design Selection

Option 1 resulted in a planned landfill crest height elevation of approximately 947 feet, a total landfill footprint of approximately 59 acres, and eliminated the need for intermediate benches on the side slopes, and had top final grade slopes as steep as 5%. Concept 1 does allow for repurposing the Leachate Pond and Stormwater/Sedimentation Pond 2.

Options 2 and 3 utilize portions of the Phase 2 Landfill. Option 3, recommended by Amec, has a total footprint of approximately 74 acres which is slightly less than Option 2, has a planned crest height elevation of approximately 936 feet, eliminates the need for intermediate side slope benches, and has top final grade slopes as flat as 3%.

2.3 Option Preference

As previously stated, Amec recommends Option 3. The primary driver in this selection is the reduction of the overall height of landfill (and reduced impacts on the view shed) and the flexibility to repurpose the Stormwater/Sedimentation Pond 2 and the Leachate Pond, should the need arise. This option also provides the necessary airspace margin should additional CCR storage be necessary during the life of coal-fired generation at Brown. This option also minimizes the impacts to the cap and closure plans that would be associated with Option 1.

3.0 Closing

We believe this short narrative along with the attached estimated construction costs and drawing provides the pertinent highlights of the conceptual landfill modification and capping of the Main Ash Pond.

Amended Phase II Landfill and Main Pond Closure Option No. 1 - Summary of Estimated Construction Costs Only

No.	Item	Unit	Quantity	Unit Cost	Total Cost
1	Mobilization and Demobilization	LS	1	\$ 650,000	\$ 650,000
2	Borrow Area Site Preparation & Restoration				
2a	Borrow Area Clearing, Grubbing, and Stripping	AC	15	\$ 3,500	\$ 52,500
2b	Borrow Area Haul Roads	LS	1	\$ 150,000	\$ 150,000
2c	Borrow Area Erosion Control	LS	1	\$ 100,000	\$ 100,000
2e	Final grading	AC	15	\$ 8,712.00	\$ 130,680
2f	Topsoil, Seed, and Mulch	AC	15.00	\$ 5,500	\$ 82,500
2g	Temporary Erosion Control Blanket	SY	16,200	\$ 2.00	\$ 32,400
Borrow Area Site Preparation Subtotal					\$ 548,080
3	Landfill Construction				
3a	Construction Layout and Staking	LS	1	\$ 480,000	\$ 480,000
3b	Progress Surveys	LS	1	\$ 25,000	\$ 25,000
3c	As-built Survey	LS	1	\$ 10,000	\$ 10,000
3d	Landfill Area Erosion Control	LS	1	\$ 110,000	\$ 110,000
3e	Shaping and fine grading existing clay cover material	AC	16	\$ 10,890.00	\$ 174,240
3f	Phase Berm Construction	CY	77,900	\$ 7.42	\$ 578,018
3g	Landfill Liner Geotextile Cushion Layer	SY	67,800	\$ 1.50	\$ 101,700
3h	Landfill Liner Geomembrane	AC	14	\$ 34,848	\$ 487,872
3i	Geocomposite Drainage Layer	AC	14	\$ 43,560	\$ 609,840
3j	Leachate Collection Piping	LF	3,650	\$ 125.00	\$ 456,250
3k	Leachate Header Piping	LF	450	\$ 165.00	\$ 74,250
3l	Chimney Drains for Landfill Stormwater Control During Operation	EA	0	\$ -	\$ -
3m	CCR Placement	CY	0	\$ -	\$ -
3n	Perimeter Ditch Lining	SF	125,600	\$ 5.00	\$ 628,000
3o	24-inch Storm Drain Pipe	LF	240	\$ 165	\$ 39,600
3p	Stone Slope Protection	CY	10,500	\$ 40	\$ 420,000
3q	6-FT Diameter Manholes	EA	2	\$ 14,000	\$ 28,000
3r	Expanded Phase 1 Landfill Limits Clearing and Grubbing Borrow Site	AC	0	\$ -	\$ -
3s	Landfill Cap Geotextile Cushion	SY	0	\$ -	\$ -
3t	Landfill Cap Geomembrane	AC	0	\$ -	\$ -
3u	Landfill Cap Geocomposite Drainage Layer	AC	0	\$ -	\$ -
3v	Landfill Cap Protective Cover Soil	CY	0	\$ -	\$ -
3w	Landfill Cap Topsoil	CY	0	\$ -	\$ -
3x	Perimeter Drain Stone	CY	0	\$ -	\$ -
3y	Gas Vents	EA	0	\$ -	\$ -
Landfill & Closure Subtotal					\$ 4,222,770
4	Main Ash Pond Cap				
4a	Construction Layout and Staking	LS	1	\$ 90,000	\$ 90,000
4b	Progress Surveys	LS	1	\$ 25,000	\$ 25,000
4c	As-built Survey	LS	1	\$ 10,000	\$ 10,000
4d	Main Ash Pond Erosion Control	LS	1	\$ 100,000	\$ 100,000
4e	Shaping and fine grading existing clay cover material	AC	48.86	\$ 2,178.00	\$ 106,417
4a	Main Ash Pond Geotextile Cushion	SY	236,516	\$ 1.50	\$ 354,773
4b	Main Ash Pond Cap Geomembrane	AC	48.86	\$ 34,848	\$ 1,702,673
4c	Main Ash Pond Cap Geocomposite Drainage Layer	AC	48.86	\$ 43,560	\$ 2,128,342
4d	Main Ash Pond Cap Protective Cover Soil	CY	118,258	\$ 7.42	\$ 877,473
4e	Main Ash Pond Topsoil	CY	39,419	\$ 7.62	\$ 300,375
Main Ash Pond Closure Subtotal					\$ 5,695,053
Sub Total					\$ 11,115,903
25% Contingency					\$ 2,778,976
Construction Total					\$ 13,894,878
Construction Technical Oversight					\$ 1,111,590
Total Cost					\$ 15,006,468

Notes

Amended Phase II Landfill and Main Pond Closure Option No. 2 - Summary of Estimated Construction Costs Only

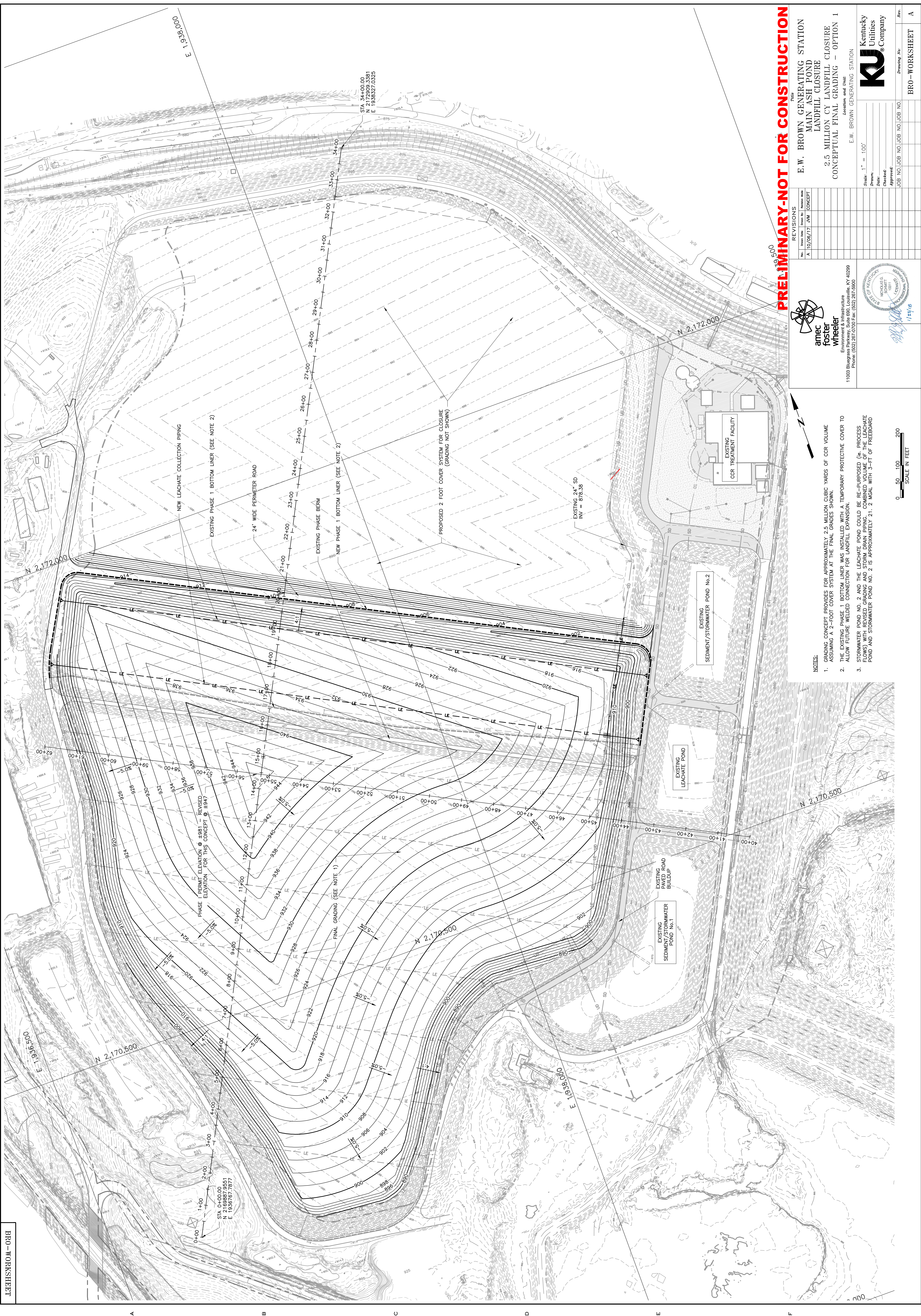
No.	Item	Unit	Quantity	Unit Cost	Total Cost
1	Mobilization and Demobilization	LS	1	\$ 675,000	\$ 675,000
2	Borrow Area Site Preparation & Restoration				
2a	Borrow Area Clearing, Grubbing, and Stripping	AC	17	\$ 3,500	\$ 57,750
2b	Borrow Area Haul Roads	LF	1	\$ 150,000	\$ 150,000
2c	Borrow Area Erosion Control	LS	1	\$ 120,000	\$ 120,000
6a	Final grading	AC	17	\$ 8,712.00	\$ 143,748
6b	Topsoil, Seed, and Mulch	AC	16.50	\$ 5,500	\$ 90,750
6c	Temporary Erosion Control Blanket	SY	17,050	\$ 2.00	\$ 34,100
Borrow Area Site Subtotal					\$ 596,348
3	Landfill Construction & Closure				
3a	Construction Layout and Staking	LS	1	\$ 500,000	\$ 500,000
3b	Progress Surveys	LS	1	\$ 25,000	\$ 25,000
3c	As-built Survey	LS	1	\$ 10,000	\$ 10,000
3d	Landfill Area Erosion Control	LS	1	\$ 130,000	\$ 130,000
3e	Shaping and fine grading existing clay cover material	AC	31	\$ 10,890.00	\$ 337,590
3f	Phase Berm Construction	CY	55,750	\$ 7.42	\$ 413,665
3g	Landfill Liner Geotextile Cushion Layer	SY	150,050	\$ 1.50	\$ 225,075
3h	Landfill Liner Geomembrane	AC	31	\$ 34,848.00	\$ 1,062,864
3i	Geocomposite Drainage Layer	AC	31	\$ 43,560.00	\$ 1,328,580
3j	Leachate Collection Piping	LF	5,175	\$ 125.00	\$ 646,875
3k	Leachate Header Piping	LF	780	\$ 165.00	\$ 128,700
3l	Chimney Drains for Landfill Stormwater Control During Operation	EA	0	\$ -	\$ -
3m	CCR Placement	CY	0	\$ -	\$ -
3n	Perimeter Ditch Lining	SF	141,200	\$ 5.00	\$ 706,000
3o	24-inch Storm Drain Pipe	LF	240	\$ 165	\$ 39,600
3p	Stone Slope Protection	CY	12,600	\$ 40	\$ 504,000
3q	6-FT Diameter Manholes	EA	2	\$ 14,000	\$ 28,000
3r	Expanded Phase 1 Landfill Limits Clearing and Grubbing Borrow Site	AC	0	\$ -	\$ -
3s	Landfill Cap Geotextile Cushion	SY	0	\$ -	\$ -
3t	Landfill Cap Geomembrane	AC	0	\$ -	\$ -
3u	Landfill Cap Geocomposite Drainage Layer	AC	0	\$ -	\$ -
3v	Landfill Cap Protective Cover Soil	CY	0	\$ -	\$ -
3w	Landfill Cap Topsoil	CY	0	\$ -	\$ -
3x	Perimeter Drain Stone	CY	0	\$ -	\$ -
3y	Gas Vents	EA	0	\$ -	\$ -
Landfill & Closure Subtotal					\$ 6,085,949
4	Main Ash Pond Cap				
4a	Construction Layout and Staking	LS	1	\$ 120,000	\$ 120,000
4b	Progress Surveys	LS	1	\$ 25,000	\$ 25,000
4c	As-built Survey	LS	1	\$ 10,000	\$ 10,000
4d	Main Ash Pond Erosion Control	LS	1	\$ 130,000	\$ 130,000
4e	Shaping and fine grading existing clay cover material	AC	31.86	\$ 2,178.00	\$ 69,391
4f	Main Ash Pond Geotextile Cushion	SY	153,814	\$ 1.50	\$ 230,721
4g	Main Ash Pond Cap Geomembrane	AC	31.86	\$ 34,848	\$ 1,110,257
4h	Main Ash Pond Cap Geocomposite Drainage Layer	AC	31.86	\$ 43,560	\$ 1,387,822
4i	Main Ash Pond Cap Protective Cover Soil	CY	77,097	\$ 7.42	\$ 572,060
4j	Main Ash Pond Topsoil	CY	25,699	\$ 7.62	\$ 195,826
Main Ash Pond Closure Subtotal					\$ 3,851,077
Sub Total					\$ 11,208,374
25% Contingency					\$ 2,802,094
Construction Total					\$ 14,010,468
Construction Technical Oversight					\$ 1,120,837
Total Cost					\$ 15,131,305

