

**STERLING
VENTURES**

May 19, 2015

HAND DELIVERED

Hon. Jeff Derouen
Executive Director
Public Service Commission
211 Sower Boulevard

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MAY 20 2015

PUBLIC SERVICE
COMMISSION

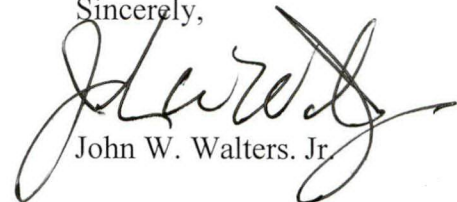
Re: Sterling Ventures, LLC v. Kentucky Utilities Company

Dear Mr. Derouen:

Accompanying this letter, please find for filing an original and ten copies of a Complaint by Sterling Ventures, LLC against Kentucky Utilities Company. Because there are a number of Exhibits to the Complaint, I am also including for you convenience a USB flash drive containing a copy of the Complaint and each Exhibit.

Please let me know if there are any questions regarding this filing. Thank you for your assistance.

Sincerely,



John W. Walters, Jr.

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MAY 20 2015

PUBLIC SERVICE
COMMISSION

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

STERLING VENTURES, LLC

)

COMPLAINANT

)

vs.

)

CASE NO. 2015-_____

)

KENTUCKY UTILITIES COMPANY

)

DEFENDANT

)

FORMAL COMPLAINT

1) By Order dated December 23, 2009, the Public Service Commission (the "Commission") granted Kentucky Utilities Company ("KU") and Louisville Gas and Electric Company ("LG&E") a Certificate of Public Convenience and Necessity (the "CPCN") (i) to build the first phase of a coal combustion residuals ("CCR") landfill at the Trimble County Generating Station ("the Trimble Landfill"), and (ii) to build the first phase of a CCR landfill at the Ghent Generating Station (the "Ghent Landfill")¹.

2) Pursuant to KRS §§ 278.260, 278.280(1) and 807 KAR 5:001 § 12, Sterling Ventures, LLC ("Sterling") requests that the Commission revoke the 2009 CPCN granted to KU and LG&E (the "Companies") to build the first phase of the Trimble Landfill, and to limit the environmental cost recovery surcharge paid by KU ratepayers for the Ghent Landfill.

3) The Companies have not been able to obtain the various federal and state permits required to begin construction of the Trimble Landfill. As explained below, since 2009, the design, capital

¹ In the matter of Application of Kentucky Utilities Company for Certificates of Public Convenience and Necessity and Approval of Its 2009 Compliance Plan for Recovery by Environmental Surcharge, KU Case No. 2009-00197 (the "2009 KU Application"), LG&E Case No. 2009-00198 (the "2009 LG&E Application") (Orders of December 23, 2009).

cost, location, operational expense and capacity requirements of the Trimble Landfill have dramatically changed, and it is now clear that the Trimble Landfill will not serve the public convenience, is not necessary and is unjust, unreasonable and improper. Due to a staggering increase in the capital cost of the first phase of the Trimble Landfill, a substantial reduction in the annual CCR capacity requirements of the Trimble Landfill and the availability of a less costly off-site disposal alternative for Trimble's CCR, the Trimble Landfill is unnecessary, and is a wasteful duplication of facilities.

4) Sterling also requests the Commission cap the environmental cost recovery surcharge (the "ECR") allowed on the Ghent Landfill. KU failed to take advantage of a known, less costly disposal alternative that would have substantially reduced the ECR.

I. PARTIES

3) Complainant, Sterling Ventures, LLC, is a KU customer, with its business office in Lexington, Fayette County, Kentucky, and is in the business of operating an underground limestone mine in Gallatin County, Kentucky. Sterling Ventures' business address is:

Sterling Ventures, LLC
376 South Broadway
Lexington, KY 40508

4) KU is a public utility, as defined in KRS § 278.010(3)(a), engaged in the business of furnishing retail electric service in the Commonwealth of Kentucky. KU's mailing address is:

Kentucky Utilities Company
Post Office Box 32010,
220 West Main Street, Louisville, Kentucky 40232.

II. JURISDICTION

5) The Commission's authority to review the CPCN for the Trimble and Ghent Landfills derives from KRS §§ 278.260(1) and 278.280(1).

III. FACTS

BACKGROUND

6) On December 23, 2009, the Commission granted LG&E and KU a CPCN to build the first phase of two multi-phase landfills at the Trimble and Ghent generating Stations to dispose of coal combustion residuals ("CCR"). The PSC approved recovery of the landfill construction, capital and operating cost through LG&E and KU's ECR.

7) In his filed testimony before the PSC in the 2009 KU Application, John Voyles, Vice President, Transmission and Generation Services for KU and LG&E, described the Trimble Landfill project as follows:

Project 32 -- Trimble County Station Landfill

Q. Please describe the new Trimble County Station landfill (Project 32), the anticipated cost and the associated timeline.

A. Project 32 consists of constructing the first phase (Phase I of four phases) of a new 210 acre onsite landfill at the Trimble County station. Phase I is expected to cost \$94.0 million (total). The total landfill project capital cost, with the inclusion of the Synthetic Materials and Holcim beneficial reuse contracts, is estimated to be \$551.4 million. The Synthetic Materials and Holcim beneficial reuse opportunities allow the deferral of future phases and the capital expenditures associated with those phases. Construction of Phase I is expected to take 18-24 months to complete and is expected to be in-service in January 2013.

As presented in Exhibit CRS-4, Coal Combustion Byproduct Plan for Trimble County Station, the total Phase I cost of the landfill is anticipated to be approximately \$94.04 million. The Companies will be co-owners of 75% of the landfill, with partners IMPA and IMEA owning jointly approximately 25%. The Companies will share the utility portion of the landfill, with LG&E

owning approximately 52% and KU owning approximately 48% of the facility. Accordingly, KU's share of the Phase I cost of the landfill is expected to be approximately \$33.86 million.²

- 8) Mr. Voyles similarly described the Ghent Landfill as follows:

Project 30 -- Ghent Station Landfill

Q. Please describe the new landfill at the Ghent Station (Project 30), the anticipated cost and the associated timeline.

- A. Project 30 consists of the first phase (Phase I) of a three phase, new landfill construction project at the Ghent station for continued on-site management of CCP. Completion of this project requires the procurement of approximately 350 acres of land and relocation of approximately 2,500 linear feet of transmission line, existing underground utilities and a small cemetery (currently known to contain six burial plots). The project includes a transport system for the CCP material and the installation of a leachate collection/sediment retention pond. Phase I is expected to cost approximately \$204 million with a total project capital cost (Phases I-III) estimated to be approximately \$360 million. Phase I construction is expected to take 18-24 months to complete and is expected to be in-service by 2013.³

- 9) However, according to documents recently filed in the 2014 KU and LG&E Rate Increase Application, the Companies now project that Phase I of the Trimble Landfill will cost \$429.3 million – a staggering 457% increase over the original approved projected cost of \$94 million.⁴ (As Mr. Voyles described, the Companies effectively own 75% of the Trimble Generating Station, and therefore, the Companies' capital cost of Phase I has risen from \$70.5 million to \$322 million).

² 2009 KU Application, Direct Testimony of John Voyles, at 31-32.

³ *Id.* at 23-24.

⁴ See Exhibit A: *In re Application of Kentucky Utilities Company for an Adjustment of Its Electric Rates - Case No. 2014-00371* ("2014 Rate Increase Application"), Capital Review-Trimble County CCR, Attachment to Filing Requirement, 807 KAR 5:001, Section 167(7)(c)I, Witness K. Blake/Thompson, at 228 of 272.

- 10) The cost of the Ghent Landfill project has also exploded. Based on the 2014 Rate Increase Application, Phase I of the Ghent Landfill will now cost \$341 Million – \$137 million over the Commission's approved CPCN cost of \$205 million.⁵
- 11) Fundamental to the PSC's review of an application for a CPCN is the principal that the proposed project must be the least, reasonable cost alternative, and one that will not result in wasteful duplication.⁶ Kentucky Courts have defined wasteful duplication as "an excess of capacity over need" and "an excessive investment in relation to productivity or efficiency, and an unnecessary multiplicity of physical properties."⁷
- 12) Accordingly, if a chosen capital project requires the utility to invest substantially more to achieve essentially the same results as a lesser cost alternative, the utility is not fulfilling the requirement that capital expenditures be the least, reasonable cost alternative.
- 13) In addition to review of initial capital costs of project alternatives, the PSC also reviews projected future operating and maintenance costs over the life of the project.⁸
- 14) The accepted method in Kentucky for a utility to identify the lesser cost alternatives of various capital projects is to determine the Present Value Revenue Requirement (PVRR) of the capital and operational cost of each alternative.

⁵ *Id.* at 226 of 272.

⁶ See *Public Service Comm'n v. Continental Tel. Co.*, 692 S.W.2d 794, 799 (Ky. 1985) (where the court noted that a key objective the PSC must consider is whether the proposed utility project will result in the lowest possible cost to the ratepayers).

⁷ See *Kentucky Utilities Co. v. Public Service Comm'n*, 252 S.W.2d 885 (Ky. 1952).

⁸ See *In the Matter of: Application of Kentucky-American Water Company for a Certificate of Public Convenience and Necessity Authorizing Construction of the Northern Division Connection*, Case No. 2012-0096 (Order entered February 28, 2013) (approving an alternative where lower O&M expenses would eventually erase any initial difference in capital cost from a lower capital cost alternative).

15) KU and LG&E confirmed that the PVRR alternatives analysis is the proper method for determining the overall lowest cost alternative for CCR disposal, including comparing the cost of off-site disposal alternatives to the construction of new CCR landfills:

While many factors impact decisions on how to proceed (such as safety, ability to acquire needed permit(s), etc.) **present value of revenue requirements is used as the primary economic decision metric**. In some instances, additional cost metrics (such as cost per cubic yard or cost per ton) may also be quantified. Documentation for the evaluation is typically produced in close proximity to completing the evaluation. Often the supporting documentation is the source from which many internal and external presentations or business cases discussing the issue are developed. As previously stated, documentation regarding the alternatives is typically developed in coordination with consultants, however, the economic evaluation and associated documentation summarizing the economic evaluation is developed within E.ON U.S. At each decision point (such as formulation of alternatives, evaluation of options, development of documentation), oversight is built into the process to serve as a check. The function of this validation step is to subject the alternatives, evaluation or documentation to extensive "what ifs" and to confirm that a better alternative or solution does not possibly exist. **For example, is it possible that more favorable economics could not be achieved by selecting an alternative site or location?**⁹

16) Attached to this Complaint as Exhibits B and C are the PVRR Alternatives Analysis for each the Ghent Landfill and the Trimble Landfill, respectively.

17) Attached as Exhibits D and E are summaries of the projected capital and maintenance and operating costs for the Ghent and Trimble Landfills thorough 2018 that the Companies filed with the Commission as part of their respective 2009 Applications.

⁹ See 2009 KU Application and 2009 LG&E Application, Exhibit, *E.ON Comprehensive Strategy for Management of Coal Combustion Byproducts*, June 2009 (the "Comprehensive Strategy"), at 14 (emphasis added).

IV. ANALYSIS: STERLING VENTURES' DISPOSAL OPTIONS

1. Sterling's Ghent Proposal

18) Sterling Ventures, LLC owns and operates an underground limestone mine near Verona, Kentucky, approximately 17 miles from the Ghent Generating Station, and 50 miles from Trimble. Sterling has been mining on the site since 2000, and has mined and sold approximately 17,000,000 tons of limestone from the mine since its opening. Sterling currently mines between 900,000 and 1,500,000 tons of limestone per year. Average annual production is approximately 1,200,000 tons.

19) In addition to producing limestone for the general aggregate construction market, Sterling also mines high calcium limestone for Mississippi Lime Company for use in a lime kiln located on Sterling's property. This high calcium limestone exceeds Trimble's specifications for use as scrubber stone in Trimble's flue gas desulfurization ("FGD") scrubber system.

20) Sterling also has a Registered Permit by Rule for Beneficial Reuse of Special Waste issued by the Kentucky Department of Environmental Protection, Division of Solid Waste to use FGD gypsum in Sterling's mine.

21) In September 2011, Sterling presented KU an alternative proposal for the planned construction of the Ghent landfill (the "Ghent Gypsum Proposal"). Sterling proposed that KU utilize Sterling's beneficial reuse permit and construct only that portion of the proposed Ghent Landfill necessary for coal ash, and use Sterling's underground mine for Ghent's excess gypsum.

22) According to projections filed with the 2009 KU Application, capital costs directly attributed to improvements and equipment necessary for gypsum disposal were \$53.1 million of

the \$204 million Phase I Ghent landfill cost.¹⁰ In addition, operating expenses directly related to gypsum disposal were \$9.6 million of the projected \$19.6 million total annual operating and maintenance cost.¹¹

23) Attached as Exhibit G is Sterling's PVRR calculation of placing gypsum in the Ghent Landfill, based on the above capital cost assumptions, and the present value assumption in Exhibit B. The PVRR cost of placing gypsum in the Ghent Landfill would have been approximately \$275.5 million, with the "all-in"¹² cost for disposal in the Ghent Landfill in 2013 to be approximately \$19.43 per cubic yard, including transportation.¹³ Sterling proposed to place Ghent's gypsum in the mine for \$12.29 per cubic yard (\$10.50 per ton at 1.17 conversion).¹⁴ Even without considering the PVRR savings from delaying Phase II of the Ghent Landfill and completely eliminating Phase III, the PVRR savings for using Sterling's mine verses the Ghent Landfill would have been approximately \$41 million.¹⁵ Delaying the construction of Phases II and III (projected at the time to cost another \$157.4 million) would have dramatically increased the PVRR savings.

24) In addition, at the time Sterling presented the Ghent Gypsum Proposal, KU knew that Phase I of the Ghent Landfill project was already at least \$99 million over the projected cost

¹⁰ See Exhibit F, 2009 KU Application, Ghent Landfill (Phase I) Capital Expenditures, Attachment to Response to KIUC Question No. 1-4(a), at 1.

¹¹ *Id.*

¹² All-in cost charged to the Companies' ratepayers as an Environmental Surcharge is the sum of (i) the return on rate base (10.68% x net base), (ii) depreciation, (iii) taxes and (iv) operational and maintenance expenses.

¹³ See Exhibit G, Sterling's PVRR Calculation of Ghent Landfill Gypsum Disposal Cost.

¹⁴ See Exhibit H, Sterling's Ghent Station Alternative for CCP/Gypsum Disposal.

¹⁵ See Exhibit G, *supra* note 13.

presented to, and approved by, the Commission.¹⁶ (As noted above, KU now projects that Phase I will be \$137 million over budget.) If the improvements and equipment related to gypsum disposal caused the cost overruns, the PVRR savings noted above would have increased.

25) Sterling attempted numerous times between September and December 2011 to meet with KU and discuss the concepts presented and logistics of Ghent Gypsum Proposal. On December 12, 2011, Scott Straight, Project Engineer on the Ghent Landfill, responded by email with KU's determination that: "[T]his potential opportunity you have presented would not eliminate the need to construct the infrastructure required to process the by-products at Ghent, nor would it eliminate the construction of the landfill infrastructure. Instead, it potentially could have merit in a few years to defer the next phased expansion of the landfill [and] the next phase of the landfill is years away"

26) The decision not to pursue the Sterling mine alternative was improper. The opportunity to use Sterling's Beneficial Reuse Permit had arisen. (In fact, it had been available for over a year.) It was an immediate beneficial reuse opportunity, not a potential future opportunity. It was a current opportunity with a lower PVRR cost alternative that would have substantially reduced the cost, size and scope of Phase I of the landfill, and substantially delayed Phase II and eliminated the need for Phase III. Delaying the full PVRR review and analysis to some date in the future was completely contrary to KU's commitment to the Commission on the procedures that it would follow in making an unbiased decision on whether to spend capital, or to take advantage of a beneficial reuse opportunity.

¹⁶ See Exhibit I, 2014 Rate Increase Application, Capital Review-Ghent CCR, Attachment to Response to AG-1 Question No. 106, Witness K. Blake, at 819 of 1615.

All beneficial reuse opportunities will be screened, discussed, evaluated and documented (in conjunction with the current plan) **when their availability first becomes known** - not solely when a need for additional storage capacity has been identified, as the evaluation of each prudent reuse opportunity could provide a delay of the next phase of construction (emphasis added).¹⁷

27) KU improperly decided to spend \$53.1 million on gypsum specific infrastructure cost for the Ghent Landfill, use up valuable space in the landfill, incur an additional \$9.6 million per year transporting gypsum to the landfill, in order to determine at some time in the future whether all of that cost and expense was the least expensive alternative for gypsum disposal.

2. Proposed Trimble County Landfill

28) As of the filing of this Complaint, it has been over 5 years since the PSC granted KU and LG&E the CPCN for the Trimble County Landfill, and construction has not yet begun. The delay is the direct result of the Companies' inability to obtain the required state and federal permits necessary to begin construction. Relevant to this Complaint are two permits – a Landfill Construction permit from the Kentucky Division of Waste Management, Solid Waste Branch (“KDWM”), and a site permit from the U.S. Army Corps of Engineers (the “Corps”) for impacts to wetlands under Section 404 of the federal Clean Water Act (“CWA 404 Permit”)

29) An applicant for a CWA 404 Permit must demonstrate to the Corps that, among other things, the proposed project is the least environmentally damaging practicable alternative (LEDPA) to achieve the project's purpose, which must include, in addition to the environmental impact analysis, an accurate analysis of the cost of the considered alternatives. To determine the

¹⁷ See Comprehensive Strategy, *supra* note 9, at 13.

LEDPA, an applicant conducts a 404(b)(1) Alternatives Analysis.¹⁸ With respect to the “practical alternatives,” the regulations state:

An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.

30) The CWA 404(b)(1) Guidelines require consideration of “overall” project costs when comparing LEDPA alternatives.¹⁹ According to the EPA, “[t]he determination of what constitutes an unreasonable expense should generally consider whether the projected cost is substantially greater than the costs normally associated with the *particular type of project*.”²⁰

31) The particular type of project in this case is construction by a regulated utility subject to Commission jurisdiction, and, as the Companies have acknowledged, the PVRR of the capital and operational cost of disposal alternatives is the recognized method of determining the lowest overall project cost. Therefore, the critical component of the 404(b)(1) Alternatives Analysis would be the overall project cost of each alternative on a PVRR basis. As detailed below, the Companies initially acknowledged that the PVRR comparative analysis method was the appropriate method for determining overall cost of alternatives. However, the Companies quickly abandoned that method as the appropriate alternative overall cost analysis as the cost of Phase I of the Trimble landfill exploded.

¹⁸ 40 C.F.R. § 230.10(a).

¹⁹ See 45 Fed. Reg. at 85339 (the practicability determination requires consideration of the “*overall scope/cost of the proposed project*”) (emphasis added).

²⁰ EPA, *Memorandum: Appropriate Level of Analysis Required for Evaluating Compliance with the Section 404(b)(1) Guidelines Alternatives Requirements*, at 3(b) (emphasis added).

a. MACTEC 404(b)(1) Alternatives Analysis

32) In December 2010, the Companies submitted their first application for the CWA 404 Permit to the Corps, which included a 404(b)(1) Alternatives Analysis prepared by MACTEC. After this initial filing, LG&E and KU met with the EPA and the Corp in May 2011 to discuss the Alternatives Analysis. As a result of that meeting, in March 2012, the Companies submitted a revised CWA 404 Permit application with a revised 404(b)(1) Alternatives Analysis prepared by MACTEC (the “MACTEC 2012 Analysis”), which is attached to this Complaint as Exhibit J.

33) The MACTEC 2012 Analysis was submitted 6 months after Sterling submitted its proposal to KU to use the underground mine as an alternative for gypsum disposal. However, MACTEC did not include Sterling’s underground mine option in its comparative analysis.

34) It is clear that the MACTEC Analysis adopted the PVRR Alternatives Analysis used in filings with the Commission as the proper method of determining the least cost alternative under the 404 Alternatives Analysis. The Evaluation Criteria in the MACTEC Analysis included the following cost criteria:

Cost of Disposal/Storage – As a public utility regulated by the Public Service Commission, LG&E is required to seek out measures with the least cost to the ratepayers.²¹

35) The MACTEC 2012 Analysis concluded that chosen alternative of building the Trimble County Landfill in Ravine B “fulfills the responsibility of a publically regulated utility by the Public Service Commission to provide the least cost alternative to LG&E rate payers.”²² The only

²¹ See Exhibit J, MACTEC Engineering and Consulting, Inc., *Section 404 Alternatives Analysis, Coal Combustion Residuals Storage Project, LG&E Trimble County Generating Station*, Issued December 2010 and Revised March 2012 (the “MACTEC 2012 Analysis”), at 1-2.

²² *Id.* at 6-3.

alternatives analysis prepared at the time of the MACTEC analysis was the PVRP comparative analysis used by the Companies in their respective 2009 Applications for the CPCN.

36) KU, LG&E and MACTEC also knew at the time they submitted the MACTEC Analysis that Phase I of the Ravine B Landfill Project was \$183 Million over budget (\$137 Million over budget net of IMPA/IMEA).²³

37) MACTEC also computed capacity requirements for Trimble CCR as follows:

2.2 NEED

Unit 1 currently generates approximately 367,571 tons of CCR per year and Unit 2 generates 480,142 tons of CCR per year for a combined annual CCR production of about 847,713 tons. Estimated annual CCR production rates are illustrated in **Table 1**. Tons of CCR are converted to CY to determine the pond or landfill volume required for storage of the material. The Trimble County Generating Station will exceed existing CCR storage capacity within approximately one year of bringing Unit 2 on-line. Due to lack of CCR storage, expansion of the on-site Bottom Ash Pond (BAP) and Gypsum Storage Pond (GSP) will address short term needs for CCR storage. To meet long term needs within the window created by these short term measures, LG&E has developed several alternatives to assess CCR storage options.

TABLE 1 LG&E Trimble County Generating Station Estimated Coal Combustion					
Units	Tons Per Year			TONS/CY	CY PER YEAR
Material	Unit 1	Unit 2	Total	Density	Volume
Pyrites	3,411	4,440	7,850	1.823	4,306
Bottom Ash	30,965	39,950	70,645	1.080	65,412
Economizer/ Duct Ash	4,263	5,550	9,813	0.810	12,115
Fly Ash	132,160	172,034	304,195	0.878	346,463
Gypsum	197,041	258,169	455,210	0.945	481,703
Total	367,571	480,142	847,713		910,000

²³ See Exhibit K, 2014 Rate Increase Application, Capital Review-Trimble County CCR, Attachment to Response to AG-1 Question No. 106, Witness K. Blake, at 820 of 1615.

38) In response to the MACTEC 2012 Analysis, Region 4 of the EPA expressed numerous reservations and issues with the Trimble Landfill. Specifically, in a letter dated April 25, 2012, the EPA concluded that the Companies' 404(b)(1) Alternatives Analysis was improperly overstating the required capacity of the landfill:

The applicant's alternatives analysis included as Appendix 1 of their CWA 404 permit application bases the evaluation of potential alternatives on a need to dispose of 910,000 cubic yards of CCR material annually throughout the anticipated 38-year lifetime of the facility's two power generating units (Mactec, rev. 2012). Many of the alternatives for CCR waste disposal considered, but eliminated from further consideration by LG&E were rejected due to the inability of those alternatives to accommodate the total 910,000 annual cubic yards of material. However, based on information provided by LG&E, the EPA believes that it will likely be unnecessary to dispose of this volume of CCR, and consequently, the applicant's alternatives analysis does not comply with the requirements of the Guidelines (40 CFR 230.12).

The total volume of CCR material generated at the Trimble County Generating Station is actually comprised of five different waste streams. As illustrated in Table 1, over 90-percent of this material consists of fly ash and synthetic gypsum. In its alternatives analysis, LG&E indicates that approximately 11 percent of the annual fly ash and bottom ash produced at the facility and approximately 93-percent of synthetic gypsum is adaptively reused. On December 8, 2011, representatives of LG&E verbally informed representatives of the EPA that up to 75-percent of its fly ash production may be reused. In fact, LG&E is presently constructing two new barge loading facilities at the Trimble County Generating Station to increase its capacity to facilitate adaptive reuse of its CCR material, one for fly ash and a second for gypsum.

The EPA believes that the actual volume of CCR material necessary for annual disposal may be between 17-percent and 46-percent of the 910,000 cubic yards used by LG&E in its alternatives analysis. Deducting the proportional volumes of reused material cited in the alternatives analysis results in a revised total waste volume necessary for disposal of approximately 417,000 cubic yards per year (Table 2), or 46 percent of the volume used in the alternatives analysis. Similarly, deducting the proportional volumes of material assuming reuse of up to 75 percent of fly ash and bottom ash reduces the total annual volume for disposal to approximately 153,000 cubic yards per year (Table 2), or 17 percent of the volume used in the alternatives analysis.

[. . .]The EPA believes it is inconsistent with the intent of the Guidelines to discount potentially practicable alternatives based, at least in part, on the inability of those alternatives to provide a storage volume that ignores the already

demonstrated volumetric reductions in CCR as a result of adaptive reuse. Even further reductions in the necessary storage capacity are likely as evidenced by LG&E's laudable commitment to facilitate CCR reuse and its stated goals to significantly increase the quantity of material reused. These considerations warrant a more detailed alternatives analysis in order to properly consider all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem, as required by the Guidelines. In the absence of such an analysis, identification of the least environmentally damaging practicable alternatives cannot be made definitively.²⁴

39) In addition to the above issues raised by the EPA, the KDWM's review of the Landfill Construction Permit found problems with the Landfill's proposal. In March 2013, KDWM notified the Companies that it would be denying the permit application after concluding that the Landfill, as initially proposed, would fill a natural karst cave, and violate the Kentucky Cave Protection Act.

b. *GAI Consultants 404(b)(1) Alternatives Analysis*

40) In January 2014, the Companies submitted another revised CWA 404 Permit application to the Corps for the Trimble Landfill using the alternative location that avoided the karst cave. However, the 404(b)(1) Alternatives Analysis included in this new application was prepared by GAI Consultants, not MACTEC. A copy of the GAI Alternatives Analysis is attached as Exhibit M.

41) The GAI Consultants report for the first time included specific cost data for each alternative disposal option. However, because the Companies knew that the cost of Phase I of the Trimble Landfill had, by this time, increased by over 400%²⁵, and that a cost PVRR analysis

²⁴ See Exhibit L, Letter from James D. Giattina, Director, Water Protection Division, U.S. Environmental Protection Agency, to Colonel Luke T. Leonard, District Engineer, Louisville District Corps of Engineers (April 25, 2012) at 2-3, enclosure Table 2 .

²⁵ See Exhibit N, *2014 Rate Increase Application*, Capital Review-Trimble County CCR, Attachment to Response to AG-1 Question No. 106, Witness K. Blake, at 141 of 1615.

would not show that Ravine B was the lowest cost alternative, the Companies abandoned the PVRR comparative analysis method in favor of a limited specific cost method.²⁶

42) The Companies however did address the beneficial reuse issue the EPA voiced in its April 25th letter, and analyzed the disposal alternatives assuming a projected a 30% beneficial use of CCR (637,000 cubic yards per year).²⁷

43) The EPA responded to the new GAI Alternatives Analysis in a letter to the Corps dated July 11, 2014, and again expressed concerns that the Companies' new 404(b)(1) Alternatives Analysis was insufficient:

We do not believe that the applicant has adequately demonstrated that the proposed alternative to fill nearly 17 miles of headwater stream represents the least environmentally practicable alternative, consistent with the Guidelines. The alternatives analysis should more clearly and completely describe the process by which the least environmentally damaging practicable alternative was identified. The information provided to date appears to rely considerably on undocumented or undefined cost information and with very little to no comparative analysis of the range of environmental impacts associated with different alternatives that were considered or estimated compensatory mitigation costs.

...

The EPA believes that potentially feasible alternatives may have been eliminated in the alternatives analysis based on incompletely vetted economic considerations and that these sites warrant closer scrutiny.²⁸

44) The EPA followed up its July 11, 2014 letter with another letter to the Corps dated August 7, 2014. Specifically at issue was the failure to identify and evaluate a known disposal alternative:

²⁶ See Exhibit M, GAI Consultants, Inc., *Alternatives Analysis Report, LG&E and KU Services Company, Trimble County Generating Station Landfill Project*, January 2014 (the "GAI Alternatives Analysis"), at Attachment 5.

²⁷ *Id.* at Figure A-9, note 5.

²⁸ See Exhibit O, Letter from James D. Giattina, Director, Water Protection Division, U.S. Environmental Protection Agency, to Colonel Luke T. Leonard, District Engineer, Louisville District Corps of Engineers (July 11, 2014), at 2.

In addition, since providing the July 11, 2014, comment letter, the EPA has learned of a potentially feasible alternative not considered by the applicant. Sterling Ventures, LLC owns and operates an underground limestone mine in Gallatin County, Kentucky that holds a Special Waste Facility permit from the Kentucky Division of Waste Management (KDWM) to accept synthetic gypsum produced during the flue gas desulfurization (FGD) process at the Kentucky Utilities Ghent Power Station to fill mine voids in the mined out sections of the underground mine. It is the EPA's understanding that, subsequent to KDWM's issuance of the Special Waste Facility permit for Sterling Ventures which had originally identified the Ghent Power Station as a source of FGD, Kentucky Utilities elected to dispose of this material on-site of the Ghent Power Station instead of utilizing the Sterling Ventures mine. Based on information contained in the Sterling Ventures permit application approved by KDWM (summarized in enclosure 1), the mine may have the storage- capacity necessary to accommodate all of the CCR material generated by the LG&E Trimble County Generating Station. Use of the existing Gallatin County site would likely significantly reduce impacts to wetlands, surface waters, floodplains and groundwater resources in comparison to those impacts associated with construction and operation of the proposed new landfill. In addition, according to KDWM, it would require only a permit modification to the Sterling Ventures Special Waste Facility permit in order to allow for storage of CCR generated at the Trimble County Generating Station. Pursuant to 40 C.F.R. § 230.10(a), it is the applicant's responsibility to consider all practicable alternatives and to select a practicable alternative that does not involve a special aquatic site unless it can be clearly demonstrated that one is not available. The EPA believes that opportunities to utilize the underground limestone mine to store CCR from the Trimble County Generating Station warrant careful consideration as a potentially feasible alternative.²⁹

c. Supplemental 404(b)(1) Alternatives Analysis

45) In response to the most recent EPA letters, KU and LG&E filed a Supplement to the GAI Consultants original 404(b)(1) Alternatives Analysis with the Corps in December 2014.³⁰ For the first time, in this Supplemental Alternatives Analysis, the Companies' addressed the Sterling beneficial use option as an alternative.

²⁹ *Id.* Letter from Heather McTeer Toney, Regional Administrator, U.S. Environmental Protection Agency, to Colonel Christopher G. Beck, District Engineer, Louisville District Corps of Engineers (August 7, 2014), at 2.

³⁰ See Exhibit P, excerpts from Lee Wilson and Associates, Inc., et al., *Supplement to Alternatives Analysis, LG&E and KU Services Company, Trimble County Generating Station Landfill Project*, December 2014 (Exhibit P includes portions of the Supplemental Analysis applicable to this Complaint).

46) The Supplemental Analysis did include an analysis of the Kentucky law with respect to the cost analysis applicable when issuing a CPCN.³¹ However, the Companies concluded that the accepted method of examining the lowest cost alternative for public utility projects based on the PVRR of the project should not apply to the 404(b)(1) Alternatives Analysis:

No consideration is given to timing factors that are common in many types of financial analyses, such as for a rate-of-return determination. There is no adjustment for inflation on future operations costs, possible future increases in energy costs, discounting to bring future costs to present value, or return on investment if operation costs are fully funded on Day 1 but only expended over time. LG&E considers the gross costs for construction and 37 years of operations to provide the fairest comparison of relative costs among alternatives.³²

47) The only conclusion to be drawn from the Companies' position is that the Trimble Landfill was no longer the lowest cost PVRR alternative when viewed in the traditional manner of analyzing the costs of alternative long-term public utility project options.

48) With respect to the beneficial use and capacity issue raised by the EPA, the Companies flip-flopped again, and abandoned the 30% beneficial reuse assumption used in GAI's January 2014 Alternatives Analysis. In the Supplemental Analysis the Companies decided to ignore their history of beneficial reuse of CCR from Trimble and the long-term beneficial reuse contracts in place, and based the Supplemental Alternatives Analysis on the need for a landfill for 100% of annual CCR production:

The volume of CCR produced at the TC Station is projected to average approximately 910,000 cubic yards per year, with an uncertain potential for waste reduction through beneficial use. For planning purposes, the total waste volume is estimated to be on the order of 33.4 million cubic yards over the nearly 37 year minimum lifetime that remains for the TC Station.³³

³¹ *Id.* Appendix III.D-2 at 140 of 183, Kentucky Public Service Commission Consideration of Least-Cost Alternatives Certificates of Public Convenience and Necessity.

³² *Id.* Appendix III.D-1 at 116 of 183, Methods for Assessment of Costs, at 2.

³³ *Id.* at Section I. Introduction, at 1 (page 5 of 183)

49) By abandoning any reasonable estimate of beneficial use, the Companies are improperly ignoring existing executed contracts to purchase a minimum of 50% of Trimble CCR over the next 16 years. As indicated above in the EPA's April 25, 2012 letter, the Companies indicated a substantial amount of CCR was being beneficially reused.³⁴ In addition, attached is various information Sterling has discovered from internet research related to CCR beneficial use at Trimble, which further confirms the EPA discussions with the Companies.³⁵

3. Sterling's Trimble Proposal

50) As noted above, in August of 2014, the EPA specifically questioned the omission of Sterling's underground mine as part of the CWA 404 Alternatives Analysis for the Landfill. When Sterling discovered the August 2014 letter, it contacted Scott Straight, Director of Project Engineering for the Companies, by email to inquire if the Companies were interested in meeting to discuss using the Sterling mine as an alternative CCR disposal site for Trimble's CCR.³⁶

51) Mr. Straight responded by email on October 3, 2014 stating that as a result of the EPA's August 2014 letter, the Companies were now evaluating Sterling's mine as an alternative CCR disposal option, and he requested basic information as a preliminary step in his analysis. On October 24, 2014 Sterling responded to Mr. Straight's questions by email, but specifically noted that the responses were based upon limited knowledge of specific details concerning how the CCR would be staged at the plant, and the contemplated terms of the contractual obligations between the parties. Sterling noted that it may be appropriate to meet and discuss any issues and questions

³⁴ See Exhibit L, *supra* note 24, at Attachment.

³⁵ See Exhibit Q.

³⁶ See Exhibit R, E-mail from John Walters, General Counsel/CFO, Sterling Ventures, LLC, to Scott Straight, Director of Project Engineering, LG&E and KU (Sept. 24, 2014)..

regarding its responses, as well as meet with the USACE and KDWM. Sterling based its proposal on transporting the CR by truck. However, Sterling indicated that it would be interested in discussing the option of constructing a new barge facility near Sterling's mine for CCR transportation.³⁷

52) On October 31, 2014, Mr. Straight emailed Sterling that no more information was required to allow them to complete their evaluation. There was no request to meet, discuss or obtain any additional information on the barge option.³⁸

53) On December 1, 2014, Sterling discovered that a barge permit had been issued to the owner of an industrial parcel of property in Warsaw, Kentucky near Sterling's mine. Sterling immediately contacted Mr. Straight by email about this development to ask if he would be interested in discussing the possibilities of this barge site. Mr. Straight responded on December 5, 2014 questioning whether an existing barge load-out facility was physically on the new site. Sterling responded that same day telling Mr. Straight that the riverside improvements were in place, but construction of a new load-out facility would be required. After that brief email exchange, Sterling heard nothing more from the Companies. Sterling sent two additional emails on December 11, and December 30, 2014 asking Mr. Straight if he wanted to sit down and talk about the newly discovered barge site option, with no response.³⁹

³⁷ *Id.* E-mail from Scott Straight, Director of Project Engineering, LG&E and KU, to John Walters, General Counsel/CFO, Sterling Ventures, LLC (Oct. 3, 2014); E-mail from John Walters, General Counsel/CFO, Sterling Ventures, LLC, to Scott Straight, Director of Project Engineering, LG&E and KU (Oct. 24, 2014).

³⁸ *Id.* E-mail from Scott Straight, Director of Project Engineering, LG&E and KU, to John Walters, General Counsel/CFO, Sterling Ventures, LLC (Oct. 31, 2014)

³⁹ *Id.* E-mail from John Walters, General Counsel/CFO, Sterling Ventures, LLC, to Scott Straight, Director of Project Engineering, LG&E and KU (Dec. 1, 2014); E-mail from Scott Straight, Director of Project Engineering, LG&E and KU, to John Walters, General Counsel/CFO, Sterling

54) Sterling has prepared a PVRR comparative analysis of CCR disposal in the proposed Trimble Landfill verses in Sterling's underground mine (the "Sterling PVRR Analysis") based on using the Warsaw barge location.⁴⁰ Attached to the Sterling PVRR Analysis are assumptions on which Sterling based its calculations.

55) Sterling is projecting that, based upon 30% beneficial reuse, its mine option is by far the least cost alternative from a PVRR standpoint, and will save the Companies' ratepayers \$256,915,601 on a PVRR basis over the life of the project (total savings of \$491,983,428). The "all in cost" charged to the Companies ratepayers for using the Sterling option in 2018 is \$23.83 per cubic yard, verses \$75.41 per cubic yard disposing of CCR in the Trimble Landfill.⁴¹

56) The Sterling PVRR Analysis, attached as Exhibit S, also assumes that the Companies will not need to construct the CCR Treatment infrastructure to dry the CCR. The Companies currently transport CCR to buyers for beneficial reuse without treating the CCR.⁴² However, even if the Companies spend an additional \$152.3⁴³ (net of IMPA/IMEA) for infrastructure necessary to treat the CCR before shipment to Sterling, the Sterling landfill is still the lowest cost alternative, with a PVRR that is \$46.7 million lower than the Trimble Landfill option.⁴⁴

Ventures, LLC (Dec. 5, 2014, 02:58 EST); E-mail from John Walters, General Counsel/CFO, Sterling Ventures, LLC, to Scott Straight, Director of Project Engineering, LG&E and KU (Dec. 5, 2014, 04:26 EST); *id.* (Dec. 11, 2014); *id.* (Dec. 30, 2014).

⁴⁰ See Exhibit S, Sterling's PVRR Analysis of Trimble CCR to Sterling Materials.

⁴¹ *Id.*

⁴² See Exhibit J, MACTEC 2012 Analysis, *supra* note 21, at 3-1 to 3-2.

⁴³ See Exhibit T, 2014 Rate Increase Application, Project Engineering 2015 Business Plan, Attachment 1 to Response to Sierra Club Question No. 2.7, Witness Voyles, at 2 of 11. (Note that Sterling added the summary of cost at Bottom of Projected Engineering 2015 Business Plan).

⁴⁴ See Exhibit U, Sterling's PVRR Analysis of Trimble CCR to Sterling Materials.

57) In addition, as beneficial use increases, the cost savings from the Sterling option increase dramatically due to the enormous cost of Phase I of the landfill. Attached as Exhibits V and W are Sterling's PVRR comparative analyzes with CCR volume reductions as set forth in Scenarios 1 and 2 of the April 25, 2012 EPA letter (assuming the requirement of having to build the treatment infrastructure as a following analysis from Exhibit U).⁴⁵ If the total CCR capacity required is reduced to 416,709 cubic yards from beneficial use (EPA Scenario #1), the PVRR cost savings increases from \$46,699,283 to \$67,764,060, and increases to \$82,441,874 under EPA Scenario #2 (153,109 cubic yards).

58) As Exhibits U, V and W indicate, when landfill construction costs are pushed into Phase I, substantial cost saving from increased beneficial use are essentially lost. The enormous up front infrastructure costs are "sunk cost," and future beneficial use options are therefore only compared to the landfill's operational cost. As a result, a future beneficial use option has a higher cost hurdle to overcome, thereby reducing the viability of the future options, which then results in more CCR placed in the landfill, leading to the necessity of building all landfill phases.

59) As indicated earlier, in response to the EPA's comments in its August 2014 letter, the Companies did finally address the option of using Sterling's mine as an alternative to the Trimble Landfill. The Supplemental Analysis included a barge/conveyor option for Sterling's mine that contemplated building a massive conveyor system up a steep mountain with accompanying roads, bridges and ancillary facilities, on a parcel of property adjacent to Sterling's mine (the "Adjacent Parcel Barge Plan")⁴⁶. This construction alternative was a complete surprise to Sterling. Given the

⁴⁵ See Exhibit L, Letter from James D. Giattina, Director, Water Protection Division, U.S. Environmental Protection Agency, to Colonel Luke T. Leonard, District Engineer, Louisville District Corps of Engineers (April 25, 2012).

⁴⁶ See Exhibit P, Table III.D-3 at 59 of 183

complexity and issues involved with the Adjacent Parcel Barge Plan, it is surprising that not one representative of the Companies ever contacted Sterling to request a meeting, ask any question about the Adjacent Parcel Barge Plan, explore options, discuss and resolve potential issues, or obtain any information of any kind from Sterling concerning the Adjacent Parcel Barge Plan. This is even more surprising given that Sterling is in the business of moving materials by conveyor over long distances.

60) According to the Supplemental Analysis, the Adjacent Parcel Barge Plan would have a capital cost \$75.2 million (net of IMPA and IMEA). Given the option for a barge facility near Warsaw, KY., the Adjacent Parcel Barge Plan is overly complex, expensive and unnecessary.

V. LEGAL ANALYSIS OF PSC REVIEW

61) The Commission has the authority to review a previously approved CPCN:

A proceeding that examines the continued need for approved facilities in light of drastically changed economic conditions, however, is distinguishable from merely reopening a closed proceeding. Old issues are not re-litigated. New evidence not previously in existence at the time of the original proceedings and economic conditions not reasonably foreseeable at the time of the original proceedings is considered to determine if construction of the approved, but uncompleted, facilities is still necessary, reasonable and economically prudent. The Commission has previously initiated new proceedings to examine the continued need for approved facilities. As to this allegation, we have subject matter jurisdiction.⁴⁷

62) The commission has previously held that in circumstances substantially identical to the case at hand, a review of a CPCN is appropriate:

While the Commission does not typically investigate issues that have already been adjudicated, there are unique facts and circumstances relating to Smith 1 that justify this course of action. They include the passage of over 3.5 years since the date the Commission approved the facility and all necessary permits still not obtained by

⁴⁷ *In the Matter of Chris Schimmoller and Connie Lemley v. Kentucky American Water Company*, Case No. 2009-00096 (Ky. P.S.C. 2009).

East Kentucky, a very substantial escalation in the estimated cost of construction, and issues raised by three retail customers in a separate complaint case challenging Smith 1 as neither needed nor least-cost.⁴⁸

63) It has now been over five (5) years since the date the Commission approved Phase I of the Trimble Landfill, and the Companies still have not obtained all necessary permits required for construction. By the Companies' own admissions, if the Corp agrees to issue the CWA 404 Permit, the resulting litigation will delay construction for at least one more year. The projected cost for building the Landfill have increased by over 400%, and based upon cost overruns after the Companies began construction of the Ghent Landfill, the cost of the Trimble Landfill will most likely increase even more than it already has increased. Finally, a viable, less costly alternative to building the Trimble Landfill has emerged that would eliminate the need for the Landfill.

64) Upon the Commission determining that there has been a drastic change in the economics on which a CPCN is based, or when a more economically viable alternative has emerged, Kentucky law prevents the Companies from building the Trimble Landfill until the Commission's review of the CPCN determinations that "public convenience and necessity require the service or construction."⁴⁹

65) As a condition of the Commission granting the CPCN for a new facility, it must determine that there is both a need for the facility and "an absence of wasteful duplication resulting from the construction of the new system or facility."⁵⁰ This statutory mandate is designed to avoid "wasteful duplication" and to foreclose "excessive investment in relation to productivity or efficiency, [or] an unnecessary multiplicity of physical properties." *Id.* To demonstrate that a

⁴⁸ *In the Matter of Application of East Kentucky Power Corporative, Inc. 's Need for the Smith 1 Generating Facility.*, Case No. 2010-00238 (Ky. P.S.C. 2010).

⁴⁹ KRS § 278.020(1).

⁵⁰ *Kentucky Utilities Co.v. Public Service Com'n*, 252 S.W.2d 885, 890 (Ky. 1952).

proposed facility does not result in wasteful duplication, the Commission has held that the applicant must demonstrate that a thorough review of all reasonable alternatives has been performed.⁵¹

66) When reviewing a CPCN application, the Commission has the authority to "issue or refuse to issue the certificate, or issue it in part and refuse it in part."⁵² The Commission's review is guided by the overall requirement that utility rates are "fair, just, and reasonable."⁵³ The Commission has consistently recognized that "'least cost' is one of the fundamental principles utilized when setting rates that are fair, just, and reasonable."⁵⁴

67) The Commission also has the authority to modify any order or decision under 278.930, which provides in pertinent part: "Every order entered by the commission shall continue in force... until revoked or modified by the commission"

VI. CLAIMS FOR RELIEF

CLAIM ONE (MULTIPLE CHANGES IN SITUATION)

68) Complainant incorporates by reference paragraphs 1 - 67.

⁵¹ *In the matter of Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for a Certificate of Public Convenience and Necessity for the Construction of Transmission Facilities in Jefferson, Bullitt, Meade, and Hardin Counties, Kentucky* Case No. 2005-00142 (Ky. P.S.C, 2005).

⁵² KRS § 278.020(1).

⁵³ KRS § 278.030(1); KRS § 278.040; *Kentucky Public Service Com'n v. Com. ex rel. Conway*, 324 S.W.3d 373, 377 (Ky. 2010).

⁵⁴ *In the Matter of Application of Kentucky Power Co.*, Case No. 2009-00545 (Ky. P.S.C. 2010).

69) Numerous changes since the Commission issued the CPCN for Phase I of the Trimble Landfill in 2009 indicate that the construction of the Trimble Landfill is not needed or convenient.

These include:

1. The capital cost of Phase I of the Trimble Landfill has increased dramatically;
2. Environmental Regulations defining the classification of CCR have been issued; and
3. A less costly alternative for CCR disposal is now available.

70) Therefore, the construction of the Trimble Landfill will result in wasteful duplication.

CLAIM TWO
(BREACH OF CONDITION OF GRANTING CPCN)

71) Complainant incorporates by reference paragraphs 1 - 67.

72) The Commission granted the CPCNs for the first phases of the Trimble and Ghent Landfills based and conditioned upon the direct testimony of LGE/KU representatives, and documents entered into the record. The testimony and documents state that KU would pursue, and fully analyze, future beneficial reuse opportunities in order to reduce or eliminate the Landfills' capital costs and their operating and maintenance costs.

73) With respect to the Sterling Ventures mine option, KU has failed to follow the procedures that it committed to the Commission would be used in evaluating and capturing future beneficial reuse opportunities that would reduce the impact of ECR surcharges on KU's ratepayers.

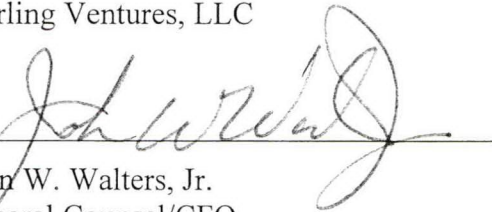
74) The failure to follow those procedures has resulted in KU needlessly increasing Ghent's ECR Rate Base, and, as a result, is improperly charging its ratepayers for unnecessary environmental compliance costs.

VII. PRAYER FOR RELIEF

75) Therefore, for the reasons stated above, the Complainant respectfully requests that the Commission:

- (i) revoke the CPCN with respect to the Trimble Landfill;
- (ii) conduct a review and evaluation of KU's analysis and decision process with respect to Sterling Ventures' beneficial reuse opportunity for Ghent and Trimble CCR;
- (iii) disallow ECR recovery of any operating and maintenance cost and capital expenditures associated with flue gas desulfurization ("FGD") gypsum disposal in the Ghent Landfill above and beyond the PVRR cost of gypsum placement in the Sterling mine; and/or
- (v) provide all other relief that is just and proper.

Respectfully submitted,
Sterling Ventures, LLC

By: 

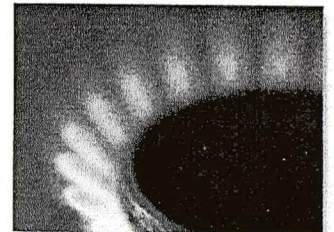
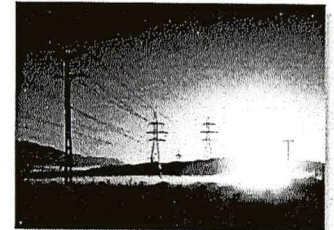
John W. Walters, Jr.
General Counsel/CFO
376 South Broadway
Lexington, KY 40508
Phone: (859) 259-9600
johnwalters@sterlingventures.com



PPL companies

Project Engineering 2015 Business Plan

September 17, 2014



Appendix



PPL companies

Capital Review – Ghent CCR

Accrual Basis, \$Millions

Authority/ECR Comparison

	<u>Total Projection</u>	<u>Current Authority</u>	<u>ECR Filing</u>	<u>Variance to Authority</u>	<u>Variance to ECR Filing</u>
Landfill Phase I/Fines & Transport	\$341	\$341	\$205	\$0	(\$137)
Landfill Phase II, III, Close & Cap	\$135	\$0	\$0	(\$135)	(\$135)
Total	\$476	\$341	\$205	(\$135)	(\$272)

Business Plan Comparison

	<u>Pre-2014</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>Post 2019</u>	<u>Total</u>
2014 BP									
Landfill Phase I	\$54	\$8	\$2	\$0	\$0	\$0	\$1	\$3	\$68
Fines & Transport	\$234	\$20	\$0	\$0	\$0	\$0	\$0	\$0	\$255
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$135	\$135
Total 2014 BP	\$288	\$28	\$2	\$0	\$0	\$0	\$1	\$138	\$457
2015 BP									
Landfill Phase I	\$45	\$3	\$8	\$0	\$0	\$0	\$1	\$3	\$59
Fines & Transport	\$251	\$21	\$10	\$0	\$0	\$0	\$0	\$0	\$282
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$135	\$135
Total 2015 BP	\$296	\$24	\$18	\$0	\$0	\$0	\$1	\$138	\$476
Variance to 2014 BP									
Landfill Phase I	\$9	\$5	(\$5)	\$0	\$0	\$0	(\$0)	\$0	\$9
Fines & Transport	(\$17)	(\$1)	(\$10)	\$0	\$0	\$0	\$0	\$0	(\$27)
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Variance to 2014 BP	(\$8)	\$5	(\$15)	\$0	\$0	\$0	(\$0)	\$0	(\$19)

Key Messages

- The increase over the ECR Filing is due to the Transport System going from Preliminary to Level I engineering, unexpected underground interferences, excusable events with EPC, and final permit design conditions against design.



PPL companies

Capital Review – Trimble County CCR

Accrual Basis, \$Millions

Authority/ECR Comparison

	<u>Total Projection</u>	<u>Current Authority</u>	<u>ECR Filing</u>	<u>Variance to Authority</u>	<u>Variance to ECR Filing</u>
BAP/GSP	\$28	\$30	\$25	\$2	(\$3)
Landfill Phase I/Treatment & Transport	\$322	\$76	\$73	(\$246)	(\$249)
Landfill Phase II, III, & IV	\$180	\$0	\$0	(\$180)	(\$180)
Holcim	\$9	\$9	\$8	\$0	(\$1)
Total	\$539	\$115	\$106	(\$424)	(\$433)

Business Plan Comparison

	<u>Pre-2014</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>Post 2019</u>	<u>Total</u>
2014 BP									
BAP/GSP	\$29	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$29
Landfill Phase I	\$10	\$2	\$19	\$28	\$32	\$8	\$10	\$2	\$112
Treatment & Transport	\$8	\$1	\$29	\$86	\$42	\$0	\$0	\$0	\$165
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$148	\$148
Holcim	\$9	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9
Total 2014 BP	\$57	\$3	\$48	\$113	\$74	\$9	\$10	\$150	\$463
2015 BP									
BAP/GSP	\$28	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$28
Landfill Phase I	\$12	\$3	\$5	\$44	\$38	\$42	\$1	\$3	\$148
Treatment & Transport	\$7	\$0	\$20	\$80	\$44	\$23	\$0	\$0	\$174
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$180	\$180
Holcim	\$9	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9
Total 2015 BP	\$57	\$3	\$25	\$124	\$81	\$65	\$1	\$183	\$539
Variance to 2014 BP									
BAP/GSP	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landfill Phase I	(\$2)	(\$1)	\$14	(\$16)	(\$5)	(\$34)	\$9	(\$1)	(\$36)
Treatment & Transport	\$1	\$1	\$9	\$6	(\$2)	(\$23)	\$0	\$0	(\$9)
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$31)	(\$31)
Holcim	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Variance to 2014 BP	(\$0)	(\$0)	\$23	(\$10)	(\$7)	(\$57)	\$9	(\$32)	(\$75)

Key Messages

- All numbers are net of IMPA/IMEA reimbursement.
- The increase over the ECR Filing is due to refined engineering on the Transport System, permit delays, new landfill layout, and project contingencies added.
- Permitting issues have delayed Phase I at least 2 years.

*Coal Combustion Byproduct
Plan for Ghent Station*

For



Subsidiaries

*Kentucky Utilities and
Louisville Gas and Electric*

June 2009

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CONFIDENTIAL INFORMATION REDACTED

1. Executive Summary

Kentucky Utilities Company's ("KU") Ghent station ("Ghent") produces three primary coal combustion byproducts ("CCP"): bottom ash, fly ash and gypsum, which are currently stored in two ash treatment basins and two gypsum stacking areas. These storage areas are expected to reach full capacity in 2012, creating a need for additional CCP management solutions.

A variety of on-site and off-site options were considered to meet CCP management needs at Ghent. The most effective solutions were identified through a needs analysis and economic analysis based on engineering cost estimates.

To address the pre-2013 need for gypsum storage capacity, an opportunity to remove a quantity of gypsum to be beneficially reused as structural fill was identified. This reuse option is significantly lower cost than transporting CCP to an off-site landfill, which is the other short-term option.

For longer-term CCP storage needs, KU contracted an engineering consultant to develop potential on-site storage alternatives. Of multiple options considered, four options were selected for further economic evaluation. Based on cost estimates and qualitative factors for these alternatives, the most favorable option is a single on-site landfill to store both ash and gypsum.

The most cost effective and environmentally sound CCP management options for Ghent are:

- a proposal for beneficial reuse of 1.3 million cubic yards ("MCY") of CCP (approximately 75% of annual CCP production) by Trans Ash, Inc. in 2010-2012 (Present value of revenue requirement ("PVRR") of [REDACTED] million or [REDACTED] per cubic yard), and
- the construction of a new on-site landfill system to store both ash and gypsum production for 25 years to be in-service by 2013 (PVRR of [REDACTED] million or [REDACTED] per cubic yard).

In addition, KU will continue to pursue other beneficial reuse opportunities that result in lower disposal costs.

CONFIDENTIAL INFORMATION REDACTED

2. Background

Kentucky Utilities Company's ("KU's") Ghent generating station ("Ghent") is located in Carroll and Gallatin Counties, Kentucky and is comprised of four coal-fired generating units for a total net station capacity of over 1,900 MW. The station produces three primary coal combustion byproducts ("CCP"): bottom ash, fly ash and gypsum. The Ghent station has four existing on-site storage facilities for CCP as follows:

- Ash Treatment Basin ("ATB") #1
- ATB #2
- North Gypsum Stack
- South Gypsum Stack

The ATBs are used to store bottom ash and fly ash which are byproducts of burning coal. ATB #1 is at maximum capacity¹ and ATB #2 is nearing maximum desired capacity. As of February 2009², ATB #2 can hold approximately an additional 2.5 MCY of ash. Ghent is forecast to produce approximately 0.7 MCY of ash annually, thus depleting the capacity in ATB #2 in 2012.³

Gypsum is produced by Ghent's flue gas desulfurization ("FGD") systems, which use limestone reagent to remove sulfur dioxide from flue gas. Until an additional repository can be developed, Ghent's gypsum is stacked on site. Based on the plant's expected generation, the existing capacity of the north and south gypsum stacks (collectively the "gypsum stack") is expected to be exhausted in 2012.⁴

Some gypsum is currently sold to a third party for beneficial reuse.⁵ CertainTeed, Inc. ("CertainTeed") currently pays KU █ per cubic yard for gypsum to be used as a raw material in the production of wallboard. This contract began in 1999 and runs through 2024. CertainTeed does not have minimum or maximum volume obligations, but their expected annual volume is approximately 222,000 cubic yards of gypsum (approximately 20% of annual gypsum production) based on recent utilization data.⁶

¹ ATB #1 is not relevant to this analysis as it is not currently receiving any CCP, although it is available for emergency use.

² A bathymetric survey of ATB #2 was conducted by HDR/Quest/Rudy for GAI Consultants in February 2009.

³ The available capacity of ATB #2 at the end of June 2009 is forecasted to be approximately 2.3 MCY.

⁴ The available capacity of the gypsum stack at the end of June 2009 is forecasted to be approximately 2.6 MCY.

⁵ KU identifies economically and environmentally favorable options to beneficially reuse CCP, consistent with KU's Comprehensive Strategy for Management of CCP shown in Exhibit JNV-3.

⁶ Gypsum sales to CertainTeed were 263,000 tons in 2007, 375,000 tons in 2008, and 103,000 tons year-to-date through May 2009. However, their purchases decreased late in 2008 and year-to-date in 2009 as the economy slowed.

3. Process and Methodology

KU and Louisville Gas and Electric Company (collectively "the Companies") develop the most effective plan for meeting the CCP storage needs at each generating station. The process of identifying the plan consists of the three following primary tasks which are performed by several departments within the Companies.

- Needs assessment
- Development of alternatives
- Comparison of alternatives

The CCP storage needs are defined by forecasting the production of CCP over the applicable planning period as compared to the existing storage capacity. The Project Engineering department and the applicable generating station are responsible for providing an estimate of remaining capacity.

The expected life of the existing storage capacity is based on the forecast of CCP production, which is developed by Generation Planning for all stations as a function of the expected coal usage for each unit. The Companies compile information regarding the cost of generation for each unit (fuel, variable O&M, emission costs, etc.), a description of the generation capabilities of each unit (capacity, heat rate curve, commitment parameters, emission rates, availability schedules, etc.), a load forecast, the market price of electricity, and the volumetric ability (transfer capability) to access the market. All of this information is brought together in the PROSYM^{TM7} software, which is used to model the economic operation of the Companies' generating system. The projected coal usage data provided by this model is checked for reasonableness by comparing the results to historical data.

The Project Engineering department develops alternatives for on-site CCP storage solutions and their associated costs. Any alternatives for off-site disposal such as beneficial reuse or off-site landfill disposal are provided by the generating stations' staff and a CCP team focused on exploring alternatives for byproduct storage. The cash flows for selected options are summarized and provided to Generation Planning for evaluation.

The Generation Planning department evaluates the storage and disposal options received from Project Engineering to determine the present value of revenue requirements ("PVR") associated with the capital expenditures and O&M expenses of each option. This analysis is performed using the Capital Expenditure Recovery module of the Strategist^{®8} software model.

⁷ The PROSYMTM model has formed the foundation of prior analyses involving certificates of convenience and necessity for new generating plants, environmental cost recovery for pollution control equipment, and the fuel adjustment clause.

⁸ Strategist[®] is a proprietary, state-of-the-art resource planning computer model. The Capital Expenditure Recovery module is used to quantify the revenue requirements impact associated with capital projects.

4. Needs Assessment

The following capacities were provided by Project Engineering and the Ghent station:

- ATB #1 is at capacity and is available for emergency use only.
- As of February 2009, the remaining available capacity of ATB #2 is 2.5 million cubic yards.⁹
- The remaining available capacity of the gypsum stacks is estimated to be 2.9 MCY as of January 2009.¹⁰

The expected life of the remaining capacity of the ATB #2 and the Gypsum Stack were estimated by forecasting the CCP production of ash and gypsum at Ghent. The quantity of ash produced at Ghent is estimated at a coal specification of 11.5% ash by weight of the total quantity of coal used, or approximately 11.5 tons of ash per 100 tons of coal. Converting to volumetric measurement, assuming ash production consists of 80% fly ash and 20% bottom ash by weight, approximately 11.5 cubic yards of total ash is produced per 100 tons of coal.¹¹

The chemical reaction by which gypsum is produced results in a net gypsum production of approximately 18% by weight of the total quantity of coal used,¹² or approximately 18 tons of gypsum per 100 tons of coal. Converting to volumetric measurement for the gypsum stack, approximately 17.8 cubic yards of gypsum is produced per 100 tons of coal.

The forecasted CCP production volume for Ghent is shown in Table 1 and depicted graphically in Figure 1 and Figure 2, based on the forecasted coal burn shown in Table 2. Table 2 also contains the historical quantities of coal burned as a comparison to the forecast. The increase in coal burn during the 2010-2013 period is due to the completion of the FGD installations at Ghent in 2009, which required prior scheduled outages on each of the Ghent units during 2007-2009. Also, with the addition of the FGDs, Ghent has lower fuel costs, resulting in higher forecasted generation.

⁹ Based on expected coal burn, Generation Planning forecasts that by the end of 2009, the remaining capacity of ATB #2 will be 1.9 MCY.

¹⁰ Based on expected coal burn and existing beneficial reuse, Generation Planning forecasts that by the end of 2009, the remaining capacity of the gypsum stacks will be 2.2 MCY.

¹¹ Density assumptions for wet storage are 0.945 tons per cubic yard for bottom ash and 1.0125 tons per cubic yard for both fly ash and gypsum.

¹² Fuel specification assumptions include SO₂ content of approximately 5.9 lb/mmBTU and heat content of 22.16 mmBTU/ton.

Table 1: CCP Production Forecast (MCY)

CCP Production Forecast (MCY – wet storage)			
	Fly Ash	Bottom Ash	Gypsum
2009	0.54	0.14	0.88
2010	0.55	0.15	1.09
2011	0.58	0.15	1.12
2012	0.55	0.15	1.06
2013	0.55	0.15	1.09

Table 2: Ghent Coal Usage (Million Tons)

Ghent Coal Usage (M Tons)	
<i>Historical</i>	
2004	5.4
2005	5.6
2006	5.6
2007	5.3
2008	5.7
<i>Forecast</i>	
2009	5.6
2010	6.0
2011	6.3
2012	6.1
2013	6.1

The forecasted generation and the resulting coal usage at Ghent correspond to an average capacity factor of approximately 77%. This relatively high capacity factor is consistent with Ghent's low production cost. Since Ghent is already modeled as a baseload station, the risk of significantly underestimating CCP production is low. However, reduction in load or unexpected outages at Ghent could affect the capacity factor and lower future CCP production.

Figures 1 and 2 show the forecasted cumulative CCP production at the end of each year compared to the expected available capacity at the end of 2009. With current forecasts for ash production and without any additional on-site capacity or off-site storage or reuse, ATB #2 is expected to reach full capacity during 2012, as shown in Figure 1. Assuming no beneficial reuse beyond the expected 222,000 cubic yards per year by CertainTeed, the gypsum stack is also expected to reach maximum capacity in 2012, as shown in Figure 2.

