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PUBLIC SERVICE COMMISSION

June 29, 2007

Via Federal Express

Ms. Elizabeth O'Donnell
Executive Director
Public Service Commission
211 Sower Boulevard, P.O. Box 615
Frankfort, Kentucky 40602-0615

Re: In the matter of: The Application of Big Rivers Electric Corporation for a Certificate of Public Convenience and Necessity to Construct a 161 kV Transmission Line in Ohio County, Kentucky, Case No. 2007-00177

Dear Ms. O'Donnell:

Enclosed for filing pursuant to 807 KAR 5:120 are (1) an original and six copies of the application of Big Rivers Electric Corporation for a certificate of public convenience and necessity to construct of 161 kV transmission line; (2) three copies of a set of maps showing the location of the proposed transmission line; and (3) one copy of a set of maps showing alternative routes that were considered. Thank you for your assistance in this matter.

Sincerely,

Tyson Kamuf

TAK/ej
Enclosures

cc: David Spainhoward
David Crockett
Burns Mercer
Kelly Nuckols
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PUBLIC SERVICE
COMMISSION

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the matter of:)
)
The Application of Big Rivers Electric Corporation) Case No. 2007-00177
for a Certificate of Public Convenience and)
Necessity to Construct a 161 kV Transmission Line)
in Ohio County, Kentucky)

APPLICATION

Big Rivers Electric Corporation ("Big Rivers") files this application ("Application") pursuant to KRS 278.020 and 807 KAR 5:120, seeking a certificate of public convenience and necessity to construct a 161 kilovolt ("kV") transmission line. In support of this Application, Big Rivers states as follows:

1. The applicant, Big Rivers, is a rural electric cooperative corporation organized pursuant to KRS Chapter 279. Its address is P.O. Box 24, 201 Third Street, Henderson, Kentucky 42419. 807 KAR 5:120 Section 2(1)(a); 807 KAR 5:001 Section 8(1).

2. Big Rivers owns generating assets, and purchases, transmits and sells electricity at wholesale. Its principal purpose is to provide the wholesale electricity requirements of its three distribution cooperative members: Kenergy Corp, Meade County Rural Electric Cooperative Corporation, and Jackson Purchase Energy Corporation. The distribution cooperatives in turn provide retail electric service to approximately 110,000 consumer/members located in 22 Western Kentucky counties: Ballard, Breckenridge, Caldwell, Carlisle, Crittenden, Daviess, Graves, Grayson, Hancock, Hardin, Henderson, Hopkins, Livingston, Lyon, Marshall, McCracken, McLean, Meade, Muhlenberg, Ohio, Union and Webster.

3. A certified copy of the articles of incorporation of Big Rivers, and all amendments thereto, is attached as Exhibit 1 to the Application of Big Rivers in *In the Matter of:*

Application of Big Rivers Electric Corporation, LG&E Energy Marketing Inc., Western Kentucky Energy Corp., WKE Station Two Inc., and WKE Corp., Pursuant to the Public Service Commission Orders in Case Nos. 99-450 and 2000-095, for Approval of Amendments to Station Two Agreements, PSC Case No. 2005-00532. 807 KAR 5:120 Section 2(1)(a); 807 KAR 5:001 Section 8(3).

4. Big Rivers is seeking approval to construct a new 13-mile 161 kV transmission line in Ohio County, Kentucky, to connect the existing Big Rivers Wilson Switchyard to an existing 161 kV transmission line owned by Big Rivers. Due to the length and voltage of this transmission line, KRS 278.020 requires a certificate of public convenience and necessity for the construction. The authority of the Public Service Commission ("Commission") to grant this certificate is found in KRS 278.020(1). 807 KAR 5:120 Section 2(1)(a); 807 KAR 5:001 Section 8(1).

5. The route for the proposed line begins at Big Rivers' Wilson Power Plant site located approximately 6 miles west of Centertown in western Ohio County and extends 13 miles to the southeast to an existing Big Rivers 161 kV transmission line located approximately 3 miles southeast of McHenry in southern Ohio County. This route is part of the route selected by East Kentucky Power Cooperative, Inc. ("East Kentucky") for the transmission line project for which the Commission granted it a certificate of public convenience and necessity in *In the Matter of: Application of East Kentucky Power Cooperative, Inc. for a Certificate of Public Convenience and Necessity for the Construction of a 161 kV Electric Transmission Line in Barren, Warren, Butler, and Ohio Counties, Kentucky*, PSC Case No. 2005-00207. Big Rivers is using the same route and structure design selected by East Kentucky and approved by the Commission in that case. Although East Kentucky abandoned its project and its certificate was

revoked (see Order dated May 31, 2007, in PSC Case No. 2005-00207), Big Rivers is requesting approval to construct the 13 mile segment itself based upon its own demonstrated needs. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 9(2)(c).

6. Three copies of a proposed route map, with a scale of one inch equals 1000 feet, and showing the location of the proposed construction, have been filed with the Commission along with this Application. 807 KAR 5:120 Section 2(2).

7. The route and structure designs of Big Rivers' proposed line are identical to the relevant portion of East Kentucky's route and structure designs approved by the Commission in PSC Case No. 2005-00207. The only substantive difference between the Big Rivers project and the relevant portion of the East Kentucky project is that Big Rivers' need for the line is different from East Kentucky's. Nevertheless, the proposed construction is still required by the public convenience and necessity. As the Commission knows, Big Rivers has entered into an agreement with certain subsidiaries or affiliates of E.ON U.S., LLC, formerly known as LG&E Energy LLC (the "E.ON Parties"), to pursue terminating the various agreements in place between and among them since 1998 that gave the E.ON Parties operational control of Big Rivers owned or operated power plants, and ownership of the electricity generated by them. If the transaction terminating those agreements (the "Unwind Transaction") closes as contemplated, Big Rivers will resume control of its generation facilities and ownership of all the power generated by those facilities. As shown in the transmission study attached hereto as Exhibit A, if Big Rivers regains control of the operation of its generating stations, the ability to export the excess generation capacity of those generating stations under a range of system conditions becomes critical to the long-term viability of Big Rivers. One contingency that requires additional export capacity is the potential loss of the loads from two large industrial loads

(aluminum smelters) served within the Big Rivers system. These two industrial loads currently represent approximately 850 MW of load demand. These two customers will execute new service contracts as part of the Unwind Transaction. Although those new service contracts are not yet finalized, Big Rivers anticipates that, after the Unwind Transaction closes, these two customers will be able to terminate their contemplated new service contracts on relatively short notice. The loss of these loads would result in a significant change in the level of excess generation on the Big Rivers system. In the absence of a replacement large load addition, the ability to export this excess generation outside the Big Rivers system is necessary. Various scenarios with the loss of both of these large industrial loads were evaluated in the transmission study. 807 KAR 5:001 Section 9(2)(a); 807 KAR 5:120 Section 2(1)(b).

8. Big Rivers has planned several projects that together will enable it to have the export capacity that it needs to withstand the potential loss of the two smelter loads. These projects include the proposed transmission line as well as other projects, such as upgrading some existing lines and constructing a new line terminal. Although all of these projects are necessary to provide the needed export capacity, the proposed transmission line is the only project for which a certificate of public convenience and necessity is required. The other projects are ordinary extensions of existing systems in the usual course of business for which no certificate is required under KRS 278.020.

9. As noted above, the proposed transmission line is necessary in the event the Unwind Transaction closes. Should the Unwind Transaction not go forward, the proposed project will not be necessary at this time. Therefore, Big Rivers is asking that approval of the proposed line be made contingent upon, and effective concurrently with, approval of the Unwind Transaction.

10. In the transmission study process, Big Rivers evaluated other transmission system improvements as alternatives to the proposed construction. Big Rivers considered and rejected construction of 1) a new 21 mile transmission line to add an interconnection from its Wilson Switchyard to the TVA Paradise Plant Switchyard, and 2) two new 13 mile transmission lines to interconnect and loop the existing Hardinsburg to Paradise line through the Wilson Switchyard. The proposed 13 mile transmission line construction proved to be the most effective improvement alternative, required the least amount of new right-of-way, and was the low-cost alternative. The transmission study describes in more detail the benefits and justification for the proposed construction as well as the limitations of the construction alternatives considered, but not selected.

11. Big Rivers also considered a total of eight alternative routes for the construction of the proposed transmission line. The evaluation of these routes is summarized in the report, "The EPRI Overhead Electric Transmission Line Siting Methodology Results for Big Rivers Electric Corporation's Line 19-F – Wilson to Line 7B Tap 161 kV Transmission Line," attached hereto as Exhibit B. That report also discusses and supports the reasons for the route selection. Maps depicting the alternative routes not selected have been filed with the Commission along with this Application. 807 KAR 5:120 Section 2(2).

12. The proposed transmission line requires a right-of-way of 100 feet in width and will typically be constructed using single steel pole structures. Access to the proposed right-of-way for the construction of the new transmission line will maximize the use of existing roads in the project area, and off road movement of vehicles will be restricted to the proposed right-of-way, to the maximum extent practicable. Trees within the proposed new right-of-way will be removed in order to achieve electrical clearances. Conventional construction equipment will be

used to frame and install the transmission line steel poles. The electrical conductors will then be strung, dead-ended, and clipped in using conventional equipment and processes. Sketches of proposed typical structures are attached hereto as Exhibit C. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 9(2)(c).

13. The proposed construction will be self-financed by Big Rivers. The total cost of the transmission line project, including the purchase price of the necessary easements, is estimated to be $4,700,000. The estimated cost of operation of the new construction, including the cost of insurance, taxes, and operation and maintenance ("O&M"), based on historical averages, is 6.63% of the net book value of the transmission improvement per year, or approximately $190,000 per year. The project does not involve sufficient capital outlay to materially affect the existing financial condition of Big Rivers. The proposed construction will not result in any increased charges to Big Rivers' members. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 9(2)(e)-(f).

14. No franchises or permits from any other public authority are required for the proposed construction. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 9(2)(b).

15. The proposed construction will not compete with any other public utilities, corporations, or persons. 807 KAR 5:120 Section 2(1)(b); 807 KAR 5:001 Section 9(2)(c).

16. Each property owner over whose property the transmission line right-of-way is proposed to cross has been sent by first-class mail, addressed to the property owner at the owner's address as indicated by the county property valuation administrator records, or hand delivered:

(a) Notice of the proposed construction;

(b) The commission docket number under which the application will be processed and a map showing the proposed route of the line;

(c) The address and telephone number of the executive director of the commission;

(d) A description of his or her rights to request a local public hearing and to request to intervene in the case; and

(e) A description of the project.

807 KAR 5:120 Section 2(3).

17. The notification letters sent by Big Rivers took two different forms as a result of East Kentucky having already acquired easements from some of the property owners. Big Rivers has an option to purchase those easements. One form letter was sent to the property owners who had already granted easements, and the other form letter was sent to the property owners who had not. A copy of each notice form letter is attached hereto as Exhibit D. A list of the names and addresses of the property owners to whom Big Rivers sent the notices is attached hereto as Exhibit E. 807 KAR 5:120 Section 2(4).

18. A notice of intent to construct the proposed transmission line was published in the *Owensboro Messenger-Inquirer* and the *Ohio County News*, newspapers of general circulation in Ohio County. The notice included:

(a) A map showing the proposed route;

(b) A statement of the right to request a local public hearing; and

(c) A statement that interested persons have the right to request to intervene.

807 KAR 5:120 Section 2(5).

19. A copy of the newspaper notice is attached hereto as Exhibit F.

WHEREFORE, Big Rivers requests that the Commission issue an order granting it a certificate of public convenience and necessity for the proposed construction, with the order being made contingent upon and effective concurrently with approval of the Unwind Transaction, and for all other relief to which it may be entitled.

On this the 29th day of June, 2007.

SULLIVAN, MOUNTJOY, STAINBACK
& MILLER, P.S.C.

____

James M. Miller
Tyson Kamuf
100 St. Ann Street
P. O. Box 727
Owensboro, Kentucky 42302-0727
(270) 926-4000
Counsel for Big Rivers Electric Corporation

Verification

I, David G. Crockett, Vice President, System Operations for Big Rivers Electric Corporation, hereby state that I have read the foregoing Application and that the statements contained therein are true and correct to the best of my knowledge and belief, on this the 29th day of June, 2007.

David G. Crockett
Vice President, System Operations
Big Rivers Electric Corporation

COMMONWEALTH OF KENTUCKY)
COUNTY OF HENDERSON)

SUBSCRIBED AND SWORN to before me by David G. Crockett, as Vice President, System Operations for Big Rivers Electric Corporation, on this the 29th day of June, 2007.

Paula Mitchell
Notary Public, State at Large KY
My commission expires: 1-12-09

Big Rivers
Electric Corporation

A Touchstone Energy Cooperative

EXHIBIT A
BIG RIVERS ELECTRIC CORPORATION
BULK TRANSMISSION SYSTEM ASSESSMENT

Prepared by
Big Rivers Electric Corporation
June 28, 2007

TABLE OF CONTENTS

APPENDICES

INTRODUCTION

Background

As Big Rivers regains operation of its generating stations, the ability to export this generation under a wide range of system conditions becomes critical to the long-term viability of Big Rivers Electric Corporation (Big Rivers or BREC). Consequently, a complete bulk transmission system evaluation, including load loss scenarios, was undertaken.

Specifically, two large industrial customers (aluminum smelters) served within the Big Rivers balancing area have loads that total approximately 850 MW. The loss of one or both of these loads would result in significant excess generation in the Big Rivers balancing area. In the absence of a large load addition, the ability to export this generation outside the Big Rivers control area would be critical. Various scenarios with the loss of these industrial loads were evaluated in the transmission assessment study.

As evaluations of load loss scenarios were beginning, Vectren contacted Big Rivers with a request to evaluate possible EHV interconnections. This request resulted from a Vectren long-range transmission plan completed in late 2006. This plan includes a 345 kV Vectren to Big Rivers interconnection. If constructed, this interconnection will connect AB Brown (Vectren) to Reid EHV (BREC). In addition, the Vectren plan includes a 345 kV interconnection in the eastern part of their system. If constructed, this eastern interconnection will connect Culley (Vectren) to Elmer Smith (Owensboro Municipal Utilities). An alternative to this eastern interconnection was also evaluated. This alternative is a 345 kV interconnection from Culley (Vectren) to Coleman EHV (BREC). These proposed interconnections were evaluated as part of the load loss scenarios to assess their effect on the ability to export excess generation off the Big Rivers system. These are the only know external bulk transmission projects which, if built, were deemed to have the potential to impact the study results.

Purpose

The purpose of this study was to prepare a complete analysis of the Big Rivers bulk transmission system with and without the loss of smelter load. The focus of the study was the Big Rivers transmission system, but consideration was given to external system conditions.

Various system improvement alternatives were evaluated with and without the loss of smelter load. In addition, to fully assess the Big Rivers transmission system and the improvement alternatives considered, the overall ability to import and export power during a variety of system conditions was studied.

Scope of Study

This study included steady-state power flow analyses and limited short-circuit analyses. The following transmission projects were considered in the study process:

Transmission Additions Included in all Studies

Daviess County EHV 345 kV Interconnection (BREC-KU)
Skillman to Meade County to New Hardinsburg 161 kV circuit
Francisco 345/138 kV substation (Vectren)
Dubois to Newtonville 138 kV circuit (Vectren)

Transmission Additions Evaluated

Reid to AB Brown 345 kV interconnection (BREC-Vectren)
Wilson to Paradise 161 kV interconnection (BREC-TVA)
Culley 345/138 kV transformer (Vectren)
Culley to Smith 345 kV interconnection (Vectren-KU)
Coleman EHV to Culley 345 kV interconnection (BREC-Vectren)
Culley to Duff 345 kV line (Vectren)
AB Brown 345/138 kV transformer (Vectren)
AB Brown to Gibson 345 kV interconnection (Vectren-Duke)

SUMMARY OF RESULTS AND CONCLUSIONS

At this time, it is not known whether any of the Vectren interconnection study improvements will be implemented. Therefore, the study results and conclusions are made in light of these results, but are not dependent upon any of the improvements. The following system enhancements were found to be necessary to reliably export all excess generation during the loss of both aluminum smelters:

IMPROVEMENT	MINIMUM REQUIRED RATING
Reid to Daviess Co. 161 kV Upgrade	1200 Amp
Coleman EHV to Coleman 161 kV 1 & 2 Upgrades	1200 Amp
Coleman to Newtonville 161 kV Upgrade	1200 Amp
Wilson to N.Hard/Paradise 161 kV 3 Terminal	2000 Amp
3 Terminal-Paradise 161 kV Upgrade	1600 Amp
Paradise 161 kV Terminal Upgrade	1600 Amp

Additional details regarding the study results and required improvements are included below:

- Modify the existing New Hardinsburg to Paradise 161 kV interconnection by constructing a 13 mile circuit from Wilson to the existing interconnection. This will create a New Hardinsburg/Wilson/Paradise three-terminal circuit.
- Upgrade the 8 mile 161 kV transmission circuit from the new three-terminal tap point to Paradise to allow for 1600 Amp operation.
- Upgrade the Paradise terminal (TVA) to allow for 1600 Amp operation.
- Upgrade the 22 mile Reid to Daviess County 161 kV circuit to allow for 1200 Amp operation.
- Upgrade the 6.4 mile Coleman to Newtonville 161 kV interconnection to allow for 1200 Amp operation.
- Upgrade both Coleman EHV to Coleman 161 kV circuits (the total combined circuit length is 2.8 miles) to allow for 1200 Amp operation.

MODELING ASSUMPTIONS AND STUDY SCENARIOS

Power Flow Base Case

A 2015 model created from a 2015 summer peak ECAR/MEM/VEM base case (created in 2005) was used to complete the system assessment. A detailed Big Rivers model was merged into the case. The loads modeled by Big Rivers are consistent with the 2005 corporate load forecast. In addition, facilities either planned or under consideration by Big Rivers were added to the model. From this 2015 summer peak model, four basic models were developed. These models are described as Case A, Case B, Case C, and Case D. A detailed discussion of each case is included later in this report. Additional models were also created to allow light load and other transfer scenarios to be evaluated. These scenarios are number 1 through 6 and are described later in this report.

Short-Circuit and Transient Stability Models

A regional short-circuit model was used to evaluate the fault duty impacts of the proposed construction. Stability analyses were not performed as part of the initial study. Instead, previously prepared stability studies were reviewed. If necessary, additional stability studies will be completed as part of a subsequent interconnection or system impact study.

Summer Peak Study Scenarios

The study was conducted in two phases. In the first phase, the following study scenarios were evaluated with the 2015 summer peak model. The second phase included an additional evaluation of the improvements proposed as a result of the first phase studies. The intent of the second phase was to provide a sensitivity analysis of the proposed facilities with power flow models that represent different system conditions. Four separate cases (A, B, C, and D) were created from the 2015 summer peak model. A description of the facilities included in each of these cases follows.

Case A – 2015 Summer Model Without the Proposed Vectren Interconnections

The Case A study results will serve as a benchmark for evaluating the interconnections proposed by Vectren. These study results will also provide an assessment of the impacts expected with the loss of smelter load.

Facilities included as in-service in the base model include:

Daviess County EHV 345 kV interconnection (BREC-KU)
Ensor 161/69 kV substation
30 MVAR Hancock County 69 kV capacitor

Case B – 2015 Summer Model with the Proposed Vectren Interconnections

The Case B study results will allow the proposed Vectren interconnections to be evaluated under various system conditions.

Facilities included as in-service in the base model include:

Francisco 345/138 kV substation
Dubois to Newtonville 138 kV circuit
Daviess County EHV 345 kV Interconnection (BREC-KU)
Reid to AB Brown 345 kV interconnection
Culley 345/138 kV station
Culley to Smith 345 kV interconnection
Culley to Duff 345 kV line
AB Brown 345/138 kV station
AB Brown to Gibson 345 kV interconnection
Ensor 161/69 kV substation
30 MVAR Hancock County 69 kV capacitor

Case C – 2015 Summer Model with a Variation of the Proposed Vectren Interconnections

The Case B study results will allow a modified Vectren interconnection plan to be evaluated under various system conditions. In this case, the proposed Culley to Smith 345 kV circuit is replaced with a Culley to Coleman EHV 345 kV circuit.