Notes

Amended Phase II Landfill and Main Pond Closure Option No. 3 - Summary of Estimated Construction Costs Only

No.	Item	Unit	Quantity	Unit Cost	Total Cost
1	Mobilization and Demobilization	LS	1	\$ 675,000	\$ 675,000
2	Borrow Area Site Preparation & Restoration				
2a	Borrow Area Clearing, Grubbing, and Stripping	AC	16.5	\$ 3,500	\$ 57,750
2b	Borrow Area Haul Roads	LF	1	\$ 150,000	\$ 150,000
2c	Borrow Area Erosion Control	LS	1	\$ 120,000	\$ 120,000
6a	Final grading	AC	16.5	\$ 8,712.00	\$ 143,748
6b	Topsoil, Seed, and Mulch	AC	16.50	\$ 5,500	\$ 90,750
6c	Temporary Erosion Control Blanket	SY	17,050	\$ 2.00	\$ 34,100
Borrow Area Site Subtotal					\$ 596,348
3	Landfill Construction & Closure				
3a	Construction Layout and Staking	LS	1	\$ 500,000	\$ 500,000
3b	Progress Surveys	LS	1	\$ 25,000	\$ 25,000
3c	As-built Survey	LS	1	\$ 10,000	\$ 10,000
3d	Landfill Area Erosion Control	LS	1	\$ 130,000	\$ 130,000
3e	Shaping and fine grading existing clay cover material	AC	29.3	\$ 10,890.00	\$ 319,077
3f	Phase Berm Construction	CY	57,200	\$ 7.42	\$ 424,424
3g	Landfill Liner Geotextile Cushion Layer	SY	141,700	\$ 1.50	\$ 212,550
3h	Landfill Liner Geomembrane	AC	29.3	\$ 34,848.00	\$ 1,021,046
3i	Geocomposite Drainage Layer	AC	29.3	\$ 43,560.00	\$ 1,276,308
3j	Leachate Collection Piping	LF	5,175	\$ 125.00	\$ 646,875
3k	Leachate Header Piping	LF	740	\$ 165.00	\$ 122,100
3l	Chimney Drains for Landfill Stormwater Control During Operation	EA	0	\$ -	\$ -
3m	CCR Placement	CY	0	\$ -	\$ -
3n	Perimeter Ditch Lining	SF	138,600	\$ 5.00	\$ 693,000
3o	24-inch Storm Drain Pipe	LF	240	\$ 165	\$ 39,600
3p	Stone Slope Protection	CY	12,250	\$ 40	\$ 490,000
3q	6-FT Diameter Manholes	EA	2	\$ 14,000	\$ 28,000
3r	Expanded Phase 1 Landfill Limits Clearing and Grubbing	AC	0	\$ -	\$ -
3s	Geotextile Cushion	SY	0	\$ -	\$ -
3t	Geomembrane	AC	0	\$ -	\$ -
3u	Geocomposite Drainage Layer	AC	0	\$ -	\$ -
3v	Protective Cover Soil	CY	0	\$ -	\$ -
3w	Topsoil	CY	0	\$ -	\$ -
3x	Perimeter Drain Stone	CY	0	\$ -	\$ -
3y	Gas Vents	EA	0	\$ -	\$ -
Landfill & Closure Subtotal					\$ 5,937,980
4	Main Ash Pond Cap				
4a	Construction Layout and Staking	LS	1	\$ 120,000	\$ 120,000
4b	Progress Surveys	LS	1	\$ 25,000	\$ 25,000
4c	As-built Survey	LS	1	\$ 10,000	\$ 10,000
4d	Main Ash Pond Erosion Control	LS	1	\$ 130,000	\$ 130,000
4e	Shaping and fine grading existing clay cover material	AC	30.20	\$ 2,178.00	\$ 65,776
4f	Main Ash Pond Geotextile Cushion	SY	145,960	\$ 1.50	\$ 218,940
4g	Main Ash Pond Cap Geomembrane	AC	30.20	\$ 34,848	\$ 1,052,410
4h	Main Ash Pond Cap Geocomposite Drainage Layer	AC	30.20	\$ 43,560	\$ 1,315,512
4i	Main Ash Pond Cap Protective Cover Soil	CY	73,103	\$ 7.42	\$ 542,423
4j	Main Ash Pond Topsoil	CY	24,361	\$ 7.62	\$ 185,629
Main Ash Pond Closure Subtotal					\$ 3,665,689
Sub Total					\$ 10,875,018
25% Contingency					\$ 2,718,754
Construction Total					\$ 13,593,772
Construction Technical Oversight					\$ 1,087,502
Total Cost					\$ 14,681,274

Notes



PRELIMINARY-NOT FOR CONSTRUCTION

E. W. BROWN GENERATING STATION
MAIN ASH POND
LANDFILL CLOSURE
2.5 MILLION CY LANDFILL CLOSURE
CONCEPTUAL FINAL GRADING - OPTION 1

Location and Unit:
 E. W. BROWN GENERATING STATION

Scale: 1" = 100'
 Author:
 Checker:
 Approver:
 JOB NO./JOB NO./JOB NO./JOB NO.

11003 Bluegrass Parkway, Suite 600, Louisville, KY 40299
 Phone: (502) 267-0700 Fax: (502) 267-5900

amec
 foster
 wheeler

Environmental & Infrastructure
 11003 Bluegrass Parkway, Suite 600, Louisville, KY 40299
 Phone: (502) 267-0700 Fax: (502) 267-5900

Professional Engineer
 No. 10011
 State of Kentucky
 1/24/18

REVISIONS

No.	Date	Drawn By	Checked By	Revised
A	10/06/17	JJM	CONCEPT	

Notes:

1. GRADING CONCEPT PROVIDES FOR APPROXIMATELY 2.5 MILLION CUBIC YARDS OF CCR VOLUME ASSUMING A 2-FOOT COVER SYSTEM AT THE FINAL GRADIES SHOWN.
2. THE EXISTING PHASE 1 BOTTOM LINER WAS INSTALLED WITH A TEMPORARY PROTECTIVE COVER TO ALLOW FUTURE WELDED CONNECTION FOR LANDFILL EXPANSION.
3. STORMWATER POND NO. 2 AND THE LEACHATE POND COULD BE RE-PURPOSED (i.e. PROCESS POND AND STORMWATER POND NO. 2 IS APPROXIMATELY 21.2 ACRES WITH 3'-FT. OF FREEBOARD

0 50 100 200
 SCALE IN FEET

North Arrow

STA 34+00.00
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 E 1938527.0325

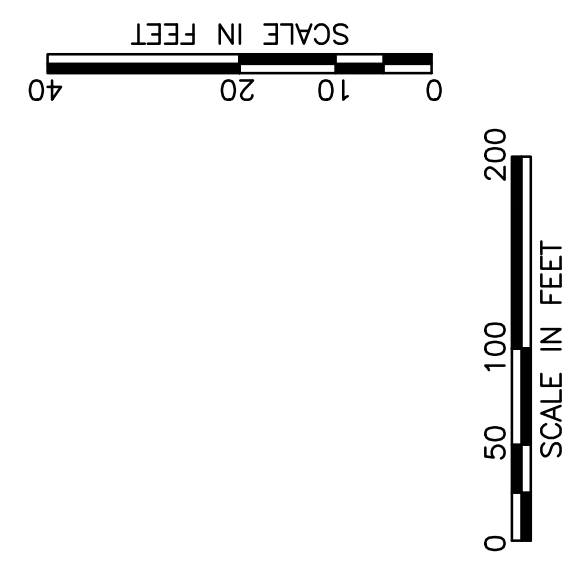
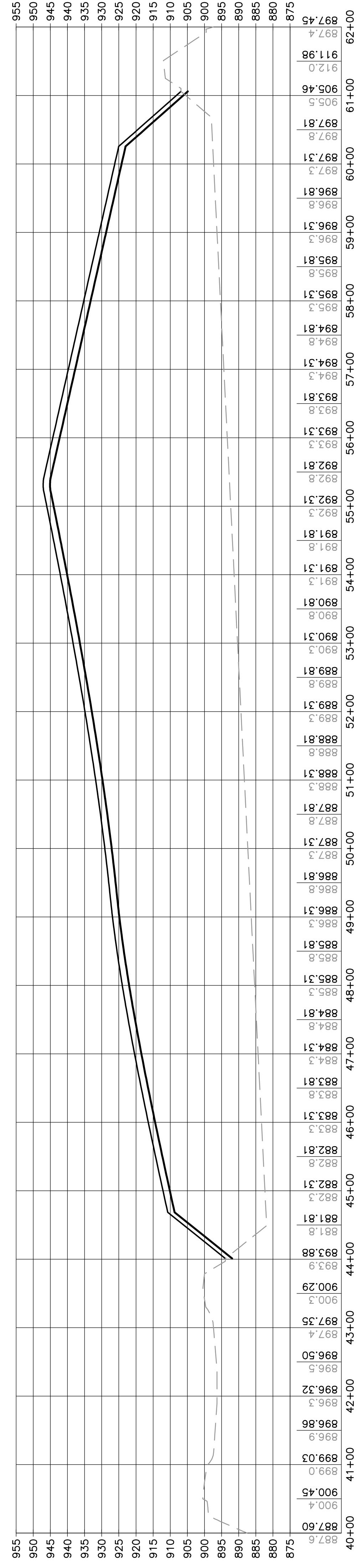
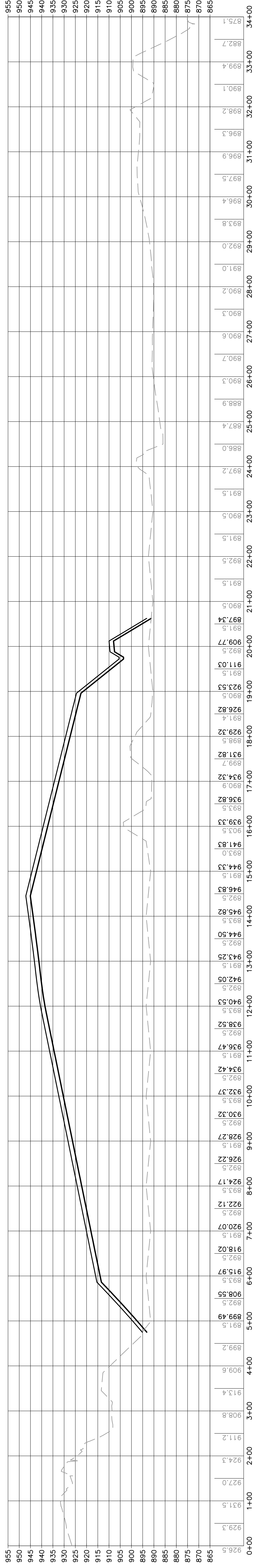
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 E 19336767.7877