Figure 1: ATB #2 Capacity

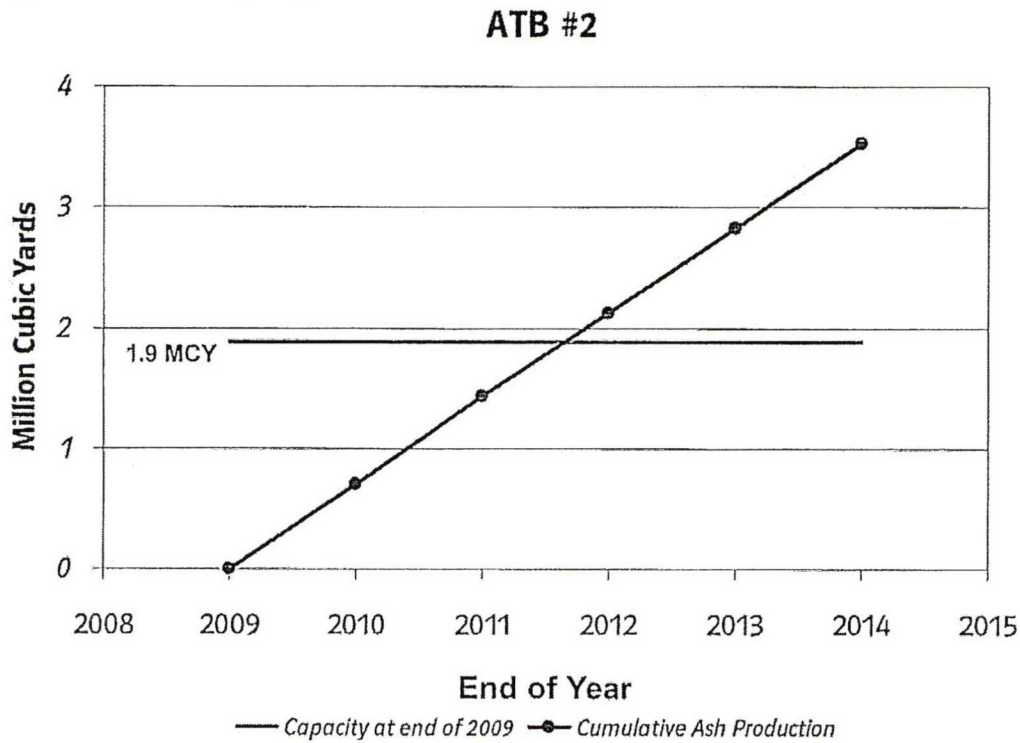
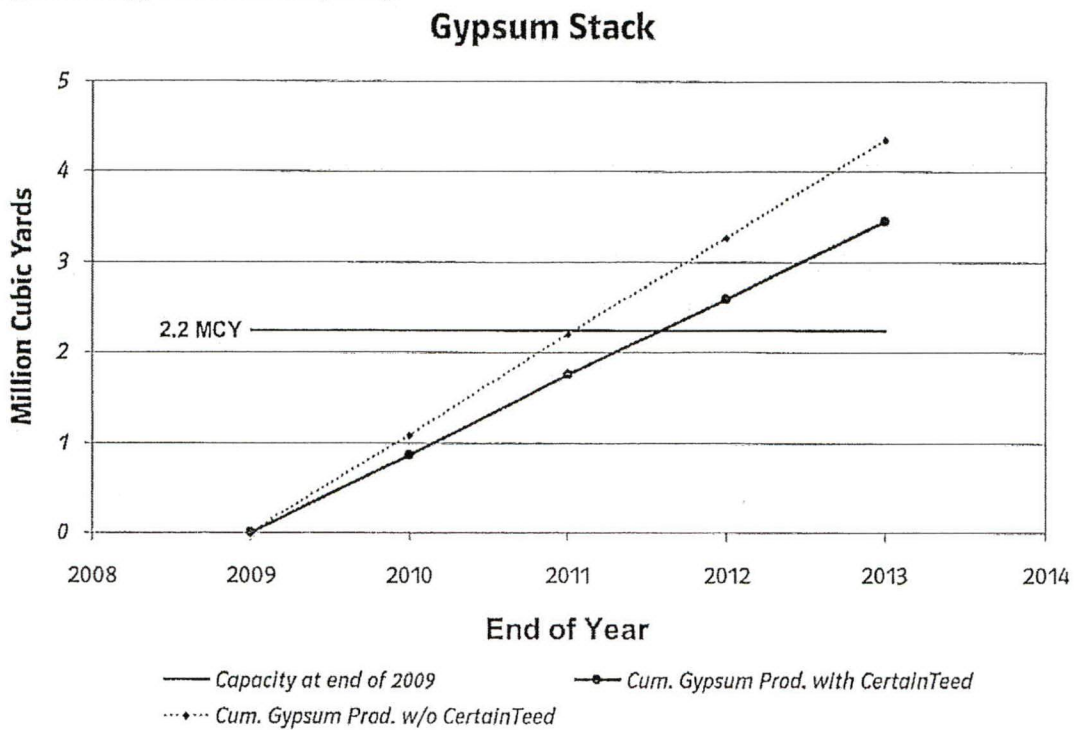


Figure 2: Gypsum Stack Capacity



In summary, the needs assessment indicates that additional CCP disposal alternatives will be needed for both ash and gypsum at Ghent by 2012. At least 0.6 MCY of CCP must be moved off-site in order to maintain operations of the existing storage facilities at Ghent through 2012.

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5. Development of Alternatives

In the case of CCP solutions for Ghent, Project Engineering and the CCP team developed two sets of options for evaluation:

1. Short-term storage options to meet 2009-2012 requirements
2. Long-term storage options to meet 2013-2037 requirements.

The short-term options were developed because long-term options cannot be in service before 2013, and on-site capacity is expected to be depleted in 2012. These options were evaluated independently, leading to a recommendation for short-term and long-term solutions.

5.1 Short-Term Disposal

As a result of ATB #2 and the gypsum stack nearing their maximum desired storage capacities, the station, in conjunction with the CCP Team, negotiated with Trans Ash, Inc. ("Trans Ash"), a company specializing in the reuse of CCP, to beneficially reuse 1.3 MCY (approximately 1.5 million tons as hauled) of CCP as structural fill. The 2009 base cost of this proposal is [REDACTED] per MCY¹³, subject to annual adjustments to the base price and fuel cost adjustments. The base price is redetermined by increasing the previous year's price by 90 percent of the year-over-year percent change in the Consumer Price Index – All Urban Customers, U.S. City Average. The fuel adjustments are made for both off-road and on-road diesel use. Off-road fuel adjustments are calculated as the difference between the base diesel unit price of [REDACTED] per gallon and the average unit diesel price paid multiplied by the quantity of off-road diesel purchased each year. The on-road diesel adjustment is calculated as the product of the average quantity of fuel used and the difference between the base diesel price and the index price as published by the U.S. Department of Energy, Energy Information Administration in "The U.S. No 2 Diesel Low Sulfur (15-500 ppm) Retail Sales by All Sellers (Cents per Gallon)"

An agreement with Trans Ash would require that the full 1.3 MCY be moved in 2010-2012 to satisfy the end consumer of the beneficial reuse opportunity. Consistent with KU's CCP management strategy, this fill location has been evaluated and confirmed as appropriate for beneficial reuse. The location is not in an environmentally sensitive area.

The only near-term alternative to beneficial reuse of CCP is the use of an existing off-site commercial landfill. For 2009, the total unit cost of storage in the closest off-site landfill was estimated to be [REDACTED] per cubic yard¹⁴. In contrast to the Trans Ash proposal, an off-site landfill storage option requires that only a minimum of 0.6 MCY must be moved off-site prior to 2013 to ensure continuing operations at Ghent.

¹³ [REDACTED] per MCY as stored is equivalent to [REDACTED] per ton as hauled.

¹⁴ [REDACTED] per cubic yard is equivalent to [REDACTED] per ton as hauled for transport and storage at Valley View landfill near Sulphur, KY, approximately 25 miles from Ghent. Cost components per ton are [REDACTED] for excavating and loading, [REDACTED] for hauling, and [REDACTED] for landfill tipping fee. This quoted tipping fee is slightly below the listed rates of [REDACTED]/ton for other regional public landfills.

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5.2 Long-Term Storage

To meet the long-term storage needs at Ghent, KU contracted GAI Consultants, Inc., Pittsburgh, PA ("GAI") to provide both an Initial Siting Study ("ISS") and a Final Conceptual Design Study of CCP storage alternatives at Ghent.¹⁵ The ISS identified over forty potential alternatives based on combinations of a number of variables, including storage and transport methods, site locations, and relocation of transmission lines. As a result of this study, four on-site alternatives shown in Table 3 were selected for further consideration. In the process of developing the Final Conceptual Design Study, GAI refined the cost estimates for these alternatives in addition to other detailed engineering tasks. As an alternative to building on-site storage facilities, use of an existing off-site commercial landfill for storing future CCP was also considered as a long-term option.

Table 3: Alternatives for Long-Term Storage

		On-Site				Off-Site Landfill
Case		14/28	37	41	42/28	
Description		2 Landfills	1 Landfill	1 Pond	1 Pond 1 Landfill	
Total Capacity (MCY)		46.1	46.1	53.6	48.3	46.1 needed
Nominal Cost (\$M)	Capital O&M ¹⁶					

Each of the cases for on-site long-term storage was designed to hold twenty-five years of CCP production with phased construction. The total capacity required for each case differs due to the different density of CCP stored in ponds versus landfills. Table 4 shows the construction periods, the in-service years, and the capacity for each phase of the on-site cases. The site locations as shown in Figure 3 are noted as follows:

- Site M is north of ATB #2 on property owned by KU.
- Site E/F which is southeast of ATB #2 and include properties owned by KU and approximately 350 acres owned by others.
- Pond L represents vertical and lateral expansion east of ATB #2 with an impoundment.

¹⁵ A preliminary draft of the Final Conceptual Design Study is shown in Exhibit JNV-4.

¹⁶ The O&M figures in Table 3 include the cost for power to operate the on-site storage alternatives.

Figure 3: CCP Storage Site Alternatives

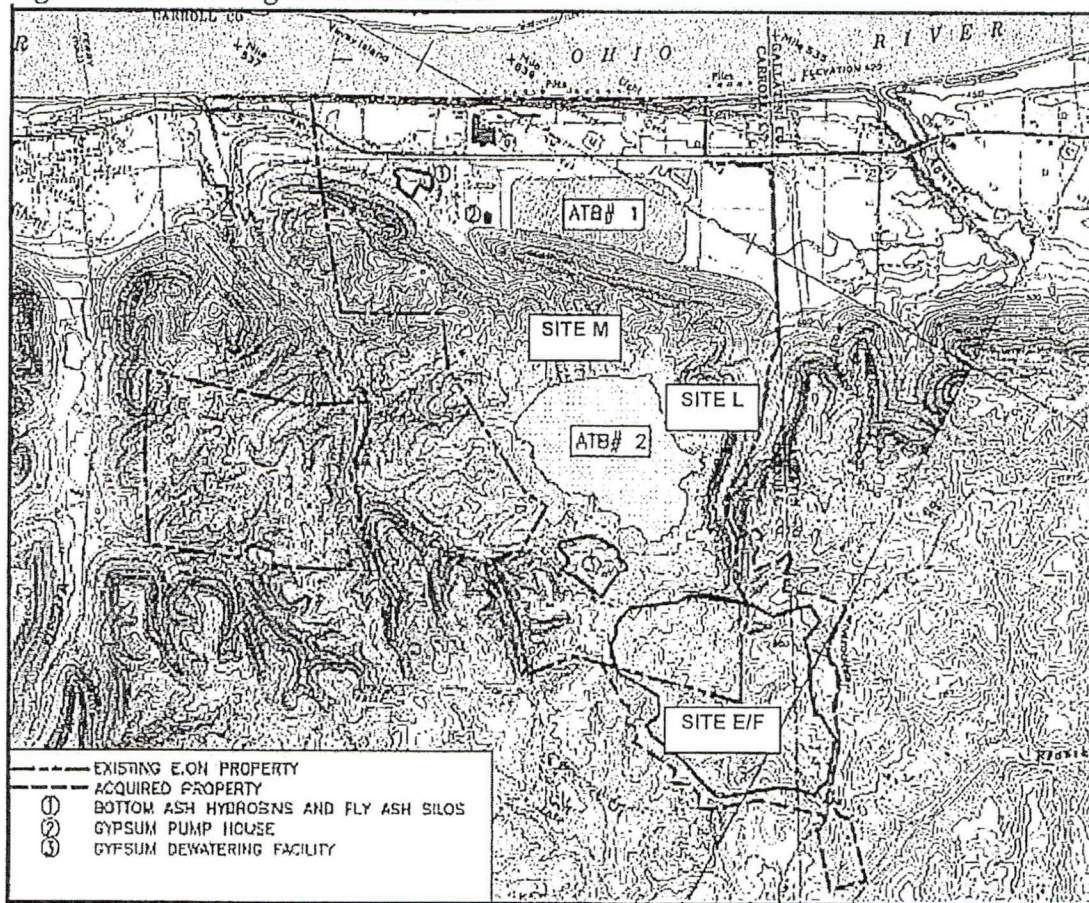


Table 4: Construction Phases for On-Site Storage Options

Case		14/28		37	41	42/28	
Site Location		M	E/F	E/F	L	L	E/F
Phase 1	Construction	2010-14		2010-14	2010-13	2010-14	
	In-Service	2013		2013	2013	2013	
	Capacity (MCY)	5.3	5.7	14.7	16.5	7.2	8.4
Phase 2	Construction	2016-18		2018-19	2017-19	2018-20	
	In-Service	2019		2020	2020	2021	
	Capacity (MCY)	8.5	8.0	12.3	15.7	8.3	7.7
Phase 3	Construction	--	2023-25	2024-26	2025-27	2027-29	
	In-Service	--	2026	2027	2028	2030	
	Capacity (MCY)	--	12.4	19.1	21.6	6.1	8.0
Phase 4	Construction	2027-29	--	--	--	--	
	In-Service	2030	--	--	--	--	
	Capacity (MCY)	6.2	--	--	--	--	--

Case 14/28. Case 14/28 consists of separate landfills for ash and gypsum with ash stored at Site M and gypsum stored at Site E/F. Construction of the landfills consists of four phases as shown in Table 4 with the first phase beginning in 2010 and the final phase ending in 2029. Figure 4 shows the phased cumulative design capacity of the landfill at Site M compared to the forecasted ash production. Figure 5 shows the phased cumulative design capacity of the landfill at Site E/F compared to the forecasted gypsum production both including and excluding the effect of the expected gypsum reuse by CertainTeed. These figures, as well as Figures 6-9, demonstrate that the designs for the timing and volume of capacity additions for each of the cases considered are reasonable compared the forecasted CCP production.

Figure 4: Long-Term Needs Assessment – Case 14/28, Landfill M

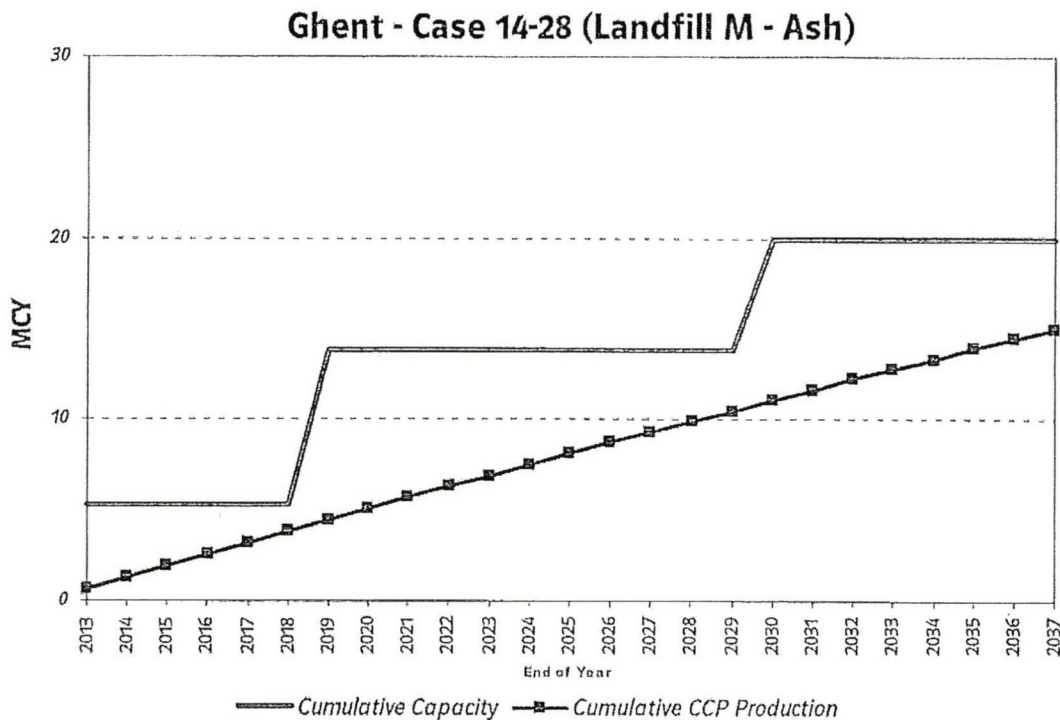
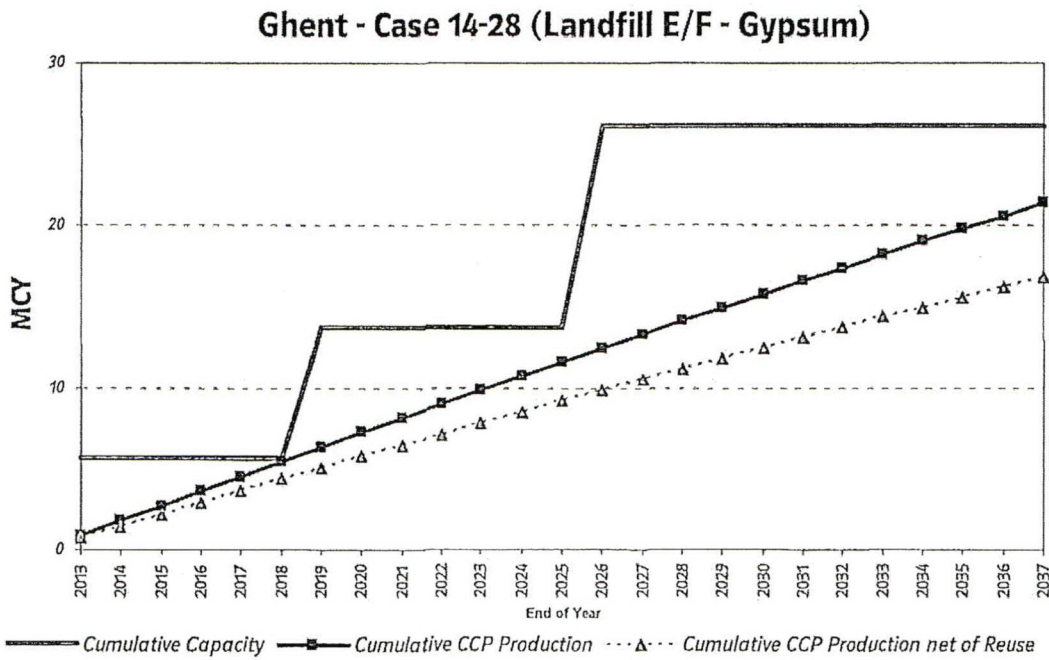
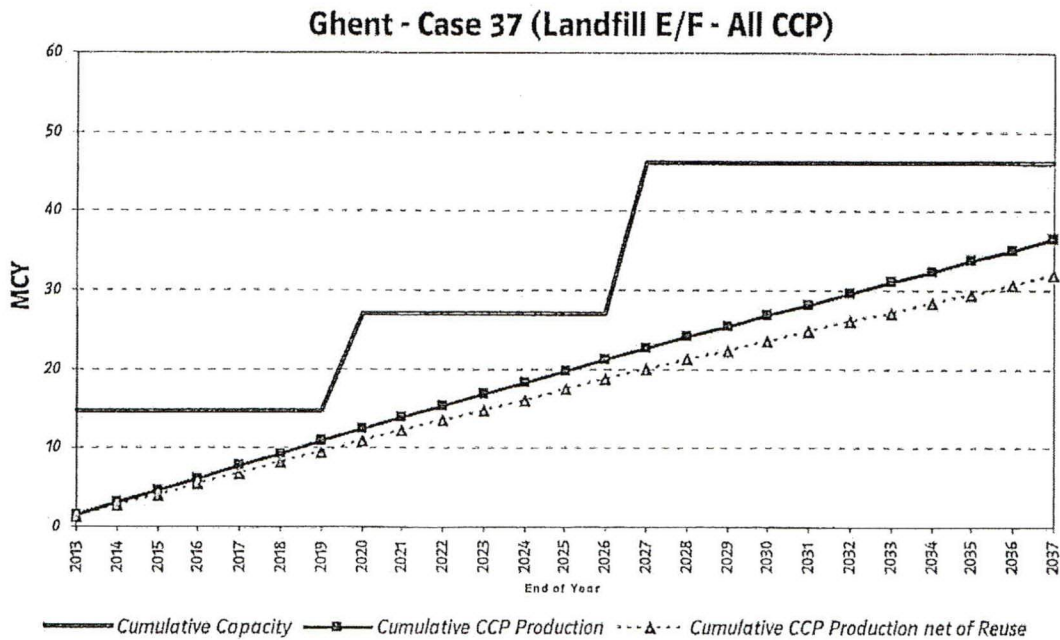


Figure 5: Long-Term Needs Assessment – Case 14/28, Landfill E/F



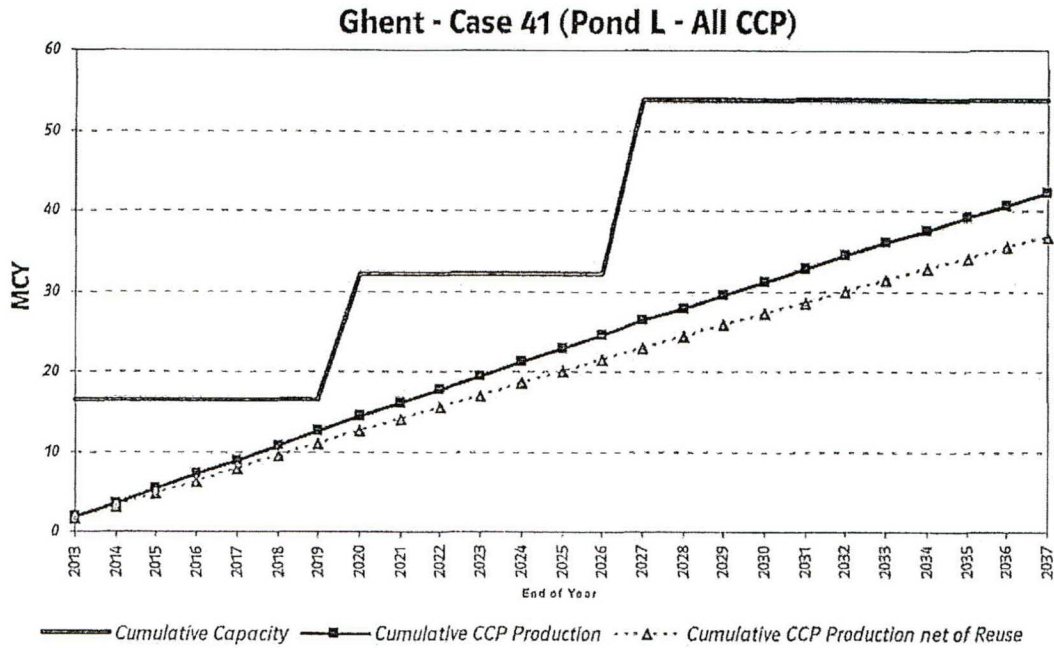
Case 37. Case 37 consists of a single landfill for both ash and gypsum at Site E/F. The construction schedule consists of three phases beginning in 2010 and ending in 2026. Figure 6 shows the phased cumulative design capacity of this landfill compared to the forecasted cumulative CCP production both including and excluding the effect of the expected gypsum reuse by CertainTeed.

Figure 6: Long-Term Needs Assessment – Case 37, Landfill E/F



Case 41. Case 41 consists of a single pond for both ash and gypsum at Site L. The construction schedule consists of three phases beginning in 2010 and ending in 2027. Figure 7 shows the phased cumulative design capacity of this landfill compared to the forecasted cumulative CCP production both including and excluding the effect of the expected gypsum reuse by CertainTeed.

Figure 7: Long-Term Needs Assessment – Case 41, Pond L



Case 42/28. Case 42/28 consists of a pond at “Site L” for ash and a landfill at “Site E/F” for gypsum. Construction of these facilities consists of four phases as shown beginning in 2010 and the final phase ending in 2029. Figure 8 shows the phased cumulative design capacity of the pond at Site L compared to the forecasted ash production. Figure 9 shows the phased cumulative design capacity of the landfill at Site E/F compared to the forecasted gypsum production both including and excluding the effect of the expected gypsum reuse by CertainTeed.

Figure 8: Long-Term Needs Assessment – Case 42/28, Pond L

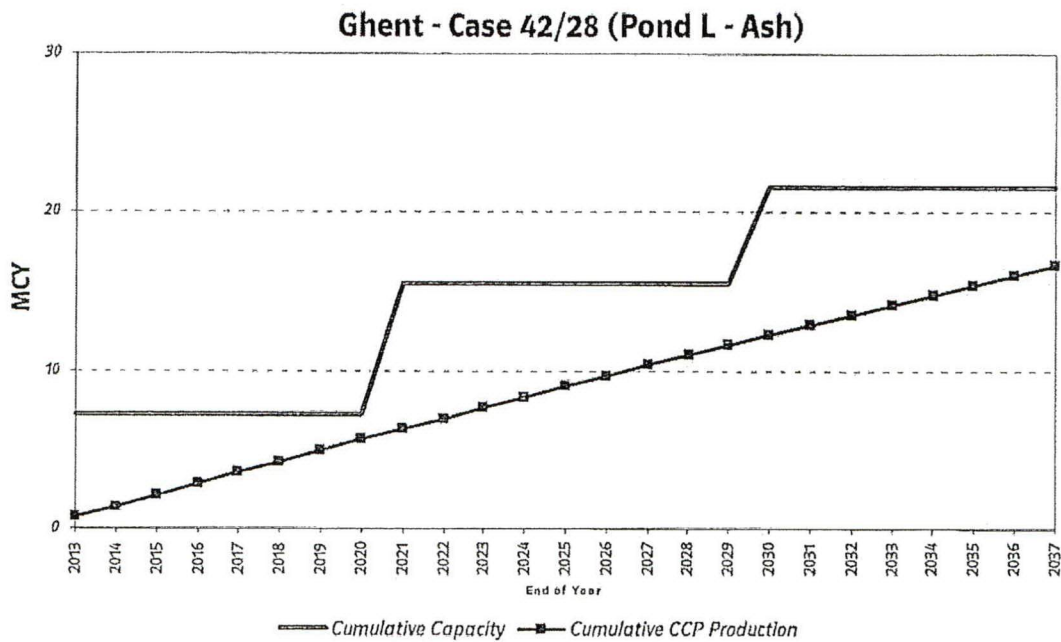
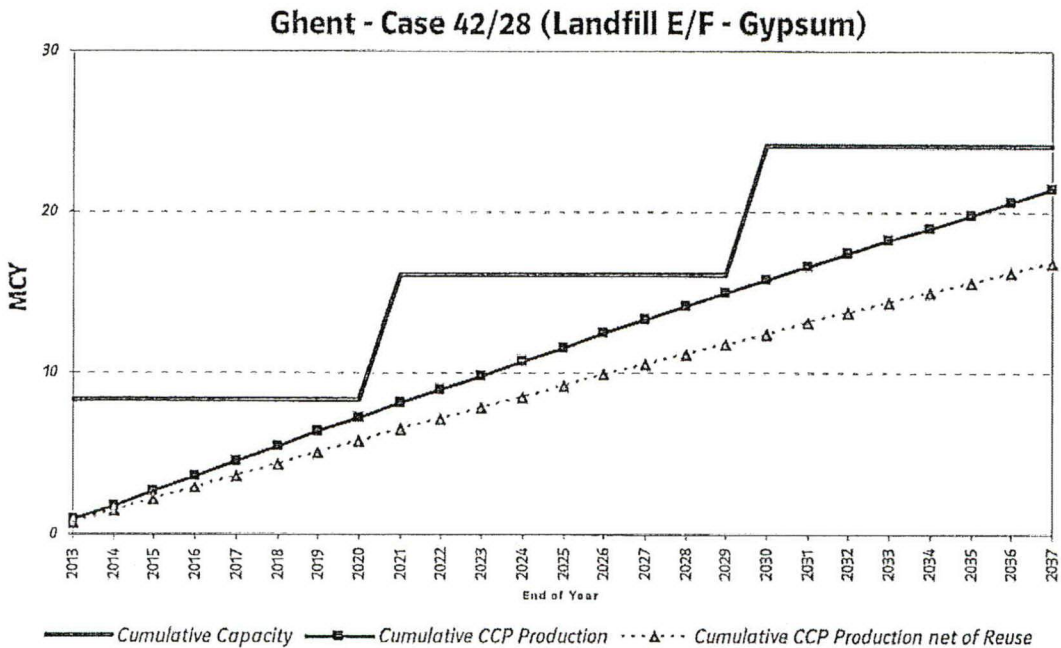


Figure 9: Long-Term Needs Assessment – Case 42/28, Landfill E/F



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6. Comparison of Alternatives

6.1 Short-Term Disposal

The short term disposal analysis compares the cost of a beneficial reuse initiative with Trans Ash to the cost of off-site landfill disposal. The Trans Ash proposal is to move 1.3 MCY in 2010 through 2012 and the plan for off-site landfill disposal is to move 0.6 MCY in 2012. Both of these options consist only of O&M costs, with no additional capital expenditure. As seen in Table 5, the Trans Ash proposal is the least-cost option to meet the short term capacity needs at Ghent. On a cost per volume basis, the Trans Ash option is almost 80% less costly than the off-site landfill option. Also, despite the higher volume requirement, the Trans Ash proposal's PVRR is \$9.8 million lower than the off-site landfill alternative.

Table 5: PVRR Analysis Summary of Short-Term Alternatives

	Trans Ash Beneficial Reuse	Off-site Landfill Disposal
Total Quantity (MCY)	1.3	0.6
PVRR (2009 million \$)		
Delta to Least Cost Case	Least Cost	9.8
Unit Cost (2009 PVRR \$/cubic yard)		

6.2 Long-Term Storage

The long-term storage evaluation (Table 6) compares the PVRR and per-unit cost of four on-site storage alternatives selected in the engineering studies, in addition to disposal in an off-site commercial landfill. The financial assumptions related to the analysis of these cases are shown in Appendix 1, the projected cash flows are shown in Appendix 2, and the annual revenue requirements are detailed in Appendix 3.

The following is a brief comparison of the results:

Case 37. Case 37 consists of a common on-site landfill for both ash and gypsum. This is least cost on a PVRR basis by \$26 million. This option is also lowest cost on a per unit volume basis at [REDACTED] PVRR per cubic yard. The favorable capital profile of this project results from the single landfill approach compared to Case 14/28, which includes separate landfills for ash and gypsum.

Case 14/28. Case 14/28 consists of separate landfills for ash and gypsum and involves higher up-front capital costs (\$34 million higher through 2017, \$6 million of which is due to transmission expenditures), an accelerated timeline for the addition of subsequent phases, and an additional construction phase compared to Case 37. This is partially offset by slightly lower annual O&M costs due to reduced distances for transporting ash. In summary, the lower costs associated with the shorter transport distances are overcome by the additional costs of the two landfills.

Cases 41 and Case 42/28. Case 41 consists of a single pond for both ash and gypsum and Case 42/28 consists of an ash pond and a gypsum landfill. The construction of an ash

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pond is significantly more capital intensive compared to a landfill, although the ongoing operation is less costly. Through 2016, both of these cases are approximately \$95 million higher in total capital costs than Case 37. Construction of the second and third phases increases the capital premium to \$850 million for Case 41 and \$350 for Case 42/28. Inclusion of the pond closure costs in 2038 raises these figures to \$1,145 million and \$475 million for Cases 41 and 42/28, respectively. Although the O&M is significantly lower for these cases compared to Case 37, it is not enough to offset the effect of the higher initial capital expenditures.

Off-site landfill. The off-site landfill option consists only of O&M costs, but this option is the highest-cost alternative due to the high unit cost of off-site landfill disposal, which is approximately [REDACTED] PVRR per cubic yard.

Beneficial Reuse. KU will evaluate beneficial reuse opportunities as they arise, and will pursue proposals that are favorable to on-site disposal.

Table 6: PVRR Analysis Summary of Long-Term Alternatives
(2009 PVRR million \$)

Case	14/28	37	41	42/28	Off-Site Landfill
PVRR					
Capital					
O&M					
Total					
<i>Delta to Least Cost Case</i>	26	<i>Least Cost</i>	254	125	413
Capacity (MCY)	46.1	46.1	53.6	48.3	46.1
Unit Cost (2009 PVRR \$/CY)					

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7. Recommendations

The needs assessment demonstrates a need for additional CCP storage capacity at the Ghent station by 2012. Analysis of the options provided by Project Engineering demonstrates that the most favorable alternatives to meet Ghent's CCP storage needs are:

- Short-term: the proposal for beneficial reuse of 1.3 MCY of gypsum by Trans Ash in 2010 through 2012. The PVRR is [REDACTED] million, or [REDACTED] per cubic yard.
- Long-term: constructing the first phase of an on-site landfill to store both ash and gypsum, to be in-service in 2013. The PVRR is [REDACTED] million, comprised of [REDACTED] million capital and [REDACTED] million O&M.

The short-term solution utilizing beneficial reuse is almost 80% less on a per unit of volume basis than disposal at an off-site commercial landfill. The unit cost of this short-term recommendation is also lower than the unit cost of the recommended long-term on-site landfill. The long-term solution includes the construction of a single landfill and is 4% less on a PVRR basis than the dual landfill option (Case 14/28).

Further details regarding the status of this project and the expected construction schedule are shown in Appendix 4.

Appendix 1

Analysis Assumptions

- Study Period: 30-year period for operational costs impacts (2009-2038)
50-year period for capital costs impacts (2009 through tax life of final project phase).

The revenue requirements associated with capital costs are determined via the Capital Expenditure and Recovery module of the Strategist production and capital costing software. To completely account for capital projects costs over their lifetime, the revenue requirements associated with new capital projects were included beyond the operational study period through the end of their tax life.

- Capital and O&M costs associated with the addition of new environmental projects will be subject to recovery through the Environmental Cost Recovery (“ECR”) mechanism. O&M costs for electrical power usage required to operate equipment related to CCP storage are included when comparing alternatives (noted as “Power” in Appendix 2) but are not included as recoverable costs for calculation of ECR billing factors.
- Financial data
 - Discount rate: 7.81%
 - Income tax rate: 38.9%
 - Insurance rate: 0.07%
 - Property tax rate: 0.15 %
 - Percentage of debt in capital structure: 47.01%
 - Debt interest rate/weighted cost of debt: 4.64%
 - Return on equity: 10.63%
 - Book life - average landfill phase (non-transmission): 12 years
 - Book life – transmission (line relocation): 40 years
 - Tax life: 20 years
 - Annual capital and O&M escalation rate: 6%
 - Contingency included in cost estimates: ~28%
 - E.ON US overhead included in capital costs 3.5%
 - Capital expenditures are assumed to occur at year end.
- CCP data
 - Coal ash content: 11.5%
 - Coal SO₂ content: ~5.9 lb/mmBTU
 - Coal heat content: 22.16 mmBTU/ton
 - FGD removal efficiency:
 - Units 1, 3, 4 98%
 - Unit 2 (currently Unit 1) 94.3%

Appendix 2

CCP Plan for Ghent Station
June 2009
Appendix 2 – Projected Cash Flows

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Projected Cash Flows

Annual Cash Flows		
Short-Term Options		
O&M Only (\$ thousands)		
Case	Beneficial Reuse	Off-Site Landfill
2008		
2009		
2010		
2011		
2012		
2013+		
Total		

\$ thousands

Case	14/28		2 landfills		Annual Cash Flows									
	Capital						O&M				Total			
	Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans	Ash	Total O&M			
2008														
2009														
2010														
2011														
2012														
2013														
2014														
2015														
2016														
2017														
2018														
2019														
2020														
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2030														
2031														
2032														
2033														
2034														
2035														
2036														
2037														
2038														
Total														

CCP Plan for Ghent Station
June 2009
Appendix 2 – Projected Cash Flows

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\$ thousands

Case	37	1 landfill	Annual Cash Flows									
			Capital					O&M				Total
			Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans Ash	Total O&M
2008												
2009												
2010												
2011												
2012												
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
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2027												
2028												
2029												
2030												
2031												
2032												
2033												
2034												
2035												
2036												
2037												
2038												
Total												

CCP Plan for Ghent Station
June 2009
Appendix 2 – Projected Cash Flows

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\$ thousands

Case	41	1 pond											
	Annual Cash Flows												
	Capital						O&M					Total	
	Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans	Ash	Total O&M		
2008													
2009													
2010													
2011													
2012													
2013													
2014													
2015													
2016													
2017													
2018													
2019													
2020													
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2028													
2029													
2030													
2031													
2032													
2033													
2034													
2035													
2036													
2037													
2038													
Total													

CCP Plan for Ghent Station
June 2009
Appendix 2 – Projected Cash Flows

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\$ thousands

Case	42/28	1 pond/1 landfill												
		Annual Cash Flows												
		Capital					O&M					Total		
		Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans	Ash	Total O&M		
2008														
2009														
2010														
2011														
2012														
2013														
2014														
2015														
2016														
2017														
2018														
2019														
2020														
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2028														
2029														
2030														
2031														
2032														
2033														
2034														
2035														
2036														
2037														
2038														
Total														

CCP Plan for Ghent Station
June 2009
Appendix 2 – Projected Cash Flows

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\$ thousands

Case	Off-Site Landfill (O&M Only)		
	Capital	O&M	
Cost Escalation		6%	2%
2008			
2009			
2010			
2011			
2012			
2013			
2014			
2015			
2016			
2017			
2018			
2019			
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
2031			
2032			
2033			
2034			
2035			
2036			
2037			
2038			
Total			

Appendix 3

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Revenue Requirements Detail

\$ thousands

Case	Short-Term Beneficial Reuse (O&M Only)	
	Capital	O&M
2008		
2009		
2010		
2011		
2012		
2013+		
2009 PVRR		

\$ thousands

Case	Short-Term Off-Site Landfill (O&M Only)	
	Capital	O&M
2008		
2009		
2010		
2011		
2012		
2013+		
2009 PVRR		

CCP Plan for Ghent Station
June 2009
Appendix 3 – Revenue Requirements Detail

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\$ thousands

Case	14/28		2 landfills		Annual Revenue Requirements									
	Capital						O&M				Total			
	Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans	Ash	Total O&M			
2009														
2010														
2011														
2012														
2013														
2014														
2015														
2016														
2017														
2018														
2019														
2020														
2021														
2022														
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2049														
2050														
2051														
2052														
2053														
2054														
2055														
2056														
2057														
2058														
2009 PVRR														

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Appendix 3 – Revenue Requirements Detail

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\$ thousands

Case	37	1 landfill	Annual Revenue Requirements									
			Capital					O&M				Total
			Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans Ash	Total O&M
2009												
2010												
2011												
2012												
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
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2052												
2053												
2054												
2055												
2056												
2057												
2058												
2009 PVRR												

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Appendix 3 – Revenue Requirements Detail

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\$ thousands

Case	41 1 pond		Annual Revenue Requirements									
	Capital						O&M				Total	
	Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans	Ash	Total O&M	
2009												
2010												
2011												
2012												
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
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2054												
2055												
2056												
2057												
2058												
2009 PVRR												

CCP Plan for Ghent Station
June 2009
Appendix 3 – Revenue Requirements Detail

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\$ thousands

Case	42/28	1 pond/1 landfill	Annual Revenue Requirements									
			Capital					O&M				Total
			Phase1	Phase2	Phase3	Phase4	Transmission	Total Capital	Non-Power	Power	Trans Ash	Total O&M
2009												
2010												
2011												
2012												
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
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2055												
2056												
2057												
2058												
2009 PVRR												

CCP Plan for Ghent Station
June 2009
Appendix 3 – Revenue Requirements Detail

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Case
\$ thousands

Off-Site Landfill (O&M Only)

using 6% cost escalation

	Capital	O&M
2008		
2009		
2010		
2011		
2012		
2013		
2014		
2015		
2016		
2017		
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		
2035		
2036		
2037		
2038		
2009 PVRR		

using 2% cost escalation

	Capital	O&M
2008		
2009		
2010		
2011		
2012		
2013		
2014		
2015		
2016		
2017		
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		
2035		
2036		
2037		
2038		
2009 PVRR		

Appendix 4

Project Status (As of April 2009)

Detailed Design

The detailed design phase for Case 37 is currently in progress. Meetings are being conducted with the E.ON U.S. property appraiser and the individual owners of properties within the boundaries of Site F. After obtaining approval from these property owners, geotechnical, archaeological, ecological, and historical structures studies have begun. This will allow for the completion of the detailed engineering design and the start of the development of the permits for this location. The permits are expected to be submitted by the end of 2009.

Construction Schedule

The preliminary design for the landfill is to develop it in three distinct phases. This detail as well as the closure plan for each phase will be further developed in the detailed design phase. The current schedule is shown in Table A4-1.

Table A4-1: Preliminary Construction Schedule

Task	Schedule
Property acquisition	3 rd Quarter 2009
Begin first phase landfill development	2 nd Quarter 2010
Finish first phase landfill development	4 th Quarter 2014
Begin second phase landfill development	2 nd Quarter 2018
Finish second phase landfill development	4 th Quarter 2019
Begin third phase landfill development	2 nd Quarter 2024
Finish third phase landfill development	4 th Quarter 2026

The risks associated with the project include the following:

- Inability to reach a settlement on purchase price for one or more of the properties required for the site, resulting in lengthy eminent domain litigation
- Discovery of unknown geotechnical issues
- Litigation and intervention of the 401/404 permits for Sites E/F could delay the construction of this section of the work
- Failure of major components during start-up
- Unseasonable weather, such as exceptionally heavy rainfall, late spring, early onset of winter, etc.
- Engineering design failure of a component of design
- Contractor delays due to shortage of materials or manpower issues
- Change in regulations

*Coal Combustion Byproduct
Plan for Trimble County Station
For*



*Subsidiaries
Kentucky Utilities and
Louisville Gas and Electric*

June 2009

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1. Executive Summary

Kentucky Utilities and Louisville Gas and Electric Company's (collectively "the Companies") Trimble County station ("Trimble") produces three primary coal combustion byproducts ("CCP"): bottom ash, fly ash and gypsum, which are currently stored in the Bottom Ash Pond ("BAP") or beneficially reused. The BAP is expected to reach capacity in 2010, creating a need for additional CCP management solutions. Trimble also has an existing Emergency Fly Ash Pond, now known as the Gypsum Storage Pond ("GSP"), located just north of the BAP. The GSP was built during the construction of Trimble's Unit 1, but was never placed in service. The GSP needs a liner to meet regulations to store gypsum.

A variety of on-site and off-site CCP storage options were considered to meet management or disposal needs at Trimble. The most effective solutions were identified through a needs analysis and economic analysis based on engineering cost estimates.

To partially address the near-term need (prior to 2013) for CCP storage capacity, a beneficial reuse opportunity for gypsum was identified. The gypsum will be used in the manufacturing of wallboard. This reuse option is significantly lower cost than transporting CCP to an off-site landfill, but the volume is not sufficient to meet the entire near-term storage need. The remaining near-term CCP storage need will be met by expanding on-site storage, including extending the bottom ash pond dikes and lining the gypsum storage pond.

For post-2013 storage needs, the Companies contracted an engineering consultant to develop potential on-site storage alternatives. Of multiple options considered, three landfill options were selected for further economic evaluation. Based on cost estimates and qualitative factors for these alternatives, the most favorable option is a single on-site landfill to store both ash and gypsum. In addition, Trimble and the CCP Team have identified an opportunity for long-term beneficial reuse with a large cement producer to beneficially reuse 95% of fly ash produced at Trimble. The fly ash reuse is in addition to continuing the gypsum reuse opportunity. The reuse of fly ash is a lower cost alternative to sending the CCP to an off-site landfill or the construction of additional on-site storage.

In summary, the cost-effective and environmentally sound CCP disposal options for Trimble are:

- Near-Term:
 - Beneficial reuse of 1.1 million cubic yards ("MCY") of gypsum (approximately 50% of annual gypsum production as specified by the contract) by SynMat, Inc. in 2010 through 2012 (Present Value of Revenue Requirements ("PVR") of \$[REDACTED] million), or \$[REDACTED] per cubic yard;
 - Extending the BAP dikes and lining the GSP in 2010 (PVR of \$[REDACTED] million) or \$[REDACTED] per cubic yard.

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- Longer-Term:
 - The construction of a new on-site landfill and conveyor system to store both ash and gypsum by 2013 (PVRR of \$■ million for 32.5 MCY of storage);
 - Beneficial reuse of 5.9 MCY of fly ash (PVRR of \$■ million)
 - Continued beneficial reuse of gypsum by SynMat (PVRR of \$■ million)

2. Background

The Companies' Trimble County station is comprised of one coal-fired generating unit rated at 495 MW. A second coal-fired steam boiler, rated at 750 MW, is scheduled to begin commercial operation during 2010. The station produces three primary coal combustion byproducts ("CCP"): bottom ash, fly ash and gypsum.

Trimble has two existing on-site storage basins for CCP as follows:

- Bottom Ash Pond (BAP)
- Gypsum Storage Pond (GSP)

The BAP is currently used to store all CCPs except for a quantity of gypsum that is beneficially reused off-site. Gypsum is produced by Trimble's flue gas desulfurization ("FGD") system, which use limestone reagent to remove sulfur dioxide from flue gas. As of February 2009¹, the BAP's remaining capacity was estimated at 150,000 cubic yards.

Almost 90%² of the gypsum produced by the current generating unit is currently shipped off-site for beneficial reuse by Synthetic Material ("SynMat")³. This contract began in 2008 and runs through 2027. With the second generating unit beginning operation in 2010, SynMat has a minimum annual volume obligation of 300,000 cubic yards per year (approximately 50% of total gypsum production).

Trimble is forecast to produce approximately 0.4 MCY of CCP in 2009 of which 0.26 MCY of gypsum is reused, thus leaving only 0.14 MCY to be deposited in the BAP. Based on this, the BAP is expected to last through 2009.

The GSP is not currently and has never been in service. However, with the installation of a liner, the GSP will have a maximum desired storage capacity of 1.05 MCY.

¹ A bathymetric survey of BAP was conducted by HDR/Quest/Rudy for GAI Consultants in February 2009.

² Gypsum sales to SynMat was 205,000 tons in 2008. However, their purchases declined late in 2008 as the economy slowed.

³ The Companies identify economically and environmentally favorable options to beneficially reuse CCP, consistent with the Companies' Comprehensive Strategy for Management of CCP shown in Exhibit JNV-2.

3. Process and Methodology

The Companies develop the most effective plan for meeting the CCP storage needs at each generating station. The process of identifying the plan consists of the three following primary tasks which are performed by several departments within the Companies.

- Needs assessment
- Development of alternatives
- Comparison of alternatives

The CCP storage needs are defined by forecasting the production of CCP over the applicable planning period and comparing this production to the maximum desired storage capacity. The Project Engineering department and the applicable generating station are responsible for providing an estimate of remaining capacity.

The expected life of the existing storage capacity is based on the forecast of CCP production, which is developed by Generation Planning for all stations as a function of the expected coal usage for each unit. The Companies compile information regarding the cost of generation for each unit (fuel, variable O&M, emission costs, etc.), a description of the generation capabilities of each unit (capacity, heat rate curve, commitment parameters, emission rates, availability schedules, etc.), a load forecast, the market price of electricity, and the volumetric ability (transfer capability) to access the market. All of this information is brought together in the PROSYM⁴ software, which is used to model the economic operation of the Companies' generating system. The projected coal usage data provided by this model is checked for reasonableness by comparing the results to historical data.

The Project Engineering department develops alternatives for on-site CCP storage solutions and their associated costs. Any alternatives for off-site disposal such as beneficial reuse or off-site landfilling are provided by the generating stations' staff and a CCP team. The cash flows for selected options are summarized and provided to Generation Planning for evaluation.

The Generation Planning department evaluates the storage and disposal options received from Project Engineering to determine the present value of revenue requirements ("PVR") associated with the capital expenditures and O&M expenses of each option. This analysis is performed using the Capital Expenditure Recovery module of the Strategist⁵ software model.

⁴ The PROSYM model has formed the foundation of prior analyses involving certificates of convenience and necessity for new generating plants, environmental cost recovery for pollution control equipment, and the fuel adjustment clause.

⁵ Strategist[®] is a proprietary, state-of-the-art resource planning computer model. The Capital Expenditure Recovery module is used to quantify the revenue requirements impact associated with capital projects.

4. Needs Assessment

The following capacities were provided by Project Engineering and Trimble:

- As of February 2009, the remaining available capacity of the BAP is 150,000 cubic yards. This is equivalent to a year end 2008 capacity of approximately 174,000 cubic yards, considering the historical CCP production rate and beneficial reuse volume.
- Approximately 150,000 cubic yards of bottom ash can be used as construction material in extending the BAP dikes.

The expected life of the remaining capacity of the BAP was estimated by forecasting the CCP production of ash and gypsum at Trimble. The quantity of ash produced at Trimble is estimated at a coal specification of 11.3% ash by weight of the total quantity of coal used, or approximately 11.3 tons of ash per 100 tons of coal. Converting to volumetric measurement, assuming ash production consists of 80% fly ash and 20% bottom ash by weight, approximately 9.8 cubic yards of total ash is produced per 100 tons of coal.⁶

The chemical reaction by which gypsum is produced results in a net gypsum production of approximately 18% by weight of the total quantity of coal used,⁷ or approximately 18 tons of gypsum per 100 tons of coal. Converting to volumetric measurement for the BAP, approximately 19 cubic yards of gypsum is produced per 100 tons of coal.

The forecasted CCP production volume for Trimble is shown in Table 1 and depicted graphically in Figure 1 and Figure 2, based on the forecasted coal burn shown in Table 2. Table 2 also contains the historical quantities of coal burned as a comparison to the forecast. The increase in coal burn during the 2010-2013 period results from the second Trimble generating unit, scheduled to begin operation in mid 2010.

Table 1: CCP Production Forecast (MCY)

CCP Production Forecast (MCY - wet storage)			
	Fly Ash	Bottom Ash	Gypsum
2009	0.12	0.03	0.24
2010	0.24	0.06	0.42
2011	0.32	0.08	0.53
2012	0.32	0.09	0.54
2013	0.32	0.09	0.58

⁶ Density assumptions for wet storage are 1.08 tons/CY for bottom ash, 0.88 tons/CY for fly ash and 0.945 tons/ CY for gypsum. Density assumptions for dry storage are 1.15 tons/CY for fly ash and 1.22 for gypsum.

⁷ Fuel specification assumptions include SO₂ content of approximately 6.34 lb/mmBTU for High Sulfur (HS) coal and 0.8 lb/mmBTU for Powder River Basin (PRB) coal and a heat content of 22.3 mmBTU/ton for HS coal and 17.6 mmBTU/ton for PRB coal.

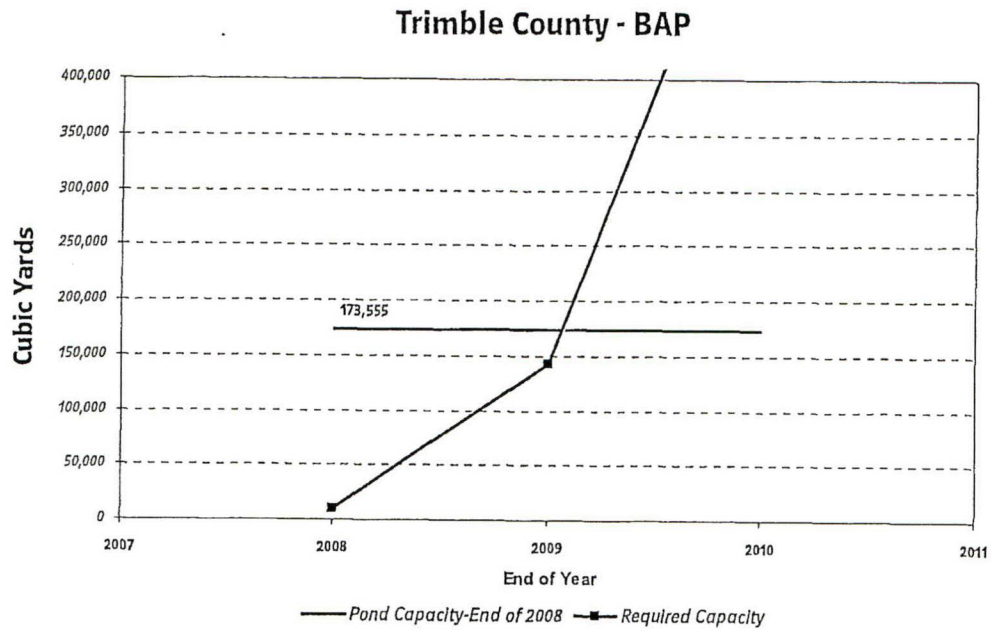
Table 2: Trimble Coal Usage (Million Tons)

Trimble Coal Usage (M.Tons)	
<i>Historical</i>	
2004	1.7
2005	1.7
2006	1.9
2007	1.6
2008	1.9
<i>Forecast</i>	
2009	1.6
2010	3.1
2011	4.0
2012	4.1
2013	4.1

The forecasted generation and the resulting coal usage at Trimble correspond to an average capacity factor of approximately 84%. This relatively high capacity factor is consistent with Trimble's low production cost. Since Trimble is already modeled as a base load station, the risk of significantly underestimating CCP production is low. However, reduction in load or unexpected outages at Trimble could affect the capacity factor and lower future CCP production.

Figure 1 shows the forecasted cumulative CCP production at the end of each year compared to the available capacity at the end of 2008. The illustrated CCP production is net of 300,000 cubic yards taken by SynMat. Without additional on-site capacity or off-site storage, the BAP is expected to reach maximum desired capacity in early 2010, as shown in Figure 1.

Figure 1: BAP Capacity



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5. Development of Alternatives

In the case of CCP solutions for Trimble, Project Engineering and the CCP team developed two sets of options for evaluation:

1. Short term storage options to meet 2009-2012 requirements
2. Long term storage options to meet 2013-2050 requirements.

Construction timelines limit the alternatives prior to 2013. These options were evaluated independently, leading to a recommendation for short-term and long-term solutions.

5.1 Short-Term Storage Options

As a result of the BAP nearing capacity, the station in conjunction with the CCP Team considered three options to meet CCP disposal needs: on-site storage, beneficial reuse and offsite landfill disposal as shown in Table 3 below.

Table 3: Alternatives for Short-Term Storage

Description		Expanding BAP/Lining GSP	Beneficial Reuse	Off-Site Landfill
Total Maximum Desired Capacity (MCY)		3.15*	1.08	2.84 minimum
Nominal Cost (\$M)	Capital O&M ⁸			

* Total capacity includes 0.15 MCY created in the BAP as result of excavating 0.15 MCY of ash from the BAP to be used in constructing the new landfill.

5.1.1 Short-Term On-Site Storage

For the on-site storage option, Trimble contracted MACTEC Engineering and Consultants Inc., Louisville, KY ("MACTEC") to provide alternatives that would meet the short term gap. The most favorable solution identified involves extending the existing BAP dikes and lining the GSP to gain incremental storage. After the extension, the BAP usable capacity will be 2.1 MCY, assuming ash storage only.

The GSP will be used to store gypsum and gypsum fines. In addition, the GSP provides a means of discharging surplus service water to the river. (Unlike the GSP, the BAP is a closed system that does not discharge water into the river. The EPA prohibits the discharge of water that has come in contact with fly ash.)

5.1.2 Short-Term Beneficial Reuse

Trimble in conjunction with the CCP Team negotiated with Synthetic Material (SynMat), a company specializing in reusing gypsum in wall board production, to beneficially reuse 50% of the gypsum produced annually at a base cost of \$■■■■ per cubic yard⁹. The

⁸ The O&M figures in Table 3 include the cost for power to operate the on-site storage alternatives. The power costs are used to compare options but and not used to calculate ECR billing factors.

⁹ \$■■■■ per cubic yard is equivalent to \$■■ per ton per the contract

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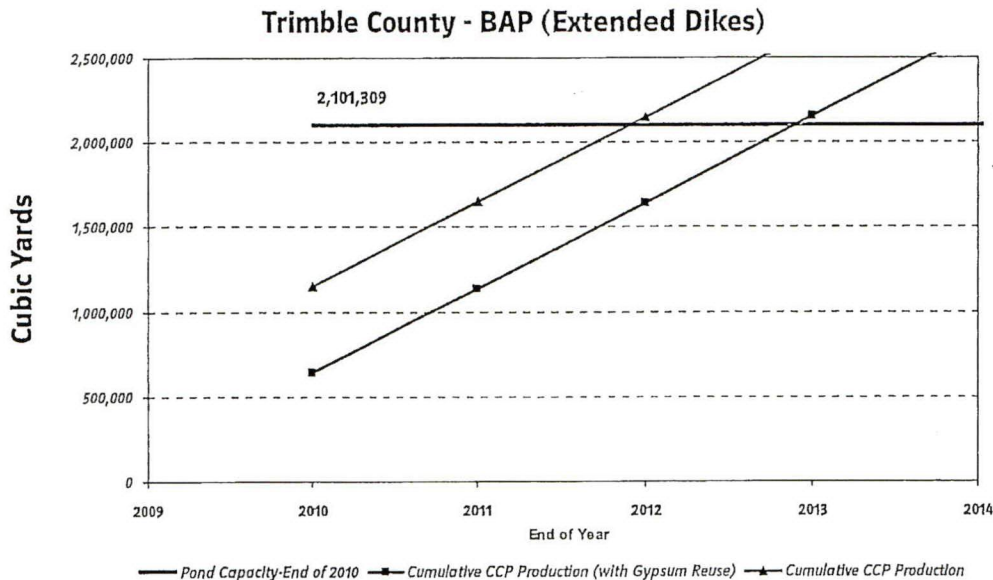
agreement has a minimum take of 300,000 cubic yards. This option is the most favorable but it does not provide sufficient disposal volume to eliminate the need for on-site construction. The SynMat contract specifies a minimum gypsum reuse of 350,000 tons per year (300,000 cubic yards) until 2027 at \$[REDACTED] per cubic yard, not subject to increases.

5.1.3 Short-Term Off-Site Landfill Disposal

The third option is the use of an existing off-site commercial landfill. For 2009, the total unit cost of storage in the closest off-site landfill was estimated to be \$[REDACTED] per cubic yard¹⁰.

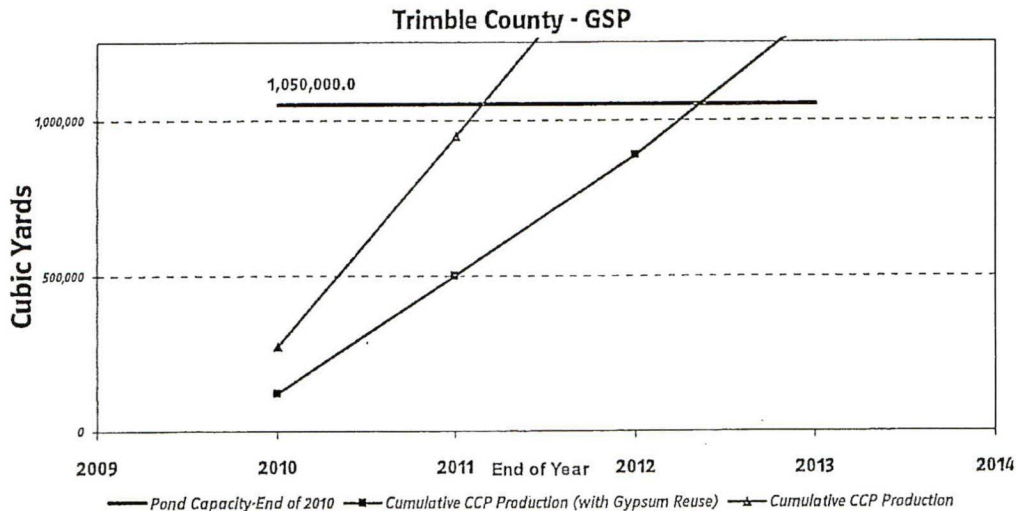
As shown in Figures 2 and 3, by extending the dikes and reusing 300,000 cubic yards of gypsum, the BAP and the GSP will reach capacity in 2013. Without the reuse with SynMat, the BAP and the GSP will reach capacity in 2012. An on-site landfill will not be available before 2013.

Figure 2: BAP (Extended Dikes) Capacity



¹⁰ \$[REDACTED] per cubic yard is equivalent to \$[REDACTED] per ton as hauled for transport and storage at Valley View landfill near Sulphur, KY, approximately 8 miles from Trimble. Cost components per ton are \$[REDACTED] for excavating and loading, \$[REDACTED] for hauling, and \$[REDACTED] for landfill tipping fee. This quoted tipping fee is slightly below the listed rates of \$[REDACTED]/ton for other regional public landfills.

Figure 3: GSP (Lined) Capacity



5.2 Long-Term Storage Options

Three options were also considered for Trimble's long term storage needs: on-site storage, beneficial reuse and offsite landfill disposal.

5.2.1 Long-Term On-Site Storage

To meet the long-term storage needs at Trimble, the Companies contracted MACTEC to provide the Initial Siting Study ("ISS") of CCP storage alternatives at Trimble.¹¹ The ISS identified over 26 potential alternatives based on combinations of variables, including storage and transport methods, site locations, and relocation of transmission lines. As a result of this study, three on-site alternatives shown in Table 4 were selected for further consideration. Each alternative includes a leachate treatment wetland and sediment basin at the mouth of ravine B, as well as improvements along the main ravine channel and associated costs for stream mitigation. Both ash and gypsum will be transported to the landfills via conveyor belts.

¹¹ The Draft Interim Report of Initial Conceptual Design Study is shown in Exhibits JNV-5 for Landfill Storage of CCP Materials

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Table 4: Alternatives for Long-Term Storage

		On-Site			Beneficial Reuse	Off-Site Landfill
Case		16	21	23		
Description		2 Landfills	1 Landfill	1 Landfill		
Ash		Lower Ravine B	Landfill Ravine B	Landfill Ravine B	Holcim	Off-Site
Gypsum		Upper Ravine B			SynMat	
Total Capacity (MCY)		26.8	28.1	30.0	9.5	27.0 needed
Nominal Cost (\$M)	Capital O&M ¹²					

Each of the alternatives for on-site long-term storage was designed to hold at least 35 years of CCP production, assuming expected densities for the CCP stored, and will be constructed in a phased approach in ravine "B". Table 5 shows the construction periods, the in-service years, and the capacity for each phase of the on-site cases.

Table 5: Construction Phases for On-Site Storage Options

Case		16	21	23
Site		Lower Ravine B	Upper Ravine B	Ravine B
Phase 1	Construction	2011-12	2012-13	2011-12
	In-Service	2013	2014	2013
	Capacity (MCY)	16.1	10.7	8.0
Phase 2	Timing	--	--	2021-22
	In-Service	--	--	2024
	Capacity (MCY)	--	--	14.8
Phase 3	Timing	--	--	2040-41
	In-Service	--	--	2043
	Capacity (MCY)	--	--	5.3
Total Capacity		16.1	10.7	28.1

¹² The O&M figures in Table 4 include the cost for power to operate the on-site storage alternatives. The power costs are used to compare options, but are not used to calculate ECR billing factors.

Case 16. Case 16 consists of separate landfills for ash and gypsum. The gypsum landfill will be located in upper ravine B and the ash landfill will be located in lower ravine B as shown in Figure 4. Two separate conveyor belts are required to move the ash and gypsum to the appropriate landfills. The ash landfill will be constructed in one phase, in service in 2013, with a capacity of 16.1 MCY and a peak elevation of 1,020 ft. The gypsum landfill will also be constructed in one phase, in service in 2014, with a capacity of 10.7 MCY and a peak elevation of 980 ft.

The fly ash landfill will reach capacity in 2061 with no beneficial reuse and in 2074 with beneficial reuse (95% fly ash reuse from 2010 until 2029). The gypsum landfill will reach capacity in 2040 with 50% gypsum reuse (300,000 cubic yards annually from 2008-2027). Figure 5 shows the capacity of the fly ash landfill compared to the forecasted fly ash production both including and excluding the effect of the expected fly ash reuse. Figure 6 shows the capacity of the gypsum landfill compared to the forecasted gypsum production, including and excluding the effect of the expected gypsum reuse.

Figure 4: Site Illustration-Case 16



Figure 5: Fly Ash Landfill Capacity-Case 16

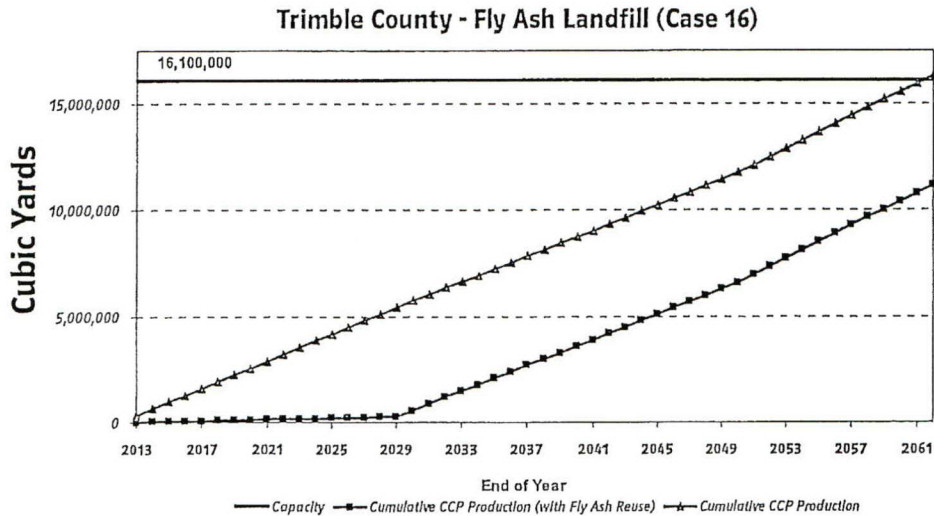
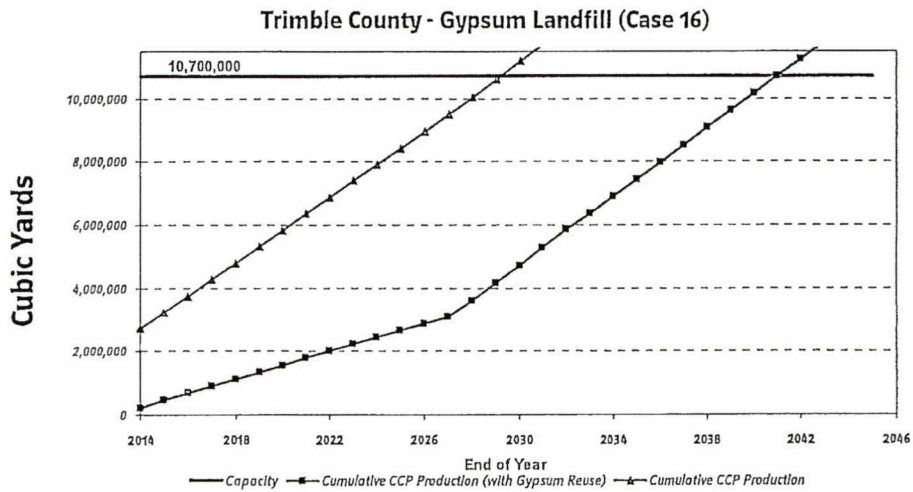


Figure 6: Gypsum Landfill Capacity-Case 16



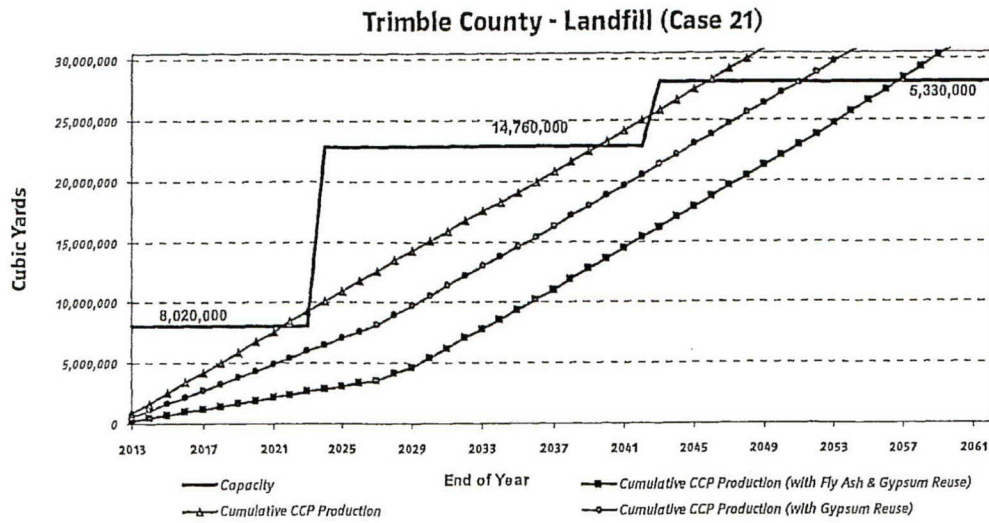
Case 21. Case 21 consists of a common on-site landfill for both ash and gypsum as shown in Figure 7. A common conveyor belt will be used to transport both gypsum and fly ash, which will be handled and stored separately. Phase 1 of the landfill will be in service in 2013 with a total capacity of 28.1 MCY and a peak elevation of 880 feet. This landfill will be constructed in three phases.