Facilities included as in-service in the base model include:

Francisco 345/138 kV substation
Dubois to Newtonville 138 kV circuit
Daviess County EHV 345 kV Interconnection (BREC-KU)
Reid to AB Brown 345 kV interconnection
Culley 345/138 kV station
Coleman EHV to Culley interconnection (BREC-Vectren)

Culley to Duff 345 kV line
AB Brown 345/138 kV station
AB Brown to Gibson 345 kV interconnection
Ensor 161/69 kV substation
30 MVAR Hancock County 69 kV capacitor

Case D – 2015 Summer Model Without an Eastern Vectren Interconnection

The case Case D study results will allow the Vectren 345 kV interconnection proposed from AB Brown to Reid to be evaluated. In this case, the proposed Culley to Smith 345 kV circuit (and the Culley to Coleman EHV 345 kV circuit) are removed from the model.

Facilities included as in-service in the base model include:

Francisco 345/138 kV substation
Dubois to Newtonville 138 kV circuit
Daviess County EHV 345 kV Interconnection (BREC-KU)
Reid to AB Brown 345 kV interconnection
Culley 345/138 kV station
Culley to Duff 345 kV line
AB Brown 345/138 kV station
AB Brown to Gibson 345 kV interconnection
Ensor 161/69 kV substation
30 MVAR Hancock County 69 kV capacitor

In addition, various scenarios were studied with each of the four cases. These scenarios are numbered 1 through 4. As description of these scenarios follows:

Scenario 1: Base model with the facilities included in the Case A, B, C or D description.

Scenario 2: Loss of both aluminum smelters with the excess generation exported (25% to the northeast, 25% to the northwest, 25% to the southeast, and 25% to the southwest).

Scenario 3: Loss of both aluminum smelters with the excess generation exported (25% to the northeast, 25% to the northwest, 25% to the southeast, and 25% to the southwest). Also included is a modification of the existing New Hardinsburg (BREC) to Paradise (TVA) 161 kV interconnection (the existing circuit is looped through Wilson).

Scenario 4: Loss of both aluminum smelters with the excess generation exported (25% to the northeast, 25% to the northwest, 25% to the southeast, and 25% to the southwest). Also included is new terrain Wilson to Paradise (TVA) 161 kV interconnection.

The Big Rivers system loads and excess generation included in both the 2015 summer peak model and a light load model (described later) are shown below:

Big Rivers Power Flow Model Loads (MW)

	2015 Summer Peak Model		2015 Off Peak Model	
	Scenario 1	Scenarios 2, 3, 4	Scenario 1	Scenario 2
Generation	1744	1744	1744	1744
System Load	1599	749	1360	510
HMP&L Take	100	100	100	100
Balancing Area Load	1699	849	1460	610
Excess Generation	45	895	284	1134

POWER FLOW ANALYSIS – SUMMER PEAK

Study Contingencies and Monitored Facilities

Big Rivers used the GE PSLF power flow and contingency processor program to automatically perform the power flow analysis. The contingencies studied included all transmission lines and transformers in the Big Rivers balancing area as well as select external outages. Each transmission line and transformer outage was evaluated alone and with the simultaneous outage of single generating units. This is consistent with the Big Rivers planning criteria described in Appendix A. In addition, select outages of multiple generating units with the outage of each transmission line or transformer were also studied.

The BREC, EKPC, Hoosier Energy, LGEE, TVA, and Vectren systems were monitored for overloads and voltage violations. Summary reports of the study results are included in Appendix B of this report. The table on the following page shows the maximum observed loading on each overloading facility for various scenarios. Additional details are included in later report sections.

MAXIMUM LOADING (% OF RATING)

LIMITING FACILITY	CASE A				CASE B				CASE C			CASE D		
	1	2	3	4	1	2	3	4	1	2	3	1	2	3
Reid to Daviess Co. 161 kV	102%	129%	123%	126%	100%	95%	92%	98%	98%	97%	97%	107%	107%	108%
Hancock to Coleman EHV 161 kV	95%				94%				93%			95%		
Hardin to Daviess Co EHV 345 kV		126%	102%	104%	102%	137%	116%	117%	101%	131%	118%	95%	129%	111%
Wilson to Green River 161 kV		106%				95%				97%			99%	
Coleman EHV to Coleman 161 kV		112%	104%	109%			93%	96%		91%	97%		98%	107%
Reid 345/161 kV Transformer		108%	99%	103%										
Smith to Daviess Co EHV 345 kV					101%									
Coleman to Newtonville 161 kV		132%	115%	118%		115%	99%	100%		106%	97%		122%	108%
Wilson to Reid EHV 345 kV					96%		93%	103%	95%	90%	108%	105%	95%	105%
Wilson to Paradise 161 kV			134%	157%			135%	169%			158%			169%

CASE A: Base 2015 summer peak model.

CASE B: 2015 summer peak model with the addition of all proposed Vectren interconnections.

CASE C: 2015 summer peak model with a modified Vectren interconnection plan (Culley to Coleman EHV 345 kV interconnection).

CASE D: 2015 summer peak model with only the AB Brown to Reid 345 kV interconnection added (the eastern Vectren-OMU or BREC interconnection was not included).

SCENARIO 1: Base model.

SCENARIO 2: Loss of both smelters.

SCENARIO 3: Loss of both smelters with the addition of a New Hardinsburg-Wilson-Paradise 161 kV loop.

SCENARIO 4: Loss of both smelters with the addition of a new Wilson to Paradise 161 kV circuit.

Case A – 2015 Summer Model without the Proposed Vectren-BREC Interconnections

Case A models include the Big Rivers system with planned system upgrades. The proposed Vectren interconnections with Big Rivers are not included. The study results are provided in Appendix B and discussed in this section.

As these studies show, a slight overload (102%) of the Reid to Daviess County 161 kV circuit is expected with a single contingency outage. System voltages in the Coleman-Hancock County-Daviess County area are below the criteria limit. In addition, import limitations have been experienced during multiple generating unit outages and heavy north to south transfers.

As described earlier, the loss of one or both smelter loads is a concern for Big Rivers. Studies completed with the loss of both smelter loads (with all excess generation exported off-system) indicate significant facility overloads should be expected. Overloads and/or heavy loadings are expected on the Reid to Daviess County 161 kV circuit (129%), the Coleman EHV to Hancock County 161 kV circuit (98%), the Wilson to Green River (KU) 161 kV interconnection (106%), the Coleman to Coleman EHV 161 kV circuits 1 and 2 (112%), the Daviess County EHV to Hardin County (LGEE) 345 kV circuit (126%), and the Coleman to Newtonville (Hoosier

Energy) 161 kV interconnection (132%). Additionally, a north to south transfers bias that can be reasonably expected to occur would result in increased loadings.

Since the existing Big Rivers bulk transmission system is primarily a 161 kV system with limited 138 kV and 345 kV facilities, the system is not capable of transferring large amounts of power to load outside the Big Rivers control area. Consequently, transmission enhancements that provide additional paths to either existing load centers or the EHV transmission system were found to be necessary to accommodate large power exports.

A previously prepared generator interconnection study identified the need for additional outlets (interconnections with neighboring utilities) during system conditions that include increased power exports from Big Rivers. More specifically, two interconnections were required to support the addition of 750 MW of generation to the Big Rivers transmission system. One of these upgrades (a 345 kV interconnection with KU) is already scheduled to be constructed in 2007. The second outlet is a new-terrain 161 kV Wilson to Paradise (TVA) interconnection. Since both interconnections were found to increase the ability to export power, the second interconnection was evaluated as part of the aluminum smelter load loss studies. In addition, two alternatives to this interconnection were also considered. Both alternatives include a modification of the existing New Hardinsburg to Paradise 161 kV interconnection. One alternative involves looping the existing line through the Wilson station. The second alternative involves creating a three-terminal circuit by constructing a new 161 kV circuit from Wilson to the existing New Hardinsburg to Paradise interconnection. Either alternative would minimize the necessary new right-of-way (ROW) required to interconnect Wilson with Paradise.

The addition of a Wilson to Paradise (TVA) 161 kV interconnection along with a loss of both smelters results in reduced loadings. However, overloads do remain. Overloads are expected on Reid to Daviess County 161 kV circuit (126%), the Coleman to Coleman EHV 161 kV circuits 1 and 2 (109%), the Coleman to Newtonville (Hoosier Energy) 161 kV interconnection (118%) and the Daviess County EHV to Hardin County 345 kV circuit (104%).

The modification of the existing New Hardinsburg to Paradise (TVA) 161 kV interconnection (loop through Wilson), along with a loss of both smelters, also results in reduced loadings. However, overloads again remain. Overloads are expected on Reid to Daviess County 161 kV circuit (123%), the Coleman to Coleman EHV 161 kV circuits 1 and 2 (104%), the Daviess County EHV to Hardin County (LGEE) 345 kV circuit (102%), and the Coleman to Newtonville (Hoosier Energy) 161 kV interconnection (115%).

With the heavy loadings on both internal Big Rivers facilities and external facilities, an addition outlet (interconnection) is required to provide required transfer capability improvement. Since the modification of the existing New Hardinsburg to Paradise (TVA) 161 kV interconnection (either creating a loop circuit or three-terminal circuit) results in reduced loadings on key facilities and requires less ROW when compared to a direct Wilson to Paradise interconnection, this improvement is preferred option for providing increased export capability. No other reasonable interconnection option was identified. The complete list of facilities needed to export all excess power during peak loads and the loss of both aluminum smelters follows:

- Modify the existing New Hardinsburg to Paradise 161 kV interconnection by constructing a 13 mile circuit from Wilson to the existing interconnection. This will create a New Hardinsburg/Wilson/Paradise three-terminal circuit.
- Upgrade the 8 mile 161 kV transmission circuit from the new three-terminal tap point to Paradise to allow for 1600 Amp operation.
- Upgrade the Paradise terminal (TVA) to allow for 1600 Amp operation.
- Upgrade the 22 mile Reid to Daviess County 161 kV circuit to allow for 1200 Amp operation.
- Upgrade the 6.4 mile Coleman to Newtonville 161 kV interconnection to allow for 1200 Amp operation.
- Upgrade both Coleman EHV to Coleman 161 kV circuits (the total combined circuit length is 2.8 miles) to allow for 1200 Amp operation.
- Upgrade the KU 345 kV circuit from Daviess County EHV to Hardin County to allow for 1200 Amp operation.

Additional study details follow:

1. Normal System Observations (base model)

No facility overloads or low voltages were identified.

2. Normal System Observations (with loss of both smelters)

No facility overloads or low voltages were identified.

3. Normal System Observations (loss of both smelters, N. Hard/Paradise to Wilson)

No facility overloads or low voltages were identified.

4. Normal System Observations (loss of both smelters, Wilson to Paradise 16 kV Line Added)

No facility overloads or low voltages were identified.

1. Contingency Observations (base model)

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Reid – Daviess County 161 kV	102%
BREC	Coleman EHV – Hancock Co. 161 kV	95%

Unacceptable single contingency voltages are expected on the 161 kV system at both the Hancock County substation (91%) and the Newman substation (91%).

When the planning criteria is expanded to include the outage of two generating units and a single transmission element, the following transmission facilities (100 kV and above) exceeded their emergency ratings:

BREC	Reid – Daviess County 161 kV	122%
BREC	Coleman EHV – Hancock Co. 161 kV	100%
BREC	Newtonville (HE) – Coleman EHV 161 kV	112%

With the expanded criteria, voltages as low as 83% are expected with an outage of two Coleman generating units with a simultaneous outage of the Coleman EHV to Daviess County EHV 345 kV circuit.

2. Contingency Observations (with loss of both smelters)

BREC	Reid – Daviess County 161 kV	129%
BREC	Wilson – Green River (LGEE) 161 kV	106%
BREC	Coleman – Newtonville (HE) 161 kV	132%
BREC	Coleman EHV – Coleman 161 kV	112%
KU	Hardin-Daviess County EHV 345 kV	126%
BREC	Reid EHV 345/161 kV Transformer	108%

3. Contingency Observations (loss of both smelters, N. Hard/Paradise to Wilson)

BREC	Reid – Daviess County 161 kV	123%
BREC	Coleman EHV – Coleman 161 kV	104%
BREC	Newtonville (HE) – Coleman 161 kV	115%
KU	Hardin-Daviess Co EHV 345 kV	102%

4. Contingency Observations (loss of both smelters, Wilson to Paradise 161 kV Line Added)

BREC	Reid – Daviess County 161 kV	126%
BREC	Coleman EHV – Coleman 161 kV	109%
BREC	Newtonville (HE) – Coleman 161 kV	118%
BREC	Hardin-Daviess Co. EHV 345 kV	104%

Case B – 2015 Summer Model with the Proposed Vectren-BREC Interconnections

Case B models include the Big Rivers system with planned system upgrades and the proposed Vectren interconnections. The study results are provided in Appendix B and discussed in this section.

The single contingency overload (102%) of the Reid to Daviess County 161 kV circuit found with Case A studies was reduced to 100% with the Vectren additions. However, the loading on the Smith (OMU) to Daviess County EHV (KU) 345 kV increased to 101%. The flow on the

Reid to Wilson 345 kV circuit was found to be 96%. Unacceptable system voltages in the Coleman-Hancock County-Daviess County area were improved from 91% to 92.5%.

Studies completed with the loss of both smelter loads (with all excess generation exported off-system) indicate facility overloads should be expected with the Vectren additions. Overloads and/or heavy loadings are expected on the Reid to Daviess County 161 kV circuit (95% with Vectren compared to 129% without), the Wilson to Green River (KU) 161 kV interconnection (95% with Vectren and 106% without), the Coleman to Newtonville (Hoosier Energy) 161 kV interconnection (115% with the Vectren addition and 132% without) and the Daviess County EHV to Hardin County (KU) 345 kV interconnection (137% with Vectren and 126% without).

While the Vectren additions improve system voltages, the Hardin to Daviess County EHV circuit overload is more severe with the Vectren interconnection. In order to export all excess generation during peak, off-peak, and times of heavier north to south flows, additional improvements are required. The addition of a Wilson to Paradise interconnection (through a modification of the existing New Hardinsburg to Paradise interconnection) or the reconductoring of the Coleman to Newtonville 161 kV line is necessary.

The complete list of facilities needed to export all excess power during peak loads and the loss of both aluminum smelters follows:

- Upgrade the 6.4 mile Coleman to Newtonville 161 kV interconnection to allow for 1200 Amp operation.
- Modify the existing New Hardinsburg to Paradise 161 kV interconnection by constructing a 13 mile circuit from Wilson to the existing interconnection. This will create a New Hardinsburg/Wilson/Paradise three-terminal circuit.
- Upgrade the 8 mile 161 kV transmission circuit from the new three-terminal tap point to Paradise to allow for 2000 Amp operation.
- Upgrade the Paradise terminal (TVA) to allow for 2000 Amp operation.
- Upgrade both Coleman EHV to Coleman 161 kV circuits (the total combined circuit length is 2.8 miles) to allow for 1200 Amp operation.
- Upgrade the KU 345 kV circuit from Daviess County EHV to Hardin County to allow for 1200 Amp operation.

Additional study details follow:

<u>1. Normal System Observations (base model)</u>

LGEE	Daviess Co. EHV – Hardin County 161 kV	93%

No unacceptable system voltages are expected.

<u>2. Normal System Observations (with loss of both smelters)</u>

LGEE	Daviess Co. EHV – Hardin County 161 kV	122%

No unacceptable system voltages are expected.

3. Normal System Observations (loss of both smelters, N. Hard/Paradise to Wilson)

LGEE	Daviess Co. EHV – Hardin County 161 kV	116%

No unacceptable system voltages are expected.

1. Contingency Observations (base model)

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Reid – Daviess County 161 kV	100%
BREC	Coleman EHV – Hancock Co. 161 kV	94%
LGEE	Daviess Co. EHV – Hardin County 161 kV	102%
LGEE	Daviess Co. EHV – Smith 161 kV	101%

No unacceptable system voltages are expected. The lowest observed bulk system voltage was 92.5% at the Newman substation (with an outage of the Reid to Daviess County 161 kV circuit with a simultaneous outage of 1 Coleman generating unit.

When the planning criteria is expanded to include the outage of two generating units and a single transmission element, the following transmission facilities (100 kV and above) exceeded their emergency ratings:

BREC	Reid – Daviess County 161 kV	126%
BREC	Coleman EHV – Hancock Co. 161 kV	99%
BREC	Newtonville (HE) – Coleman EHV 161 kV	109%
BREC	Coleman EHV – Coleman 161 kV 1 & 2	100%
LGEE	Daviess Co. EHV – Smith 161 kV	107%

With the expanded criteria, voltages as low as 85% are expected during various outage combinations.

2. Contingency Observations (with loss of both smelters)

LGEE	Daviess Co. EHV – Hardin County 161 kV	137%
BREC	Newtonville (HE) – Coleman EHV 161 kV	115%
BREC	Wilson – Green River (LGEE) 161 kV	95%
BREC	Reid – Daviess County 161 kV	95%

3. Contingency Observations (loss of both smelters, N. Hard/Paradise to Wilson)

BREC	Reid – Daviess County 161 kV	92%
BREC	Newtonville (HE) – Coleman EHV 161 kV	99%
BREC	Coleman EHV – Coleman 161 kV 1 & 2	93%
LGEE	Daviess Co. EHV – Hardin County 161 kV	116%
BREC	Wilson – Reid EHV 345 kV	93%

Case C – 2015 Summer Model with a variation of the Proposed Vectren-BREC Interconnections

Case C models include the BREC system with already planned system upgrades and the proposed Vectren interconnections. However, the Culley to Smith (OMU) 345 kV interconnection proposed by Vectren was replaced with a 345 kV Culley to Coleman interconnection. The study results are provided in Appendix B and discussed in this section.

The single contingency overload (102%) of the Reid to Daviess County 161 kV circuit found with Case A studies was reduced to 98% with the Vectren additions. However, the Daviess County to Hardin County 345 kV circuit was overloaded at 101%.

Studies completed with the loss of both smelter loads (with all excess generation exported off-system) indicate facility overloads or heavy system loadings should be expected with the Vectren additions. Overloads and/or heavy loadings are expected on the Reid to Daviess County 161 kV circuit (97% with Vectren compared to 129% without), the Wilson to Green River (KU) 161 kV interconnection (97% with Vectren and 106% without), the Coleman to Newtonville (Hoosier Energy) 161 kV interconnection (106% with the Vectren addition and 132% without) and the Daviess County EHV to Hardin County (KU) 345 kV interconnection (131% with Vectren and 126% without).

While the Vectren additions improve system voltages, the Hardin to Daviess County EHV circuit overload is more severe with the Vectren interconnection. In order to export all excess generation during various system conditions (the Wilson to Green River 161 kV line loading is 106% with additional north to south transfers modeled) additional improvements are required. The addition of a Wilson to Paradise 161 kV interconnection (through a modification of the existing New Hardinsburg to Paradise interconnection) eliminates the Wilson to Green River overload and reduces the contingency loading on the Coleman to Newtonville 161 kV interconnection to just below 100%.

The complete list of facilities needed to export all excess power during peak loads and the loss of both aluminum smelters follows:

- Modify the existing New Hardinsburg to Paradise 161 kV interconnection by constructing a 13 mile circuit from Wilson to the existing interconnection. This will create a New Hardinsburg/Wilson/Paradise three-terminal circuit.
- Upgrade the 8 mile 161 kV transmission circuit from the new three-terminal tap point to Paradise to allow for 2000 Amp operation.
- Upgrade the Paradise terminal (TVA) to allow for 2000 Amp operation.
- Upgrade the KU 345 kV circuit from Daviess County EHV to Hardin County to allow for 1600 Amp operation.