EXISTING 24" SD
 INV = 878.38

EXISTING TREATMENT FACILITY
 CCR TREATMENT FACILITY

EXISTING LEACHATE POND
 EXISTING/STORMWATER POND No.2
 EXISTING PAVED ROAD BUILDUP
 SEDIMENT/STORMWATER POND No.1

BR0 - WORKSHEET



amec foster wheeler
 Environmental & Infrastructure
 11003 Bluegrass Parkway, Suite 600, Louisville, KY 40299
 Phone: (502) 267-0700 Fax: (502) 267-5900

Nicholas G. Smith
1/27/18

PRELIMINARY-NOT FOR CONSTRUCTION

REVISIONS

No.	Date	Drawn By	Checked By	Revised
A	10/06/17	JMM	CONCEPT	

E. W. BROWN GENERATING STATION
 MAIN ASH POND
 LANDFILL CLOSURE
 2.5 MILLION CY LANDFILL CLOSURE
 CROSS SECTIONS - OPTION 1

Location and Unit:
 E.W. BROWN GENERATING STATION

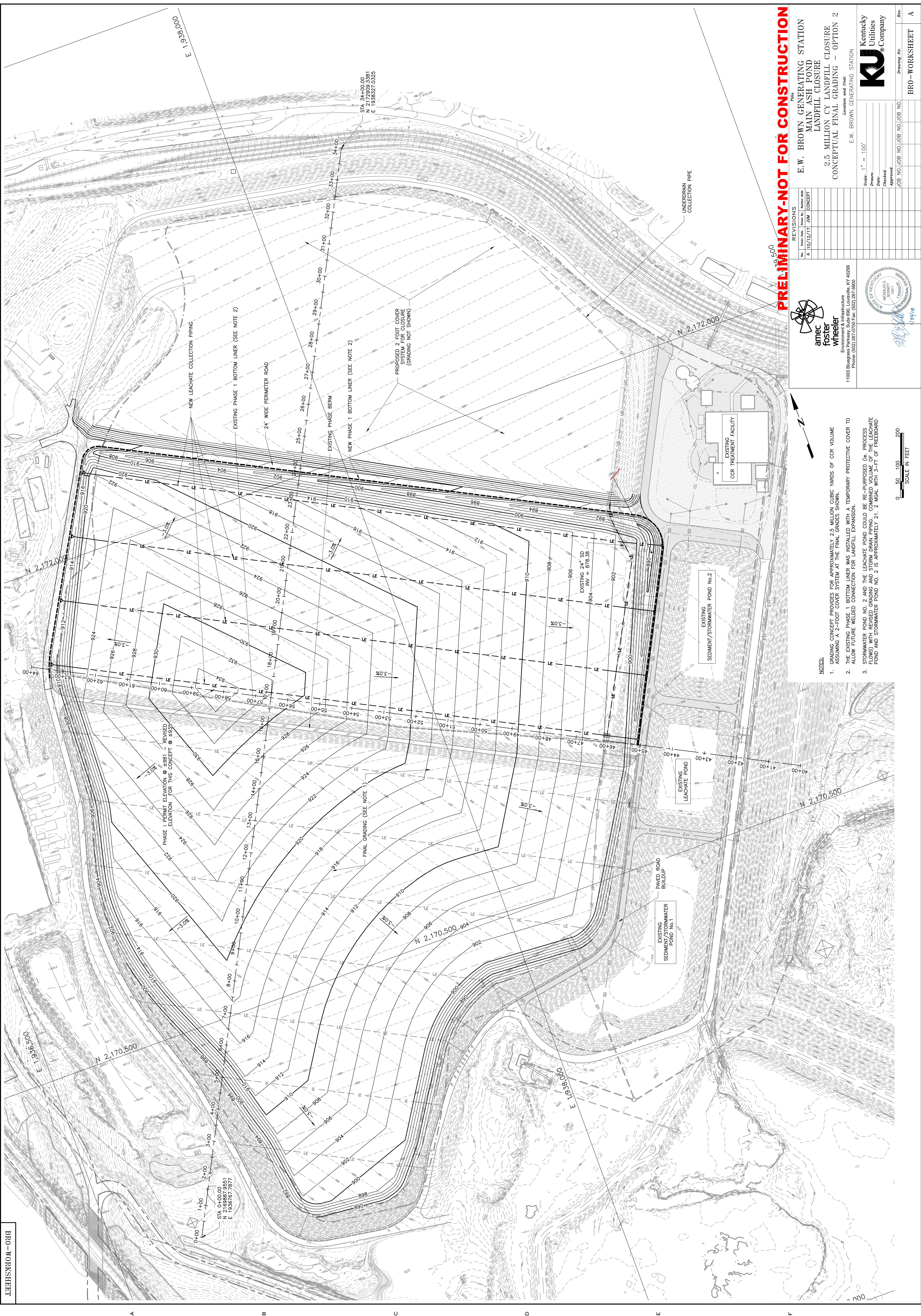
Scale: 1" = 100'

Drawn: _____
 Check: _____
 Approved: _____

JOB NO./JOB NO./JOB NO./JOB NO.

KU
 Kentucky Utilities Company

Rev: _____
 Drawing No: _____
BR0 - WORKSHEET
 A



PRELIMINARY-NOT FOR CONSTRUCTION

**E.W. BROWN GENERATING STATION
MAIN ASH POND
LANDFILL CLOSURE
2.5 MILLION CY LANDFILL CLOSURE
CONCEPTUAL FINAL GRADING - OPTION 2**

Location and Unit:
E.W. BROWN GENERATING STATION

Scale: 1" = 100'
Author: [Signature]
Checker: [Signature]
Approver: [Signature]

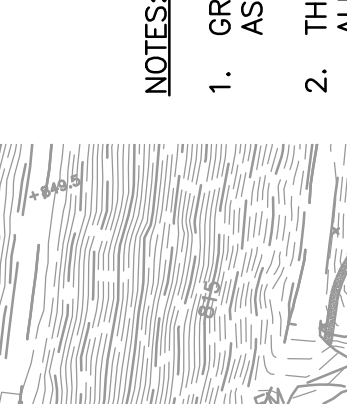
Job No./Job No./Job No./Job No.
Drawing No. **A**

BRO - WORKSHEET

J.M.C. Version 2.0

Rev.	Date	Drawn By	Checked By	Job No.	Sheet No.
A	10/12/17	J.M.C.	J.M.C.		

AMEC
foster
wheeler
Engineering & Construction
11008 Bluegrass Parkway, Suite 600, Louisville, KY 40299
Phone: (502) 267-0700 Fax: (502) 267-5900



NOTES:
1. GRADING PROVIDES FOR APPROXIMATELY 2.5 MILLION CUBIC YARDS OF CCR VOLUME ASSUMING A 2-FOOT COVER SYSTEM AT THE FINAL GRADES SHOWN.
2. THE EXISTING PHASE 1 BOTTOM LINER WAS INSTALLED WITH A TEMPORARY PROTECTIVE COVER TO ALLOW FUTURE WELDED CONNECTION FOR LANDFILL EXPANSION.
3. STORMWATER POND NO. 2, AND THE LEACHATE POND COULD BE RE-PURPOSED (AS PROCESS FLOWS) WITH REVISED GRADING AND STORM DRAIN PIPING. COMBINED VOLUME OF THE LEACHATE POND AND STORMWATER POND NO. 2 IS APPROXIMATELY 21.2 MGAL WITH 3-FT OF FREEBOARD.

PHASE 1 PERMIT ELEVATION @ 4981 - REVISED ELEVATION FOR THIS CONCEPT @ 4935

FINAL GRADING (SEE NOTE 1)

PROPOSED 2 FOOT COVER SYSTEM FOR CLOSURE (GRADING NOT SHOWN)

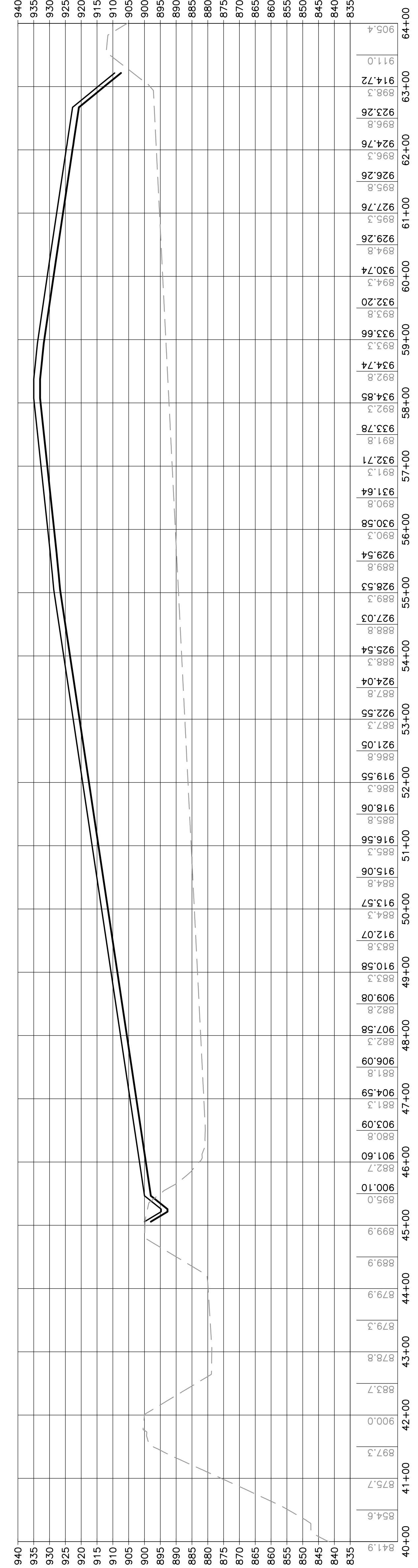
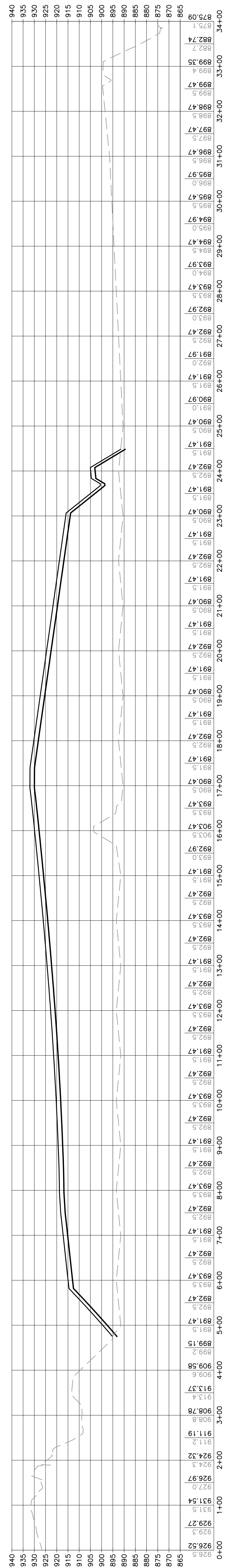
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E 1938527.0325

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N 2169987.9551
E 19346787.7877

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PRELIMINARY-NOT FOR CONSTRUCTION

REVISIONS

Rev.	Date	Drawn By	Checked By	Revised
A	10/12/17	JM	CONCEPT	

THE
E. W. BROWN GENERATING STATION
MAIN ASH POND
LANDFILL CLOSURE
2.5 MILLION CY LANDFILL CLOSURE
CROSS SECTIONS - OPTION 2

Location and Unit:
 E.W. BROWN GENERATING STATION

Scale: 1" = 100'
 Author:
 Check:
 Appr:
 JOB NO./JOB NO./JOB NO./JOB NO.