The landfill in case 21 will be sufficient to store the CCP produced at Trimble until 2057, including both fly ash and gypsum reuse as shown in Figure 8 (95% fly ash reuse from 2010 until 2029 and 300,000 cubic yards annually of gypsum reuse from 2008-2027). Figure 8 shows the phased cumulative design capacity of this landfill compared to the forecasted cumulative CCP production both including and excluding the effect of the expected gypsum and fly ash reuse.

Figure 7: Site Illustration-Case 21



Figure 8: Ash and Gypsum Landfill Capacity-Case 21



Case 23. Case 23 consists of a common on-site landfill for both ash and gypsum as shown in Figure 9. One conveyor belt will be used to transport both gypsum and fly ash, which will be handled and stored separately. The landfill will be in service in 2013 with a total capacity of approximately 30 MCY and a peak elevation of 910 feet. This landfill will be constructed in three phases. This alternative requires land acquisition for access road construction and stormwater diversion.

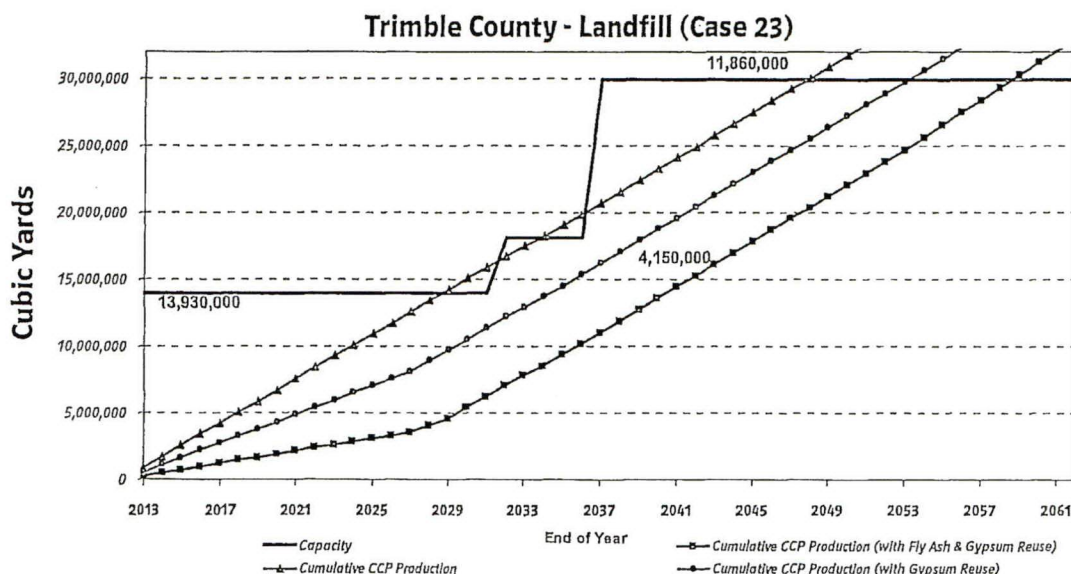
The landfill in Case 23 will be sufficient to store the CCP produced at Trimble until 2059, including both fly ash and gypsum reuse as shown in Figure 10. (95% fly ash reuse from 2010 until 2029 and 300,000 cubic yards annually of gypsum reuse from 2008-2027). Figure 10 shows the phased cumulative design capacity of the landfill compared to the forecasted gypsum production, both including and excluding the effect of the expected gypsum and fly ash reuse.

Figure 9: Site Illustration-Case 23



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Figure 10: Ash and Gypsum Landfill Capacity-Case 23



This figure, as well as Figures 5, 6, and 8, demonstrates that the designs for the timing and volume of capacity additions for each of the cases considered are reasonable compared the forecasted CCP production.

5.2.2 Long-Term Beneficial Reuse

Trimble and the CCP Team have identified an opportunity for long-term beneficial reuse with one of the largest cement producers to beneficially reuse 95% of fly ash produced annually at Trimble. The contract is under negotiation and will involve constructing a barge loading facility at a cost of \$[REDACTED] million to transfer the fly ash from Trimble to the cement production site. The contract term is expected to span 20 years, from mid 2010 until 2029, thus beneficially reusing 5.9 MCY of ash. This beneficial reuse opportunity will result in delaying phases 2 and 3 of the selected landfill as shown in Figures 11 and 12.

The existing gypsum beneficial reuse contract with SynMat is assumed to continue until 2027, with a minimum annual take of 300,000 cubic yards annually at a base cost of \$[REDACTED] per cubic yard.

On a combined basis, both beneficial reuse contracts cover 11.3 MCY of CCP, which does not eliminate the need of on-site storage or off-site disposal.

Figure 11: Ash and Gypsum Landfill Capacity-Case 21 with Beneficial Reuse

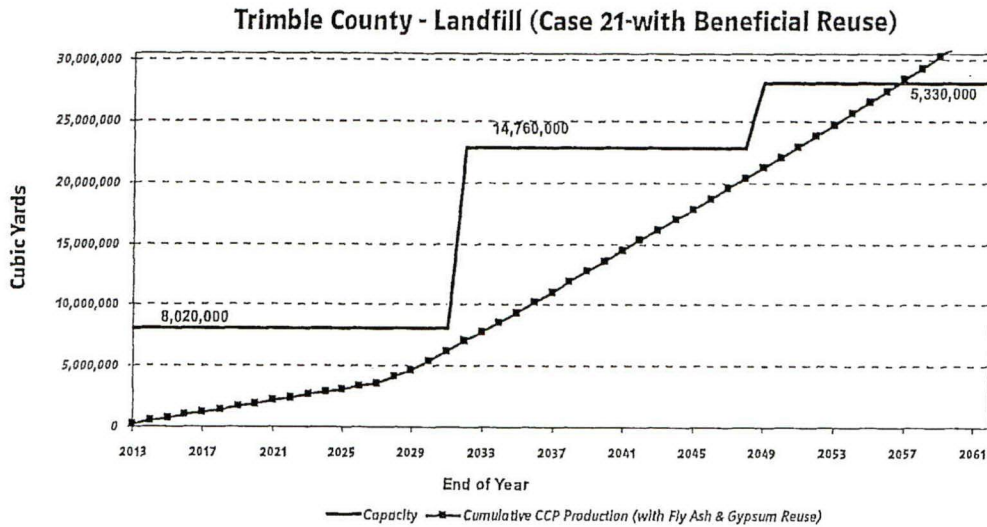
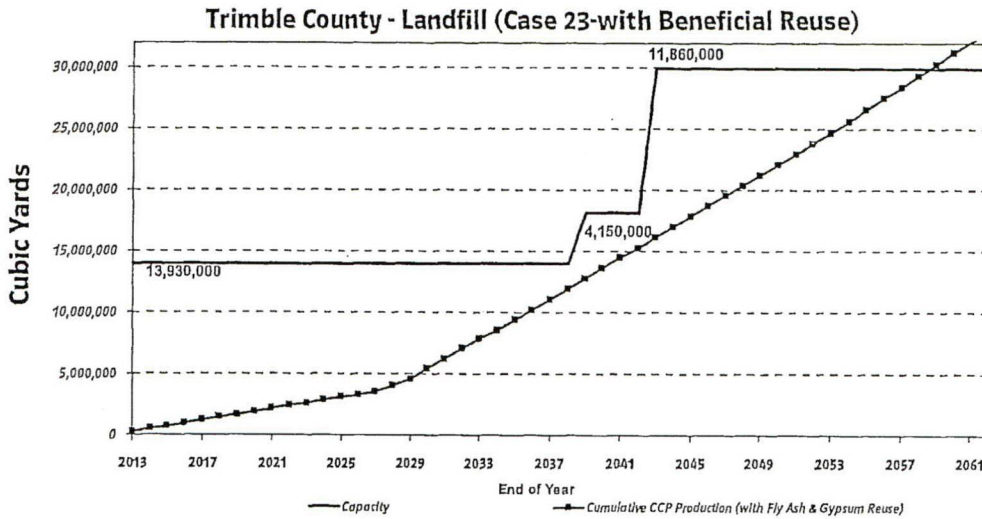


Figure 12: Ash and Gypsum Landfill Capacity-Case 23 with Beneficial Reuse



5.2.3 Long-Term Off-Site Landfill Disposal

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The third option is to dispose of CCP in an existing off-site commercial landfill. This option requires moving 27.0 MCY of CCP, which is the cumulative CCP production at Trimble from 2013 until 2057 at an estimated nominal cost of \$**[REDACTED]** per cubic yard.

6. Comparison of Alternatives

6.1 Short-Term Alternatives

The pre-2013 disposal analysis compares the cost of on-site storage (extending the BAP dikes and relining the GSP) to the beneficial reuse initiative and to the cost of off-site landfill disposal. As seen in Table 6, the beneficial reuse with SynMat is the least-cost option, but does not fully meet the short term capacity needs. On a PVRR basis, the combination of expanding the BAP, lining the GSP, and beneficial reuse is 50% less costly than the off-site landfill option.

Table 6: PVRR Analysis Summary of Short-Term Alternatives
(2009 PVRR million \$)

Alternatives	Expanding BAP/ Lining GSP	Beneficial Reuse	Off-Site Landfill
PVRR			
Capital			
O&M			
Total			
<i>Delta to Least Cost Case</i>	39.6	<i>Least Cost</i>	85.4
Capacity (MCY)	3.15	1.08	2.84
Unit Cost (2009 PVRR \$/CY)			

6.2 Long-Term Alternatives

The long-term storage evaluation (summarized in Table 7) compares the cost of three on-site storage alternatives, in addition to disposal in an off-site commercial landfill. The financial assumptions related to the analysis of these cases are shown in Appendix 1, the projected cash flows are shown in Appendix 2, and the annual revenue requirements are detailed in Appendix 3.

The following is a brief comparison of the results:

Case 16. Case 16 consists of separate landfills for ash and gypsum constructed in a single phase and two conveyor systems requiring \$106 million higher capital costs through 2013 compared to Case 21. Case 16 also requires \$13.2 million more in O&M than Case 21 due to material handling costs associated with operating two landfills.

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Case 21. Case 21 consists of a common on-site landfill for both ash and gypsum. This is least cost on a PVRR basis by \$26 million. This option is also lowest cost on a PVRR per unit volume basis at \$[REDACTED] per cubic yard. The favorable capital profile of this project results from the single landfill approach compared to Case 16, which includes separate landfills for ash and gypsum.

Cases 23. Case 23 consists of a single landfill for both ash and gypsum similar to Case 21, but with alternate phase volume and timing. Case 23 requires land acquisition at a cost of \$[REDACTED] million compared to Case 21, which does not require additional land. Case 23 involves higher upfront capital costs driven by a larger phase 1 (13.9 MCY), compared to phase 1 of case 21 (8 MCY). The O&M of Case 23 is \$13 million greater than Case 21 due to:

- Additional capacity - The landfill in Case 23 stores two more years of CCP compared to the landfill in Case 21.
- Two loading bases - Case 23 requires two loading bases: one for fly ash and one for gypsum compared to one loading base for both CCPs in Case 21.

Off-site landfill. The off-site landfill option consists only of O&M costs, but this option is the highest-cost alternative due to the high unit cost of off-site landfill disposal (PVRR per unit volume of \$[REDACTED] per cubic yard). The projected cash flows are shown in Appendix 2, and the annual revenue requirements are detailed in Appendix 3.

Table 7: PVRR Analysis Summary of Long-Term Alternatives
(2009 PVRR million \$)

Case	16	21	23	Off-Site Landfill
PVRR				
Capital				
O&M				
Total				
Delta to Least Cost Case	56	Least Cost	26	385
Capacity (MCY)	31.2	32.5	34.4	31.0
Unit Cost (2009 PVRR \$/CY)				

The quantities in Table 7 include 4.4 MCY of gypsum reuse at an O&M cost of \$[REDACTED] million PVRR (which is approximately 300,000 cubic yards of gypsum annually from 2013-2027). The gypsum beneficial reuse with SynMat continues to be the least cost option in the long-term CCP management at Trimble. The PVRR of building a landfill according to Case 21 is \$[REDACTED] million with beneficial reuse and \$[REDACTED] million with no gypsum reuse. Without gypsum reuse, Case 21 PVRR would increase by \$73 million.

6.2.1 Long-Term Beneficial Reuse

After identifying Case 21 as the most effective long-term CCP option, a potential long-term beneficial reuse opportunity was also considered. Holcim has proposed a 20 year reuse of up to 5.9 MCY of fly ash for cement manufacturing. This quantity is in addition

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to the 5.4 MCY (1 MCY in short-term and 4.4 MCY in long-term) gypsum reuse with SynMat.

The reuse proposal has a PVRR of \$[REDACTED] million for the 5.9 MCY, resulting in a PVRR per-unit of \$[REDACTED] per cubic yard. This is favorable to the PVRR per-unit cost of Case 21 of \$[REDACTED] per cubic yard. Combining this reuse opportunity with Case 21 diverts material from the proposed landfill and results in net O&M savings of \$5 million PVRR for the landfill. While the need for the proposed on-site landfill remains, the second phase is delayed by eight years and the third phase is delayed by six years, resulting in \$7 million lower PVRR for the landfill's capital expenditures.

Overall, combining Case 21 with fly ash reuse results in a \$21 million higher PVRR, but reuse includes an additional 5.9 MCY of capacity, leading to an 8% reduction in per-unit cost as detailed in Table 8.

Table 8: PVRR Analysis Summary of Long-Term Beneficial Reuse
(2009 PVRR million \$)

	Excluding Long-Term Fly Ash Beneficial Reuse (Case 21)	Including Long-Term Fly Ash Beneficial Reuse (Case 21-H)
PVRR		
Capital		
O&M		
Total		
Delta to Least Cost Case	Least Cost	21
Volume (MCY)	32.5	38.4
Unit Cost (2009 PVRR \$/CY)		

7. Recommendations

The needs assessment demonstrates a need for additional CCP storage capacity at Trimble by 2010. Analysis of the options provided by Project Engineering demonstrates that the cost effective alternatives to meet Trimble's CCP storage needs are:

- Pre-2013:
 - Beneficial reuse of 1.1 MCY of gypsum (approximately 50% of annual gypsum production as specified by the contract) by SynMat, Inc. in 2010 through 2012 (PVRR of \$[REDACTED] million or \$[REDACTED] per cubic yard)
 - Extending the BAP dikes and lining the GSP (PVRR of \$[REDACTED] million or \$[REDACTED] per cubic yard).
- Post-2013:
 - Continue beneficial reuse of gypsum by SynMat (PVRR of \$[REDACTED] million O&M or \$[REDACTED] per cubic yard)
 - Construct a new on-site landfill to store both ash and gypsum to be in-service by 2013. The PVRR is \$[REDACTED] million, comprised of \$[REDACTED] million capital and \$[REDACTED] million O&M (\$[REDACTED] per cubic yard on a PVRR basis).

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- o Beneficial reuse of 5.9 MCY of fly ash by Holcim. The PVRR is \$[REDACTED] million, comprised of \$[REDACTED] million capital and \$[REDACTED] million O&M (\$[REDACTED] per cubic yard on a PVRR basis).

The pre-2013 solution of expanding the BAP, lining the GSP and utilizing beneficial reuse is 50% less on a PVRR basis than disposal at an off-site commercial landfill. This option meets Trimble's CCP needs through 2012.

The post-2013 solution will require a total (PVRR) of \$[REDACTED] million in capital: \$[REDACTED] million for on-site storage construction and \$[REDACTED] million for building a barge loading system for fly ash reuse. O&M (PVRR) totals \$[REDACTED] million: \$[REDACTED] million for storing and operating the landfill, \$[REDACTED] million for fly ash handling for beneficial reuse, and \$[REDACTED] million for gypsum handling related to SynMat beneficial reuse.

Further details regarding the status of this project and the expected construction schedule are shown in Appendix 4.

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Appendix 1 - Analysis Assumptions

Appendix 1

Analysis Assumptions

- Study Period: 43-year period for operational costs impacts (2009-2052)
63-year period for capital costs impacts (2009 through tax life of final project phase).

The revenue requirements associated with capital costs are determined via the Capital Expenditure and Recovery module of the Strategist production and capital costing software. To completely account for capital projects costs over their lifetime, the revenue requirements associated with new capital projects were included beyond the operational study period through the end of their tax life.

- Capital and O&M costs associated with the addition of new environmental projects will be subject to recovery through the Environmental Cost Recovery ("ECR") mechanism. O&M costs for electrical power usage required to operate equipment related to CCP storage are included when comparing alternatives (noted as "Power" in Appendix 2) but are not included as recoverable costs for calculation of ECR billing factors.
- Financial data
 - Discount rate: 7.76%
 - Income tax rate: 38.9%
 - Insurance rate: 0.07%
 - Property tax rate: 0.15 %
 - Percentage of debt in capital structure: 47.22%
 - Debt interest rate/weighted cost of debt: 4.55%
 - Return on equity: 10.63%
 - Environmental projects book life (non-transmission): 14-16 years
 - Environmental projects book life (transmission): 40 years
 - Environmental projects tax life (years): 20 years
 - Annual capital and O&M escalation rate: 6%
 - Cost contingency included in estimates: 20%
 - E.ON US overhead included in capital costs 3.5%
- CCP data
 - Coal ash content: 11.32%
 - HS Coal SO₂ content: ~6.34 lb/mmBTU
 - PRB Coal SO₂ content: ~0.8 lb/mmBTU
 - HS Coal heat content: 22.3 mmBTU/ton
 - PRB Coal heat content: 17.6 mmBTU/ton
 - FGD removal efficiency: Units 1&2 98%

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Appendix 2 – Projected Cash Flows*

Appendix 2

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Projected Cash Flows

Annual Cash Flows Short-Term Options (\$M)			
	On-Site Storage	Beneficial Reuse	Off-Site Landfill
2009			
2010			
2011			
2012			
Total			

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Appendix 2 – Projected Cash Flows

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Annual Cash Flows (\$M)											
Case 16	Capital					O&M					Total
	Fly Ash Landfill	Gypsum Landfill	Final Cap Gypsum Landfill	Final Cap Fly Ash Landfill	Total Capital	Non-Power	Power	Beneficial Reuse Gypsum	Beneficial Reuse Fly Ash	Total O&M	
2009											
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2063											
Total											

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Appendix 2 – Projected Cash Flows

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Annual Cash Flows (\$M)											
Case 21	Capital					O&M					Total
	Phase 1	Phase 2	Phase 3	Final Cap	Total Capital	Non-Power	Power	Beneficial Reuse	Beneficial Reuse Fly	Total O&M	
								Gypsum	Ash		
2009											
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Total											

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Appendix 2 – Projected Cash Flows

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Annual Cash Flows (\$M)												
Case 21 With Holcim	Capital						O&M					Total
	Phase 1	Phase 2	Phase 3	Final Cap	Capital Holcim	Total Capital	Non-Power	Power	Beneficial Reuse Gypsum	Beneficial Reuse Fly Ash	Total O&M	
2009												
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Total												

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Appendix 2 – Projected Cash Flows

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Annual Cash Flows (\$M)												
Case 23	Capital						O&M					Total
	Phase 1	Phase 2	Phase 3	Final Cap	Capital	Total Capital	Non-Power	Power	Beneficial	Beneficial	Total O&M	
					Holdcm				Reuse	Reuse Fly		
									Gypsum	Ash		
2009												
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Off-Site Landfill (O&M only) (\$M)				
	Capital	Beneficial Reuse Gypsum	O&M (6% infl.)	Total O&M (6% infl.)
2009				
2010				
2011				
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
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2021				
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2050				
Total				

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Appendix 3 – Revenue Requirements Detail

Off-Site Landfill (O&M only) (\$M)				
	Capital	Beneficial Reuse Gypsum	O&M (2% infl.)	Total O&M (2% infl.)
2009				
2010				
2011				
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
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2050				
Total				

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Appendix 3 – Revenue Requirements Detail

Appendix 3

Appendix 3 – Revenue Requirements Detail

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On-Site Storage and SYNMAT- Short-Term Option

	Annual Revenue Requirements (\$000)					
	Capital			O&M		Total
	BAP	GSP	Total Capital	Storage	Beneficial Reuse	Total O&M
2009						
2010						
2011						
2012						
2013						
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2016						
2017						
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2049						
2050						
2009 PVRR						

Off-Site Landfill Disposal - Short-Term Option

	Annual Revenue Requirement		
	Capital	O&M	Total
2009			
2010			
2011			
2012			
2013			
2009 PVRR			

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[illegible]

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Appendix 3 – Revenue Requirements Detail

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Case 21

	Annual Revenue Requirements (\$000)									
	Capital					O&M				
										Total
	Phase 1	Phase 2	Phase 3	Final Cap	Total Capital	Non-Power	Power	Beneficial Reuse	Beneficial Reuse Fly Ash	Total O&M
2009										
2010										
2011										
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2009 PVR										

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Appendix 3 – Revenue Requirements Detail

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Case 21 with Holcim

	Annual Revenue Requirements (\$000)										Present Value
	Capital						O&M				Total
							Beneficial Reuse Gypsum		Beneficial Reuse Fly Ash		
	Phase 1	Phase 2	Phase 3	Final Cap	Capital Holcim	Total Capital	Non-Power	Power		Total O&M	
2009											
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2080											
2009 PVRR											

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CCP Plan for Trimble Station
June 2009
Appendix 3 – Revenue Requirements Detail

CONFIDENTIAL INFORMATION REDACTED

Case 23

Annual Revenue Requirements (\$000)										
Capital					O&M					Total
Phase 1	Phase 2	Phase 3	Final Cap	Total Capital	Non-Power	Power	Beneficial Reuse Gypsum	Beneficial Reuse Fly Ash	Total O&M	
2009										
2010										
2011										
2012										
2013										
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
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2070										
2071										
2072										
2072										
2072										
2072										
2009 PVRR										

CONFIDENTIAL INFORMATION REDACTED

Off-Site Landfill (O&M Only)

	Annual Revenue Requirements (\$000)			
	Capital	Beneficial Reuse Gypsum	O&M	Total
6% Inflation				
2009				
2010				
2011				
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
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2047				
2048				
2049				
2050				
2051				
2009 PVRR				

CONFIDENTIAL INFORMATION REDACTED

Off-Site Landfill (O&M Only)

2% Inflation	Annual Revenue Requirements (\$000)			
	Capital	Beneficial Reuse Gypsum	O&M	Total
2009				
2010				
2011				
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
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2046				
2047				
2048				
2049				
2050				
2051				
2009 PVRR				

Appendix 4

Project Status (As of May 2009)

Scope for Trimble County Station CCP Storage in Ravines A and/or B

For Ravines A and/or B development includes:

- Removal of marketable timber from Ravines A and/or B
- Development of Sediment/Leachate Collection Basins at the west end of Ravines A and/or B
- Clear-cut removal of timber in the first phase of development
- Development of a road/access system from the BAP/GSP area to the Ravine by means of a highway bridge crossing existing State Road 1838 and connecting to the existing Wentworth Road. Wentworth Road is a county road that divides Ravine A and B.
- Development of landfill and/or impoundment structures for Ravines A and/or B. As indicated above, this is currently being studied by MACTEC in the Initial Siting Study.
- Mitigation of the loss of the stream(s) in Ravines A and/or B, by development an 80-acre wetland on LG&E-owned Dickey Farm at the north end of the property and re-working of the existing Corn Creek from the LG&E property to the north for approximately 6-miles to the intersection with State Road 625 near Joyce Mills Road.
- Development of any required CCP treatment facilities, including gypsum dewatering, fly ash pug mills, bottom ash dewatering bins, etc.

Path Forward for Station County CCP Storage in Ravines A and B

The Path Forward for the development of the Ravines for Trimble County Generating Station will include:

- Completion of the Water Balance Issues as a result of the KPDES Permit withdrawal.
- Completion of the Initial Siting Study by MACTEC in late April, 2009
- Development of Capital Cash Flows, O&M Cash Flows, and resulting NPV's of 10 alternative by MACTEC by the end of April.
- Completion of the Final Conceptual Engineering (Level I Engineering) Study by early 4th Quarter, 2009.
- Selection of engineer for the Civil Detail Engineering by 4th Quarter, 2009.
- Selection of engineer for the Mechanical Detail Engineer for the CCP transportation systems, by 4th Quarter, 2009.
- Completion of Detailed Design by 2nd Quarter of 2010.
- Filing of 401/404 Permit Application by 3rd Quarter, 2009.
- Filing of Kentucky Dam Safety Permit for Sediment Retention Ponds by 4th Quarter of 2009.
- Filing of Kentucky Division of Waste Management, if landfills are the selected method of CCP Storage, by 2nd Quarter, 2010.
- Removal of Marketable Timber start in 2nd Quarter of 2010
- Start Construction in the Ravines, 3rd Quarter of 2010
- Start Stream Mitigation on Corn Creek, 3rd Quarter of 2010.
- Anticipated approval of 401/404 Permits by 1st Quarter, 2011.
- Anticipated approval of Kentucky Dam Safety Permits for Sediment Retention Ponds by 2nd Quarter of 2010.
- Anticipated approval of Kentucky Division of Waste Management, if landfills are selected, by 4th Quarter 2011.

Risk for Trimble County Station CCP Storage in Ravines A and/or B

The risk associated with the development of Ravines A and/or B includes the following:

- Discovery of unknown geotechnical issues
- Litigation and intervention of the 401/404 permits for Ravines A and/or B could delay the construction of this section of the work. This is likely due to the condition of the streams in Ravines A and/or B.
- Litigation and intervention of the KYDWM Special Waste Landfill permit or the KYDOW Dam Safety Permit.
- Unseasonable weather, such as exceptionally heavy rain in the fall, late spring, early onset of winter, etc.
- Contractor delays due to shortage of materials or manpower issues
- Rejection of the EPA Region IV of the discharge of Gypsum Return Water to the Ohio River as part of the E.ON U.S. revised KPDES Permit application
- Unforeseen and unprecedented requirements by EAP Region IV on discharge of Gypsum Return Water to the Ohio River
- Change in regulations

Revenue Requirements Summary **2009 Amended Plan - KU**

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Project 30 Ghent Landfill - Phase I										
Revenue Requirement										
Eligible Plant	4,321,671	46,478,848	105,485,803	177,577,356	191,133,918	201,941,953	202,576,976	203,254,220	203,969,979	203,969,979
Less: Retired Plant	-	-	-	-	-	-	-	-	-	-
Less: Accumulated Depreciation	-	-	-	-	(5,110,443)	(10,744,624)	(16,396,577)	(22,067,370)	(27,758,132)	(33,448,895)
Plus: Accumulated Depreciation on retired plant	-	-	-	-	-	-	-	-	-	-
Less: Deferred Tax Balance	-	-	-	-	(732,114)	(3,915,287)	(6,717,731)	(9,167,825)	(11,289,716)	(13,100,909)
Plus: Deferred Tax Balance on retired plant	-	-	-	-	-	-	-	-	-	-
Environmental Compliance Rate Base	4,321,671	46,478,848	105,485,803	177,577,356	185,291,361	187,282,042	179,464,668	172,019,025	164,922,131	157,420,175
Rate of return	11.12%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%
	<u>\$ 480,509</u>	<u>\$ 5,098,393</u>	<u>\$ 11,571,030</u>	<u>\$ 19,478,952</u>	<u>\$ 20,325,122</u>	<u>\$ 20,543,486</u>	<u>\$ 19,685,976</u>	<u>\$ 18,869,243</u>	<u>\$ 18,090,765</u>	<u>\$ 17,267,855</u>
 Operating expenses	 84,800	 121,349	 128,630	 136,348	 19,003,308	 20,143,507	 21,352,117	 22,633,244	 23,991,239	 25,430,713
Annual Depreciation expense	-	-	-	-	5,110,443	5,634,180	5,651,953	5,670,793	5,690,762	5,690,762
Less depreciation on retired plant	-	-	-	-	-	-	-	-	-	-
Annual Property Tax expense	-	6,483	69,718	158,229	266,366	279,035	286,796	279,274	271,780	264,318
Total OE	<u>\$ 84,800</u>	<u>\$ 127,832</u>	<u>\$ 198,348</u>	<u>\$ 294,577</u>	<u>\$ 24,380,117</u>	<u>\$ 26,056,723</u>	<u>\$ 27,290,866</u>	<u>\$ 28,583,310</u>	<u>\$ 29,953,782</u>	<u>\$ 31,385,793</u>
 Total E(m)	 565,309	 5,226,225	 11,769,378	 19,773,528	 44,705,239	 46,600,208	 46,976,843	 47,452,553	 48,044,547	 48,653,648

**Revenue Requirements Summary
2009 Amended Plan - KU**

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Project 32 TC CCP Storage (Landfill - Phase I)										
Revenue Requirement										
Eligible Plant	205,835	205,835	16,548,518	33,855,024	33,855,024	33,855,024	33,855,024	33,855,024	33,855,024	33,855,024
Less: Retired Plant	-	-	-	-	-	-	-	-	-	-
Less: Accumulated Depreciation	-	-	-	-	(1,174,487)	(2,400,039)	(3,625,591)	(4,851,143)	(6,076,695)	(7,302,247)
Plus: Accumulated Depreciation on retired plant	-	-	-	-	-	-	-	-	-	-
Less: Deferred Tax Balance	-	-	-	-	(33,838)	(467,481)	(835,819)	(1,143,912)	(1,396,098)	(1,596,714)
Plus: Deferred Tax Balance on retired plant	-	-	-	-	-	-	-	-	-	-
Environmental Compliance Rate Base	205,835	205,835	16,548,518	33,855,024	32,646,699	30,887,504	29,393,614	27,859,969	26,382,231	24,956,064
Rate of return	11.12%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%	10.97%
	<u>\$ 22,886</u>	<u>\$ 22,579</u>	<u>\$ 1,815,253</u>	<u>\$ 3,713,651</u>	<u>\$ 3,581,107</u>	<u>\$ 3,399,105</u>	<u>\$ 3,224,267</u>	<u>\$ 3,056,037</u>	<u>\$ 2,893,940</u>	<u>\$ 2,737,500</u>
Operating expenses	-	-	-	-	892,889	946,462	1,003,249	1,063,444	1,127,251	1,194,886
Annual Depreciation expense	-	-	-	-	1,174,487	1,225,552	1,225,552	1,225,552	1,225,552	1,225,552
Less depreciation on retired plant	-	-	-	-	-	-	-	-	-	-
Annual Property Tax expense	-	309	309	24,823	50,783	49,021	47,182	45,344	43,506	41,657
Total OE	<u>\$ -</u>	<u>\$ 309</u>	<u>\$ 309</u>	<u>\$ 24,823</u>	<u>\$ 2,118,158</u>	<u>\$ 2,221,035</u>	<u>\$ 2,275,984</u>	<u>\$ 2,334,340</u>	<u>\$ 2,396,309</u>	<u>\$ 2,462,105</u>
Total E(m)	22,886	22,887	1,815,561	3,738,474	5,699,265	5,620,140	5,500,251	5,390,377	5,290,249	5,199,605

Revenue Requirements Summary 2009 Amended Plan - LG&E

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Project 24 TC CCP Storage (Landfill - Phase I)										
Revenue Requirement										
Eligible Plant	222,988	222,988	17,927,561	36,676,276	36,676,276	36,676,276	36,676,276	36,676,276	36,676,276	36,676,276
Less: Retired Plant	-	-	-	-	-	-	-	-	-	-
Less: Accumulated Depreciation	-	-	-	-	(1,272,361)	(2,600,042)	(3,927,724)	(5,255,405)	(6,583,086)	(7,910,767)
Plus: Accumulated Depreciation on retired plant	-	-	-	-	-	-	-	-	-	-
Less: Deferred Tax Balance	-	-	-	-	(36,657)	(506,438)	(905,471)	(1,239,238)	(1,512,439)	(1,729,773)
Plus: Deferred Tax Balance on retired plant	-	-	-	-	-	-	-	-	-	-
Environmental Compliance Rate Base	222,988	222,988	17,927,561	36,676,276	35,367,257	33,569,796	31,843,081	30,181,633	28,580,751	27,035,736
Rate of return	10.82%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%	10.67%
	\$ 24,137	\$ 23,803	\$ 1,913,658	\$ 3,914,968	\$ 3,775,239	\$ 3,583,371	\$ 3,399,054	\$ 3,221,705	\$ 3,050,820	\$ 2,885,900
Operating expenses	-	-	-	-	967,296	1,025,334	1,086,854	1,152,065	1,221,189	1,294,460
Annual Depreciation expense	-	-	-	-	1,272,361	1,327,681	1,327,681	1,327,681	1,327,681	1,327,681
Less depreciation on retired plant	-	-	-	-	-	-	-	-	-	-
Annual Property Tax expense	-	334	334	26,891	55,014	53,106	51,114	49,123	47,131	45,140
Total OE	\$ -	\$ 334	\$ 334	\$ 26,891	\$ 2,294,671	\$ 2,406,121	\$ 2,465,649	\$ 2,528,869	\$ 2,596,001	\$ 2,667,281
Total E(m)	24,137	24,137	1,913,992	3,941,860	6,069,910	5,989,491	5,864,703	5,750,574	5,646,822	5,553,180

GHENT LANDFILL (PHASE I)

Capital Expenditures (\$ million)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Property Acquisition											
Disposal Site(s)	-	-	4.66	-	-	-	-	-	-	-	4.66
Overhead Electric Line(s)	-	-	0.03	-	-	-	-	-	-	-	0.03
Buffer Zones	-	-	-	-	2.37	-	-	-	-	-	2.37
Higher End House Acquisition	-	-	1.40	-	-	-	-	-	-	-	1.40
Engineering, Permits and Fees, and Construction Documents	0.46	2.00	-	-	-	-	-	-	-	-	2.46
Stream and Wetland Mitigation	-	-	4.14	-	-	-	-	-	-	-	4.14
Ground Water Monitoring System	-	0.27	-	-	-	-	-	-	-	-	0.27
Transmission Line Relocation Design, Engineering, and Construction	-	-	-	-	0.82	-	-	-	-	-	0.82
CCWD Relocation	-	-	0.12	-	-	-	-	-	-	-	0.12
Pump House Fly Ash and Bottom Ash Segregation	-	0.72	-	-	-	-	-	-	-	-	0.72
Dry Ash/Pyrites Handling System - Conveyor	-	-	16.29	27.08	38.93	-	-	-	-	-	82.31
Dry Gypsum Handling System	-	-	7.79	15.96	13.05	-	-	-	-	-	36.80
Gypsum Fines Project	-	0.74	6.30	6.30	-	-	-	-	-	-	13.34
Initial Site Preparation											
Clearing, Grubbing, and Site Preparation	-	-	-	0.62	0.65	0.69	-	-	-	-	1.96
Stripping and Stockpiling Soil	-	-	-	0.50	0.53	0.56	-	-	-	-	1.58
Hauling Topsoil - Phase 1 - 1.0 Mile Round Trip	-	-	-	0.19	0.20	0.21	-	-	-	-	0.59
Erosion and Sedimentation Controls	-	-	-	0.06	0.06	0.06	-	-	-	-	0.18
Sedimentation Pond	-	-	-	0.33	-	-	-	-	-	-	0.33
Collection Channels (Fabriform)	-	-	-	0.36	0.38	0.40	-	-	-	-	1.15
Diversion Channels (Riprap)	-	-	-	0.11	0.12	0.12	-	-	-	-	0.35
Liner Subgrade Preparation											
Scraping and Hauling - 0.25 Mile Round Trip	-	-	-	0.32	0.33	0.35	-	-	-	-	1.01
Excavating	-	-	-	0.15	0.16	0.17	-	-	-	-	0.49
Hauling Subgrade - Phase 1 - 1.0 Mile Round Trip	-	-	-	0.31	0.33	0.35	-	-	-	-	0.99
Spreading and Compacting Subgrade	-	-	-	0.49	0.52	0.55	-	-	-	-	1.57
Subgrade QA/QC	-	-	-	0.24	0.25	0.27	-	-	-	-	0.76
Gypsum Dewatering Facility Earthwork											
Excavating	-	-	-	0.73	-	-	-	-	-	-	0.73
Hauling Earth - 1.0 Mile Round Trip	-	-	-	1.53	-	-	-	-	-	-	1.53
Spreading and Compacting	-	-	-	1.21	-	-	-	-	-	-	1.21
Earthwork QA/QC	-	-	-	0.24	-	-	-	-	-	-	0.24

Attachment to Response to KIUC Question No. 1-4(a)

Page 1 of 3

Voyles

GHENT LANDFILL (PHASE I)

Capital Expenditures (\$ million)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Haul Roads											
CCP Disposal On-Landfill Haul Road (60 Feet Wide)	-	-	-	-	0.61	0.05	0.05	0.05	0.05	0.06	0.87
CCP Disposal Off-Landfill Haul Road (60 Feet Wide)	-	-	-	0.30	1.03	-	-	-	-	-	1.33
Liner											
Landfill - Single Liner System	-	-	-	-	7.00	7.43	7.87	-	-	-	22.30
Liner System QA/QC	-	-	-	-	1.23	1.30	1.38	-	-	-	3.90
Leachate Collector Line	-	-	-	-	0.19	0.20	0.21	-	-	-	0.60
On-Landfill Leachate Trunk Line	-	-	-	-	0.08	0.08	0.09	-	-	-	0.25
Off-Landfill Leachate Trunk Line	-	-	-	-	0.07	-	-	-	-	-	0.07
Leachate Storage Pond	-	-	-	-	0.29	-	-	-	-	-	0.29
Leachate Pump House	-	-	-	-	0.09	-	-	-	-	-	0.09
Leachate Pipe Line	-	-	-	-	0.08	-	-	-	-	-	0.08
Underdrains - Trunk	-	-	-	-	0.17	0.18	0.19	-	-	-	0.54
Underdrains - Collector	-	-	-	-	0.11	0.12	0.12	-	-	-	0.35
Cap											
Intermediate Soil Cover	-	-	-	-	-	-	0.28	0.30	0.32	0.34	1.24
Cap System	-	-	-	-	-	-	0.22	0.23	0.25	0.26	0.96
Cap System QA/QC	-	-	-	-	-	-	0.03	0.03	0.03	0.03	0.12
Total	0.46	3.72	40.73	57.01	69.65	13.10	10.44	0.62	0.65	0.69	197.07
E.ON-US Overheads	0.02	0.13	1.43	2.00	2.44	0.46	0.37	0.02	0.02	0.02	6.90
Total with Overheads	0.47	3.85	42.16	59.01	72.09	13.56	10.81	0.64	0.68	0.72	203.97

GHENT LANDFILL (PHASE I)

Operating & Maintenance Costs (\$)	2010	2011	2012	2013	2014	2015	2016	2017
Ground Water Sampling and Testing	14,045	14,888	15,781	16,728	17,731	18,795	19,923	21,118
Leachate Management	-	-	-	83,639	88,657	93,977	99,616	105,592
Surveying (As-built)	16,292	17,270	18,306	19,404	20,569	21,803	23,111	24,497
Pump House Fly Ash and Bottom Ash Segregation	75,843	80,394	85,217	-	-	-	-	-
Dry Ash/Pyrites Handling System - Conveyor	-	-	-	2,161,234	2,290,908	2,428,363	2,574,065	2,728,509
Dry Gypsum Handling System	-	-	-	682,495	723,445	766,851	812,863	861,634
Leachate Pump House	15,169	16,079	17,043	18,066	19,150	20,299	21,517	22,808
Hauling Fly Ash and Bottom Ash to Landfill								
Loading	-	-	-	1,338,226	1,418,519	1,503,630	1,593,848	1,689,479
Phase 1 - 2.25 Mile Round Trip	-	-	-	2,822,723	2,992,087	3,171,612	3,361,909	3,563,623
Hauling Gypsum to Landfill								
Loading	-	-	-	1,746,384	1,851,167	1,962,237	2,079,972	2,204,770
Phase 1 - 2.25 Mile Round Trip	-	-	-	3,997,156	4,236,986	4,491,205	4,760,677	5,046,318
Landfilling Fly Ash and Bottom Ash	-	-	-	2,408,806	2,553,334	2,706,534	2,868,927	3,041,062
Landfilling Gypsum	-	-	-	3,143,492	3,332,101	3,532,027	3,743,949	3,968,586
Ash/Gypsum Placement QA/QC	-	-	-	54,198	57,450	60,897	64,551	68,424
Maintenance								
Landfills	-	-	-	301,101	319,167	338,317	358,616	380,133
Haul Roads	-	-	-	53,529	56,741	60,145	63,754	67,579
Dust Control	-	-	-	156,126	165,494	175,424	185,949	197,106
TOTAL	121,349	128,630	136,348	19,003,308	20,143,507	21,352,117	22,633,244	23,991,239

Revenue Requirements Summary - E(m)

Ghent Landfill Gypsum Disposal Cost		12/31/2018	12/31/2019	12/31/2020	12/31/2021
Gypsum Capital in Phase I		\$53,110,000	\$53,110,000	\$53,110,000	\$53,110,000
Other Adjustments		\$0	\$0	\$0	\$0
Revised Eligible Plant		\$53,110,000	\$53,110,000	\$53,110,000	\$53,110,000
Less Accumulated Depreciation		(\$10,622,000)	(\$12,392,333)	(\$14,162,667)	(\$15,933,000)
Less Deferred Tax Balance		(\$3,061,987)	(\$3,383,178)	(\$3,628,754)	(\$3,861,935)
Environmental Compliance Rate Base		\$39,426,013	\$37,334,488	\$35,318,579	\$33,315,065
Return on Environmental Rate Base	PV	10.63%	10.63%	10.63%	10.63%
Capital E(m)	7.8	\$4,190,985	\$3,968,656	\$3,754,365	\$3,541,391
Expense Inflation Assumption	6%				
Depreciation		\$ 1,770,333	\$ 1,770,333	\$ 1,770,333	\$ 1,770,333
Property Tax	Assumed Rate	\$ 66,388	\$ 63,732	\$ 61,077	\$ 58,421
Gypsum Specific Expenses	PVRR	7.8	\$ 12,806,186	\$ 13,574,557	\$ 14,389,030
Total E(m)	PVRR	7.8	\$ 18,833,892	\$ 19,377,278	\$ 19,974,805
All in Cost per Cubic yard	868,000 cu yds	\$ 21.70	\$ 22.32	\$ 23.01	\$ 23.76
Tonnage Conversion	1.17				
Cost of Gypsum to Sterling	1,015,560	\$10 14,270,008	\$ 15,126,208	\$ 16,033,781	\$ 16,995,808
All in Cost per Cubic yard		\$ 16.44	\$ 17.43	\$ 18.47	\$ 19.58
PVRR Comparative (Savings) Cost					
Gypsum	Depreciation Year	6	7	8	9
Capital	Book Depreciation Years	\$1,770,333	\$1,770,333	\$1,770,333	\$1,770,333
	Tax Depreciation (20yr MACRS unless life < 20yrs)	\$2,806,864	\$2,596,017	\$2,401,634	\$2,369,768
	Difference	(\$1,036,530)	(\$825,683)	(\$631,301)	(\$599,435)
	Rate	38.9%	38.9%	38.9%	38.9%
	Deferred Tax	(\$403,210)	(\$321,191)	(\$245,576)	(\$233,180)
	Accumulated Deferred Tax Balance	(\$3,061,987)	(\$3,383,178)	(\$3,628,754)	(\$3,861,935)
	MACRS Tax Depreciation Rate	5.285%	4.888%	4.522%	4.462%

Revenue Requirements Summary - E(m)

Ghent Landfill Gypsum Disposal Cost

			12/31/2029	12/31/2030	12/31/2031	12/31/2032
Gypsum Capital in Phase I			\$53,110,000	\$53,110,000	\$53,110,000	\$53,110,000
Other Adjustments				\$0	\$0	\$0
Revised Eligible Plant			\$53,110,000	\$53,110,000	\$53,110,000	\$53,110,000
Less Accumulated Depreciation			(\$30,095,667)	(\$31,866,000)	(\$33,636,333)	(\$35,406,667)
Less Deferred Tax Balance			(\$5,726,549)	(\$5,959,523)	(\$6,192,703)	(\$6,425,677)
Environmental Compliance Rate Base			\$17,287,784	\$15,284,477	\$13,280,963	\$11,277,657
Return on Environmental Rate Base	P		10.63%	10.63%	10.63%	10.63%
Capital E(m)	7.		\$1,837,691	\$1,624,740	\$1,411,766	\$1,198,815
Expense Inflation Assumption	6%					
Depreciation		\$	1,770,333	\$ 1,770,333	\$ 1,770,333	\$ 1,770,333
Property Tax	Assumed Rate	\$	37,177	\$ 34,522	\$ 31,866	\$ 29,211
Gypsum Specific Expenses	PVRR	7.	\$ 24,309,964	\$ 25,768,562	\$ 27,314,676	\$ 28,953,556
Total E(m)	PVRR	7.8	\$ 27,955,166	\$ 29,198,157	\$ 30,528,641	\$ 31,951,915
All in Cost per Cubic yard	868,000 cu yds	\$	32.21	\$ 33.64	\$ 35.17	\$ 36.81
Tonnage Conversion	1.17					
Cost of Gypsum to Sterling	1,015,560	\$10	27,088,735	\$ 28,714,059	\$ 30,436,903	\$ 32,263,117
All in Cost per Cubic yard		\$	31.21	\$ 33.08	\$ 35.07	\$ 37.17
PVRR Comparative (Savings) Cost						
Gypsum	Depreciation Year		17	18	19	20
Capital	Book Depreciation Years		\$1,770,333	\$1,770,333	\$1,770,333	\$1,770,333
	Tax Depreciation (20yr MACRS unless life < 20yrs)		\$2,369,768	\$2,369,237	\$2,369,768	\$2,369,237
	Difference		(\$599,435)	(\$598,904)	(\$599,435)	(\$598,904)
	Rate		38.9%	38.9%	38.9%	38.9%
	Deferred Tax		(\$233,180)	(\$232,974)	(\$233,180)	(\$232,974)
	Accumulated Deferred Tax Balance		(\$5,726,549)	(\$5,959,523)	(\$6,192,703)	(\$6,425,677)
	MACRS Tax Depreciation Rate		4.462%	4.461%	4.462%	4.461%

Revenue Requirements Summary - E(m)

30 Yr Life

Shent Landfill Gypsum Disposal Cost		12/30/2040	12/30/2041	12/30/2042	12/30/2043
Gypsum Capital in Phase I		\$53,110,000	\$53,110,000	\$53,110,000	\$53,110,000
Other Adjustments		\$0	\$0	\$0	\$0
Revised Eligible Plant		\$53,110,000	\$53,110,000	\$53,110,000	\$53,110,000
Less Accumulated Depreciation		(\$49,569,333)	(\$51,339,667)	(\$53,110,000)	(\$53,110,000)
Less Deferred Tax Balance		(\$1,377,319)	(\$688,660)	\$0	\$0
Environmental Compliance Rate Base		\$2,163,347	\$1,081,674	(\$0)	(\$0)
Return on Environmental Rate Base	P	10.63%	10.63%	10.63%	10.63%
Capital E(m)	7.1	\$229,964	\$114,982	(\$0)	(\$0)
Expense Inflation Assumption	6%				
Depreciation		1,770,333	\$ 1,770,333	\$ 1,770,333	\$ -
Property Tax	Assumed Rate	7,966	\$ 5,311	\$ 2,655	\$ (0)
Gypsum Specific Expenses	PVRR	7.1	46,147,570	\$ 48,916,424	\$ 51,851,409
Total E(m)	PVRR	7.1	48,155,833	\$ 50,807,050	\$ 53,624,398
All in Cost per Cubic yard	868,000 cu yds	55.48	\$ 58.53	\$ 61.78	
Tonnage Conversion	1.17				
Cost of Gypsum to Sterling	1,015,560	\$10	51,422,507	\$ 54,507,858	\$ 57,778,329
All in Cost per Cubic yard		59.24	\$ 62.80	\$ 66.56	
PVRR Comparative (Savings) Cost					
Gypsum	Depreciation Year	28	29	30	31
Capital	Book Depreciation Years	\$1,770,333	\$1,770,333	\$1,770,333	\$0
	Tax Depreciation (20yr MACRS unless life < 20yrs)	\$0	\$0	\$0	\$0
	Difference	\$1,770,333	\$1,770,333	\$1,770,333	\$0
	Rate	38.9%	38.9%	38.9%	38.9%
	Deferred Tax	\$688,660	\$688,660	\$688,660	\$0
	Accumulated Deferred Tax Balance	(\$1,377,319)	(\$688,660)	\$0	\$0
	MACRS Tax Depreciation Rate				

Revenue Requirements Summary - E(m)

Ghent Landfill Gypsum Disposal Cost				12/28/2051	12/27/2052	Totals
Gypsum Capital in Phase I				\$53,110,000	\$53,110,000	
Other Adjustments				\$0	\$0	
Revised Eligible Plant				\$53,110,000	\$53,110,000	
Less Accumulated Depreciation				(\$53,110,000)	(\$53,110,000)	
Less Deferred Tax Balance				\$0	\$0	
Environmental Compliance Rate Base				(\$0)	(\$0)	
Return on Environmental Rate Base				PI 10.63%	10.63%	
Capital E(m)				7.1 (\$0)	(\$0)	\$70,150,051
Expense Inflation Assumption 6%						
Depreciation				\$ -	\$ -	\$ 53,110,000
Property Tax				Assumed Rate (0)	\$ (0)	
Gypsum Specific Expenses				PVRR 7.8	\$ -	\$ 756,549,448
Total E(m)				PVRR 7.8	(0) \$ (0)	\$ 886,689,899
All in Cost per Cubic yard				868,000 cu yds		
Tonnage Conversion				1.17		
Cost of Gypsum to Sterling				1,015,560 \$16	\$ -	\$ 843,027,482
All in Cost per Cubic yard						
PVRR Comparative (Savings) Cost						
Gypsum Depreciation Year				39	40	
Capital Book Depreciation Years				\$0	\$0	\$53,110,000
Tax Depreciation (20yr MACRS unless life < 20yrs)				\$0	\$0	\$53,110,000
Difference				\$0	\$0	
Rate				38.9%	38.9%	
Deferred Tax				\$0	\$0	\$0
Accumulated Deferred Tax Balance				\$0	\$0	
MACRS Tax Depreciation Rate						

GHENT STATION ALTERNATIVE FOR CCP/GYPSUM DISPOSAL

Background

Sterling Materials is an active underground limestone mine located in Verona, Kentucky, approximately 20 miles from Kentucky Utilities Company's Ghent Station. Sterling currently mines between 1,000,000 and 1,600,000 tons of limestone per year, and has been in operation since 2000.

In addition to producing limestone for the general aggregate construction market, Sterling also mines high calcium limestone for Mississippi Lime Company for use in Mississippi Lime's kiln located on Sterling's property. This high calcium limestone is also suitable for use as scrubber stone in Ghent's limestone FGD scrubber system.

In November 2010, Sterling obtained a Beneficial Reuse Special Waste Permit from the Kentucky Department of Environmental Protection, Division of Waste Management specifically allowing the beneficial reuse of Ghent's FGD gypsum in Sterling's mine.

KU has proposed building a new landfill at Ghent in three phases for an estimated total cost of \$360,000,000 to handle the plant's three coal combustion by-products ("CCPs") through 2037¹. KU forecasted the following wet storage CCP production volumes for Ghent Station (Cubic Yards):

Year	Fly Ash	Bottom Ash	Gypsum
2009	540,000	140,000	880,000
2010	550,000	150,000	1,090,000
2011	580,000	150,000	1,120,000
2012	550,000	150,000	1,060,000
2013	550,000	150,000	1,090,000

*Source: Coal Combustion Byproduct Plan for Ghent Station
June 2009 (the "Ghent CCP Plan", page 7)*

Ghent's FGD gypsum is currently placed in a wet gypsum stacking pond. Ghent also has a contract to supply CertainTeed, Inc. with gypsum, and KU has estimated that CertainTeed will purchase approximately 222,000 cubic yards per year of gypsum from Ghent. As a result, Ghent will be required to continue diverting a portion of its gypsum production to the gypsum stacking pond.

Alternative Proposal for Gypsum Disposal at Sterling Materials' Mine

Sterling Materials is proposing that Ghent send all of its gypsum production (net of sales CertainTeed) to Sterling's mine for beneficial reuse, with Ghent's with the new landfill being used for ash disposal only. Sterling estimates that the PVRR cost saving from the beneficial reuse of Ghent's gypsum is at least \$80,000,000. The substantial saving are generated from the ability to significantly delay the construction of phase 2 of the landfill, completely eliminate phase 3, and eliminate gypsum related

¹ Phase I cost thru 2018 of \$203,969,979 as set forth in Revenue Requirement Summary for Project 30 – Ghent Landfill Phase I attached. Total project capital cost estimated to be \$360,000,000 per direct testimony of John Voyles before the Kentucky Public Service Commission in Case No. 2009-00197.

capital cost and expenses associated with the landfill (all gypsum continue to be placed in stacking pond for transfer to CertainTeed and Sterling Materials).

Sterling is not proposing that the Ghent landfill not be built, but rather that KU take advantage of Sterling's Beneficial Reuse Permit so that the life of the landfill can be extended, and capital and operating cost be eliminated, by diverting the gypsum that would have been placed in the landfill to Sterling's mine. The attached PVRR analysis assumes that all gypsum would be diverted beginning with the opening of the new landfill.

Assumptions in Ghent Project 30 PVRR Analysis

1. Total price for loading, hauling and fees to Sterling Materials of \$10.50 in 2013.
2. Net CCP production of approximately 868,000 cubic yards (1,090,000 – 222,000 to CertainTeed).
3. Cubic yards to ton conversion factor – cy x 1.155 (based on Trans Ash conversion assumption of 1.3 MCY equals 1.5 million tons as hauled - see page 10 of Ghent CCP Plan).
4. Reduce Phase I construction cost by \$53,110,000² by continuing to place gypsum temporarily in existing gypsum stacking pond until shipment to Sterling.

Dry Gypsum Handling System	\$36,800,000
Gypsum Fines Project	\$12,600,000
Gypsum Dewatering Facility Earthwork	<u>\$ 3,710,000</u>
Total	\$53,110,000

5. Phase III landfill construction cost eliminated. Phase II construction delayed from 2018 to 2030.
Phase I capacity – 14.7 MCY (See Ghent CCP Plan page 12)
Ash Production – 700,000 MCY (See Ghent CCP Plan page 7)
Phase I life until full – 21 years

6. Total Phase II and III construction costs - \$157,421,024 (timing and amounts of expenditures based retirement studies analysis in PSC Case No. 2011-00162)

Phase II construction cost - \$40,000,000
Phase III construction cost - \$117,421,024

7. Eliminate following Ghent Landfill Operating Expenses 2013 Estimates (See Ghent Landfill - Phase I attached)

Dry Gypsum Handling System	\$ 682,495
Hauling Gypsum to Landfill	
Loading	\$1,746,384
Phase I-2.25 mile round trip	\$3,997,156
Landfilling Gypsum	<u>\$3,143,492</u>
Total	\$9,569,527

8. Continue 2018 Annual Depreciation Rate of 2.7899% on Eligible Capital through 2037
9. Continue 2018 Property Tax Expense Rate of .1259% on Eligible Capital through 2037
10. Apply KU O&M Escalation Rate of 6% and Discount Rate of 7.81% (See Ghent CCP Plan, page 22).

² See Ghent Landfill - Phase I attached.

Purchase of Scrubber Stone from Sterling

Sterling Materials mines a high calcium seam of limestone in its 2nd and 3rd levels that will meet, and possibly exceed, Ghent's calcium specifications for scrubber stone. Based on general industry knowledge, without verification, it is believed that Ghent's current cost of scrubber stone FOB plant is approximately \$8.50.

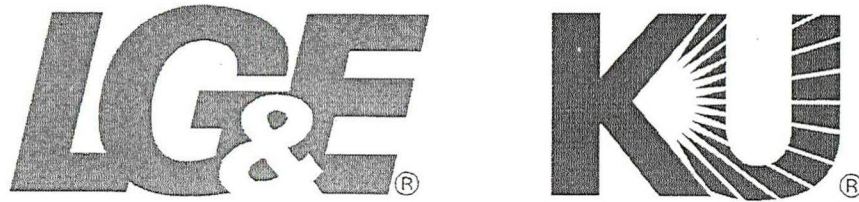
The proposed price of \$10.50 for gypsum disposal at Sterling includes \$4.50 per ton for transportation, based upon an assumed round trip turn of 1.5 hours, and \$75.00 per hour to haul 25 tons.

Sterling is proposing to sell high calcium limestone to Ghent for \$7.00 per ton (as of October, 2011) and backhauling the stone to Ghent. If a \$1.50 per ton trucking fee is assigned to the transportation of the limestone, Ghent will incur no additional cost for its scrubber stone. However, reducing the transportation component of the gypsum disposal cost by \$1.50 reduces the proposed disposal cost from \$10.50 to \$9.00 per ton, and correspondingly increases the PVRR saving advantage from approximately \$80,000,000 to over \$100,000,000.

Construct Ash Storage Pond at Site M (see Ghent CCP Plan, Page 12)

It would appear that transporting gypsum to Sterling's mine, then using Site M as an ash landfill, versus Site E/F, would substantially reduce ash disposal cost and further increase the PVRR saving from disposing all of Ghent's gypsum at Sterling.

Site M is substantially closer to Ghent than Site E/F. The estimated cost of hauling fly and bottom ash to Site E/F is \$2,822,723 in 2013, and the corresponding haul Road maintenance cost is \$53,529. Even reducing those costs by a modest 50% for the haul to Site M versus site E/F would produce another \$21,800,000 in PVRR savings.

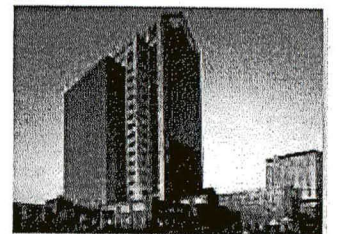
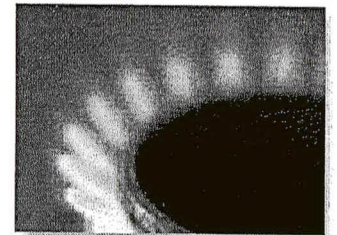
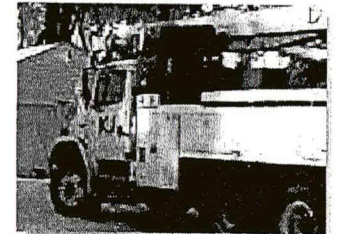
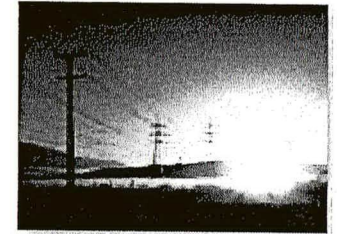


PPL companies

Project Engineering

2012 – 2016 MTP

October 13, 2011



Capital Review - Ghent CCR

Accrual Basis, \$Millions

Authority/ECR Comparison

	<u>Total Projection</u>	<u>Current Authority</u>	<u>ECR Filing</u>	<u>Variance to Authority</u>	<u>Variance to ECR Filing</u>
Landfill Phase I/Fines & Transport	\$303	\$205	\$205	(\$99)	(\$99)
Landfill Phase II, III, Close & Cap	<u>\$132</u>	<u>\$0</u>	<u>\$0</u>	<u>(\$132)</u>	<u>(\$132)</u>
Total	\$435	\$205	\$205	(\$230)	(\$230)

MTP Comparison

	<u>Pre-2011</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>Post 2016</u>	<u>Total</u>
2011 MTP									
Landfill Phase I	\$25	\$12	\$10	\$9	\$5	\$1	\$1	\$1	\$63
Fines & Transport	\$7	\$90	\$89	\$52	\$0	\$0	\$0	\$0	\$238
Landfill Phase II, III, Close & Cap	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$127</u>	<u>\$128</u>
Total 2011 MTP	\$33	\$102	\$99	\$61	\$5	\$1	\$1	\$128	\$429
2012 MTP									
Landfill Phase I	\$15	\$17	\$18	\$11	\$11	\$1	\$1	\$1	\$75
Fines & Transport	\$2	\$46	\$102	\$73	\$6	\$0	\$0	\$0	\$229
Landfill Phase II, III, Close & Cap	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$132</u>	<u>\$132</u>
Total 2012 MTP	\$17	\$63	\$121	\$84	\$17	\$1	\$1	\$133	\$435
Variance to 2011 MTP									
Landfill Phase I	\$10	(\$5)	(\$8)	(\$2)	(\$6)	\$0	\$0	(\$0)	(\$11)
Fines & Transport	\$5	\$44	(\$13)	(\$20)	(\$6)	\$0	\$0	\$0	\$10
Landfill Phase II, III, Close & Cap	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>(\$5)</u>	<u>(\$5)</u>
Total Variance to 2011 MTP	\$16	\$39	(\$22)	(\$22)	(\$13)	\$0	\$0	(\$5)	(\$6)

Key Messages

- The increase over the ECR Filing is driven by the Transport System estimate being based on Level I Engineering rather than Preliminary Engineering.



PPL companies

Appendix 1
SECTION 404 ALTERNATIVES ANALYSIS
Coal Combustion Residuals Storage Project
LG&E Trimble County Generating Station
(3/12)

Prepared for:

Louisville Gas & Electric Company
Trimble County Generating Station
Bedford, KY

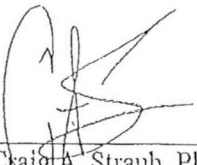
Prepared by:

MACTEC Engineering and Consulting, Inc.
4460 Lake Forest Drive
Suite 200
Cincinnati, Ohio 45242
(513) 489-6611
Fax: (513) 489-6619

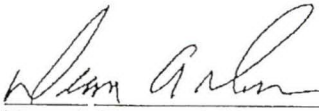
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Craig A. Straub, PhD
Senior Ecologist



Dean A. Duncan, P.E.
Principal

SECTION 404 ALTERNATIVES ANALYSIS
Coal Combustion Residuals Storage Project
LG&B Trimble County Generating Station
(3/12)

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List of Acronyms

APE - Area of Potential Effects
BAP - Bottom Ash Pond
CCR - Coal Combustion Residuals
CY - Cubic Yard
DWM - Division of Waste Management
GSP - Gypsum Storage Pond
IMEA - Illinois Municipal Electric Agency
IMPA - Indiana Municipal Power Agency
MSW - Municipal Solid Waste
O&M - Operations and Management
TPY - tons per year

1.0 INTRODUCTION OF ALTERNATIVES ANALYSIS

To meet future energy needs, LG&E completed a second pulverized coal fired facility (Unit 2) in July 2010 at the existing generating station located in Trimble County, Kentucky. The existing coal-fired facility (Unit 1) at the Trimble County plant was completed in September 1980 and is jointly owned by the Illinois Municipal Electric Agency (IMEA, 12.12% of generating capacity), the Indiana Municipal Power Agency (IMPA, 12.88% of generating capacity) and LG&E (75% of generating capacity).