Additional study details follow:

<u>1. Normal System Observations (base model)</u>

LGEE	Daviess Co. EHV – Hardin County 161 kV	93%

<u>2. Normal System Observations (with loss of both smelters)</u>

LGEE	Daviess Co. EHV – Hardin County 161 kV	121%

<u>3. Normal System Observations (loss of both smelters, N. Hard/Paradise to Wilson)</u>

LGEE	Daviess Co. EHV – Hardin County 161 kV	115%

<u>1. Contingency Observations (base model)</u>

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Reid – Daviess County 161 kV	98%
BREC	Coleman EHV – Hancock Co. 161 kV	93%
LGEE	Daviess Co. EHV – Hardin County 161 kV	101%

No unacceptable system voltages are expected. The lowest observed bulk system voltage was 92.5% at the Hancock County substation (with an outage of the Coleman EHV to Hancock County 161 kV circuit with a simultaneous outage of the Wilson generating unit.

When the planning criteria is expanded to include the outage of two generating units and a single transmission element, the following transmission facilities (100 kV and above) exceeded their emergency ratings:

BREC	Reid – Daviess County 161 kV	104%
BREC	Coleman EHV – Hancock Co. 161 kV	97%
BREC	Coleman EHV – Coleman 161 kV 1 & 2	108%

With the expanded criteria, voltages as low as 91.6% are expected.

<u>2. Contingency Observations (with loss of both smelters)</u>

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Newtonville (HE) – Coleman EHV 161 kV	106%
BREC	Reid – Daviess County 161 kV	97%
LGEE	Daviess Co. EHV – Hardin County 161 kV	131%

3. Contingency Observations (loss of both smelters, N. Hard/Paradise to Wilson)

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Reid – Daviess County 161 kV	97%
BREC	Coleman EHV – Coleman 161 kV 1 & 2	97%
BREC	Wilson – Reid EHV 345 kV	108%
LGEE	Daviess Co. EHV – Hardin County 161 kV	118%

Case D – 2015 Summer Model with only the AB Brown to Reid Interconnection

Case D models include the Big Rivers planned system upgrades and the proposed 345 kV Vectren interconnections from AB Brown to Reid EHV. However, the Culley to Smith (OMU) 345 kV interconnection proposed by Vectren (and the 345 kV Culley to Coleman interconnection) was removed from the model. The study results are provided in Appendix B and discussed in this section.

The single contingency overload (102%) of the Reid to Daviess County 161 kV circuit found with Case A studies increased to 107% with the Vectren addition. In addition, the Reid EHV to Wilson 345 kV circuit was overloaded at 105% and the Coleman EHV to Hancock County 161 kV circuit was loaded at 95%. Similar to Case A, system voltages in the Coleman-Hancock County-Daviess County area are near the 92% criteria limit.

Studies completed with the loss of both smelter loads (with all excess generation exported off-system) indicate facility overloads or heavy system loadings should be expected with the Vectren addition. Overloads and/or heavy loadings are expected on the Reid to Daviess County 161 kV circuit (107% with Vectren compared to 129% without), the Wilson to Green River (KU) 161 kV interconnection (99% with Vectren and 106% without), the Coleman to Newtonville (Hoosier Energy) 161 kV interconnection (122% with the Vectren addition and 132% without) and the Daviess County EHV to Hardin County (KU) 345 kV interconnection (129% with Vectren and 126% without).

With the 345 kV AB Brown to Reid EHV circuit in-place, the following facilities are required to export all excess power during peak loads and the loss of both aluminum smelters follows:

- Upgrade the 22 mile Reid to Daviess County 161 kV circuit to allow for 1200 Amp operation.
- Upgrade the 6.4 mile Coleman to Newtonville 161 kV interconnection to allow for 1200 Amp operation.
- Modify the existing New Hardinsburg to Paradise 161 kV interconnection by constructing a 13 mile circuit from Wilson to the existing interconnection. This will create a New Hardinsburg/Wilson/Paradise three-terminal circuit.
- Upgrade the 8 mile 161 kV transmission circuit from the new three-terminal tap point to Paradise to allow for 2000 Amp operation.

- Upgrade the Paradise terminal (TVA) to allow for 2000 Amp operation.
- Upgrade both Coleman EHV to Coleman 161 kV circuits (the total combined circuit length is 2.8 miles) to allow for 1200 Amp operation.
- Upgrade the KU 345 kV circuit from Daviess County EHV to Hardin County to allow for 1200 Amp operation.
- Upgrade the KU 345 kV circuit from Daviess County EHV to Hardin County to allow for 1600 Amp operation.

Additional study details follow:

1. Normal System Observations (base model)

No facility overloads or low voltages were identified.

2. Normal System Observations (with loss of both smelters)

LGEE	Daviess Co. EHV – Hardin County 161 kV	118%

3. Normal System Observations (loss of both smelters, N. Hard/Paradise to Wilson)

LGEE	Daviess Co. EHV – Hardin County 161 kV	111%

1. Contingency Observations (base model)

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Reid EHV – Wilson 345 kV	105%
BREC	Reid – Daviess County 161 kV	107%
BREC	Coleman EHV – Hancock Co. 161 kV	95%
LGEE	Daviess Co. EHV – Hardin County 161 kV	95%

Single contingency voltages at the accepted low voltage limit are expected on the 161 kV system at the Newman substation (91.9%).

2. Contingency Observations (with loss of both smelters)

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Reid – Daviess County 161 kV	107%
BREC	Wilson – Green River (LGEE) 161 kV	99%
BREC	Coleman – Newtonville (HE) 161 kV	122%
BREC	Coleman EHV – Coleman 161 kV	98%
KU	Hardin-Daviess County EHV 345 kV	129%

3. Contingency Observations (loss of both smelters, N. Hard/Paradise to Wilson)

The following transmission facilities (100 kV and above) either exceeded their emergency ratings or experienced heavy loadings near their ratings.

BREC	Coleman – Newtonville (HE) 161 kV	108%
BREC	Reid – Daviess County 161 kV	108%
BREC	Coleman EHV – Coleman 161 kV 1 & 2	107%
BREC	Wilson – Reid EHV 345 kV	105%
LGEE	Daviess Co. EHV – Hardin County 161 kV	111%

POWER FLOW ANALYSIS – SENSITIVITY

In order to more fully evaluate the proposed system enhancements, the following sensitivity studies were completed. A complete N-1 analysis was completed with each model (Case E, F, G, and H). In addition, scenarios 1, 4, and 5b were analyzed with each case. Again, a complete N-1 analysis was performed.

Case E: 3000 MW north to south transfer and no system improvements.
Case F: 3000 MW north to south transfer with the AB Brown to Reid EHV 345 kV interconnection.
Case G: Off-peak model with no system improvements.
Case H: Off-peak model with the AB Brown to Reid EHV 345 kV interconnection.

Scenario 1: Base model (with smelters).
Scenario 4: No smelter.
Scenario 5b: No smelter with a Wilson to Paradise 161 kV interconnection (3-terminal from the existing New Hardinsburg to Paradise 161 kV interconnection).

Results

As expected, facility loadings during off-peak load levels (with all excess generation exported) can be higher than the loadings experienced during peak load conditions. The same is true for system conditions that include heavier north to south transfers (the study results are included as Appendix E).

These scenarios, as described above, were studied with the addition of a Wilson to Paradise 161 kV interconnection (3-terminal with the existing New Hardinsburg to Paradise interconnection connected to Wilson). The study results showed no additional improvements are necessary above those identified with the peak load studies.

IMPORT/EXPORT ANALYSES

The intent of these analyses was to determine the impact various system improvement options are expected to have on the overall ability to import and export power to and from the Big Rivers balancing area. The loadings on internal Big Rivers facilities and nearby external facilities were considered. These analyses are not coordinated ATC studies. The results do not guarantee or imply that firm transmission that will be available to the market.

Export capability studies were completed with and without the loss of the aluminum smelter load. Without the load loss, over-generating was necessary to reach facility limitations. Consequently, the study results may not accurately represent actual conditions. Since the Reid to Daviess County 161 kV circuit is already planned to be upgraded, limits found on this circuit were not considered. In addition, the Wilson to Reid EHV 345 kV circuit is limited by a CT ratio. Since this upgrade could be easily accomplished, this limit was also not considered.

Export: Existing System (no Vectren Interconnections)

With the existing system, the 2015 summer peak export capability was found to be 574 MW as limited by the Wilson to Green River 161 kV circuit. With the addition of the proposed Wilson to Paradise interconnection (modification of the existing New Hardinsburg to Paradise 161 kV circuit), the export capability increased to 1121 MW as limited by the Coleman to Newtonville 161 kV interconnection.

With loss of both smelters, the 2015 summer peak export capability was found to be 912 MW as limited by the Coleman to Newtonville 161 kV interconnection. With the addition of the proposed Wilson to Paradise interconnection (modification of the existing New Hardinsburg to Paradise 161 kV circuit), the export capability increased to 1098 MW as limited by the Coleman to Newtonville 161 kV interconnection. With an upgrade of the Coleman to Newtonville circuit, the next limit was found to be the Reid to Hopkins County 161 kV circuit at 1380 MW.

The Wilson to Paradise interconnection (modification of the existing New Hardinsburg to Paradise 161 kV circuit) was found to significantly increase the Big Rivers export capability. With the loss of smelters and an upgrade of the Coleman to Newtonville interconnection, the export capability (not considering external flow gates or other external facilities) was increased by 468 MW.

Export: With the Addition of the Brown to Reid EHV 345 kV Interconnection

With 2015 summer peak conditions, the export capability was found to be 632 MW as limited by Wilson to Green River 161 kV circuit. With the addition of the proposed Wilson to Paradise interconnection (modification of the existing New Hardinsburg to Paradise 161 kV circuit), the export capability increased to 972 MW as limited by the Reid to Hopkins County 161 kV circuit.

With loss of both smelters, the 2015 summer peak export capability was found to be 1040 MW as limited by the Coleman to Newtonville 161 kV interconnection. With the addition of the proposed Wilson to Paradise interconnection (modification of the existing New Hardinsburg to Paradise 161 kV circuit), the export capability increased to 1212 MW as limited by the Coleman to Newtonville 161 kV interconnection.

The interconnection addition is expected to increase flows into the Big Rivers system. However, when studied with 2015 summer peak load conditions, the interconnection did offer a modest increase in export capability (58 MW during normal peak conditions and 128 MW with the loss of both aluminum smelters).

Export: With the Addition of the Brown to Reid EHV 345 kV and Culley to Coleman 345 kV Interconnection

With 2015 summer peak conditions, the export capability was found to be 742 MW as limited by Wilson to Green River 161 kV circuit. With the addition of the proposed Wilson to Paradise interconnection (modification of the existing New Hardinsburg to Paradise 161 kV circuit), the export capability increased to 1294 MW as limited by the Reid to Hopkins County 161 kV circuit.

With loss of both smelters, the 2015 summer peak export capability was found to be 1259 MW as limited by the Wilson to Green River 161 kV interconnection. With the addition of the proposed Wilson to Paradise interconnection (modification of the existing New Hardinsburg to Paradise 161 kV circuit), the export capability increased to 1583 MW as limited by the Coleman to Newtonville 161 kV interconnection. With an upgrade of the Coleman to Newtonville circuit, the next limit was found to be the Reid to Hopkins County 161 kV circuit at 2048 MW.

The addition of both Vectren interconnections resulted in an export capability increase of 168 MW during normal peak load conditions and 347 MW with the loss of both smelter loads (as compared to export values with the addition of neither Vectren interconnection).

Import Study Results

2015 summer peak import studies were completed with the smelters load being served. The import was modeled as a transfer from the north (Duke). With the existing system, an import limit of 621 MW was found (limited by the Coleman to Newtonville 161 kV interconnection). With the addition of a Wilson to Paradise interconnection, an import limit of 626 MW was found (limited by the Coleman to Newtonville 161 kV interconnection). With an upgrade of the Coleman to Newtonville 161 kV circuit, the import limit increases to approximately 950 MW.

With the addition of the proposed AB Brown to Reid EHV 345 kV interconnection, the import capability increased to 895 MW. Again, the impact of the Wilson to Paradise interconnection was not significant (896 MW import capability). The limiting facility was found to be the Coleman to Newtonville 161 kV interconnection. An upgrade of the Coleman to Newtonville 161 kV circuit was found to increase the import limit to approximately 1200 MW. The overall import capability is expected to increase with the addition of the AB Brown to Reid EHV 345 kV interconnection.

With the addition of both of the proposed Vectren interconnections (AB Brown to Reid EHV 345 kV and Culley to Smith 345 kV) the import capability increased to 942 MW. Again, the impact of the Wilson to Paradise interconnection was not significant (941 MW import capability). The limiting facility was found to be the Coleman to Newtonville 161 kV interconnection. An upgrade of the Coleman to Newtonville 161 kV circuit is expected to increase the import limit. The overall import capability is expected to increase with the addition of these Vectren interconnections.

With the addition of both of the modified Vectren interconnection plan (AB Brown to Reid EHV 345 kV and Culley to Coleman EHV 345 kV) the import capability increased to 2000+MW (assuming the Coleman EHV to Coleman 161 kV circuits are upgraded). Again, the impact of the Wilson to Paradise interconnection was not significant (2000+ MW import capability).

LOSS COMPARISON

A comparison of system losses is provided below. The largest loss reduction is in the Vectren system. The LGEE system includes the only significant loss increase. The overall change in system losses does not appear significant.

MW LOSSES (NO NEW PARADISE INTERCONNECTION)				
System	**Case A Losses**	**Case B Losses**	**Case C Losses**	**Case D Losses**
BREC (214)	22	23	22	23
LGEE (211)	258	267	266	264
TVA (147)	797	799	799	799
VECTREN (210)	43	35	35	35
Total	**1120**	**1124**	**1122**	**1121**

MW LOSSES (WITH NEW PARADISE INTERCONNECTION)				
System	**Case A Losses**	**Case B Losses**	**Case C Losses**	**Case D Losses**
BREC (214)	22	23	23	24
LGEE (211)	257	266	265	263
TVA (147)	797	800	800	800
VECTREN (210)	43	35	35	35
Total	**1119**	**1124**	**1123**	**1122**

SHORT-CIRCUIT STUDY RESULTS

A short circuit analysis was completed. The intent of the analysis was to determine if the replacement of any circuit breakers would be required as a result of the proposed construction (line reconductors and the creation of a Wilson to Paradise interconnection). The study results are shown in Appendix D. Based on these results, no breaker replacement projects are proposed.

TRANSIENT STABILITY STUDY

Transient stability is a study conducted to investigate the dynamic response of generators due to a fault or some other type of system disturbance near a generator. Stability analyses were not completed as part of this study effort. However, a previously prepared stability study was reviewed.

The previously prepared stability study included a generation addition near the Wilson station and a new 161 kV Wilson to Paradise interconnection (in addition to the planned Daviess County EHV 345 kV switching station). Based on these study results, acceptable dynamic performance is expected with the addition of a Wilson to Paradise interconnection (either a new direct interconnection or through a modification of the existing New Hardinsburg to Paradise 161 kV interconnection).

RECOMMENDATION

The proposed facility upgrades described in the Summary of Results and Conclusions section of this report were found to be the most cost effective system improvements available to meet the system export needs. No other improvements were found to provide the robustness of the proposed facilities while limiting the need for new right-of-ways. The Vectren improvements were found to benefit the Big Rivers system and the regional transmission network. However, these improvements did not eliminate the need for the proposed Wilson to New Hardinsburg/Paradise Tap 161 kV circuit. Consequently, the Vectren interconnection alternatives were not selected due to the limited improvement provided to the Big Rivers export capability.

Three connection alternatives were considered for the 161 kV Wilson circuit. One alternative included a 21 mile new terrain Wilson to Paradise 161 kV interconnection. This alternative requires new 161 kV terminals at both Wilson and Paradise. Due to the additional miles of new-terrain right-of-way required (as compared to the selected alternative) and higher cost, this connection alternative was not selected. A second alternative included two 13 mile new terrain circuits on a common right-of-way to loop the Hardinsburg to Paradise 161 kV circuit through the Wilson switchyard. This alternative requires two new 161 kV terminals at Wilson. Due to the additional right-of-way and cost, this connection alternative was not selected. The selected alternative includes approximately 13 miles of new-terrain 161 kV construction from Wilson to a tap point in the existing Hardinsburg to Paradise 161 kV circuit. In addition, by creating a three-terminal circuit with an existing interconnection, only one new terminal (Wilson) is required. When cost, effectiveness, and necessary new right-of-way were considered, the proposed alternative was found to be the superior alternative.

APPENDIX A: BIG RIVERS PLANNING CRITERIA

Big Rivers
Electric Corporation

Procedure Documentation

TRANSMISSION PLANNING CRITERIA AND GUIDELINES

PL-FAC-0001

Document Information		
Current Revision	Review Cycle	Subject to External Audit
Rev. 1.0	As needed (copy to RC)	Yes

Big Rivers Corporate Approvals		
Prepared By	Chris Bradley/Bob Warren	5/18/2007
Approval - Supervisor	N/A	
Approval - Dept. Manager	N/A	
Approval - Vice President		

Revision Information				
Number	**Date**	**Notes**	**Revised by**	**Approved**
Rev. 1.0	3/15/2007	New Document - Replaces original document.	Chris Bradley	Yes
Rev. 1.1	5/18/2007	Dynamic stability procedures were expanded.	Chris Bradley	Yes

TABLE OF CONTENTS

I. GENERAL SYSTEM PLANNING REQUIREMENTS

The Big Rivers transmission system consists of the physical equipment necessary to transmit power from its generating plants and interconnection points to all substations from which customers of its three member distribution cooperatives are served. Transmission planning embodies making investment decisions required to maintain this system so that it can reliably meet the power needs of the customers served. Transmission planning also includes the evaluation of transmission service requests, internal and external generator interconnection requests, internal and external transmission interconnection requests, and end-user connection requests. Justifications used in any transmission study are based on technical and economic evaluations of options that may be implemented to meet the specific need. The planning criteria described in this document are consistently utilized for all transmission studies.

The technical studies performed by the system planning section require the use of several software packages. The software package PSLF (Positive Sequence Load Flow) is a comprehensive set of transmission system planning programs supported by the General Electric Company. PSSE is a similar program supported by Siemens. Both software programs are used to complete AC and DC power flow studies, to create power flow equivalents, to prepare stability studies, and to complete other studies.

A software package for short-circuit calculations and relay coordination is also used. This package is known as CAPE (The Computer-Aided Power Engineering System) and is supported by Electrocon International Inc.

The above-described software programs are used in the preparation of seasonal assessments (for internal use and to meet NERC and/or SERC requirements) as well as short-term and long-term construction plans (as defined and required by RUS). Power flow studies for specific operating conditions are also performed to support system operations. Special power flow studies, generator, transmission, and end-user interconnection studies, and transfer capability studies are performed as needed.

II. POWER FLOW STUDIES

The most widely used software program for transmission system planning is the power flow program. In order to get consistent and meaningful results from power flow studies, specific criteria and procedures have been established and are followed. Succeeding sections of the document describe the contingency criteria, voltage criteria, line and transformer loading criteria, and modeling procedures established and consistently applied by Big Rivers for all transmission system planning study efforts.

1. Contingency Criteria

Big Rivers follows two RUS recommended criteria for analyzing the adequacy of its transmission system. The first criteria defines single contingency outages to be used in all system planning studies. This criteria serves as the basis for planning and justifying system improvements. The second criteria outlines double contingency outages that can be analyzed to determine the extent of problems encountered on the system under extreme outage or emergency situations. In most double contingency cases, system improvements would not be considered justifiable. However, the type and severity of the system problems encountered is useful information in planning those system improvements that are justifiable.

Single Contingency Criteria:

1. Outage of two generation units (any combination).
2. Outage of one generation unit and one transmission line.
3. Outage of one generating unit and one transformer.
4. Outage of one transmission line.

Double Contingency Criteria:

1. Outage of two transmission lines on the same right-of-way.
2. Outage of transmission lines due to outage of one bus.
3. Outage of three generation units.

In addition to the above-described criteria, Big Rivers also analyzes its transmission system to ensure compliance with NERC Planning Standards. The following describes the outages studied to ensure compliance with the NERC TPL standards:

NERC Category A (no contingencies)

As with all studies, base case conditions (no outages) are evaluated to ensure compliance with all planning criteria and standards. Base case models used for all studies should include appropriate loads that are consistent with the corporate load forecast, firm transactions, realistic generator dispatch based on historic data, and should include existing and planned facilities.