11003 Bluegrass Parkway, Suite 600, Louisville, KY 40299
 Phone: (502) 267-0700 Fax: (502) 267-5900

amc
 foster
 wheeler

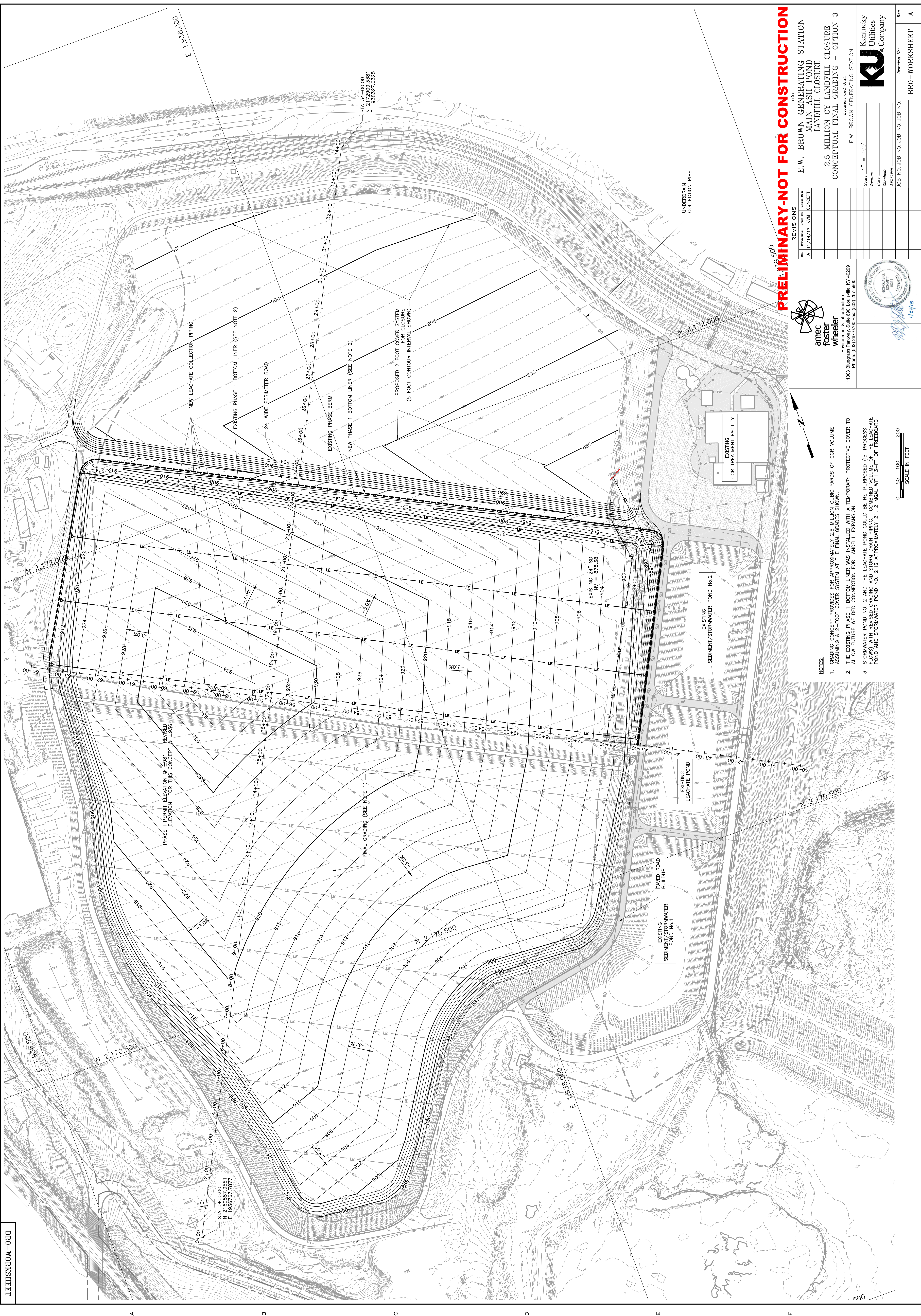
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Kentucky
 Utilities
 Company

BR0 - WORKSHEET

2 3 4 5 6 7 8 9 10

A B C D E F



PRELIMINARY-NOT FOR CONSTRUCTION

E. W. BROWN GENERATING STATION
MAIN ASH POND
LANDFILL CLOSURE
2.5 MILLION CY LANDFILL CLOSURE
CONCEPTUAL FINAL GRADING - OPTION 3

Location and Unit:
 E. W. BROWN GENERATING STATION

Scale: 1" = 100'
 Author: [Signature]
 Checker: [Signature]
 Approver: [Signature]

Job No./Job No./Job No./Job No.
 Drawing No. A

REVISONS

No.	Date	Drawn By	Checked By	Revised
A	11/14/17	JM	CONCEPT	

11003 Bluegrass Parkway, Suite 600, Louisville, KY 40299
 Phone: (502) 267-0700 Fax: (502) 267-5900

amec
 foster
 wheeler

Environmental
 Infrastructure
 11003 Bluegrass Parkway, Suite 600, Louisville, KY 40299
 Phone: (502) 267-0700 Fax: (502) 267-5900

Professional Engineer
 License No. 11737/d

11/17/17

11/17/17

11/17/17

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NOTES:
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SCALE IN FEET
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11/17/17

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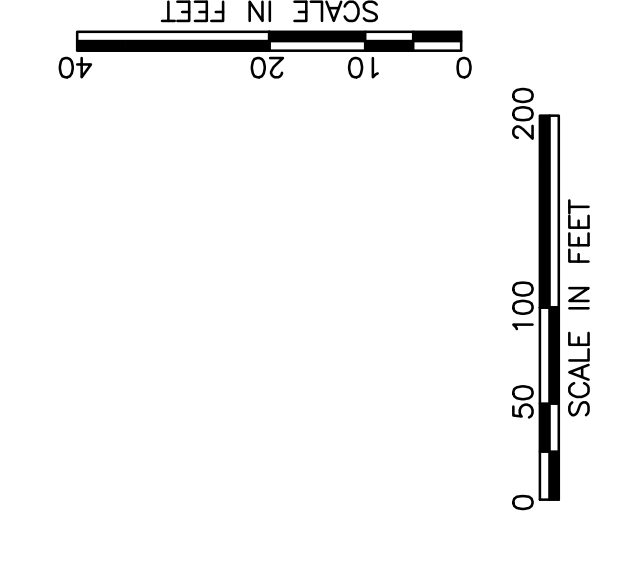
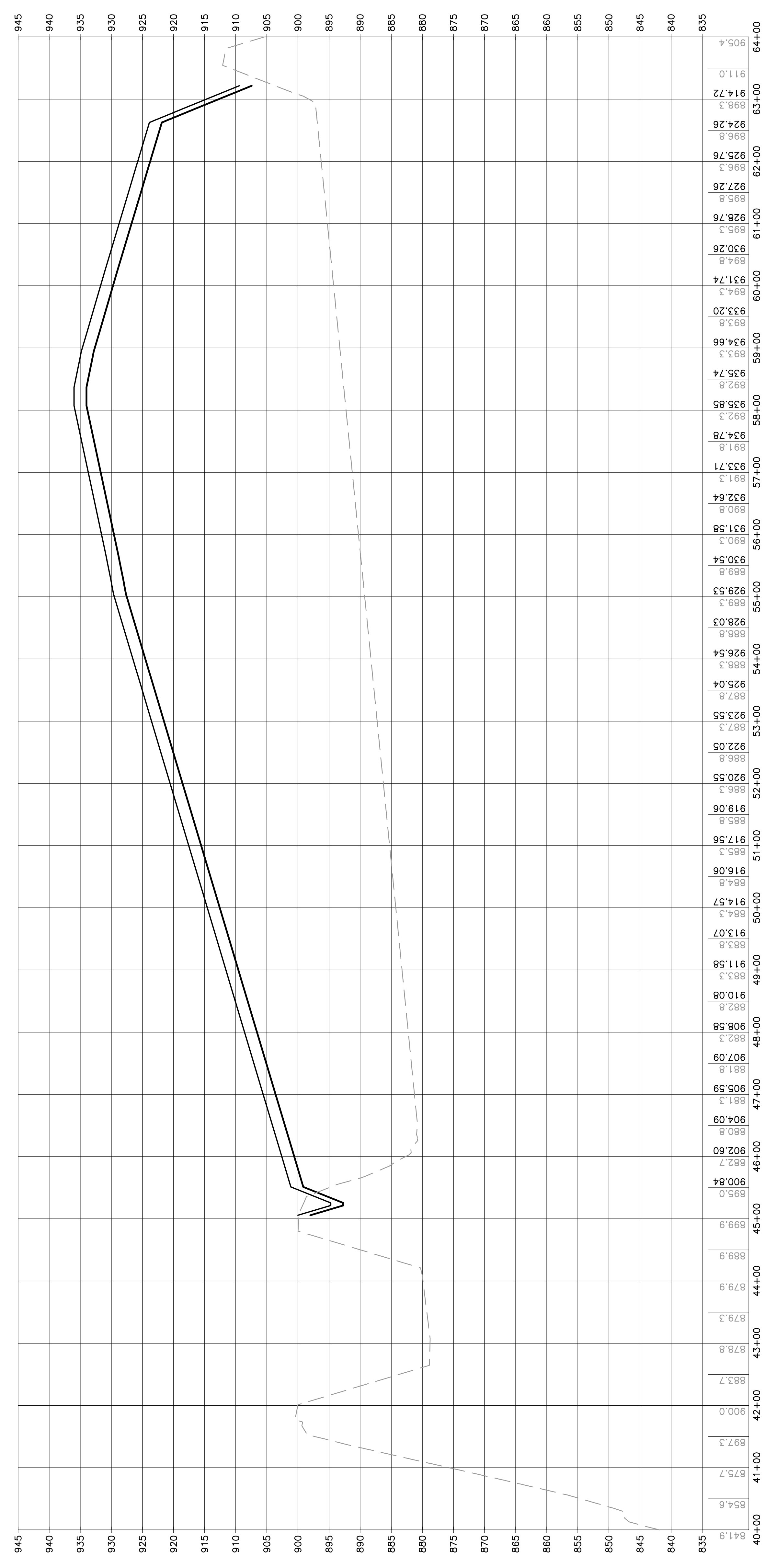
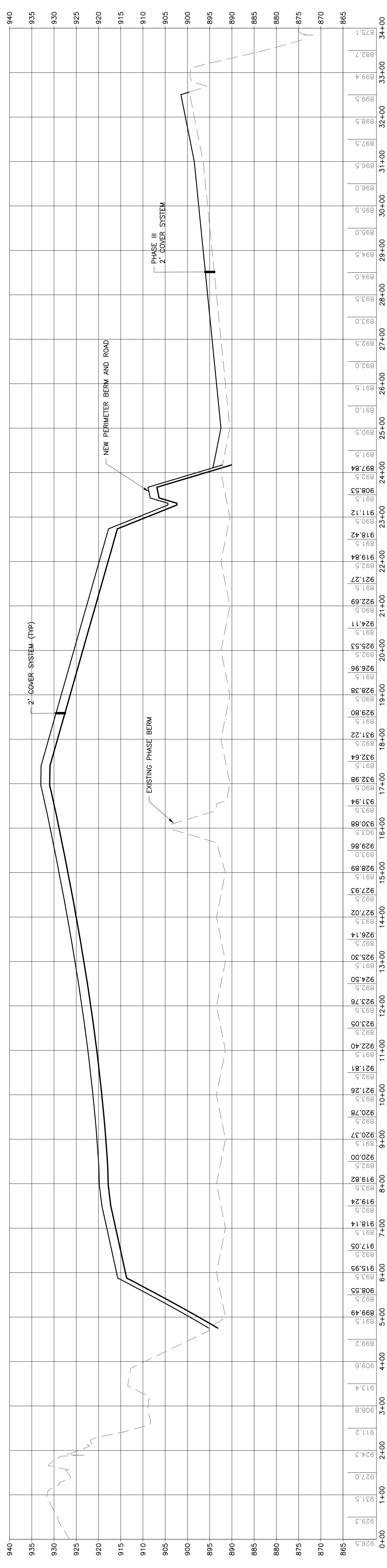
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PRELIMINARY-NOT FOR CONSTRUCTION

REVISIONS

No.	Date	Drawn By	Checked By	Revised By	Revised Date
A	11/14/17	JJM	CONCEPT		

THE
E. W. BROWN GENERATING STATION
MAIN ASH POND
LANDFILL CLOSURE
2.5 MILLION CY LANDFILL CLOSURE
CROSS SECTIONS - OPTION 3

Location and Unit:
 E.W. BROWN GENERATING STATION

Scale: 1" = 100'

Drawn: _____
 Check: _____
 Approved: _____

JOB NO./JOB NO./JOB NO./JOB NO.
 Drawing No. _____
 Rev. _____

Kentucky Utilities Company

amec foster wheeler
 Environmental & Infrastructure
 11003 Bluegrass Parkway, Suite 600, Louisville, KY 40299
 Phone: (502) 267-0700 Fax: (502) 267-5900

11/17/17

BRO - WORKSHEET

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF KENTUCKY UTILITIES)	
COMPANY FOR A CERTIFICATE OF PUBLIC)	CASE NO: 2017-00483
CONVENIENCE AND NECESSITY AND)	
APPROVAL OF AMENDMENT TO ITS 2016)	
COMPLIANCE PLAN FOR RECOVERY BY)	
ENVIRONMENTAL SURCHARGE)	

DIRECT TESTIMONY OF
GARY H. REVLETT
DIRECTOR, ENVIRONMENTAL AFFAIRS
KENTUCKY UTILITIES COMPANY

Filed: January 26, 2018

1 **Q. Please state your name, position, and business address.**

2 A. My name is Gary H. Revlett. I am Director of Environmental Affairs for Kentucky
3 Utilities Company (“KU” or “Company”) and Louisville Gas and Electric Company
4 (“LG&E”) and an employee of LG&E and KU Services Company, which provides
5 services to LG&E and KU (collectively “Companies”). My business address is 220
6 West Main Street, Louisville, Kentucky, 40202. A complete statement of my
7 education and work experience is attached to this testimony as Appendix A.