The Trimble County Station has one 514-megawatt (net) coal-fired facility (Unit 1) constructed in 1980. Since 2002, the station has added six natural-gas-fired, simple-cycle combustion turbines with a combined capacity of more than 900 megawatts (net) for peak load demand. Unit 2 has been operational since the middle of 2010 and consists of one pulverized-coal boiler, associated control equipment and new fly ash handling equipment. Both Units 1 and 2 are fired primarily by eastern bituminous coal delivered to the existing barge unloading facility; however in 2010 provisions were made to blend power river basin coal with the bituminous coal for both units. Unit 2 utilizes high efficiency, supercritical pulverized coal technology to generate steam to power a 750 MW (net) generating unit. Both Units 1 and 2 provide base-load power to the electric grid on a continuous basis.

Critical to the operation of Unit 2 at the Trimble County Generating Station is the decision on how to handle and store Coal Combustion Residuals (CCR). These materials, which include pyrites, bottom ash, fly ash and gypsum, are inorganic residues that remain after pulverized coal is burned. Coarse particles settle to the bottom of the combustion chamber and the fine portion is removed from the flue gas by electrostatic precipitators. Due to the high sulfur content of bituminous coal, flue gas desulfurization equipment is installed on the scrubbers to meet air emission standards. Flue gas desulfurization is a chemical process to remove sulfur oxides from the flue gas by reacting them with limestone to form hydrous calcium sulfate (synthetic gypsum).

Unit 1 currently generates approximately 565,000 tons of CCR per year and Unit 2 generates 738,000 tons of CCR per year for a combined annual CCR production of about 1,300,000 tons. Accounting for the density of the material, this is equivalent to a required storage volume of 1,400,000 cubic yards (CY) of CCR materials annually. The Trimble County Generating Station will exceed existing CCR storage capacity by year 2015. Construction is completed on an

expansion to the existing on-site facilities. This expansion is expected to provide several additional years of capacity while long term storage solutions are developed.

1.1 EVALUATION CRITERIA

To meet this long term storage need, LG&E has evaluated several alternatives to assess CCR storage options. These alternatives were evaluated with a screening methodology containing eight criteria. In the screening process, the evaluation criteria were applied to a level commensurate with the feasibility of the alternative. Those alternatives that met at least 6 of the criteria were carried forward for additional analysis.

The Evaluation Criteria Were:

- **Adequate Storage Capacity** – The proposed alternative should provide enough capacity to store the 38 year production of CCR at the annual rate of 910,000 CY, totaling 34 million CY over the life of the station. This criterion could be met with more than one alternative site that in combination meets this goal.
- **Implementation** – To meet CCR storage requirements, the plan must be practicable and implementable by 2015. This criterion must include allowances for time to design, permit, and construct a new storage facility.
- **Risk and Liability** – The proposed alternative must consider LG&E's ultimate liability for CCR during transport, storage or disposal.
- **Socio-Economic Effects** – The proposed alternative must consider impacts on population, economy and land use patterns.
- **Effects on the Environment** – The proposed alternative must consider impacts to natural resources. Cultural and Archeological resources are included under this criterion.
- **Proximity** – Proximity assesses the distance traveled from the location of CCR production to storage opportunities.
- **Transportation** – The method of transportation influences storage alternatives. For example a storage option requiring delivery of wet materials would limit available transportation alternatives.
- **Cost of Disposal/Storage** – As a public utility regulated by the Public Service Commission, LG&E is required to seek out measures with the least cost to the rate payers.

1.2 SUMMARY OF REVIEWED ALTERNATIVES

The following alternatives were analyzed with the screening methodology:

- **No Action (Alternative 1):** Under this alternative, construction of expanded on-site capacity for CCR storage would proceed as planned, but no new provisions for long term storage would be developed.
- **Beneficial Reuse (Alternative 2):** This alternative addresses the feasibility of dedicating all CCR production to beneficial reuse.
- **On-Site (Alternatives 3A, 3B, 3C, 3D):** All property at the Trimble County Generating Station that is not currently used or reserved for other purposes was reviewed for feasibility of CCR storage. Tracts include **Dickey Farm, Ravine C, Ridgetops** above the ravines and **Ravines A and B**.
- **Near Site (Alternatives 4A, 4B, 4C):** All other property on or adjacent to the terrace on which Trimble County Generating Station is located was evaluated. Tracts include property north of Trimble County Generating Station (**North Terrace, Corn Creek**) and south of Trimble County Generating Station (**South Terrace 1 and Liler's Quarry, South Terrace 2, and South Terrace 3**). These sites are generally within 3 miles of the generating station.
- **Other Terraces on McAlpine Pool (Alternatives 5A, 5B, 5C, 5D):** This analysis addressed all terraces that offered any possibility of acquisition by LG&E for development of CCR storage. Candidate sites include: **Bethlehem Terrace, Lee Bottom, Spring Creek Terrace and Cooper Bottom**.
- **Other Barge Accessible Opportunities on the Ohio River (Alternative 5E):** The feasibility of transporting CCR over long distances to barge accessible facilities elsewhere on the Ohio River was assessed under this alternative.
- **Ghent Station Landfill (Alternative 5F):** This alternative consists of evaluating the feasibility of storing CCR at Kentucky Utilities (KU) Ghent Generating Station Landfill.
- **Landfills Developed by Others (Alternative 6A):** This alternative evaluates developing a contract with a CCR landfill operated by another entity and addresses the availability of such an alternative.
- **Sand and Gravel Quarries (Alternative 6B):** Quarries are located both upriver and downriver of the Trimble County site. These were investigated as potential storage areas for CCR.
- **Limestone Aggregate Quarry (Alternative 6C):** This alternative assessed placement of CCR in an aggregate quarry owned by Mulzer Crushed Stone along the Ohio River and the availability of other quarries in the region.
- **Coal Mines (Alternative 6D):** The feasibility of CCR disposal to coal mining sites was evaluated.
- **Existing Landfills (Alternative 6E):** This alternative assessed disposal of CCR to area landfills.

Alternatives not owned by LG&E (6A,6B,6C,6D,6E) contain uncertainties with transporting CCR material. Increased traffic loads contribute to overcrowding and

accelerated degradation of local roads, air emissions from truck fuel and CCR dust, noise impacts, traffic safety issues and the potential for CCR spills with localized air and water impacts.

1.3 PREFERRED ALTERNATIVE (3D)

The screening process resulted in selection of a preferred alternative. The Preferred Alternative 3D involves the storage of CCR material in Ravine B. This alternative meets the long term storage needs of Trimble County Generating Station, can be implemented with minimal risk and liability, involves the least amount of socio-economic impacts, utilizes the preferred mode of pipe conveyor transport and provides the most cost effective solution to the customers of LG&E. Under the evaluation criteria employed by the following analyses, no other alternative meets a standard of practicability for the needs of Trimble County Generating Station. Additional discussion of the Preferred Alternative 3D is presented in Section 6.

- The Preferred Alternative 3D involves maximization of beneficial reuse opportunities prior to the placement of CCR in a landfill developed within Ravine B. This ravine is an on-site resource at Trimble County Generating Station owned by LG&E. Both Ravines A and B were previously permitted for CCR storage in the 1980's. The CCR storage system for Ravine B is designed to:
 - maximize storage capacity within Ravine B
 - efficiently transport CCR into ravine B.

The landfill within ravine B will contain adequate storage capacity for the CCR material. The design includes an enclosed pipe conveyor to transport CCR materials to the landfill terminus. The enclosed pipe conveyor was selected since it completely encloses the CCR materials during transportation to the landfill, thereby eliminating fugitive dust issues.

2.0 PROJECT PURPOSE AND NEED

2.1 PURPOSE

To assure long term availability of Coal Combustion Residuals (CCR) storage and beneficial reuse opportunities to support reliable supply of electric service to customers of the Trimble County Generating Station. This is required to maintain uninterrupted power generation at Units 1 and 2 over the complete lifetimes (38 years) of these units.

2.2 NEED

Unit 1 currently generates approximately 367,571 tons of CCR per year and Unit 2 generates 480,142 tons of CCR per year for a combined annual CCR production of about 847,713 tons. Estimated annual CCR production rates are illustrated in Table 1. Tons of CCR are converted to CY to determine the pond or landfill volume required for storage of the material. The Trimble County Generating Station will exceed existing CCR storage capacity within approximately one year of bringing Unit 2 on-line. Due to lack of CCR storage, expansion of the on-site Bottom Ash Pond (BAP) and Gypsum Storage Pond (GSP) will address short term needs for CCR storage. To meet long term needs within the window created by these short term measures, LG&E has developed several alternatives to assess CCR storage options.

TABLE 1 LG&E Trimble County Generating Station Estimated Coal Combustion Residuals Volumes					
Units:	TONS PER YEAR			TONS/CY	CY PER YEAR
Material	Unit 1	Unit 2	Total	Density	Volume
Pyrites	3,411	4,440	7,850	1.823	4,306
Bottom Ash	30,965	39,950	70,645	1.080	65,412
Economizer/ Duct Ash	4,263	5,550	9,813	0.810	12,115
Fly Ash	132,160	172,034	304,195	0.878	346,463
Gypsum	197,041	258,169	455,210	0.945	481,703
Total	367,571	480,142	847,713		910,000

A site vicinity map for Trimble County Generating Station is presented in **Figure 1**. The BAP and EFAP are illustrated in **Figure 1a** and the central power plant facilities in **Figure 1b**.

Responsible storage of CCR must meet the following objectives:

- Manage the large volumes of CCR in an environmentally safe manner and minimize environmental impacts
- Maintain uninterrupted delivery of service
- Develop storage options for CCR at a cost effective scale

Measures to meet environmentally safe standards include maximizing product beneficial reuse, transfer and storage procedures to minimize potential escape to the environment, and ownership by LG&E of CCR handling / storage facilities to avoid risks and liabilities associated with third party handling and/or storage of CCR.

Maintaining uninterrupted service delivery requires measures to assure that backup storage capacity for the BAP is available whenever access to primary storage (selected alternative) is unavailable. The expansion of the BAP includes reserved capacity to meet this need assuming timely completion of the selected alternative.

Achieving a CCR storage solution that provides capacity for 38 years of power production is critical to meeting the project purpose and need. Adequate storage capacity must meet the following objectives:

- Covers the life of the production units
- Allows for long term planning, investment and management that is consistent with plant operations
- Minimizes the prohibitive cost of identifying, designing and permitting multiple storage facilities
- Avoids the future uncertainty associated with a finite number of potential storage locations and growing competition for these sites
- Maintain control over CCR materials to eliminate future legal risks
- Cost effective solution

3.0 ALTERNATIVES ANALYSIS BACKGROUND

This section provides an explanation of the multiple issues considered for developing alternatives to address storage of CCR.

3.1 CRITICAL DEADLINE FOR DEVELOPMENT OF LONG TERM CCR STORAGE

Existing capacity for CCR storage at Trimble County Generating Station is near exceedance. Long term CCR storage to address the project purpose and need must be permitted, constructed and available for operation by 2015.

The current expansion and utilization of all available on-site capacity will add a few additional years to arrive at 2015. The capacity in the Bottom Ash Pond (BAP) has been expanded by raising the pond dikes approximately 30 feet. Additional capacity will be added by using the Emergency Fly Ash Pond, which has never been placed in service, for storage of gypsum. The implications of addressing long-term CCR storage include:

- Exceeding storage capacity by 2015
- Siting, design and permitting takes many years
- The selected storage location must be ready to begin the permitting process
- Construction can take 2 years
- Time required to condemn non-willing sellers
- Alternatives requiring acquisition from multiple owners adds to the difficulty of quick action

3.2 BENEFICIAL REUSE

Currently, beneficial reuse of CCR from Trimble County Generating Station Unit 1 accounts for about 11% of annual fly and bottom ash production (about 25,700 tons per year (tpy)) and about 93% of Synthetic gypsum (247,600 tpy). Beneficial reuse remains the preferred option for disposal of CCR (both at Trimble County Generating Station and as official corporate policy of LG&E) and will be exercised to the maximum extent feasible. Material will be placed in long term storage only if no feasible reuse market is available. This approach is applicable to all alternatives addressed in this analysis. To increase Trimble County Generating Station's ability to increase beneficial reuse opportunities, two new barge loading facilities are being built, one for fly ash and the other for gypsum. This will increase the current beneficial reuse opportunities of both

materials. Simultaneous with barge loading opportunities, transporting of fly ash and gypsum by truck will continue.

Segregation of CCR materials in the landfill for future reclaiming as beneficial reuse was evaluated during the engineering design of the CCR treatment and transportation. The evaluation determined that segregation of CCR material at the time of disposal is not practical.

3.3 RISK MANAGEMENT AND LIABILITY

LG&E recognizes that contracting with an off-site facility would not provide the cost control, liability control, or guaranteed availability of capacity that is associated with developing a facility owned by the utility. Liability control is a critical issue. At a contracted site, LG&E would still be liable for its CCRs, but would relinquish control of its disposal. This introduces a degree of market uncertainty; it would be difficult to find a contractor willing to sign a 38 year agreement.

Additional risk is introduced whenever CCR must be transported from Trimble County Generating Station to an off-site location. Transport risks increase with distance traveled, the number of units required to convey the material, the method of transport and the number of transfer stations from the source to final storage. Transporting large volumes of 910,000 CY of CCR materials annually on public roadways will also generate community opposition.

These risk and liability issues have been considered in the development and analysis of all alternatives.

3.4 OPTIONS FOR TRANSPORT

Transportation of CCR from the point of origin to a storage location on an around-the-clock basis is a key factor in selection of a storage alternative. The station annually generates 910,000 CY of CCR materials (Table 1).

Development, operation and maintenance of the transport system is a major portion of the overall cost of CCR storage and will consume large amounts of energy over the lifetime of the delivery operations. Some systems can be operated on electric power produced by the station, while others must rely on external fuel sources that are subject to price fluctuations or delivery interruptions. System selection will also need to evaluate the impact to the environment and land use. Impacts

associated with any transportation option will also persist over the lifetime of CCR delivery operations.

3.4.1 Pipe Conveyor

The pipe conveyor system is considered the most reliable and environmentally preferred means of short range CCR transport. Compared to other transport methods (trucks, barge, hydroveyors, other piping systems and traditional conveyors), the pipe conveyor system produces minimal noise, dust, and spills, has a small footprint, is easy to construct, cost effective, and energy efficient. From an environmental standpoint it is preferred to other options for transport due to the isolation of CCR materials from the environment. This includes reduction in fugitive dust and reduction in spill potential. A pipe conveyor system is the preferred transport mechanism for storage sites in close proximity to Trimble County Generating Station.

3.4.2 Conveyor Transport

Dry material can be moved by conveyor systems and are commonly used in multiple locations for different materials. Conveyors are used at Trimble County Generating Station to transport coal from barges to storage areas and then to Unit 1 and 2 boilers. Limestone is also conveyed by conveyors at the station from barge unloading to the limestone storage pile. At some power plants, conveyors are used to move CCR to nearby landfills. Conveyors are generally energy and cost efficient and reliable. Compared to a pipe conveyor system, they produce greater air and noise impacts, which are controlled in compliance with applicable air and noise permits. They can go further than pipelines; have a small footprint, and relatively low environmental impacts. This transportation option also provides preference to site selection for locations within a short distance of the plant.

3.4.3 Truck Transport

The primary impacts of trucking CCR include noise, traffic congestion, roadway infrastructure impacts, fuel consumption, safety issues and air impacts. The amount of CCR materials to be transported by truck is 910,000 CY per year. This is equivalent to 2,500 CY per day round-the-clock, 365 days per year. For tri-axle dump trucks with a typical capacity of 27 CY, this is 93 truck loads per day or 4 loads per hour (once every 15 minutes) around-the-clock. Accounting for trucks

returning empty, either a full truck or empty truck will pass a given point on the transport route every 7.5 minutes round-the-clock, 365 days per year.

The roads that serve Trimble County are primarily secondary roads that are not designed for either the weight or volume of trucks needed to haul this material.

This volume of heavy trucks would be of concern to adjacent property owners, other users of the roads and local government responsible for maintenance. Compared to other transport options, trucking is the least desirable on the basis of environmental impacts, socio-economic issues and cost. In spite of these limitations trucking is often the only available option for transport beyond the limits of conveyors or pipelines and to destinations not served by barge or rail.

Truck transportation also has the inherent vulnerability to escalating fuel oil costs, which makes it difficult for LG&E to control costs to their customers.

Fly ash, bottom ash and gypsum are currently trucked off site for beneficial reuse applications. LG&E is currently expanding barge facilities at Trimble County Generating Station to increase its beneficial reuse opportunities for fly ash and gypsum. However, trucking of some CCR materials for beneficial reuse will most likely continue even after the barge loading facilities are completed. Long term storage options could require that some or all CCR be transported by truck.

3.4.4 Rail Transport

This alternative does not exist at the Trimble facility and would need to be combined with another transport method. The nearest railroad is located over 20 miles from the station near Sulfur, Kentucky or Pendleton, Kentucky. For example, truck or barge transport could be utilized for multi-modal transport via rail to a distant alternative. A truck to rail system would have the same disadvantages as a truck-only option (i.e. – the volume of trucks on the current roads). This example would require an additional transfer facility, which would add a handling step, increase the risk of spills and add higher costs.

3.4.5 Barge Transport

LG&E is proceeding with planned expansion of barge shipping facilities at Trimble County Generating Station. This will require construction of a conveyor system to move CCR from on-shore storage to outgoing barges via an existing river cell. The establishment of this barge shipping capability increases access to a broader range of reuse markets; supporting the objective of maximizing beneficial reuse to extend long term storage life. It also increases accessibility to off-site CCR storage. Analysis of such alternatives has been addressed in this report to account for the availability of barge transport.

The proposed construction of an additional barge loading facility will require the modification of the existing mooring cells systems. The air permit for the station will need to be evaluated to address impacts of fugitive dust emissions, water quality, aquatic organisms and shoreline habitats. However, such impacts associated with outgoing barge transport will constitute a relatively minor increment (less than 10%) over equivalent impacts associated with barge delivery of coal and limestone.

Scenarios for the development of alternative storage sites would likely require air and water permitting for construction of new barge terminal facilities at the receiving locations. A separate evaluation of regulatory requirements would be required for each project site. The effect of impacts associated with such development and subsequent operation will potentially degrade shoreline resources through dredging a channel, disposal of dredge waste, shading, siltation and the risks of large spill events.

Wherever it is feasible, barge transport of bulk material such as CCR is the most cost efficient option for long distance transport, provided the receiving facility is close to the destination terminal. If the destination is more distant, transfer to rail or truck would be required and would introduce additional cost.

3.4.6 Multi-Modal Transport

Various transport components can be combined to address specific needs. However, cost and environmental impacts generally increase with each transfer point. Additional costs and impacts

may result if interim storage is required at the transfer points. Multi-modal transport also increases costs, spill risks and fuel consumption.

3.5 OPTIONS FOR STORAGE - PONDS AND LANDFILLS

There are many similarities between storage in landfills and ponds, with the main difference being that ponds are a wet facility and landfills are dry. Both can be built on level terrain such as floodplain terraces of the Ohio River if the land surface is sufficiently above the water table and flood elevations. Ponds or landfills can also be built into the ravines that occur along the Ohio River valley. These two alternative methods of storage in terraces or ravines represent the majority of existing CCR storage solutions at power plants on the Ohio River. Each alternative has distinct advantages and disadvantages.

Ponds require a larger area than a landfill for the same quantity of material because the elevation cannot be as high, there needs to be freeboard, and the walls must be thicker. Landfills cannot accept materials with a high liquid content. Noise and dust are associated with landfills, whereas ponds have more issues with excess water and reducing impacts to wildlife that tend to be attracted to the water bodies.

For ponds on level ground, a minimum berm height of 35 feet is required to provide 5 feet of freeboard for a 30 foot storage depth. A minimum 25 feet of berm width at the top is needed to provide access for compaction equipment and maintenance vehicles. The berm slope must be 2.5:1 or less to establish and to promote vegetative cover and minimize slope erosion. The use of several smaller ponds would result in an even greater footprint and acreage requirement. It would be very difficult to acquire this amount of land through voluntary sale and a piecemeal approach is what LG&E is trying to avoid.

Landfills on flat terraces do not require the wide berms necessary for pond storage and therefore make more efficient use of the available space. They can also be filled to a greater height than is typically feasible for a storage pond. Landfill slopes must be 3:1 to promote greater stability and as compensation for the lack of containment berms. As a general basis for comparison, landfills in the settings described herein can achieve approximately twice the storage capacity of ponds utilizing the same development site.

For either a pond or a landfill to be constructed in a ravine, a major design criterion is the diversion of water. Both the landfill and the storage pond would require a dam across the ravine to hold the material back, although the pond dam would need to be wider. The landfill could be filled to a higher elevation and have a smaller footprint relative to the quantity stored. Either alternative would be lined.

Operationally, trucks or conveyors are required to haul and dispose of the dry material in the landfill and additional equipment is required to contour the delivered material. Water pumps and spray equipment are required for dust control in dry and windy conditions, and settling or evaporative ponds are needed to control runoff. Runoff or leachate from a landfill requires treatment. These active maintenance requirements must continue until the landfill is completed and capped.

For a pond, material would be pumped in pipes and poured into the pond. Concerns would include wildlife coming in contact with the ponds, the dewatering of ponds, and avoiding discharge of the material to surface waters. Water discharged from the pond would need to be treated for the life of the pond.

Early in the feasibility process, an assessment was performed concerning the development of storage ponds in Ravines A and B. LG&E believes that landfills would be more feasible due to recent proposed changes by EPA in regards to CCR impoundments. One possibility being considered by the EPA is not permitting new CCR impoundments.

3.6 STORAGE LOCATION OPTIONS

3.6.1 Terraces

Ohio River terraces are a geographically limited resource suitable to a number of competing uses. The availability of bulk transport and/or industrial process water is attractive to mining operations, large manufacturing industries, and coal fired power plants. Approximately 30 coal-electric utilities are located on terraces of the Ohio River and an additional 12 on tributaries of the Ohio River. Most of these include ash ponds or landfills on the terraces adjacent to the power plants.

Undeveloped terraces provide highly productive farmland. Periodic flooding deposits the organic content of loamy, well drained soils on these locations. The majority of farmland associated with Ohio River terraces is classified as Prime Farmland.

Ohio River terraces are known for a high concentration of cultural resources. Located on the major transportation corridor of the region, with abundant fisheries and productive croplands, terraces have been a major concentration point for village settlements over the course of 12,000 years. For similar reasons, terraces were used by early explorers and settlers, and succeeding generations of occupants up to the present. As such, almost all terraces are considered important by the Kentucky Heritage Council.

Despite the encroachment of dams, agriculture, commerce and urban development; terraces continue to provide important ecological functions at local and regional scales. The Ohio River is a major migration corridor and terrace habitats provide critical resources for feeding, resting and storm shelter during these migrations. Important habitat functions are highly associated with frequently flooded areas and are mostly concentrated in the riparian corridors of tributary streams, emergent scrub / shrub wetlands on fallow agricultural fields and adjacent forested hillsides or bluffs.

A candidate terrace for development of a new disposal facility requires a sufficiently large tract of land lying above the 100 year floodplain. Adequate fill material to construct a clay liner and to provide for embankment construction or cover material should be available onsite or close by. Storage capacity of the site needs to be sufficient to compensate for the added costs of site preparation, transport, mitigation for resource impacts, and the construction of terminals and conveyor facilities. The availability of power of condemnation is likely to be required to complete any land acquisition process.

Past commercial development of the most suitable terraces severely limits the availability of candidate sites for new disposal facilities. There is strong competition for these few remaining terraces. On most undeveloped terraces, large portions are situated within the 100 year floodplain, a location that is likely to be unsuitable to storage pond or landfill development or difficult to permit.

3.6.2 Ravines

Deeply incised ravines occur on many sections of the Ohio River where glacial forces contributed to downcutting of the river between relatively narrow bluffs. In the vicinity of Trimble County Generating Station, steep bluffs rise 250 to 350 feet above the terraces. Numerous ravines occur on both sides of the river in this area. These ravines have been used to store ash products at other power stations on the Ohio River.

In contrast to the developed terraces, ravines tend to be unused and unoccupied. They have traditionally provided a poor or marginal agricultural resource. Ravines are too steep and narrow for paved roads, but many have gravel or two-track roads. Most ravines contain woody overstory, cabins or second homes, abandoned farms, and provide recreational use and / or timber harvest.

The ravines are sensitive ecological resources. The quality of water resources and riparian and upland forest habitats are dependent on the nature of present land use. Ravines which lack road maintenance, but are the site of off-road vehicle activity, over-grazing and / or timber harvest can experience erosion and downstream sediment accumulations. Degraded ravines are likely to have rapid runoff during wet weather with a short duration of stream flow. By contrast, roadless ravines with no off-road recreational vehicles, grazing or timber harvest activity are likely to develop a heavy forest canopy that slows erosion and runoff, increases infiltration and supports longer periods of stream flow during dry weather. These ravines typically have high quality streams.

Ravines offer advantages for storage of CCR. Contouring a ravine to provide a stable angle of repose for installation of clay and geomembrane liners typically generates sufficient material for slope construction and soil cover during landfill operations.

At many power plant sites on the Ohio River, there is a correlation between the size of the terrace and the size of the power facility that can be established. The cost of power generation, and the ultimate cost of power delivered to the consumer is reduced in proportion to the total capacity that can be generated from an individual plant site. Ravines provide an opportunity for CCR placement within terrain that is unusable for other components of plant operation and maximizes the availability of level terrain on the terrace for other uses.

3.6.3 Mineral Extraction Sites

A potential benefit of using closed sand / gravel pits for CCR storage would be the opportunity to avoid the cultural and environmental impacts of developing new CCR storage. After filling and capping the former mining pit, the site could be returned to agricultural or other uses similar to pre-development conditions at the site. However, many such pits are located within the floodplain and/or excavated, in the wet, to below the surface of the water table. The ability to construct an impervious liner system would be complex and expensive in such conditions. Flood proofing would incur additional expense in proportion to the probable frequency of flood events. With the small size of gravel pits in the project area, these development efforts would result in minimal capacities for storage. Additionally, the EPA has indicated that the use of CCR to fill sand and gravel pits poses many potential risks and generally advises that such practices should be avoided.

An important exception to this general case may apply to closed limestone quarries that are sufficiently inland to avoid floodplain issues. This type of excavation is generally pumped to keep the excavation dry. At closure, a limestone mine would offer competent rock bottom and sides for construction of liners. The larger size of such operations could yield net storage costs that are closer to the costs of other feasible alternatives.

4.0 REVIEW OF EVALUATION CRITERIA

The preceding alternatives analysis background illustrates some of the factors addressed by the eight evaluation criteria employed in comparison of alternatives. These criteria address both qualitative and quantitative issues. The relative importance or applicability of each criterion will vary with the characteristics of each alternative being addressed. There is some redundancy between criteria because each criterion assesses a similar topic from a different perspective. The overall objective is to use the criteria to facilitate an objective comparison of the alternatives. Following is an expanded description of the evaluation criteria:

Adequate Storage Capacity – The proposed alternative must provide enough capacity to store the 38 year production of CCR at the annual rate of 910,000 CY, totaling 34.6 million CY. Alternatives that do not meet the total capacity objective may be acceptable if they can be combined efficiently with other potential sites that employ equivalent storage technology, modes of transport and the ability to be jointly or sequentially permitted. Storage options are required to provide long-term assured capacity to be cost efficient and to avoid higher risks of repeatedly developing short term options.

Implementation – The proposed alternative must be practicable and implementable by 2015 to meet the CCR storage requirements of this station. This requires the ability to design, permit, and construct the proposed alternative and the ability to purchase land while avoiding controversial or legal issues such as condemnation.

Risk and Liability – The proposed alternative must consider LG&E's ultimate liability for CCR during transport and storage. Liability control is a critical issue. At a contracted site, LG&E would still be partially liable for its CCRs, but would relinquish control of CCR storage.

Socio-Economic Effects – The proposed alternative must consider impacts on population, economy and land use patterns. This criterion assesses impacts of relocating residents and converting farmland or forest to CCR storage. Acquisition of multiple properties, owner resistance and condemnation proceedings can significantly delay a project. Competing land uses will limit development opportunities and influence the costs of CCR storage.

Effects on the Environment – The proposed alternative must consider impacts to natural resources. Cultural resources are included under this criterion. CCR storage may produce air, water quality, noise, and habitat loss impacts. Transportation impacts of CCR are also assessed. Environmental analysis includes how these factors influence the ability to obtain permits and perform mitigation commensurate with the environmental impacts.

Proximity – Proximity assesses the distance traveled from the location of CCR production to storage opportunities. Proximity issues include the types of transport options that may be feasible and the availability of options for handling leachate. For example, pipe conveyors or a conventional conveyor system can only be used practically for relatively short distances, whereas truck transportation is applicable to intermediate distance. Rail and barge transport is required for long distances.

Transportation – Transport of CCR from its point of origin to a storage location is a key factor in site selection. The transport system must be capable of moving large quantities of CCR on an around the clock basis. Development, operation and maintenance of the transport system will constitute a major portion of the overall cost of CCR storage and will consume large amounts of energy over the lifetime of the delivery operations. Impacts associated with any transportation alternative will persist for as long as CCR deliveries continue. The method of transportation influences storage alternatives; for example, the transport of wet vs. dry materials has an influence on the storage option.

Transportation alternatives can be described under the following preferred hierarchy: enclosed pipe conveyor, open conveyor, barge, rail and truck. Multimodal methods are possible, but costs and spill potential increase. In general: costs, fuel consumption and environmental impacts will range from lowest (pipe) to highest (truck) along this hierarchy. Suitability of transportation alternatives is also a function of distance. Pipe or conveyor is only suitable to short distance transport and movement by barge or rail is only feasible for long distances. In spite of higher costs and impacts, truck transport is often the only option for mid-range transport.

Cost of Storage – As a publicly regulated utility there is a responsibility to seek out cost effective measures of benefit to the rate payers. This criterion provides a qualitative assessment of cost.

The cost of storage of CCR affects the rates paid by LG&E's customer. These rates not only affect individual customers, but also impact business and industry in the LG&E service area. Higher rates will cause industry to be non-competitive, which can result in industries leaving the area with the resulting unemployment.

5.0 SCREENING AND DISCUSSION OF ALTERNATIVES

Alternatives were analyzed to determine those that would reasonably meet the overall project purpose, separately or in combination with other alternatives. In the screening process, the evaluation criteria were applied to a level commensurate with the feasibility of the alternative. Those alternatives that met at least 6 of the criteria were carried forward for detailed analysis.

5.1 NO ACTION (ALTERNATIVE 1)

Under this alternative, construction of expanded on-site capacity in GSP and BAP would proceed as planned. With Unit 2 online, the expanded capacity in the GSP and BAP will provide additional CCR storage for both Units 1 and 2 for only a few years.

Alternative 1 was eliminated from further evaluation as a practicable alternative to the proposed project because both Units 1 and 2 would cease operation when the BAP and GSP reach full capacity. This is not feasible to meet customer needs.

5.2 BENEFICIAL REUSE (ALTERNATIVE 2)

Under this alternative, no storage would be used. The disposition of CCR would be solely dependent on the reuse market. CCR would continue to be transported off-site by truck or barge to reuse markets.

Alternative 2 was eliminated from further evaluation as a practicable alternative to the proposed project because:

- The beneficial reuse market does not support 100% of CCR production; current beneficial reuse accounts for 11% of annual fly and bottom ash production (about 25,700 tons per year) and 93% of Synthetic gypsum (247,600 tpy).
- Expanded production of synthetic gypsum from other power plants is oversupplying the market. The reuse of fly ash and bottom ash is limited by overabundant supplies and static development of new reuse opportunities. The beneficial reuse of CCR is also impacted by any slow-down in the economy.

Beneficial reuse will continue as a primary component of any alternative, but it must occur in conjunction with another alternative. LG&E is committed to pursuing all feasible beneficial reuse opportunities of its CCR. LG&E has facilities to accumulate and transport materials for beneficial reuse as the need arises. These materials are generated on an on-going basis and the company anticipates being able to satisfy beneficial reuse requests using existing production. Thus, there is no need to segregate these materials at the time of disposal.

5.3 ON-SITE ALTERNATIVES (3A, 3B, 3C, 3D)

These alternatives are undeveloped parcels owned by LG&E at the Trimble County Generating Station. Use of these sites would be within the ownership control of LG&E and accessible to pipe conveyor transport of CCR.

5.3.1 Dickey Farm (Alternative 3A) (Figure 2a, Site #1)

This 80 acre parcel was originally purchased and excavated as a source of clay liner for the BAP. Additional excavation will be used as structural fill material for expansion of the BAP. The Dickey Farm parcel is bounded to the south and east by Corn Creek, with the Ohio River to the west. These border and stream setbacks, plus the footprint of the containment berms, reduce the maximum footprint of a CCR storage pond on this site to approximately 35 acres.

Construction of a storage pond in this location would be subject to frequent flooding by the Ohio River and year round high water tables; the entire parcel lies within the 100-year floodplain. The feasibility of constructing a CCR pond on this site is also complicated by the excavation of fill material for expansion of the BAP. Additional property acquisition from adjacent landowners would be required for acquisition of fill material for construction of clay liner and berms for an on-site storage pond.

Alternative 3A was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided. A 35 acre storage pond or landfill would yield 11% of needed capacity.
- Development would require additional property acquisition.
- Flooding risks and a high water table affect feasibility and capacity issues

5.3.2 Ravine C (Alternative 3B) (Figure 2b, Site #5)

This small ravine is located east of the BAP. The close proximity of State Road 1838 presents complications for diverting stormwater around the perimeter. High operation and maintenance costs relative to storage capacity would be required to operate a landfill at this location.

Alternative 3B was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided. An 80 acre landfill would yield 39% of needed capacity.
- High operation and maintenance costs relative to storage capacity to operate a landfill in Ravine C.
- Development would require additional property acquisition.

5.3.3 Ridge Tops (Alternative 3C) (Figures 2a and 2b, Site #4)

LG&E owns ridge tops between Ravines A and B and south of Ravine B. As illustrated in the figures, the terrain is irregularly dissected by Ravine tributaries; CCR storage would require numerous small, individual pond cells. Construction on ridge tops would impact the uplands and ephemeral headwater streams that feed into the ravines. Ridge-top storage structures would eliminate the buffer zone between the Trimble Plant site and area residents and would impose visual, noise, dust and related impacts.

Alternative 3C was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided. Approximately 200 acres of multiple, small storage ponds or 111 acres of landfill would yield 33% of needed capacity.
- Ridge-top storage ponds would eliminate the buffer zone between the Trimble Plant site and area residents, imposing visual, noise, and dust impacts.
- Additional property acquisition would be required for clay liner and berm construction materials.
- The height of a ridge top landfill would result in significant view shed issues to adjacent property owners.

5.3.4 Ravine B (Alternative 3D) (Figure 3)

This alternative addresses development of the ravines adjacent to the Trimble County Generating Station as a landfill for long term CCR storage. Landfill storage of CCR materials in both Ravines A and B was assessed during an evaluation for landfill storage and concluded that landfills encompassing both Ravine A and Ravine B is not needed and the environmental impact could be minimized by restricting the impact to one ravine. From an environmental standpoint, both ravines are considered essentially equal. Development of a landfill for CCR storage within Ravine B was considered the most cost-effective option. In conjunction with expanding the capacity of existing CCR storage at Trimble County Generating Station and continued priority marketing of CCR for beneficial reuse; Ravine B can provide assured on-site storage capacity that will last through the 38 year operational life of Units 1 and 2.

Planned utilization of Ravine B includes development of a landfill. The feasibility of separating the CCR materials in the landfill for future beneficial reuse recovery has been investigated. An enclosed pipe conveyor will transport CCR ash and synthetic gypsum to the material handling terminus. To move the CCR to the landfill face, either a short shuttle conveyor will be used or front-end loaders will load articulating trucks for the short distance. An access road will be constructed at KY 1838 near the northeast corner of the bottom ash pond, traversing to the east parallel to Wentworth Road (see Figure 3).

From an environmental standpoint, an enclosed pipe conveyor is far superior to other options for transport due to the reduction of fugitive dust from the CCR materials being conveyed. A pipe conveyor system is the preferred transport mechanism for storage sites in close proximity to Trimble County Generating Station.

Alternative 3D was retained as a practicable alternative for detailed analysis. As summarized below, this alternative fully meets 7 of the 8 evaluation criteria:

- **Adequate Storage Capacity** - This alternative provides capacity to store the 38 year production of CCR over the life of the station.
- **Implementation** - This alternative is practicable and implementable by 2015.
- **Risk and Liability** - This alternative meets LG&E criteria for minimization of risk and liability. Direct ownership of on-site facilities maximizes LG&E control over all aspects of CCR management, transport and storage.
- **Socio-Economic Effects** - This alternative results in minimal impacts on population, economy and land use patterns. No residents are displaced and no farms or other economic activities are impacted.

- **Effects on the Environment** – This alternative will impact high quality streams and other natural resources. A watershed-based Mitigation Plan has been prepared for Corn Creek to address these impacts. The Corn Creek Mitigation Plan will provide various improvements to Corn Creek to compensate for stream impacts in Ravine B.

Cultural and Archeological resources are also impacted under this option. Impacts to cultural resources were addressed in coordination with the Kentucky Heritage Council.

- **Proximity** – This alternative minimizes the distance traveled from the location of CCR production to storage facilities.
- **Transportation** – This alternative makes it feasible to use an enclosed pipe conveyor system for transport of CCR to the landfill. Pipe conveyor transport is the most reliable and environmentally preferred means of short range delivery of CCR.
- **Cost of Disposal/Storage** – This alternative provides for cost effective delivery of service to LG&E customers and shareholders.

Ravine B, Alternative 3D, is the preferred alternative based on the consideration of all selection criteria.

5.4 NEAR-SITE ALTERNATIVES (4A, 4B, 4C) (DEFINED AS ACCESSIBLE VIA PIPE CONVEYOR OR OPEN CONVEYOR)

5.4.1 Introduction

Purchase and development of landfills on near-site properties would allow for avoidance of environmental liabilities associated with contracting with an outside vendor, avoidance of off-site shipping costs and risks, maintaining access and cost control over use of the available capacity and pipe conveyor transport of the CCR.

5.4.2 North River Terrace and Corn Creek Valley (Alternative 4A)

North River Terrace (Figure 2a, Site #2) and Corn Creek Valley (Figure 2a, Site #3) were assessed for CCR storage ponds or landfills and as sources of fill material for other construction applications. The North River Terrace is under two ownerships, both land owners are unwilling to participate in land acquisition. The first owner has expressed preference to retain family ownership and farming activities. This farm includes a known and significant archaeological site that represents occupations dating to the Archaic, Woodland and Late Mississippian/Fort Ancient.

The second owner farms and operates Preston Plantation; a “Heritage Recreation Area” (Civil War and Underground RR re-enactment, story-telling, cultural history education, camping). The property is a

remnant of a mid-19th century plantation that included lower and middle Corn Creek and the ridge between Corn Creek and the Ohio River. The plantation (circa 1840-1860) was associated with abolitionist activities and the site of an integrated grade school. The primary home and school site of the plantation, located on an adjacent property on the ridge, is listed on the national Register of Historic Places.

Corn Creek Valley is limited by the terrain and stream meanders, allowing for small storage ponds or landfills. Development would require significant impacts to Corn Creek and its tributaries, wetlands and cultural sites and would require acquisition of multiple properties.

Alternative 4A was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided from the combination of storage sites; storage capacities for each area are approximately 20 acres (North River Terrace), and 80 acres (Corn Creek Valley) for a combined storage capacity of 100 acres; these storage capacities meet 33% of the required capacity for ponds or landfills
- Construction of storage ponds on North River Terrace would be subject to frequent flooding by the Ohio River and year round high water tables
- Significant cultural resource issues are associated with both areas
- Property owners not willing to sell

5.4.3 South River Terrace-1 and Lites Quarry (Alternative 4B)

South River Terrace-1 (Figure 2b, Site #6) was assessed for the storage of CCR into a storage pond or landfill and as a source of fill material. The first property owner south of Trimble County Generating Station has previously indicated a willingness to sell the 179 acre parcel. In conjunction with LG&E property south of Wises Landing Road, the small level field north of Barebone Creek could potentially be developed as a small (<30 acre) pond or landfill or utilized as a source of fill material. The 179 acre parcel also includes a small ravine similar to the previously described 'Ravine C'. Access to this ravine would require crossing Barebone Creek with an open conveyor or pipe conveyor.

This area is isolated from properties farther south by the Lites Quarry properties. Pipe conveyors constructed to access the Terrace-1 area could not be extended through the sand and gravel pit operations area without a negotiated agreement. Purchase and use of Terrace-1 would be within ownership control of LG&E and accessible to pipe conveyor transport of CCR.

Liter's Quarry (Figure 2b, Site #7) is a sand & gravel operation that includes two excavated ponds with a combined surface area of approximately 20 acres. About half of the 95 total acres are level ground; the remainder is a steep bluff. Barebone Creek defines the north and west boundaries of the site and flows through the south portion. Immediately west of Barebone Creek is the community of Wises Landing, which includes approximately 20 households.

Alternative 4B was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided from the combination of storage sites; storage capacities for each area are approximately 20 acres of pond on level ground, approximately 110 acres of landfill in a ravine similar to "Ravine C" and 20 acres of storage ponds (Liter's Quarry); these storage capacities meet 31% of the required storage capacity.
- The small field on South River Terrace-1 is not suitable due to its close proximity to the Wises Landing well field.
- The ravine on South River Terrace-1 would be expensive to develop and maintain by crossing Barebone Creek with a pipe conveyor.
- Liter's Quarry area is not suitable for CCR storage because Barebone Creek flows into the quarry and potential inherited liabilities associated with past mining practices.

5.4.4 South River Terrace-2 and South River Terrace-3 (Alternative 4C)

South River Terrace-2 (Figure 2c, Site #8) was assessed for potential pond or landfill storage. The two parcels (one owner) south of Liter's Quarry and Wises Landing Road are bounded by Barebone Creek on the east and south and by the Ohio River to the west. On the east, Barebone Creek has been straightened; on the south it is unstable and migrating laterally at a rapid rate.

Access to the site via pipe conveyor transport may be feasible; it would require an above ground pipe conveyor or open conveyor running west of Wises Landing. The approximate length of the pipe conveyor would be 1.75 miles.

South River Terrace-3 (Figure 2c, Site #9) was assessed for pond or landfill storage. The seven properties between Barebone and Middle Creek include approximately 231 acres of level floodplain. However, allowing for setbacks and berms the effective containment area is limited by the narrow configuration of the site. Extending the pipe conveyor or open conveyor would extend the total length from 1.75 to approximately 2.9 miles.

Land use details for South River Terraces 2 and 3 are presented in Figure 4a and 4b. An illustration of the conceptual project areas on these terraces is presented in Figure 5a and 5b.

Alternative 4C was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided from the combination of storage sites. Storage capacities for each area are approximately 45 acres within South Terrace-2 and 123 acres within South Terrace-3. If developed as landfills or ponds, these two areas represent 90% of required capacity.
- Multiple property acquisitions would be required to develop consolidated storage sites on both terraces. Although Eminent Domain is available to LG&E in Kentucky, it is unlikely that disputes could be resolved within the required timeframe for development.
- Feasibility to construct a haul road or pipe conveyor within South River Terrace-2 is limited due to significant fill and stabilization issues to elevate either option above the existing floodplain. Use of the existing road through Wises Landing for any of these transport options would require multiple property acquisitions.
- Long term stabilization of Barebone Creek is infeasible so long as the stream flows into the abandoned upstream quarry. During high water, bedload drops out in the abandoned quarry, resulting in high erosional flows in the stream where it passes between the potential storage sites.

5.5 OFF-SITE ALTERNATIVES

Offsite storage alternatives assessed consist of landfills, former limestone quarries, sand and gravel pits, and coal mines.

5.5.1 LG&E Owned CCR Storage (Alternatives 5A, 5B, 5C, 5D, 5E, 5F)

These alternatives consist of the purchase and development of storage resources by LG&E on nearby Ohio River terraces. Transport by barge from Trimble County Generating Station is feasible, but dry transport would be required. Landfills would be preferred over ponds because this allows for twice the net storage volume. Separate landfills for gypsum and CCR ash would be technically feasible, but would likely require extra costs and/or less total storage volume.

Volumes of CCR storage were estimated based on the net acreage of available terrain minus acreages required for setbacks and lift slopes. Other factors that could affect the cost or capacity of these candidate sites, which were not evaluated at this preliminary screening level, include floodplain impacts and cultural resources. Floodplain impacts would reduce the feasibility of landfills on these terraces as illustrated in

Figure 10. It is anticipated that required cultural resource surveys would identify significant cultural features on these terraces.

Nearby candidate sites include two terraces on the Indiana side and two terraces on the Kentucky side of the Ohio River. While condemnation power is available in both Kentucky and Indiana, condemnation is never a desirable action.

Opportunities north of these four terraces must compete with heavy commercial/industrial activity, beginning with the Clifty Creek power plant 12 miles upriver from Trimble County Generating Station, followed by the community of Madison, Indiana. Additional industry includes Nugent Sand, Dow Corning, Kentucky Utilities Ghent Generating Station, North American Stainless, Celotex, and Gallatin Steel.

Opportunities further south must compete with concentrated land uses extending upstream from Louisville. Potential terrace sites are currently being developed with activities related to mining, commercial, industrial, and residential/community development.

LG&E's two power plants at Trimble County Generating Station and Ghent Generating Station, located near the Ohio River McAlpine Pool, must compete for CCR storage or landfill space with the Clifty Creek power plant and with Gallatin Steel. Further upstream, five coal-fired power plants operate on the Ohio River Markland Pool. Downstream from Louisville, four coal-fired power plants operate on the Cannelton Pool. The loss of the main lock at Markland Dam for the foreseeable future reinforces the level of uncertainty attached to distant disposal alternatives.

5.5.1.1 Bethlehem Terrace Sites (Alternative 5A)

This large floodplain terrace lies south of Trimble County Generating Station on the Indiana side. It begins below the community of Bethlehem and extends for about 2.5 miles to the mouth of Camp Creek. The terrace includes over 1,000 acres, but the central area is dominated by two large sand and gravel mining operations on the river banks and a large limestone mine inland. The only currently available area that could potentially result in consolidation and acquisition of sufficient space to develop landfill capacity lies south of the sand and gravel operations and north of the Camp Creek area, at river mile 577.8, which is approximately 6.5 miles downstream of Trimble County Generating Station. At best, it might be possible to consolidate up to 200 acres of landfill capacity in this area. Surface features (pre-

development) for Bethlehem Terrace are illustrated in **Figure 6**. Current land use is presented in **Figures 6a and 6b**.

In the future, the limestone mine, which is inland and out of the floodplain, could become a feasible site for disposal of CCR after the mining activity is concluded. Feasibility assumes that the mine site could be maintained in a dewatered condition that would allow construction of clay and geomembrane liners.

Alternative 5A was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided from the available storage sites; the potential storage capacity for property that may be currently available on Bethlehem Terrace totals approximately 73% of needed capacity.
- Multiple property acquisitions would be required to develop a consolidated storage site. Condemnation through Eminent Domain for property owners not willing to sell would be most difficult within the timeframe for development.
- Lifetime costs of CCR storage would escalate due to the need to construct and permit a barge off-loading facility and transfer system, the higher costs of barge transport compared to an on-site pipe conveyor system and the costs of property acquisition compared to property currently owned by LG&E.
- Potential storage capacity in the limestone mining site is not presently available to develop. The mine is likely to operate for many more years and the ability to evaluate its feasibility for CCR storage would depend on the condition of the site after mining has ended.

5.5.1.2 Lee Bottom (Alternative 5B)

The first terrace upstream of Trimble County Generating Station is Lee Bottom on the Indiana side beginning at river mile 568.0 and extending upriver to the mouth of Lee Creek at river mile 566.4. The midpoint of the terrace is about 4.1 miles upriver from Trimble County Generating Station. Land use is agricultural, with only a few residences on the terrace. Level terrain on the terrace totals about 340 acres, but stream setback requirements (minimum 250 feet) reduces the effective storage footprint to less than 200 acres. **Figure 7** illustrates the surface features for Lee bottom and current land use is presented in **Figures 7a and 7b**.

Alternative 5B was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided from the available land. The narrow configuration of Lee Bottom and the need for stream setbacks reduces the available storage capacity for a landfill to 54% of needed capacity.
- Multiple land acquisitions on Lee Bottom (10 to 12 properties) are required. Use of Eminent Domain by LG&E outside Kentucky would be most difficult within the timeframe for development.
- Floodplain constraints will limit development capacity and / or increase development costs.
- Lifetime costs of CCR storage would escalate due to the need to construct and permit a barge off-loading facility and transfer system, the higher costs of barge transport compared to an on-site pipe conveyor and the costs of property acquisition compared to property currently owned by LG&E.

5.5.1.3 Spring Creek Terrace (Alternative 5C)

The next upstream terrace lies on the Kentucky side north of Spring Creek at river mile 566.0 and extends to south of Gilmore Creek at river mile 564.4. The midpoint of the terrace is about 6.1 miles upriver from Trimble County Generating Station. Acquisition of 12 or 15 properties would provide approximately 320 acres of level property. A preliminary measurement suggests that about 220 acres of landfill capacity could be developed on this site.

Aerial photography shows land use to be agricultural and rural residential. There is no local municipality. There are approximately 10 to 12 property parcels that would require acquisition for storage development. Surface features for Spring Creek are illustrated in Figure 8. Current land use is presented in Figures 8a and 8b.

Alternative 5C was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Adequate storage capacity is not provided from the available land. The narrow configuration of the terrace and the need for stream setbacks reduces the available storage capacity to approximately 92% of needed capacity.
- Multiple land acquisitions (10 to 12 properties) are required. Although Eminent Domain is available to LG&E in Kentucky, it is unlikely that disputes could be resolved within the required timeframe for development.
- Floodplain constraints will limit development capacity and/or increase development costs.
- Lifetime costs of CCR storage would escalate due to the need to construct and permit a barge off-loading facility and transfer system, the higher costs of barge transport

compared to an on-site pipe conveyor and the costs of property acquisition compared to property currently owned by LG&E.

5.5.1.4 Cooper's Bottom (Alternative 5D)

This terrace is on the Kentucky side approximately 10.0 miles upriver from Trimble County Generating Station and directly across from the Clifty Creek power plant site. It lies between Cooper Creek at mile 562.0 and Page Creek at mile 559.7. Acquisition of all properties on level terrain would provide approximately 395 acres of landfill storage. Although this area is larger than Lee Bottom or Spring Creek, streams and a road occupy the center of the terrace. These features would reduce the potential acreage for development. Surface features are illustrated in Figure 9. Current land use is presented in Figures 9a and 9b.

Alternative 5D was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Multiple land acquisitions are required. Although Eminent Domain is available to LG&E in Kentucky, it is unlikely that disputes could be resolved within the required timeframe for development.
- Floodplain constraints will increase development costs.
- Lifetime costs of CCR storage would escalate due to the need to construct and permit a barge off-loading facility and transfer system, the higher costs of barge transport compared to an on-site pipe conveyor and the costs of property acquisition compared to property currently owned by LG&E.

5.5.1.5 Other Barge Accessible Opportunities on the Ohio River (Alternative 5E)

The feasibility of transporting CCR over long distances to barge accessible facilities elsewhere on the Ohio River was assessed under this alternative. Opportunities to acquire and develop a suitable terrace upstream or downstream of McAlpine Pool are reduced by competition for landfill space from other power plants and coal burning industries. Riverfront development from other industries, mining, barge terminals, and urban development further reduces the opportunity to find a suitable site.

Upstream of McAlpine, the City of Cincinnati, Ohio is situated on the middle of Markland Pool, which is one of the most heavily developed pools on the Ohio River. In addition to five coal fired power plants,

numerous industries, terminals and mining operations occupy riverfront properties. The probability of finding suitable land for development of CCR storage on this pool is very low.

The downstream half of McAlpine Pool and upper portion of Cannelton Pool are dominated by the City of Louisville, Kentucky. This reach of industrialized riverfront is not likely to provide any suitable location for development of a CCR landfill. Farther downstream the landscape is more rural and the potential to locate a potentially feasible site may improve, although there are four coal-fired power plants on Cannelton Pool that would compete for such a facility.

Moving CCR materials through Ohio River locks either upstream or downstream from the Trimble County Generating Station is problematic due to outages on the locks from maintenance. Selecting any site outside of the McAlpine pool is not considered prudent.

Alternative 5E was eliminated from further evaluation as a practicable alternative to the proposed project because:

- There is not adequate time to locate, evaluate, acquire, permit and develop a CCR storage facility that meets the capacity needs of Trimble County Generating Station within the next few years.
- Liability concerns would increase; adding a lock passage and additional distance to CCR transport would increase the risk of spills.
- Similar patterns of residential occupation and agricultural economies would be encountered on any terrace not occupied by mining, industry or other competing uses. Multiple land acquisitions are required and owner resistance would be expected. Use of Eminent Domain by LG&E outside of Kentucky would be most difficult within the timeframe for development.
- Similar impacts to streams, wetlands, floodplain habitats and cultural resources would be expected on any candidate terrace. Impacts due to air emissions from fuel burning would increase in proportion to distance traveled.
- Adding a lock passage and additional distance to CCR transport would increase the probability of service interruptions during flood or drought events or lock repair on the Ohio River.
- Lifetime costs of CCR storage would escalate due to the need to construct and permit a barge off-loading facility and transfer system, the higher costs of barge transport, and the costs of property acquisition compared to property currently owned by LG&E.

5.5.1.6 Ghent Station Landfill (Alternative 5F)

This alternative consists of evaluating LG&E's Ghent Plant as a landfill source. The Ghent plant is nearing the end of available CCR storage and is developing additional capacity. Long term plans for operation of existing facilities at this site require an additional 25 years of CCR storage capacity. The Ghent plant is located on the Ohio River at mile point 535, which is 37 miles upriver from Trimble County Generating Station. This facility was able to acquire just enough capacity in the vicinity of the plant to meet its minimum criteria of 25 years storage capacity. There is no additional storage potential that could be developed at the Ghent site for use by Trimble County Generating Station. Further, the Ghent Generating Station does not have sufficient mooring cell capacity to add a CCR unloading facility. Therefore, alternative 5F was eliminated from further evaluation as a practicable alternative to the proposed project.

5.5.2 Options Not Owned by LG&E (Alternatives 6A, 6B, 6C, 6D, 6E)

5.5.2.1 CCR Landfills Developed by Others (Alternative 6A)

This alternative includes seeking a contract with a CCR landfill operated by another entity. In contrast to a fully contained landfill that accepts Municipal Solid Waste, a CCR landfill would be required to handle special waste dedicated to disposal of utility product.

Alternative 6A was eliminated from further evaluation due to the required truck transportation for the large volume of CCR materials. Further, LG&E does not maintain control of the CCR materials for the life of the materials, which creates significant risk to LG&E. Also, no facility is available within a 50-mile radius of the Trimble County Generating Station within the timeframe of the project.

5.5.2.2 Sand and Gravel Quarries (Alternative 6B)

Sand and gravel quarries are located both upriver and downriver of the Trimble County Generating Station. These potential storage areas were initially investigated for storage of CCR, but eliminated from further consideration due to the need to procure the land, obtain the necessary permits and the cost associated with transporting the products to the quarry sites. Other significant disadvantages of these sites are the possibility of flooding, their small size and a high groundwater table. Additionally, EPA has

indicated the use of CCR to fill quarries poses many potential risks and generally advises that such practices should be avoided.

Further investigation of Sand and Gravel quarries reaffirms the extent of their limited feasibility as CCR storage locations. Of major concern is the complexity of converting mined out pits to CCR storage with clay liners and geomembrane and the difficulty of maintaining a barrier/lining system against the pressure of ground and/or surface water. Some pits are open to the Ohio River while many others are constructed at very low elevations. These would likely require diking or containment berms to prevent flooding of the storage site. In some cases it could be necessary to backfill the quarry up to the point where pond liners were above the level of groundwater.

Purchase of some sites could potentially cause LG&E to inherit liability related to unresolved (or undiscovered) past infractions or commitments to future closure and mitigation obligations from site impacts. Use of the site for CCR storage would forego the usual opportunities to convert closed sites to recreational or habitat applications.

Finally, for all the effort required to develop such sites, one acquires only limited capacity for storage of CCRs. Excavated pits are typically 20 to 30 acres, although there may be clusters of several pits at a given location.

Alternative 6B was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Sand and gravel quarry features provide insufficient volume capacity for storage
- Implementation would be technically complex and could introduce unanticipated liabilities
- Flooding risks affect liability, feasibility and capacity issues
- Costs and impacts related to transportation would increase; delivery of CCR to small pits at multiple locations could require truck transport

5.5.2.3 Limestone Aggregate Quarry (Alternative 6C)

This alternative assessed 1) placement of CCR in an aggregate quarry owned by Mulzer Crushed Stone along the Ohio River and 2) the availability of other quarries in the region.

Alternative 6C was eliminated from further evaluation as a practicable alternative to the proposed project because:

- Insufficient volume capacity for storage is available at the Mulzer facility without hindering the existing quarry operation.
- No mined-out areas are currently available or capable of becoming available in the near future at the Mulzer facility.
- No other quarries are available within a 50-mile radius of the Trimble County Generating Station.
- EPA's concerns with filling former sand and gravel pits with CCR

5.5.2.4 Coal Mines (Alternative 6D)

This alternative assessed CCR storage at coal mining sites. CCR storage at coal mining sites in Kentucky is currently under regulatory review by the Office of Surface Mining. However, the closest mining operation that could accept CCR is 160 miles, located in Muhlenberg County. This would require a multi-modal transportation system using barge, rail and truck to deliver CCR to the mining region and would not be feasible. Therefore, alternative 6D was eliminated from further evaluation as a practicable alternative to the proposed project.

5.5.2.5 Existing Landfills (Alternative 6E)

The Valley View landfill in Trimble County was contacted to investigate the feasibility for storage of CCR to area landfills. This facility is designed and permitted to receive Municipal Solid Waste (MSW) and would be able to accept CCR for storage.

Several factors may influence the near and long term capacity that such a landfill could provide. The immediately available capacity may be limited to an increment over day to day use by existing customers. Near term expansion of capacity to accommodate 2,500 CY per day of CCR would involve accelerated expansion of operations and would shorten the life span of the facility as presently permitted. The daily quantity that LG&E could bring to such a facility may be limited if existing MSW customers have contracts protecting their access to available capacity.

The presence of an existing landfill appears to be feasible because of an area already developed and in use as a storage resource. However, over the long term, the quantities of CCR from Trimble County Generating Station would require a substantial and rapid expansion of landfill capacity. Such expansion

could occur on-site or at a new facility for MSW customers so as to make more space available for the CCR. This would have the effect of moving the burden of siting and permitting responsibilities away from LG&E and to the local community. Landfilling CCR would require landfill expansion and ultimately result in an approximately equivalent footprint, with comparable socio-economic, cultural/archaeological and environmental impacts.

Transport of CCR to this facility would require trucking on public roads. LG&E presently trucks about 273,300 CY of its annual CCR for delivery to beneficial reuse customers. For both Units 1 and 2, truck hauling of CCR would increase by over 300% to an annual volume of 910,000 CY. The amount of CCR materials to be transported by truck is 910,000 CY per year. This is equivalent to 2,500 CY per day round-the-clock, 365 days per year. For tri-axle dump trucks with a typical capacity of 27 CY, this is 93 trucks per day or 4 loads per hour (once every 15 minutes) around-the-clock. Accounting for trucks returning empty, either a full truck or empty truck will pass a given point on the transport route every 7.5 minutes round-the-clock, 365 days per year. These traffic loads would contribute to overcrowding and accelerated degradation of local roads, air emissions from truck fuel and CCR dust, noise impacts, traffic safety issues and the potential for CCR spills with localized air and water impacts.

This option also introduces the worst case scenario regarding LG&E's desire to avoid exposure to liability issues by transferring CCR storage to a separate entity. LG&E recognizes that contracting with an off-site facility would not provide the cost control, liability control, or guaranteed availability of capacity that is associated with developing the resources already owned by the utility. Liability control is a critical issue. At a contracted site, LG&E would still be liable for its CCRs, but would relinquish control of CCR storage. In addition, LG&E would have no control over wastes delivered to the site by other customers of the facility.

Alternative 6E is non-preferred as a practicable alternative to the proposed project because:

- Adequate storage capacity is not assured. LG&E would have no control over the costs and ongoing availability of storage capacity.
- Liability is unacceptable. CCR would be mixed with MSW from other sources. LG&E would be liable for its CCRs, but would lose control over CCR storage.
- Landfill expansion would require property acquisition, relocation of residents and loss of agriculture or other productive use on acquired parcels. Socio-economic impacts of trucking would include noise, dust, traffic congestion and safety issues for residents near the landfill, residents along the truck route, and other users of the route.

- Environmental impacts related to trucking include air emissions from truck fuel and CCR dust and the potential for CCR spills with localized air and water impacts.
- Additional trucking impacts include public relation issues with large volume of truck traffic and accelerated degradation of local roads.
- Lifetime costs of CCR storage would escalate due to the cost of tipping fees and direct costs of truck hauling. Compared to an alternative owned by LG&E, there is no protection against unanticipated future cost increases.

5.6 PREFERRED ALTERNATIVE (3D)

Storage of CCR in Ravine B is the preferred alternative. Under the evaluation criteria employed by the preceding analyses, no other alternative meets a standard of practicability for the needs of Trimble County Generating Station. Additional discussion of the Preferred Alternative 3D is presented in Section 6.

6.0 DISCUSSION OF PREFERRED ALTERNATIVE

This section presents an evaluation of Preferred Alternative 3D for coal combustion residuals storage.

6.1 PREFERRED ALTERNATIVE - ON-SITE STORAGE: RAVINE B

The Preferred Alternative involves the storage of CCR material in Ravine B. This alternative meets the long term storage needs of Trimble County Generating Station, can be implemented with minimal risk and liability, involves the least amount of socio-economic impacts, utilizes the preferred mode of pipe conveyor transport, was previously permitted as CCR landfill, and provides the most cost effective solution to the customers of LG&E.

6.1.1 Adequate Storage Capacity

Development of a landfill within Ravine B will provide capacity for the 38-year CCR production of 34,600,000 CY. This alternative incorporates ongoing beneficial reuse of CCR as a first priority. Maintaining reserve capacity in the BAP will contribute to uninterrupted continuation of power generation whenever access to the Ravine B is unavailable.

6.1.2 Implementation

LG&E owns Ravine B and has developed a storage design plan and a mitigation plan. Most important, this alternative can be developed and placed into operation within the window of remaining storage capacity.

Construction of a landfill in Ravine B with combined clay and geomembrane liners is technically feasible as confirmed by a series of 38 borings and 22 test pits indicating an adequate supply of soil suitable for use as structural fill or clay liner.

The Preferred Alternative provides the cost control, liability control and guaranteed availability of capacity that is associated with developing the resources already owned by the utility.

6.1.3 Socio-economic Effects

Ravine B was acquired in conjunction with the original assembly of Trimble County Generating Station property in the 1980's. At the same time, LG&E also obtained the necessary permits to landfill CCR in Ravines A and B, including Division of Waste Management (DWM) permit 112-00003. These permits have been maintained, since being granted in the early 1980's. Development of Ravine B for its intended purpose is expected to have minimal impact on the population, present or future land-use patterns or traffic movement near the site. No residents will be displaced and no farms or other economic activities are impacted. Positive economic impacts are expected from continued local employment through construction activities and expenditures and power generation expansion at the Trimble Plant. Aesthetic impacts may include viewshed changes, noise and dust. An Area of Potential Effects (APE) study will assess potential viewshed impacts in conjunction with historic structures in the area. A contoured buffer zone with tree plantings will minimize aesthetic impacts.

6.1.4 Proximity

Close proximity of the Trimble Plant to Ravine B allows for the use of an enclosed pipe conveyor system. Pipe conveyor delivery of CCR to Ravine B over a maximum distance of approximately two miles is technically feasible, minimizes air and water emissions by isolating CCR during transport and minimizes spill risks. It is considered the best environmental transport method, most reliable, energy efficient and cost-effective option compared to alternate modes of transportation including hydroveyors, barge loading, trucking, and pneumatic transport. Any alternative that reduces the distance travelled increases the reliability and potential impact of the action.

6.1.5 Transport

The enclosed pipe conveyor system is the most secure and reliable material handling option available. The ability to use this mode of transport minimizes potential environmental and socio-economic effects of transportation, improves risk management and reduces costs. An enclosed pipe conveyor will transport CCR ash and synthetic gypsum to the material handling terminus into separate piles. To move the CCR to the landfill face, either a short shuttle conveyor will be used or front-end loaders will load the articulating trucks for the short distance. An access road to the landfill will be constructed at KY 1838 near the northeast corner of the bottom ash pond, traversing to the east parallel to Wentworth Road.

6.1.6 Risk and Liability

The preferred alternative fully meets the risk and liability criteria for LG&E. Ravine B is feasible for the construction of a landfill with clay and geomembrane liners that will reliably store the CCR with minimal risk of escape to air or water resources. Close proximity to Ravine B minimizes transport risks and allows for use of the most secure and reliable material handling option available. LG&E is able to maintain full ownership and direct quality control over all aspects of CCR storage and will continue such control into the foreseeable future.

6.1.7 Cost

The Preferred Alternative fulfills the responsibility of a publicly regulated utility by the Kentucky Public Service Commission to provide the least cost alternative to LG&E rate payers.