NERC Category B

1. Individual outage of all single elements in Big Rivers (including 3-terminal circuits), Hoosier Energy (HE), KU and LG&E (LGEE), Southern Illinois Power Cooperative (SIPC), TVA, and Vectren.

2. Single generating unit outages.

Seasonal assessments and other bulk system assessments performed by Big Rivers include the outage of each single element above 100 KV in the systems listed above with the bulk facilities in each of the above listed systems monitored.

NERC Category C (including NERC Category B with Generating Unit outage)

1. Single transmission element outage with simultaneous generating unit outage (including each of the following: Wilson, Green, Coleman, and Paradise).

2. Double transmission element outages including two circuits on a common tower (global Big Rivers outages and select external).

3. Substation bus or bus section outage.

Seasonal assessments include every combination of double contingencies in the Big Rivers system (above 100 KV). In addition, each Big Rivers single contingency is performed with the simultaneous outage of select individual generating units (listed above). Select bus section outages in Big Rivers are studied. While performing these outages, all bulk facilities (Big Rivers, HE, LGEE, SIPC, TVA, and Vectren) are monitored. However, the external facilities are monitored only for the potential to cascade (130% overload). Other transmission assessment studies may include only a subset of the above described outages.

NERC Category D

1. Coleman generating plant outaged.

2. Wilson generating plant outaged.

3. Green generating plant outaged.

4. Century Aluminum load outaged.

5. Alcan load outaged.

6. Outage of Reid 161 kV switchyard.

7. Outage of Coleman 161 kV switchyard.

8. Outage of all Green and HMP&L generating units.

Seasonal assessments include the above described Category D outages. While performing these outages, all bulk facilities (Big Rivers, HE, LGEE, SIPC, TVA, and Vectren) are monitored. However, the external facilities are monitored only for the potential to cascade (130% overload). Other transmission assessment studies may include only a subset of the above described outages.

When completing all bulk transmission studies, all internal facilities are monitored for voltage and loading violations. Either select external facilities or the complete list of external system previously described are also monitored. When completing seasonal assessments, the neighboring systems may only be monitored for the potential to cascade. When completing expansion studies or connection studies, any neighboring system violation will be compared against the base model to determine the impact of the proposed projects. Any violation made worse by the proposed system improvement will be investigated with the facility owner.

2. Voltage Criteria

As indicated in the following table, Big Rivers has adopted a voltage criteria for planning and assessing its transmission system. This criteria defines acceptable minimum and maximum voltage levels for the high-side buses. The criteria include a range of acceptable voltages for normal system conditions (all facilities in service) and during single contingency conditions. A more detailed description of the voltage criteria is included as Appendix A.

Transmission System Conditions	69 kV Bus Voltage		> 69 kV Bus Voltage	
	Minimum	**Maximum**	**Minimum**	**Maximum**
Range A: Normal System Operations	95.0%	105.0%	95.0%	105.0%
Range B: Single Contingency Conditions	91.7%	105.8%	92.0%	105.0%

3. Facility Rating Criteria

Big Rivers' transmission lines are rated according to limits determined by the most restrictive of either the conductor thermal ratings, the NESC minimum line to ground clearances, or the terminal equipment ratings. Big Rivers' transformer ratings are established according to their thermal design ratings as specified by the manufacturer. For normal and single contingency situations, all lines are to be loaded at or below their ratings and all transformers are to be loaded at or below their maximum 65°C ratings. Substation equipment ratings are based on manufacturer recommendations. Big Rivers does not derate high voltage air switches, line traps, or power circuit breakers based on weather conditions or previous loading conditions. Shunt capacitors are designed for a minimum of 1.05 p.u. voltage. Jumpers connecting these substation components to other elements of the transmission system are sized with current carrying capacity greater than the component itself. Additional rating details can be found later in this report.

4. Modeling Procedures

In order to perform a power flow study, a model of the electrical system is required. The power flow model requires line and transformer impedances, transformer tap settings, generation levels, load levels (MW and MVAR), scheduled voltages, line and transformer ratings, and interchange schedules for Big Rivers' facilities as well as for other utilities.

To start the model development process, an MMWG power flow case for a desired year is obtained. This model includes information for neighboring utilities within SERC as well as other reliability areas. Neighboring utilities may be contacted directly in order to obtain more detailed system information. After the MMWG case is obtained, the Big Rivers model and any desired neighboring utility representations are removed and more detailed models are merged into the case.

After all detailed representations are merged into the MMWG case, fine-tuning of the case begins. The first step is to make sure Big Rivers' interchange is correct. The modeled interchange should typically reflect firm contract sales for the desired time period. Transactions that are consistent with firm transmission reservations confirmed on the OASIS may also be modeled as part of Big Rivers' scheduled interchange. Close attention is paid to HMP&L's allocation from Station 2 generation and HMP&L's loads (in the MMWG case, the HMP&L take is modeled as Big Rivers load. HMP&L load is modeled in a separate HMP&L area in the detailed case). After the interchange is modeled, the loads in Big Rivers' area are reviewed and revised. The distributed loads will match the forecast numbers found in the latest available Big Rivers load forecast for the desired year. Regression techniques or averages based on historical data are used to distribute the total rural load. The large industrial loads modeled in the power flow case will match the values given in the Big Rivers load forecast. Each distribution cooperative is consulted during this load distribution process. Additional details regarding this process are included in Appendix B. In most cases, the generation at Reid 1 and at the Reid CT is modeled off-line. All transmission or generation construction scheduled to be completed before the time period to be studied is added into the model. A final check of line and transformer impedances and ratings is performed prior to starting the desired power flow studies.

III. SHORT CIRCUIT STUDIES

System planning utilizes short circuit study results to evaluate the adequacy of the short time current or interrupting ratings of existing equipment, to determine the ratings of new equipment to be purchased, and to provide short circuit source data to its member cooperatives, their industrial customers, or for Big Rivers' own protection coordination studies. System planning currently performs these short circuit studies. Short circuit studies are performed using the CAPE software package.

In order to perform these short circuit studies, a database model including the positive and zero sequence impedances of each line, transformer, and generator is prepared for Big

Rivers' system. Equivalent system impedances for each of Big Rivers' interconnections are also determined and modeled. Short circuit studies are then run to determine the magnitude of single phase to ground and three phase faults at each station or bus in Big Rivers' system. These fault levels are compared to the existing power circuit breaker ratings to determine if any equipment ratings are exceeded. If equipment ratings are exceeded, then upgrades in equipment are recommended.

IV. STABILITY STUDIES

Another concern of the system planning section is system stability. Stability refers to the ability of a generator to remain in synchronism with all other generators after a disturbance or fault. On an annual basis, seasonal assessments performed by Big Rivers will be reviewed to determine significant NERC Category B, C, and D outages that warrant near-term dynamic simulations. In general, any Category B, C, or D outage that has the potential to result in significant facility overloads, widespread low voltages, or cascading outages without operator action will be considered for inclusion in a dynamic analysis. Particular attention should be given to facilities or geographic areas that appear particularly vulnerable to frequent overloading or low voltage conditions (during various independent single or multiple contingencies). If no new significant facilities, outages, or areas of concerns are identified, previously prepared dynamic simulations may be sufficient. However, dynamic simulations should be performed if any of the following conditions or situations occur:

- Significant system changes have occurred since the last dynamic simulations were completed. This includes internal and nearby external changes (EHV additions, generator additions or retirements, interconnection additions, load loss or addition, etc.).
- Additional significant facilities or outages are identified through the seasonal assessment study process.
- The most recent dynamic simulations are found to be over 5 years old.

The criteria followed during stability studies follows:

- With one transmission element out-of-service, all generating units must remain stable with a subsequent single phase-to-ground fault.
- Under normal system peak load conditions with full generation output, all generating units must remain stable with a three phase-to ground fault at the most critical location.
- Under normal system peak load conditions with full generation output, all generating units must remain stable with a single phase-to-ground fault at the most critical location followed by a breaker failure.

- All circuit breakers should be capable of interrupting the maximum fault current duty imposed on the circuit breaker.

- All NERC standards and SERC Supplement requirements must be met.

V. CONSTRUCTION WORK PLANS

RUS requires that borrowers maintain an up-to-date short-range construction work plan (CWP). The CWP consists of a series of system studies, which covers a period of 2 to 3 years in the future and identifies required transmission facility improvements. The CWP is consistent with the long-range engineering plan. The CWP studies use the system load estimates found in the borrower's approved load forecast. A CWP, according to RUS, shall normally include studies of power flows, voltage regulation, and stability characteristics to demonstrate system performance and needs. These requirements, as well as additional requirements, are described in the Federal Register in 7 CFR Part 1710.

A CWP, as prepared by Big Rivers, covers a three year period beyond the year in which the study is being performed. For example, a CWP prepared in the summer of 1995 would cover the time frame from 1996 to 1998. New CWPs are typically prepared during the last year covered by an existing CWP.

Power flow studies make up the majority of a CWP as prepared by Big Rivers. A power flow database is prepared as previously described. Load levels that are consistent with the most current load forecast are modeled. Typically, the interchange is modeled according to firm contract sales and purchases. However, transactions that are consistent with firm transmission reservations that are confirmed on the OASIS may also be modeled as part of Big Rivers' scheduled interchange. Single contingency outages of each line of Big Rivers' system (excluding radial lines) are studied. Single contingencies, which yield unacceptable system results, are identified. Alternate systems switching arrangements or changes in transformer tap settings are evaluated as the first solution option. If operational changes will not correct the problem, then system improvement alternatives are defined, modeled, and studied to determine their merits in correcting the system problem. The system improvements that prove to be successful solutions for the system problem are then evaluated based on economics, reliability, practicality, possible system benefits, and consistency with long range engineering plans to determine their inclusion in the CWP recommendation. Both external and internal improvement options are considered. When external options are considered (or internal options that may impact external facilities), coordination with all neighboring systems (including MISO, SPP, and TVA RC) is necessary and will be initiated as soon as possible. Final construction plans should be provided to interested and potentially impacted entities for comment as soon as possible. Power flow studies are typically completed for summer and winter peak conditions. Power flow studies with extreme conditions (peak load forecast with extreme weather) are also performed and may be used to evaluate construction alternatives.

Maximum transfer capability studies may be included as a part of the CWP. A maximum transfer capability study typically includes multiple scenarios to evaluate potential transfers. Maximum power transfer studies from Big Rivers to TVA and MISO would be evaluated. The intent of these studies is to identify any system problems that may occur because of off-system sales or purchases.

Short circuit studies to evaluate the adequacy of system equipment ratings are also performed and their results analyzed. Stability studies accompany any study in which additional generation is being recommended or evaluated.

VI. LONG-RANGE ENGINEERING PLANS

RUS also requires that borrowers maintain up-to-date long-range engineering plans. These long-range engineering plans are prepared in a manner similar to the process of preparing a CWP. A long-range engineering plan is prepared immediately following each CWP. This allows the CWP to be reviewed in light of long-range plans. Reviewing and revising a long-range engineering plan is acceptable in place of preparing an entirely new study if system changes and load forecast changes have been minimal. Engineering judgment is used to decide if simply reviewing and revising the study is appropriate.

As with a CWP, the long-range engineering plan is predominantly driven by the results of system power flow studies. The power flow studies are again prepared with an MMWG database. This database represents all systems ten years in the future. A detailed representation of Big Rivers, and any desired neighbor, is merged into the MMWG database. The load level modeled for Big Rivers are consistent with the approved load forecast for the desired year. The power flow cases are modeled with summer peak and off-peak loads. The modeled interchange reflects what Big Rivers management believes is most probable for the study period. This interchange level may be equivalent to firm contract sales and purchases or may include transactions that are consistent with firm transmission reservations that are confirmed on the OASIS. Single contingency outages of each Big Rivers' line (excluding radial lines) are studied. These single contingency studies identify cases that yield unacceptable voltages or line loading conditions. Studies are then run to evaluate possible solutions for the problems identified. Operational changes such as switching or transformer tap changes are the first solution options studied. If operational changes proved to be unsuccessful, then various system improvement options are studied. All system improvements that are found to be successful solutions for the system problems are then evaluated based on economics, reliability, practicality, and other system benefits to determine the best solution. Additional system studies are run to evaluate the cumulative effects of multiple system improvements. The result is a transmission system that will allow Big Rivers to provide reliable and cost-effective electric service to its member cooperatives.

In addition to the ten-year study, a fifteen or twenty year study is performed. A procedure, similar to the ten-year study procedure, would be followed with a fifteen or twenty year power flow database. Any final conclusion is made using the results from both the ten-year study and the fifteen or twenty year study.

Maximum power transfer capability studies are also be prepared as part of a long-range engineering plan. These studies will help to identify any problems that may occur in the long run as a result of off-system transactions. Possible solutions to correct the deficiencies are identified and evaluated following normal power flow study procedures.

Short circuit studies are also performed as previously described. These studies help identify long-term problems associated with increasing fault duties. Stability studies accompany any study in which additional generation is being recommended or evaluated.

It should be noted that not every system addition or upgrade identified or proposed in the long-range engineering is implemented. As Big Rivers' system actually grows, it may become obvious that the problems identified in the long-range study may not develop or that problems may develop in other areas. The actual system development is continually reviewed and monitored to determine when a new long-range engineering plan is necessary. The long-range plan, when reviewed with the CWP, helps to identify any proposed short run solutions that may just be "band-aid" solutions for a major long-range problem. In some of these cases, investing in a facility that may only be a temporary solution may not be advisable. Instead, other alternatives may be more economical when the long-term system needs are considered.

VII. SHORT-TERM/OPERATIONAL PLANNING

Technical studies are performed by the system planning department to support near-term and real-time reliability efforts. These studies utilize both the OSI OpenNet application that provides a real-time state estimator and contingency analysis tool (EMS application) and the off-line power flow study tool (PSLF).

1. Planned System Outages

Both the on-line and off-line power flow programs are used to study planned outages and system events as necessary. The TVA RC studies all outages entered into the NERC SDX and coordinates this information with other reliability coordinators. Any action plans involving Henderson Municipal Power and Light (HMP&L), our member cooperatives, or any impacted customer are coordinated through Big Rivers System Supervisors with Engineering support provided as needed. Action plans involving adjacent reliability coordinators are coordinated through TVA.

2. Real-Time Contingency Analysis

The real-time contingency analysis tool is used on a continuous basis (once every two minutes) to study all bulk system single contingencies (single line, transformer, and generator outages). Also, all single line/transformer contingencies are run with simultaneous generator outages on a regular basis (generally on a daily basis). Several external outages that have a known impact on the Big Rivers' system are also run on a daily basis. In Addition, the TVA RC uses the AREVA state estimator/contingency analysis program to monitor and study the Big Rivers system as well as the regional transmission network.

3. Real-Time Contingency Analysis Alarming

As previously discussed, the real-time contingency analysis tool is part of the EMS and the results can be viewed by the System Supervisors. The thermal and voltage results can be viewed on two separate displays. Any line or transformer with normal or N-1 loadings at 90% or greater of its seasonal thermal rating are alarmed and displayed. Normal and N-1 system voltages outside of the range from 95% to 105% of nominal are also alarmed and displayed.

4. Off-Line Model

MMWG power flow models for the desired years are used as the basis for developing the power flow model for use in reliability and planning studies. Detailed models for Big Rivers and any desired neighboring utility are merged into the case. This model is then updated to reflect the system conditions that are to be studied. Actual system data from the EMS is used in the update process.

5. Real-Time Model

The real-time model was also created from a MMWG power flow model with the detailed Big Rivers model merged in. The model is updated manually with support from the engineering department and neighboring utilities as needed. Real-time data is brought into the model every time the state estimator executes (once per minute) through the Big Rivers SCADA system and the ICCP connection with the TVA.

VIII. MISCELLANEOUS PLANNING STUDIES

Other studies performed by Big Rivers include operational studies, system impact studies to evaluate transmission service requests, generator interconnection studies, transmission interconnection studies, end-user connection studies, and various other special studies. The study process and format will vary according to need. However, all studies should follow the same voltage and facility loading criteria and should be consistent with the procedures and methodologies outlined in this report (the alternative selection process is consistent with the process described in Section V). As with all studies, compliance with NERC standards is necessary.

In addition, transmission studies should be properly coordinated with neighboring transmission systems and reliability organizations. Specifically, all potentially impacted neighbors (E.ON. U.S., Hoosier Energy, MISO, SIPC, SPP, TVA, and Vectren) should be invited to participate in all generator interconnection studies and significant transmission interconnection or modification studies. Modeling information, study results, and proposed transmission plans should be communicated to these entities and any other interested transmission planning entity or transmission owner/provider. After all internal and external approvals (including regulatory approvals) are obtained, the proposed facilities will be included in the MMWG model building process and communicated to the TVA Reliability Coordinator. A log of communication (email history is acceptable) should be maintained as part of the study process.

On an annual basis, studies are prepared to evaluate all annual firm transmission requests (new or renewals). Other studies are performed to support the calculation of the ATC values that are posted to the OASIS. Details concerning these studies are included in a separate document.

Seasonal system assessments are also prepared on an annual basis. These seasonal assessments include (at a minimum) summer peak studies, winter peak studies, stress cases (heavy transfers or extreme loads), and long-range studies. Single, double, and extreme contingencies should be studied with the results compared against NERC planning standard requirements. Stability studies should also be reviewed as necessary.

Big Rivers also participates in SERC near-term and long-term assessments. In addition, Big Rivers participates in the quarterly OASIS studies prepared by SERC companies.

IX. RATING METHODOLOGIES

All transmission facility ratings are based on the most limiting element included in any circuit (switches, breakers, buses, traps, protective relaying systems and their trip settings, transformers, CTs, transmission lines, etc.). Unless otherwise stated, summer and winter ratings are based on the same methodology.

All transmission system ratings have been provided to the TVA reliability coordinator. Any rating changes are communicated to the TVA reliability coordinator and interested neighboring systems as the changes occur. In addition, up-to-date ratings are included in the MMWG models available to most interested parties. Additional rating details will be made available to neighboring utilities and other interested parties as needed. Interconnection ratings are coordinated once per year as part of the MMWG model building process. Additional coordination is completed via email as necessary.

Conductors

The calculations of transmission line ratings are consistent with IEEE Standard 738-1993 "IEEE Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors". The following assumptions are utilized in the calculations:

1. Minimum ground clearances (as defined by NESC) will be maintained during operations at the conductor's maximum operating temperature (typically 212° F).

2. Summer Normal and Summer Emergency ratings are calculated with 2 foot per second wind speed, full sun, and an ambient temperature of 100° F.

3. Winter Normal and Winter Emergency ratings are calculated with 2 foot per second wind speed, full sun, and an ambient temperature of 32° F.

4. In addition to the above ratings, temperature dependent ratings are used by system operations (actual temperatures are used in place of the assumed temperature when calculating the ratings).

Generators

Manufactures nameplate information (including reactive capability curves) is used to determine unit ratings when actual test data is unavailable. At this time, each generating unit is schedule to be field tested. The test will determine actual real and reactive capabilities and other data necessary to properly model the generating units for steady-state and dynamic analyses.

High Voltage Air Switches

Big Rivers purchases, operates and maintains transmission voltage (100 kV and above) High Voltage Air Switches in accordance with ANSI C37.32 *HV Air Switches – Preferred Ratings, Specifications and Application Guide.* Table 1 of C37.32 lists *Preferred Ratings for Outdoor Air Switches.* Big Rivers does not derate High Voltage Air Switches based on weather conditions or previous loading conditions. Jumpers connecting switches to other elements of the transmission facility are sized with current carrying capacity greater than the switch itself.

Shunt Capacitors

Big Rivers purchases, operates and maintains transmission voltage (100 kV and above) Shunt Capacitors in accordance with NEMA CP1 - Shunt Capacitors, and ANSI/IEEE C37.99 – Guide for Protection of Shunt Capacitor Banks, and IEEE 1036 Guide for the Application of

Shunt Power Capacitors. These capacitor banks are composed of capacitor can groups in series and connected in a grounded wye configuration. Since substation bus voltages run higher than 1.0 p.u., banks are designed for a minimum of 1.05 p.u. Jumpers connecting capacitor banks to other elements of the transmission system are sized with current carrying capacity greater than the capacitor bank itself.