8 **Q. Have you previously testified before this Commission?**

9 A. Yes. I testified before this Commission in the Companies’ three most recent
10 environmental cost recovery (“ECR”) compliance plan proceedings in 2016,¹ 2011,²
11 and 2006.³ I have also filed testimony in cases in which the Commission has issued a
12 Certificate of Public Convenience and Necessity (“CPCN”).⁴

13 **Q. What is the purpose of your testimony?**

14 A. The purpose of my testimony is to identify the environmental regulatory requirements
15 that cause the need for the proposed Amended Project 36 in KU’s 2016
16 Environmental Compliance Plan (“2016 ECR Plan”) and demonstrate how Amended
17 Project 36 will allow KU to comply with the environmental regulations, most
18 specifically the federal Hazardous and Solid Waste Management System; Disposal of
19 Coal Combustion Residuals from Electric Utilities (“Federal CCR Rule”).

20 **Q. Please summarize environmental regulation as it exists today.**

¹ Case Nos. 2016-00026 (KU) and 2016-00027 (LG&E).

² Case Nos. 2011-00161 (KU) and 2011-00162 (LG&E).

³ Case Nos. 2006-00206 (KU) and 2006-00208 (LG&E).

⁴ Case No. 2011-00375 and Case No. 2014-00002.

1 A. The Companies' applicable environmental regulations have experienced a significant
2 change over the past several years, with respect to the number and breadth of the
3 regulations. These regulations have expanded into a complex, and costly, component
4 of providing electrical service. As I explained in Case No. 2016-00026, one of the
5 most significant developments was the finalization of the Federal CCR Rule in
6 October 2015, which provided a national comprehensive set of self-implementing
7 requirements for the safe disposal of Coal Combustion Residuals ("CCR") from coal-
8 fired power plants such as KU's E.W. Brown Generating Station ("Brown" or
9 "Brown Station") generating units. It establishes self-implementing technical
10 requirements for CCR landfills and surface impoundments under subtitle D of the
11 Resource Conservation and Recovery Act, the nation's primary law for regulating
12 solid waste.

13 **Q. Can you please provide more information regarding what is required under the**
14 **Federal CCR Rule?**

15 A. Certainly. The Federal CCR Rule establishes stringent design, monitoring, operating,
16 corrective action, closure, and post-closure requirements for CCR landfills and
17 surface impoundments in order to manage environmental risks associated with CCR
18 storage and disposal. Given the new requirements, the Companies, as part of their
19 respective 2016 ECR Plans, began moving from wet to dry handling and storage of
20 CCR. The key operating requirements of the Federal CCR Rule are: (1) structural
21 integrity; (2) hydrologic, hydraulic, and air criteria; (3) groundwater monitoring and
22 corrective action; and (4) location standards.

23 **Q. Are these requirements the same as you explained in Case No. 2016-00026?**

1 A. Yes, although there have been developments with respect to the Federal CCR Rule
2 that were the basis of the requirements identified in Case No. 2016-00026. The
3 Federal CCR Rule became effective on October 19, 2015. In June 2017, the Utility
4 Solid Waste Activities Group petitioned the United States Environmental Protection
5 Agency (“EPA”) for reconsideration of portions of the Federal CCR Rule.
6 Subsequently, in November 2017, EPA filed a motion in the United States Court of
7 Appeals for the District of Columbia Circuit that voluntarily remanded portions of the
8 Rule. EPA is expected to release its draft rule changes in March 2018. The
9 reconsideration by EPA is not expected to impact the timing or design requirements
10 to close the Companies’ CCR impoundments or the same requirements associated
11 with the amended Phase II of the landfill at Brown (“Brown CCR Landfill”).

12 **Q. Please briefly describe the principal CCR storage facilities at Brown.**

13 A. The Brown Station has three principal facilities for the storage of ash and other waste
14 byproducts from the burning of coal to generate electricity: the main ash pond
15 impoundment facility (“Main Ash Pond”), the auxiliary ash pond impoundment
16 facility (“Aux CCR Impoundment”), and the Brown CCR Landfill. Project 36 in
17 KU’s 2016 ECR Plan involved the construction of Phase II of the Brown CCR
18 Landfill.

19 **Q. Was Project 36 in the 2016 ECR Plan necessary to comply with the Federal CCR**
20 **Rule?**

21 A. Yes, it was. Project 36, as proposed and approved in the 2016 ECR Plan, involved
22 constructing Phase II of the Brown CCR Landfill to store the CCR produced at
23 Brown in a least-cost manner. The timing for Phase II was driven by KU’s permit for
24 the Brown CCR Landfill. When the Kentucky Division of Waste Management

1 (“KDWM”) issued a Special Waste Permit for the Brown CCR Landfill, it established
2 a 10 feet differential storage requirement of CCR between each phase of the landfill;
3 thus Phase II was required to be constructed and placed into service to receive CCR
4 once Phase I reached 10 feet of CCR. KU then anticipated that the storage capacity
5 of Phase I could be exhausted by the second quarter of 2018 based on historical
6 production rates.

7 **Q. Did KU begin construction of Phase II of the Brown CCR Landfill following**
8 **Case No. 2016-00026?**

9 A. No, as explained more fully in the testimony of R. Scott Straight, KU did not proceed
10 with constructing Phase II after obtaining a CPCN for the project in Case No. 2016-
11 00026. And as described in the testimony of Robert M. Conroy, the CPCN lapsed.

12 **Q. Now that Phase I is reaching capacity, does the amended Phase II – even with a**
13 **smaller footprint – remain necessary to comply with the Federal CCR Rule?**

14 A. Yes, it does. KU must continue to store CCR in a compliant, least-cost manner.
15 Although KU is forecasting reduced volumes of CCR will be produced at Brown, the
16 amended Phase II is required for the operation of Brown Unit 3. In addition, under
17 the Federal CCR Rule the Brown Aux CCR Impoundment is still expected to require
18 closure beginning in early 2019.

19 **Q. Why is the Main Ash Pond at Brown being closed?**

20 A. After the Brown Main Ash Pond surface impoundment reached full capacity, CCR
21 was placed into the Aux CCR Impoundment. The use of this facility allowed time to
22 construct Phase I of the Landfill. The timing of Phase I was set by the expected date
23 that the Aux CCR Impoundment would reach its capacity with an operating margin.
24 The KDWM Special Waste permit issued in July 2014 allowed the construction of the

1 landfill, but also required that KU fully close the dewatered Main Ash Pond in
2 accordance with Kentucky's special waste regulations (401 KAR Chapter 45). A
3 copy is provided in Exhibit 3 to the Application.

4 **Q. In addition to constructing the amended Phase II of the Brown CCR Landfill, is**
5 **there another component to the Amended Project 36 proposed in this case?**

6 A. Yes. In addition to constructing the amended Phase II of the Brown CCR Landfill,
7 KU is also required to complete the cap and closure of the remaining areas in the
8 Main Ash Pond at Brown that have not been covered with Phase I, Phase II, or the
9 hardscaped areas over the original Main Ash Pond surface area.

10 **Q. Is capping and closing the Main Ash Pond required by environmental**
11 **regulations?**

12 A. Yes, this portion of Amended Project 36 is driven by the 2014 KDWM Special Waste
13 Permit. As explained above, the Main Ash Pond is not regulated under the Federal
14 CCR Rule. However, the closure cap of the Main Ash Pond was designed to meet the
15 bottom liner requirements under the Federal CCR Rule for the Brown CCR Landfill.
16 This approach for construction of the Brown CCR Landfill was acceptable under the
17 Federal CCR Rule. However, with the reduction in the overall size and footprint of
18 the Brown CCR Landfill once the amended Phase II is constructed, the Main Ash
19 Pond will still be required to be closed per the requirements of the 2014 Special
20 Waste Permit. As a result, the cap and closure of the areas of the Main Ash Pond not
21 within the footprint of the modified landfill and hardscaped areas will require closing
22 per the permit requirements. The proposed liner system to be used in capping and
23 closing the remaining Main Ash Pond is designed to meet the closure requirements of

1 the 2014 permit. The only exception will be areas that have been previously
2 hardscaped with asphalt or concrete.

3 The 2014 permit for closing the Main Ash Pond also included a Groundwater
4 Remedial Action Plan (“GWRAP”) to address groundwater contamination. The
5 GWRAP included capping and closing the Main Ash Pond by building the Brown
6 CCR Landfill overtop of the facility. Given that Phase III of the Brown CCR Landfill
7 will not be constructed, areas outside of the modified landfill footprint must still be
8 capped and closed.

9 **Q. Do you have a recommendation for the Commission?**

10 A. Yes. Amended Project 36 provides KU a reasonable method to comply with the
11 requirements of Federal CCR and state environmental regulations. I recommend that
12 the Commission approve the Amended Project 36 that KU has proposed in this case.

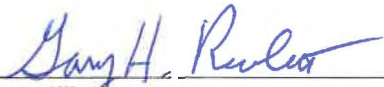
13 **Q. Does this conclude your testimony?**

14 A. Yes, it does.

VERIFICATION

COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

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



Gary H. Revlett

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 26th day of January 2018.



Notary Public (SEAL)

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

APPENDIX A

Gary H. Revlett

Director, Environmental Affairs
LG&E and KU Services Company
220 West Main Street
Louisville, Kentucky 40202
(502) 627-4621

Education

University of Louisville, Ph.D. Analytical/Environmental Chemistry - May 1976
Murray State University, B.S. Chemistry - June 1971
OSHA Hazardous Waste Worker Training and 8-hour Refresher Courses

Previous Positions

E.ON U.S. Services Inc.
2006-2010 - Air Manager - Environmental Affairs

Tetra Tech EMI, Louisville, Kentucky
2005-2006 - Senior Air Quality Manager

Kenvirons, Inc., Frankfort, Kentucky
1994-2005 - Vice President and Treasurer
(Director of Air Services and Laboratory Services)
1985-1994 - Associate
(Manager of Testing and Air Services)
1978- 1984 - Senior Environmental Scientist
(Manager of Emission Testing and Air Modeling)

Kentucky Division of Pollution Control, Frankfort, KY
1976-1977 - Principal Chemist - Air Modeling Team

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF KENTUCKY UTILITIES)	
COMPANY FOR CERTIFICATE OF PUBLIC)	CASE NO: 2017-00483
CONVENIENCE AND NECESSITY AND)	
APPROVAL OF AMENDMENT TO ITS 2016)	
COMPLIANCE PLAN FOR RECOVERY BY)	
ENVIRONMENTAL SURCHARGE)	

DIRECT TESTIMONY OF
STUART A. WILSON
DIRECTOR, ENERGY PLANNING, ANALYSIS, AND FORECASTING
KENTUCKY UTILITIES COMPANY

REDACTED VERSION

Filed: January 26, 2018

1 **Q. Please state your name, position, and business address.**

2 A. My name is Stuart A. Wilson. I am Director of Energy Planning, Analysis, and
3 Forecasting for Kentucky Utilities Company (“KU” or “Company”) and Louisville Gas
4 and Electric Company (“LG&E”) and an employee of LG&E and KU Services
5 Company, which provides services to LG&E and KU (collectively “Companies”). My
6 business address is 220 West Main Street, Louisville, Kentucky, 40202. A complete
7 statement of my education and work experience is attached to this testimony as
8 Appendix A.

9 **Q. Please describe your current job responsibilities.**

10 A. I am responsible for developing the Companies’ load forecast, market analysis, and
11 long-term planning of utility generation. As it pertains to this proceeding, the
12 Generation Planning & Analysis group performed the analyses discussed below under
13 my direction.

14 **Q. Have you previously testified before this Commission?**

15 A. Yes, I have testified in the Companies’ last several fuel adjustment clause proceedings.
16 I have also sponsored numerous data requests in other proceedings and participated in
17 informal conferences.