6.1.8 Environmental Effects

6.1.8.1 Soil

Grading and excavation operations for the construction of the landfill would cause soil disturbance of approximately 547 acres, which could increase the potential for erosion and soil runoff. However, engineering controls and best management practices such as revegetation and silt fences would minimize the potential impacts to soil and surface water. Upon completion of construction activities, all disturbed areas would be regraded and revegetated and erosion rates would return to current levels.

6.1.8.2 Water Quality and Hydrology

The filling of the upper reach of Ravine B will result in permanent loss of water quality functions such as aquatic habitat and assimilative capacity.

Engineering controls and best management practices employed during excavation and construction activities would limit impacts to local drainage areas. Construction of the landfill would not substantially change local hydrologic conditions and a sediment basin would minimize impacts to stormwater. The leachate collection system of the landfill will direct leachate into a leachate treatment pond. Erosion

control measures such as silt fences would be applied during construction of the landfill. These measures will prevent erosion and sediment movement in drainage ways and other surface waters.

6.1.8.3 Air Quality

Excavation activities could result in minor increases in fugitive dust emissions, which would be minimized through engineering controls and best management practices (e.g., dust suppressants and revegetation). Trucking distances from the material handling termini to the landfill would be a short distance to minimize dust contribution. Trucking, spreading, and covering with soil will generate dust from the ash products. Engineering measures may include spraying the material. A pipe conveyor will be used to transport the CCR from the Trimble County Generating Station to the landfill. It has the least air quality impact of any other transport system due to elimination of fugitive dust. It is anticipated that a modification to the existing air permit may be required to address long term operational standards.

6.1.8.4 Noise Levels

Noise levels during the construction and operation of the landfill would be typical of any industrial setting. Impacts to nearby residents will be minimized due to the buffer zones, development of berms, and the preservation of existing trees to the extent possible.

6.1.8.5 Biotic Resources

Impacts to Indiana bat habitat associated with the Preferred Alternative will occur. Approximately 372 acres of upland forest will be permanently impacted from construction of the landfill. This includes construction of the access road from KY 1838 near the northeast corner of the bottom ash pond, traversing to the east parallel to Wentworth Road. Impacts to Indiana bat habitat from landfill activities in support of the preferred alternative will be mitigated in accordance with the existing Memorandum of Agreement between LG&E and the USFWS. Section 7 consultation with USFWS is being addressed through the preparation of a Biological Assessment to present an effects analysis of potential impacts to threatened and endangered species.

The proposed landfill area in Ravine B was surveyed for the presence/absence of threatened and endangered species such as Indiana and gray bats, running buffalo clover, and several species of endangered mussels (Attachments B-1, B-2, C). Coordination with state agencies resulted in no records

of endangered mussel species found within the vicinity of the project area and the closest records were found in the Ohio River. A survey for the presence of running buffalo clover was performed during the flowering season in Ravines A and B in May of 2007, and no presence of the species was documented. The U.S. Fish and Wildlife Service (USFWS) concurred with this finding in correspondence dated October 29, 2007. It appears that this project will not adversely affect running buffalo clover or endangered mussel populations.

An Indiana bat mist net and acoustical survey of Ravines A and B was conducted in June and July, 2007. Seventeen bats of three species were captured during the survey. The mist net survey did not result in the capture of any Indiana (*Myotis sodalis*) or gray (*Myotis grisescens*) bats. Additionally, the concurrent acoustical survey did not record any potential Indiana bat calls. A Phase I Habitat Assessment of Ravines A and B was conducted on January 14 and 15, 2008. None of these evaluated features were found to contain Indiana or gray bats or provide suitable winter habitat for Indiana bats or summer/winter habitat for gray bats.

A mist net and acoustical survey of the Corn Creek mitigation corridor was performed in 2009 in areas where tree clearing would be necessary to implement the stream restoration project. During the mist net survey, 22 individuals of five bat species were captured including two federally endangered bat species: one juvenile female Indiana bat and three gray bats resulting in a "known maternity summer colony" designation for the Indiana bat in Trimble County. None of the acoustical recordings were identified as potential Indiana bat calls using the standard call filters, provided by USFWS and the Kentucky Department of Fish and Wildlife resources (KDFWR).

Based on the lack of impacts to roosting habitat for the gray bat and the limited impacts to foraging habitat through the use of erosion control measures, modified construction methods, and revegetation efforts, it appears that this project will not adversely affect the gray bat.

A more extensive acoustical survey was performed in June and July of 2010 to provide a better perspective on the capture of the juvenile female Indiana bat and re-evaluation of the "known maternity summer habitat" designation. The survey resulted in no Indiana bat calls recorded within the three survey circles in Kentucky and Indiana suggesting that Indiana bats may not be using the survey area for summer maternity roosts, and supported the theory that the captured juvenile female Indiana bat was a transient and not part of a maternity colony. The USFWS concurred with this finding in a letter dated January 31,

2011, and reduced the "known maternity summer colony" designation to a "known non-maternity" designation.

A third-party consultant performed a thorough examination of Ravine B in December 2011 to identify any karst features that might be interpreted as caves warranting protection under the Kentucky Cave Protection Act. A total of six features were identified for further investigation and biological assessment. The report (Attachment G-1) indicated none of the features met the statute requirements of a cave, nor the presence of any cave dependant life forms.

6.1.8.6 Cultural Resources

The National Historic Preservation Act (36 CFR 800, Section 106) requires Federal agencies to protect properties on or eligible for inclusion on the National Register of Historic Places. This list includes undiscovered resources, districts, sites, buildings, structures, or objects that may be eligible for inclusion on the National Register.

An assessment of archaeological resources within the property was achieved through a pedestrian survey augmented with screened shovel probes. The effort concentrated on landforms such as benches and stream terraces considered to be high probability areas for recovering evidence of past human activities in excess of fifty years of age. The survey consisted of 700 acres of steep slope, 400 acres of wooded uplands, stream beds and flood plain, and 197 acres of cultivated uplands. Cultural resources identified have been inventoried and impacts to cultural resources have been coordinated with the Kentucky Heritage Council.

An archaeological assessment was performed in September 2011 on a feature commonly known as "lime cave" or "Wentworth Cave." The assessment concluded that this feature did not meet the requirements to be eligible for inclusion in the National Register of Historic Places (Attachment G-2).

6.1.8.7 Waters of the U.S. and Floodplains

Additional field assessments were conducted in 2011 to identify project impacts to waters of the U.S. resulting from a refinement of project boundaries to minimize those impacts.

A waters of the U.S. delineation and assessment (Appendix III, Attachment G-3) was performed on the Preferred Alternative proposed landfill area. This assessment identified unavoidable adverse impacts to

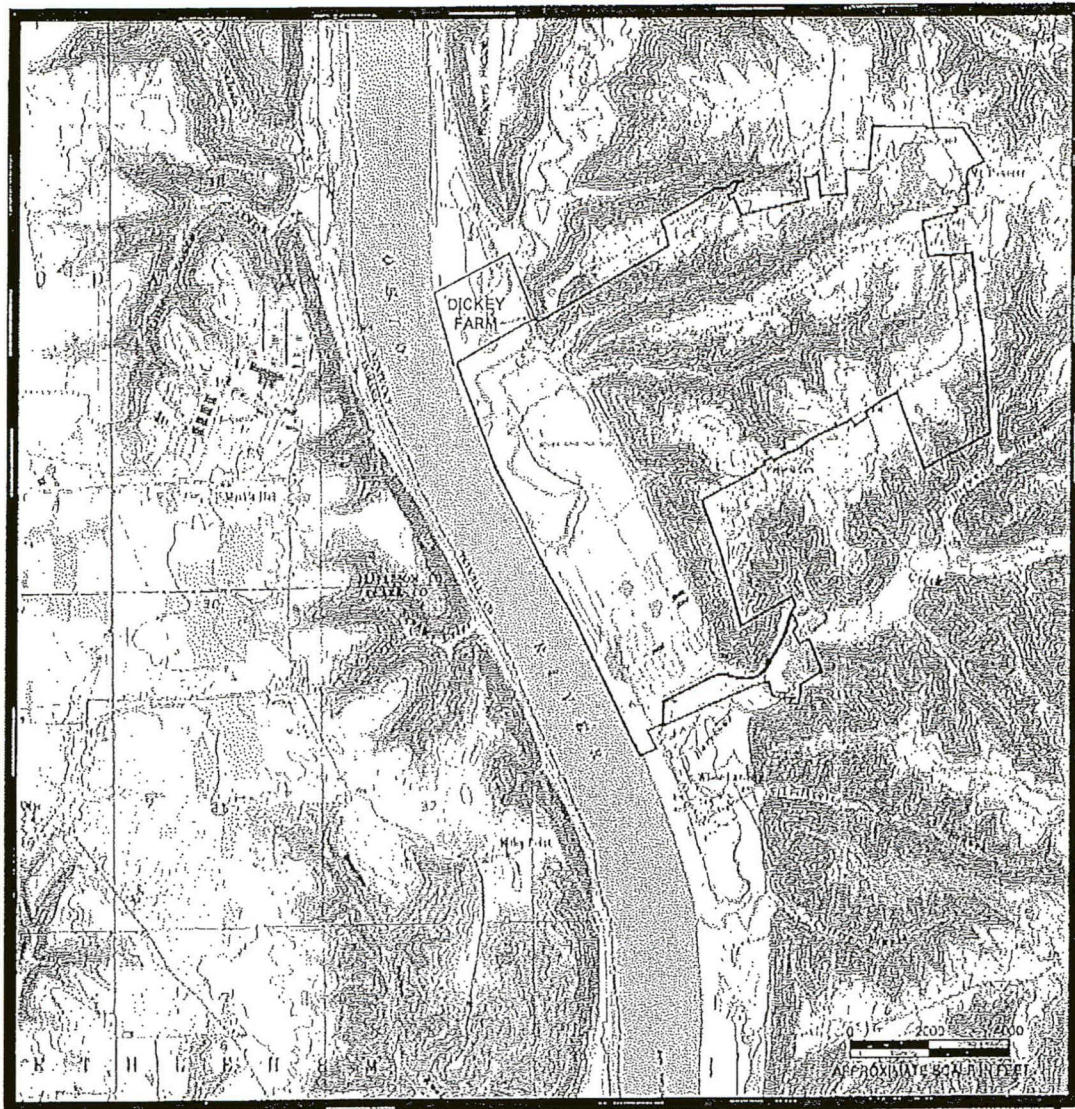
streams, wetlands and ponds. A summary of the impacts to jurisdictional waters include: approximately 39,939 linear feet of ephemeral streams; 14,722 linear feet of intermittent streams; 1.14 acres of wetlands and 0.27 acres of ponds. Impacts to jurisdictional waters will be appropriately mitigated in accordance with the Section 404(b)(1) guidelines.

A watershed-scale mitigation plan has been prepared to incorporate stream restoration, wetland construction and enhancement and riparian corridor preservation (Appendix II). Within the Corn Creek Watershed, approximately 29,722 linear feet of stream is available for mitigation along with constructing and enhancing 33 acres of wetlands. The goals of the mitigation plan are to improve aquatic and terrestrial habitat complexity, water quality, nutrient cycling, and sediment transport. The overall goal is to define the maximum impact that can occur to the resource, develop a mitigation plan that is commensurate with those impacts, and the overall result is an improvement of water quality for this watershed.

Impacts to the floodplain of Ravine B associated with construction activities of the landfill will be addressed in consultation with the Trimble County Floodplain Coordinator.

6.2 SELECTION OF THE PREFERRED ALTERNATIVE

On-Site Storage: Ravine B (Alternative 3D) is the Preferred Alternative because it provides assured storage capacity for the 38-year CCR production and provides cost and liability control. On the basis of currently available information, the preferred alternative provides the best balance of trade-offs among the alternatives with respect to the evaluation criteria.



Source: USGS Topographic Map
 (Bethlehem Quadrangle)
 Bethlehem, Indiana-Kentucky
 Contour Interval 10 feet
 1953
 Photorevised 1987
 Minor Revision 1993

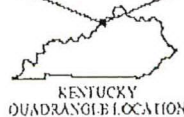
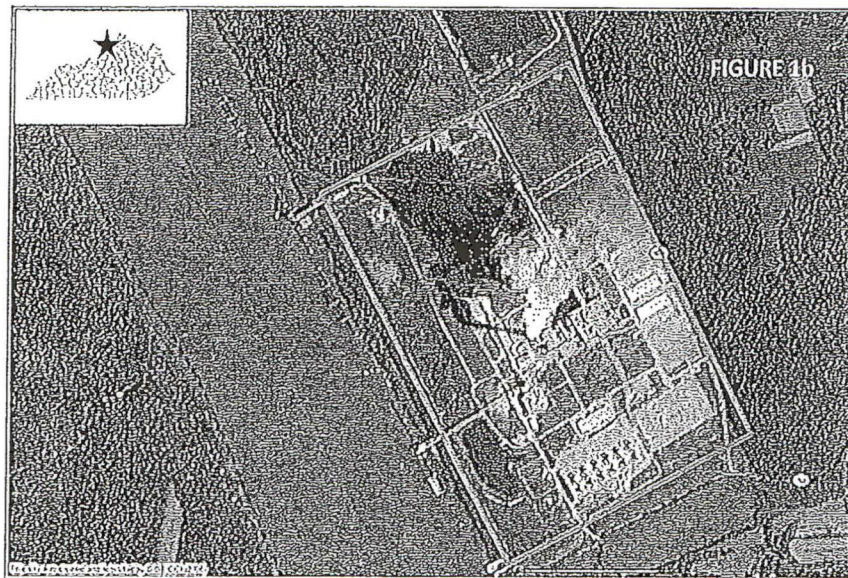
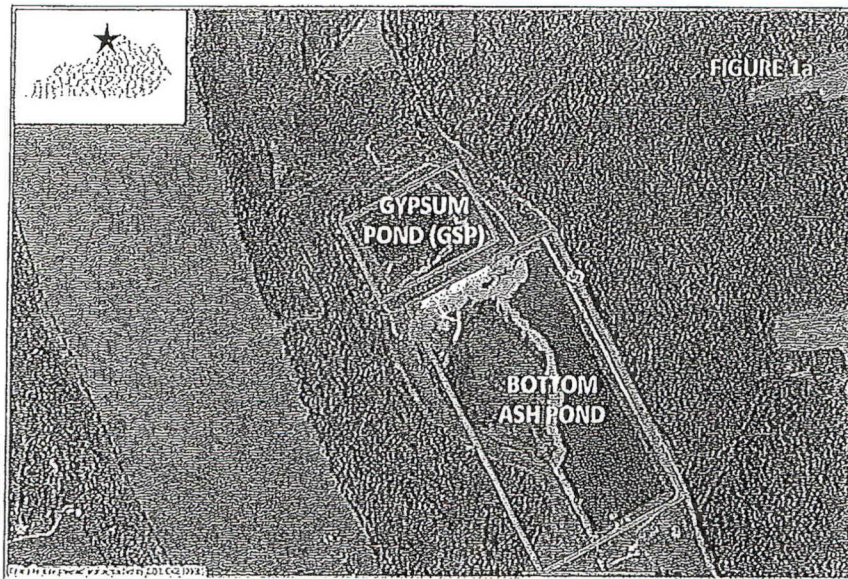


FIGURE 1: VICINITY MAP - LG&E TRIMBLE
 COUNTY GENERATING STATION
 BEDFORD, KY

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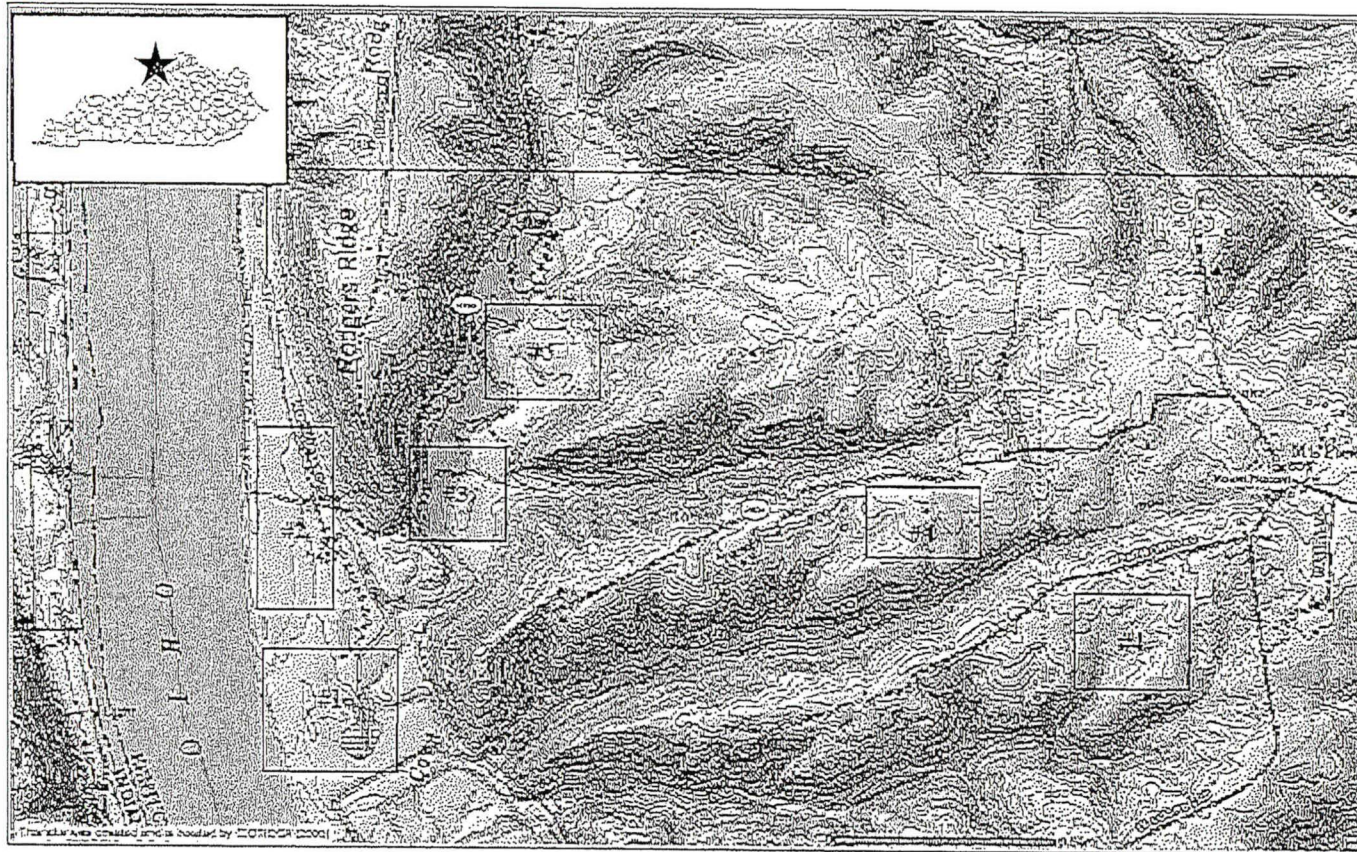
SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal
 AVAILABLE ONLINE AT:
<http://kgsmap.uky.edu/website/KGSGeoPortal/KGSGeoPortal.asp>
 JANUARY 2009

FIGURE 1a: TRIMBLE COUNTY GENERATION STATION PROJECT SITE
 NORTH, BOTTOM ASH POND AND GYPSUM STORAGE POND
 FIGURE 1b: TRIMBLE COUNTY GENERATING STATION UNIT 1,
 COOLING TOWER, COAL YARD

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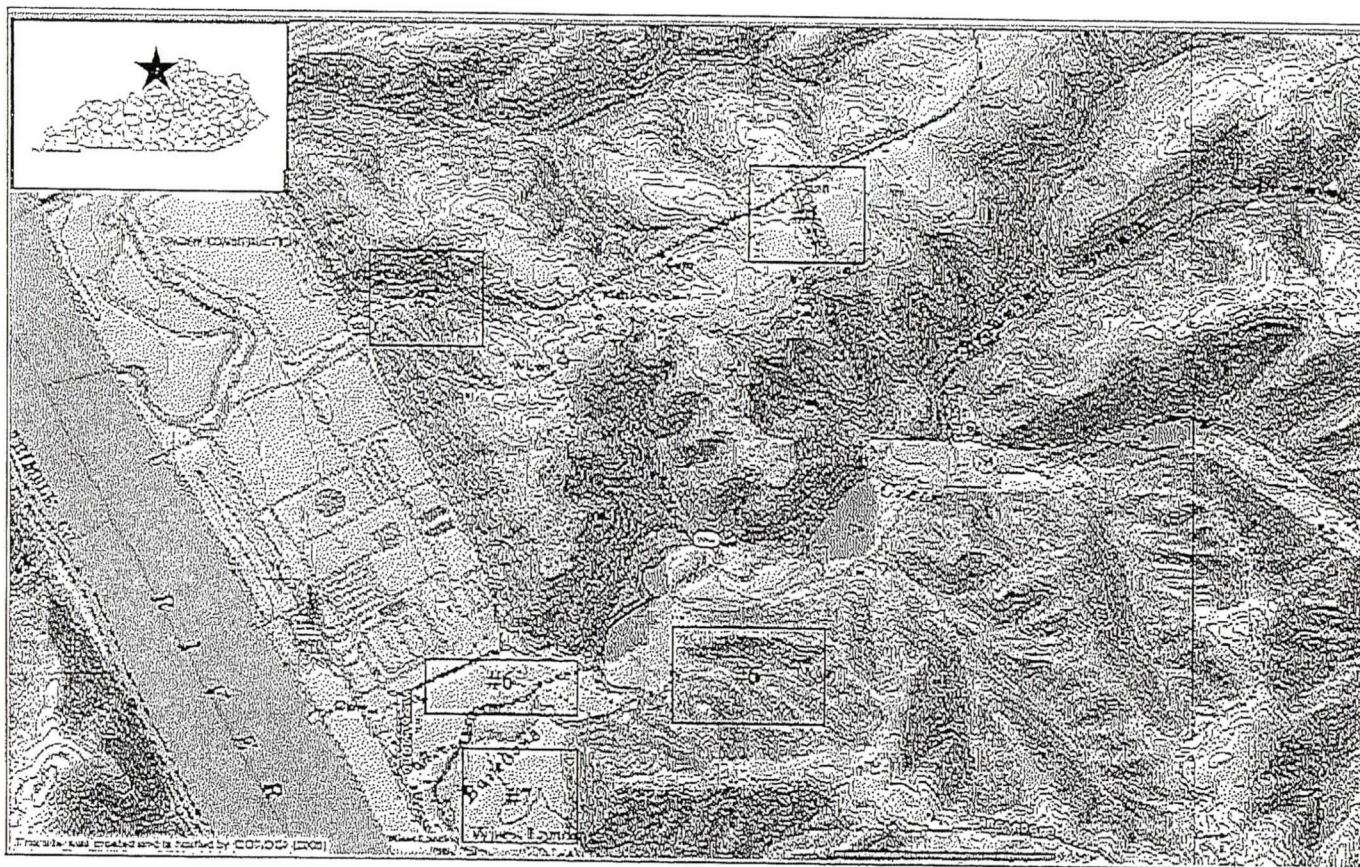


SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal
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FIGURE 2a: TRIMBLE COUNTY GENERATING STATION
 NEAR-SITE NORTH

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SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal

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FIGURE 2b: TRIMBLE COUNTY GENERATING STATION
NEAR-SITE MIDDLE

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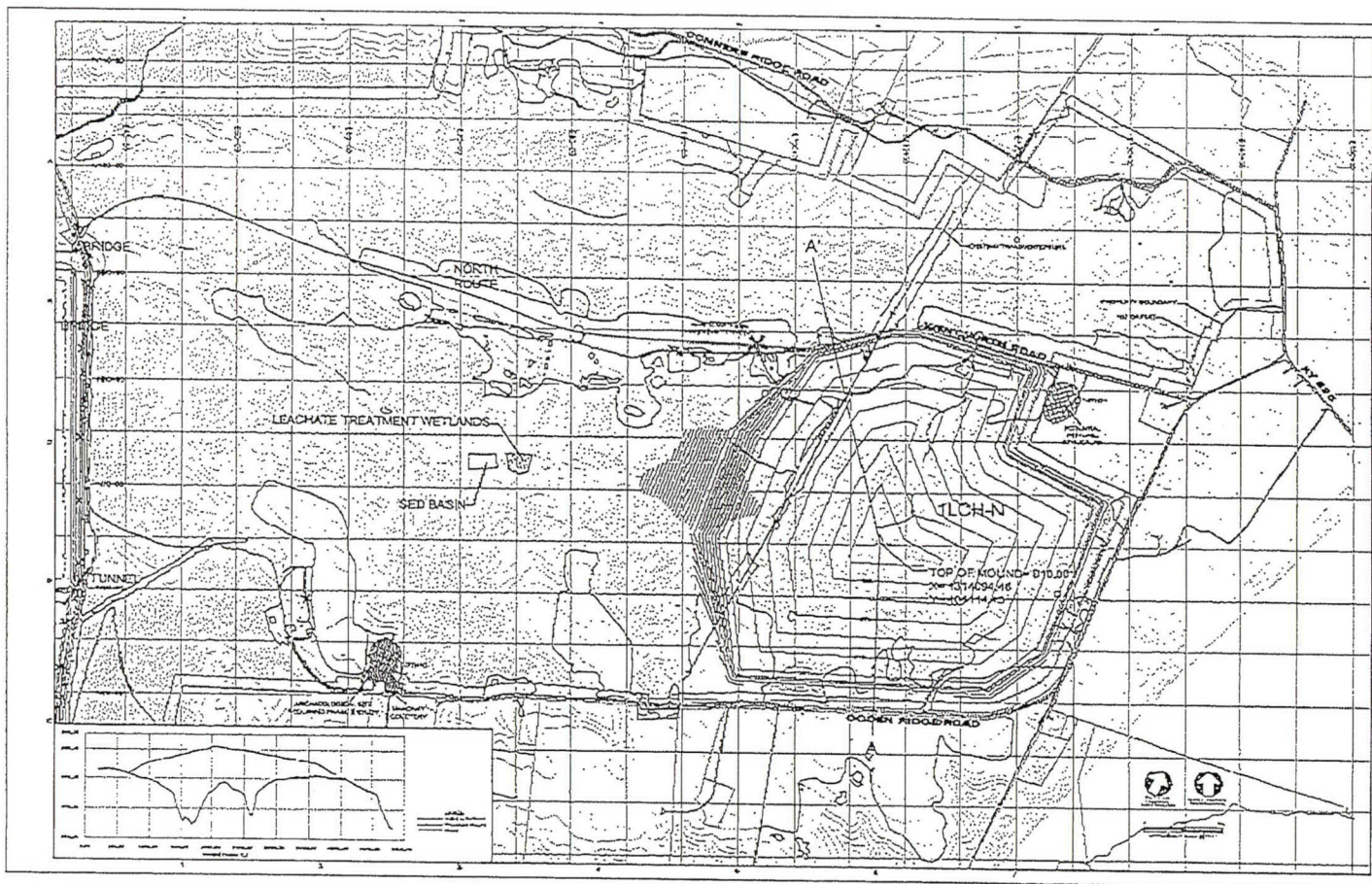
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FIGURE 2c: TERRACE 2 & 3
 SURFACE FEATURES

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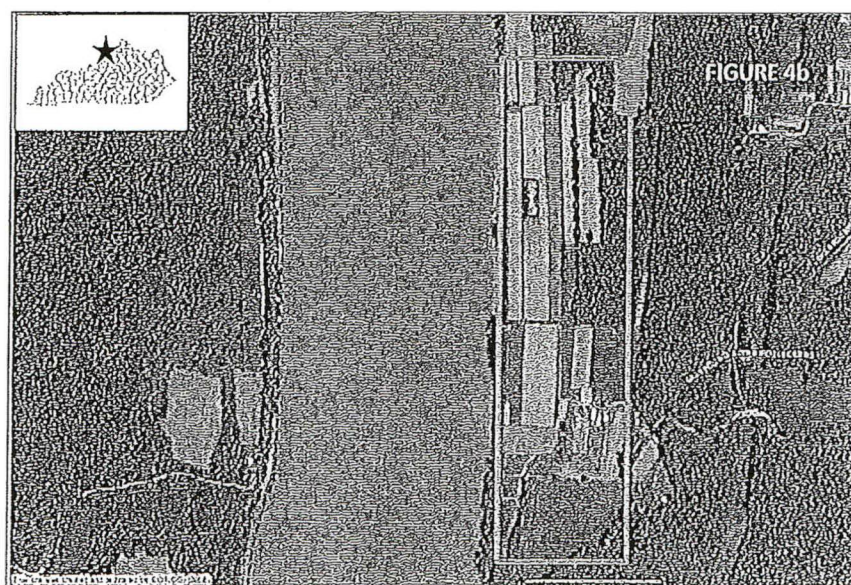


SOURCE: Ravine B Site Plan, MACTEC – Louisville, KY
October 2009

FIGURE 3: RAVINE B LANDFILL PLAN
CORN CREEK MITIGATION SITE

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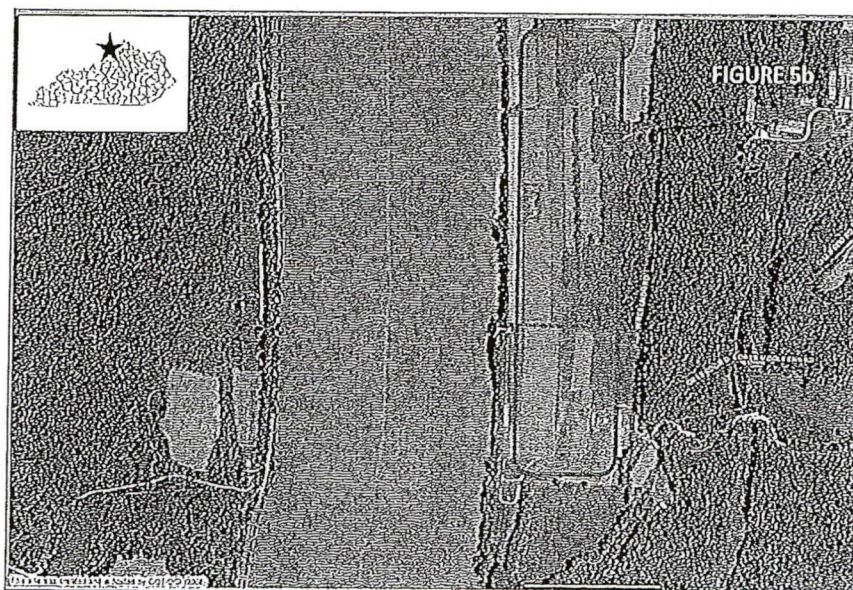
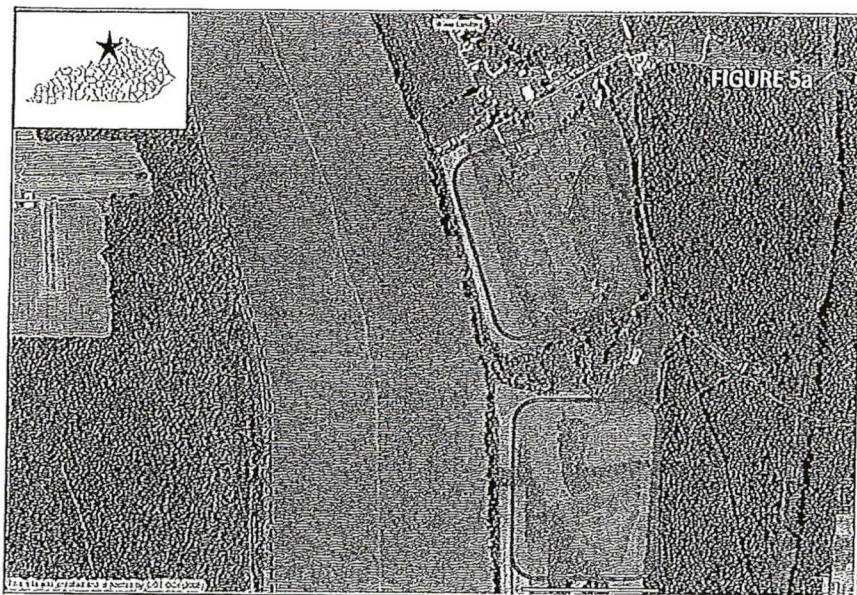
SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal
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<http://kgmap.uky.edu/website/KGSGeoPortal/KGSGeoPortal.asp>
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FIGURE 4a: LAND USE, TERRACE 2 &
 NORTH SECTION OF TERRACE 3
 FIGURE 4b: LAND USE
 SOUTH SECTION OF TERRACE 3

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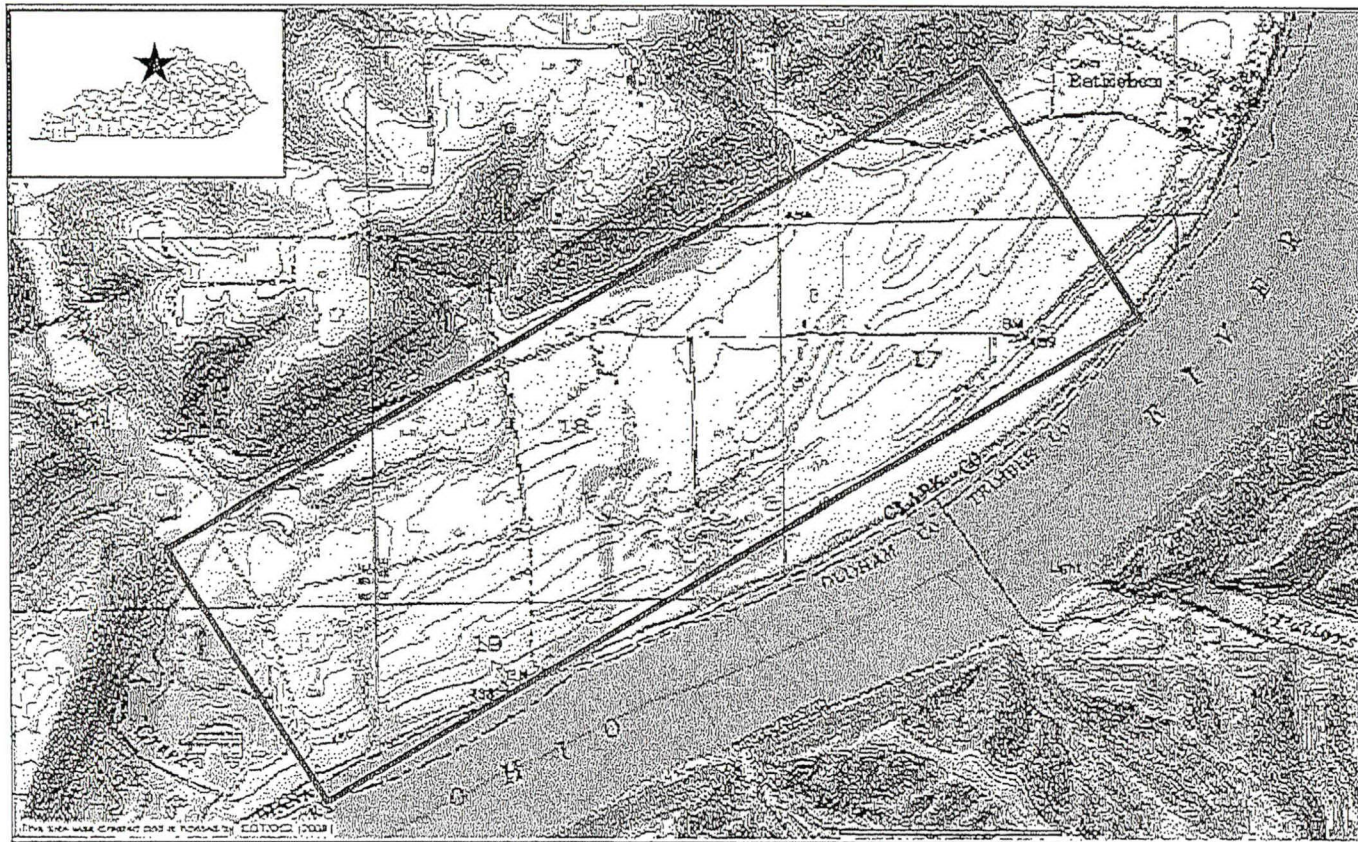
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FIGURE 5a: POND CONCEPTUAL, TERRACE 2 &
 NORTH SECTION OF TERRACE 3
 FIGURE 5b: POND CONCEPTUAL
 SOUTH SECTION OF TERRACE 3

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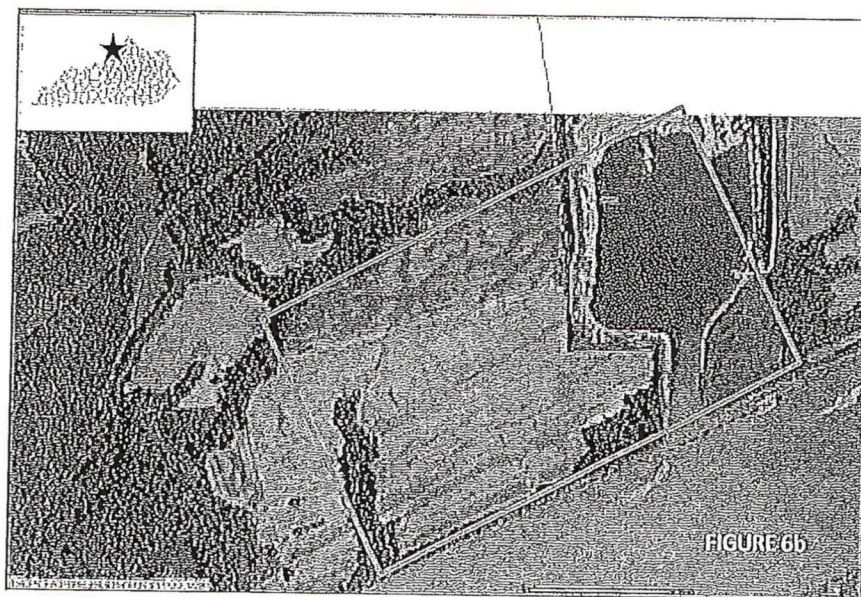
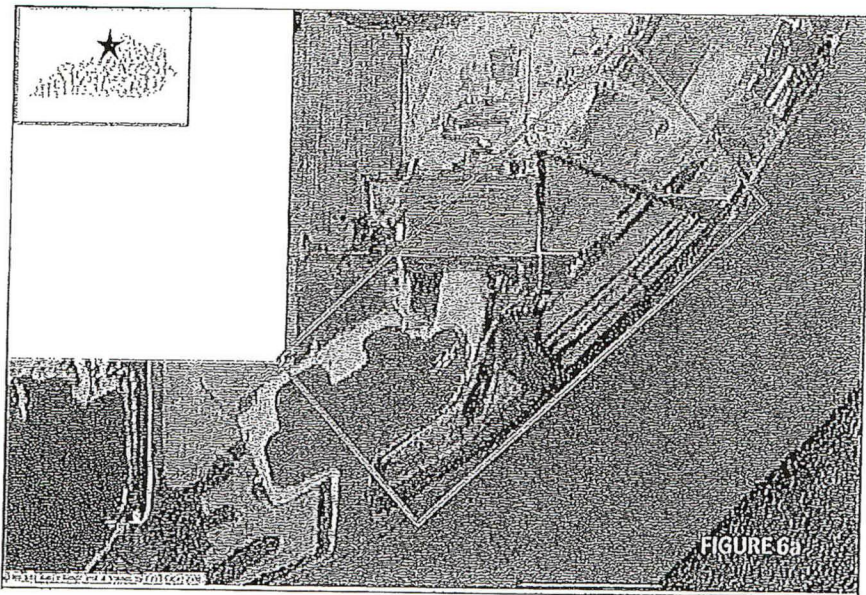


SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal
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<http://kgsmmap.uky.edu/website/KGSGeoPortal/KGSGeoPortal.asp>
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FIGURE 6: BETHLEHEM TERRACE
 SURFACE FEATURES, PRE-DEVELOPMENT

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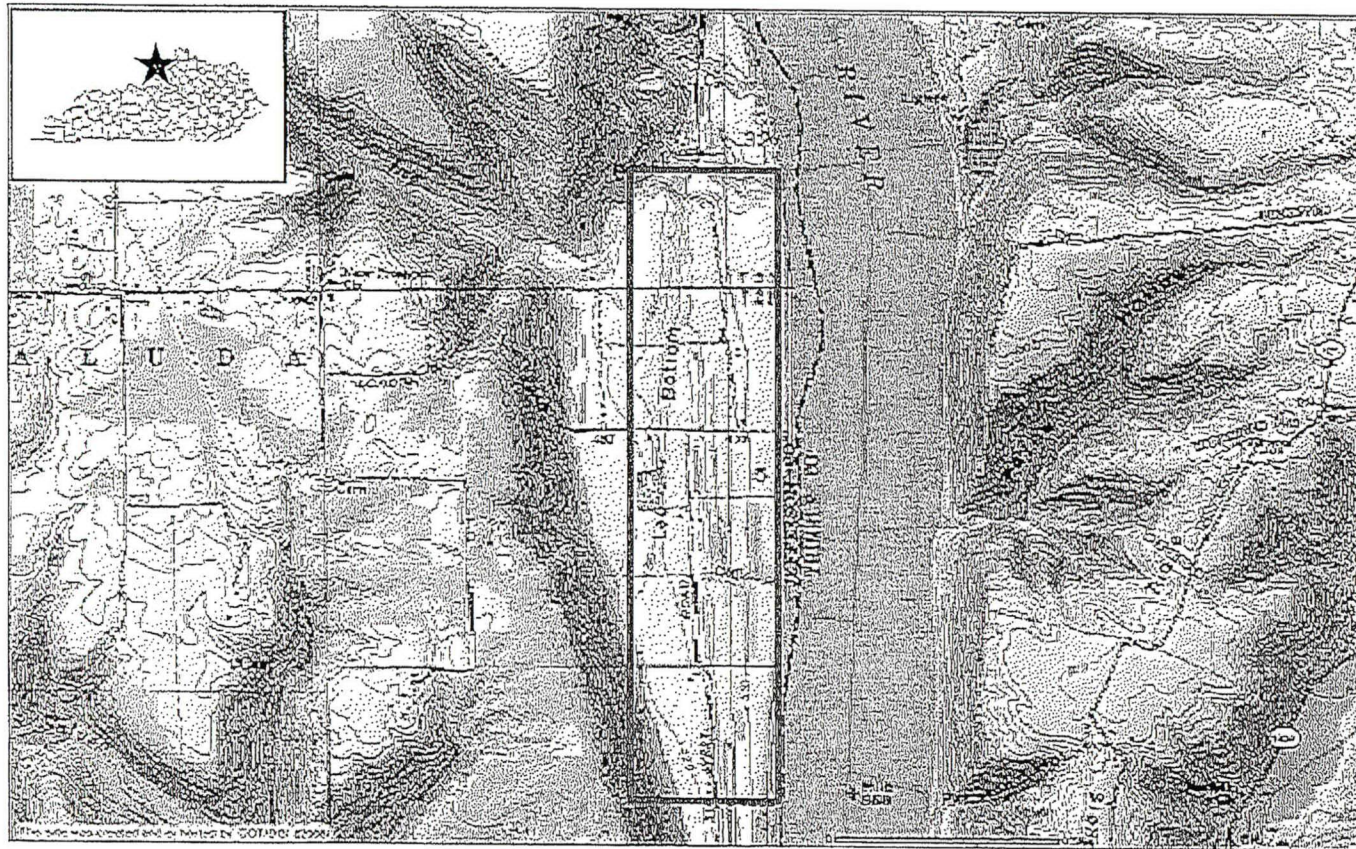
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FIGURE 6a: LAND USE
 BETHLEHEM TERRACE NORTH
 FIGURE 6b: LAND USE
 BETHLEHEM TERRACE SOUTH

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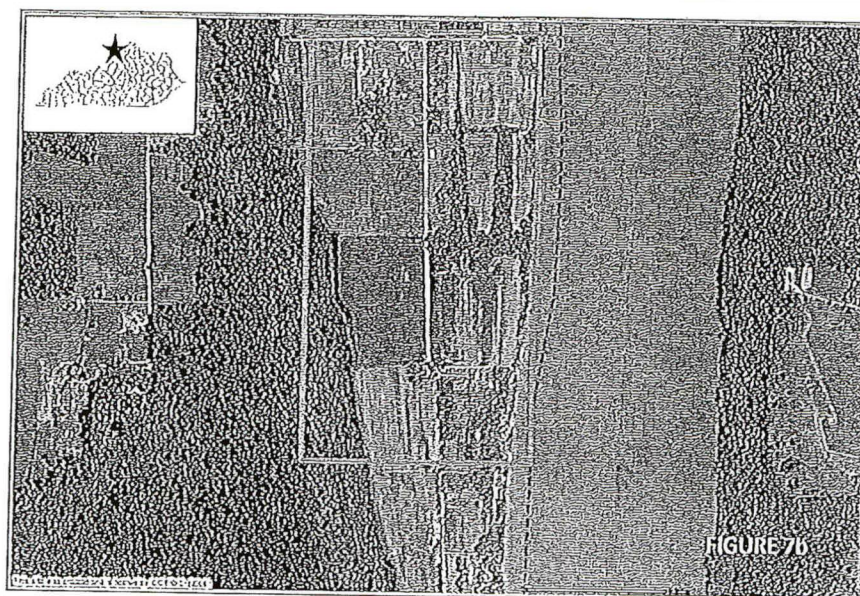


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FIGURE 7: LEE BOTTOM
 SURFACE FEATURES

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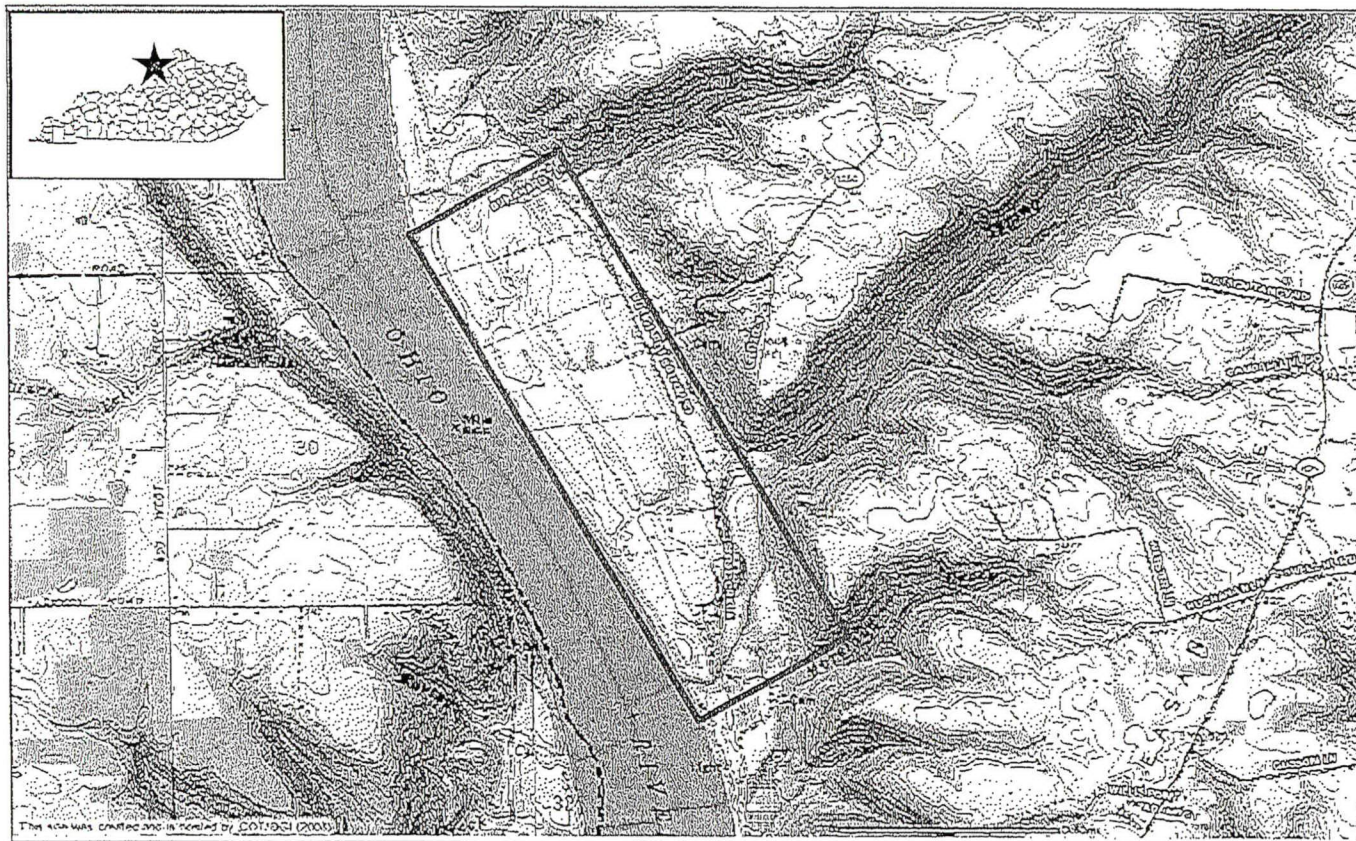
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FIGURE 7a: LAND USE
 LEE BOTTOM NORTH
 FIGURE 7b: LAND USE
 LEE BOTTOM SOUTH

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SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal

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FIGURE 8: SPRING CREEK TERRACE
SURFACE FEATURES

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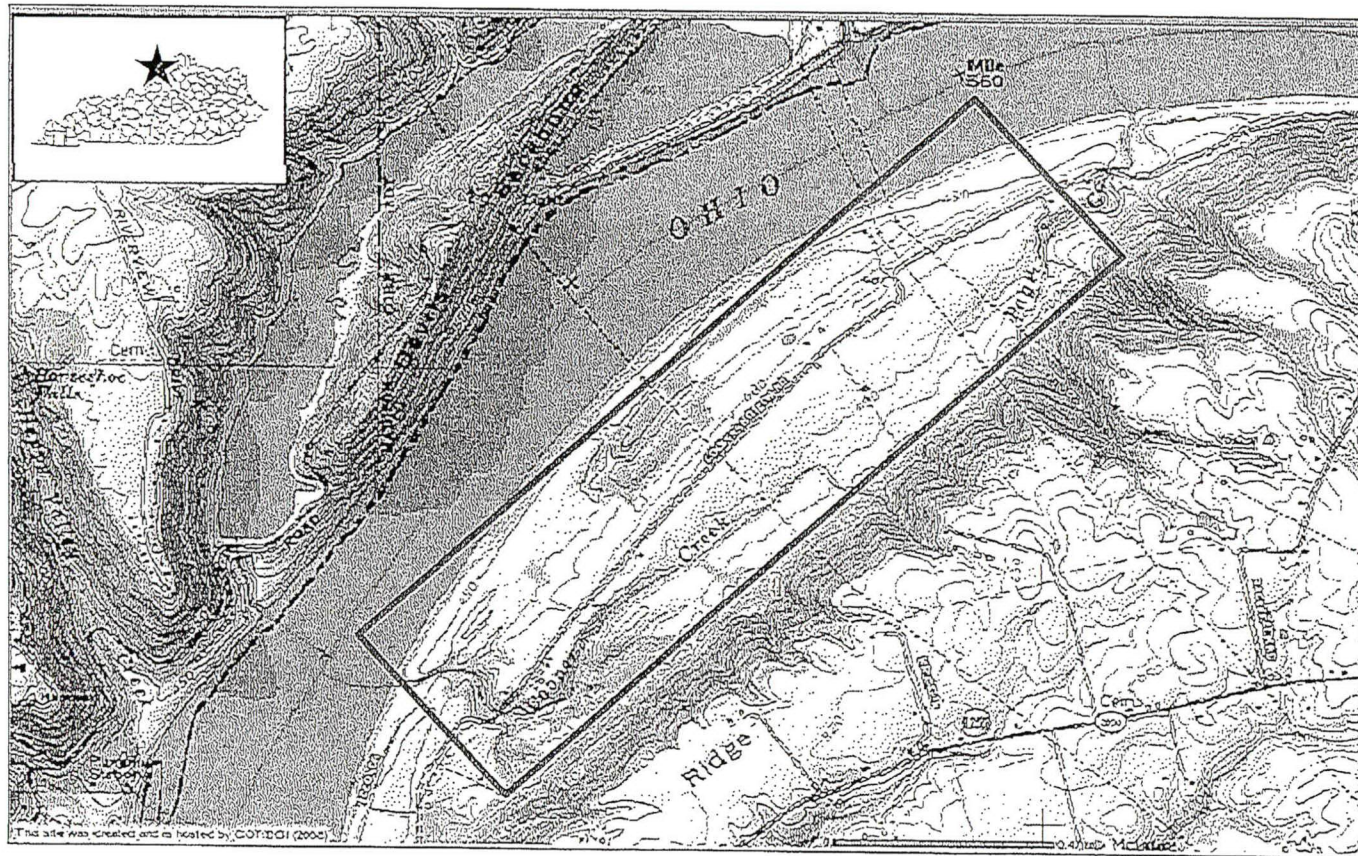
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FIGURE 8a: LAND USE
 SPRING CREEK NORTH
 FIGURE 8b: LAND USE
 SPRING CREEK SOUTH

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SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal
 AVAILABLE ONLINE AT:
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FIGURE 9: COOPER BOTTOM
 SURFACE FEATURES

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SOURCE: Kentucky Geological Survey, University of Kentucky, KGS GeoPortal
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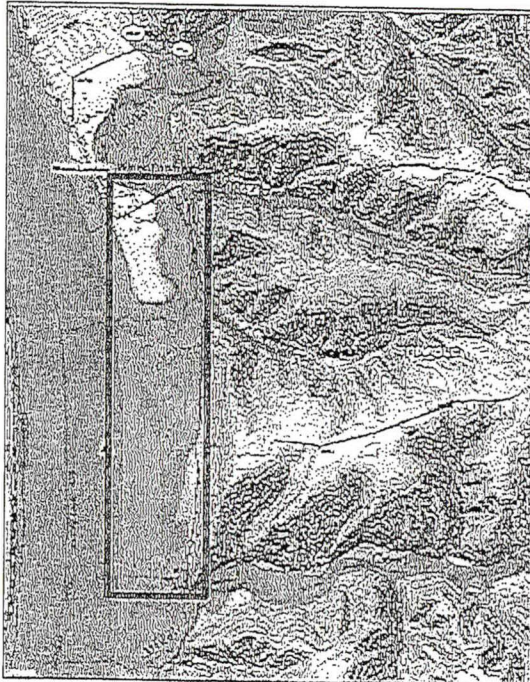
FIGURE 9a: LAND USE
 COOPER BOTTOM NORTH
 FIGURE 9b: LAND USE
 COOPER BOTTOM SOUTH

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 PROJECT NO. 3143-06-0788

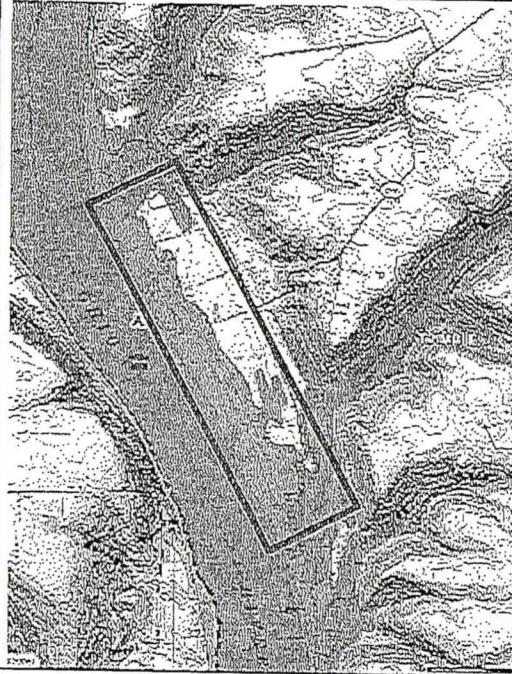
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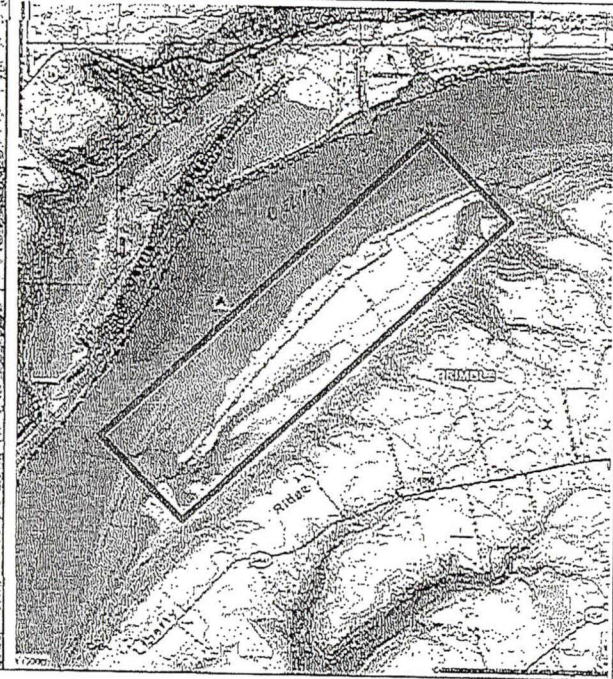
WISES LANDING



SPRING CREEK



COOPER BOTTOM



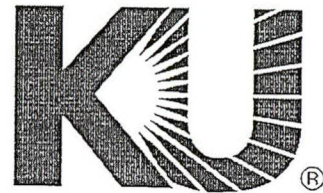
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AVAILABLE ONLINE AT:
<http://kgsmap.uky.edu/website/KGSGeoPortal/KGSGeoPortal.asp>
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FIGURE 10: FLOOD ZONES FOR 100-YEAR STORM EVENT
WISES LANDING, SPRING CREEK, & COOPER BOTTOM

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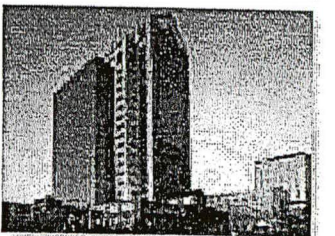
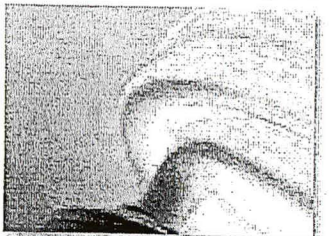
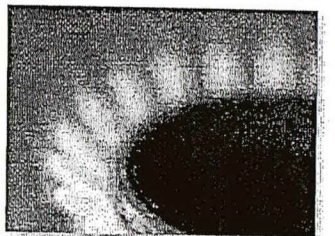
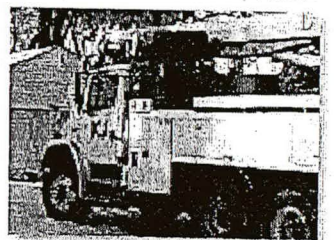
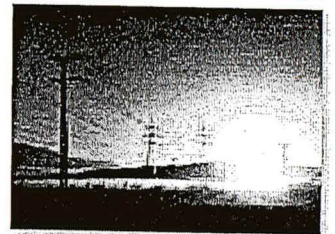


PPL companies

Project Engineering

2012 – 2016 MTP

October 13, 2011



Capital Review – Trimble County CCR

Accrual Basis, \$Millions

Authority/ECR Comparison

	<u>Total Projection</u>	<u>Current Authority</u>	<u>ECR Filing</u>	<u>Variance to Authority</u>	<u>Variance to ECR Filing</u>
BAP/GSP	\$30	\$30	\$25	\$0	(\$5)
Landfill Phase I/Fines & Transport	\$210	\$73	\$73	(\$137)	(\$137)
Landfill Phase II, III, & IV	\$186	\$0	\$0	(\$186)	(\$186)
Holcim	\$11	\$8	\$8	(\$3)	(\$3)
Total	\$436	\$110	\$106	(\$326)	(\$331)

MTP Comparison

	<u>Pre-2011</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>Post 2016</u>	<u>Total</u>
2011 MTP									
BAP/GSP	\$25	\$2	\$0	\$0	\$0	\$0	\$0	\$0	\$26
Landfill Phase I	\$3	\$37	\$17	\$0	\$0	\$0	\$0	\$0	\$57
Fines & Transport	\$0	\$0	\$71	\$0	\$0	\$0	\$0	\$0	\$71
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$230	\$230
Holcim	\$1	\$7	\$0	\$0	\$0	\$0	\$0	\$0	\$8
Total 2011 MTP	\$29	\$45	\$89	\$0	\$0	\$0	\$0	\$230	\$393
2012 MTP									
BAP/GSP	\$21	\$9	\$0	\$0	\$0	\$0	\$0	\$0	\$30
Landfill Phase I	\$2	\$4	\$46	\$20	\$10	\$0	\$0	\$0	\$84
Fines & Transport	\$0	\$3	\$37	\$58	\$28	\$0	\$0	\$0	\$126
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$186	\$186
Holcim	\$1	\$2	\$8	\$0	\$0	\$0	\$0	\$0	\$11
Total 2012 MTP	\$24	\$19	\$92	\$78	\$37	\$0	\$0	\$186	\$436
Variance to 2011 MTP									
BAP/GSP	\$4	(\$8)	\$0	\$0	\$0	\$0	\$0	\$0	(\$3)
Landfill Phase I	\$1	\$32	(\$29)	(\$20)	(\$10)	(\$0)	(\$0)	\$0	(\$27)
Fines & Transport	(\$0)	(\$3)	\$34	(\$58)	(\$28)	\$0	\$0	\$0	(\$55)
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$44	\$44
Holcim	\$0	\$5	(\$8)	\$0	\$0	\$0	\$0	\$0	(\$3)
Total Variance to 2011 MTP	\$5	\$26	(\$3)	(\$78)	(\$37)	(\$0)	(\$0)	\$44	(\$43)

Key Messages

- All numbers are net of IMPA/IMEA reimbursement.
- The 2012 MTP is based on the assumption the landfill and transport and treatment will be operational in late 2013.
- The increase over the ECR Filing is due refined engineering on the Transport System, however conceptual design will not be complete until late 2011.
- The 2012 MTP is based on 50% completion of the Landfill Detailed Design.



PPL companies



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAR 25 2012

Colonel Luke T. Leonard
District Engineer
Louisville District Corps of Engineers
Attn: Kimberley J. Simpson
CELRL-OP-FS, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Louisville Gas & Electric Company (LG&E)
Coal Combustion Residuals Landfill, Trimble County, Kentucky
LRL-2010-711

Dear Colonel Leonard:

The U.S. Environmental Protection Agency, Region 4, has completed a preliminary review of the above referenced project. Although this project was announced on public notice from the U.S. Army Corps of Engineers (Corps), Louisville District on October 26, 2011, the applicant immediately began revising his permit application and opined that a completely revised application would be forthcoming. On December 8, 2011, the applicant hosted an interagency meeting and site visit at the LG&E Trimble County Generating Station. Subsequently and based at least in part on feedback provided to the company from the state and federal agencies present at that meeting, LG&E submitted a completely revised CWA Section 404 permit application to the Corps' Louisville District in March 2012. On March 29, 2012, Ms. Kimberley Simpson and Ms. Lee Anne Devine of your staff officially extended the comment period for this project to April 30, 2012, and further clarified that all comments submitted by the EPA before that date would be accepted by the Corps and considered fully in accordance with the 1992 Clean Water Act Section 404(q) Memorandum of Agreement between the EPA and the Department of the Army.

The EPA's review of this project has been informed by the above referenced site meeting on December 8, 2011, the March 2012 revised CWA 404 permit application and all attendant reports, as well as additional data, maps and other information provided by the permit applicant on numerous dates throughout the first week of April 2012. The EPA is especially appreciative of the applicant's diligent response to the many queries for additional information and clarification during our review.

The proposed project is a 218-acre landfill designed to accommodate coal combustion residual (CCR) material from the existing LG&E Trimble County Generating Station for the next 38 years. The proposed landfill and its appurtenant structures and operation will result in direct impacts to 54,661 linear feet of stream, 1.14 acres of wetland and 0.27 acres of ponds. All of these proposed impacts to jurisdictional waters of the U.S. will occur in a watershed drained by an unnamed tributary to Corn Creek that has been documented as having excellent water quality and a diverse biological community, as evidenced by an "excellent" Macroinvertebrate Bioassessment Index (MBI) rating. Sampling

conducted by LG&E's consultants (Mactec 2007) documented that conditions in the stream proposed to be impacted by the construction of the CCR landfill were in fact better (i.e. higher scoring on the MBI) than conditions documented in a stream lying immediately to the north that is designated by the Commonwealth of Kentucky as an Exceptional Water of the Commonwealth and an Outstanding State Resource Water. That stream is also included in the state's biological reference reach network.

Information available to the EPA suggests that the aquatic resources proposed to be impacted as a result of this project may be among the highest quality headwater stream resources in this region of the Commonwealth. Headwater streams provide numerous physical, chemical and biological functions that directly affect the physical, chemical and biological integrity of downstream waters. The functions of headwater streams include providing hydrologic retention capacity that reduces downstream flooding and augments baseflow; sediment retention; temperature regulation; uptake, transformation and retention of nutrients and contaminants; organic matter processing and export to support downstream food webs; and contributions to the biological integrity of river networks via provision of spawning and nursery habitats and niche habitat for unique and threatened species. High gradient headwater streams such as those proposed to be impacted by this project are characterized by riffle and pool complexes that are considered special aquatic sites in 40 CFR §230.45 due to their special ecological characteristics that are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region (40 CFR §230.3(q-1)).