Line Traps

Big Rivers purchases, operates and maintains transmission voltage (100 kV and above) Line Traps in accordance with ANSI C93.3 – *Requirements for Power-Line Carrier Line Traps*. Table 5 of C93.3 lists *Current Ratings*. Big Rivers does not derate Line Traps based on weather conditions or previous loading conditions. Jumpers connecting Line Traps to other elements of the transmission facility are sized with current carrying capacity greater than the Line Trap itself.

Transformers

Big Rivers purchases, operates and maintains transmission voltage (100 kV and above) Transformers in accordance with ANSI / IEEE C57.12.00 – 1987 *General Requirements for Liquid Immersed Power Transformers* and ANSI / IEEE C57.92 – 1981 *Loading Mineral Oil Immersed Power Transformers*. Big Rivers plans and operates power transformers on its system whose voltage ratings fall within the bulk transmission level (100 kV and above high side). Big Rivers has established that the normal and emergency rating for power transformers shall be the highest nameplate rating with all cooling equipment operating. For most of the Big Rivers transformers, this is the maximum FOA or FA (OFAF or ONAF) 65 degree Celsius nameplate rating with all cooling equipment operating. In the absence of any or all stages of cooling equipment, the rating is the maximum nameplate rating associated with that level of cooling. For the six 345/161 kV power transformers the rating is 420 MVA (a significant increase above the nameplate value as determined by the manufacturer, General Electric Company). However, if these units are operated in a step-up mode (direction of flow from 161 kV to 345 kV system), either the high side voltage must be limited to 345 kV (1.0 per unit) or the unit rating reverts back to the 336 MVA nameplate value.

High Voltage Bus

Big Rivers purchases, operates and maintains transmission voltage (100 kV and above) High Voltage Bus in accordance with ANSI / IEEE Standard 605 – 1987 *Guide for Design of Substation Rigid-Bus Structures*. Table B3 of Standard 605 Appendix B lists *Bus Conductor Ampacity - Aluminum Tubular Bus –Schedule 40 AC Ampacity (53% Conductivity)*. Big Rivers utilizes this table assuming a normal oxidized surface with emissivity of 0.50, with sun, in still but unconfined air, with a 30 degree C temperature rise over 40 degrees C ambient.

Power Circuit Breakers

Big Rivers purchases, operates and maintains transmission voltage (100 kV and above) Power Circuit Breakers in accordance with ANSI C37.06 *AC HV Circuit Breakers – Preferred Ratings and Related Required Capabilities*. Table 3 of C37.06 lists *Preferred Ratings for Outdoor Circuit Breakers 121 kV and Above.* Big Rivers does not derate PCBs based on weather conditions or previous loading conditions. PCBs on the Big Rivers transmission system are equipped with Bushing Current Transformers (BCTs). These BCTs are usually Multi-ratio and sometimes tapped at less than the full continuous current rating of the PCB. In these situations the PCB is derated to the Multi-Ratio BCT tap value. The Thermal Rating Factor of the BCT is used where applicable. Jumpers connecting PCBs to other elements of the transmission facility are sized with current carrying capacity greater than the PCB itself.

Protective Relaying

Big Rivers purchases, operates and maintains transmission facilities protective relays in accordance with IEEE C37 Guides and Standards for Protective Relaying Systems. The protective relaying schemes are specified and their settings are calculated such that neither limits the capacity of the transmission facility. For impedance relays of networked transmission facilities, 0.85 p.u. voltage is utilized in the rating calculation.

Current Transformers

Big Rivers purchases, operates, and maintains current transformers in accordance with ANSI/IEEE C57.13 – Standard Requirements for Instrument Transformers. Current transformers are operated up-to a maximum current level equal to the nameplate rating multiplied by any continuous-thermal-current rating factor (RF).

X. LINE SWITCH CRITERIA

The following documents the criteria applied in the planning, design, construction, and operation of line switches on Big Rivers' transmission system. The focus here is on the 69 kV system serving all of the rural and many of the dedicated (customer) delivery point substations of our three member cooperatives. The following functional objectives and standards define the 69 kV transmission line switching practices currently in effect.

For loop or dual feed line sections:

1. Line sectionalizing switches shall be employed at both ends of every line section.

2. Full load interrupting capability shall exist at a minimum on one end of every line section.

3. Load interrupting capability shall exist on the other end line sectionalizing switch of sufficient rating to safely de-energize the line (i.e. break the line charging current).

4. Remote control operational equipment shall be added to full load interrupting switches to solve service reliability problems and typically shall be applied at three-way junction points to provide alternate power supply switching arrangements for a number of distribution stations.

For radial line sections:

1. Line sectionalizing switches shall be applied for tap lines greater than 4.0 miles in length or where continuous service is essential to other stations supplied off the radial line section being tapped.

2. Line sectionalizing switches shall have sufficient load interrupting capability to safely de-energize the line (i.e. minimum capability equal to or greater than line charging current).

XI. CRITICAL FACILITIES

While no critical facilities have been identified, Big Rivers has internal flowgates that can limit the ability to import and export power. The state estimator/on-line power flow model is used to monitoring and study each flowgate as well as all other bulk system facilities. Big Rivers recognizes the IROL and SOL definitions and processes as documented in *Transmission Reliability Order of Curtailment* (attached as Appendix F).

XII. COORDINATION/COMMUNICATION

As stated previously, transmission studies should be properly coordinated with neighboring transmission systems and reliability organizations. Specifically, all potentially impacted neighbors (E.ON. U.S., Hoosier Energy, MISO, SIPC, SPP, TVA, and Vectren) should be invited to participate (or allowed to review and provide input regarding planned improvements) in all generator interconnection studies and significant transmission interconnection or modification studies. Modeling information, study assumptions, alternatives considered, study results, and proposed transmission plans should be communicated to these entities and any other interested transmission planning entity or transmission owner/provider. After all internal and external approvals (including regulatory approvals) are obtained, the proposed facilities will be included in the MMWG model building process and communicated to the TVA Reliability Coordinator. A log of communication (email history is acceptable) should be maintained as part of the study process. All documentation will be maintained for a minimum of five years.

As part of this communication/coordination effort, Big Rivers participates in near-term and long-term SERC study groups. Internal seasonal assessments will be made available to the reliability coordinator and others as requested.

In addition to study coordination and communication, facility ratings and methodologies must be properly coordinated and communicated. As previously stated, all transmission system ratings have been provided to the TVA reliability coordinator. Any rating changes are communicated to the TVA reliability coordinator and interested neighboring systems as the changes occur. In addition, up-to-date ratings are included in the MMWG models available to most interested parties. Additional rating details will be made available to neighboring utilities and other interested parties as needed. Interconnection ratings are coordinated once per year as part of the MMWG model building process. Additional coordination is completed via email as necessary.

As an additional communication and coordination effort, this document and Big Rivers documents relating to TTC/ATC/TRM/CBM will be provided to the reliability coordinator when any update is made (prior to effective date or implementation of any significant change). Upon request, or as appropriate, these documents will also be made available to neighboring utilities and other interested parties. Any comments or concerns received will be addressed in a written response within 45 calendar days of receipt.

XIII. TRANSFER CAPABILITY

Transfer capabilities are calculated, coordinated, and communicated to others through various means. The criteria described in this document are consistently applied in all transfer capability studies (near-term operating horizon and longer-term planning horizon). In all study processes, Big Rivers will respect all system operating limits (internal and external). Any variations from the criteria will be documented in the appropriate study report.

Big Rivers participates in SERC near-term, long-term, and OASIS study groups. These studies include all existing and planned facilities in the Big Rivers system. The Big Rivers loads will be consistent with the Big Rivers corporate load forecast for the study period. Only those transactions with a firm contract will be included in the model (after proper coordination with the other entity). Generation dispatch should reflect past experience. Reliability margins (CBM, TRM, etc.) are not included in these models. Appropriate summer and winter ratings will be modeled. Various import and export scenarios are studied. Currently, Big Rivers imports from TVA and SIPC as well as exports to LGEE, SIPC, and TVA are studied. Additional transfers will be added as necessary. Study results are available to all SERC members and other appropriate entities.

Internal studies also consider transfer capabilities. Internal seasonal assessments generally begin with all generation except Reid 1 and Reid CT dispatched. This net export base model gives an indication of expected system performance with most generation dispatched. Generation outages (single and multiple units) provide an indication of performance under import conditions. Summer assessments generally include a study of north to south transfers. The seasonal assessment study reports are provided internally to system operations and are also made available to the reliability coordinator. Additionally, the report will also be made available to neighboring utilities and other interested parties.

Big Rivers TTC, AFC, and ATC calculations are performed by TVA. These calculations are described in the Big Rivers document PL-MOD-0001 *AFC/ATC Calculation Procedures*. This document and resulting ATC values are available through the Big Rivers OASIS.

APPENDIX A:

Voltage Level Criteria Guideline

APPENDIX A: VOLTAGE LEVEL CRITERIA GUIDELINE

In 1989, Big Rivers adopted a voltage criteria for use as a guideline in planning for the design and operation of its transmission system. This criteria was based on service voltage requirements defined by the Kentucky Public Service Commission (PSC) and the Rural Utilities Service (RUS). This criteria was defined as the acceptable voltage level at the unregulated distribution and/or industrial substation low-voltage buses (served from Big Rivers' 69 kV transmission system). This criteria, summarized below, includes a Range A criteria which is applied during normal system operations (all transmission elements in service) and a Range B criteria that is applied during single contingencies.

Transmission System Conditions	Minimum Bus Voltage	Maximum Bus Voltage
Range A: Normal System Operations	95.0%	105.0%
Range B: Single Contingency Conditions	91.7%	105.8%

A second criteria, which applies to Big Rivers' 161 kV transmission system, has also been adopted. The development of this criteria also involved a review of PSC and RUS voltage requirements. This criteria was based on maintaining acceptable voltage levels on the low-side unregulated bus at all 161 kV delivery points. The Range A and Range B criteria apply to the same system conditions as defined for the 69 kV system. These criteria limits are defined below:

Transmission System Conditions	Minimum Bus Voltage	Maximum Bus Voltage
Range A: Normal System Operations	95.0%	105.0%
Range B: Single Contingency Conditions	90.0%	105.0%

Both criteria, as previously defined, were applied to the low-side unregulated buses. For transmission planning purposes, a voltage criteria that applies to the high side buses was developed. When reflecting the voltage criteria to the high side bus, transformer regulation (voltage drop across the transformer) and the boost supplied by the no load tap changers was considered. Low-side voltage regulators or load tap changers were not considered.

When developing the low voltage criteria limit for the 69 kV delivery points, it was assumed that the transformer would be set on their mid-tap. In most cases, the mid-tap is 67 kV. With a 67 kV nominal tap, the transformer regulation is offset. In the few instances that the transformer mid-tap is 69 kV, it is assumed that the fixed tap could be changed to a boost position (which would offset the transformer regulation). When calculating the transformer regulation, it was assumed that the transformer was two-thirds loaded with a 90% power factor.

When developing the low voltage criteria limit for the 161 kV delivery points, it was assumed that the transformer would be set with one fixed tap of boost. It was also assumed that the transformers would be two-thirds loaded (with the corresponding transformer regulation). If a customer taking service from the 161 kV system has special needs which a 90% to 105% voltage criteria fail to meet, an LTC may be used to maintain acceptable voltage levels under both normal and single-contingency conditions.

To protect against damage due to high voltages during off-peak times or instances when a transformer may be unloaded (little or no transformer regulation would be expected), the high voltage limits were not changed when the criteria was reflected to the high-side bus.

The high-side voltage ranges included below were found to be necessary to maintain the low-side voltage criteria. However, the operator should not wait until voltages fall outside of the accepted range to take action. System operators should take all available actions to maintain voltages between .95 P.U. and 1.05 P.U. This includes, but is not limited to, switching capacitors and reactors, changing the voltage schedules at the generator buses, and utilizing load tap changers.

Transmission System Conditions	**69kV Bus Voltage**		**161 kV Bus Voltage**	
	Minimum	**Maximum**	**Minimum**	**Maximum**
Range A: Normal System Operations	95.0%	105.0%	95.0%	105.0%
Range B: Single Contingency Conditions	91.7%	105.8%	92.0%	105.0%

APPENDIX B:

Load Distribution and Modeling

LOAD DISTRIBUTION AND MODELING

A key part of the database development is load modeling. Big Rivers prepares a load forecast on an annual basis. This load forecast is built from individual member cooperative load forecast forecasts. The loads modeled in the power flow database should be consistent with the Big Rivers coincident peak load forecast with the loads distributed among all of the member cooperative substations.

Regression techniques have been used to help distribute the loads on an individual substation basis. Historical substation data is collected for each delivery point. The data series for each substation is regressed on time using a simple linear curve equation. In addition, the load at each substation is forecasted by applying the system average growth rate (from the cooperative forecast) to an average of the two most recent years coincident peak data. These two forecast values, along with input from each distribution cooperative and engineering judgment, are used to create a forecasted load for each delivery point. These forecasts are uniformly ratioed to match the overall Big Rivers coincident peak forecast. This method allows the historical trends to be reflected in the load distribution while consistency with the overall load forecast is maintained.

Industrial customers with dedicated delivery points are forecasted by the individual industries. As part of the load forecast preparation, all large industrial customers are contacted and asked to supply a forecast for their energy needs and expected peak demand. These forecasts are used to model these individual customers.

HMP&L personnel should provide HMP&L load. This load should be modeled in a separate area in the detailed power flow cases. However, in the MMWG models, the HMP&L take (HMP&L load supplied from Station 2) should be modeled as load at Henderson County, Reid 161 kV, and Reid 69 kV.

Power factors for each load are also based on historical data. The actual power factors at each delivery point during the most recent coincident peak for both summer and winter seasons are used. Since this historical power factor information is generally based on low-side meter data, adjustments are necessary when modeling loads on the high-side of the distribution transformers. This adjustment is typically accomplished by reducing the power factors by 98% to 99%. The percent adjustment is calculated on a seasonal basis for each distribution cooperative by modeling a distribution transformer loaded at 50% with a low-side power factor equal to the system average power factor during the most recent coincident peak. Loads metered on the high-side need no adjustment (this includes: Kimberly-Clark, Lodestar, P&M, Patriot Coal, Hopkins County Coal, ALCAN, and Century).

Appendix C:

Transformer Information

This information is available from a separate document.

Appendix D:

Shunt Information

This information is available from a separate document.

Appendix E:

Loadability Tables

Big Rivers Electric operates transmission voltage (100 kV and above) facilities according to the attached Loadability Table. The table identifies various limiting elements on each transmission line terminal. The lines are sorted in rows according to voltage with 345 kV lines listed first.

Equipment and conductor ratings exclusive of Current Transformer Ratio limitations are listed in the first set of columns. These columns indicate that the limiting component is usually the conductor. However, both 345 kV lines are limited by 1600 A line disconnect switches. Bryan Rd, Meade County and Newman 161 kV radial lines are limited by their transformation capacity. The Hardinsburg 138 kV Cloverport line is limited by a line trap.

Limiting Current Transformer Ratios are identified in the next set of columns. CTRs are only listed if they are set lower than the conductor would allow.

The next four columns check all components of the transmission facility and report the minimum rating. Listed are the Summer and Winter MVA and Amp ratings for each transmission line.

This information is available from a separate document.

Appendix F

Transmission Reliability Order of Curtailment

This information is available from the TVA document titled:

Transmission Reliability Order of Curtailment

APPENDIX B: 2015 SUMMER PEAK STUDY RESULTS

Appendix B: Line Loadings

Base

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Daviess EHV	Reid-Daviess Co	265	58%	92%	67%	91%			69%	102%
Hancock-Coleman EHV	Reid-Daviess Co	265	58%	98%	67%	97%	65%	97%	69%	97%
Reid-Daviess Co	Hancock-Coleman EHV	265	33%	91%	26%	91%			25%	91%
Base	Hardin-Daviess EHV	600			93%	93%	93%	93%		
Wilson-Green River	Hardin-Daviess EHV	600			93%	102%			85%	95%
Wilson-Daviess EHV	Smith-Daviess EHV	483			45%	95%				
Wilson-Reid EHV	Reid-Daviess Co	265							69%	97%

Wilson Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Hancock-Coleman EHV	Reid-Daviess Co	265	55%	100%	67%	98%	64%	98%	69%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	35%	92%	27%	92%	28%	91%	25%	92%
Wilson-Reid EHV	Reid-Daviess Co	265			67%	94%	64%	91%	69%	107%
Wilson-Reid EHV	Smith-Daviess EHV	483			57%	93%				
Wilson-Daviess EHV	Reid-Daviess Co	265							69%	94%
New Hardinsburg-Paradise	Wilson-Reid EHV	598							88%	90%
Reid-Daviess Co	Wilson-Reid EHV	598							88%	105%
Ensor-Daviess Co	Wilson-Reid EHV	598							88%	91%
Gibson-Francisco	Wilson-Reid EHV	598			74%	96%	76%	95%	88%	96%

Coleman 1 Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Daviess EHV	Reid-Daviess Co	265	65%	102%	74%	99%	71%	96%	76%	111%
Coleman-Daviess EHV	Reid-Daviess Co	265	65%	93%	74%	100%			76%	98%
Hancock-Coleman EHV	Reid-Daviess Co	265	65%	98%	74%	97%	71%	97%	76%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	27%	95%	21%	94%	23%	93%	21%	95%
Wilson-Reid EHV	Reid-Daviess Co	265			74%	94%	71%	91%	76%	105%
Wilson-Daviess EHV	Smith-Daviess Co	483			48%	101%				
Wilson-Green River	Hardin-Daviess EHV	600					88%	97%		

Appendix B: Line Loadings

Green 2 Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Hancock-Coleman EHV	Reid-Daviess Co	265	46%	99%	58%	98%	55%	98%	59%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	43%	91%	32%	91%	34%	91%	31%	91%
Wilson-Green River	Hardin-Daviess EHV	600			87%	95%	86%	94%		
Wilson-Daviess EHV	Smith-Daviess EHV	483			49%	93%				
Coleman-Daviess EHV	Hardin-Daviess EHV	600			87%	92%				
Wilson-Reid EHV	Reid-Daviess Co	265							59%	90%

Paradise 1 Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Daviess EHV	Reid-Daviess Co	265	58%	91%	68%	92%			70%	104%
Hancock-Coleman EHV	Reid-Daviess Co	265	58%	98%	68%	97%	66%	97%	70%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	33%	91%	25%	91%	27%	91%	25%	91%
Base	Hardin-Daviess EHV	600			91%	91%	91%	91%		
Wilson-Green River	Hardin-Daviess EHV	600					91%	101%	82%	92%
Wilson-Reid EHV	Reid-Daviess Co	265							70%	99%

Coleman 1 and 2 Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	73%	93%	82%	102%	78%	99%	84%	113%
Wilson-Daviess EHV	Reid-Daviess Co	265	73%	111%	82%	108%	78%	104%		
Coleman-Daviess EHV	Coleman-Newtonville	265	45%	112%	27%	109%				
Coleman-Daviess EHV	Reid-Daviess Co	265	73%	122%	82%	126%			84%	125%
Hancock-Coleman EHV	Reid-Daviess Co	265	73%	99%	82%	98%	78%	98%	84%	98%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	48%	90%	49%	100%	52%	108%		
Reid-Daviess Co	Hancock-Coleman EHV	265	20%	100%	15%	99%	17%	97%	14%	100%
Wilson-Green River	Hardin-Daviess EHV	600			82%	91%	83%	92%		
Wilson-Daviess EHV	Smith-Daviess EHV	483			52%	107%				
Coleman-Newtonville	Reid-Daviess Co	265							84%	91%

Wilson and Green 2 Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Hancock-Coleman EHV	Reid-Daviess Co	265	43%	102%	57%	99%	54%	99%	60%	99%
Reid-Daviess Co	Hancock-Coleman EHV	265	46%	92%	33%	91%	36%	91%	32%	92%
AB Brown-Reid EHV	Smith-Daviess EHV	483			61%	92%				
Wilson-Reid EHV	Smith-Daviess EHV	483			61%	91%				
Wilson-Reid EHV	Reid-Daviess Co	265							60%	93%
Reid-Daviess Co	Wilson-Reid EHV	598							77%	91%