18 **Q. What are the purposes of your testimony?**

19 A. The purposes of my testimony are to present KU’s assessment of the long-term need
20 for dry coal combustion residuals (“CCR”) storage at the E.W. Brown Generating
21 Station (“Brown”), the timing of the need, and the alternatives for meeting the need.
22 The analyses is set forth in Exhibit SAW-1 *Analysis of Amended ECR Project 36 at*
23 *E.W. Brown Generating Station* attached to my testimony, and fully supports KU’s
24 recommendation to the Commission to approve the amendment to the 2016 ECR Plan

1 and related certificate of public convenience and necessity (“CPCN”) and
2 environmental cost recovery (“ECR”). Amended Project 36, more fully described in
3 the testimony of Mr. R. Scott Straight, is the lowest reasonable cost method of
4 complying with applicable environmental laws and regulations.

5 **Q. Please briefly describe the principal CCR storage facilities at Brown.**

6 A. The Brown Station has three principal facilities for the storage of ash and other waste
7 byproducts from the burning of coal to generate electricity: the main ash pond
8 impoundment facility (“Main Ash Pond”), the auxiliary ash pond impoundment
9 facility (“Auxiliary Impoundment”) and the landfill. Project 36 in KU’s 2016 ECR
10 Plan involved the construction of Phase II of the landfill (“Landfill”) at Brown.

11 **Q. What are the proposed amendments to Project 36 in KU’s amended 2016 ECR
12 Plan?**

13 A. As discussed in the testimony of Mr. Robert M. Conroy, KU is requesting the
14 regulatory approval of the construction of a smaller Phase II Landfill than was
15 originally proposed in Project 36 and the cap and closure of any remaining surface area
16 of the Brown Main Ash Pond. The cost of and construction plans for this project are
17 explained in more detail in the testimony of Mr. R. Scott Straight. The applicable
18 environmental regulations are discussed in detail in the testimony of Mr. Gary H.
19 Revlett.

20 **Retirement of Units 1 and 2 at Brown**

21 **Q. Is KU planning to retire Units 1 and 2 at Brown?**

22 A. Yes. On November 14, 2017, KU announced plans to retire Units 1 and 2 at the Brown
23 Generating Station in February 2019. KU’s analysis showed that doing so will allow
24 KU to reduce costs for customers while maintaining an adequate level of generation

1 reliability. As to the analytical approach, the value of these units to customers is
2 primarily a function of customers' energy requirements and the difference between
3 natural gas and coal prices ("gas-coal spread"). Forecasted energy requirements have
4 declined significantly in recent years due to customers fully embracing energy-
5 efficiency measures, such as LED lighting. In addition, stricter environmental
6 regulations continue to lead to the retirement of coal-fired units due to high compliance
7 costs. KU evaluated the retirement decision over a range of gas-coal spread scenarios.
8 In all of the scenarios, operating Brown 1 and 2 beyond February 2019 is not warranted.

9 **Evaluation of Long-Term Dry Storage Needs at Brown**

10 **Q. How much CCR is currently being stored in Phase I of the Brown Landfill?**

11 A. Based on the latest bathymetric survey, approximately 330 thousand cubic yards of
12 CCR were stored in the Brown landfill through July 31, 2017. The estimated volume
13 of CCR stored in the landfill through the end of 2017 is 410 thousand cubic yards.

14 **Q. What factors particular to the Brown Landfill affect the timing of additional
15 capacity?**

16 A. When the Brown Landfill was permitted, the Kentucky Division of Waste Management
17 included a restriction in the landfill permit that limits the elevation difference between
18 landfill phases to ten feet. As a result, the station can only store up to ten feet of CCR
19 in Phase I before Phase II is needed; ten feet of CCR storage capacity in Phase I equates
20 to approximately 540 thousand cubic yards of CCR capacity. Based on this permit
21 restriction and the estimated volume of CCR stored in the landfill through the end of
22 2017 (410 thousand cubic yards), Phase I has approximately 130 thousand cubic yards
23 of remaining storage capacity.

1 In addition to the remaining CCR storage capacity, approximately 100 thousand
2 cubic yards of CCR will be needed as beneficial use to close the Brown Auxiliary Pond
3 and an additional 100 thousand cubic yards will be beneficially used to construct Phase
4 II.

5 **Q. Has KU continued to look for opportunities to beneficially use CCR at Brown?**

6 A. Yes, it has. Beneficial use is a key consideration in determining Brown's long term
7 CCR storage needs. Due to the retirement of coal-fired generation that has been
8 occurring across the country in the last five to ten years, the supply of available CCR
9 for beneficial use markets has decreased. As a result, opportunities for beneficially
10 using Brown's fly ash have improved since the 2016 ECR Plan was approved. KU is
11 negotiating an agreement with a company to take fly ash from Unit 3. Prospects for
12 beneficially using gypsum produced at Brown, however, remain limited because the
13 gypsum produced at Brown continues to have a moisture content that exceeds most
14 beneficial use market limits. In addition, by maintaining gypsum with high moisture
15 content, Brown will require fewer systems for treating its process-water. This is a key
16 reason why KU is able to significantly reduce the cost of Brown's process-water
17 systems and the cost to comply with the state's wastewater discharge regulations by
18 retiring Brown 1 and 2. Because KU will not have a cost-effective alternative for
19 reducing Brown's gypsum moisture content after Brown 1 and 2 are retired, KU does
20 not expect to supply Brown gypsum to offsite beneficial use markets.

21 **Q. How much additional CCR storage will be required for the Brown station?**

22 A. As shown in Table 4 in Exhibit SAW-1 *Analysis of Amended ECR Project 36 at E.W.*
23 *Brown Generating Station*, including the current capacity of Phase 1, and assuming the

1 possibility of retiring Brown 3 after 55 years of life, Brown will need between 0.8
2 million and 2.7 million cubic yards of dry storage capacity for CCR.

3 **Q. When does KU expect to need additional storage capacity at Brown?**

4 As shown in Table 4 in Exhibit SAW-1 *Analysis of Amended ECR Project 36 at E.W.*
5 *Brown Generating Station*, KU developed six forecasts of Brown's long-term dry CCR
6 storage need based on a range of coal-gas spreads and two offsite beneficial use
7 scenarios. The current storage capacity of Phase 1 based on the ten foot permit
8 restriction (540 thousand cubic yards) is depleted in 2019 in one of the forecasts and
9 not until 2020 or later in the remaining forecasts. However, because the Brown coal
10 units are among KU's marginal coal units, CCR production at Brown can vary
11 significantly in the short-term due to weather and the availability of other generating
12 units. Due to the variability in these factors as well as the potential variability in the
13 coal-gas spread and offsite beneficial use levels, the current Phase I storage capacity
14 could be depleted as early as December 2018. For this reason, KU is targeting a mid-
15 2019 in-service date for Phase II.

16 **Analysis of Dry Storage Alternatives**

17 **Q. Please describe Amended Project 36.**

18 A. Amended Project 36 includes the costs to design and construct an amended Phase II of
19 the Brown Landfill, as well as the costs to cap and close any remaining surface area of
20 the Brown Main Ash Pond (and the unopened portion of the original Phase II footprint).
21 Table 1 in Exhibit SAW-1 *Analysis of Amended ECR Project 36 at E.W. Brown*
22 *Generating Station* presents a comparison of the costs of Amended Project 36 with the
23 costs of Project 36 as presented in KU's 2016 ECR plan.

CONFIDENTIAL INFORMATION REDACTED

1 **Q. What alternatives did you consider in your analysis of Amended Project 36 with**
2 **respect to the construction of an amended Phase II?**

3 A. As an alternative to opening the amended Phase II, KU evaluated trucking CCR to a
4 municipal landfill. The [REDACTED] municipal landfill is approximately [REDACTED]
5 [REDACTED]. To store CCR at a municipal landfill, the municipal landfill must open and
6 separately operate a section of the landfill that is permitted specifically for storing CCR.
7 This process is very similar to the process KU must follow to open the amended Phase
8 II.

9 **Q. What costs did you assume for the municipal landfill alternative?**

10 A. The total cost of transporting CCR to the municipal landfill is assumed to be \$[REDACTED]/ton.
11 The estimated cost for opening a section of the municipal landfill, which is based on a
12 proposal from [REDACTED] received in [REDACTED], is \$[REDACTED] million in 2017
13 dollars. Table 1 below compares capital and variable costs for the two alternatives.
14 Both alternatives include the cost to cap and close the Main Ash Pond as well as the
15 costs to cap and close both phases of the landfill. In the Municipal Landfill alternative,
16 the closure of Phase II is accelerated to 2019. Compared to the amended Phase II
17 alternative, both the capital and variable costs for the Municipal Landfill alternative are
18 higher.

CONFIDENTIAL INFORMATION REDACTED

1 **Table 1 - Cost Summary (2017 Dollars)**

Open Amended Phase II	Cost	Year of Spend
Capital Cost		
Open Amended Phase II (Amended Project 36, \$M)	8.4	2018-2019
Close Main Ash Pond (Amended Project 36, \$M)	6.3	2019
Close Phase I and Amended Phase II (\$M)	11.4	After Brown 3 Retirement
Total (\$M)	26.1	
Fixed O&M – Chimney Drains (\$M)	0.2	2019-2027 ¹
Variable Storage Costs (\$/cubic yard)	█	2019-2027
Municipal Landfill	Cost	Year of Spend
Capital Cost		
Close Main Ash Pond (\$M)	6.3	2019
Close Phase II (\$M)	5.8	2019
Close Phase I (\$M)	6.2	After Brown 3 Retirement
Total (\$M)	18.2	
Fixed O&M – Open Municipal Landfill Section (\$M)	█	█ ²
Variable Transportation Cost (\$/ton)	█	2019-2027

2

3 **Q. To calculate the costs of Phase II, what assumptions did KU utilize regarding the**
 4 **size of the amended Phase II?**

5 A. By opening the amended Phase II, KU will increase the capacity of the Brown landfill
 6 from approximately 540 thousand cubic yards to approximately 2.5 million cubic yards.
 7 However, by modifying the storage contours and stacking CCR higher, the landfill –
 8 with the proposed footprint – could be used to store up to 5.5 million cubic yards, far
 9 more than the high end of the cumulative dry CCR storage range. The selected capacity
 10 increase results primarily from the ability to balance the storage of CCR between
 11 landfill phases and utilize the full capacity of Phase I. The amended capacity will allow
 12 for CCR storage at Brown for the life of Brown 3. In comparison, the capacity of the
 13 proposed municipal landfill is only 500 thousand cubic yards, enough capacity to

¹ Estimated cost is \$26 thousand in 2019, escalating at 2.4% per year.

² █

1 operate Brown through 2025 in the high gas-coal spread scenario and through 2028 in
2 the low and mid gas-coal spread scenarios assuming all fly ash from Brown 3 is
3 beneficially used offsite. As such, the municipal landfill option is more costly than the
4 amended Phase II, and provides less incremental capacity than constructing the
5 amended Phase II.

6 **Q. Given differences in storage capacity, how did you evaluate alternatives?**

7 A. The present value of revenue requirements was computed for each alternative over each
8 of the dry CCR storage forecasts in Table 5 in Exhibit SAW-1 *Analysis of Amended*
9 *ECR Project 36 at E.W. Brown Generating Station*. Based on the storage capacity of
10 the municipal landfill, costs for each alternative were evaluated through 2027 and the
11 value provided by the amended Phase II beyond 2027 was ignored.

12 **Q. What are the results of your analysis?**

13 A. Not surprisingly, because the amended Phase II alternative has lower fixed and variable
14 costs, it is favorable to the Municipal Landfill alternative under any CCR storage
15 scenario. This is shown in Table 7 *Analysis Results* in Exhibit SAW-1 *Analysis of*
16 *Amended ECR Project 36 at E.W. Brown Generating Station*. Compared to transporting
17 CCR to a municipal landfill, construction of the amended Phase II of the Brown landfill
18 is lower cost.

19 **Q. Did you consider alternatives in your analysis of Amended Project 36 with respect**
20 **to capping and closing the remaining surface area of the Brown Main Ash Pond?**

21 A. No. KU is required by permit to cap and close any remaining surface area of the Brown
22 Main Ash Pond.

23 **Q. Based on all of the analyses for the Brown projects, what do you recommend?**

1 A. I recommend that the Commission approve Amended Project 36 because it is the lowest
2 reasonable cost alternative.

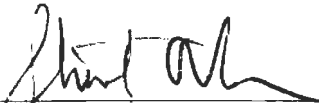
3 **Q. Does this conclude your testimony?**

4 A. Yes, it does.

VERIFICATION

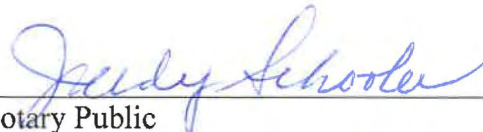
COMMONWEALTH OF KENTUCKY)
) SS:
COUNTY OF JEFFERSON)

The undersigned, **Stuart A. Wilson**, being duly sworn, deposes and says that he is Director, Energy Planning, Analysis & Forecasting for LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the foregoing testimony, and that the answers contained therein are true and correct to the best of his information, knowledge and belief.