For reasons outlined below, the EPA does not believe that the applicant has undertaken a proper alternatives analysis required under the Clean Water Act Section 404(b)(1) Guidelines in order to justify the proposed alternative as the least environmentally damaging practicable alternative.

Alternatives Analysis – 40 CFR §230.10(a)

The Clean Water Act Section 404(b)(1) Guidelines, at 40 CFR §230.10(a), provide that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. The Guidelines consider an alternative practicable if it is capable of being done after taking into consideration cost, existing technology and logistics in light of the overall project purpose.

The applicant's alternatives analysis included as Appendix 1 of their CWA 404 permit application bases the evaluation of potential alternatives on a need to dispose of 910,000 cubic yards of CCR material annually throughout the anticipated 38-year lifetime of the facility's two power generating units (Mactec, rev. 2012). Many of the alternatives for CCR waste disposal considered, but eliminated from further consideration by LG&E were rejected due to the inability of those alternatives to accommodate the total 910,000 annual cubic yards of material. However, based on information provided by LG&E, the EPA believes that it will likely be unnecessary to dispose of this volume of CCR, and consequently, the applicant's alternatives analysis does not comply with the requirements of the Guidelines (40 CFR §230.12).

The total volume of CCR material generated at the Trimble County Generating Station is actually comprised of five different waste streams. As illustrated in Table 1, over 90-percent of this material consists of fly ash and synthetic gypsum. In its alternatives analysis, LG&E indicates that approximately 11-percent of the annual fly ash and bottom ash produced at the facility and approximately 93-percent of

synthetic gypsum is adaptively reused. On December 8, 2011, representatives of LG&E verbally informed representatives of the EPA that up to 75-percent of its fly ash production may be reused. In fact, LG&E is presently constructing two new barge loading facilities at the Trimble County Generating Station to increase its capacity to facilitate adaptive reuse of its CCR material, one for fly ash and a second for gypsum.

The EPA believes that the actual volume of CCR material necessary for annual disposal may be between 17-percent and 46-percent of the 910,000 cubic yards used by LG&E in its alternatives analysis. Deducting the proportional volumes of reused material cited in the alternatives analysis results in a revised total waste volume necessary for disposal of approximately 417,000 cubic yards per year (Table 2), or 46 percent of the volume used in the alternatives analysis. Similarly, deducting the proportional volumes of material assuming reuse of up to 75-percent of fly ash and bottom ash reduces the total annual volume for disposal to approximately 153,000 cubic yards per year (Table 2), or 17 percent of the volume used in the alternatives analysis.

The Clean Water Act Section 404(b)(1) Guidelines specify that the proposed disposal sites for dredged or fill material must be specified as failing to comply with the requirements of the Guidelines where the proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem (40 CFR §230.12(3)(iii)). The EPA believes it is inconsistent with the intent of the Guidelines to discount potentially practicable alternatives based, at least in part, on the inability of those alternatives to provide a storage volume that ignores the already demonstrated volumetric reductions in CCR as a result of adaptive reuse. Even further reductions in the necessary storage capacity are likely, as evidenced by LG&E's laudable commitment to facilitate CCR reuse and its stated goals to significantly increase the quantity of material reused. These considerations warrant a more detailed alternatives analysis in order to properly consider all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem, as required by the Guidelines. In the absence of such an analysis, identification of the least environmentally damaging practicable alternatives cannot be made definitively.

Other Considerations

The EPA also has concerns with other aspects of the project as proposed, including but not necessarily limited to the potential for significant degradation of waters of the U.S. (40 CFR §230.10(c)) and the potential inconsistency of the proposed compensatory mitigation plan with the Final Rule on *Compensatory Mitigation for Losses of Aquatic Resources* (Federal Register 73(70):19594-19705; 33 CFR Part 332; Subpart J of the Guidelines). However, these concerns are superseded by the need to conduct a detailed alternatives analysis consistent with the issues outlined above. The EPA will therefore defer detailed comment on these aspects of the project until a defensible least environmentally damaging practicable alternative can be identified.

National Environmental Policy Act (NEPA)

The EPA has commenting responsibilities under NEPA and the CEQ implementing regulations (40 CFR. Parts 1500-08), and under Section 309 of the Clean Air Act, to review and publicly comment on proposed Federal actions with potentially significant impacts on the quality of the environment. The EPA believes it may be appropriate for the Corps to prepare an Environmental Impact Statement (EIS) concerning this proposed project. In making the determination regarding the need to prepare an EIS, we recommend that the Corps consider the potentially significant adverse impacts associated with the

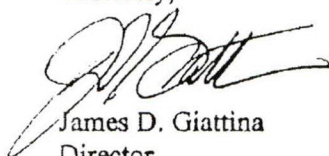
proposed project and provide assurances that the proposed mitigation will reduce the severity of the potential direct, indirect and cumulative impacts in order to support a Finding of No Significant Impact. The potentially significant adverse impacts associated with this project include (but may not be limited to) the loss of 54,661 linear feet of high quality streams in an unnamed tributary to Corn Creek. Further, the project could potentially impact a "cave" that may have historical significance.¹ The EPA recommends further investigation regarding the potential for this project to impact a historically significant site.

Conclusion

In conclusion, the EPA believes that the project, as proposed, may not comply with the Clean Water Act Section 404(b)(1) Guidelines. The EPA finds this project may have substantial and unacceptable adverse impacts on aquatic resources of national importance (ARNI). Therefore, we recommend denial of this project as currently proposed. As summarized above, a significantly revised alternatives analysis is necessary to reevaluate all alternatives to the proposed CCR landfill in the unnamed tributary of Corn Creek, with particular emphasis on those alternatives previously dismissed based on a lack of holding capacity. This letter follows the field level procedures outlined in the August 1992 Memorandum of Agreement between the EPA and the Department of the Army, Part IV, paragraph 3(a) regarding § 404(q) of the CWA.

I want to thank you and your staff for your cooperation and willingness to address our concerns. We look forward to working closely with you and the applicant to resolve the concerns outlined above. If you have any questions, please call me at (404) 562-9345 or Eric Somerville (706) 355-8514 of my staff.

Sincerely,



James D. Giattina
Director
Water Protection Division

cc: Mr. Jim Townsend, U.S. Army Corps of Engineers Louisville District
Mr. Lee Andrews, U.S. Fish and Wildlife Service
Mrs. Sandy Gruzesky, Kentucky Division of Water

Enclosure (Tables 1 and 2)

Table 1. Estimated annual volume of coal combustion residuals at the LG&E Trimble County Generating Station.

¹ In letters dated November 30, 2011, and March 12, 2012, the Kentucky Division of Waste Management (KDWM) indicates that the proposed project may impact a cave within the footprint of the landfill. KDWM has opined that the project may violate the Kentucky Cave Protection Act. In addition, there are unverified reports from the 1970's that this "cave" may have been part of the network of secret routes and safe houses used by 19th-century black slaves in the United States to escape to free states and Canada with the aid of abolitionists and allies who were sympathetic to their cause. The EPA understands that the Kentucky Archaeological Survey is presently investigating these claims.

Material	Volume per Year (cubic yards)	Percent of Total
Pyrites	4,306	0.5%
Bottom Ash	65,412	7%
Economizer / Duct Ash	12,115	1%
Fly Ash	346,463	38%
Gypsum (Flue Gas Desulfurization waste)	481,703	53%
SUM	910,000	100%

Source: Mactec, 2012.

Table 2. Revised estimated coal combustion residuals volume (cubic yards) necessary for disposal under two adaptive reuse scenarios.

Material	Volume per Year	Adaptive Reuse Scenario #1		Adaptive Reuse Scenario #2	
		Percent Reused	Revised Disposal Volume per Year	Percent Reused	Revised Disposal Volume per Year
Pyrites	4,306	0.0%	4,306	0.0%	4,306
Bottom Ash	65,412	11%	58,217	75%	16,353
Economizer / Duct Ash	12,115	0%	12,115	0%	12,115
Fly Ash	346,463	11%	308,352	75%	86,616
Gypsum (Flue Gas Desulfurization waste)	481,703	93%	33,719	93%	33,719
Sum Waste Volume per Year	910,000	--	416,709	--	153,109

Source: Mactec (2012); LG&E personal communication (December 8, 2011).

Alternatives Analysis Report

LG&E and KU Services Company
Trimble County Generating Station Landfill Project
Trimble County, Kentucky

GAI Project Number: C100784.05, Task 005

January 2014

Prepared for: LG&E and KU Services Company
220 West Main Street
Louisville, Kentucky 40202

Prepared by: GAI Consultants, Inc.
Pittsburgh Office
385 East Waterfront Drive
Homestead, Pennsylvania 15120-5005



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Executive Summary

This Alternatives Analysis Report (Report) was prepared by GAI Consultants, Inc. (GAI) at the request of LG&E and KU Services Company (LG&E) for the Trimble County Generating Station Landfill Project (Project), located in Trimble County, Kentucky (KY). The *Section 404 Alternatives Analysis*, originally prepared by MACTEC Engineering and Consulting, Inc. (MACTEC) in 2010 and revised in March 2012, is included as Appendix 1. The 2010 and March 2012 documents were included as the *Section 404 Alternatives Analysis* (Appendix 1) of LG&E's Clean Water Act (CWA) Section 404 permit application, which was initially announced on public notice by the United States Army Corps of Engineers (USACE), Louisville District on October 26, 2011. MACTEC's report is no longer being submitted as part of the Section 404 permit application based on the May 2, 2013 KY Department for Environmental Protection's (DEP) Division of Waste Management (KDWM) Special Waste Permit denial letter described below. LG&E withdrew the original CWA Section 404 permit application that was submitted March 2012 and is submitting a new CWA Section 404 permit application to the USACE. Information obtained from the *Section 404 Alternatives Analysis* (Appendix 1) will be used in this Report.

The Project purpose is to develop a nominal 40-year plan for dry storage (special waste landfill) of Coal Combustion Residuals (CCRs) produced at the Trimble County Generating Station. The station produces approximately 910,000 cubic yards per year (CY/yr) of fly ash, synthetic gypsum, bottom ash, and pyrites. Based on projections of the remaining capacity of existing CCR storage facilities at the Trimble County Generating Station and the need for prudent planning measures, construction of the special waste landfill would need to begin in the year 2015.

Presently, the CCRs generated at the Trimble County Generating Station are primarily stored in the existing Bottom Ash Pond (BAP). CCRs are currently sluiced (pumped) and stored in a wet condition at the BAP or the Gypsum Storage Pond. Due to insufficient capacity within the BAP to store CCRs over the long-term operation of the generating station, LG&E initiated a siting study in 2005 to consider various off-site and on-site storage alternatives. Given the United States Environmental Protection Agency's (USEPA's) 2010 announcement of possible new regulations for storage of CCRs, LG&E decided to pursue the study of dry storage options.

The original *Section 404 Alternatives Analysis* (Appendix 1) conducted in 2010 considered 20 possible Site Alternatives for new or expanded special waste landfills for CCR storage. The USEPA submitted comments on the original *Section 404 Alternatives Analysis* (Appendix 1) which addresses: a) whether the correct storage volumes were assumed as it related to beneficial reuse, b) the elimination of Site Alternatives without consideration of using multiple sites to satisfy the storage volume, and c) the quality of the watershed drained by the Ravine B Unnamed Tributary (UNT) of Corn Creek that would be impacted by the proposed special waste landfill within Ravine B.

This Report was developed considering the specific comments mentioned above from the USEPA, USACE, and KDWM, and to identify the Least Environmentally Damaging Practicable Alternative (LEDPA). A summary of the analysis included for each of the USEPA's comments are as follows:

- a) LG&E's evaluation of their historical beneficial reuse of CCRs, as detailed in Attachment 1, has shown an aggressive 30 percent of CCR material produced could potentially be beneficially reused at the Trimble County Generating Station. However, LG&E believes the assumption of 30 percent beneficial reuse over the entire life of the special waste landfill is a speculative assumption in light of 1) potential USEPA treatment of CCRs as hazardous waste, 2) increases in supply of CCR material due to additional environmental controls being implemented at all power stations nationwide, 3) the overall fluctuations in the strength of the economy, housing and construction markets, and 4) potential reduction in demand for fly ash as beneficial reuse due to air pollution control systems to reduce emissions changing the characteristics of CCRs and making the product less desirable. As a result, GAI evaluated several Site Alternatives that

satisfy 100 percent of the CCR storage volume (910,000 CY/yr), while also considering the aggressive 30 percent beneficial reuse volume (storage volume of 637,000 CY/yr) in the event that this rate of beneficial reuse could actually be periodically achieved during the Project's nominal 40-year duration.

- b) The analysis reevaluated the original 20 Site Alternatives included in the *Section 404 Alternatives Analysis* (Appendix 1) as well as six new independent Site Alternatives. Additionally, 17 combinations of Site Alternatives that met the minimum storage volume requirements as detailed in this Report were also evaluated, totaling 43 initial Site Alternatives. As a result of the May 2, 2013 KDWM denial letter, detailed in this Report, LG&E decided to pursue and evaluate CCR Storage Plans to study special waste landfill sites that not only avoided "Lime Cave" but that also reduced impacts to the overall number of small karst features as suggested by KDWM during a May 23, 2013 site visit with KDWM, LG&E, and GAI. Of the six new independent Site Alternatives, one site was further broken down into five additional Site Alternatives to reduce impacts to a number of small karst features. These Site Alternatives are referred to as Plan IIC Site Alternatives and were not included in the analysis until Cut III. In total, this Report includes consideration of a total 48 Site Alternatives, including 43 initial Site Alternatives and the five additional Plan IIC Site Alternatives. A list of the initial Site Alternatives considered is included in Section 3.3. The five additional Plan IIC Site Alternatives are described in Section 3.6.

All Site Alternatives were evaluated in a series of three progressively more detailed screenings in order to determine which Site Alternatives were practicable. The screenings considered the costs, logistics, and existing technologies in light of this Report's purpose to eliminate Site Alternatives that were deemed not practicable. The remaining practicable Site Alternatives were advanced and evaluated for impacts on aquatic ecosystems and other environmental receptors or factors to identify the LEDPA. As detailed in Section 1.0 of this Report, this evaluation process followed the USEPA Code of Federal Regulations (CFR) 40 Part 230 Section 404(b)(1) "Guidelines for Specification of Disposal Sites for Dredged or Fill Material".

The preliminary screening of Site Alternatives eliminated 22 Site Alternatives as not being practicable based on insufficient volume and other obvious inadequacies. For each Site Alternative, landfills were conceptually designed to determine the approximate available storage volume considering the existing ground topography. More detailed information on the Site Alternatives that were determined not to be practicable during the preliminary screening can be found in Section 3.4. A total of 21 Site Alternatives advanced to the second round of screening analysis.

The second round of screening utilized a rating system to assign a low, medium, or high impact rating to each Site Alternative based on its estimated degree of cost, logistical complexities, safety risks, and socioeconomic impacts. Site Alternatives with a large number of impacts based on specific attributes within these criteria were determined to be not practicable. As a result of the second screening, a total of 10 Site Alternatives advanced to the third round of analysis.

During the third round of screening, one independent site was further broken down into five additional Site Alternatives to reduce impacts to a number of small karst features, based on the May 2, 2013 KDWM denial letter and May 23, 2013 site visit with KDWM, LG&E, and GAI. These five Site Alternatives were also reviewed for criteria described in the first and second round of analyses. The third round screening of Site Alternatives eliminated Site Alternatives based on cost and logistical analysis. The cost analysis was based on a quantitative cost estimate where each Site Alternative was conceptually graded at a higher level of detail than during the preliminary screening analysis. Costs were developed for line

items that were anticipated to be significantly different between the remaining Site Alternatives. Site Alternatives that were determined to be unreasonably expensive or logistically infeasible were eliminated from further analysis as not practicable. Logistical reasons included scheduling impacts, and public utility and road relocations. Schedule impacts could delay construction, which would run the extensively more expensive risk of having to store material without a prepared site available. Two Site Alternatives were determined to be practicable and advanced for the final analysis for impacts on aquatic resources as well as other environmental considerations.

A 30 percent beneficial reuse scenario was also evaluated by minimizing the footprint of the landfill while building the landfill to the maximum height that could feasibly be constructed (920 feet). The analysis showed the stream impacts would decrease by approximately 2,200 feet which is only 2.5 percent of the total stream impacts associated with either Site Alternative. LG&E submits that it is probable that the selection of this scenario would result in the necessity for additional CCR storage capacity in the likely event that the aggressive and uncertain 30 percent beneficial reuse rate is not realized over the entire life of the Project and that production continues beyond the estimated 40 years, as described in Section 3.2 of this Report. It is reasonable to expect that the Trimble County Generating Station could be operated for longer than 40 years. This additional storage capacity would need to be implemented as a separate, new location not currently developed. This scenario would undoubtedly result in much greater impacts to aquatic ecosystems than the 2,200 feet of stream impacts that could be avoided under this scenario. In the end, this scenario can be considered impracticable due to the risk that at the very least, 30 percent beneficial reuse would need to be obtained throughout the entire life of the project. It is simply unrealistic and inherently risky to assume, with all of the different variables and uncertainty that is associated with beneficial reuse, that the 30 percent beneficial reuse rate would be obtained.

- c) The fourth and final round of analysis (environmental impact evaluation) of the practicable Site Alternatives entailed the evaluation of the extent of impacts on aquatic resources, as well as consideration of other environmental attributes such as threatened and endangered species, cemeteries, Section 106 (potential National Register of Historic Places (NRHP)-eligible sites, air quality, public safety, and aesthetics and noise. The two remaining Site Alternatives (3G-IIC-4B-1B and 3G-IIC-4B-1C) were evaluated on both a 100 percent storage volume and a 30 percent beneficial reuse case; therefore, four separate Site Alternatives were comparatively analyzed under this evaluation. The 30 percent beneficial reuse Site Alternative landfill layouts were identical to their 100 percent storage volume counterparts, except that the height of the landfill is reduced to compensate for the 30 percent reduction in CCRs.

All of the streams that would be impacted for the four practicable Site Alternatives consist of intermittent and ephemeral streams (no perennial streams would be impacted). Ephemeral-type streams would make up 72 percent of the streams impacted, with the remaining 28 percent being intermittent. The rating category for these ephemeral streams were 82 percent "average" or "poor" with the remaining 18 percent rated as "excellent." For the intermittent streams that would be impacted, 12 percent were rated as "average" and the remainder rated as "excellent."

The total number of wetlands impacted for the four Site Alternatives were approximately 38 relatively small, individual wetlands varying in size from less than 0.01-acre to 0.51-acre.

Based on the aquatic and environmental analysis conducted for this Report, Site Alternatives 3G-IIC-4B-1C and 3G-IIC-4B-1C-BR were eliminated. Site Alternatives 3G-IIC-4B-1B and 3G-IIC-4B-1B-BR would be expected to have the same stream and wetland impacts. In the event that the Alternative 3G-IIC-4B-1B-BR design was selected, but the 30 percent beneficial reuse was not realized over the

first 25 to 30 years of landfill operation, then additional CCR storage capacity would need to be added. This additional capacity would need to be added by way of a future vertical expansion permit approved by the KDWM. This vertical expansion would allow for additional storage, but it would be a fraction of the storage capacity that the 100 percent storage design, Alternative 3G-IIC-4B-1B, would have provided due to the phasing and construction goals. If the proposed 100 percent storage capacity design was selected and 30 percent beneficial reuse was obtained, the special waste landfill would continue as planned and the end result would be that the special waste landfill would have a lower final height or a longer life if production continues beyond the estimated 40 years, while not creating any additional impacts to aquatic resources.

LG&E has determined that Alternative 3G-IIC-4B-1B is the LEDPA based on the identical aquatic impacts, the inherent flexibility to adjust to varying beneficial reuse rates, and lower cost per cubic yard, as shown in the Cut IV Cost Comparison (Attachment 5) when compared to the Site Alternative 3G-IIC-4B-1B-BR.

1.0 Introduction

This Alternatives Analysis Report (Report) was prepared by GAI Consultants, Inc. (GAI) at the request of LG&E and KU Services Company (LG&E) for the Trimble County Generating Station Landfill Project (Project), located in Trimble County, Kentucky (KY). The analysis was performed per Section 404(b)(1) of the Clean Water Act (CWA) which requires project proponents to obtain a permit from the United States Army Corps of Engineers (USACE) before commencing any activities that involve placement of dredged or fill material into waters of the United States. Further, the United States Environmental Protection Agency (USEPA) has established guidance under 40 Code of Federal Regulations (CFR) Part 230 titled "Guidelines for Specification of Disposal Sites for Dredged or Fill Material", which includes restrictions on such discharges in Subpart B, Section 230.10. These restrictions specifically state: "...no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." "Practicable" is defined in 40 CFR 230.10(a)(2) as "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes".

Under this guidance, it is incumbent upon a project proponent to demonstrate that the proposed or recommended action is the least environmentally damaging practicable alternative (LEDPA) that meets the Project's purpose. The USACE, in turn, will use the information in this Report to make a determination of compliance with the Section 404(b)(1) guidelines.

This analysis was prepared for the Project with consideration of studies, planning and agency correspondence for Coal Combustion Residuals (CCR) storage originating in the late 1970s and continuing to present which are detailed herein. The dates and purpose of the specific correspondence and meetings that have had recent impacts on Site Alternatives considered for the Project are as follows:

- December 8, 2011 - interagency meeting among LG&E, USEPA, and USACE to discuss the agencies' comments regarding the Alternatives Analysis performed for the Trimble County Landfill Project as proposed at that time.
- March 2012 - LG&E submitted a revised CWA Section 404 permit application to the USACE for the Project as proposed at that time based on comments received from the agencies during the December 8, 2011 meeting.
- April 25, 2012 - Correspondence from J.D. Giattina, USEPA Region IV, to Col. L.T. Leonard, USACE; preliminary review comments on LG&E's March 2012 CWA Section 404 permit application.

- May 22, 2012 - Correspondence from G.H. Revlett, and LG&E, to J.D. Giattina, USEPA Region IV; response to USEPA comments on CWA Section 404 permit application.
- May 22, 2012 - Correspondence from G.K. Fleming, USEPA Region IV, to Col. L.T. Leonard, specific review comments on LG&E's March 2012 CWA Section 404 permit application.
- March 20, 2013 - An Intent to Deny application letter received from the KY Department for Environmental Protection's (DEP) Division of Waste Management (KDWM) for the Project area as proposed at that time, which included a karst feature known as "Wentworth" or "Lime Cave" within the footprint of the landfill.
- May 2, 2013 - Notice of Denial letter received from the KDWM notifying LG&E that the Project permit application was denied.
- May 23, 2013 - The KDWM expressed concern about special waste landfill Site Alternatives impacting certain karst features during a site visit with KDWM, LG&E, and GAI.

The above-referenced comments and meetings related to the prior Plan II Project design and Alternative Analysis. The previous Alternatives Analyses were prepared by MACTEC Engineering and Consulting, Inc. (MACTEC) (2010/2012) and was withdrawn by LG&E, but is included as *Section 404 Alternatives Analysis* (Appendix 1) to this Report for reference purposes. Comments from the USEPA on the prior Alternatives Analysis were related to the total volume of CCRs to be stored that formed the design basis for the proposed special waste landfill, the need for consideration of using multiple sites to satisfy the storage volume, and the quality of the watershed drained by the Unnamed Tributary (UNT) of Corn Creek (Ravine B) that would be impacted by the proposed special waste landfill within Ravine B. The March 20, 2013 KDWM's letter focused on the karst feature referred to as "Wentworth Cave" or "Lime Cave", and comments at a subsequent meeting with the KDWM included concern about special waste landfill Site Alternatives that impacted certain karst features. In the letter, the KDWM stated the excavation of this cave would not comply with the Cave Protection Act in KY Revised Statutes (KRS) 433.877(1). This action was finalized on May 2, 2013. As a result of the May 2, 2013 final denial of the application and the May 23, 2013 meeting with the KDWM listed above, the alternative analysis for the newly proposed Project takes into consideration minimizing the potential impacts to karst features.

Included in this document are the following sections:

1. Introduction;
2. Summary of LG&E's Prior Planning Actions for Long-Term CCR Storage; and
3. Alternatives Analysis.

This Report includes an evaluation of LG&E's historic and potential CCR storage volumes and beneficial reuse volumes. GAI evaluated the various Site Alternatives in MACTEC *Section 404 Alternatives Analysis* (Appendix 1), previously included in LG&E's original CWA Section 404 permit application for this Project in March 2012 to consider combinations of Site Alternatives that would provide sufficient capacity to store the total projected Project CCR production volume, which is 910,000 cubic yards per year (CY/yr). Further, GAI evaluated individual and combinations of sites to provide storage for the production volume reduced by potential beneficial reuse volumes that are based upon very optimistic projections of reuse. Resulting from the KDWM correspondence mentioned above, five additional Site Alternatives were included that would minimize impacts to karst features.

Evaluation criteria were developed to analyze the Site Alternatives developed in *Section 404 Alternatives Analysis* (Appendix 1), in addition to several new Site Alternatives identified by GAI, and combinations of sites from both sources. A total of four screening and evaluation steps were performed and are summarized in this document. The final evaluation and fourth step involved the analysis of the

practicable Site Alternatives to identify the LEDPA as described in the Section 404(b)(1) guidelines of the CWA.

2.0 Summary of LG&E's Prior Planning Actions for Long-Term CCR Storage

The Trimble County Generating Station located in Trimble County, KY has a total rated capacity of 2,164 megawatts of electricity based on total net rated capacity of Unit 1, Unit 2, and six combustion turbine units. The Trimble County Generating Station was planned in the late 1970s. Units 1 and 2, both of which are coal-fired units, began commercial operation in 1990 and 2010, respectively. Approximately 4.3 million tons of coal is burned annually.

The combined Units will typically generate on an annual basis approximately 910,000 CY of CCR material. For storage of these CCRs, and since the original plan of four units was no longer considered, the Bottom Ash Storage Pond (BAP) was partially constructed to an elevation of 500 feet (30 feet below the final design elevation) and put in service in 1990 to provide short-term CCR storage. An Emergency Fly Ash Pond (EFAP) was constructed at the same time, but was not put into service. For long-term CCR management, LG&E also purchased approximately 1,400 acres located on the east side of State Route (SR) 1838 and east of the BAP/EFAP. This land was purchased for the future storage of CCR materials. This area of land consists of two main ravines (A and B), and a small ravine to the southwest of Ravine A and B (Ravine C), and narrow ridge tops. Prior to the property purchase, LG&E performed a hydrogeologic investigation of Ravines A and B, completed in 1979, to assess the land's suitability for storage of CCR materials. LG&E proceeded with design of special waste landfills in these ravines and obtained a permit to construct a special waste landfill for CCR storage in Ravines A and B in the late 1980s (Permit #112-000003) from the KY Department of Environmental Protection (DEP). This permitted special waste landfill was designed as a ravine fill and was proposed to fill the length of Ravines A and B from near the mouth of the ravines near SR 1838 to the upper reaches of the ravine and all adjacent tributaries. Refer to Figure A.1 for a depiction of the originally proposed and permitted special waste landfill. Construction was not initiated on this permitted special waste landfill plan.

Since the Unit 1's start up in 1990 to present, the BAP has been the primary means of CCR storage. Beginning in 2005, LG&E performed a fleet-wide study of CCR Storage Facilities at all their coal-fired generating stations. At Trimble County Generating Station, the study identified that the existing BAP did not have sufficient storage capacity for the long-term operation of the station. A siting study or Initial Conceptual Design study was performed by MACTEC and was completed in October 2005. The study considered various off-site and on-site storage Alternatives. A Two-Part (short-term and long-term) Storage Plan was developed as a result of this study.

Part I (short-term) of the Two-Part Storage Plan was to develop incremental storage from the existing BAP and EFAP. This incremental storage would be accomplished by raising the existing BAP dikes 30 feet, where needed, to the original approved design height of 530 feet. Also, the existing unused EFAP would be lined and put in service to operate as a Gypsum Storage Pond. The incremental storage achieved in Part I was put in service December 31, 2011, and would be used for a finite amount of CCR storage, until the storage alternative developed in Part II was to be permitted and prepared to accept CCRs.

In September 2012, LG&E conducted an internal review of the current BAP storage volume, recent history of beneficial reuse, projected future production rates, and required emergency storage life throughout the life of the generating station. Based on LG&E planning, landfill CCR placement, Part II (long-term), must start in 2018. Allowing for two years of construction time, this means special waste landfill construction would need to begin no later than 2015. The original Part II (long-term) of the Two-Part Storage Plan was identified in a siting study entitled the *Final Conceptual Design Phase*, initiated in 2006 by MACTEC. During this study, LG&E initiated correspondence with the KDWM and the

USACE concerning the long-term storage of CCR material for the Trimble County Generating Station. The initial meeting was held on January 30, 2007 and discussions continued on numerous occasions through the present concerning the Project's objectives and various permitting requirements. The original study was substantially complete in December 2008 and resulted in the identification of a wet storage option in Ravines A and B as the recommended alternative. The resulting long-term storage area for the dams in Ravines A and B would inundate most of the ravines and tributary areas owned by LG&E.

As a result of the addition of Unit 2's production, the water balance at the station necessitated a change to dry storage for CCR storage. Due to the process changes, LG&E directed MACTEC to revisit the conceptual design to reevaluate long-term (Part II) special waste landfill storage options. This resulted in the *Final Conceptual Design Report* (December 11, 2009). MACTEC evaluated sites using the following siting criteria:

- a minimum of 40 years of CCR placement;
- development of special waste landfill;
- water control;
- site access;
- property acquisition;
- security fence;
- utility relocation;
- tree clearing;
- Indiana bat impacts/mitigation;
- air impacts;
- stream and wetland impact;
- mitigation for stream and wetland impacts;
- CCR transport; and
- operation and maintenance;
 - material transport;
 - dust control; and
 - groundwater monitoring.

This study resulted in special waste landfill site Case 21 (1LCH-N) being the recommended Site Alternative. This site corresponds to the alternative identified as 3D in *Section 404 Alternatives Analysis* (Appendix 1). This special waste landfill alternative would be located in the upper reach of Ravine B.

The USEPA released a pre-publication copy of a proposal to regulate CCR storage on May 4, 2010 that further supported the selection of a special waste landfill for the long-term storage of CCRs for Trimble County Generating Station. The proposed regulations were then published in the Federal Register on June 21, 2010. The proposed regulations had various options for regulating CCRs that were presented for comment. Under at least one of the proposed regulatory paths, CCR storage operations in wet storage impoundments would need to cease five years after the regulations would be enacted. Other regulatory options added requirements that would also negatively affect the long-term practicability of wet storage options.

Under consideration of these potential new regulations, the results of the 2009 MACTEC study, and water balance issues, LG&E moved forward with the recommended practicable Site Alternative from the 2009 study that identified a special waste landfill in the upper part of Ravine B. The conceptual layout encompassed the ridge tops and the upper reaches of Ravine B. The recommended Site

Alternative resulted in slightly over one-half of the physical length of Ravine B being used for the special waste landfill and ancillary features when compared to the wet storage option which would require nearly all of Ravines A and B. See Figure A.2 for a depiction of the *Final Conceptual Design Report* recommended Site Alternative Case 21 (1LCH-N).

Case 21, along with other Site Alternatives, were previously analyzed per the requirements in Section 404(b)(1) of the CWA in *Section 404 Alternatives Analysis* (Appendix 1). Alternative Case 21 (1LCH-N) was referred to as Site 3D in the previous Alternative Analysis included in *Section 404 Alternatives Analysis* (Appendix 1). Site 3D was the site that Final Design Engineering was performed for, as the Part II Storage Plan for Trimble County Station CCR storage. A major permit modification application was submitted to the KDWM in May 2011 for the Final Design of Site 3D. Various studies were performed on a karst feature referred to as "Wentworth Cave" or "Lime Cave" as a result of Technical Notice of Deficiency No. 1 and No. 2 (November 30, 2011 and March 8, 2012) from the KDWM for this application. As noted in Section 1.0, the correspondence with the KDWM resulted in a letter from the KDWM detailing the Intent to Deny the May 2011 Application for a Special Waste Landfill Permit (March 20, 2013) and a denial letter on May 2, 2013. The KDWM "...determined that the excavation or destruction of the cave (referred to as "Wentworth Cave" or "Lime Cave") does not comply with the requirements of the Cave Protection Act in KRS 433.877(1)".

As a result of the May 2, 2013 Denial Letter from the KDWM, LG&E proceeded with evaluation of a new CCR Storage Plan. The new CCR Storage Plan evaluation was referred to as Plan IIB (Site 3G). Plan IIB (Site 3G) was a modification to the previous Plan II (Site 3D) in order to avoid disturbance of the karst feature referred to as "Lime Cave" also referred to as "Lime Cave Avoidance Study". This feature is in the upper portion of the northern hollow of Ravine B. A new site (Site 3G) was developed as a result of this study and a preliminary CCR landfill footprint was developed. LG&E and the KDWM met on May 23, 2013 to discuss the "Lime Cave Avoidance" special waste landfill footprint (Site 3G). At this meeting the KDWM expressed that it would be more difficult to permit sites that impacted a number of small karst features and LG&E decided to eliminate any Site Alternatives that would impact a number of small karst features.

As a result of the May 23, 2013 meeting with the KDWM, LG&E decided to pursue and evaluate CCR Storage Plans to study special waste landfill sites that not only avoided "Lime Cave" but that also reduced impacts to the overall number of karst features as directed by the KDWM. This evaluation was referred to as Plan IIC. The results of the evaluations of the Plan IIC Storage Plan sites are included in the Cut III analyses of this Alternatives Analysis.

Ravine B is currently undeveloped property with the exception of a major transmission line corridor. From 2007 to 2013, LG&E completed technical studies of Ravines A, B, and C and the surrounding ridge tops comprising the 1,400 acres purchased in the 1980s. Those studies included: baseline aquatic studies of the main streams in Ravines A, B, and C (intermittent tributaries of Corn Creek); threatened and endangered species surveys; cultural resource studies; delineation studies and determinations of streams and wetlands; study of karst features, and work to support engineering design for the special waste landfill. In addition, studies of Corn Creek and associated riparian areas were completed to assess aquatic quality, the presence of threatened and endangered species, and the presence and significance of cultural resources; Corn Creek was initially identified as a potential site for on-site mitigation of water resources that may be dredged or filled through construction of the future CCR landfill. The United States Fish and Wildlife Service (USFWS) concurred with the findings of the threatened and endangered species studies stating that the Project should not adversely affect the threatened and endangered species in the vicinity of Ravine B. The KY Heritage Council (KHC) concurred with the results and findings of the cultural resource studies stating that seven sites should undergo Phase II testing to determine eligibility for the National Register of Historic Places (NRHP), if they would be affected by a proposed special waste landfill located in Ravine B.

MACTEC reported the results of the NRHP evaluation of five historic period farmsteads, 15TM36, 15TM64, 15TM65, 15TM74, and 15TM76, which lay in the direct construction footprint of the initial special waste landfill proposed by LG&E for the Trimble County Generating Station. No adverse effects to sites 15TM36, 15TM65, 15TM74, and 15TM76 will occur as a result of the proposed Project.

Only one site (15TM64) has been determined to be NRHP-eligible under Criterion D at the time of this Report. MACTEC recommended that the adverse effects to 15TM64 caused by construction be mitigated through archaeological data recovery. In a letter dated October 5, 2009, KHC concurred that the proposed Project would have adverse effects on site 15TM64 and also concurred with MACTEC's recommendations. Recently, additional Phase I and II studies have been performed by GAI, which are discussed in Section 3.7.1.4.

Throughout the process, from the original Special Waste Landfill Permit to the present, the environmental impacts of potential storage sites have been incrementally reduced as a result of modifications to the long-term CCR management plan for Trimble County Generating Station. As a result of various studies conducted within Ravine B, several engineering studies and analyses, and regulatory agency input and comments, the recommended special waste landfill impacts of the proposed special waste landfill in this Report have reduced from previous Site Alternatives that would have impacted the majority of both Ravines A and B.

These studies include:

- eliminating the borrow areas proposed for use within the drainage area of Ravine A;
- evaluating other borrow/spoil areas to reduce ecological impacts;
- additional cultural resource studies concerning the potential use of a karst feature, known as the "Lime Cave";
- a view shed study to assess view shed impacts on possible NRHP-eligible historic structures;
- a diversion channel design between Ravines A and B per suggestion of the USACE and USEPA to minimize the impacts to Ravine A;
- additional field studies to identify karst features; and
- "Evaluation of Groundwater Flow in Karst" Report by GAI, August 2012;
 - Dye injection testing; and
 - Sinkhole water testing

3.0 Alternatives Analysis

As stated in the Introduction, this Report was performed based on previous agency comments and correspondence received to date (January 2014). The following sections describe the evaluation performed for the Analysis.

3.1 The Requirements of the Section 404(b) Guidelines

As stated above, Section 404(b)(1) of the CWA requires obtaining a permit from the USACE before commencing any activities that involve placement of dredged or fill material into water of the United States. Further, the USEPA has established guidance under Section 404(b)(1) titled "Guidelines for Specification of Disposal Sites for Dredged or Fill Material", which include restrictions on discharge in Subpart B, Section 230.10. These restrictions specifically state: "...no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences". The guidelines consider an alternative practicable "if

it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes”.

Under this guidance, it is incumbent upon a project proponent to demonstrate that the proposed or recommended action is the LEDPA that meets the Project’s purpose. The USACE, in turn, will use the information in this document to make a determination of compliance with the Section 404(b)(1) guidelines.

3.2 The Overall Project Purpose

Defining the Project purpose is critical to the evaluation of any project’s compliance with the Section 404(b)(1) guidelines. LG&E defines the Project purpose as providing dry permanent storage of a nominal 40 years-worth of CCR generation from the Trimble County Generating Station. Upon further detailed engineering evaluation and based on the topographical and viewshed constraints used to develop the detailed design submitted in the 2011 KDWM Special Waste Permit, the design life for the special waste landfill was reduced to 38 years. However, based on advances in design and technology and prudent utility operating practices, it is not unreasonable to expect the Trimble County Generating Station could be operated longer than 38 years. For example, one of LG&E’s stations is currently being upgraded for an additional 20 years of anticipated operating life for a total of 60 years of life.

Based on LG&E projections of remaining life of the existing CCR storage facilities on-site at the Trimble County Generating Station, prudent planning would suggest that construction of the special waste landfill should begin no later than 2015 in order to avoid more costly storage of CCR materials.

From LG&E’s Generation Planning, the projected generation rate of CCR material from the Trimble County Generating Station is approximately 910,000 CY/yr, for a total volume produced over 38 years of approximately 34.6 million cubic yards (MCY) (100 percent storage). LG&E intends to pursue beneficial reuse markets to the maximum extent possible. As detailed in Attachment 1 of this Report, LG&E foresees that up to a 30 percent beneficial reuse rate may be possible over the life of the Project, which is considered an aggressive projection. Based on a 30 percent beneficial reuse rate over the entire course of the special waste landfill’s life, the minimum total volume of the special waste landfill would be approximately 24.2 MCY. However, an assumption that an overall 30 percent beneficial reuse rate can be achieved is viewed as speculative in light of 1) potential USEPA treatment of CCRs as hazardous waste, 2) increases in supply of CCR material due to additional environmental controls being implemented at all power stations, 3) the overall fluctuations in the strength of the economy, housing and construction markets and 4) the potential for new additives needed to be incorporated into air pollution control systems to reduce emissions, thus reducing the demand potential for beneficial reuse due to changing characteristics of CCRs that make the product less desirable.

3.3 Practicable Alternative Evaluation Criteria

The previously submitted *Section 404 Alternatives Analysis* (Appendix 1) considered a total of 20 separate Site Alternatives. In that Report/Analysis, several of the Site Alternatives were eliminated solely because the storage capacity was less than 34.6 MCY (38 years of CCR production at a rate of 910,000 CY/yr). Based on comments received from the USEPA and USACE on the original MACTEC *Section 404 Alternatives Analysis* (Appendix 1), this Report considers combinations of sites and potential beneficial reuse scenarios.

United States Geological Survey (USGS) topographic quadrangle maps and aerial maps depicting the area, in the vicinity of the generating station, were studied to identify additional preliminary potential storage sites based on topography and land use/cover. In addition to the 20 Site Alternatives identified in *Section 404 Alternatives Analysis* (Appendix 1), six additional individual potential site locations as well as 17 combinations of alternative sites with incremental storage at multiple sites were identified that cumulatively would conceptually meet the 38-year storage capacity. Of the six additional individual

potential site locations, one of the sites was further broken down into five additional Site Alternatives to reduce impacts to a number of small karst features as directed by the KDWM. These Site Alternatives are referred to as Plan IIC. The total number of Site Alternatives to be considered was 43, before including the five Plan IIC Site Alternatives. The Report takes into consideration both the 100 percent storage volume and an optimistic 30 percent beneficial reuse. The minimum storage volume to meet the Project's purpose for all CCR materials projected to be generated is 34.6 MCY and the minimum storage volume assuming an aggressive 30 percent beneficial reuse of CCR material is 24.2 MCY.

An overall site location map showing the locations of all potential conceptual special waste landfill sites is included as Figure A.5. Conceptual Site Alternatives with no specific physical location, such as mines, quarries, and existing special waste landfills were not shown on Figure A.5.

The Site Alternatives were evaluated in a series of progressively more detailed screening steps to determine the practicable Site Alternatives based on the Project purpose, cost, logistics, and existing technology as defined in the regulations. The following screening steps were performed and the results are documented herein:

1. Preliminary Screening of Site Alternatives (CUT I);
2. Second Round Screening of Site Alternatives (CUT II); and
3. Third Round Screening of Site Alternatives (CUT III).

Once the practicable Site Alternatives were determined, an environmental impact evaluation was performed to evaluate the impacts to wetlands, streams, and other environmental considerations for the remaining practicable Site Alternatives, in order to identify the Site Alternative as the LEDPA.

A flow diagram showing the procedure for this process is included as Figure A.6.

The following 20 Site Alternatives were originally identified and evaluated as part of the *Section 404 Alternatives Analysis* (Appendix 1). Detailed descriptions of each of these site locations can be found in the *Section 404 Alternatives Analysis* (Appendix 1) document.

- 1 No Action;
- 2 Beneficial Reuse;
- 3A Dickey Farm;
- 3B Ravine C;
- 3C Ridge Tops;
- 3D Ravine B;
- 4A North River Terrace and Corn Creek Valley;
- 4B South River Terrace-1 and Liter's Quarry;
- 4C South River Terrace-2 and South River Terrace-3;
- 5A Bethlehem Terrace;
- 5B Lee Bottom;
- 5C Spring Creek Terrace;
- 5D Cooper Bottom;
- 5E Other Barge Accessible Opportunities on the Ohio River;
- 5F Ghent Station Landfill;

- 6A CCR Landfills Developed by Others;
- 6B Sand and Gravel Quarries;
- 6C Limestone Aggregate Quarry;
- 6D Coal Mines; and
- 6E Existing Landfills.

In addition to the 20 Site Alternatives analyzed in *Section 404 Alternatives Analysis* (Appendix 1), GAI identified an additional six independent Site Alternatives as well as 17 combinations of Site Alternatives that conceptually met the storage volume requirements. Of the six Site Alternatives GAI identified, one of the sites was further broken down into five additional Site Alternatives to reduce impacts to karst features. These five Site Alternatives are referred to as Plan IIC Site Alternatives and are described in Section 3.6. A short description of each of the six Site Alternatives identified by GAI follows. Locations of each of these Site Alternatives are provided on Figure A.5:

- **3E MACTEC Case 16 (2LA-N and 1LG-N)** - Originally identified during the *Final Conceptual Design Phase* by MACTEC in 2009, this Site Alternative includes two independent special waste landfill sites located in the southern coves of Ravine B.
- **3F MACTEC Case 23 (12LCH-N)** - Originally identified in the *Final Conceptual Design Phase* by MACTEC, this Site Alternative includes one single special waste landfill that encompasses the majority of southern Ravine B.
- **3G GAI "Lime Cave" Avoidance Study Alternative** - This Site Alternative was conceptualized as a potential alternative to the KDWM's Special Waste Permit Application submission design in order to avoid disturbance of the karst feature referred to as "Lime Cave" as referenced in the March 20, 2013 Intent to Deny application letter. This feature is in the upper portion of the northern hollow of Ravine B.
- **4D Ridge Tops** - This Site Alternative is an area of ridge top land approximately 2.2 miles northeast of the Trimble County Generating Station along Conner Ridge Road with topography that could be suitable for a special waste landfill. Note that this Site Alternative is different than the previously identified **3C Ridge Tops**.
- **4E Browning Branch Tributary Ravine** - This Site Alternative is a ravine approximately 2.5 miles east of the Trimble County Generating Station. This Site Alternative is surrounded by SR 625 and South Campbell Lane, approximately 3.7 miles west of Bedford, KY.
- **4F Barebone Tributary Ravine** - This Site Alternative is a ravine to the south of existing LG&E property. This ravine drains into Barebone Creek, which parallels SR 754. While this ravine would not support the necessary storage volume on its own, it was considered in combination of sites.

Once all individual special waste landfill site locations were identified, conceptual special waste landfills were developed to determine the approximate storage volume available at the site optimizing existing ground topography. Site Alternatives that did not meet the minimum storage volume were included as groups, or Combination Site Alternatives. The following Combination Site Alternatives were developed that conceptually met the minimum storage volume:

- **Combination 1** - (3A Dickey Farm, 3B Ravine C, and 3C Ridge Tops);
- **Combination 2** - (4B South River Terrace-1-East, 4F Barebone Tributary Ravine);
- **Combination 3** - (3A Dickey Farm, 3B Ravine C, 4A North River Terrace and Corn Creek Valley);

- **Combination 4** - (4B South River Terrace-1 and Liter's Quarry, 4C South River Terrace-2 and South River Terrace-3);
- **Combination 5** - (4A Corn Creek Valley, 4D Ridge Tops);
- **Combination 6** - (3B Ravine C, 4F Barebone Tributary Ravine);
- **Combination 7** - [3B Ravine C, 3E MACTEC Case 16 (2LA-N only)];
- **Combination 8** - [3B Ravine C, 3F MACTEC Case 23 (12LCH-N)];
- **Combination 9** - (3F MACTEC Case 23 (12LCH-N), 4F Barebone Tributary Ravine);
- **Combination 10** - (3E MACTEC Case 16 (2LA-N only), 4F Barebone Tributary Ravine);
- **Combination 11** - (3B Ravine C, 4A North River Terrace and Corn Creek Valley);
- **Combination 12** - (4B South River Terrace-1-East, 4C South River Terrace-3);
- **Combination 13** - (4A Corn Creek Valley, 4B South River Terrace-1-East);
- **Combination 14** - (4D Ridge Tops, 3A Dickey Farm);
- **Combination 15** - [3A Dickey Farm, 3E MACTEC Case 16 (2LA-N only)];
- **Combination 16** - (4D Ridge Tops, 3B Ravine C); and
- **Combination 17** - [4D Ridge Tops, 3C Ridge Tops (Landfill-1 only)]

3.4 Preliminary Screening of Site Alternatives (CUT I)

The initial screening was primarily based on storage volume or other obvious disqualifiers as detailed below (barge transport, requiring multiple independent special waste landfill sites, construction and operation in Ohio River 100-year floodplain, construction within mining/quarry areas or lack of facility within reasonable distance). See Figure A.7 - "Preliminary Screening of Site Alternatives (CUT I)" for more information for each Site Alternative eliminated in the preliminary screening. The following table lists the 22 Site Alternatives that were initially eliminated as not practicable per the Project purpose.

Table A.1
CCR Site Alternatives Eliminated from the Original 43 Total Site Alternatives (CUT I)

Site Alternative	Name	Conceptual Storage Volume (MCY)	Transport Method
1	No Action	-	N/A
2	Beneficial Reuse	-	Varies
3A	Dickey Farm	6.1	Pipe Conveyor, Truck
3B	Ravine C	8.7	Pipe Conveyor, Truck
3C	Ridge Tops	12.8	Pipe Conveyor, Truck
4A	North River Terrace and Corn Creek Valley	19.0	Pipe Conveyor, Truck
4B	South River Terrace-1 and Liter's Quarry	22.5	Pipe Conveyor, Truck
4C	South River Terrace-2 and South River Terrace-3	14.4	Pipe Conveyor, Truck
4F	Barebone Tributary Ravine	14.8	Pipe Conveyor, Truck
5A	Bethlehem Terrace	33.7	Barge, Truck
5B	Lee Bottom	35.4	Barge, Truck

Site Alternative	Name	Conceptual Storage Volume (MCY)	Transport Method
5C	Spring Creek Terrace	35.4	Barge, Truck
5D	Cooper Bottom	24.5	Barge, Truck
5E	Other Barge Accessible Opportunities on the Ohio River	-	Barge, Truck
5F	Ghent Station Landfill	-	Barge, Truck
6A	CCR Landfills Developed by Others	-	Varies
6B	Sand and Gravel Quarries	-	Varies
6C	Limestone Aggregate Quarry	-	Varies
6D	Coal Mines	-	Varies
Combination 1	Dickey Farm, Ravine C, Ridge Tops	27.6	Pipe Conveyor, Truck
Combination 3	Dickey Farm, Ravine C, North River Terrace, Corn Creek Valley	33.8	Pipe Conveyor, Truck
Combination 4	South River Terrace-1-East/West, Liter's Quarry, South River Terrace-2/3	36.9	Pipe Conveyor, Truck

The following is a description of the major siting categories that define a Site Alternative as being not practicable. Each of the Site Alternatives eliminated in this round of screening (listed above in Table A.1) fall under at least one of these major categories:

Site Volume Requirements: As the Project purpose states, the primary intent of construction of a new special waste landfill facility is to have capacity for 38 years of CCR production volume. **Site Alternatives 1, 2, 3A, 3B, 3C, 4A, 4B, 4C, 4F, 5F, and 6B were eliminated due to insufficient storage volume.** All of these Site Alternatives do not meet the storage volume requirements at the 100 percent storage or 30 percent beneficial reuse rate (38 years of storage equals 34.6 and 24.2 MCY, respectively) to satisfy the Project purpose. Note that sites that do not meet the storage volume requirement on their own have also been evaluated as part of "Combination" Site Alternatives independently.

Barge Transport: As stated in the *Section 404 Alternatives Analysis* (Appendix 1), LG&E had a planned expansion of a barge off-loading facility to increase access to beneficial reuse markets but it is not anticipated that those markets will be able to handle all CCR material produced at the Plant. This barge facility is currently completed. Therefore, the feasibility of long-term CCR management via the current barge transport would require a potential special waste landfill site that is within a reasonable distance along the Ohio River to the Station. The potential special waste landfill site would also need to be relatively near the unloading facility so as not to require excessive infrastructure to unload and convey (via truck, pipe conveyor, or rail) the materials to the special waste landfill area. It would also require greater expansion of an additional barge loading facility than already in place at the Trimble County plant as well as an unloading facility at the destination site. Air and water permitting would also likely need to be reevaluated and safety/control of CCR material could be impacted. The combined substantial increase in capital and operating costs for these new loading and unloading facilities over the nearby landfill sites make Site Alternatives that require barge transport not practicable. **Site Alternatives 5A, 5B, 5C, 5D, 5E, and 5F were eliminated because of the requirement of barge transport to move CCR material from the Station to the landfill site.**

Multiple (four or more) Independent Special Waste Landfill Sites: Multiple individual special waste landfill sites are inherently more costly than other practicable site locations, where the storage volume could be met with individual special waste landfill locations, due to increased liner areas, lengths of

haul roads and pipe conveyor systems, number of stormwater and leachate ponds and pumps, as well as the additional overall management and maintenance of multiple sites. A conceptual evaluation of storage costs at the sites that would require four or more independent special waste landfill sites was performed. The evaluation showed that the cumulative costs to install composite liner and cover systems, haul roads, and pipe conveyors for each of these sites would be between approximately four and six dollars per CY of material disposed more than individual site locations that meet the entire storage volume requirement. This would relate to an approximate overall cost increase between \$100 and \$200 million over individual special waste landfill sites. **Site Alternatives 3C, Combination 1, Combination 3, and Combination 4 were eliminated due to their need of four or more individual special waste landfill sites to meet storage requirements.** Note that Site Alternatives that would require three or less individual sites were not eliminated during the preliminary screening due to this category alone.

Permitting and Construction within Ohio River 100-year Floodplain: Obtaining approvals and constructing a special waste landfill within a floodplain would be very difficult from a cost and logistical standpoint. Both the USACE and KDWM have concerns and/or restrictions with building within the 100-year floodplain.

33 CFR Part 320.4(l)(3) states, *"In accordance with Executive Order 11988, the district engineer should avoid authorizing floodplain developments whenever practicable alternatives exist outside the floodplain. If there are no such practicable alternatives, the district engineer shall consider, as a means of mitigation, alternatives within the floodplain which will lessen any significant adverse impact to the floodplain."*

401 Kentucky Administrative Regulations (KAR) 45:130 states, *"Waste disposed in special waste landfills shall not be placed within the 100-year floodplain of the waters of the Commonwealth unless the applicant complies with 401 KAR 30:031 concerning base flow restriction, temporary water storage capacity reduction, and waste washout."*

401 KAR 30:031, Section 2 states, *"No waste site or facility shall restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain, or be placed in a manner likely to result in washout of waste, so as to pose a hazard to human health, wildlife, or land or water resources."*

In addition, the permitting required would likely impact the Project schedule to meet the proposed start date. A Letter of Map Revision and Conditional Letter of Map Revision would be required by the Federal Emergency Management Agency (FEMA). GAI's prior similar permitting experiences with FEMA suggest that this process could take up to two years before approval is granted. **Site Alternatives 3A, 4A, 4C, 5A, 5C, and 5D were eliminated due to the necessity to construct and operate within the Ohio River 100-year floodplain, which is considered not practicable for the reasons stated above.**

Construction within Mining/Quarry Areas: Closed sand or gravel pits are frequently located within the floodplain and the excavation is below the groundwater table. The USEPA has expressed concern over the potential risks associated with filling quarries with CCR and generally advises against this practice. **Site Alternatives 4B, 5A and 6B were eliminated due to their proposed locations within quarries/mines.**

Lack of Facility within Reasonable Distance: **Site Alternatives 6A, 6C, and 6D were eliminated due to a lack of nearby storage facilities.** Additionally, all existing special waste landfills other than Valley View municipal solid waste (MSW) special waste landfill were eliminated from Site Alternative 6E. These options rely upon off-site storage for CCR materials and no suitable facilities are located within 50 miles. This would result in unreasonably expensive hauling/transporting costs.

3.5 Second Round Screening of Site Alternatives (CUT II)

The second round screening includes elimination of additional Site Alternatives that have been determined to be not practicable due to various cost, logistical, safety, and socioeconomic criteria items that may be encountered for the various special waste landfill Site Alternatives. The combinations of the impacts, as a result of these issues, factor into whether the Site Alternative is capable of achieving the Project purpose.

A conceptual site development plan was prepared for each of the 21 remaining storage sites to estimate approximate available special waste landfill storage volumes and to also qualitatively evaluate whether the site was a practicable alternative. The development plans included major Project considerations, for example: storage volume, access, property acquisition, stormwater control, soil borrow areas, utility line relocation, floodplain encroachment, and CCR transport.

Site Alternatives were assigned one of three notations for each criteria item based on the anticipated degree of impact. Note that each of the criteria items represent issues that would impact the cost, existing technology, and/or logistics in light of the Project purpose, and Section 404(b)(1) guidelines for a given alternative. The rating system is defined as follows:

- a blank indicates no to very low degree of impact;
- a circle indicates a low to moderate degree of impact; and
- a solid filled circle indicates a high degree of impact.

The following criteria items were evaluated for each Site Alternative:

Cost Issues

- area required for off-site soil and clay borrow material;
- 100-year Ohio River floodplain encroachment construction and costs;
- relocation of utility lines;
- property acquisition and needed buffer;
- controlling fugitive emissions during construction;
- controlling fugitive emissions during operation;
- truck hauling/CCR transport distance; and
- double handling of borrow or CCR material.

Logistical Issues (ability to meet the Project schedule and factors that make site unworkable or inefficient)

- property acquisition and needed buffer;
- other permitting schedule concerns (KDWM, 404/401, Airspace);
- 100-year Ohio River floodplain encroachment - permitting;
- other construction concerns (bridge, haul road, pipe conveyor, special waste landfill earthwork); and
- complexities of design schedule and operation of multiple or complex sites.

Safety Risks/Socioeconomic Impacts (from a costs/logistical standpoint)

- public safety risks (based on truck hauling distance);
- cemeteries requiring relocation;
- potential for cultural resource sites/historic structures requiring mitigation;

- farmland removal (including "prime" farmland);
- aesthetics (number of residences within 0.5-miles); and
- noise impacts (number of receptors).

Site Alternatives that encounter a large number of impact issues were eliminated based on the determination that they were determined to be not practicable. Each eliminated Site Alternative would be either excessively expensive, logistically infeasible, or causes such safety risks and socioeconomic impediments that the alternative is not practicable. Anticipated permitting issues (KDWM, 404/401, Airspace, etc.) as well as required property acquisition, would affect Project logistics and may result in expensive temporary CCR storage measures. No Site Alternatives were eliminated in Cut II due to not obtaining the desired 100 percent storage or 30 percent beneficial reuse volume.

See Figure A.8 - "Second Round Screening of Site Alternatives (CUT II)" for more detailed information for each alternative eliminated in the second round screening and Attachment 2 - "Second Round Screening Scoring Evaluation Criteria (CUT II)" for an explanation of the rating system for each criteria item.

The following table lists the 11 Site Alternatives that were eliminated as a result of the second round screening of Site Alternatives:

Table A.2
CCR Site Alternatives Eliminated from the 21 Remaining Site Alternatives (CUT II)

Site Alternative	Name	Conceptual Storage Volume (MCY)	Transport Method
4D	Ridge Tops	23.9	Pipe Conveyor, Truck
4E	Browning Branch Tributary Ravine	36.2	Pipe Conveyor, Truck
Combination 2	South River Terrace-1-East, Barebone Tributary Ravine	32.3	Pipe Conveyor, Truck
Combination 5	Corn Creek Valley, Ridge Tops	36.2	Pipe Conveyor, Truck
Combination 11	Ravine C, North River Terrace, Corn Creek Valley	27.7	Pipe Conveyor, Truck
Combination 12	South River Terrace-1-East, South River Terrace-3	27.9	Pipe Conveyor, Truck
Combination 13	Corn Creek Valley, South River Terrace-1-East	29.8	Pipe Conveyor, Truck
Combination 14	Ridge Tops, Dickey Farm	30.0	Pipe Conveyor, Truck
Combination 15	Dickey Farm, MACTEC Case 16 (2LA-N only)	26.9	Pipe Conveyor, Truck
Combination 16	Ridge Tops, Ravine C	32.6	Pipe Conveyor, Truck
Combination 17	Ridge Tops, Ridge Tops (Landfill-1 only)	31.1	Pipe Conveyor, Truck

3.6 Third Round Screening of Site Alternatives (CUT III)

The third round of screening was performed on the remaining Site Alternatives. GAI developed a conceptual subgrade and landfill grading for each of the Site Alternatives. Generalized subsurface investigation information and readily available USGS information were used to develop conceptual earthwork quantities, rock blasting and site CCR storage volumes and costs. Impact boundaries were developed for each Site Alternative to calculate estimated costs for property acquisition, relocation of

roads, utility relocation, forest clearing, and mitigation of impacts to streams, wetlands, Indiana bat habitat, cultural resources, and cemeteries.

Due to the final denial of the prior Special Waste Permit application on May 2, 2013 and the May 23, 2013 meeting with the KDWM, additional Site Alternatives were added that were variations of existing Site Alternatives to reduce impacts to a number of small karst features as suggested by KDWM. GAI further refined the Plan IIB (Site 3G) alternative into five additional Site Alternatives that reduced impacts to the overall number of karst features and analyzed access to the site. These five Site Alternatives are in addition to the original 43 sites and are referenced as Plan IIC in this Report. These five Plan IIC Site Alternatives were evaluated under Cut III but were also analyzed based on prior evaluations considered in Cuts I and II. A detailed write-up explaining the removal of any of these new five Plan IIC Site Alternatives is provided later in Cut III.

A conceptual plan was created for each site using USGS topographic maps and aerial mapping where available to estimate the site's available storage volume. The footprint of each site was developed in accordance with the KY Siting Requirements for Special Waste Landfills (Section 401 KAR 45:130), where possible. Soil volume estimates for special waste landfills were developed using an effective slope of 3.5 horizontal (H) to 1 vertical (V) for all landfill grading. The special waste landfill's subgrade was developed with a 100-foot-wide Ravine floor, minimum slopes of three percent, and maximum slopes of 3H to 1V. A 60-foot-wide flat area was included around the perimeter of the landfill grading in order to provide room for diversion channels, collection channels, liner termination, and site access. A diversion channel with a minimum slope of one percent was developed in order to positively capture and convey flows from drainage areas upslope of the landfill footprint. A footprint of an Erosion and Sedimentation/Stormwater Management (E&S/SWM) pond with approximate dimensions in order to capture the runoff from a 10-year storm was developed. A footprint of a Leachate Pond with approximate dimensions based on previous design and construction experience on similar projects was developed. A pipe conveyor was shown at approximate minimum horizontal radius of 1,000 feet. Where changes in direction were anticipated to exceed 90 degrees, a pipe conveyor transfer station was assumed to be required. Haul roads were shown to not exceed a vertical radius of 1,000 feet.

Preliminary cost estimates were prepared to estimate Project costs in 2012 dollars and took into account property acquisition, transportation system from the Station to the storage site, site construction, operating costs, and other factors that were anticipated to be significantly different between Site Alternatives. Items anticipated being similar in cost for all Site Alternatives (i.e., Project management, groundwater and surface water monitoring, yearly maintenance) were not included in the cost estimate comparison.

Site location figures of each of the Site Alternatives evaluated in CUT III are provided as Attachment 3. A summary table of the capital, operating, and total costs is included as Figure A.9. A detailed estimate of probable cost, including quantities and costs for line items which are anticipated to be significantly different between the remaining Site Alternatives, is included as Attachment 4.

As a result of the more detailed grading plans developed in CUT III, the Site Alternative's available storage volumes changed to a degree. The change in storage volume occurred as the design basis for a composite liner system was developed with respect to the existing topography and then connected to the conceptual final landfill grading.

To evaluate each Site Alternative's costs on a comparable level, each storage volume was normalized to 24.2 MCY (38 years of CCR production including 30 percent beneficial reuse). A normalization factor was calculated by dividing the minimum storage volume of 24.2 MCY by each special waste landfill's original volume. For example, if a site's conceptual landfill volume was 30.2 MCY, the normalization factor for that alternative would be $24.2/30.2$ equals 0.8. The volume normalization factor was then multiplied by the quantities in line items that would be affected by a change in landfill volume. These

line items are denoted with an "X" next to their description on the cost comparison estimate included as Attachment 4. The actual and normalized quantities are listed side-by-side for each Site Alternative for reference purposes.

This normalization is a simplified approximation used to compare the costs for the Site Alternatives based on the same storage volume. If each alternative was refined in a more detailed design, some of the line items may not follow such a simplified scaling of quantities. For example, a Site Alternative that fell short of the required storage volume by eight percent may require extensive earthwork and liner construction in order to gain the additional volume, and the costs associated with this additional construction could vary more or less than eight percent.

The following is a detailed description of the criteria used to screen the Site Alternatives in Cut III:

Lime Cave/Karst Avoidance: On March 20, 2013 the KDWM sent the Intent to Deny application letter stating "...that the excavation or destruction of the cave does not comply with the requirements of the Cave Protection Act in KRS 433.877(1)..." The cave reference is in regard to the karst feature referred to as "Lime Cave" or "Wentworth Cave". This letter also states, "...a final decision by the Division to deny the permit application would not preclude the submission of a new application for a similar facility in an alternate location." On May 2, 2013, the applicant was denied on that basis. LG&E, GAI, and KDWM met on May 23, 2013 and discussed a conceptual landfill footprint to avoid the karst feature referred to as "Lime Cave" and sites that impact a large amount of karst features. Any site that has significant impacts to the "Lime Cave" or other large karst features that could be caves as described in the Cave Protection Act.

Inadequate Storage Volume: The Project purpose requires that the selected Site Alternative be capable of handling the CCR storage volume from 38 years of CCR production at the Trimble County Generating Station. Since the aggressive beneficial reuse rate of 30 percent is a very optimistic projection as described in Attachment 1, the grading plans developed as part of CUT III were initially designed with the intent of supplying 38 years of the 100 percent CCR production volume. The minimum storage volume is 34.6 MCY for 100 percent CCR production and 24.2 MCY for 30 percent beneficial reuse rate. This criterion was used in Cut I but revisited for the five Plan IIC Site Alternatives to avoid a number of small karst features.

Cemetery Relocation/Avoidance: Based on conceptual plans, several Site Alternatives would impact a private family cemetery known as "Mahoney Cemetery" located on Ogden Ridge Road. During the third round screening analysis, a more detailed evaluation was performed on the feasibility of avoiding or relocating the Mahoney Cemetery. Additional research on the Mahoney Cemetery is included as Attachment 6.