Appendix B: Line Loadings

No Century			Case A		Case B		Case C	
Contingent Element	Monitored Element	Rating	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Coleman-Coleman EHV	Coleman-Coleman EHV	265	54%	111%	48%	97%	48%	97%
Hancock-Coleman EHV	Reid-Daviess Co	265	42%	96%	49%	96%	49%	96%
Base	Hardin-Daviess EHV	600	89%	89%	112%	112%	110%	110%
AB Brown-Reid EHV	Hardin-Daviess EHV	600			112%	105%	110%	103%
Wilson-Green River	Hardin-Daviess EHV	600	89%	103%	112%	122%	110%	121%
Wilson-Reid EHV	Hardin-Daviess EHV	600			112%	101%		
Coleman-Newtonville	Hardin-Daviess EHV	600	89%	98%	112%	117%		
Coleman-Daviess EHV	Hardin-Daviess EHV	600					110%	100%
Hardin-Daviess EHV	Coleman-Newtonville	265	55%	110%	67%	95%	69%	95%

No Smelters			Case A		Case B		Case C		Case D	
Contingent Element	Monitored Element	Rating	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	64%	122%	68%	95%			65%	98%
Wilson-Daviess EHV	Reid-Daviess Co	265	64%	110%	68%	95%			65%	98%
Wilson-Daviess EHV	Wilson-Green River	530	56%	101%	62%	92%			59%	92%
Coleman-Coleman EHV	Coleman-Coleman EHV	265	48%	98%			45%	90%	47%	95%
Hancock-Coleman EHV	Reid-Daviess Co	265	64%	92%	65%	92%	64%	92%		
Reid 345/161	Reid 345/161	336	52%	91%						
Base	Hardin-Daviess EHV	600	110%	110%	126%	126%	121%	121%	118%	118%
Wilson-Green River	Hardin-Daviess EHV	600	110%	126%	126%	137%			118%	131%
Wilson-Daviess EHV	Hardin-Daviess EHV	600	110%	79%	126%	101%	121%	93%		
Coleman-Daviess EHV	Coleman-Newtonville	265			81%	105%			69%	93%
Wilson-Reid EHV	Hardin-Daviess EHV	600	110%	94%	126%	110%	121%	102%	118%	91%
Reid-Daviess Co	Wilson-Reid EHV	598							75%	91%
Hardin-Daviess EHV	Coleman-Newtonville	265	65%	128%	81%	115%	76%	105%	69%	122%

Appendix B: Line Loadings

No Smelter with Coleman 1 Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	70%	128%	71%	97%	70%	97%	72%	107%
Wilson-Reid EHV	Hardin-Daviess EHV	600			117%	102%	116%	98%		
Wilson-Daviess EHV	Reid-Daviess Co	265	70%	118%	71%	98%	70%	96%	72%	107%
Wilson-Daviess EHV	Hardin-Daviess EHV	600			117%	92%				
Hancock-Coleman EHV	Reid-Daviess Co	265	66%	92%	71%	92%	70%	92%	72%	92%
Reid 345/161	Reid 345/161	336	53%	92%						
Reid-Daviess Co	Wilson-Reid EHV	598							78%	96%
Hardin-Daviess EHV	Coleman-Newtonville	265							51%	101%
Gibson-Francisco	Wilson-Reid EHV	598			72%	90%				
Wilson-Green River	Hardin-Daviess EHV	600			117%	128%	116%	127%	112%	124%
Wilson-Daviess EHV	Wilson-Green River	530	53%	100%					57%	92%
Base	Hardin-Daviess EHV	600	102%	102%	117%	117%	116%	116%	112%	112%

No Smelter with Wilson Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	60%	129%
Hancock-Coleman EHV	Reid-Daviess Co	265	57%	92%
Reid 345/161	Reid 345/161	336	63%	108%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	55%	112%

No Smelter with Green 2 Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.
Hancock-Coleman EHV	Reid-Daviess Co	265	49%	91%
Base	Hardin-Daviess EHV	600	99%	99%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	51%	104%

Appendix B: Line Loadings

No Smelters with Green River Unit 4 Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	64%	123%	65%	92%	64%	91%	66%	101%
Wilson-Reid EHV	Hardin-Daviess EHV	600			120%	104%	118%	99%		
Gibson-Francisco	Wilson-Reid EHV	598			36%	91%	75%	90%		
Wilson-Daviess EHV	Hardin-Daviess EHV	600					118%	92%		
Wilson-Daviess EHV	Reid-Daviess Co	265	64%	107%					66%	98%
Wilson-Daviess EHV	Green River 161/138	100	44%	103%	63%	92%	64%	95%	64%	100%
Wilson-Daviess EHV	Wilson-Green River	530	56%	106%	68%	95%	68%	97%	68%	99%
Coleman-Coleman EHV	Coleman-Coleman EHV	265	48%	100%	45%	91%	45%	91%	48%	97%
Hancock-Coleman EHV	Reid-Daviess Co	265	60%	92%	65%	92%	64%	92%	66%	92%
Reid 345/161	Reid 345/161	336	53%	94%						
Reid-Daviess Co	Wilson-Reid EHV	598							79%	95%
Wilson-Green River	Hardin-Daviess EHV	600			120%	133%	118%	131%	115%	129%
Base	Hardin-Daviess EHV	600	110%	110%	120%	120%	118%	118%	115%	115%
Gibson-Francisco	Coleman-Newtonville	265							67%	93%
Coleman-Daviess EHV	Coleman-Newtonville	265			74%	96%			67%	93%
Hardin-Daviess EHV	Coleman-Newtonville	265	70%	132%	74%	105%	75%	103%	67%	118%

No Smelters with Paradise Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	64%	122%	66%	92%	65%	92%	66%	102%
Wilson-Daviess EHV	Reid-Daviess Co	265	64%	109%	66%	91%	65%	90%	66%	101%
Wilson-Daviess EHV	Wilson-Green River	530	58%	102%	63%	91%	63%	93%	62%	96%
Wilson-Daviess EHV	Hardin-Daviess EHV	600					119%	91%		
Coleman-Coleman EHV	Coleman-Coleman EHV	265	49%	100%	45%	91%	45%	91%	48%	98%
Hancock-Coleman EHV	Reid-Daviess Co	265	60%	92%	66%	92%	65%	92%	66%	92%
Reid-Daviess Co	Wilson-Reid EHV	598							78%	95%
Wilson-Reid EHV	Hardin-Daviess EHV	600			120%	105%	119%	99%		
Wilson-Green River	Hardin-Daviess EHV	600			120%	132%	119%	130%	115%	128%
Skillman-Meade Co	Coleman-Newtonville	265					76%	91%		
Coleman-Daviess EHV	Coleman-Newtonville	265			75%	92%				
Gibson-Francisco	Coleman-Newtonville	265							66%	93%
Gibson-Francisco	Wilson-Reid EHV	598			72%	90%				
Base	Hardin-Daviess EHV	600	103%	103%	120%	120%	119%	119%	115%	115%
Hardin-Daviess EHV	Coleman-Newtonville	265	67%	131%	75%	106%	76%	104%	66%	118%

Appendix B: Line Loadings

No Smelters with New Hardinsburg-Paradise Looped through Wilson			Case A		Case B		Case C		Case D	
Contingent Element	Monitored Element	Rating	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	62%	123%	64%	91%	63%	91%	65%	99%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	54%	102%	46%	93%	46%	93%	49%	99%
Hancock-Coleman EHV	Reid-Daviess Co	265	62%	92%	64%	92%	63%	92%	65%	92%
Reid 345/161	Reid 345/161	336	56%	97%						
Base	Hardin-Daviess EHV	600	102%	102%	116%	116%	115%	115%	111%	111%
Wilson-Reid EHV	Hardin-Daviess EHV	600	102%	90%	116%	103%	115%	98%		
Wilson-Daviess EHV	Hardin-Daviess EHV	600			116%	95%				
Wilson-Daviess EHV	Reid-Daviess Co	265	62%	92%					65%	90%
Coleman-Daviess EHV	Coleman-Newtonville	265			72%	97%			64%	93%
Reid-Daviess Co	Wilson-Reid EHV	598			78%	93%	80%	95%	84%	101%
Coleman-Daviess EHV	Wilson-Reid EHV	598					80%	94%	84%	94%
Hardin-Daviess EHV	Coleman-Newtonville	265	64%	115%	72%	99%	73%	97%	64%	108%
Gibson-Francisco	Wilson-Reid EHV	598			78%	95%	80%	95%	84%	91%

No Smelters with New Hardinsburg-Paradise Looped through Wilson with Paradise 1 Unit Outage			Case A		Case B		Case C		Case D	
Contingent Element	Monitored Element	Rating	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	57%	121%	63%	95%	62%	95%	65%	107%
Wilson-Reid EHV	Wilson-Paradise	265					133%	98%		
Reid-Daviess Co	Wilson-Reid EHV	598			89%	105%				
Base	Wilson-Paradise	265	110%	110%	135%	135%	133%	133%	130%	130%
Wilson-Daviess EHV	Wilson-Paradise	265	110%	134%	135%	155%	133%	154%	130%	153%
Base	Wilson-Reid EHV	598					92%	92%	98%	98%
Wilson-Green River	Wilson-Paradise	265	110%	133%	135%	160%	133%	158%	130%	155%
Wilson-Paradise	Hardin-Daviess EHV	600					105%	118%		
Base	Hardin-Daviess EHV	600			107%	107%	105%	105%	101%	101%
Smith-Daviess EHV	Wilson-Reid EHV	598			89%	98%				
Calwell-Barkley	Wilson-Reid EHV	598			89%	94%	92%	97%	98%	103%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	54%	111%	48%	97%	48%	97%	52%	107%
Hancock-Coleman EHV	Reid-Daviess Co	265	57%	92%	63%	92%	62%	92%	65%	92%
Coleman-Daviess EHV	Wilson-Reid EHV	598					92%	109%	98%	109%
Coleman-Daviess EHV	Coleman-Newtonville	265			67%	94%				
Gibson-Francisco	Wilson-Reid EHV	598			89%	108%	92%	108%	98%	105%
Hardin-Daviess EHV	Wilson-Paradise	265					133%	167%	130%	169%
Reid 345/161	Reid 345/161	336	60%	104%						
Hardin-Daviess EHV	Coleman-Newtonville	265			67%	92%	68%	91%	56%	96%

Appendix B: Line Loadings

No Smelters with New Hardinsburg-Paradise Looped through Wilson with Coleman 1 Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	65%	124%	70%	98%	69%	97%	71%	108%
Wilson-Reid EHV	Hardin-Daviess EHV	600			112%	98%	110%	94%		
Wilson-Daviess EHV	Reid-Daviess Co	265	65%	97%					71%	99%
Coleman-Daviess EHV	Wilson-Reid EHV	598					81%	91%	86%	91%
Reid-Daviess Co	Wilson-Reid EHV	598			80%	96%	81%	97%	86%	104%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265								
Hancock-Coleman EHV	Reid-Daviess Co	265	65%	92%	70%	92%	69%	92%	71%	92%
Base	Hardin-Daviess EHV	600			112%	112%	110%	110%	106%	106%
Gibson-Francisco	Wilson-Reid EHV	598			80%	97%	81%	96%	86%	93%
Reid 345/161	Reid 345/161	336	56%	96%						

No Smelters with New Hardinsburg-Paradise Looped through Wilson with Green River 4 Unit Outage

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.	Case C Pre-Cont.	Case C Post-Cont.	Case D Pre-Cont.	Case D Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	59%	116%	64%	93%	63%	92%	65%	102%
Wilson-Reid EHV	Hardin-Daviess EHV	600			115%	101%	113%	96%		
Wilson-Daviess EHV	Reid-Daviess Co	265							65%	91%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	51%	104%	46%	94%	46%	94%	50%	101%
Hancock-Coleman EHV	Reid-Daviess Co	265	59%	92%	64%	92%	63%	92%	65%	92%
Reid-Daviess Co	Wilson-Reid EHV	598			80%	95%	83%	97%	87%	103%
Base	Hardin-Daviess EHV	600			115%	115%	113%	113%	109%	109%
Coleman -Daviess EHV	Coleman-Newtonville	265			71%	97%			63%	93%
Coleman -Daviess EHV	Wilson-Reid EHV	598					83%	97%	87%	96%
Reid 345/161	Reid 345/161	336	57%	99%						
Hardin-Daviess EHV	Coleman-Newtonville	265	58%	103%	71%	98%	72%	96%	63%	106%
Gibson-Francisco	Wilson-Reid EHV	598			80%	97%	83%	97%	87%	94%

No Smelter with Wilson to Paradise 161 kV Circuit

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.	Case B Pre-Cont.	Case B Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	63%	123%	64%	92%
Wilson-Reid EHV	Hardin-Daviess EHV	600			117%	104%
Wilson-Daviess EHV	Reid-Daviess Co	265	63%	96%		
Reid-Daviess Co	Wilson-Reid EHV	598			77%	92%
Coleman-Daviess EHV	Coleman-Newtonville	265			73%	96%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	49%	101%	45%	92%
Hancock-Coleman EHV	Reid-Daviess Co	265	59%	92%	64%	92%
Reid 345/161	Reid 345/161	336	56%	96%		
Gibson-Francisco	Wilson-Reid EHV	598			77%	94%
Base	Hardin-Daviess EHV	600	104%	104%	117%	117%
Hardin-Daviess EHV	Coleman-Newtonville	265	66%	118%	73%	100%
Wilson-Daviess EHV	Wilson-Paradise	265	45%	97%	60%	95%

Appendix B: Line Loadings

No Smelter with Wilson to Paradise 161 kV Circuit and Green River 4 Outage

			Case A		Case B	
Contingent Element	***Monitored Element***	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	62%	123%	64%	92%
Wilson-Daviess EHV	Reid-Daviess Co	265	62%	94%		
Wilson-Green River	Wilson-Paradise	265			52%	95%
Reid-Daviess Co	Wilson-Reid EHV	598			79%	94%
Coleman-Daviess EHV	Coleman-Newtonville	265			72%	96%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	50%	103%	46%	93%
Hancock-Coleman EHV	Reid-Daviess Co	265	59%	92%	64%	92%
Reid 345/161	Reid 345/161	336	56%	97%		
Gibson-Francisco	Wilson-Reid EHV	598			79%	96%
Base	Hardin-Daviess EHV	600	100%	100%	116%	116%
Hardin-Daviess EHV	Coleman-Newtonville	265	63%	114%	72%	99%

No Smelter with Wilson to Paradise 161 kV Circuit and Coleman 1 Outage

			Case A		Case B	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	65%	124%	70%	98%
Wilson-Reid EHV	Hardin-Daviess EHV	600			113%	99%
Wilson-Daviess EHV	Wilson-Paradise	265			54%	92%
Wilson-Daviess EHV	Reid-Daviess Co	265	65%	101%	70%	92%
Wilson-Green River	Wilson-Paradise	265			54%	90%
Hancock-Coleman EHV	Reid-Daviess Co	265	65%	92%	70%	92%
Reid-Daviess Co	Wilson-Reid EHV	598			78%	95%
Gibson-Francisco	Wilson-Reid EHV	598			78%	96%
Reid 345/161	Reid 345/161	336	55%	95%		
Base	Hardin-Daviess EHV	600			113%	113%
Hardin-Daviess EHV	Coleman-Newtonville	265	45%	90%		

No Smelter with Wilson to Paradise 161 kV Circuit and Paradise 1 Outage

			Case A		Case B	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	61%	126%	65%	96%
Wilson-Reid EHV	Wilson-Paradise	265			138%	96%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	53%	109%	47%	96%
Hancock-Coleman EHV	Reid-Daviess Co	265	58%	92%	65%	92%
Reid 345/161	Reid 345/161	336	59%	103%		
Reid -Daviess Co	Wilson-Reid EHV	598			88%	103%
Coleman-Daviess EHV	Coleman-Newtonville	265			68%	92%
Hardin-Daviess EHV	Coleman-Newtonville	265	55%	100%	68%	94%
Caldwell-Barkley	Wilson-Reid EHV	598			88%	93%
Smith-Daviess EHV	Wilson-Reid EHV	598			88%	97%
Base	Hardin-Daviess EHV	600			108%	108%
Base	Wilson-Paradise	265	119%	119%	138%	138%
Gibson-Francisco	Wilson-Reid EHV	598			88%	106%
Wilson-Green River	Wilson-Paradise	265	119%	148%	138%	169%
Wilson-Daviess EHV	Wilson-Paradise	265	119%	157%		

Appendix B: Line Loadings

No Smelters with Three Terminal

Contingent Element	Monitored Element	Rating	Case A Pre-Cont.	Case A Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	59%	118%
Wilson-Daviess EHV	Reid-Daviess Co	265	59%	93%
Coleman-Daviess EHV	Coleman-Newtonville	265	49%	101%
Hancock-Coleman EHV	Reid-Daviess Co	265	59%	92%
Reid 345/161	Reid 345/161	336	55%	95%
Hardin-Daviess EHV	Coleman-Newtonville	265	61%	113%

Case C
Green 1 and 2 and HMPL 1 Outaged

Contingent Element	Monitored Element	Rating	Pre-Cont.	Post-Cont.	W/Out AB Brown to Reid EHV Pre-Cont.	W/Out AB Brown to Reid EHV Post-Cont.
Wilson-Reid EHV	Hancock-Coleman EHV	265	67%	107%		
Wilson-Reid EHV	Henderson-AB Brown	224	71%	102%		
Hancock-Coleman EHV	Reid-Daviess Co	265	22%	119%	38%	105%
Reid-Daviess Co	Hancock-Coleman EHV	265	67%	91%	51%	91%
Reid 345/161	Reid 345/161	336			54%	90%

Appendix B: Voltages

Base		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.032	0.923	1.033	0.931	1.034	0.931	1.032	0.930
	Daviess Co	1.011	0.943	1.014	0.952	1.015	0.952	1.013	0.951
	Ensor	1.018	0.936	1.020	0.944	1.021	0.943	1.019	0.943
	Newman	0.999	0.930	1.002	0.939	1.003	0.939	1.001	0.938

Wilson Unit Outage		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.026	0.910	1.030	0.925	1.031	0.925	1.028	0.923
	Daviess Co	1.005	0.930	1.010	0.945	1.011	0.945	1.008	0.943
	Ensor	1.012	0.923	1.017	0.938	1.018	0.938	1.015	0.936
	Newman	0.993	0.917	0.998	0.932	0.999	0.932	0.996	0.930
Reid-Daviess Co	Daviess Co	1.005	0.953					0.996	0.946
	Newman	0.993	0.940						

Coleman 1 Unit Outage		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.018	0.921	1.022	0.930	1.025	0.930	1.020	0.929
	Daviess Co	1.002	0.940	1.006	0.950	1.008	0.950	1.004	0.949
	Ensor	1.007	0.934	1.011	0.943	1.013	0.943	1.009	0.942
	Newman	0.990	0.927	0.994	0.938	0.996	0.938	0.992	0.936
Reid-Daviess Co	Daviess Co	1.002	0.927	1.006	0.937	1.008	0.948	1.004	0.932
	Newman	0.990	0.914	0.994	0.925	0.996	0.935	0.992	0.919
Coleman-Daviess EHV	Newtonville	1.020	0.933					1.026	0.965
	Coleman 161	1.019	0.927	1.025	0.953			1.022	0.957
	Hancock Co	1.018	0.929	1.022	0.953			1.02	0.956
	National Aluminum	1.021	0.934	1.026	0.958			1.024	0.961
	Daviess Co	1.002	0.948						
	Ensor	1.007	0.941	1.011	0.959				
	Newman	0.990	0.935						

Appendix B: Voltages

Green 2 Unit Outage		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.032	0.913	1.034	0.929	1.035	0.929	1.033	0.927
	Daviess Co	1.012	0.933	1.016	0.949	1.016	0.949	1.014	0.947
	Ensor	1.019	0.926	1.021	0.942	1.022	0.942	1.020	0.940
	Newman	1.000	0.920	1.004	0.936	1.005	0.936	1.003	0.934