Stuart A. Wilson

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 26th day of January 2018.



Notary Public (SEAL)

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

APPENDIX A

Stuart A. Wilson, CFA

Director, Energy Planning, Analysis, and Forecasting
LG&E and KU Services Company
220 West Main Street
Louisville, Kentucky 40202
Telephone: (502) 627-3324

Previous Positions

Manager, Generation Planning & Analysis	October 2009 – April 2016
Manager, Sales Analysis & Forecasting	May 2008 – October 2009
Supervisor, Sales Analysis & Forecasting	Aug 2006 – April 2008
Economic Analyst	Aug 2000 – July 2006
Compensation Analyst	Aug 1999 – July 2000
Business Analyst	June 1997 – July 1999

Professional Memberships

CFA Society of Louisville

Education/Certifications

E.ON Emerging Leaders Program: 2004-2006

CFA Charterholder: September 2003

LG&E Energy Leadership Development Program: 1997-2002

Master of Business Administration;
Indiana University, May 1997

Master of Engineering in Electrical Engineering;
University of Louisville, December 1995

Bachelor of Science in Electrical Engineering;
University of Louisville, December 1995

REDACTED VERSION

**Analysis of Amended ECR Project 36 at
E.W. Brown Generating Station**



PPL companies

**Generation Planning & Analysis
January 2018**

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1 Introduction

The 2016 Environmental Compliance Plan (“2016 ECR Plan”) for Kentucky Utilities Company (“KU”) was filed in January 2016 and included Project 36 to construct Phase II of the special-waste landfill (“Phase II”) at the E.W. Brown Generating Station (“Brown”).¹ In July 2017, based on refined engineering studies, it was determined that the cost of Brown’s process-water systems and the cost to comply with the state of Kentucky’s wastewater discharge regulations could be reduced by retiring E.W. Brown Units 1 and 2 (“Brown 1 and 2”) in the first quarter of 2019.² It was also determined that retiring Brown 1 and 2 would reduce the capacity of Phase II and totally eliminate the need for Phase III of the Brown landfill (“Phase III”).

Table 1 compares Brown’s updated landfill cost estimates to landfill cost estimates from January 2016 at the time of the 2016 ECR Plan filing. By permit and as a result of the Environmental Protection Agency’s Coal Combustion Residual Rule (“CCR Rule”), KU is required to close the Main Ash Pond. In addition, after the retirement of E.W. Brown Unit 3 (“Brown 3”), KU is required to close the landfill. In the 2016 ECR Plan, the costs to open Phase III, close the Main Ash Pond, and close the landfill were not included in Project 36 because the need for these projects was not imminent.

Table 1 – Brown Landfill Capital Costs (\$M, 2017 Dollars)

Project	Cost Estimate Date	
	January 2016	December 2017
Open Phase II (Project 36)	11.7	-
Open Amended Phase II / Close Main Ash Pond (Amended Project 36)	-	14.7
Open Phase III / Close Main Ash Pond	15.5	-
Close Landfill (after Retirement of Brown 3)	17.1	11.4
Total	44.3	26.1

The amended Project 36 cost (\$14.7 million) includes \$8.4 million to open Phase II as well as \$6.3 million to close the Main Ash Pond. Because KU is required to close the Main Ash Pond, this analysis evaluates trucking coal combustion residuals (“CCR”) to a municipal landfill as an alternative to opening Phase II. Opening Phase II has a lower present value of revenue requirements (“PVRR”) than the alternative and creates significantly more dry CCR storage capacity. As a result, opening Phase II in 2019 is least-cost for customers.

2 Brown CCR Storage

2.1 Long-Term CCR Storage Need

The long-term need for CCR storage capacity at Brown is primarily a function of the price difference between natural gas and coal (“gas-coal spread”), Brown’s ability to beneficially use CCR, and the operating life of Brown 3. Brown 3 is 46 years old and has been retrofitted with flue-gas desulfurization equipment designed to remove 98% of the unit’s sulfur dioxide emissions, selective catalytic reduction designed to remove 90% of the unit’s emissions of nitrogen oxides, a fabric filter baghouse designed to remove 99.5% of the unit’s particulate matter, and an overall air quality control system designed to

¹ See Case No. 2016-00026.

² In November 2017 KU announced the retirement of Brown 1 and 2. See the press release at <https://lge-ku.com/newsroom/press-releases/2017/11/14/kentucky-utilities-announces-upcoming-retirement-two-coal-fired>.

achieve 89% mercury removal. KU's 2018 generation forecast assumes Brown 3 will be retired by 2036, after 65 years of operation. In November 2017, PPL submitted a report that assessed the long-term impact of climate policies on PPL.³ In addition to the 65-year retirement scenario, the report also considered a 55-year retirement scenario.

Due to the retirement of coal generating capacity nationwide over the past five to ten years, the supply of CCR to beneficial use markets has decreased. As a result, prospects for beneficially using Brown's fly ash have improved since the 2016 ECR Plan filing in January 2016. Even though Brown's fly ash and bottom ash currently have unburned carbon levels, measured as loss on ignition ("LOI"), that exceed most beneficial use market limits, KU is negotiating an agreement with a company to take fly ash from Brown 3.⁴ Prospects for beneficially using Brown's gypsum, however, remain limited. The moisture content for Brown's gypsum is approximately 15%, but the current limit for marketable gypsum is 10%.⁵ In addition, by maintaining a high gypsum moisture content, Brown will require fewer systems for treating its process-water. This is a key reason for why KU is able to significantly reduce the cost of Brown's process-water systems and the cost to comply with the state's wastewater discharge regulations by retiring Brown 1 and 2. Because KU will not have a cost-effective alternative for reducing Brown's gypsum moisture content after Brown 1 and 2 are retired, KU does not expect to supply Brown gypsum to offsite beneficial use markets.

Table 2 contains Low, Mid, and High gas-coal spread scenarios for Brown. The variability of Brown's coal generation due to potential variations in the gas-coal spread is relatively small in the near-term but increases over time as future gas and coal prices become more uncertain. As the difference between natural gas and coal prices increases, more generation from Brown 3 can be economically dispatched to serve load.

³ <http://www.pplweb.com/wp-content/uploads/2017/11/PPL-Corporation-Climate-Assessment-Report.pdf>

⁴ The LOI for Brown 3 is above market limits but lower than the LOI for Brown 1 and 2. The company taking the fly ash plans to blend the fly ash from Brown 3 with in-spec fly ash from other sources.

⁵ Lower moisture contents reduce the cost of processing the gypsum for beneficial use.

Table 2 – Gas-Coal Spread Scenarios (\$/mmBtu, Nominal)

Year	Coal ⁶	Low Gas	Mid Gas	High Gas	Low Gas-Coal Spread	Mid Gas-Coal Spread	High Gas-Coal Spread
2018	2.299	2.977	3.028	3.617	0.678	0.729	1.318
2019	2.434	2.910	2.960	3.902	0.476	0.526	1.468
2020	2.586	2.888	3.020	4.187	0.302	0.434	1.601
2021	2.708	2.902	3.139	4.472	0.194	0.431	1.764
2022	2.833	2.937	3.295	4.757	0.104	0.462	1.924
2023	2.974	2.992	3.482	5.042	0.018	0.508	2.068
2024	3.045	3.055	3.690	5.327	0.010	0.645	2.282
2025	3.099	3.131	3.917	5.612	0.032	0.818	2.513
2026	3.174	3.215	4.158	5.898	0.041	0.984	2.724
2027	3.241	3.297	4.411	6.183	0.056	1.170	2.942
2028	3.308	3.384	4.675	6.468	0.076	1.367	3.160
2029	3.385	3.472	4.815	6.753	0.087	1.430	3.368
2030	3.470	3.516	4.956	7.038	0.046	1.486	3.568
2031	3.554	3.560	5.096	7.323	0.006	1.542	3.769
2032	3.645	3.604	5.236	7.608	(0.041)	1.591	3.963
2033	3.749	3.650	5.377	7.893	(0.099)	1.628	4.144
2034	3.849	3.695	5.517	8.178	(0.154)	1.668	4.329
2035	3.953	3.742	5.658	8.463	(0.211)	1.705	4.510

Table 3 contains the Brown CCR production forecast in the Mid gas-coal spread scenario through 2035. Based on the Companies’ latest bathymetric survey, approximately 330 thousand cubic yards of CCR were stored in the Brown landfill through July 31, 2017.⁷ The estimated volume of CCR stored in the landfill through the end of 2017 is 410 thousand cubic yards. Fly ash from Brown 1 and 2 is stored in the Brown Auxiliary Pond and all other CCR that is not beneficially used is stored in Phase I of the Brown landfill (“Phase I”). In addition to any offsite beneficial use, approximately 200 thousand cubic yards of CCR will be beneficially used onsite to close the Auxiliary Pond and open Phase II.⁸ Table 3 contains two dry CCR storage forecasts: one with no offsite beneficial use (“No OBU”) and one where all fly ash from Brown 3 is beneficially used offsite (“OBU: BR3 FA”).⁹ Table 4 contains dry CCR storage forecasts for all gas-coal spread scenarios.

⁶ In December 2017, the Companies entered into a one-year agreement with Norfolk-Southern railroad for 2018 that lowers Brown’s variable fuel cost.

⁷ This volume includes CCR used as protective cover to open Phase I.

⁸ Approximately 100 thousand cubic yards will be needed for each activity.

⁹ Both dry storage forecasts exclude fly ash from Brown 1 and 2 which is stored in the Auxiliary Pond.

Table 3 – Brown CCR Forecast (Thousand Cubic Yards, Base Load Forecast, Mid Gas-Coal Spread)

Year	Brown 1&2 Fly Ash	Brown 3 Fly Ash	Brown 1-3 Gypsum	Brown 1-3 Bottom Ash	Annual Total CCR Production	Onsite Beneficial Use	Dry CCR Storage Forecasts (Cumulative Volumes Stored)	
							No OBU	OBU: BR3 FA
Through 2017							410	410
2018	28	31	124	13	197	100	479	447
2019	4	28	74	8	114	100	489	429
2020	0	20	48	5	74		563	483
2021	0	28	66	7	100		663	555
2022	0	25	59	6	91		754	621
2023	0	27	63	7	96		850	691
2024	0	26	61	6	93		943	758
2025	0	30	70	7	107		1,050	835
2026	0	27	64	7	97		1,147	906
2027	0	26	62	7	95		1,242	975
2028	0	29	68	7	104		1,347	1,050
2029	0	29	69	7	105		1,452	1,126
2030	0	28	67	7	103		1,555	1,200
2031	0	32	75	8	114		1,669	1,283
2032	0	29	68	7	103		1,772	1,358
2033	0	30	71	8	109		1,881	1,437
2034	0	25	58	6	89		1,971	1,501
2035	0	32	76	8	116		2,086	1,585

Table 4 – Brown Dry CCR Storage Forecasts (Thousand Cubic Yards, Cum. Vol. Stored, No CO₂ Price)

Year	Low Gas-Coal Spread		Mid Gas-Coal Spread		High Gas-Coal Spread	
	No OBU	OBU: BR3 FA	No OBU	OBU: BR3 FA	No OBU	OBU: BR3 FA
2018	482	450	479	447	506	470
2019	490	431	489	429	544	473
2020	563	484	563	483	647	548
2021	658	553	663	555	775	640
2022	748	618	754	621	898	730
2023	843	686	850	691	1,032	826
2024	931	750	943	758	1,150	911
2025	1,026	818	1,050	835	1,291	1,013
2026	1,112	881	1,147	906	1,428	1,113
2027	1,195	941	1,242	975	1,554	1,204
2028	1,288	1,008	1,347	1,050	1,699	1,308
2029	1,375	1,071	1,452	1,126	1,845	1,415
2030	1,458	1,131	1,555	1,200	1,986	1,516
2031	1,547	1,196	1,669	1,283	2,144	1,630
2032	1,634	1,258	1,772	1,358	2,290	1,736
2033	1,716	1,318	1,881	1,437	2,441	1,845
2034	1,780	1,364	1,971	1,501	2,567	1,936
2035	1,867	1,427	2,086	1,585	2,726	2,052

Based on the dry storage forecasts in Table 4 and considering the possibility of retiring Brown 3 after 55 years of life, Brown will need between 818 thousand and 2.7 million cubic yards of dry storage capacity (see highlighted cells in Table 4).¹⁰ The low end of this range is cumulative volume through 2025 in the Low gas-coal spread scenario assuming all of Brown 3’s fly ash is beneficially used offsite. The high end of the range is the cumulative volume through 2035 in the High gas-coal spread scenario assuming no offsite beneficial use.