Reviews of KY's statutory and regulatory requirements indicate the following requirements for the removal of bodies from one cemetery location and relocation at a different cemetery:

The owner of a public or private burial ground, regardless of size or number of graves, must protect the burial grounds from desecration or destruction, or from being used as a dumping ground, building site, or any other use, which may result in the burial grounds being damaged or destroyed [see KRS 381.697(2)]. Pursuant to KRS 213.076(12), authorization for the disinterment, transportation, and re-interment of human graves is required from the State Registrar or a court prior to disinterment of any human remains. When one or more bodies are to be disinterred for reburial in a different cemetery or for other storage, an application for a disinterment/re-interment permit must be made to the State Registrar of Vital Statistics (see 901 KAR 5:090 Section 2). A disinterment permit is required for each grave. To obtain a disinterment permit under law, the applicant must demonstrate that it has obtained written permission from all members of the same class of the next-of-kin for each deceased person within the cemetery. Any single next-of-kin that refuses to provide consent precludes the issuance of a disinterment permit. [see 901 KAR 5:090 Section 2(2)]. There are no standards provided for when a

court order might be issued in the event that permission from each next-of-kin for each grave cannot be obtained.

Based on the above research and feasibility analysis, it was determined that any Site Alternatives that would require relocation of this cemetery was not practicable due to the following logistical and cost factors:

- In order to relocate the burials to a different cemetery location, permission would need to be granted by the next-of-kin for each of the deceased, including agreements on reburial location for each of the remains. One denial by a single next-of-kin could delay or halt the relocation planning process indefinitely, making the Site Alternatives requiring cemetery relocation not practicable;
- In 2010, Kentucky Utilities' (KU) special waste landfill siting for the Ghent Generating Station Landfill Project required the exhumation and reburial of seven human burials which were located within a small family cemetery on KU property. This small seven-burial cemetery relocation project cost an estimated \$120,000 to complete. LG&E projects that the cost to relocate 78 burials would be in excess of \$1,000,000 even if all required permissions are granted; and
- Discussions with next-of-kin revealed an intention to preserve the Mahoney Cemetery and allow the future use of the Cemetery.

Excessive Cost: The KY Public Service Commission requirements (KRS 278.020 and KRS 278.183) state that a public utility company is legally bound to provide the lowest cost alternative for energy production to its customers. The Site Alternatives in Cut III were evaluated for cost and eliminated for excessive cost where appropriate. Site Alternatives eliminated for excessive cost included any cost per cubic yard greater than twenty percent of the lowest cost Site Alternatives' cost per cubic yard.

The following table lists the initial Site Alternatives that were eliminated as a result of the third round screening of Site Alternatives:

Table A.3a
CCR Site Alternatives Eliminated from the Remaining Initial Site Alternatives (CUT III)

Site Alternative	Name	Conceptual Storage Volume (MCY)	Normalized Storage Volume (MCY)	Normalized Cost (Cost/CY)	Reason for Elimination
3E	MACTEC Case 16	22.2	24.2	8.48	- Unacceptable Cemetery Impacts - Inadequate Storage Volume
3E-Cemetery Avoidance	MACTEC Case 16-Cemetery Avoidance	24.2	24.2	10.00	- Excessive Costs
3F	MACTEC Case 23 (12LCH-N)	24.9	24.2	9.47	- Unacceptable Cemetery Impacts
6E	Existing Landfills (Valley View MSW Landfill)	24.2	24.2	31.31	- Excessive Costs
Combo 6	Ravine C, Barebone Tributary Ravine	21.8	24.2	9.43	- Unacceptable Cemetery Impacts - Excessive Costs - Inadequate Storage Volume
Combo 6-Cemetery Avoidance	Ravine C, Barebone Tributary Ravine-Cemetery Avoidance	24.3	24.2	10.52	- Excessive Costs

Site Alternative	Name	Conceptual Storage Volume (MCY)	Normalized Storage Volume (MCY)	Normalized Cost (Cost/CY)	Reason for Elimination
Combo 7	Ravine C, MACTEC Case 16 (2LA-N Only)	22.3	24.2	8.27	- Unacceptable Cemetery Impacts - Inadequate Storage Volume
Combo 8	Ravine C, MACTEC Case 23 (12LCH-N)	33.9	24.2	9.68	- Unacceptable Cemetery Impacts - Excessive Costs
Combo 9	MACTEC Case 23 (12LCH-N), Barebone Tributary Ravine	35.5	24.2	9.46	- Unacceptable Cemetery Impacts - Excessive Costs
Combo 10	MACTEC Case 16 (2LA-N Only), Barebone Tributary Ravine	19.9	24.2	-	- Unacceptable Cemetery Impacts - Inadequate Storage Volume
3D	Ravine B	34.5	24.2	7.43	- Unacceptable Karst Features Impact
3G	Lime Cave Avoidance Study Alternative	39.4	24.2	8.49	- Unacceptable Karst Features Impact

The Site Alternatives were screened for unacceptable impacts to karst features. Due to the denial letter sent on May 2, 2013 from the KDWM, Site Alternatives that excavate or destruct the "Lime Cave" or impact a large amount of karst features were deemed unacceptable. Site Alternatives 3D and 3G were eliminated.

The Site Alternatives were screened for inadequate storage volume. The minimum storage volume to meet the Project purpose for all CCR materials projected to be generated is 34.6 MCY and the minimum storage volume assuming an aggressive 30 percent beneficial reuse of CCR material is 24.2 MCY. The Site Alternatives that could not even meet the optimistic volume of 24.2 MCY for 30 percent beneficial reuse were removed from consideration. Site Alternatives 3E, Combo 6, Combo 7, and Combo 10 were eliminated.

The Site Alternatives were screened for unacceptable impacts to the Mahoney Cemetery. The Site Alternatives that impact the cemetery would require obtaining permission from the next-of-kin for each of the deceased, including agreements on reburial location for each of the remains. In addition, following research into another special waste landfill encountering a similar situation, the cost for the relocation of Mahoney Cemetery was estimated to be in excess of \$1,000,000. That cost is assuming that all the required permissions were granted. Also, by means of discussions with the next-of-kin, it was revealed that the intention is to preserve the cemetery. Thus, Site Alternatives that impact the cemetery were deemed impractical. Site Alternatives 3E, 3F, Combo 6, Combo 7, Combo 8, Combo 9, and Combo 10 were eliminated.

The Site Alternatives were screened for excessive costs. Site Alternatives with excessive cost are sites with a cost per cubic yard of the Project greater than approximately 20 percent more expensive than the lowest cost Alternative. The lowest cost Alternative is 3G-IIC-4A at \$7.17 per cubic yard. Thus, any cost greater than approximately \$8.60 per cubic yard were considered excessive cost. Site Alternatives 3E-Cemetery Avoidance, 3F, 6E, Combo 6, Combo6-Cemetery Avoidance, Combo 8, and Combo 9 were eliminated.

The following table lists the additional Plan IIC Site Alternatives that were eliminated as a result of the third round screening of Site Alternatives:

Table A.3b
CCR Site Alternatives Eliminated from the Additional Site Alternatives (CUT III)

Site Alternative	Name	Conceptual Storage Volume (MCY)	Normalized Storage Volume (MCY)	Normalized Cost (Cost/CY)	Reason for Elimination
3G-IIC-4B-1A	Northern Road	33.0	24.2	9.24	- Excessive Costs - Logistics
3G-IIC-4A	Southern Expansion	39.0	24.2	7.17	- Logistics/ Scheduling Issues
3G-IIC-5A	Ravine A	33.6	24.2	8.14	- Environmental Features

3G-IIC-4B-1A was eliminated due to excessive cost and logistics. The cost per cubic yard, as shown in Table A.3b, is \$9.24. As described earlier, this is far greater than \$8.60 per cubic yard, or 20 percent of the lowest cost per cubic yard of \$7.17, rendering it excessive. The northern road had excessive costs due to the route's greater length. The greater length would increase the cost of the haul road and the cost of the coupled conveyor system. These items, along with some other minor cost additions, contributed to the northern route's excessive cost. The northern road also has logistical issues due to the pipe conveyor termination point and landfill phasing not being ideal for construction from that access point.

3G-IIC-4A was eliminated due to logistics/scheduling concerns. LG&E plans to start storing CCR material no later than the year 2018. With construction of the landfill subgrade estimated to take two years from permit approval before the acceptance of CCR material, in order to achieve the 2018 start date, landfill construction would need to start no later than 2016. Access to the subgrade construction site will be needed before any work on the special waste landfill can begin, thus the haul road leading up to the special waste landfill would need to be completed before special waste landfill construction can commence. In order to begin accepting material by 2018, it is estimated that the haul road construction will need to begin approximately no later than 2015. Additionally, before the haul road construction can begin, LG&E would have to have the proper permits filed and approved. If the proposed schedule were to be delayed, LG&E would run the more expensive risk of having to store material without a prepared site available. The Site Alternative also requires that additional property be purchased and would involve negotiations with the landowners. One of the landowners of the properties required has shown opposition to the special waste landfill, thus making the acquisition of the property unlikely without condemnation. It is anticipated that the property would have to be acquired by eminent domain which may take up to a year. The Site Alternative also requires that Ogden Ridge Road be relocated. Relocation of a road would require time-consuming procedures, such as County approval, permitting and design, utility relocation, and construction. In addition, it may inconvenience the public as there are some residents who live in the vicinity of Ogden Ridge Road.

3G-IIC-5A was eliminated based on LG&E's consultation with the KY Division of Water (KDOW) and the USEPA to avoid adverse effects to the Ravine A stream, which is a tributary to Corn Creek. The KDOW has assigned a unique use designation to this tributary as a special use per 401 KAR 10:026, referred to as an Outstanding Resource Water (OSRW), in contrast to Ravine B which has a use designation of Warm Water Aquatic Habitat (not a special use designation). The 3G-IIC-5A alternative consists of a landfill that would be centered over the existing intersection of Mt. Pleasant Road and Ogden Ridge Road, which would result in surface water runoff from the landfill construction area being discharged into the upper reach of Ravine A. Based on the OSRW use designation, all options that would result in construction stormwater being discharged to Ravine A were eliminated, including 3G-IIC-5A.

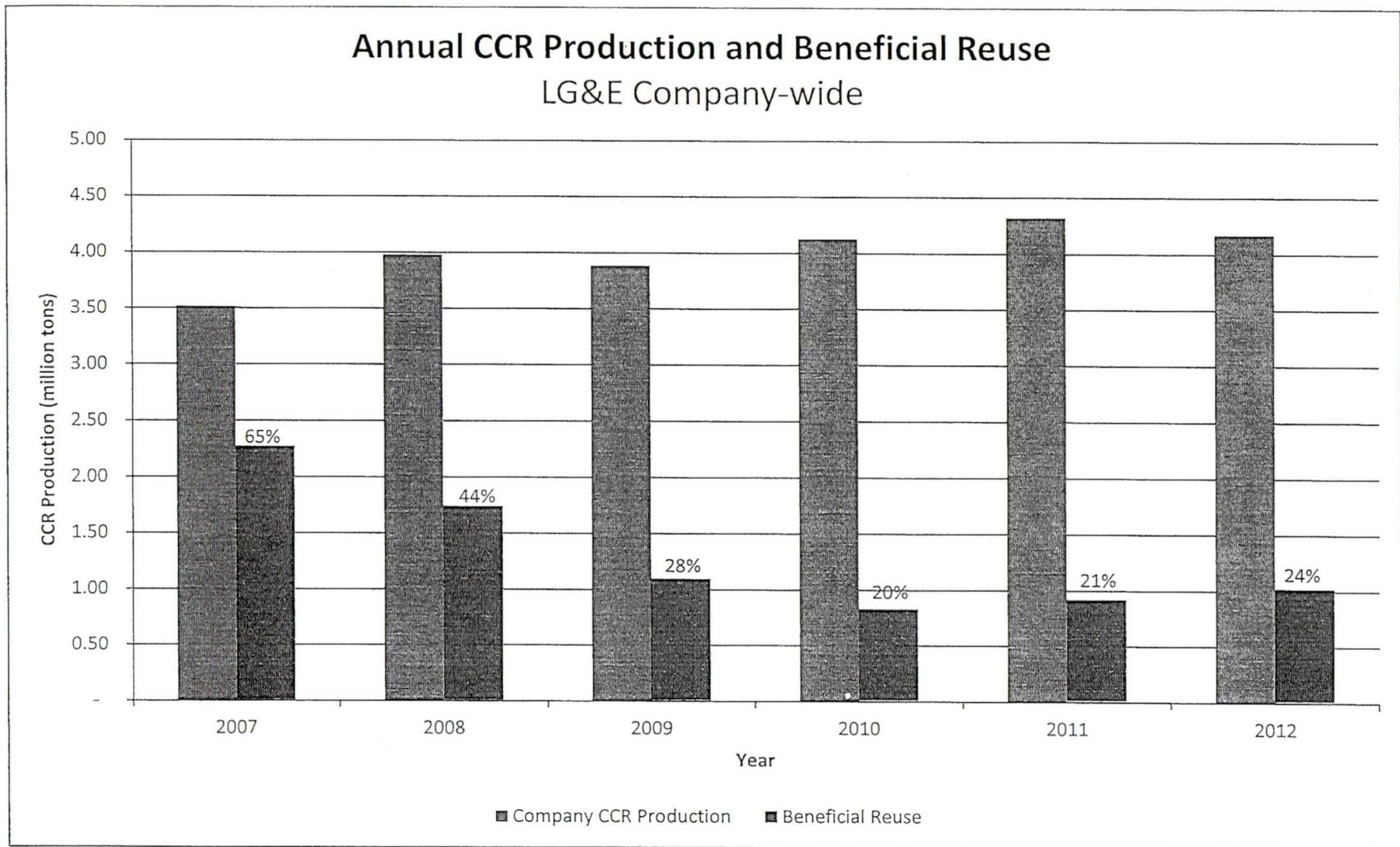


FIGURE A.3 – LG&E and KU Company-Wide Production and Beneficial Reuse Data

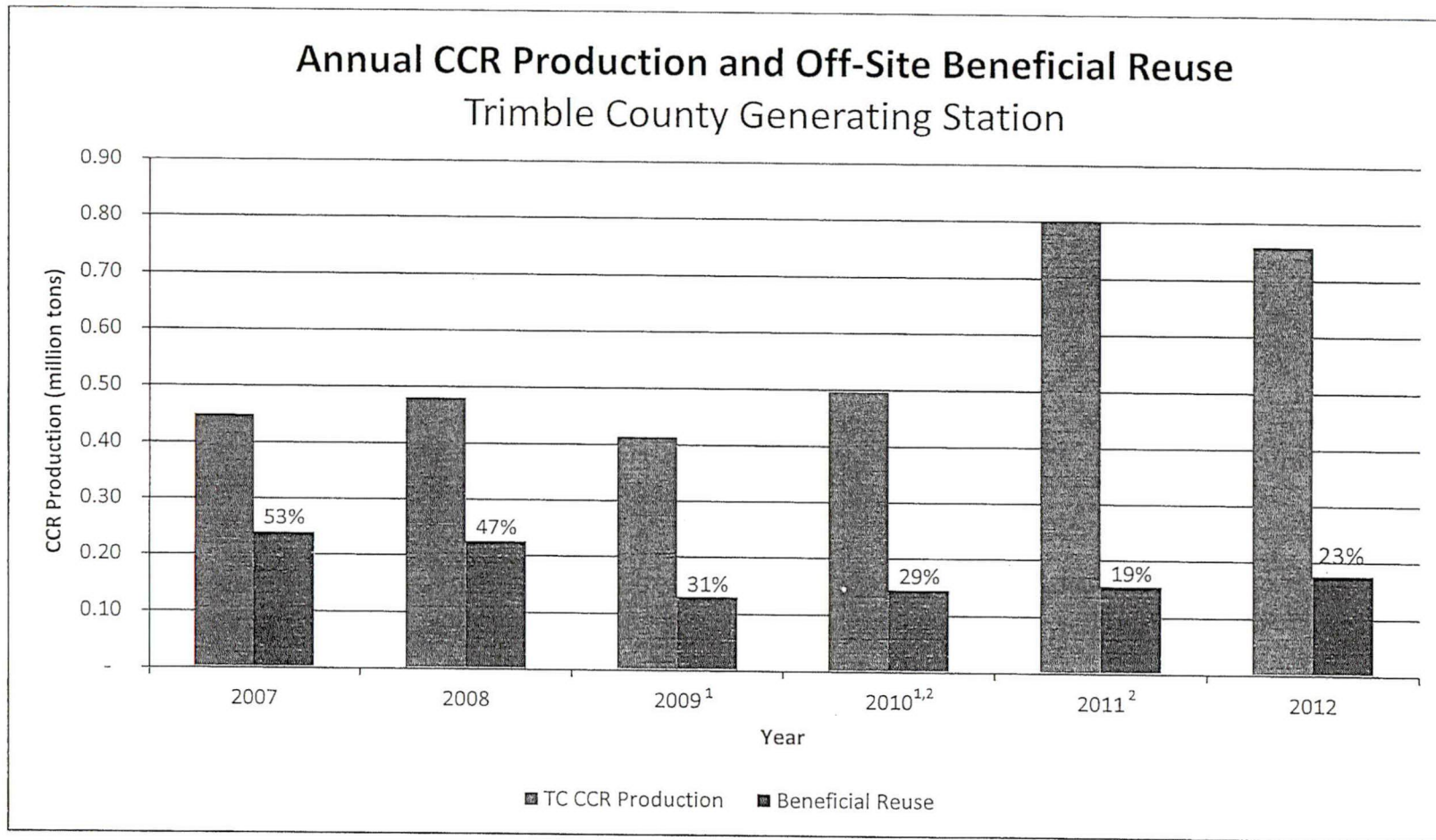


FIGURE A.4 – Trimble County Generating Station Production and Beneficial Reuse Data

¹ Does not include CCR reused for one-time event in raising of TC Bottom Ash Pond (BAP) dikes (0.28 million tons in 2009 and 0.05 million tons in 2010).

² Second generating unit (TC-2) came online in Summer 2010. TC-2 is a 760 MW unit, compared to TC-1 at 514 MW.

FIGURE A.9
COST COMPARISON SUMMARY (CUT III)^{1,2,3,4,5}

Site Alternative	3D	3E	3E - CEM AVOID	3F	3G	Combo 6	Combo 6 - CEM AVOID	Combo 7	Combo 8	Combo 9	3G - IIC - 4B - 1A	3G - IIC - 4B - 1B	3G - IIC - 4B - 1C	3G - IIC - 4A	3G - IIC - 5A
Components	RAVINE B	MACTEC CASE 16	MACTEC CASE 16 CEM. AVOID	MACTEC CASE 23	"LIME CAVE" AVOIDANCE	3B & 4F	3B & 4F - CEM. AVOID.	3B & 3E	3B & 3F	3F & 4F	NORTHERN ROAD	SOUTHERN ROAD	DECOUPLED	SOUTH EXPANSION	RAVINE A
Conceptual Storage Capacity (MCY)	34.47	22.16	24.22	24.92	39.43	21.83	24.31	22.27	33.86	35.49	32.96	32.96	32.96	38.98	33.59
Volume Normalization Factor	0.70	1.09	1.00	0.97	0.81	1.11	1.00	1.09	0.72	0.68	0.73	0.73	0.73	0.62	0.72
Normalized Storage Capacity (MCY)	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21	24.21
Percent of "100% Storage" Volume (34.6 MCY)	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%
Percent "30% Beneficial Reuse" Volume (24.22 MCY)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
"100% Storage" Life of Landfill (Years)	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6
"30% Beneficial Reuse" Life of Landfill (Years)	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0
Total Capital Cost (\$1 Million)	\$ 113	\$ 126	\$ 104	\$ 141	\$ 117	\$ 140	\$ 166	\$ 112	\$ 148	\$ 140	\$ 135	\$ 114	\$ 114	\$ 107	\$ 108
Total Operating Cost (\$1 Million)	\$ 87	\$ 79	\$ 78	\$ 89	\$ 89	\$ 89	\$ 89	\$ 89	\$ 89	\$ 89	\$ 89	\$ 67	\$ 67	\$ 67	\$ 89
Average Annual Operating Cost (30% Beneficial Reuse) (\$1 Million)	\$ 1.8	\$ 2.1	\$ 2.1	\$ 2.3	\$ 2.3	\$ 2.3	\$ 2.3	\$ 2.3	\$ 2.3	\$ 2.3	\$ 2.3	\$ 1.8	\$ 1.8	\$ 1.8	\$ 2.3
Total Cost (\$1 Million)	\$ 180	\$ 205	\$ 242	\$ 229	\$ 205	\$ 228	\$ 255	\$ 200	\$ 234	\$ 229	\$ 224	\$ 181	\$ 181	\$ 174	\$ 197
Total Cost (\$/CY)	\$ 7.43	\$ 8.48	\$ 10.00	\$ 9.47	\$ 8.49	\$ 9.43	\$ 10.52	\$ 8.27	\$ 9.88	\$ 9.46	\$ 9.24	\$ 7.47	\$ 7.48	\$ 7.17	\$ 8.14

Total Cost Comparisons			
Rank ⁶	Alternative	Cost (\$1 Million)	Difference (\$1 Million)
1	3G - IIC - 4A	174	-
2	3D	180	6
3	3G - IIC - 4B - 1B	181	7
4	3G - IIC - 4B - 1C	181	8
5	3G - IIC - 5A	197	23
6	Combo 7	200	27
7	3E	205	32
8	3G	205	32
9	3G - IIC - 4B - 1A	224	50
10	Combo 6	228	55

Operational Cost Comparisons			
Rank ⁶	Alternative	Cost (\$1 Million)	Difference (\$1 Million)
1	3G - IIC - 4B - 1B	67	-
2	3D	67	0.0
3	3G - IIC - 4B - 1C	67	0.0
4	3G - IIC - 4A	67	0.0
5	3E - CEM AVOID	78	11.6
6	3E	79	12.6
7	Combo 6 - CEM AVOID	89	21.8
8	3G - IIC - 5A	89	21.8
9	3F	89	21.8
10	3G	89	21.8

Cost Per CY Comparisons			
Rank ⁶	Alternative	Cost Per CY	Difference (\$/CY)
1	3G - IIC - 4A	\$7.17	-
2	3D	\$7.43	0.26
3	3G - IIC - 4B - 1B	\$7.47	0.30
4	3G - IIC - 4B - 1C	\$7.48	0.31
5	3G - IIC - 5A	\$8.14	0.97
6	Combo 7	\$8.27	1.10
7	3E	\$8.48	1.31
8	3G	\$8.49	1.31
9	3G - IIC - 4B - 1A	\$9.24	2.07
10	Combo 6	\$9.43	2.26

NOTES:

- Costs are for comparison of Site Alternatives only. No contingencies applied.
- Costs were developed including only line items which are anticipated to be significantly different between Site Alternatives. Items anticipated to be similar in cost for all Site Alternatives are not included (i.e., project management, groundwater and surface water monitoring, yearly maintenance, etc.).
- Costs are calculated on 2012 dollar basis. No present worth, inflation, or discount rates included.
- Alternatives 6E and Combination 10 were eliminated in Cut III due to unreasonable costs and not meeting storage volume requirements, respectively, as described in the report.
- Each Site Alternative's storage volumes have been normalized as detailed in the report to show 38 years of CCR production storage volume at 30% beneficial reuse (24.21 MCY). However, Alternatives 3E, Combo 6, and Combo 7 did not meet the storage volume requirement as conceptually designed with respect to the existing topography. See Attachment 3 for conceptual landfill development.
- Ranks for each consideration are based on 1 being the lowest cost and 10 being the highest cost.

FIGURE A.7
PRELIMINARY SCREENING OF SITE ALTERNATIVES

SITE ALTERNATIVES			STORAGE CAPACITY			REASONS FOR ELIMINATION OF IMPRACTICABLE SITES
LINE	ALTERNATIVE	DESCRIPTION	Storage Capacity (MCY) ¹	"100% Storage" Scenario % of Volume ²	"30% Beneficial Reuse" Scenario % of Volume ³	
Sites Provided in MACTEC Section 404 Alternatives Analysis (Appendix 1)						
1		No Action				1. Does not meet storage requirement
2		Barbone Tributary Ravine				1. Does not meet storage requirement
3		Dickey Farm	5.1	18%	25%	1. Does not meet storage requirement 2. Costs would be unreasonably expensive due to permitting and construction within Ohio River 100-year floodplain
4		Com Ravine C	8.7	25%	36%	1. Does not meet storage requirement
5		Com Creek Valley	12.8	37%	53%	1. Does not meet storage requirement 2. Costs would be unreasonably expensive due to requiring up to four independent landfills and associated haul roads and pipe conveyor systems
6	3D	Ravine B	34.3	99%	142%	
7		South River Terrace-1 & Com Creek Valley	19.0	55%	78%	1. Does not meet storage requirement 2. Costs would be unreasonably expensive due to permitting and construction within Ohio River 100-year floodplain
8		South River Terrace-1 & Ufers Quarry	22.5	55%	93%	1. Removed from "100% Storage" due to storage requirement 2. Costs would be unreasonably expensive due to permitting, engineering and construction within area of quarry
9		South River Terrace-2 & South River Terrace-3	14.4	42%	59%	1. Does not meet storage requirement 2. Costs would be unreasonably expensive due to permitting and construction within Ohio River 100-year floodplain
10		Barbone Tributary Ravine	33.7	97%	139%	1. Costs would be unreasonably expensive due to: a. Combination of barge and truck transport required b. Permitting and construction within Ohio River 100-year floodplain c. Permitting, engineering and construction within sand/gravel pits and limestone mine
11		Lee Bottom	35.4	102%	146%	1. Costs would be unreasonably expensive due to combination of barge and truck transport required
12		Com Creek Valley	35.4	102%	146%	1. Costs would be unreasonably expensive due to: a. Combination of barge and truck transport required b. Permitting and construction within Ohio River 100-year floodplain
13		Cooper Bottom	24.5	71%	101%	1. Costs would be unreasonably expensive due to: a. Combination of barge and truck transport required b. Permitting and construction within Ohio River 100-year floodplain
14		Com Creek Valley				1. Costs would be unreasonably expensive due to combination of barge and truck transport required
15		Gher's Glacial Landfill				1. Costs would be unreasonably expensive due to combination of barge and truck transport required 2. Does not meet storage requirements for barge due to Gher's own design storage capacity
16	BA	CCR Landfills Developed by Others				1. No facility within 50 miles, therefore not feasible due to unreasonably expensive costs
17	6E	Sand and Gravel Quarries				1. Does not meet storage requirement 2. Costs would be unreasonably expensive due to permitting, engineering and construction within sand/gravel pits and limestone mine
18	6C	Limestone Aggregate Quarry				1. One facility within 50 miles, no CCR placement areas available in that facility
19	6D	Coal Mines				1. No coal mines within 160 miles, therefore not feasible due to unreasonably expensive costs
20	6E	Existing Landfills	-	-	-	1. Valley View Municipal Solid Waste Landfill to be advanced to next round of screening. All other existing landfills eliminated as not practicable.
Additional Sites Identified by GAI						
21	3E	MACTEC Case 16 (2LA-N and 1LG-N)*	29.9	86%	124%	1. Removed from "100% Storage" scenario due to storage requirement
22	3F	MACTEC Case 23 (12LCH-N)*	30.2	87%	125%	1. Removed from "100% Storage" scenario due to storage requirement
23	3G	GAI "Lime Cave" Avoidance Study Alternative	36.1	104%	149%	
24	4D	Ridge Tops*	23.9	69%	99%	1. Removed from "100% Storage" scenario due to storage requirement
25	4E	Browning Branch Tributary Ravine	36.2	105%	150%	
26	4F	Barbone Tributary Ravine	14.8	43%	61%	1. Does not meet storage requirement
Combination Sites						
27		Dickey Farm, Ravine C, Ridge Tops	27.6	80%	114%	1. Costs would be unreasonably expensive due to site development requiring up to six independent landfills and associated ancillary facilities
28	Combination 2, 4B, 4F	South River Terrace-1-East, Barbone Trib Ravine	32.3	94%	134%	
29		South River Terrace-1, South River Terrace, Com Creek Valley	33.8	98%	140%	1. Costs would be unreasonably expensive due to site development requiring up to four independent landfills and associated ancillary facilities
30	Combination 4, 3E, 4D	South River Terrace-1-East, Ufers Quarry, South River Terrace-2, South River Terrace-3	36.9	107%	152%	1. Costs would be unreasonably expensive due to site development requiring up to five independent landfills and associated ancillary facilities
31	Combination 5, 4A, 4D	Com Creek Valley, Ridge Tops†	36.2	105%	150%	1. Removed from "30% Beneficial Reuse" scenario due to 4D - Ridge Tops meeting storage requirement on its own
32	Combination 6, 3B, 4F	Ravine C, Barbone Tributary Ravine	33.2	96%	137%	
33	Combination 7, 3B, 3E	Ravine C, MACTEC Case 16 (2LA-N only)*	29.5	85%	122%	1. Removed from "100% Storage" scenario due to storage requirement
34	Combination 8, 3B, 3F	Ravine C, MACTEC Case 23 (12LCH-N)†	38.9	112%	161%	1. Removed from "30% Beneficial Reuse" scenario due to 3F - MACTEC Case 23 (12LCH-N) meeting storage requirement on its own
35	Combination 9, 3F, 4F	MACTEC Case 23 (12LCH-N), Barbone Tributary Ravine†	45.0	130%	186%	1. Removed from "30% Beneficial Reuse" scenario due to 3F - MACTEC Case 23 (12LCH-N) meeting storage requirement on its own
36	Combination 10, 3E, 4F	MACTEC Case 16 (2LA-N Only), Barbone Tributary Ravine	35.6	103%	147%	
37	Combination 11, 3B, 4A	Ravine C, North River Terrace, Com Creek Valley*	27.7	80%	114%	1. Removed from "100% Storage" scenario due to storage requirement
38	Combination 12, 4B, 4C	South River Terrace-1-East, South River Terrace-3*	27.9	81%	115%	1. Removed from "100% Storage" scenario due to storage requirement
39	Combination 13, 4A, 4B	Com Creek Valley, South River Terrace-1-East*	29.8	86%	123%	1. Removed from "100% Storage" scenario due to storage requirement
40	Combination 14, 4D, 3A	Ridge Tops, Dickey Farm†	30.0	87%	124%	1. Removed from "100% Storage" scenario due to storage requirement 2. Removed from "30% Beneficial Reuse" scenario due to 4D - Ridge Tops meeting storage requirement on its own
41	Combination 15, 3A, 3E	Dickey Farm, MACTEC Case 16 (2LA-N Only)*	26.9	78%	111%	1. Removed from "100% Storage" scenario due to storage requirement
42	Combination 16, 4D, 3B	Ridge Tops, Ravine C†	32.6	94%	135%	1. Removed from "30% Beneficial Reuse" scenario due to 4D - Ridge Tops meeting storage requirement on its own
43	Combination 17, 4D, 3C	Ridge Tops, Ridge Tops (Landfill-1 Only)*	31.1	90%	129%	1. Removed from "100% Storage" scenario due to 4D - Ridge Tops meeting storage requirement on its own

NOTES:

¹ GAI developed conceptual grading for landfill sites based on attempting to maximize storage to take advantage of existing topographic features. Reported storage capacity is based on conceptual grading and assumes 5% volume reduction for liner, intermediate cover, and final cover systems.

² "100% Storage" scenario based on no beneficial reuse of CCRs (CCR landfill rate = CCR generation rate = 910,000 CY/YR). 38 years of CCR landfill = 34.6 MCY.

³ "30% Beneficial Reuse" scenario based on beneficial reuse of 30% of CCRs generated (CCR landfill rate = 70% of CCR generation rate = 637,000 CY/YR). 38 years of CCR landfill = 24.2 MCY.

	Site Alternative determined to be not practicable due to storage volume requirements (<90% of required storage capacity) or other key practicability factors (See report for more detailed information for each Site Alternative).
*	Site Alternative is removed from the "100% Storage" scenario due to not meeting the storage volume requirements (<90% of required storage capacity). Site Alternative was still considered for the "30% Beneficial Reuse" scenario.
†	Site Alternative is removed from the "30% Beneficial Reuse" scenario due to an individual site component meeting the storage volume requirement on its own. Site Alternative was still considered for the "100% Storage" scenario if specific storage requirement is met.

FIGURE A.8
SECOND ROUND SCREENING OF SITE ALTERNATIVES (CUT II)

LINE	ALTERNATIVE	DESCRIPTION	Storage Capacity (MCY) ¹	"100% Storage" Scenario % of Volume ²	"30% Beneficial Reuse" Scenario % of Volume ³	COST IMPACTS										LOGISTICAL IMPACTS - (ABILITY TO MEET PROJECT SCHEDULE AND FACTORS THAT MAKE SITE UNWORKABLE OR INEFFICIENT)				SAFETY RISKS / SOCIOECONOMIC IMPACTS (FROM A COSTS / LOGISTICAL STANDPOINT)				
						AREA REQUIRED FOR OFF-SITE SOLID CLAY BORROW	100-YEAR OHIO RIVER FLOODPLAIN ENCROACHMENT - CONSTRUCTION AND COSTS	RELOCATION OF UTILITY LINES	PROPERTY ACQUISITION AND NEEDED BUFFER	CONTROLLING FLUGITIVE EMISSIONS - DURING CONSTRUCTION	CONTROLLING FLUGITIVE EMISSIONS - DURING OPERATION	TRUCK HAULING / CCR TRANSPORT DISTANCE	DOUBLE HANDLING OF BORROW OR CCR MATERIAL	PROPERTY ACQUISITION AND NEEDED BUFFER	OTHER PERMITTING SCHEDULE CONCERNS (KIDWA, 404/401, AIRSPACE)	100-YEAR OHIO RIVER FLOODPLAIN ENCROACHMENT - PERMITTING	OTHER CONSTRUCTION CONCERNS (BRIDGE, HAUL ROAD, LANDFILL EARTHWORK, AND/OR PIPE CONVEYOR)	COMPLEXITIES OF DESIGN SCHEDULE AND OPERATION OF MULTIPLE OR COMPLEX SITES	PUBLIC SAFETY RISKS (BASED ON TRUCK HAULING DISTANCE)	CEMETERIES REQUIRING RELOCATION	POTENTIAL FOR ARCHAEOLOGICAL SITES / HISTORIC STRUCTURES REQUIRING MITIGATION	FARMLAND REMOVAL (INCLUDING "PRIME" FARMLAND)	AESTHETICS (NUMBER OF RESIDENCES WITHIN 0.5 MILES)	NOISE IMPACTS (NUMBER OF RECEPTORS)
1	3D	Ravine B	34.3	99%	142%																			
2	6E	Existing Landfills (Valley View Municipal Solid Waste Landfill) ⁴	-	-	-																			
3	3E	MACTEC Case 16 (2LA-N and 1LG-N)*	29.9	86%	124%																			
4	3F	MACTEC Case 23 (12LCH-N)*	30.2	87%	125%																			
5	3G	GAI "Lime Cave" Avoidance Study Alternative	36.1	104%	149%																			
6	4D	Ridge Tops*	23.9	69%	99%																			
7	4E	Browning Branch Tributary Ravine	36.2	105%	150%																			
8	Combination 2, 4B, 4F	South River Terrace-1-East, Barebone Tributary Ravine	32.3	93%	133%																			
9	Combination 5, 4A, 4D	Corn Creek Valley, Ridge Tops†	36.2	105%	150%																			
10	Combination 6, 3B, 4F	Ravine C, Barebone Tributary Ravine	33.2	96%	137%																			
11	Combination 7, 3B, 3E	Ravine C, MACTEC Case 16 (2LA-N only)*	29.5	85%	122%																			
12	Combination 8, 3B, 3F	Ravine C, MACTEC Case 23 (12LCH-N)†	38.9	113%	161%																			
13	Combination 9, 3F, 4F	MACTEC Case 23 (12LCH-N), Barebone Tributary Ravine†	45.0	130%	186%																			
14	Combination 10, 3E, 4F	MACTEC Case 16 (2LA-N Only), Barebone Tributary Ravine	35.6	103%	147%																			
15	Combination 11, 3B, 4A	Ravine C, North River Terrace, Corn Creek Valley	27.7	80%	114%																			
16	Combination 12, 4B, 4C	South River Terrace-1-East, South River Terrace-3*	27.9	81%	115%																			
17	Combination 13, 4A, 4B	Corn Creek Valley, South River Terrace-1-East†	29.8	86%	123%																			
18	Combination 14, 4D, 3A	Ridge Tops, Dickey Farm†	30.0	87%	124%																			
19	Combination 15, 3A, 3E	Dickey Farm, MACTEC Case 16 (2LA-N Only)*	26.9	78%	111%																			
20	Combination 16, 4D, 3B	Ridge Tops, Ravine C†	32.6	94%	135%																			
21	Combination 17, 4D, 3C	Ridge Tops, Ridge Tops (Landfill 1 Only)*	31.1	90%	129%																			

Rating of Criteria:

	Indicates no to very low degree of impact
○	Indicates low to moderate degree of impact
●	Indicates high degree of impact

	Site Alternative eliminated in second round screening as impracticable due to a high number of unreasonable cost, logistics, safety risks, and/or socioeconomic impacts.
*	Site Alternative was removed from the "100% Storage" scenario during first screening (Cut 1) due to not meeting the storage volume requirements (<90% of required storage capacity). Site Alternative was still considered for the "30% Beneficial Reuse" scenario.
†	Site Alternative was removed from the "30% Beneficial Reuse" scenario during first screening (Cut 1) due to an individual site component meeting the storage volume requirement on its own. Site Alternative was still considered for the "100% Storage" scenario if specific storage requirement is met.

NOTES:

- GAI developed conceptual grading for landfill sites based on attempting to maximize storage to take advantage of existing topographic features. Reported storage capacity is based on conceptual grading and assumes 5% volume reduction for liner, intermediate cover, and final cover systems.
- "100% Storage" scenario based on no beneficial reuse of CCRs (i.e. CCR landfill rate = CCR generation rate = 910,000 CY/YR). 38 years of CCR landfill = 34.6 MCY.
- "30% Beneficial Reuse" scenario based on beneficial reuse of 30% of CCRs generated (i.e. CCR landfill rate = 70% of CCR generation rate = 637,000 CY/YR). 38 years of CCR landfill = 24.2 MCY.
- It was determined that Valley View Municipal Solid Waste (MSW) Landfill is the only feasible MSW landfill. All other MSW landfills were removed due to distance from the Trimble County Generating Station.

ATTACHMENT 1

CCR Storage and Potential Beneficial Reuse of CCRs

CCR Storage and Potential Beneficial Reuse of CCRs

GAI evaluated CCR storage volumes for 100 percent storage of the CCR production data as stated in this Report. GAI also evaluated CCR beneficial reuse data and BAP bathymetric survey data supplied by LG&E to determine a beneficial reuse percentage that could potentially be achieved to adjust the annual CCR production volume at Trimble County Generating Station. This adjusted CCR production was used to evaluate conceptual sites for a long-term storage volume of CCRs adjusted for beneficial reuse.

LG&E supplied bathymetric survey data for the BAP from the following dates:

- September 2, 2002;
- July 26, 2005;
- February 17, 2009; and
- June 1, 2011.

The BAP was put into service on September 1, 1990 and has been the primary means of CCR disposal at the station. Therefore, any material not stored in the BAP has been beneficially reused or segregated for future potential beneficial reuse. The data was adjusted for the one-time 320,000 CY beneficial reuse project to raise the BAP dikes.

From September 1, 1990 to June 1, 2011, the average fill rate of the BAP was reported as 0.29 MCY/yr. The generation rate for Unit 1 CCRs from LG&E's Generation Planning is reported as 0.41 MCY/yr. The difference of the annual beneficial reuse rate, based on the bathymetric survey results, is 0.12 MCY/yr (approximately 29 percent beneficial reuse percentage).

Based on annual Toxic Release Inventory reports, LG&E has quantified the CCR production and beneficial reuse data for all company stations combined and for Trimble County Generating Station. A summary of this data can be found on Figure A.3 and Figure A.4, respectively. The company-wide beneficial reuse has averaged approximately 20 percent of the total CCR production in 2009, 2010, 2011, and 2012. After adjusting the Trimble County Generating Station beneficial reuse quantities for the one-time station use of CCRs to raise the BAP dikes, the Trimble County Generating Station beneficial reuse has been 31 percent, 29 percent, 19 percent, and 23 percent in 2009, 2010, 2011, and 2012, respectively. The quantity of material beneficially reused off the station property over that last three years has been rather consistent ranging from approximately 0.13 MCY to 0.17 MCY. The production of CCRs has increased significantly due mostly in part to the start-up of Unit 2; therefore, even though the quantity of material reused has remained rather consistent. The overall beneficial reuse percentage has dropped to 20 percent in 2012.

There are many factors that affect the beneficial reuse market for CCRs:

- strength of economy, housing, and construction markets;
- regulations;
 - additional scrubbers at all power stations, due to air emissions regulations, result in an increased number of participants in the synthetic gypsum market;
 - LG&E has seen the demand for their synthetic gypsum drop from 1.2 million tons per year (2001 to 2008) to 0.41 million tons per year (2009 to 2011);
- USEPA-proposed treatment of CCRs as hazardous waste may affect the beneficial reuse market;
 - proposed regulations may impact CCR use in large structural fills;

- air pollution control systems to reduce emissions changing the characteristics of CCRs and making the product less desirable; and
- distance to markets for CCRs.

Based on the bathymetric survey results, the long-term, off-site reuse rate has averaged approximately 0.12 MCY/yr for the Trimble County Generating Station since Unit 1 went online in 1990 (21 years). The reuse rate is also consistent with the quantity of CCRs beneficially reused off station property from 2009 through 2012 (0.13 MCY to 0.17 MCY). Using the long-term average reuse rate with the production of CCRs from both units (0.91 MCY/yr) results in a 13.2 percent beneficial reuse rate.

Even though there is uncertainty in the CCR beneficial reuse market, LG&E actively promotes and will continue to pursue beneficial reuse with the existing gypsum barge loading, and completed the addition of fly ash barge loading facilities (placed in service December 2012) to increase their ability to transport material for beneficial reuse. One-hundred percent storage disposal rate Site Alternatives were evaluated in this Report. Also, based on the data reviewed, an aggressive 30 percent beneficial reuse rate over the life of the Project is considered to evaluate CCR storage areas for the long-term disposal plan. This equates to 273,000 CY of CCR being beneficially reused per year. Use of a higher sustained beneficial reuse rate over the life of the Project would be speculative based upon past reuse rates and the above-mentioned factors affecting future reuse rates.

[illegible]

Trimble County Generating Station Landfill Project
Alternatives Analysis Report

BY: DTH
CHECKED: CLD

ATTACHMENT 5
COST COMPARISON ESTIMATE (CUT IV)^{1,2,3}

		Unit Costs	Unit	3G-IIC-4B-1B		3G-IIC-4B-1B-BR (30% Beneficial Reuse)		3G-IIC-4B-1C		3G-IIC-4B-1C-BR (30% Beneficial Reuse)	
				Southern Road		Southern Road		Decoupled		Decoupled	
				Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
CAPITAL COSTS											
1	Property Acquisition	\$ 12,000	Acres	0	\$ -	0	\$ -	0	\$ -	0	\$ -
2	Clearing, Grubbing, and Site Preparation	\$ 17,000	Acres	521	\$ 8,851,900	521	\$ 8,851,900	524	\$ 8,901,200	524	\$ 8,901,200
3	Large Utility Line Relocation (345 KV Single Circuit)	\$ 880	LF	8,400	\$ 7,392,000	8,400	\$ 7,392,000	8,400	\$ 7,392,000	8,400	\$ 7,392,000
4	Trimble County Water District Line	\$ 50	LF	0	\$ -	0	\$ -	0	\$ -	0	\$ -
5	Shelby RECC Distribution Line Relocation	\$ 50	LF	0	\$ -	0	\$ -	0	\$ -	0	\$ -
6	Telecommunication Line	\$ 50	LF	0	\$ -	0	\$ -	0	\$ -	0	\$ -
7	Fencing	\$ 50	LF	65,045	\$ 3,252,251	65,045	\$ 3,252,251	64,017	\$ 3,200,851	64,017	\$ 3,200,851
8	Environmental Wetland Mitigation (cost based on adjusted mitigation units)	\$ 72,000	Acres	2.58	\$ 186,048	2.58	\$ 186,048	2.58	\$ 186,048	2.58	\$ 186,048
9	Environmental Stream Mitigation (cost based on adjusted mitigation units)	Varies	LF	90,524	\$ 18,466,825	90,524	\$ 18,466,825	90,524	\$ 18,466,825	90,524	\$ 18,466,825
10	Cemetery Relocation	Varies	EA	0	\$ -	0	\$ -	0	\$ -	0	\$ -
11	Cultural Resources (Potential Phase III on Site 157M40)	\$ 400,000	EA	5	\$ 2,000,000	5	\$ 2,000,000	5	\$ 2,000,000	5	\$ 2,000,000
12	Indiana Bat Mitigation	\$ 5,338	Acres	521	\$ 2,779,487	521	\$ 2,779,487	524	\$ 2,784,877	524	\$ 2,784,877
13	Road Relocation (County Road)	\$ 350	LF	0	\$ -	0	\$ -	0	\$ -	0	\$ -
14	Road Relocation (State Road)	\$ 400	LF	0	\$ -	0	\$ -	0	\$ -	0	\$ -
CCR TRANSPORT											
15	Pipe Conveyor Transport (North Ridge Top)	\$ 2,150	LF	0	\$ -	0	\$ -	0	\$ -	0	\$ -
16	Pipe Conveyor Transport (Ogden Ridge Road Path)	\$ 2,425	LF	5,236	\$ 12,687,199	5,236	\$ 12,687,199	5,319	\$ 12,899,428	5,319	\$ 12,899,428
17	Pipe Conveyor Transport (South Ridge Top)	\$ 3,125	LF	0	\$ -	0	\$ -	0	\$ -	0	\$ -
18	Transfer Station	\$ 250,000	EA	0	\$ -	0	\$ -	0	\$ -	0	\$ -
19	Haul Road - Off Landfill	\$ 1,800	LF	5,308	\$ 8,492,800	5,308	\$ 8,492,800	5,308	\$ 8,492,800	5,308	\$ 8,492,800
20	Bridge - Large (36 FT High, 440 FT long, 60 FT wide)	\$ 4,000,000	EA	0	\$ -	0	\$ -	0	\$ -	0	\$ -
21	Bridge - Medium (200 FT long, 80 FT wide)	\$ 1,750,000	EA	1	\$ 1,750,000	1	\$ 1,750,000	1	\$ 1,750,000	1	\$ 1,750,000
LANDFILL PREPARATION											
22	Perimeter Collection Channel - Fabric Form, 6-10' Bottom Width	\$ 75.00	LF	15,073	\$ 1,130,475	15,073	\$ 1,130,475	15,073	\$ 1,130,475	15,073	\$ 1,130,475
23	Upslope Drainage Diversion Channel - Fabric Form, 1-5' Bottom Width	\$ 90.00	LF	18,105	\$ 1,629,450	18,105	\$ 1,629,450	18,105	\$ 1,629,450	18,105	\$ 1,629,450
24	Subgrade Preparation - General Earthwork - Soil Inside Footprint (3000 ft R.T.)	\$ 5.65	CY	1,414,591	\$ 7,992,437	1,414,591	\$ 7,992,437	1,414,591	\$ 7,992,437	1,414,591	\$ 7,992,437
25	Subgrade Preparation - General Earthwork - Rock Blasting (3000 ft R.T.)	\$ 21.72	CY	1,300,410	\$ 28,244,905	1,300,410	\$ 28,244,905	1,300,410	\$ 28,244,905	1,300,410	\$ 28,244,905
26	Subgrade Preparation - Borrow or Spilling Excess Material - Soil - 1/2 Mile	\$ 5.65	CY	311,364	\$ 1,759,206	311,364	\$ 1,759,206	311,364	\$ 1,759,206	311,364	\$ 1,759,206
27	Subgrade Preparation - Borrow or Spilling Excess Material - Soil - 1 Mile	\$ 5.94	CY	311,364	\$ 1,849,501	311,364	\$ 1,849,501	311,364	\$ 1,849,501	311,364	\$ 1,849,501
28	Subgrade Preparation - Borrow or Spilling Excess Material - Soil - 2 Miles	\$ 6.64	CY	1,377,839	\$ 9,424,421	1,377,839	\$ 9,424,421	1,377,839	\$ 9,424,421	1,377,839	\$ 9,424,421
29	Subgrade Preparation - Borrow or Spilling Excess Material - Soil - 4 Miles	\$ 8.36	CY	0	\$ -	0	\$ -	0	\$ -	0	\$ -
30	Landfill Composite Liner System - 0.5 mi RT Protective Cover/4 mi RT Drainage Layer	\$ 91,000	Acres	0	\$ -	0	\$ -	0	\$ -	0	\$ -
31	Landfill Composite Liner System - 1.5 mi RT Protective Cover/4 mi RT Drainage Layer	\$ 93,000	Acres	0	\$ -	0	\$ -	0	\$ -	0	\$ -
32	Landfill Composite Liner System - 0.5 mi RT Protective Cover/2 mi RT Drainage Layer	\$ 88,000	Acres	194	\$ 17,059,408	197	\$ 17,325,020	194	\$ 17,059,408	197	\$ 17,325,020
33	Groundwater Underdrain Drainage Pipes	\$ 6,000	Acres	194	\$ 1,163,141	197	\$ 1,181,251	194	\$ 1,163,141	197	\$ 1,181,251
34	Leachate Collection System Drainage Pipes	\$ 15,000	Acres	194	\$ 2,807,854	197	\$ 2,953,128	194	\$ 2,807,854	197	\$ 2,853,128
ES/SWM Pond and Leachate Pond											
35	Large ES/SWM Pond and Leachate Pond - Earthwork and Liner System (~35 acre-ft)	\$ 3,000,000	EA	1	\$ 3,000,000	1	\$ 3,000,000	1	\$ 3,000,000	1	\$ 3,000,000
36	Medium ES/SWM Pond and Leachate Pond - Earthwork and Liner System (~20 acre-ft)	\$ 2,000,000	EA	0	\$ -	0	\$ -	0	\$ -	0	\$ -
37	Leachate Header Pipe	\$ 65	LF	400	\$ 26,000	400	\$ 26,000	400	\$ 26,000	400	\$ 26,000
CAP											
38	Final Cover System - 2 Mile RT (12 Inches Clay; 12 Inches Topsoil)	\$ 29,000	Acres	0	\$ -	0	\$ -	0	\$ -	0	\$ -
39	Final Cover System - 4 Mile RT (12 Inches Clay; 12 Inches Topsoil)	\$ 33,000	Acres	194	\$ 6,397,278	197	\$ 6,496,862	194	\$ 6,397,278	197	\$ 6,496,862
OPERATING COSTS											
40	Hauling - 1 Mile Round Trip (22 CY on landfill/private road)	\$ 2.58	CY	34,162,019	\$ 87,454,769	25,180,388	\$ 64,461,794	34,162,019	\$ 87,454,769	25,180,388	\$ 64,461,794
41	Hauling - 2 Mile Round Trip (22 CY on landfill/private road)	\$ 3.48	CY	0	\$ -	0	\$ -	0	\$ -	0	\$ -
42	Hauling - 3 Mile Round Trip (22 CY on landfill/private road)	\$ 4.18	CY	0	\$ -	0	\$ -	0	\$ -	0	\$ -
43	Hauling - 30 Mile Round Trip (18 CY, 35 MPH avg)	\$ 11.55	CY	0	\$ -	0	\$ -	0	\$ -	0	\$ -
44	Offsite CCR Disposal	\$ 21.20	TON	0	\$ -	0	\$ -	0	\$ -	0	\$ -
45	Pipe Conveyor Cost of Operation	\$ 0.20	CY	34,162,019	\$ 6,832,404	25,180,388	\$ 5,036,078	34,162,019	\$ 6,832,404	25,180,388	\$ 5,036,078

SITE ALTERNATIVE:	3G-IIC-4B-1B	3G-IIC-4B-1B-BR (30% BRU)	3G-IIC-4B-1C	3G-IIC-4B-1C-BR (30% BRU)
STORAGE CAPACITY (MCY):	34.16	25.18	34.16	25.18
"10% STORAGE" LIFE OF LANDFILL (YEARS):	37.5	27.7	37.5	27.7
"30% BENEFICIAL REUSE" LIFE OF LANDFILL (YEARS):	53.6	39.5	53.6	39.5
TOTAL CAPITAL COST (\$1 MILLION):	148	148	148	148
TOTAL OPERATING COST (\$1 MILLION):	94	69	94	69
AVERAGE ANNUAL OPERATING COST (30% BENEFICIAL REUSE) (\$1 MILLION):	1.8	1.8	1.8	1.8
TOTAL LIFE CYCLE COST (\$1 MILLION):	242	218	242	218
TOTAL LIFE CYCLE COST (MCY):	\$7.08	\$5.64	\$7.08	\$5.65

NOTES:

- Costs are for comparison of Site Alternatives only. No contingencies applied.
- Costs were developed including only line items which are anticipated to be significantly different between Site Alternatives. Items anticipated to be similar in cost for all Site Alternatives are not included (i.e. project management, groundwater and surface water monitoring, yearly maintenance, etc.).
- Costs are calculated on 2012 dollar basis. No present worth, inflation, or discount rates included.

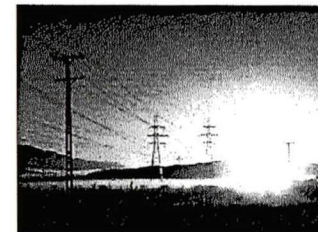
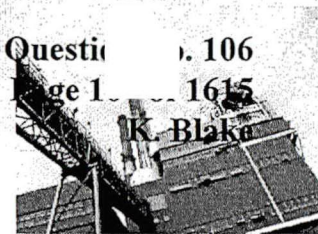


PPL companies

Project Engineering

2014 Business Plan

September 12, 2013



Capital Review – Trimble County CCR

Accrual Basis, \$Millions

Authority/ECR Comparison

	Total Projection	Current Authority	ECR Filing	Variance to Authority	Variance to ECR Filing
BAP/GSP	\$29	\$30	\$25	\$1	(\$4)
Landfill Phase I/Treatment & Transport	\$277	\$73	\$73	(\$205)	(\$205)
Landfill Phase II, III, & IV	\$148	\$0	\$0	(\$148)	(\$148)
Holcim	\$9	\$9	\$8	(\$0)	(\$1)
Total	\$463	\$111	\$106	(\$352)	(\$358)

Business Plan Comparison

	Pre-2013	2013	2014	2015	2016	2017	2018	Post 2018	Total
2013 BP									
BAP/GSP	\$29	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$29
Landfill Phase I	\$9	\$17	\$55	\$10	\$1	\$0	\$0	\$0	\$92
Treatment & Transport	\$6	\$18	\$46	\$23	\$0	\$0	\$0	\$0	\$93
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$174	\$175
Holcim	\$9	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9
Total 2013 BP	\$53	\$35	\$101	\$33	\$1	\$0	\$0	\$174	\$397
2014 BP									
BAP/GSP	\$28	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$29
Landfill Phase I	\$9	\$2	\$2	\$19	\$28	\$32	\$8	\$12	\$112
Treatment & Transport	\$7	\$1	\$1	\$29	\$86	\$42	\$0	\$0	\$165
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$148	\$148
Holcim	\$9	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9
Total 2014 BP	\$53	\$3	\$3	\$48	\$113	\$74	\$9	\$160	\$463
Variance to 2013 BP									
BAP/GSP	\$1	(\$0)	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Landfill Phase I	\$0	\$16	\$53	(\$9)	(\$27)	(\$32)	(\$8)	(\$12)	(\$21)
Treatment & Transport	(\$1)	\$16	\$46	(\$6)	(\$86)	(\$42)	(\$0)	\$0	(\$72)
Landfill Phase II, III, Close & Cap	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$26	\$26
Holcim	(\$0)	(\$0)	\$0	\$0	\$0	\$0	\$0	\$0	(\$0)
Total Variance to 2013 BP	(\$0)	\$32	\$98	(\$15)	(\$113)	(\$74)	(\$8)	\$14	(\$66)

Key Messages

- All numbers are net of IMPA/IMEA reimbursement.
- The increase over the ECR Filing is due to refined engineering on the Transport System, permit delays, new landfill layout, and project contingencies added.
- Permitting issues have delayed Phase I at least 2 years.



PPL companies



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8960

JUL 11 2014

Colonel Luke T. Leonard
District Engineer
Louisville District Corps of Engineers
Attn: Kimberley J. Simpson
CELRL-OP-FS, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Louisville Gas & Electric Company
Coal Combustion Residuals Landfill, Trimble County, Kentucky LRL-2010-711

Dear Colonel Leonard:

The U.S. Environmental Protection Agency, Region 4, has conducted a review of the public notice and the additional materials submitted by the Louisville Gas & Electric Company (LG&E) in support of its application for a Clean Water Act (CWA), Section 404 permit. The public notice from the U.S. Army Corps of Engineers (Corps), Louisville District announcing this project was dated May 23, 2014. The EPA received an advance copy of the public notice approximately one week prior to that date and on May 19, 2014, Ms. Lee Anne Devine of your staff approved the EPA's request to extend the comment period for this project to July 14, 2014. We are grateful for the additional time to review the voluminous materials provided by LG&E and hope that the following comments are useful to the Louisville District during its own review of this project.

The LG&E proposes to construct a coal combustion residuals (CCR) landfill in waters of the United States to accommodate the CCR produced at its existing Trimble County Generating Station on the Ohio River in Trimble County, Kentucky. According to project documents, the LG&E generates approximately 910,000 cubic yards of CCR annually at this facility, and design plans for the proposed landfill are based on providing enough storage capacity to accommodate 33.4 million cubic yards of CCR over a 37 year timeframe. The proposed project, which includes a 189-acre landfill and an additional 651 acres of support facilities and operations areas, will directly impact approximately 87,254 linear feet of stream, 2.6 acres of wetland and 0.5 acres of ponds. These stream impacts are a 60 percent increase over the linear length of stream impacts associated with this project as it was formerly proposed in 2011-2012.

The comments provided herein identify the EPA's views regarding compliance with the CWA Section 404(b)(1) Guidelines (40 C.F.R. Part 230) (Guidelines). The Guidelines provide the substantive environmental criteria against which Section 404 permit applications are evaluated. For reasons outlined below, the EPA has concerns that the project, as currently proposed, may not comply with the Guidelines.

Alternatives Analysis – 40 C.F.R. Part 230.10(a)

The Guidelines state that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." The permit issued by the Corps should reflect the least environmentally damaging practicable alternative. Furthermore, the Guidelines

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recognize that the rigor of analysis should be commensurate with the severity of potential adverse impacts on the aquatic ecosystem. Based on our review of available monitoring data from the project area, the EPA believes that the aquatic resources proposed to be impacted as a result of this project may be among the highest quality headwater stream resources in this region of the Commonwealth.

We do not believe that the applicant has adequately demonstrated that the proposed alternative to fill nearly 17 miles of headwater stream represents the least environmentally practicable alternative, consistent with the Guidelines. The alternatives analysis should more clearly and completely describe the process by which the least environmentally damaging practicable alternative was identified. The information provided to date appears to rely considerably on undocumented or undefined cost information and with very little to no comparative analysis of the range of environmental impacts associated with different alternatives that were considered or estimated compensatory mitigation costs.

"Unreasonable expense" is frequently cited as reason for removing sites from further analysis without thorough documentation and often without even a defined threshold for this criterion. "Unreasonable expense" is cited as partial or primary cause for elimination of 17 site alternatives in the first phase (i.e. Cut I) of the multi-phased alternatives analysis. Furthermore, factors related to "Cost Impacts" comprise 40 percent of the criteria evaluated in the second phase (i.e. Cut II), yet the Cut II analysis is entirely hypothetical and fails to quantify thresholds or otherwise include any objective rationale for elimination of alternatives evaluated therein. It is not until the third phase of the alternatives analysis (i.e. Cut III) that cost is objectively addressed. "Excessive cost" is defined in Cut III as *"any cost per cubic yard greater than twenty percent of the lowest cost Alternative's cost per cubic yard,"* (pg. 20, Alternatives Analysis Report). However, it is unclear whether "excessive cost" in Cut III is synonymous with "unreasonable cost" in Cut I and Cut II, but this is somewhat implausible given that the former is defined on a Cut III economic analysis and no costs at all are discussed in Cut I and Cut II.

We note that 13 of the 15 alternatives evaluated in Cut III of the alternative analysis are eliminated "based on cost and logistical analysis." However, even the cost threshold defined here in Cut III is confounding, because it is based on a landfill site alternative that is dismissed for logistical and scheduling concerns. If this site is dismissed due to such concerns, should it viably be used to establish the cost threshold upon which other sites are evaluated in the same phase of the analysis? The fact that numerous alternative sites were eliminated during Cuts I and II without provision of pertinent economic data, defined cost thresholds, or consideration of associated environmental impacts is of additional concern to the EPA.

The EPA believes that potentially feasible alternatives may have been eliminated in the alternatives analysis based on incompletely vetted economic considerations and that these sites warrant closer scrutiny. For example, the degree of impacts to jurisdictional waters of the United States is not a criterion used in the alternatives analysis until the final phase of the evaluation (Cut IV) when only landfills cited in Ravine B remain under consideration. The alternatives evaluated in Cut IV are materially equivalent in location, costs, and impacts. Both lie in Ravine B, both have nearly identical project costs (i.e. \$7.47 vs \$7.48 per cubic yard of ash stored) and both have the same anticipated impacts to waters of the United States. Considering that anticipated aquatic resources impacts in Ravine B are significant and the resources of high quality (further addressed below), mitigation costs for such impacts to waters of the United States will likely be significant. The EPA believes it is necessary to include compensatory mitigation costs throughout the alternatives analysis where project cost is a criterion for evaluation of practicable alternatives.

The permit application announces the LG&E's proposal to pay an in-lieu-fee (ILF) to the Kentucky Department of Fish and Wildlife Resources ILF Program to satisfy compensatory mitigation needs for the proposed project. Although no specific monetary amount was specified for this ILF payment, the EPA estimates that, based on the LG&E's own assessment of stream conditions in Ravine B and the ILF calculator on the Corps' web site, the project as presently proposed could require an ILF payment of approximately \$18 million. This would equate to \$0.54 per cubic yard of ash over the proposed life of the

landfill. As noted previously in this letter, environmental impacts to waters of the United States were not used as an evaluation criterion until Cut IV of the analysis and project cost estimates (excluding mitigation costs) were not provided until Cut III. If compensatory mitigation costs were included throughout the tiered evaluation of alternatives instead of only the final stage thereof, alternatives with fewer adverse impacts on jurisdictional waters of the United States and commensurately less mitigation cost may be more attractive from an economical perspective and thereby exert some influence on the company's determination of "unreasonable expense" during the initial phases of its alternatives analysis.

Alternative 5B (Lee Bottom) is one example where additional economic analysis may be warranted. This alternative is dismissed as a practicable alternative in Cut I of the alternatives evaluation based solely on undefined expenses related to barge transport, loading and off-loading facilities. According to project documentation, Alternative 5B (Lee Bottom) can accommodate the entire landfill design volume of 33.7 million cubic yards of CCR for long-term storage. A typical barge can hold approximately 2,400 cubic yards of material, which is the approximate daily volume of CCR produced at the Trimble County Generating Station. Considering that even the company's preferred alternative will require considerable construction costs for arguably similar infrastructure as that necessary at any CCR landfill (e.g. conveyors, haul roads, other equipment), it is uncertain whether infrastructure needs unique to a site such as Lee Bottom (e.g. barge unloading facilities) grossly exceed other costs unique to the preferred alternative in Ravine B (e.g. compensatory mitigation costs).

While the EPA concurs with the position, taken in the LG&E's alternatives analysis, that sites located within the 100-year floodplain of the Ohio River are impracticable alternatives, the EPA believes that all potentially feasible alternatives that avoid or minimize impacts to high quality jurisdictional waters should be vetted in detail, including consideration of compensatory mitigation costs and the impacts thereof on the economic evaluation of alternatives. In addition, criterion used during Cut II of the alternatives analysis should be more objectively defined. Alternative 5B (Lee Bottom) is one specific example where a more objective and complete economic analysis is needed, but there may be others.

Baseline Aquatic Resource Characterization

The present CWA 404 permit application fails to acknowledge the March 2013 field sampling effort in Ravine B where the proposed landfill would be located. That sampling was conducted by biologists from the Kentucky Division of Water (KDOW) and consultants for the LG&E. Based on KDOW's analysis, the Ravine B stream biological community was dominated by sensitive taxa, included numerous rare or uncommon taxa and scored "Excellent" on the Kentucky Macroinvertebrate Bioassessment Index (KMBI). This assessment was consistent with the conclusion reached by the LG&E's former consultant who sampled the stream six years earlier (Mactec, 2007).

However, neither the KDOW, nor the EPA, has any record that the LG&E's consultants ever provided a data summary or interpretive report based on their collection of biological samples concurrent with the KDOW's own sampling effort in March 2013. Instead, the present permit application evaluates stream quality based solely on physical stream habitat subjectively evaluated "over the course of a two-year period from June 2011 through November 2013." While the present permit application includes the Mactec (2007) report as Attachment K in Volume III of the permit application, the text of the alternatives analysis downplays the significance of the Mactec conclusions by referring to a subsequent 2012 water quality assessment compiled by Civil & Environmental Consultants, Inc. (CEC). The latter report however, provides little relevant biological information on the Ravine B stream(s), because biological sampling was conducted outside of the KDOW's required sample index period. In fact, the 2012 report itself notes, *"In consideration of the biological sampling being conducted outside of the index period for this study, CEC determined that computing MBI scores, in accordance with the biological metrics and scoring criteria outlined in the KMBI manual (KDOW 2003), was impractical,"* (CEC, 2012).