Paradise 1 Unit Outage		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.031	0.923	1.033	0.931	1.033	0.930	1.032	0.929
	Daviess Co	1.011	0.943	1.013	0.951	1.014	0.951	1.012	0.950
	Ensor	1.018	0.936	1.019	0.943	1.020	0.943	1.018	0.942
	Newman	0.999	0.930	1.001	0.938	1.002	0.938	1.000	0.937

Coleman 1 and 2 Unit Outage		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	0.989	0.915	0.998	0.927	1.004	0.928	0.994	0.926
	Daviess Co	0.983	0.935	0.990	0.948	0.995	0.948	0.988	0.946
	Ensor	0.985	0.928	0.992	0.940	0.997	0.941	0.990	0.939
	Newman	0.971	0.922	0.978	0.935	0.983	0.935	0.975	0.933
Reid-Daviess Co	Daviess Co	0.983	0.888	0.990	0.902	0.995	0.916	0.988	0.893
	Ensor	0.985	0.919	0.992	0.933	0.997	0.947	0.990	0.924
	Newman	0.971	0.874	0.978	0.889	0.983	0.903	0.975	0.879
Coleman-Daviess EHV	Newtonville	0.990	0.851	1.003	0.871			1.000	0.871
	Coleman 161	0.987	0.829	0.997	0.849			0.993	0.849
	Hancock Co	0.989	0.835	0.998	0.854			0.994	0.854
	National Aluminum	0.993	0.84	1.001	0.859			0.998	0.859
	Daviess Co	0.983	0.886	0.99	0.898			0.988	0.899
	Ensor	0.985	0.862	0.992	0.877			0.990	0.878
	Newman	0.971	0.872	0.978	0.885			0.975	0.885

Appendix E: Line Loadings

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Paradise 1 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	50%	108%	56%	91%
Wilson-Daviess EHV	Wilson-Green River	530	57%	98%	62%	95%
Wilson-Daviess EHV	Reid-Daviess Co	265	50%	94%		
Wilson-Green River	Hardin-Daviess EHV	600			119%	132%
Reid-Daviess Co	Wilson-Reid EHV	598			76%	90%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	45%	92%		
Coleman-Daviess EHV	Coleman-Newtonville	265	67%	91%	73%	97%
Hancock-Coleman EHV	Reid-Daviess Co	265				
Hardin-Daviess EHV	Coleman-Newtonville	265	67%	130%	73%	125%
Gibson-Francisco	Coleman-Newtonville	265			73%	98%
Reid 345/161	Reid 345/161	336	52%	91%		
Base	Hardin-Daviess EHV	600			119%	119%

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%) with 3 terminal to Wilson, New Hardinsburg, and Paradise

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	49%	109%		
Coleman-Daviess EHV	Coleman-Newtonville	265	66%	94%	71%	102%
Coleman-Daviess EHV	Wilson-Reid EHV	598			80%	91%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	45%	93%	49%	90%
Reid 345/161	Reid 345/161	336	56%	97%		
Hardin-Daviess EHV	Coleman-Newtonville	265	66%	120%	71%	119%
Gibson-Francisco	Coleman-Newtonville	265			71%	97%
Base	Hardin-Daviess EHV	600			117%	117%
Wilson-Green River	Hardin-Daviess EHV	600			117%	124%
Coleman-Newtonville	Hardin-Daviess EHV	600			117%	126%
Reid-Daviess Co	Wilson-Reid EHV	598			80%	93%

Appendix E: Line Loadings

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%) with 3 terminal to Wilson, New Hardinsburg, and Paradise; Coleman 1 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	55%	115%	61%	96%
Wilson-Daviess EHV	Reid-Daviess Co	265	55%	90%		
Reid 345/161	Reid 345/161	336	56%	96%		
Hardin-Daviess EHV	Coleman-Newtonville	265	49%	100%	54%	100%
Base	Hardin-Daviess EHV	600			112%	112%
Wilson-Green River	Hardin-Daviess EHV	600			112%	118%
Reid-Daviess Co	Wilson-Reid EHV	598			82%	97%

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%) with 3 terminal to Wilson, New Hardinsburg, and Paradise; Green River 4 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	49%	110%	55%	90%
Coleman-Daviess EHV	Wilson-Reid EHV	598			83%	94%
Coleman-Daviess EHV	Coleman-Newtonville	265	64%	93%	70%	101%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	46%	95%	45%	91%
Reid 345/161	Reid 345/161	336	57%	99%		
Hardin-Daviess EHV	Coleman-Newtonville	265	64%	117%	70%	117%
Gibson-Francisco	Coleman-Newtonville	265			70%	95%
Base	Hardin-Daviess EHV	600			115%	115%
Wilson-Green River	Hardin-Daviess EHV	600			115%	123%
Reid-Daviess Co	Wilson-Reid EHV	598			83%	96%

Appendix E: Line Loadings

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%) with 3 terminal to Wilson, New Hardinsburg, and Paradise; Paradise 1 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Green River	Wilson-3 Terminal	265	84%	104%	97%	125%
Wilson-Green River	Paradise-3 Terminal	265	87%	114%	94%	114%
Base	Wilson-3 Terminal	265			97%	97%
Base	Paradise-3 Terminal	265			94%	94%
Base	Hardin-Daviess EHV	600			110%	110%
Reid-Daviess Co	Wilson-Reid EHV	598			89%	103%
Caldwell-Barkley	Wilson-Reid EHV	598			89%	95%
Wilson-Reid EHV	Reid-Daviess Co	265	48%	110%	55%	93%
Wilson-Daviess EHV	Wilson-3 Terminal	265	84%	122%	97%	129%
Wilson-Daviess EHV	Paradise-3 Terminal	265	87%	102%	94%	107%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	48%	100%	46%	94%
Coleman-Daviess EHV	Wilson-Reid EHV	598			89%	101%
Coleman-Daviess EHV	Coleman-Newtonville	265			66%	98%
Gibson-Francisco	Coleman-Newtonville	265			66%	92%
Reid 345/161	Reid 345/161	336	58%	102%		
Hardin-Daviess EHV	Wilson-3 Terminal	265	84%	130%	97%	131%
Hardin-Daviess EHV	Paradise-3 Terminal	265	87%	124%	94%	123%
Hardin-Daviess EHV	Coleman-Newtonville	265	59%	108%	66%	111%

3 terminal to Wilson, New Hardinsburg, and Paradise

			Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**
Reid-Daviess Co	Hancock-Coleman EHV	265	27%	91%
Wilson-Green River	Paradise-3 Terminal	265	61%	91%
Wilson-Reid EHV	Reid-Daviess Co	265	66%	101%
Wilson-Daviess EHV	Wilson-3 Terminal	265	61%	95%
Hancock-Coleman EHV	Reid-Daviess Co	265	66%	98%
Wilson-Daviess EHV	Reid-Daviess Co	265	66%	93%
Reid-Daviess Co	Wilson-Reid EHV	598	82%	98%

Appendix E: Line Loadings

3 terminal to Wilson, New Hardinsburg, and Paradise
Coleman 1 Outaged

Contingent Element	Monitored Element	Rating	Case F Pre-Cont.	Case F Post-Cont.
Wilson-Daviess EHV	Reid-Daviess Co	265	73%	103%
Coleman-Daviess	Reid-Daviess Co	265	73%	93%
Wilson-Reid EHV	Reid-Daviess Co	265	73%	108%
Wilson-Daviess EHV	Wilson-3 Terminal	265	57%	93%
Gibson-Francisco	Wilson-Reid EHV	598	84%	92%
Hancock-Coleman EHV	Reid-Daviess Co	265	73%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	22%	95%
Reid-Daviess Co	Wilson-Reid EHV	598	84%	102%

3 terminal to Wilson, New Hardinsburg, and Paradise
Wilson Outaged

Contingent Element	Monitored Element	Rating	Case F Pre-Cont.	Case F Post-Cont.
Reid-Daviess Co	Hancock-Coleman EHV	265	26%	92%
Reid-Daviess Co	Wilson-Reid EHV	598	99%	116%
Wilson-Reid EHV	Reid-Daviess Co	265	67%	109%
Hancock-Coleman EHV	Reid-Daviess Co	265	67%	98%
Base	Wilson-Reid EHV	598	99%	99%

3 terminal to Wilson, New Hardinsburg, and Paradise
Green 2 Outaged

Contingent Element	Monitored Element	Rating	Case F Pre-Cont.	Case F Post-Cont.
Reid-Daviess Co	Hancock-Coleman EHV	265	33%	92%
Hancock-Coleman EHV	Reid-Daviess Co	265	57%	98%

Appendix E: Line Loadings

3 terminal to Wilson, New Hardinsburg, and Paradise
Paradise 1 Outaged

			Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**
Wilson-Green River	Wilson-3 Terminal	265	108%	135%
Wilson-Green River	Paradise-3 Terminal	265	105%	125%
Reid-Daviess Co	Hancock-Coleman EHV	265	26%	92%
Wilson-Daviess EHV	Reid-Daviess Co	265	67%	92%
Wilson-Daviess EHV	Paradise-3 Terminal	265	105%	119%
Wilson-Daviess EHV	Wilson-3 Terminal	265	108%	139%
Hancock-Coleman EHV	Reid-Daviess Co	265	67%	98%
Hardin-Daviess EHV	Wilson-3 Terminal	265	108%	129%
Hardin-Daviess EHV	Paradise-3 Terminal	265	105%	124%
Base	Wilson-Reid EHV	598	101%	101%
Base	Wilson-3 Terminal	265	108%	108%
Base	Paradise-3 Terminal	265	105%	105%

3 terminal to Wilson, New Hardinsburg, and Paradise
Green River 4 Outaged

			Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	67%	102%
Wilson-Daviess EHV	Reid-Daviess Co	265	67%	93%
Reid-Daviess Co	Hancock-Coleman EHV	265	26%	92%
Reid-Daviess Co	Wilson-Reid EHV	598	85%	101%
Hancock-Coleman EHV	Reid-Daviess Co	265	67%	98%

Appendix E: Line Loadings

No Smelter with Culley to Coleman 345 kV

Contingent Element	Monitored Element	Rating	Case F Pre-Cont.	Case F Post-Cont.
Base	Hardin-Daviess EHV	600	117%	117%
Wilson-Green River	Hardin-Daviess EHV	600	117%	131%
Wilson-Daviess EHV	Wilson-Green River	530	73%	99%
Coleman-Daviess EHV	Wilson-Reid EHV	598	75%	90%
Gibson-Francisco	Wilson-Reid EHV	598	75%	91%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	47%	95%
Hancock-Coleman EHV	Reid-Daviess Co	265	59%	93%
Hardin-Daviess EHV	Coleman-Newtonville	265	70%	98%

No Smelter with Culley to Coleman 345 kV
Coleman 1 Outaged

Contingent Element	Monitored Element	Rating	Case F Pre-Cont.	Case F Post-Cont.
Base	Hardin-Daviess EHV	600	112%	112%
Wilson-Green River	Hardin-Daviess EHV	600	112%	125%
Wilson-Reid EHV	Reid-Daviess Co	265	65%	92%
Wilson-Daviess EHV	Wilson-Green River	530	71%	99%
Reid-Daviess Co	Wilson-Reid EHV	598	77%	91%
Gibson-Francisco	Wilson-Reid EHV	598	77%	94%
Hancock-Coleman EHV	Reid-Daviess Co	265	65%	93%

Appendix E: Line Loadings

No Smelter with Culley to Coleman 345 kV
Green River 4 Outaged

Contingent Element	Monitored Element	Rating	Case F Pre-Cont.	Case F Post-Cont.
Base	Hardin-Daviess EHV	600	114%	114%
Wilson-Green River	Hardin-Daviess EHV	600	114%	130%
Wilson-Daviess EHV	Wilson-Green River	530	81%	106%
Wilson-Daviess EHV	Green River 161/138	100	65%	93%
Coleman-Daviess EHV	Wilson-Reid EHV	598	78%	95%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	48%	97%
Reid-Daviess Co	Wilson-Reid EHV	598	78%	92%
Hardin-Daviess EHV	Wilson-Green River	530	81%	98%
Hardin-Daviess EHV	Coleman-Newtonville	265	69%	97%
Gibson-Francisco	Wilson-Reid EHV	598	78%	95%
Hancock-Coleman EHV	Reid-Daviess Co	265	59%	93%

No Smelter with Culley to Coleman 345 kV
Paradise 1 Outaged

Contingent Element	Monitored Element	Rating	Case F Pre-Cont.	Case F Post-Cont.
Base	Hardin-Daviess EHV	600	115%	115%
Wilson-Green River	Hardin-Daviess EHV	600	115%	129%
Wilson-Daviess EHV	Wilson-Green River	530	76%	102%
Coleman-Daviess EHV	Wilson-Reid EHV	598	77%	93%
Reid-Daviess Co	Wilson-Reid EHV	598	77%	91%
Hardin-Daviess EHV	Wilson-Green River	530	76%	93%
Hardin-Daviess EHV	Coleman-Newtonville	265	70%	98%
Gibson-Francisco	Wilson-Reid EHV	598	77%	94%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	54%	97%
Hancock-Coleman EHV	Reid-Daviess Co	265	60%	93%

Appendix E: Voltages

Base		Case E		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Hancock Co	1.031	0.925	1.031	0.929
	Daviess Co	1.012	0.945	1.012	0.949
	Ensor	1.018	0.938	1.018	0.942
	Newman	1.000	0.932	1.000	0.937

Base Coleman 1 Outaged		Case E		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Coleman-Daviess EHV	Newtonville	1.018	0.923	1.024	0.955
	Skillman	1.024	0.947	1.025	0.970
	Hancock Co	1.016	0.922	1.018	0.948
	Coleman 161	1.018	0.919	1.021	0.947
	National Aluminum	1.020	0.927	1.022	0.953
	Daviess Co	1.002	0.945		
	Ensor	1.007	0.936	1.007	0.956
	Newman	0.990	0.932	0.991	0.948
Hancock-Coleman EHV	Daviess Co	1.002	0.942	1.003	0.948
	Ensor	1.007	0.936	1.007	0.940
	Newman	0.990	0.929	0.991	0.935
Reid-Daviess Co	Daviess Co	1.002	0.923	1.003	0.928
	Ensor	1.007	0.954		
	Newman	0.990	0.910	0.991	0.915

Appendix E: Voltages

Base Wilson Outaged		Case E		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Hancock Co	1.025	0.915	1.027	0.923
	Daviess Co	1.006	0.934	1.008	0.943
	Ensor	1.012	0.927	1.013	0.935
	Newman	0.994	0.921	0.996	0.930
Reid-Daviess Co	Daviess Co	1.006	0.951		
	Newman	0.994	0.939	0.996	0.945

Base Green 2 Outaged		Case E		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Hancock Co	1.032	0.916	1.032	0.926
	Daviess Co	1.012	0.936	1.014	0.946
	Ensor	1.019	0.929	1.020	0.939
	Newman	1.001	0.923	1.002	0.933

Appendix E: Voltages

Base Paradise 1 Outaged Contingent Element	Monitored Element	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.030	0.924	1.029	0.928
	Daviess Co	1.011	0.944	1.010	0.948
	Ensor	1.017	0.937	1.016	0.940
	Newman	0.999	0.931	0.998	0.936
Reid-Daviess Co	Daviess Co				
	Newman	0.999	0.949	0.998	0.949

Base Coleman 1 and 2 Outaged Contingent Element	Monitored Element	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Coleman-Daviess EHV	Newtonville	0.986	0.849	0.996	0.868
	Meade Co	0.986	0.915	0.986	0.926
	Skillman	1.000	0.869	1.001	0.885
	Hancock Co	0.987	0.835	0.991	0.852
	Coleman 161	0.985	0.829	0.990	0.847
	National Aluminum	0.991	0.840	0.995	0.857
	Daviess Co	0.983	0.888	0.986	0.898
	Ensor	0.985	0.863	0.987	0.876
	Newman	0.971	0.874	0.973	0.884
Hancock-Coleman EHV	Hancock Co	0.987	0.918	0.991	0.925
	Daviess Co	0.983	0.937	0.986	0.945
	Ensor	0.985	0.930	0.987	0.938
	Newman	0.971	0.925	0.973	0.932
Reid-Daviess Co	Hancock Co	0.987	0.942	0.991	0.949
	Coleman 161	0.985	0.946		
	Daviess Co	0.983	0.883	0.986	0.889
	Ensor	0.985	0.913	0.987	0.919
	Newman	0.971	0.869	0.973	0.876
Wilson-Daviess EHV	Coleman 161			0.990	0.949
	Newman			0.973	0.946

Appendix E: Voltages

Base (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Coleman 1 and 2 Outaged

		Case G		Case H	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Coleman-Daviess EHV	Newtonville	1.014	0.891	1.021	0.899
	Meade Co	1.012	0.960		
	Skillman	1.024	0.919	1.026	0.926
	Hancock Co	1.013	0.889	1.016	0.896
	Coleman 161	1.010	0.880	1.014	0.888
	National Aluminum	1.016	0.891	1.018	0.899
	Daviess Co	1.017	0.939	1.019	0.945
	Ensor	1.015	0.920	1.017	0.926
	Newman	1.005	0.926	1.008	0.932

3 terminal to Wilson, New Hardinsburg, and Paradise

		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Hancock Co	1.032	0.929
	Daviess Co	1.012	0.949
	Ensor	1.018	0.941
	Newman	1.000	0.936

3 terminal to Wilson, New Hardinsburg, and Paradise
Coleman 1 Outaged

		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**
Coleman-Daviess EHV	Newtonville	1.025	0.960
	Skillman	1.026	0.975
	Hancock Co	1.019	0.953
	Coleman 161	1.021	0.953
	National Aluminum	1.022	0.958
Hancock-Coleman EHV	Hancock Co	1.019	0.927
	Daviess Co	1.003	0.948
	Ensor	1.008	0.940
	Newman	0.991	0.935
Reid-Daviess Co	Daviess Co	1.003	0.929
	Newman	0.991	0.916

Appendix E: Voltages

3 terminal to Wilson, New Hardinsburg, and Paradise
Wilson Outaged

		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Hancock Co	1.028	0.924
	Daviess Co	1.008	0.943
	Ensor	1.014	0.936
	Newman	0.996	0.931
Reid-Daviess Co	Daviess Co	1.008	0.958
	Newman	0.996	0.946

3 terminal to Wilson, New Hardinsburg, and Paradise
Green 2 Outaged

		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Hancock Co	1.033	0.926
	Daviess Co	1.014	0.945
	Ensor	1.020	0.938
	Newman	1.002	0.932

3 terminal to Wilson, New Hardinsburg, and Paradise
Paradise 1 Outaged

		Case F	
Contingent Element	**Monitored Element**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Hancock Co	1.030	0.926
	Daviess Co	1.010	0.947
	Ensor	1.016	0.939
	Newman	0.998	0.934

Appendix E: Voltages

3 terminal to Wilson, New Hardinsburg, and Paradise
Green River 4 Outaged

Contingent Element	Monitored Element	Case F Pre-Cont.	Case F Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.031	0.927
	Daviess Co	1.011	0.948
	Ensor	1.019	0.940
	Newman	0.999	0.935

Appendix B: Voltages

Case C Green 1 and 2 and HMPL 1 Outaged		W/Out AB Brown to Reid EHV			
Contingent Element	Monitored Element	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Wilson-Reid EHV	Hopkins Co	1.002	0.912		
	Reid 161	1.002	0.877		
	Daviess Co	0.992	0.911		
	Henderson Co 161	0.986	0.885		
	Henderson Co 138	0.980	0.909		
	Newman	0.993	0.897		
Hancock-Coleman EHV	Hopkins Co	1.002	0.952		
	Reid 161	1.002	0.933		
	Hancock Co	1.027	0.781	1.033	0.873
	Daviess Co	0.992	0.814	1.005	0.897
	Ensor	1.007	0.797	1.016	0.887
	Henderson Co 161	0.986	0.932		
	Newman	0.993	0.799	0.993	0.883

APPENDIX C: PRESENT WORTH ANALYSES

PROPOSED WILSON TO HARDINSBURG/PARADISE 161 KV 3-TERMINAL (2008)