In the dry storage forecasts in Table 4, the assumed cost for carbon dioxide (“CO₂”) emissions is zero. Given the uncertainty regarding future CO₂ regulations, this assumption is appropriate for the high end of the dry storage range. In addition, because the low end of the range only considers CCR storage through 2025 and future CO₂ regulations – if promulgated – are unlikely to take effect prior to 2026, a cost for CO₂ emissions would likely have no impact on the low end of the range. Despite these facts, the Companies modeled the impact of a CO₂ price on Brown’s dry CCR storage needs. These results are summarized in Appendix A – Impact of CO₂ Price on Brown’s Dry CCR Storage Need.

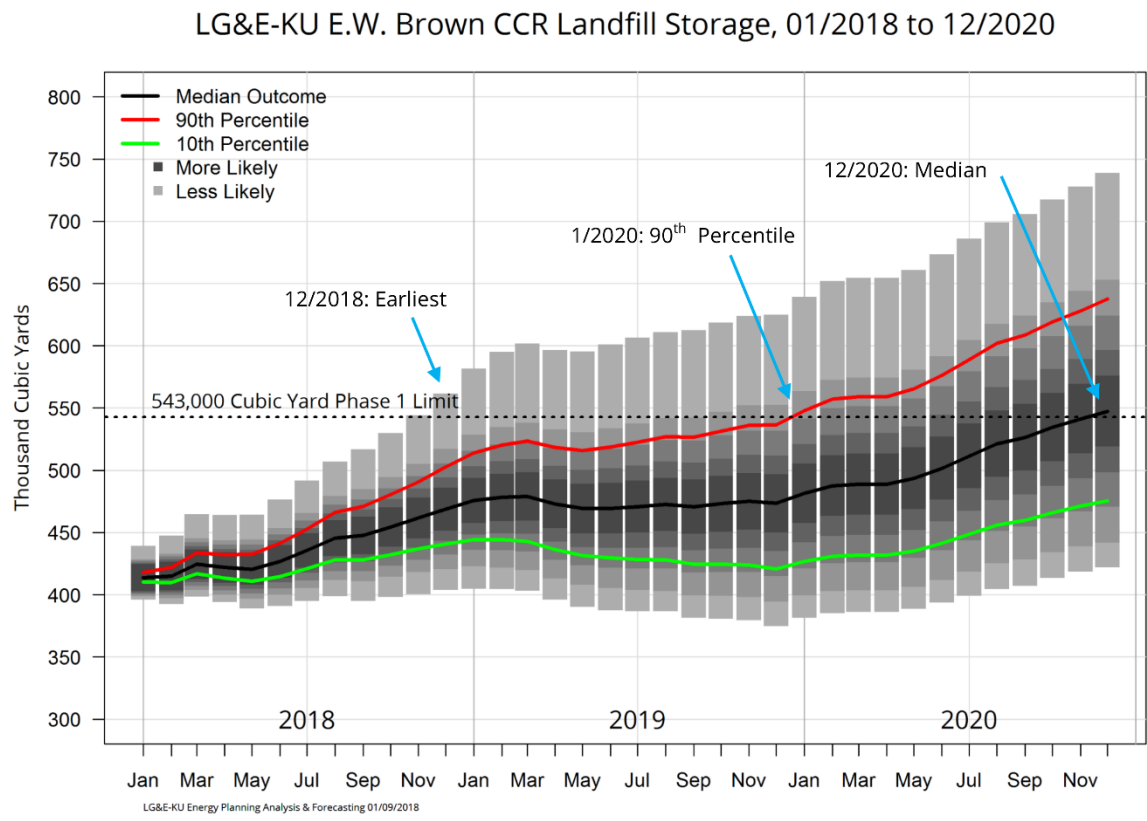
2.2 Timing of Need for Additional CCR Storage

When the Brown landfill was permitted, the Kentucky Division of Waste Management included a restriction in the landfill permit that limits the elevation difference between landfill phases to ten feet. As a result, the station can only store up to ten feet of CCR in Phase I before Phase II is needed; ten feet of CCR storage capacity in Phase I equates to approximately 540 thousand cubic yards of CCR capacity.

¹⁰ If Brown 3 is retired after 55 years of life, it will operate through 2025.

In the dry CCR storage forecasts in Table 4, the current capacity of Phase 1 based on the ten foot permit restriction (540 thousand cubic yards) is depleted in 2019 in one forecast (High gas-coal spread; no offsite beneficial use) and not until 2020 or 2021 in the remaining forecasts. However, because the Brown coal units are among KU’s marginal coal units, CCR production at Brown can vary significantly in the short-term due to weather, the availability of other generating units, offsite beneficial use levels, and – to a lesser extent – the gas-coal spread. Due to the variability in these factors, CCR production in 2018 could be as low as 104 thousand cubic yards and as high as 242 thousand cubic yards. Figure 1 plots the computer-simulated range of Brown’s cumulative dry CCR storage volumes through 2020. Based on these results, the current Phase I storage capacity could be depleted as early as December 2018.¹¹ For this reason, KU is targeting a mid-2019 in-service date for Phase II.

Figure 1 – Brown CCR Production Scenarios



3 Analysis of Storage Alternatives

As an alternative to opening the amended Phase II, KU considered trucking CCR to a municipal landfill (“Municipal Landfill alternative”). The [REDACTED] municipal landfill is approximately [REDACTED]. To store CCR at a municipal landfill, the municipal landfill must open and separately operate a section of the landfill that is permitted specifically for storing CCR. This process is very similar to the process KU must follow to open the amended Phase II. Table 5 compares costs for the two alternatives. The

¹¹ In the first half of 2019, the forecasted decline in cumulative storage volumes is the result of a planned maintenance outage for Brown 3 and the assumption that onsite beneficial use will occur ratably.

CONFIDENTIAL INFORMATION REDACTED

estimated cost for opening a section of the municipal landfill is based on an indicative proposal from [REDACTED] received in [REDACTED]. Both alternatives include the cost to close the Main Ash Pond as well as the costs to close both phases of the landfill. In the Municipal Landfill alternative, the closure of Phase II is accelerated to 2019.

Table 5 – Cost Summary (2017 Dollars)

Open Amended Phase II	Cost	Year of Spend
Capital Cost		
Open Amended Phase II (Amended Project 36, \$M)	8.4	2018-2019
Close Main Ash Pond (Amended Project 36, \$M)	6.3	2019
Close Phase I and Amended Phase II (\$M)	11.4	After Brown 3 Retirement
Total (\$M)	26.1	
Fixed O&M – Chimney Drains (\$M)	0.2	2019-2027 ¹²
Variable Storage Costs (\$/cubic yard)	[REDACTED]	2019-2027
Municipal Landfill	Cost	Year of Spend
Capital Cost		
Close Main Ash Pond (\$M)	6.3	2019
Close Phase II (\$M)	5.8	2019
Close Phase I (\$M)	6.2	After Brown 3 Retirement
Total (\$M)	18.2	
Fixed O&M – Open Municipal Landfill Section (\$M)	[REDACTED]	[REDACTED] ¹³
Variable Transportation Cost (\$/ton)	[REDACTED]	2019-2027

The amended Phase II footprint was established to minimize the total cost of opening the amended Phase II, and closing the Main Ash Pond. Based on the current design, by opening the amended Phase II, the total storage capacity of the Brown landfill will increase from approximately 540 thousand cubic yards to approximately 2.5 million cubic yards. However, by modifying the storage contours and stacking CCR higher, the landfill – with the proposed footprint – could be used to store up to 5.5 million cubic yards, more than the high end of the cumulative dry CCR storage range in Table 4. The increase in landfill storage capacity results primarily from the ability to balance the storage of CCR between landfill phases and utilize the full capacity of Phase I.¹⁴

The capacity of the proposed municipal landfill is only 600 thousand tons or approximately 500 thousand cubic yards. Therefore, the municipal landfill would increase Brown’s dry CCR storage capacity from 540 thousand cubic yards to 1.04 million cubic yards, enough capacity to operate Brown through 2025 in the High gas-coal spread scenario and through 2028 in the Low and Mid gas-coal spread scenarios assuming all fly ash from Brown 3 is beneficially used offsite. In the Municipal Landfill alternative, the need for additional CCR storage capacity occurs sooner because 100 thousand cubic yards of CCR will not be beneficially used onsite to open the amended Phase II. Regardless, the analysis assumes additional dry CCR storage capacity is available by mid-2019 in both alternatives.

¹² Estimated cost is \$26 thousand in 2019, escalating at 2.4% per year.

¹³ [REDACTED]

¹⁴ As mentioned previously, KU is currently limited to storing ten feet of CCR in Phase I.

CONFIDENTIAL INFORMATION REDACTED

The present value of revenue requirements (“PVRR”) was computed for each alternative over each of the dry CCR storage forecasts in Table 4. Based on the storage capacity of the municipal landfill, costs for each alternative were evaluated through 2027 and the value provided by the amended Phase II beyond 2027 was ignored.¹⁵ Not surprisingly, because the amended Phase II alternative has lower fixed and variable costs, it is favorable to the Municipal Landfill alternative under any CCR storage scenario (see Table 6).

Table 6 – Analysis Results (PVRR, 2018-2027, \$M)¹⁶

Gas-Coal Spread	Offsite Beneficial Use	Amended Phase II	Municipal Landfill	Difference (Amended Phase II less Municipal Landfill)
Low	No OBU	29		
	OBU: BR3 FA	28		
Mid	No OBU	30		
	OBU: BR3 FA	28		
High	No OBU	31		
	OBU: BR3 FA	29		

¹⁵ In the Municipal landfill alternative, Brown’s dry CCR storage capacity is depleted prior to 2025 in about half of the CCR storage forecasts. For these cases, the cost to acquire additional CCR storage capacity was ignored.

¹⁶ PVRR values reflect all costs in Table 5. Inputs to the analysis reflect recent changes in the federal tax law.

4 Appendix A – Impact of CO₂ Price on Brown’s Dry CCR Storage Need

Table 7 contains dry CCR storage forecasts for all gas-coal spread scenarios, assuming a cost per ton for CO₂ emissions of \$17 in 2026 increasing to \$29 in 2035. The cost for CO₂ emissions is based on a forecast developed by Synapse Energy Economics in March 2016.¹⁷

Table 7 – Brown Dry CCR Storage Forecasts (Thousand Cubic Yards, Cum. Vol. Stored, CO₂ Price)

Year	Low Gas-Coal Spread		Mid Gas-Coal Spread		High Gas-Coal Spread	
	No OBU	OBU: BR3 FA	No OBU	OBU: BR3 FA	No OBU	OBU: BR3 FA
2018	482	450	479	447	506	470
2019	490	431	489	429	544	473
2020	563	484	563	483	647	548
2021	658	553	663	555	775	640
2022	748	618	754	621	898	730
2023	843	686	850	691	1,032	826
2024	931	750	943	758	1,150	911
2025	1,026	818	1,050	835	1,291	1,013
2026	1,090	865	1,126	890	1,391	1,086
2027	1,146	905	1,198	943	1,486	1,154
2028	1,202	946	1,275	998	1,593	1,232
2029	1,260	988	1,346	1,050	1,702	1,310
2030	1,322	1,032	1,422	1,104	1,807	1,387
2031	1,381	1,075	1,498	1,160	1,923	1,471
2032	1,438	1,116	1,573	1,213	2,031	1,549
2033	1,490	1,154	1,646	1,267	2,148	1,633
2034	1,536	1,187	1,712	1,314	2,241	1,701
2035	1,586	1,224	1,790	1,370	2,362	1,788

¹⁷ Synapse’s Spring 2016 Low CO₂ price forecast began in 2022 and was presented in real 2015 dollars. For this analysis, it was escalated to nominal dollars at 1.8% annually. See Synapse’s “Spring 2016 National Carbon Dioxide Price Forecast” report (March 16, 2016) at <http://www.synapse-energy.com/sites/default/files/2016-Synapse-CO2-Price-Forecast-66-008.pdf>.