In spite of the relative paucity of biological data provided in the present permit application, the LG&E considers slightly over one-half of the total 16.5 miles of streams proposed to be impacted as "excellent" condition. Approximately 88 percent of intermittent streams in the Ravine B watershed are reported as "excellent" and 12 percent is considered in "average" condition. Furthermore, 82 percent of ephemeral channels in the Ravine B watershed are reported to be in "average" or "poor" condition, with the remainder rated as "excellent."

In light of the quantitative evidence provided by Mactec in 2007, and the KDOW in 2013, the EPA believes that the quality of the unnamed mainstem tributary stream in Ravine B is equivalent to reference stream conditions, as defined in the Commonwealth's categorization criteria for "Exceptional Waters" in its antidegradation regulations at 401 KAR 10:030 Section 1(2)(a):

(a) Categorization criteria. A surface water shall be categorized as an exceptional water if any of the following criteria are met:

1. Surface water is designated as a Kentucky Wild River and is not categorized as an outstanding national resource water;

2. Surface water is designated as an outstanding state resource water as established in 401 KAR 10:031, Section 8(1)(a)1, 2, and 3 and Section 8(1)(b);

3. Surface water contains either of the following:

a. A fish community that is rated "excellent" by the use of the Index of Biotic Integrity included in Development and Application of the Kentucky Index of Biotic Integrity (KIBI), 2003; or

b. A macroinvertebrate community that is rated "excellent" by the Macroinvertebrate Bioassessment Index included in "The Kentucky Macroinvertebrate Bioassessment Index," 2003; or

4. Surface water in the cabinet's reference reach network.

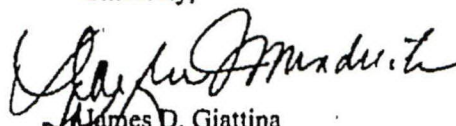
According to the KDOW, there are only 13 "reference" quality stream segments recognized in the Outer Bluegrass ecoregion of Kentucky (Ecoregion 71d) where the proposed project lies (C.Brantley, *pers. comm.*, July 7, 2014). Of those 13, only seven are headwater streams, like Ravine B, that drain a watershed of five square miles or less. The rarity of high quality reference streams in this ecoregion heightens the importance of pursuing all possible measures to avoid impacting such streams and requires regulatory diligence to ensure that such efforts are objective, quantifiable and thorough.

Conclusion

In conclusion, the EPA believes that the project, as proposed, may not comply with Guidelines. The EPA finds this project may result in substantial and unacceptable adverse impacts on aquatic resources of national importance. Therefore, we recommend denial of this project as currently proposed. As summarized above, a significantly expanded alternatives analysis is necessary to more thoroughly and objectively evaluate all alternatives to the proposed CCR landfill in the unnamed tributary of Corn Creek, with particular emphasis on those alternatives previously dismissed due to undefined and undocumented economic considerations. This letter follows the field level procedures outlined in the August 1992 Memorandum of Agreement between the EPA and the Department of the Army, Part IV, paragraph 3(a) regarding § 404(q) of the CWA.

I want to thank you and your staff for your cooperation and willingness to address our concerns. We look forward to working closely with you and the applicant to resolve the concerns outlined above. If you have any questions, please call me at (404) 562-9345 or Mr. Eric Somerville at (706) 355-8514 of my staff.

Sincerely,



James D. Giattina
Director
Water Protection Division

cc: Ms. Lee Anne Devine, U.S. Army Corps of Engineers Louisville District

Mr. Lee Andrews, U.S. Fish and Wildlife Service

Mr. Peter Goodman, Kentucky Division of Water



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

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AUG - 7 2014

Colonel Christopher G. Beck
District Engineer
Louisville District Corps of Engineers
Attn: Kimberly J. Simpson
CELRL-OP-FS, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Louisville Gas & Electric Company
Coal Combustion Residuals Landfill, Trimble County, Kentucky
LRL-2010-711

Dear Colonel Beck:

The enclosed July 11, 2014, letter from the U. S. Environmental Protection Agency provides comments in response to a Clean Water Act (CWA) Section 404 permit application submitted by the Louisville Gas & Electric Company (LG&E) proposing to construct a 189-acre landfill in jurisdictional waters of the U.S. located in Trimble County, Kentucky. The proposed landfill is designed to accommodate Coal Combustion Residuals (CCR) from the existing LG&E Trimble County Generating Station for the next 37-38 years, and together with its appurtenant structures and operations plan, will affect approximately 840 acres of land and result in direct impacts to 87,254 linear feet of streams, 2.6 acres of wetlands and 0.5 acres of open water ponds.

The EPA's July 11, 2014, letter was sent pursuant to Part IV, paragraph 3(a) of the 1992 CWA Section 404(q) Memorandum of Agreement (MOA) between the EPA and the Department of the Army. As noted below, this letter is being sent pursuant to Part IV, paragraph 3(b) of the 1992 CWA Section 404(q) MOA. The proposed LG&E project would have direct impacts, as stated above, on a watershed drained by an unnamed tributary to Corn Creek that has been documented as having high water quality and a diverse biological community, as evidenced by an "excellent" Macroinvertebrate Bioassessment Index (MBI) rating. An additional indication of the quality of this stream system can be found by comparing the system that is proposed to be impacted to a nearby stream. Sampling conducted by LG&E's consultants in 2007, documented that conditions in the streams proposed to be impacted by construction and operation of the CCR landfill were in fact better (i.e. higher scoring on the MBI) than conditions documented in a stream lying immediately to the north. That northern stream is designated by the Commonwealth of Kentucky as an Exceptional Water of the Commonwealth, an Outstanding State Resource Water and is also included in the Commonwealth's biological reference reach network. The Kentucky Division of Water resampled the streams proposed to be impacted in March 2013 and again found that the stream's biological community ranked as "excellent" according to the MBI.

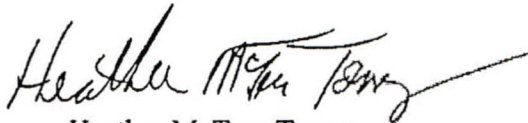
The EPA's July 11, 2014 comments were based on information contained in the CWA 404 permit application dated January 2014 and provided the EPA's views regarding compliance with the CWA Section 404(b)(1) Guidelines - 40 C.F.R. § 230 (Guidelines). The EPA expressed concerns that the permit applicant had not undertaken a proper alternatives analysis required under the Guidelines in order to justify the proposed alternative as the least environmentally damaging practicable alternative (LEDPA), consistent with 40 C.F.R. § 230.10(a). Specifically, the EPA commented that the applicant dismissed numerous potentially feasible alternatives based on economic considerations that were neither defined, nor documented. Further, the applicant's alternative analysis included little to no comparative analysis of the range of environmental impacts associated with different alternatives or their comparative estimated compensatory mitigation costs.

In addition, since providing the July 11, 2014, comment letter, the EPA has learned of a potentially feasible alternative not considered by the applicant. Sterling Ventures, LLC owns and operates an underground limestone mine in Gallatin County, Kentucky that holds a Special Waste Facility permit from the Kentucky Division of Waste Management (KDWM) to accept synthetic gypsum produced during the flue gas desulfurization (FGD) process at the Kentucky Utilities Ghent Power Station to fill mine voids in the mined out sections of the underground mine. It is the EPA's understanding that subsequent to KDWM's issuance of the Special Waste Facility permit for Sterling Ventures which had originally identified the Ghent Power Station as a source of FGD, Kentucky Utilities elected to dispose of this material on-site of the Ghent Power Station instead of utilizing the Sterling Ventures mine. Based on information contained in the Sterling Ventures permit application approved by KDWM (summarized in enclosure 1), the mine may have the storage capacity necessary to accommodate all of the CCR material generated by the LG&E Trimble County Generating Station. Use of the existing Gallatin County site would likely significantly reduce impacts to wetlands, surface waters, floodplains and groundwater resources in comparison to those impacts associated with construction and operation of the proposed new landfill. In addition, according to KDWM, it would require only a permit modification to the Sterling Ventures Special Waste Facility permit in order to allow for storage of CCR generated at the Trimble County Generating Station. Pursuant to 40 C.F.R. § 230.10(a), it is the applicant's responsibility to consider all practicable alternatives and to select a practicable alternative that does not involve a special aquatic site unless it can be clearly demonstrated that one is not available. The EPA believes that opportunities to utilize the underground limestone mine to store CCR from the Trimble County Generating Station warrant careful consideration as a potentially feasible alternative.

The EPA continues to be concerned that the proposed discharge of dredged or fill material into waters of the U.S. would eliminate 16.5 miles of streams that have been documented to be among the highest quality in this region of Kentucky. In addition, potential opportunities to avoid and minimize impacts to these resources have either not yet been considered, or have been dismissed for reasons that are not clearly defined or documented. The EPA recommends that the applicant undertake a thorough and transparent analysis of alternatives and associated environmental impacts to ensure that the LEDPA can be selected. Without this analysis, we do not believe there is sufficient information to make a determination that the proposed alternative represents the LEDPA, as required by the Guidelines. Given the potential elimination of high quality streams as described above, and consistent with Part IV, paragraph 3(b) of the 1992 CWA Section 404(q) MOA between the EPA and the Department of the Army, the EPA believes that the discharge, as proposed, will have a substantial and unacceptable impact on aquatic resources of national importance.

The EPA believes that there are opportunities to address these concerns. We look forward to working with your staff and the applicant to discuss and resolve these issues. If you have any questions, please call Mr. James D. Giattina, Director, Water Protection Division, at (404) 562-9345.

Sincerely,

A handwritten signature in black ink, appearing to read "Heather McTeer Toney", with a long horizontal flourish extending to the right.

Heather McTeer Toney
Regional Administrator

Enclosures

cc: Ms. Lee Anne Devine, U.S. Army Corps of Engineers, Louisville District
Mr. Lee Andrews, U.S. Fish and Wildlife Service
Mr. Peter Goodman, Kentucky Division of Water

Louisville Gas & Electric Company
Proposed Combustion Residuals Landfill, Trimble County, Kentucky

Attachment 1

Summary of Existing Special Waste Facility Permit Held by Sterling Ventures, LLC
Gallatin County, Kentucky

Permit I.D.: Kentucky Division of Waste Management, Registered Permit-By-Rule for
Beneficial Reuse, ARP20100001

Authorization Date: November 19, 2010

Authorized Special Waste: FGD Gypsum generated by the Kentucky Utilities Ghent Power Station

Authorized Volume/Weight: 800,000 tons per year¹

Total Capacity: 1,000,000 tons per year

¹ The existing Special Waste Facility permit held by Sterling Ventures, LLC identifies a weight of FGD gypsum to be deposited in the limestone mine per annum (800,000 tons/year). LG&E's CWA 404 permit application for its proposed CCR landfill in Trimble County identifies a volume of waste ash per annum (910,000 cubic yards/year). Based on LG&E's anticipated waste stream and published weights of the primary components of that waste stream (i.e. 53% gypsum and 38% fly ash), a cubic yard of Trimble County CCR may weigh approximately 1,300 pounds ~ 0.65 tons/cubic yard.



Supplement to Alternatives Analysis

LG&E and KU Services Company
Trimble County Generating Station Landfill Project
Trimble County, Kentucky

December, 2014

Prepared by:
Lee Wilson and Associates, Inc.
GAI Consultants, Inc.
Civil & Environmental Consultants, Inc.



Cover photo modified to show location of Ravine B (yellow = watershed border) and proposed CCR Landfill (red outline).

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- Appendix III.E-1. Methods for Assessment of Environmental Impacts
- Appendix IV.A-1. Fact Sheets for Other Alternatives
- Appendix IV.B-1. Order of Magnitude Cost of Multiple Landfill Sites

Support documents

- I-1. Alternative Analysis Report (GAI (2014))
- I-2. Public Service Commission Case No. 2009-00198
- I-3. May 1996 Special Waste Landfill Permit No. 112-00003, Ravines A and B, Trimble County Station
- I-4. CCR Disposal Landfill Application and Solid Waste Management Plan, Ravines A and B, Trimble County Station
- III.D-1-1. Scans of Pages from 2012 RS Means Heavy Construction Cost Data for Unit Cost Development
- III.D-1-2. Trimble County Budgetary Cost Estimate – Capital Cost Line Item Development for 345kV Overhead Transmission Line Relocation
- III.D-1-3. Fencing Cost Per Linear Foot Development Using 3DRavine B Fencing Requirements
- III.D-1-4. Environmental Stream and Wetland In-Lieu and Mitigation Fees/Email Discussing Indiana Bat Mitigation Fees from Paul Puckett to Jarrett Beach Dated May 21, 2014
- III.D-1-5. Cultural Resource Costs – GAI Cost Estimate
- III.D-1-6. County and State Road Relocation Costs – GAI Transportation Department Cost Estimate
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- III.D-1-8. Pipe Conveyor Transport Transfer Station Line Item Development
- III.D-1-9. Trimble County Budgetary Cost Estimate – Capital Cost Line Item Development for North Route – Haulage and Pipe Conveyor Road
- III.D-1-10. Trimble County Budgetary Cost Estimate – Capital Cost Line Item Development for North Route Haul Road Bridge
- III.D-1-11. Transportation Costs Report: Bridge Costs – New Construction
- III.D-1-12. Capital Cost Line Item Development for Subgrade Preparation:
 - General Earthwork – Soil
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- III.D-1-13. Capital Cost Line Item Development for Landfill Composite Liner System:
 - Cushion Geotextile
 - 60-mil LLDPE Geomembrane
- III.D-1-14. Trimble County Budgetary Cost Estimate – Capital Cost Line Item Development for Groundwater Underdrain Drainage Pipes and Leachate Collection System Drainage Pipes
- III.D-1-15. Trimble County Budgetary Cost Estimate – Capital Cost Line Item Development for Large ES/SWM Pond and Leachate Pond – Earthwork and Liner System
- III.D-1-16. Fenner Dunlop Project Cost Report Dated October 24, 2014
 - River Loading/Transport/Unloading Operations
- III.D-1-17. Additional Costs Considered in Case Study Analysis
- III.D-1-18. Capital Cost Line Item Development for Offsite CCR Disposal at Valley View Landfill and Sterling Ventures Mine
- III.D-1-19. Capital Cost Line Item Development for Pipe Conveyor Cost of Operation

I. INTRODUCTION

A. PURPOSE

Louisville Gas and Electric Company (LG&E)¹ proposes to construct and operate a special waste landfill and associated facilities for the storage and management of coal combustion residuals (CCR) generated by its Trimble County Generating Station (TC Station). LG&E has applied to the Louisville District, U.S. Army Corps of Engineers (USACE), for a Clean Water Act Section 404 permit to construct the landfill in a small watershed, Ravine B, which adjoins the TC Station.

In January, 2014, GAI prepared an Alternatives Analysis Report which determined that the Ravine B project is the Least Environmentally Damaging Practicable Alternative (LEDPA) for LG&E's CCR facility. The GAI report (cited throughout this Supplement as "GAI (2014)") is provided as a Support Document I-1 in Part 1 of the DVD submitted as part of this Supplement.

Region 4 of the U.S. Environmental Protection Agency has written letters to USACE dated July 11, 2014 and August 7, 2014. These letters assert that the Ravine B project is not environmentally acceptable, and that LG&E's alternatives analysis has not adequately justified its conclusion regarding the LEDPA. EPA recommends denial of the 404 permit application for the project as currently proposed.

This report is a supplement to GAI (2014) and responds to the two EPA letters referenced above.

B. LG&E'S NEED FOR A CCR LANDFILL

The Trimble County Generating Station is LG&E's newest power station. The TC Station is located in a rural area along the Ohio River, approximately 50 miles northeast of Louisville, Kentucky. Figure I.B-1 is a map showing the location of Trimble County.

Power is produced by two coal-fired units with a total net rated capacity of 1,274 megawatts, and six natural gas fired turbines that bring total capacity to 2,164 megawatts. The TC Station is one of the most environmentally and technologically advanced coal-fired generating stations in the U.S. and one of the lowest cost base load stations in the LG&E fleet. Unit 2 at TC Station has received designation as a "clean coal" unit due to having one of the lowest emission rates for coal-fired plants in the United States.

The volume of CCR produced at the TC Station is projected to average approximately 910,000 cubic yards per year, with an uncertain potential for waste reduction through beneficial use. For planning purposes, the total waste volume is estimated to be on the order of 33.4 million cubic yards over the nearly 37 year minimum lifetime that remains for the TC Station. Currently, CCR is disposed in impoundments within the site. The full capacity of the on-site storage will be reached within 3 to 7 years, depending on the extent to which beneficial reuse actually occurs and on operational or regulatory constraints on the existing disposal ponds.

¹ Trimble County Generating Station is owned by LG&E, Kentucky Utilities, the Illinois Municipal Electric Agency and the Indiana Municipal Power Agency. LG&E has assumed responsibility for obtaining all necessary permits.

C. RAVINE B LANDFILL PLAN

In the 1980s LG&E purchased land immediately to the east of the TC Station for siting a CCR landfill. That land includes small headwater drainage basins that have been designated Ravines A, B and C. In 1984, LG&E obtained a State of Kentucky landfill permit authorizing the storage of CCR that would have largely filled both Ravines A and B. Over time LG&E has made planning and process changes to substantially reduce the volume of CCR requiring management so that the current proposal would disturb only a portion of Ravine B and would avoid CCR placement in Ravine A altogether. In addition, the landfill design has been adjusted to produce a footprint that minimizes impacts on sensitive environmental features and cultural resources.

Information relating to the proposed Ravine B CCR project is provided as follows.

- Figure I.B-2 is a topographic map showing the boundaries of the Ravine B watershed, the footprint of the proposed landfill, and the location of the Trimble County Generating Station and current CCR facilities for storage of ash and gypsum.
- Table I.B-1 is a chronology of LG&E's activity regarding CCR generation and management, and the Ravine B project. The table records the Company's 30 years of effort to ensure the long-term viability of CCR management in immediate proximity to the TC Station.
- Support Document I-2 on the DVD is a copy of the Certificate of Convenience and Necessity issued by the Kentucky Public Service Commission, by which LG&E is authorized to recover the capital and operating costs for the Ravine B landfill. Support Document I-3 and I-4 are materials related to historic applications for and permitting of the Ravine B landfill.

LG&E has a Special Waste Landfill application pending with the Kentucky Division of Waste Management for construction of the Ravine B project. Given the time needed to construct the landfill, LG&E considers it prudent to begin construction of the Ravine B project no later than mid-2016. Obtaining final permits to allow construction is thus an important LG&E objective, and must be achieved in 2015 to support the 2016 start date for construction.

D. 404 PERMITTING PROCESS AND ALTERNATIVES ANALYSIS

As shown in Table I.B-1, LG&E began discussions regarding the 404 permitting process with the USACE in 2007, and submitted its initial application for a permit in December, 2010. Analyses of alternatives to the project were submitted in 2010, 2012 and 2014. GAI (2014) is the most recent of these analyses and as noted above confirms that the Ravine B landfill is the LEDPA for management of CCR from the TC Station. LG&E has taken substantial steps to avoid and minimize impacts from the project to wetlands, streams and other aquatic resources, and will provide mitigation for all remaining unavoidable impacts.

E. EPA'S 2014 COMMENTS

In July and August 2014 EPA provided two comment letters to USACE that relate specifically to LG&E's 404 application. The letters were prepared pursuant to a Memorandum of Agreement between EPA and USACE, by which EPA may request elevation of 404 permit review within the Department of Army in the event EPA determines that issuance of the permit may and potentially will result in unacceptable adverse effects to an aquatic resource of national importance (ARNI). A copy of the EPA letter dated July 11, 2014, is provided in Appendix I.E-1. The letter from August 7, 2014, is copied in Appendix I.E-2.

LG&E understands that EPA's primary concerns fall into two categories. First, EPA asserts that Ravine B contains ARNIs that would be subject to unacceptable adverse impacts from the proposed landfill. As part of this concern, EPA questions the biological analyses submitted by LG&E and contends the aquatic resources in Ravine B are among the highest quality of streams in this region of Kentucky. Second, EPA questions the adequacy of LG&E's alternatives analysis. EPA seeks further information regarding how LG&E determined certain alternatives to be not practicable, especially if that determination was based on cost. EPA identifies two specific alternatives (Lee Bottom, Appendix I.E-1; Sterling Ventures, Appendix I.E-2) that it believes warrant further analysis.

F. OVERVIEW OF LG&E'S RESPONSE TO EPA

This Supplement provides LG&E's response to the EPA letters of July and August, 2014. Much of the material addresses the aquatic resources of Ravine B, including a response to EPA's contention that the watershed may qualify as an aquatic resource of national importance, and comprehensive documentation of sampling undertaken by LG&E's consultant in Ravine B in 2013 and of comparisons of Ravine B to other watersheds in 2012. In addition, LG&E had previously completed an extensive evaluation of alternatives which was sufficient to support identification of Ravine B as the LEDPA. EPA has requested and this report provides additional details on the methods and results of that previous analysis. LG&E is also providing extensive evaluations of the alternatives that EPA has identified as requiring assessment.

This supplement is organized as follows.

Section II addresses EPA's comments relating to the aquatic ecology of Ravine B. Section II documents that EPA based much of its analysis on a biology rating provided by the Kentucky Division of Water that the Division later determined to be incorrect and too high. The section further explains the basis upon which LG&E concludes that, contrary to assertions made by EPA, Ravine B does not contain aquatic resources that are unique or of national significance. Section II also quantifies the character of jurisdictional streams for which LG&E will provide Fee In Lieu Of (FILO) mitigation.

Section III responds to EPA's request for additional information about the alternatives assessment. The section provides expanded explanations of the methods used to assess logistical, cost and environmental impacts of alternatives, and describes the application of these procedures to four case studies: i) the proposed Ravine B project; ii) the Lee Bottom alternative suggested by EPA in its July, 2014 letter; iii) the

Sterling Ventures alternative suggested by EPA in its August, 2014 letter; and iv) truck transport on existing roads to Valley View Landfill, an existing municipal solid waste landfill which is the nearest disposal option with no aquatic impacts for initial CCR management.

Section III applies the methods to determine the expected costs for long-term CCR disposal at each case study location, and makes clear the reasons why Ravine B is lowest cost, i.e., there are greater transportation costs for more distant options, land acquisition costs at Lee Bottom, and tipping fees at Sterling Ventures and Valley View. Section III also reviews unquantified risk factors associated with the case study alternatives, which have the potential to effectively make it impossible for LG&E to implement those options. The factors reviewed emphasize substantial impacts to the human environment from the Lee Bottom and Valley View alternatives (such as displacement of residents and an air field in Lee Bottom, and impacts to the public from high frequency truck traffic to and from Valley View), and uncertainties regarding permitting and implementation at all three alternative locations, in particular long-term capacity at Sterling Ventures.

Section IV uses the procedures and cost documentation provided in Section III to further explain LG&E's prior findings regarding 25 other alternatives to the Ravine B project that were previously excluded as not being practicable through a multi-stage analytical process. Section IV provides additional explanations as to why none of these alternatives can qualify as the LEDPA.

Section V summarizes LG&E's response to the EPA letters. The primary conclusions are as follows.

1. The aquatic resources in the Ravine B watershed are not unique and are substantially limited by frequently dry conditions. There is no basis for EPA's recommendation to disqualify the Ravine B project on the basis that it contains aquatic resources of national importance. Alternatives to the Ravine B project have the potential for comparable aquatic impacts, or instead would result in substantial impacts to neighboring rural communities.
2. The proximate location of Ravine B to the TC Station results in significantly lower costs and less risk than any other alternative. Ravine B is the only practicable disposal location for LG&E (other than possibly Ravine A) under EPA's 404(b)(1) guidelines. There is no basis upon which LG&E could reasonably expect the Kentucky Public Service Commission to withdraw its existing Certificate of Convenience and Necessity approval of the Ravine B project in favor of the more costly and riskier alternatives that could arguably be considered available to LG&E.

Based on the facts set forth in this Supplement, the Ravine B landfill is confirmed as the Least Environmental Damaging Practicable Alternative for management of CCR from the Trimble County Generating Station.

II. AQUATIC RESOURCES OF RAVINE B

A. INTRODUCTION

Table II.A-1 summarizes EPA's comments on the aquatic resources of Ravine B, as set out in its letters of July 11, 2014 (Appendix I.E-1) and August 7, 2014 (Appendix I.E-2). EPA concluded that a) Ravine B contains aquatic resources that may be among the highest quality headwater stream resources in this region of Kentucky, and b) the LG&E proposal to construct and operate a CCR landfill in Ravine B will have a substantial and unacceptable impact on aquatic resources of national importance. EPA recommends denial of the 404 permit application for the project as currently proposed.

LG&E's response to the EPA comments is organized as follows.

- Section II.B introduces LG&E's response to EPA through an overview of the environmental setting of Ravine B.
- Section II.C provides a discussion of the methods, results and appropriate interpretation of field sampling done in Ravine B, including joint sampling of the main channel conducted by an LG&E consultant and the Kentucky Division of Water in March, 2013.
- Section II.D addresses EPA's claims that the 2013 and other field data indicate Ravine B contains outstanding aquatic resources, equal to or better than other watersheds in the region.
- Section II.E provides a correct quantification of the impacts to the aquatic resources in Ravine B, in order to provide proper context for statements made by EPA.
- Section II.F documents LG&E's substantial efforts to minimize impacts of CCR storage in Ravine B and provides estimates of the mitigation fees that will compensate for the unavoidable impacts that remain.
- Section II.G explains why the aquatic resources in Ravine B are not reasonably identified as "special aquatic sites" or an "aquatic resource of national importance" (ARNI) and how LG&E concludes that EPA has no basis for its finding that the Ravine B project "may result in substantial and unacceptable adverse impacts" on ARNIs.

B. ENVIRONMENTAL SETTING OF RAVINE B

The following discussion is based on more extensive information provided in two appendices.

- Appendix II.B-1 describes Ravine B with respect to its physical, hydrologic, biologic and human attributes.
- Appendix II.B-2 provides details on the artificial and modified channels that exist immediately downstream of the mouth of Ravine B, and that connect the ravine drainage to the Ohio River.

Overview. Ravine B is located in the Outer Bluegrass Sub-Region of the Bluegrass Physiographic Region. This is a rolling upland underlain by relatively flat-lying Paleozoic rocks. The upland has been incised by numerous ravines, with the deepest dissection occurring near the larger drainages. Ravine B is one of a

number of steep-sided forested ravines which are cut into the bluffs along both sides of the Ohio River and its major tributaries.

Terrain. Figure II.B-1 is a map showing drainage and other features of Ravine B, similar to Figure I.B-2 except on an air photo base. The watershed boundaries on the uplands are essentially defined by Ogden Ridge Road to the south and east and Wentworth Road on the north. The drainage basin has an area of about 1.23 square miles. The land slopes steeply from the uplands to the ravine bottom, which contains a rocky channel. There is a drop in elevation of about 400 feet over the roughly two miles from the upper reach of the watershed to its discharge through a culvert at State Highway 1838. Numerous karst features occur in Ravine B, typically in the form of small solution openings.

Drainage and hydrology. Flows in the drainage occur periodically in response to rainfall and runoff events, and seasonally in response to groundwater seepage. Flow in the steep side channels is ephemeral, typically lasting for a few hours to a few days in response to rainfall events. In late winter-early spring, the weather typically is sufficiently wet to sustain percolation of excess precipitation to a shallow groundwater flow system. Groundwater discharges to the main channel through springs or seeps which occur primarily in a band along the edge of the relatively flat uplands.

Approximately 1.8 miles of the main channel is classified as having seasonal intermittent flow, especially in the upper reaches where most seepage occurs. The channels are typically dry in much of the summer and fall. Figure II.B-2 is a photo pair of a location in the ravine bottom, showing a typical pattern in which flow occurred in March 2013, but the channel was dry in October of that year.

While many of the ravines in the region are part of a natural drainage network with higher order streams, the Ravine B tributary does not have a natural connection to any downstream water body. As illustrated in Figure II.B-3, the outlet of Ravine B now discharges to a channelized drainage that parallels the state highway until it discharges to a relocated channel of Corn Creek. The Ohio River is about a half mile downstream of the mouth of Ravine B. The drainage area of the Ohio River at this location is approximately 87,500 sq. miles or more than 70,000 times the area of Ravine B.

Biology. The bulk of the ravine acreage is second growth forest that is dominated by oak and hickory in dry areas and beech and maple in moister areas. Figure II.B-4 is a 1992 air photo from Google Earth showing the watershed condition not long after the area was purchased by LG&E. Agricultural use in the uplands appears to have been extensive. The immature canopy cover is interpreted as reflecting impacts from prior logging, and provides little riparian value.

Scattered small wetlands occur at seeps along the upper ravine sides, or as a fringe around man-made ponds. Wildlife is typical of the region, with deer being the most common large mammal. Because the pools and riffles along the channel are wet only seasonally, aquatic life is variable, with sparse fauna during dry periods. During wet periods there can be abundant insects, especially in their larval state, with some occurrence of crustaceans and amphibians. Fish have not been observed in the Ravine B channels and pools even in wet periods. There are no significant aquatic resources in the ephemeral channels, and subsequent discussions of aquatic life in "Ravine B" refer only to the main channel.

Human features. Much of the relatively flat ridge tops that bound Ravine B is cleared and cultivated. The fields and scattered houses on the uplands create a rural setting for the area as a whole. LG&E has purchased those properties adjoining the proposed landfill that were available from willing sellers. A transmission line crosses the ravine and is subject to relocation. Local power lines and water supply infrastructure occurs in the TC Station ravines.

The ravine proper is fenced and has experienced little disturbance since it was purchased by LG&E some 30 years ago. The adjoining ravines immediately to the north and south also are within LG&E's property and are relatively undisturbed.

Ravine B includes a number of potentially significant resources, including karst features, historical and archeological sites, and an active cemetery. The conceptual design of the Ravine B landfill avoids all resources to the maximum extent practicable, with the offsetting consequence of significant impacts to the landfill viewshed that would not occur from earlier footprints.

C. RESULTS OF FIELD INVESTIGATIONS

The following discussion is based primarily on information provided in Appendix II.C-1, which documents field studies of Ravine B that inventory the aquatic habitats and fauna of the watershed. That appendix and the discussion below focus on five aspects of the studies.

- Documentation of an error in the data relied upon by EPA in its letter of July 7, 2014.
- Overview of the field methods that LG&E and the State of Kentucky have used in Ravine B.
- Limitations inherent in use of the field methods.
- Results of the March, 2013 field studies.
- Potential bias in the Ravine B results.

Error regarding Ravine B. EPA has faulted LG&E for its alleged failure to acknowledge a March, 2013 field survey done by an LG&E consultant and the Kentucky Division of Water (KDOW). EPA states that in its March, 2013 survey, KDOW found that the main stream in Ravine B scored "excellent" on the Kentucky Macroinvertebrate Bioassessment Index (KMBI). EPA's implication is that LG&E has chosen to ignore an unfavorable result.

This is not the case. The KDOW data that EPA relied upon were obtained by LG&E only after LG&E learned the data had been made public and made an Open Records Act request to KDOW in August 2014. Appendix II.C-2 provides the communication from KDOW to LG&E relating to this matter.

In the process of assembling information in response to LG&E's request, KDOW determined that the data prematurely sent to EPA had not been verified or subjected to an appropriate quality assurance protocol. Upon performing a quality assurance review, KDOW determined a staff member had used the incorrect template in initially calculating the KMBI score.

KDOW has advised LG&E that the prior KMBI score for the main channel of Ravine B of 63.1 is not correct. Using the correct template, the score is 55.3. This changes the KDOW rating from "excellent" to "good". Because the data EPA relied upon were incorrect, EPA's conclusions regarding the data are invalid.

As indicated in Appendix II.C-1, LG&E's consultant calculated KMBI values that scored somewhat higher than the scores determined by KDOW. Given that EPA has relied on the KMBI to compare Ravine B to other watersheds that were rated by KDOW, the most appropriate basis for comparison is the corrected KDOW score for the main stem of the unnamed tributary in Ravine B, rather than any score determined by LG&E's consultant. This outcome is further supported by the fact that LG&E's consultant used different field processing procedures for its KMBI samples, and the results are thus not directly comparable to KDOW data elsewhere. An evaluation of whether Ravine B contains aquatic resources of national importance should consider the KMBI rating for the Ravine B main stem to be 55.3, which is "good".

A discussion of how the KMBI index is used in Kentucky's water quality program is provided in Appendix II.C-3. It is important to put in context that the KMBI is one of several yardsticks used to evaluate the quality of a water resource and that consideration of other habitat, stream, and aquatic characteristics are important to an overall evaluation of stream conditions.

Field methods used in Ravine B. The KMBI discussed above is one of several methods used to characterize streams, typically to provide a score or rating for some type of regulatory purpose. In general these ratings are to measure one of two watershed attributes: physical habitat or biological integrity.

For high gradient streams such as those found in Ravine B, physical habitat ratings largely reflect the morphology, substrate and condition of the stream channel, along with attributes of the riparian zone. A high rating indicates the channel and riparian areas are in a relatively undisturbed condition. A low rating reflects observation of habitat alterations such as when land use practices, riparian disturbance or channel modifications reduce habitat quality in the stream and floodplain. Hydrologic conditions have limited effect on physical habitat ratings, and aquatic life is not considered.

Measures of biological integrity serve a different function and are primarily used to evaluate water quality and the ability of a stream to support particular uses. KDOW uses a combination of algal (diatom), macrobenthic and fish community structure to measure the ecological health of a stream. [See, for example,

http://water.ky.gov/Documents/QA/Surface%20Water%20SOPs/Historic%20SOPs/BiologicalSOPMainDocument03_08.pdf

A high rating for an index such as the KMBI indicates the aquatic biota of a watershed is as expected in a drainage that has little or no water quality impairment. A lower rating is evidence of degradation of water quality. Hydrologic conditions influence the ratings only in that some amount of water must have occurred at some times and places for aquatic biota to be present. Measures of ecosystem productivity or services are not included in the KDOW rating protocols.

Both types of ratings are intended to characterize the relative condition of the stream in comparison to other streams. Neither addresses many of the system characteristics important to determining the overall importance of the aquatic resources. Nonetheless, EPA's identification of the streams in Ravine B as a potential aquatic resource of national importance appears to be based entirely on how Ravine B scores using these types of ratings. Thus it is important to understand what these ratings do and do not indicate regarding aquatic resources in general and for Ravine B in particular.

Limitations in use of the field methods. Interpretation of physical habitat or biological integrity ratings should consider that such ratings are: approximate; relative; and incomplete as to aquatic resources.

The approximate nature of the ratings reflects the fact that different field investigators may generate different results even when they are equally trained and use the same methodology at the same time and place. Even expert investigators may differ significantly in their ratings for a particular stream; see discussion in Appendix II.C-1.

The relative nature of the ratings derives from the fact that the original labeling of a score as, for example, "fair" is not based on any judgment about the quality of the resource but on how a particular stream compares to others. KDOW established its categories by generating numeric values for a variety of watersheds, ranking the results, and placing labels on different tiers of the results. Thus, a rating of "fair" physical habitat is given to a stream that scores between 142 and 155, which means the score is in the mid-range of those streams originally evaluated. The highest rating, "good", indicates only that a stream is among the less disturbed in the region.

The ratings are not comprehensive with regard to aquatic resources, as they do not fully (or in many cases even partially) account for such ecologically important attributes as biodiversity, productivity, food chain, biomass, and support for ecological services. Thus it is not appropriate to rely on such ratings as the sole or even primary basis to identify a resource as having national importance.

Results of the March, 2013 field studies. Detailed results of the March, 2013 field studies are provided in Appendix II.C-1; the appendix also presents data from April and May, 2013. Under those rating protocols that have been applied, the main stem of the Ravine B tributary (the only channel in the watershed that has been or reasonably can be assessed) generally gets a rating that indicates a "good" score for both habitat and biological integrity. The condition of the watershed is the expected result of the fact that the ravine bottom and adjacent slopes have been protected from direct disturbance since the land was purchased by LG&E three decades ago. However, the watershed is not pristine. The basin has been subject to logging in the past, is traversed by a large transmission and distribution power line and by underground water lines, and experiences runoff from the extensive agricultural development on the uplands.

The ratings provide no evidence that aquatic resources in the drainage are exceptional. The physical habitat rating for Ravine B would be the same if it were barren of aquatic life. And in fact the rating is the same in both the wet periods when macrobenthics are most abundant, and in the dry season when aquatic life is very limited. The rating of biological integrity reflects only one category of organisms. For

example the results do not reveal that the food chain in the watershed is truncated, as fish are not observed in the watershed.

Potential bias in the Ravine B results. None of the rating methods account for the ephemeral and intermittent flows that characterize the streams in Ravine B. Two examples illustrate how the methods can generate results that are not representative of the overall ecosystem.

The example that relates to physical habitat is illustrated in Figure II.C-1, which is an example of a scoring sheet used to generate a KDOW rating of habitat in high gradient headwater streams. The sheet provides specific results for Ravine B. On the figure, circles have been drawn around the two flow-related parameters that impact the score - the velocity/depth regime and the channel flow status. The presence or absence of water otherwise is not considered.

The two flow-related parameters each received a score of 12 out of 20, toward the lower end of the "suboptimal" range. That the ratings were even this high is because LG&E's consultants made their observations by assuming wet season conditions, i.e. that water would be flowing, even though at the time of the observations the system was mostly dry. That method was as directed by KDOW, presumably to produce results relevant to the spring index period.

The total of 24 points from the two flow-related parameters amounted to nearly 15% of the total habitat score of 165 or "good". If the scoring were done using the actual observed dry condition, and not based on assumed presence of flow, the scores for the two flow-related parameters would be much less, even zero. In those times, the total habitat score would arguably be reduced by 20 or more points, and the appropriate score would be in the 140s, thus "fair" or even "poor". An annualized score would be in between. Put another way, the ratings establish conditions for the best times of the year, not the entire year that is responsible for the overall biological integrity.

The example that relates to biological integrity reflects KDOW guidance, which indicates the agency typically relies on a combination of indices to measure the ecological health (level of disturbance) of a stream (see [http citation provided previously](#)). Only one index, the Kentucky MBI (KMBI), has been applied in Ravine B. For EPA's purpose of determining if the Ravine B aquatic resource is exceptional, a first step could be to follow KDOW procedure and include diatoms and fish in its assessment of Ravine B. With this approach, Ravine B would be expected to receive a lower rating, potentially "poor".

Both the habitat and integrity indices effectively bias the Ravine B scoring by considering conditions only in the few months when significant flow may occur. Any assessment of aquatic resources in Ravine B would properly consider the highly variable hydrologic conditions in the watershed that lead to a reduced aquatic resource in comparison to watersheds with a perennial water supply. More critically, all of these indices address only stream condition. EPA's evaluation of the aquatic resources in Ravine B has given no consideration to whether the ecosystem function is limited by dry conditions. Even a cursory assessment of the watershed would recognize that the aquatic resources along the main channel of Ravine B are quite limited as to trophic structure, food web dynamics, energy and nutrient dynamics, productivity,

biodiversity, ecosystem services, and any other measure of whether it contains exceptional aquatic resources.

Conclusion. Ravine B contains mostly fair to good physical stream habitat, with some reaches that may be excellent at those times when water is present. However, aquatic resources are limited due to the seasonal absence of flow. The ratings of aquatic life along the main channel Ravine B done by LG&E and cited by EPA primarily measure the degree to which the ecosystem has been disturbed relative to the better quality streams in the region. In that regard they indicate Ravine B has been protected by LG&E's ownership and management, and is in comparatively good condition.

However, "Good" channel conditions and the seasonal abundance of short-lived macrobenthics do not imply high quality aquatic resources and provide no basis by which EPA could conclude that Ravine B contains aquatic resources of national importance.

D. EPA'S SPECIFIC CLAIMS REGARDING AQUATIC RESOURCES IN RAVINE B

Beyond relying on an invalid KMBI value, EPA has made far-ranging claims about the aquatic resources in Ravine B, and specifically the main channel where intermittent flow occurs.

- Ravine B is "dominated by sensitive taxa".
- Ravine B contains "numerous rare and uncommon taxa."
- Ravine B is equivalent in quality to rare reference streams.
- Ravine B is among the highest quality headwater stream resources in this region of Kentucky.

Each issue is addressed below. Supporting information is provided in Appendix II.D-1, which provides comparisons of Ravine B to other watersheds in the region. See also Appendix II.C-1, first cited in the preceding section.

Ravine B is "dominated by sensitive taxa". EPA's letters do not identify the taxa it refers to or what it means by "sensitive", but clearly refer to the main channel. Given the nature of the KMBI, LG&E presumes that EPA is referring to the fact that the index relies heavily on observations of common species that are pollution intolerant, particularly taxa within the EPT groups, Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies). Because these taxa are common, they are expected to be abundant in streams with good water quality; and because they are "sensitive", a reduction in their numbers will be evidence of water quality degradation. The abundance of such common species at Ravine B indicates only that there has been no marked impairment of water quality in the watershed. It does not indicate the watershed is unique or contains unique or high-value aquatic resources.

The taxa found in Ravine B do provide an important indication of aquatic resources in the watershed that was not noted by EPA. Specifically, the fauna found in the field surveys are those that have shorter life cycles that can be completed during the months when stream flow occurs. Taxa with longer life cycles (e.g. 2 years) such as dragonflies, dobsonflies and certain stoneflies were not found. These results

demonstrate the aquatic resources of Ravine B are limited by the fact that the streams are seasonally dry.

Ravine B contains "numerous rare and uncommon taxa." EPA's letters do not identify the taxa it refers to or what it means by "rare and uncommon". LG&E presumes EPA is referring to the relative distribution of taxa in the field samples taken along the main channel. Of necessity, the fact that a few taxa dominated means that other taxa will be found in lower numbers. Thus it is not unexpected that the Ravine B macrobenthic fauna in March, 2013 included taxa that were represented by only one or two individuals.

However, the taxa found in Ravine B are not "rare and uncommon" in the sense those terms are normally used. That is, it is not correct to assume that species sparsely observed in Ravine B are species that are seldom found in the region. Table II.D-1 shows at least 20 of the taxa identified by LG&E's consultant as occurring in Ravine B during the 2013 wet season are also included in the "Top 15 genera collected from reference headwater streams by bioregion" shown in Table 12 of The Kentucky Macroinvertebrate Bioassessment Index (KDOW 2003). Simply stated, there are no truly rare or uncommon aquatic taxa in Ravine B.

Ravine B is equivalent in quality to rare reference streams. EPA states its opinion that Ravine B is equivalent to what in Kentucky are termed "reference streams" or "exceptional waters", and that there are few such headwaters in the Outer Bluegrass ecoregion. The designation of reference stream or exceptional water is made for water quality purposes and indicates only that a stream is relatively undisturbed and water quality has experienced little or no impairment. The designation does not in any way imply the presence of a unique or exceptional aquatic resource.

EPA notes specifically that the main channel in Ravine A, immediately adjacent to the north of Ravine B, is designated as a reference stream and an exceptional water of the Commonwealth, and the Ravine B main stream scores even higher than Ravine A on the KMBI. That comparison is based on 2007 data. The 2013 studies were limited to Ravine B, so no current comparison to Ravine A can be made. However, to the extent that the two watersheds do have similar ratings, it simply means that both have a macrobenthic fauna that evidences minimal disturbance or impairment. It may well be that Ravine B could qualify as a reference stream due to the fact that it is not greatly disturbed. However, that would provide no evidence that the drainage contains unique or even special aquatic resources. Moreover, a close review of the 2007 data indicate that at that time the Ravine A score was below the threshold for "excellent" (see Appendix II.C-1), which indicates that potentially it would not qualify as a reference stream or exceptional water.

The extent to which streams of reference quality occur in the ecoregion is not known, since KDOW has only sampled a limited number of watersheds. Based on inspection of air photos (such as the one on the cover of this report), there likely are many similar watersheds in the region. Note especially the forested ravines to the far right of the cover photo, where the ridge tops have less agricultural land use than the rim of Ravine B.

Ravine B is among the highest quality headwater stream resources in this region of Kentucky. EPA appears to base this comment at least in part on the invalid KMBI score it obtained from KDOW. As discussed above, even if correctly calculated, the KMBI is not a complete index of aquatic resources, but is primarily an indicator of condition in relation to water quality impairment. Moreover, any consideration of KMBI should consider what is found in dry periods as well as wet, since conditions in these periods are important to the ecological value and productivity of an aquatic system.

Appendix II.D-1 provides stream habitat assessment and biological monitoring data for Ravine B in comparison to nine other headwaters in the Bluegrass Bioregion. The comparison sites were selected based on both a desktop siting analysis and field verification that the watersheds have conditions similar to that observed in Ravine B. They include six KDOW-designated exceptional use waters/reference reaches. The field studies were done in a dry period of the year and thus provide information specific to a time when aquatic life is expected to be relatively sparse. Moreover, because sampling of all sites was conducted within a narrow timeframe, the results provide a useful basis for comparison of the streams.

Table II.D-2 summarizes the results of the comparison. Of the ten headwaters surveyed in the period September 11-13, 2012, Ravine B had the lowest values by far for:

- total taxa,
- total number of organisms,
- EPT taxa, and
- intolerant taxa found in pool habitats.

The survey found that in dry conditions the isolated pools in Ravine B did not support a diverse and productive benthic macroinvertebrate community, the riffles were dry, and there were no fish. Appendix II.D-1 provides additional data; for example, based on observed specific conductance of water in the pools, water quality in Ravine B was among the poorest observed. Dissolved oxygen levels in the isolated Ravine B pools did not meet water quality standards for aquatic life.

A comparison of stream habitat assessments also is indicative of whether EPA is correct in stating that Ravine B contains among the highest quality headwaters of the region. LG&E's consultant searched KDOW records as of September 2012 to obtain habitat scores for headwaters with a catchment area of less than 5 square miles. The results are provided in Table II.D-3. A total of 173 habitat scores for the wet index period were available for comparison. Among these, the three locations in Ravine B for which habitat scores were obtained had percentile rankings of 79 to 92, with an average of just under 85. On overall physical habitat, Ravine B is not in the top 15% of the Bluegrass region watersheds in Kentucky.

Finally, value is placed on headwater streams for many reasons, but particularly their functional support for downstream waters. As shown on Figure II.B-3, there is no downstream water from Ravine B that is in natural condition, except the Ohio River. The area of Ravine B is on the order of 0.001 percent of the Ohio River drainage area, and assuredly is not important to the viability of that larger river.

E. QUANTIFICATION OF IMPACTS FROM THE RAVINE B CCR LANDFILL

As EPA has noted, the proposed landfill would impact 16.5 linear miles of "jurisdictional" streams, of which slightly over half is rated in "excellent" condition with respect to physical habitat. However, EPA is not correct to infer that this means the Ravine B landfill would have a significant effect on nationally important aquatic resources.

An aspect of the data reviewed by EPA needs to be clarified. The method used by LG&E's consultant to rate Ravine B aquatic habitat in GAI (2014) is a modification of the method discussed in Section II.C. The habitat assessment was performed at the direction of KDOW, with concurrence of USACE for the purpose of quantifying mitigation requirements. To LG&E's knowledge, there is no KDOW guidance or protocol that documents this method. Appendix II.E-1 provides documentation of the method as LG&E's consultant understands and has applied it. Note that the categories of "excellent", "average", and "poor" are different than those of the conventional habitat ratings; and that in the end, USACE chose not to use the results of the ad hoc method (see discussion in next section). Thus the ratings that EPA has commented on are not the same as those ultimately used to calculate the mitigation fee.

For habitat ratings of any type, it is important to recognize that given the seasonal absence of flow in the main Ravine B streams, a high quality aquatic fauna does not exist in Ravine B, even where the habitat rating is high. On the contrary, as the comparison to other watersheds demonstrates, Ravine B is comparatively poor in providing refugia for even the limited macrobenthic fauna that occurs in the watershed.

Any quantitative statements about impacts to jurisdictional streams need to consider the following.

- Not all of the 16.5 miles of impacted stream are in Ravine B. The Ravine B watershed contains an estimated 73,421 linear feet streams (13.9 miles) that are proposed to be impacted as part of the overall Project. The remaining 2.6 miles of impacted streams are located within the Ravine C watershed and the Barebone Creek watershed and are associated with proposed soil borrow areas.
- Of the 13.9 miles of impacted stream length in Ravine B, 42% or less than half is designated as having "excellent" physical habitat.
- The vast majority of the impacted streams are steeply sloping ephemeral side channels (9.99 miles, or 72 % of the total Ravine B streams to be lost or modified). The remainder consists of intermittent streams (3.91 miles, or 28 % of the total Ravine B streams).
- For ephemeral streams, regardless of how their physical habitat is rated, there can be no significant aquatic biota and no direct effect of the CCR landfill on aquatic habitat.
- During the wet season, only about 2 miles of intermittent stream habitat have the potential to support aquatic biota, especially EPT larvae/nymphs, and actual biota have been observed only over a 1.8 mile distance.

- It is accurate to state that 1.8 miles of real-world benthic habitat will be lost as a result of the project, with the quality of that habitat being limited due to seasonal drying.

F. MITIGATION OF IMPACTS FROM THE RAVINE B CCR LANDFILL

EPA has expressed the concern that costs for mitigation of impacts to Ravine B streams will be significant and have not been adequately considered. LG&E agrees with EPA that the direct monetary costs of mitigation are significant, and indeed larger than the \$18 million calculated by EPA. Contrary to EPA's statement, such costs were accounted for in GAI (2014) using the cost per mitigation unit as published by the Kentucky Department of Fish and Wildlife Resources as of 2012 for the FILO program. Moreover, under applicable USACE/EPA guidance, avoidance and minimization of impacts is properly considered as mitigation.

Procedure for determining mitigation of unavoidable impacts. Once the Least Environmentally Damaging Practicable Alternative is determined and accepted by the USACE, Section 404 of the CWA provides a means and authorization process to compensate for the unavoidable impacts to streams and wetlands that result from a project that is deemed to be a necessity to fulfill an applicant's needs.

Prior to granting an individual Section 404 permit, the USACE and LG&E would reach an agreement on the compensatory mitigation of impacts to streams and wetlands resulting from the project. Two options are conceivably available for use to mitigate the impacts including 1) payment of a Fee In Lieu Of (FILO) permittee-responsible mitigation, or 2) the purchase of credits from one or more mitigation banks that have stream and wetland credits available for sale within the required timeframe (to be defined by terms of an agreement with the USACE). The method for calculation of the Adjusted Mitigation Units (AMUs) for streams and wetlands is identical regardless of the planned compensatory mitigation payment program that is planned (FILO or mitigation bank credit purchase).

The procedure for calculating the required AMUs for a project, and the procedure for calculating the FILO dollar amount assuming it is the selected and agreed mitigation plan, is described in further detail in Appendix III.D-1, Methods for Assessment of Costs.

Calculated mitigation fee for Ravine B. LG&E, subject to the USACE's eventual concurrence prior to finalizing a mitigation agreement, has calculated the FILO amount for stream and wetland impacts that are expected to result from the Ravine B project. A copy of the calculation worksheet is included as Appendix II.F-1. Note that the classification of stream habitat as "good", "fair" and "poor" reflects the use of a different methodology than relied upon in GAI (2014); see discussion in prior section. Appendix II.F-2 documents a telephone conversation between GAI and (b) (6) of USACE which provided the direction for the current calculation.

The current FILO amount for the Ravine B Site Alternative is calculated at \$22,147,070 for jurisdictional stream impacts and \$183,888 for wetland impacts, which includes a 20% factor for temporal loss and cumulative impacts as required by the USACE for the FILO program. These total sums are based on the current AMU costs of \$240 per stream AMU and \$30,000 per wetland AMU as established by the

Kentucky Department of Fish and Wildlife Resources (KDFWR), the entity responsible for using these FILO funds to conserve streams and wetlands throughout the State. The costs have increased from prior values due to an increase in the fee per AMU from \$170 to \$240 AMU, and due to the increased length of impacted jurisdictional streams (from 54,661 to 87,253 feet) that resulted from the reconfiguration of the landfill footprint to avoid sensitive features. A further small increase is expected due to USACE making an anticipated increase in the classification of streams from non-jurisdictional to jurisdictional.

Mitigation of impacts to bat habitat. At most sites, including Ravine B, CCR disposal facility construction will require the clearing of trees, some of which have the potential to serve as suitable summer roosting habitat for the Indiana bat (endangered) and the northern long-eared bat (proposed endangered). The result of the Endangered Species Act Section 7(a)(2) consultation process with USFWS will likely result in requirements for compensation of lost Indiana bat habitat. Until the consultation process is complete, it is unknown if USFWS will request land be purchased through a land trust or conservation bank, deeded to a conservancy, or accepted as a deposit through the Indiana Bat Conservation Fund (IBCF). However, the USFWS Biological Opinion on Conservation Memoranda (BO) provides structure for estimating the cost of the mitigation.

The BO suggests using a base mitigation fee equal to the average value of farm real estate as published annually by the USDA Land Values and Cash Rents report, with a multiplier based on the season of Indiana bat occupancy. As of August 2014, the Indiana Bat base mitigation fee was \$3,150/acre or \$284/tree. The Project is in an area (known non-maternity habitat) where the multiplier is 1.0 from August 16 through March 31 and 1.5 for all other periods. Depending on the time of year the work is performed, tree cutting fees would cost between \$3,450 and \$4,725/acre. It is estimated that up to 562 acres of forested land may need to be cleared for construction and operations for the Ravine B Site Alternative. The final mitigation fee to be paid to the USFWS will be dependent on the specific construction schedule and the extent of clearing that may be necessary to conduct landfill operations.

Minimization of impacts through volume reduction. When LG&E first planned for generating facilities at the Trimble County location, a total of four coal-fired units (totaling approximately 2,400 MW capacity) were anticipated. However, under current plans, the recently completed Unit 2 will likely be the last coal-fired unit constructed at TC Station. One consequence of the reduction in planned generating capacity at TC Station is a large reduction in the volume of CCR to be managed. A further reduction in volume has resulted from LG&E's decision to dispose of CCR in a dry form rather than wet. LG&E will continue its efforts to make beneficial use of CCR to the extent feasible, and this can be expected to further reduce the volume that requires disposal.

Avoidance of impacts through studies and design modifications. LG&E has made a continuing effort to reduce the environmental effects of its planned CCR management where feasible. As a result of various studies conducted within Ravine B, several engineering studies and analyses, and regulatory agency input and comments, the impacts of the proposed special waste landfill in Ravine B have been reduced from previous configurations that included impacts to large areas within both Ravines A and B from landfill construction and/or soil borrow.

These efforts include:

- eliminating the borrow areas proposed for use within the drainage area of Ravine A;
- evaluating other borrow/spoil areas to reduce ecological impacts;
- additional cultural resource studies concerning the potential use of a karst feature, and the directive from the Kentucky Division of Waste Management to avoid impacts to this feature;
- a view shed study to assess view shed impacts on possible NRHP-eligible historic structures;
- a diversion channel design between Ravines A and B per suggestion of the USACE and USEPA to minimize the impacts to Ravine A;
- additional field studies to identify karst features; which included dye injection testing and sinkhole water testing; and
- siting of the landfill centroid in the upper part of Ravine B, to reduce impacts to downstream terrestrial habitats and karst features within Ravine B.

Additional design features of the landfill that will mitigate impacts include lining to limit seepage; collection and treatment of leachate; and construction and operation of a sediment retention pond.

Indirect mitigation through protection of environmental resources. The proposed impact boundary has been reduced to the extent practicable within the Ravine B watershed to preserve existing forested slopes and streams. In particular, the impact boundary near the mouth of Ravine B attempts to avoid as much tree clearing as possible near the main stream and ravine slopes in the vicinity of the Ravine mouth. The planned stormwater management pond to be constructed in Ravine B will capture the stormwater runoff from all construction disturbance areas upgradient of the pond, which is designed to minimize sedimentation and mitigate peak flow rates downstream in Ravine B and Corn Creek. Additionally, sloped forested acreage north of the main karst area is proposed to be maintained in its current state.

G. THE STREAMS IN RAVINE B ARE NOT AQUATIC RESOURCES OF NATIONAL IMPORTANCE

EPA has asserted that the streams in Ravine B described above constitute an ARNI. This assertion appears to be based on EPA's conclusion that the intermittent and ephemeral streams to be impacted are "among the highest quality in this region of Kentucky."

As discussed above, this conclusion is incorrect, having been based on an overly narrow focus and erroneous data. The main stem of the unnamed tributary to Corn Creek in Ravine B has at times been assigned a high rating under one index designed to identify impairment of water quality, but rates only as good quality by some other measures of habitat quality. Moreover, the main channel of Ravine B is dry during significant portions of the year; other channels carry flow only a few days of the year in response to heavy or prolonged rains.

The streams do not serve as habitat for any threatened or endangered species, nor have they been determined to provide habitat for macroinvertebrates that are rare in the region. Moreover, the direct

comparison of watersheds performed by GAI demonstrates that, far from being among the highest quality, the Ravine B streams are of no better quality than other streams in the region. In fact, there are ravines with aquatic resources comparable to or better than Ravine B up and down this stretch of the Ohio River. Therefore, the streams in Ravine B do not represent rare or unusual resources in the region.

There is no evidence for or expectation that the streams in Ravine B perform the functions EPA associates with headwaters streams to any significant extent. Functions not effectively provided by Ravine B include reducing downstream flooding, augmenting base flow, sediment retention, temperature regulation, transformation and retention of nutrients, organic matter processing and export, and provision of spawning and nursery habitats and niche habitats for endangered and threatened species. Ravine B is not part of a conventional drainage network in which lower order streams are integral to downstream hydrology and ecology. The unnamed tributary in Ravine B discharges through a culvert to a road-side drainage channel, then to a short stretch of modified Corn Creek stream channel before discharging into the Ohio River. With a drainage area of just over 1.2 square miles, the Ravine B watershed impact on the Ohio River watershed – which is on the order of 87,500 square miles at the Ravine B outlet – certainly could not be considered significant with respect to functions such as nutrient and organic matter contributions.

Moreover, given the ephemeral or intermittent nature of all the streams in Ravine B and their place in this drainage network, the streams offer little contribution to the biological integrity of the river network through, for example, regulation of downstream temperatures. In addition, under the proposed project newly constructed sediment and runoff control structures would improve upon the watershed's ability to mitigate downstream flooding, erosion and siltation.

Unlike other aquatic resources that EPA has categorized as ARNIs, the streams in Ravine B cannot properly be considered special aquatic sites. The aquatic resources in Ravine B certainly do not include mud flats, vegetated shallows or coral reefs, nor do they include areas designated under federal, state or local law to be managed for the preservation and use of fish and wildlife resources. While there are a few small scattered wetlands in Ravine B (typically at side-slope seeps or farm ponds), EPA does not even mention these wetlands as a concern. Rather, EPA focuses on the ephemeral and intermittent streams in Ravine B, and the only special aquatic sites potentially associated with these streams are riffle and pool complexes.

EPA has previously stated that high gradient streams such as those found in portions of Ravine B are characterized by riffle and pool complexes that can be considered special aquatic sites. However, the 404(b)(1) Guidelines make clear that riffle and pool complexes considered to be special aquatic sites are characterized by flowing water and serve as "potentially valuable habitat for fish and wildlife." 40 C.F.R. § 230.45(a). The geomorphology of riffle and pool complexes – *i.e.*, riffles with coarse substrate interspersed with deeper pools – is present in some portions of the streams in Ravine B. However, flows in these streams are intermittent at best and do not support fish, or much aquatic dependent wildlife. The primary aquatic resource is dominated by common short-lived macrobenthic organisms. Therefore, these streams cannot properly be considered special aquatic sites.

In short, there is nothing about these streams that would suggest that they are aquatic resources of *national importance*. Moreover, they do not meet the standard for ARNIs established in the Memorandum of Agreement between EPA and USACE regarding Section 404(q). EPA guidance concerning the MOA provides that "cases that would meet the [ARNI] resource threshold would be those cases that would cause resource damages similar in magnitude to cases evaluated under Section 404(c)." *Designation of Aquatic Resources of National Importance under Clean Water Act Section 404(q) Memorandum of Agreement with the Army Corps of Engineers* (Jan. 2002). A review of EPA's prior and pending 404(c) determinations confirms that under this standard the intermittent and ephemeral streams in Ravine B should not be considered ARNIs.

The best gauge of the current standard for ARNIs under this test is EPA's recent 404(c) actions and its ongoing 404(c) action with respect to Bristol Bay.² These recent actions involve potential damages to aquatic resources of substantially greater magnitude and significance than the impacts to the Ravine B jurisdictional streams under the proposed project. For example, the Yazoo Backwater Area Pumps Project would have significantly degraded the ecological functions of 67,000 acres of wetlands. The current Pebble Mine project would, at a minimum, result in the loss of 24 miles of streams, including five miles with known anadromous fish occurrence, and more than 1,200 acres of wetlands, lakes and ponds, and could result in the loss of 94 miles of streams (including 22 miles of streams with documented anadromous fish occurrence) and more than 4,900 acres of wetlands, lakes and ponds in a watershed of "unparalleled ecological value" that is a "globally significant resource" (Proposed Determination at ES-1, ES-4).

The Spruce No. 1 Surface Mine 404(c) action in West Virginia likewise involved resources characterized by important attributes that are lacking here. That project would have involved the direct loss of 7.48 miles of streams, including four miles that EPA determined were perennial streams. Moreover, like all 404(c) actions, the Spruce No. 1 Surface Mine determination focuses on the value of the aquatic resources for fish and shellfish (including spawning and breeding), wildlife, and recreation, with a particular emphasis on wildlife habitat. The streams at issue there were described by EPA as presenting some of the "last remaining least-disturbed, high quality" streams in the Coal River sub-basin and as containing important wildlife resources and habitat. EPA found that those streams provided important habitat for, *inter alia*, five species of fish, up to 46 species of amphibians and rare species of mayflies, stoneflies and caddisflies. Moreover, EPA determined that the valley fills associated with the proposed project would have significant adverse effects on wildlife downstream through the contribution of contaminants to downstream waters.

² EPA's earlier 404(c) actions included several (Lake Alma, Ware Creek, Big River, Two Forks) that involved the proposed construction of dams that would have resulted in the loss of substantial wetlands acreage as well as perennial streams or riverine habitat, i.e., resource damage well in excess of the proposed impact in this case. While some earlier 404(c) determinations involved smaller impacts, they were often driven by fundamental policy differences between EPA and the USACE – such as the disagreement over the appropriate role of mitigation in determining the LEDPA in the Sweedens Swamp/Attleboro Mall matter – rather than the magnitude of the potential impacts and should not be viewed as appropriate measures of ARNIs today, particularly given that these early 404(c) determinations were made over 25 years ago.

In contrast, the streams in Ravine B are not uncommon in the region. They do not provide habitat for any fish species or any rare macroinvertebrates, and in general do not provide high quality habitat except to a limited extent during a narrow seasonal window when sustained streamflow can occur. In addition, the project will not result in the release of contaminants to downstream waters that would adversely affect wildlife. Table II.G-1 summarizes differences between the Spruce Mine environment and that of Ravine B.

In addition, the Ravine B streams are not the types of resources that EPA has previously claimed to be ARNIs, such as:

- The Chesapeake Bay, a widely recognized resource of national importance, and the submerged aquatic vegetation deemed to be essential to its health (Virginia Seafood Council/Chesapeake Bay and Middle and Magothy Rivers 404(q) elevations);
- The Valdez Duck Flats, "one of the most productive ecosystems within Port Valdez" and a "fish and wildlife habitat type which is comparatively rare in the State of Alaska" (Petro Star/City of Valdez);
- Klatt Bog, a 1500-acre wetlands complex in Anchorage, described as providing valuable habitat for a variety of wildlife, including 58 bird species;
- The Albemarle Pamlico-Estuary Complex, containing over 6,000 acres of wetlands as well as 115,000 linear feet of streams (Potash Corporation);
- Vernal pools and seasonal wetlands, described as "high quality habitat providing unique aquatic functions and values including wildlife habitat for numerous species such as migratory waterfowl and shorebirds in the Pacific flyway, and endangered species habitat" (Churchill Downs in California);
- Louisiana marshes, "widely recognized for their value in supporting the production of commercially and recreationally valuable finfish and shellfish" (Point Au Fer), and Mississippi coastal marshes (Spectrum Gaming/D'Iberville Landing Casino).

The previous elevation case that is closest to Ravine B – involving the North Fork Hughes River Reservoir Project – involved aquatic resources that are not comparable to those in Ravine B. In the Assistant Administrator's Evaluation for the 404(q) elevation, EPA noted that the North Fork of the Hughes River was designated as a High Quality stream by the West Virginia Division of Natural Resources, a designation reserved for streams with trout populations or other "desirable fish populations that are utilized by the public," and supported a fishery that included 27 species of finfish as well as habitat for at least 22 species of freshwater mussels. In contrast, the intermittent and ephemeral streams in Ravine B do not support any fish or mussel populations. Moreover, a portion of the affected river reach was listed on the National River Inventory as including resources of national or regional significance that might qualify the river for inclusion as a National Wild and Scenic River. No such designation has been established for the ephemeral or intermittent streams in Ravine B.

In conclusion, EPA's assessment of the aquatic resources in Ravine B has not been sufficiently thorough to support the conclusion that the watershed qualifies as an ARNI. Rather, when all relevant data are considered, the streams in Ravine B that would be impacted by the proposed project cannot reasonably be classified as ARNIs. In fact, LG&E would submit that if these streams are ARNIs, that term has effectively been deprived of any meaning and it would no longer serve to provide meaningful limits on the scope of the 404(q) elevation process, contrary to the clear intent of the MOU.