	YEAR	TRANS. INVESTMENT 2008 $'s	TRANS. $ INFLATED 3.00%	SUBSTATION INVESTMENT 2008 $'s	SUB $ INFLATED 3.00%	TRANS. DEPR 2.86%	SUBSTATION DEPR 2.22%	INTEREST 5.75%	TRANS. O&M 6.63%	STATION O&M 4.30%	ANNUAL COST IN NOM. $	PRESENT WORTH (2008)
1	2008	$5,800,000	$5,800,000	$1,800,000	$1,800,000	$0	$0	$437,000	$384,540	$77,400	$898,940	$898,940
2	2009	$0	$0	$0	$0	$165,880	$39,960	$437,000	$384,540	$77,400	$1,104,780	$1,044,709
3	2010	$0	$0	$0	$0	$165,880	$39,960	$425,164	$373,542	$75,682	$1,080,228	$965,950
4	2011	$0	$0	$0	$0	$165,880	$39,960	$413,328	$362,544	$73,963	$1,055,676	$892,667
5	2012	$0	$0	$0	$0	$165,880	$39,960	$401,493	$351,546	$72,245	$1,031,124	$824,498
6	2013	$0	$0	$0	$0	$165,880	$39,960	$389,657	$340,549	$70,527	$1,006,572	$761,102
7	2014	$0	$0	$0	$0	$165,880	$39,960	$377,821	$329,551	$68,809	$982,020	$702,163
8	2015	$0	$0	$0	$0	$165,880	$39,960	$365,985	$318,553	$67,090	$957,468	$647,384
9	2016	$0	$0	$0	$0	$165,880	$39,960	$354,149	$307,555	$65,372	$932,917	$596,485
10	2017	$0	$0	$0	$0	$165,880	$39,960	$342,314	$296,557	$63,654	$908,365	$549,208
11	2018	$0	$0	$0	$0	$165,880	$39,960	$330,478	$285,559	$61,935	$883,813	$505,308
12	2019	$0	$0	$0	$0	$165,880	$39,960	$318,642	$274,562	$60,217	$859,261	$464,559
13	2020	$0	$0	$0	$0	$165,880	$39,960	$306,806	$263,564	$58,499	$834,709	$426,747
14	2021	$0	$0	$0	$0	$165,880	$39,960	$294,970	$252,566	$56,781	$810,157	$391,674
15	2022	$0	$0	$0	$0	$165,880	$39,960	$283,135	$241,568	$55,062	$785,605	$359,153
16	2023	$0	$0	$0	$0	$165,880	$39,960	$271,299	$230,570	$53,344	$761,053	$329,010
17	2024	$0	$0	$0	$0	$165,880	$39,960	$259,463	$219,572	$51,626	$736,501	$301,084
18	2025	$0	$0	$0	$0	$165,880	$39,960	$247,627	$208,574	$49,908	$711,949	$275,222
19	2026	$0	$0	$0	$0	$165,880	$39,960	$235,791	$197,577	$48,189	$687,397	$251,282
20	2027	$0	$0	$0	$0	$165,880	$39,960	$223,956	$186,579	$46,471	$662,845	$229,132
21	2028	$0	$0	$0	$0	$165,880	$39,960	$212,120	$175,581	$44,753	$638,293	$208,647
22	2029	$0	$0	$0	$0	$165,880	$39,960	$200,284	$164,583	$43,034	$613,742	$189,713
23	2030	$0	$0	$0	$0	$165,880	$39,960	$188,448	$153,585	$41,316	$589,190	$172,221
24	2031	$0	$0	$0	$0	$165,880	$39,960	$176,612	$142,587	$39,598	$564,638	$156,071
25	2032	$0	$0	$0	$0	$165,880	$39,960	$164,777	$131,590	$37,880	$540,086	$141,167
26	2033	$0	$0	$0	$0	$165,880	$39,960	$152,941	$120,592	$36,161	$515,534	$127,423
27	2034	$0	$0	$0	$0	$165,880	$39,960	$141,105	$109,594	$34,443	$490,982	$114,756
28	2035	$0	$0	$0	$0	$165,880	$39,960	$129,269	$98,596	$32,725	$466,430	$103,090
29	2036	$0	$0	$0	$0	$165,880	$39,960	$117,433	$87,598	$31,006	$441,878	$92,353
30	2037	$0	$0	$0	$0	$165,880	$39,960	$105,598	$76,600	$29,288	$417,326	$82,479
30 YR.TOTAL		$5,800,000		$1,800,000		$4,810,520	$1,158,840	$8,304,665	$7,071,075	$1,624,378	$22,969,479	$12,804,198
AVERAGE YEARLY COST OVER 30 YEARS						$160,351	$38,628	$276,822	$235,703	$54,146	$765,649	$426,807

Timing of upgrades and intalled cost in 2006 dollars:
13 mile 161 kV Wilson to Hardinsburg/Paradise tap line (2008) - $4,700,000
161 kV transmission line upgrade from new tap point to Paradise (2008) - $1,100,000
161 kV Wilson terminal addition (2008) - $1,700,000
161 kV Paradise terminal upgrade (2008) - $100,000

Inflation: 3% per year.
Transmission depreciation: 2.86% calculated from an average of 3.24% for poles and 2.47% for lines from Big Rivers 1997 depreciation study.
Substation depreciation: 2.22% from Big Rivers 1997 depreciation study.
Interest: 5.75% RUS note (cost of debt).
O&M based on 5 year average (2001-2005): 6.63% for transmission and 4.30% for substation.
Present Worth calculated with 5.75% discount rate - RUS note.

21 MILE WILSON TO PARADISE (TVA) 161 kV INTERCONNECTION (2008)

	YEAR	TRANS. INVESTMENT 2008 $'s	TRANS. $ INFLATED 3.00%	SUBSTATION INVESTMENT 2008 $'s	SUB $ INFLATED 3.00%	TRANS. DEPR 2.86%	SUBSTATION DEPR 2.22%	INTEREST 5.75%	TRANS. O&M 6.63%	STATION O&M 4.30%	ANNUAL COST IN NOM. $	PRESENT WORTH (2008)
1	2008	$7,400,000	$7,400,000	$3,200,000	$3,200,000	$0	$0	$609,500	$490,620	$51,600	$1,151,720	$1,151,720
2	2009	$0	$0	$0	$0	$211,640	$71,040	$609,500	$490,620	$51,600	$1,434,400	$1,356,407
3	2010	$0	$0	$0	$0	$211,640	$71,040	$593,246	$476,588	$50,454	$1,402,969	$1,254,548
4	2011	$0	$0	$0	$0	$211,640	$71,040	$576,992	$462,557	$49,309	$1,371,537	$1,159,756
5	2012	$0	$0	$0	$0	$211,640	$71,040	$560,738	$448,525	$48,163	$1,340,106	$1,071,563
6	2013	$0	$0	$0	$0	$211,640	$71,040	$544,484	$434,493	$47,018	$1,308,675	$989,532
7	2014	$0	$0	$0	$0	$211,640	$71,040	$528,230	$420,461	$45,872	$1,277,243	$913,254
8	2015	$0	$0	$0	$0	$211,640	$71,040	$511,975	$406,430	$44,727	$1,245,812	$842,345
9	2016	$0	$0	$0	$0	$211,640	$71,040	$495,721	$392,398	$43,581	$1,214,381	$776,447
10	2017	$0	$0	$0	$0	$211,640	$71,040	$479,467	$378,366	$42,436	$1,182,949	$715,225
11	2018	$0	$0	$0	$0	$211,640	$71,040	$463,213	$364,334	$41,290	$1,151,518	$658,365
12	2019	$0	$0	$0	$0	$211,640	$71,040	$446,959	$350,303	$40,145	$1,120,086	$605,574
13	2020	$0	$0	$0	$0	$211,640	$71,040	$430,705	$336,271	$38,999	$1,088,655	$556,578
14	2021	$0	$0	$0	$0	$211,640	$71,040	$414,451	$322,239	$37,854	$1,057,224	$511,119
15	2022	$0	$0	$0	$0	$211,640	$71,040	$398,197	$308,207	$36,708	$1,025,792	$468,958
16	2023	$0	$0	$0	$0	$211,640	$71,040	$381,943	$294,176	$35,563	$994,361	$429,871
17	2024	$0	$0	$0	$0	$211,640	$71,040	$365,689	$280,144	$34,417	$962,930	$393,648
18	2025	$0	$0	$0	$0	$211,640	$71,040	$349,434	$266,112	$33,272	$931,498	$360,094
19	2026	$0	$0	$0	$0	$211,640	$71,040	$333,180	$252,081	$32,126	$900,067	$329,024
20	2027	$0	$0	$0	$0	$211,640	$71,040	$316,926	$238,049	$30,981	$868,636	$300,269
21	2028	$0	$0	$0	$0	$211,640	$71,040	$300,672	$224,017	$29,835	$837,204	$273,668
22	2029	$0	$0	$0	$0	$211,640	$71,040	$284,418	$209,985	$28,690	$805,773	$249,072
23	2030	$0	$0	$0	$0	$211,640	$71,040	$268,164	$195,954	$27,544	$774,342	$226,342
24	2031	$0	$0	$0	$0	$211,640	$71,040	$251,910	$181,922	$26,399	$742,910	$205,347
25	2032	$0	$0	$0	$0	$211,640	$71,040	$235,656	$167,890	$25,253	$711,479	$185,966
26	2033	$0	$0	$0	$0	$211,640	$71,040	$219,402	$153,858	$24,108	$680,048	$168,085
27	2034	$0	$0	$0	$0	$211,640	$71,040	$203,148	$139,827	$22,962	$648,616	$151,600
28	2035	$0	$0	$0	$0	$211,640	$71,040	$186,893	$125,795	$21,816	$617,185	$136,410
29	2036	$0	$0	$0	$0	$211,640	$71,040	$170,639	$111,763	$20,671	$585,753	$122,423
30	2037	$0	$0	$0	$0	$211,640	$71,040	$154,385	$97,732	$19,525	$554,322	$109,555
30 YR.TOTAL		$7,400,000		$3,200,000		$6,137,560	$2,060,160	$11,685,835	$9,021,717	$1,082,919	$29,988,191	$16,672,763
AVERAGE YEARLY COST OVER 30 YEARS						$204,585	$68,672	$389,528	$300,724	$36,097	$999,606	$555,759

Timing of upgrades and intalled cost in 2006 dollars:
Wilson 161 kV line terminal (2008) - $1,200,000 (Based on Burns and McDonnell estimate for a Wilson 161 kV line terminal).
Paradise 161 kV line terminal (2008) - $2,000,000
21 mile Wilson to Paradise circuit (2008) - $7,400,000

Inflation: 3% per year.
Transmission depreciation: 2.86% calculated from an average of 3.24% for poles and 2.47% for lines from Big Rivers 1997 depreciation study.
Substation depreciation: 2.22% from Big Rivers 1997 depreciation study.
Interest: 5.75% RUS note (cost of debt).
O&M based on 5 year average (2001-2005): 6.63% for transmission and 4.30% for substation (not including Paradise terminal).
Present Worth calculated with 5.75% discount rate - RUS note.

APPENDIX D: SHORT CIRCUIT STUDY RESULTS

Short Circuit Study Results
2/5/2007
CSB

FAULT CURRENT (AMPS) AT EACH FAULT LOCATION

	ECAR Model without Improvements		ECAR Model with Improvements	
Fault Location	Three Phase	Single Line-to-Ground	Three Phase	Single Line-to-Ground
Wilson 345 kV	11,882	12,196	12,565	12,763
Coleman EHV 345 kV	10,233	10,190	10,318	10,249
Daviess Co. EHV 345 kV	13,070	12,188	13,360	12,374
Reid EHV 345 kV	9,432	9,961	9,645	10,128
Wilson 161 kV	20,096	22,359	24,212	26,217
Coleman EHV 161 kV	23,639	24,621	23,640	24,624
Reid 161 kV	24,907	29,386	25,114	29,580
Hancock County 161 kV	17,775	16,035	17,779	16,039
National Aluminum 161 kV	16,822	15,722	16,805	15,712
Daviess County 161 kV	7,833	6,603	7,850	6,611

APPENDIX E: SENSITIVITY STUDY RESULTS

Appendix E: Line Loadings

Base

Contingent Element	Monitored Element	Rating	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Hancock-Coleman EHV	Reid-Daviess Co	265	54%	98%	67%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	36%	91%	26%	91%
Wilson-Reid EHV	Reid-Daviess Co	265			67%	99%
Wilson-Daviess EHV	Wilson-Green River	530			59%	92%
Wilson-Daviess EHV	Reid-Daviess Co	265			67%	100%

Base
Coleman 1 Outaged

Contingent Element	Monitored Element	Rating	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Hancock-Coleman EHV	Reid-Daviess Co	265	60%	98%	74%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	30%	96%	21%	95%
Reid-Daviess Co	Wilson-Reid EHV	598			76%	94%
Wilson-Daviess EHV	Reid-Daviess Co	265	60%	90%	74%	110%
Wilson-Daviess EHV	Wilson-Green River	530			58%	92%
Wilson-Reid EHV	Reid-Daviess Co	265			74%	107%
Coleman-Daviess EHV	Reid-Daviess Co	265			74%	97%

Base
Wilson Outaged

Contingent Element	Monitored Element	Rating	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Hancock-Coleman EHV	Reid-Daviess Co	265	51%	99%	68%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	39%	92%	26%	92%
Base	Wilson-Reid EHV	598			97%	97%
Wilson-Reid EHV	Reid-Daviess Co	265			68%	110%
Wilson-Daviess EHV	Reid-Daviess Co	265			68%	91%

Appendix E: Line Loadings

Base
Green 2 Outaged

			Case E		Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Reid-Daviess Co	265	42%	99%	58%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	46%	91%	32%	91%

Base
Paradise 1 Outaged

			Case E		Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Reid-Daviess Co	265	54%	98%	68%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	36%	91%	25%	92%
Reid-Daviess Co	Wilson-Reid EHV	598			77%	93%
Wilson-Reid EHV	Reid-Daviess Co	265			68%	103%
Wilson-Daviess EHV	Wilson-Green River	530			62%	95%
Wilson-Daviess EHV	Reid-Daviess Co	265			68%	102%

Base
Coleman 1 and 2 Outaged

			Case E		Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Hancock-Coleman EHV	Reid-Daviess Co	265	69%	99%	83%	98%
Reid-Daviess Co	Hancock-Coleman EHV	265	23%	101%	14%	100%
Reid-Daviess Co	Wilson-Reid EHV	598			79%	98%
Wilson-Reid EHV	Reid-Daviess Co	265			83%	117%
Coleman-Daviess EHV	Reid-Daviess Co	265	69%	118%	83%	124%
Coleman-Daviess EHV	Coleman-Newtonville	265	58%	121%	51%	118%
Wilson-Daviess EHV	Reid-Daviess Co	265	69%	101%	83%	121%
Wilson-Daviess EHV	Wilson-Green River	530			56%	92%
Coleman-Newtonville	Reid-Daviess Co	265			83%	91%

Appendix E: Line Loadings

No Smelter

Contingent Element	Monitored Element	Rating	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	53%	101%	62%	98%
Wilson-Daviess EHV	Wilson-Green River	530	62%	96%	72%	103%
Wilson-Daviess EHV	Reid-Daviess Co	265			62%	93%
Coleman-Daviess EHV	Wilson-Reid EHV	598			81%	90%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	55%	112%	52%	105%
Hancock-Coleman EHV	Reid-Daviess Co	265	53%	92%	62%	93%
Hardin-Daviess EHV	Coleman-Newtonville	265	49%	102%	58%	107%
Hardin-Daviess EHV	Wilson-Green River	530			72%	91%
Reid-Hopkins Co	Wilson-Reid EHV	598			81%	91%
Reid-Daviess Co	Wilson-Reid EHV	598			81%	97%
Base	Hardin-Daviess EHV	600			112%	112%
Wilson-Green River	Hardin-Daviess EHV	600			112%	127%

No Smelter
Coleman 1 Outaged

Contingent Element	Monitored Element	Rating	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	58%	107%	68%	105%
Wilson-Daviess EHV	Wilson-Green River	530	59%	94%	70%	102%
Wilson-Daviess EHV	Reid-Daviess Co	265	58%	96%	68%	101%
Hancock-Coleman EHV	Reid-Daviess Co	265	58%	92%	68%	93%
Caldwell-Barkley	Wilson-Reid EHV	598			84%	92%
Base	Hardin-Daviess EHV	600			106%	106%

Appendix E: Line Loadings

No Smelter
Green River 4 Outaged

Contingent Element	Monitored Element	Rating	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	52%	103%	62%	100%
Wilson-Daviess EHV	Wilson-Green River	530	70%	101%	80%	110%
Wilson-Daviess EHV	Green River 161/138	100	57%	92%	64%	99%
Wilson-Daviess EHV	Reid-Daviess Co	265			62%	93%
Caldwell-Barkley	Wilson-Reid EHV	598			85%	93%
Coleman-Daviess EHV	Wilson-Reid EHV	598			85%	95%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	56%	115%	53%	107%
Hancock-Coleman EHV	Reid-Daviess Co	265	52%	92%	62%	93%
Wilson-Green River	Hardin-Daviess EHV	600			109%	125%
Hardin-Daviess EHV	Coleman-Newtonville	265	46%	97%	56%	104%
Hardin-Daviess EHV	Wilson-Green River	530	70%	94%	80%	99%
Base	Hardin-Daviess EHV	600			109%	109%

No Smelter
Paradise 1 Outaged

Contingent Element	Monitored Element	Rating	Case E Pre-Cont.	Case E Post-Cont.	Case F Pre-Cont.	Case F Post-Cont.
Wilson-Reid EHV	Reid-Daviess Co	265	53%	101%	63%	102%
Wilson-Daviess EHV	Wilson-Green River	530	63%	97%	74%	106%
Wilson-Daviess EHV	Reid-Daviess Co	265			63%	96%
Reid-Daviess Co	Wilson-Reid EHV	598			85%	100%
Caldwell-Barkley	Wilson-Reid EHV	598			85%	93%
Coleman-Daviess EHV	Wilson-Reid EHV	598			85%	93%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	56%	115%	53%	108%
Hancock-Coleman EHV	Reid-Daviess Co	265	53%	92%	63%	93%
Hardin-Daviess EHV	Wilson-Green River	530			74%	93%
Hardin-Daviess EHV	Coleman-Newtonville	265	47%	97%		
Skillman-Meade Co	New Hardinsburg 161/138	224	61%	99%	63%	105%
Base	Hardin-Daviess EHV	600			109%	109%

Appendix E: Line Loadings

No Smelter with 3 terminal to Wilson, New Hardinsburg, and Paradise

			Case E		Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Green River	Wilson-3 Terminal	265	66%	98%	84%	119%
Wilson-Green River	Paradise-3 Terminal	265			76%	101%
Wilson-Reid EHV	Reid-Daviess Co	265	51%	103%	61%	101%
Wilson-Daviess EHV	Wilson-3 Terminal	265	66%	95%		
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	57%	118%	54%	110%
Hancock-Coleman EHV	Reid-Daviess Co	265	51%	92%	61%	93%
Hardin-Daviess EHV	Wilson-3 Terminal	265	66%	104%	84%	115%
Hardin-Daviess EHV	Paradise-3 Terminal	265	57%	92%	76%	103%
Hardin-Daviess EHV	Coleman-Newtonville	265			52%	95%
Base	Wilson-Reid EHV	598			92%	92%
Base	Hardin-Daviess EHV	600			104%	104%

No Smelter with 3 terminal to Wilson, New Hardinsburg, and Paradise
Coleman 1 Outaged

			Case E		Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Green River	Wilson-3 Terminal	265	61%	92%	80%	114%
Wilson-Green River	Paradise-3 Terminal	265			69%	94%
Wilson-Reid EHV	Reid-Daviess Co	265	56%	109%	67%	107%
Wilson-Daviess EHV	Wilson-3 Terminal	265	61%	93%	80%	113%
Wilson-Daviess EHV	Reid-Daviess Co	265			67%	92%
Hancock-Coleman EHV	Reid-Daviess Co	265	56%	92%	67%	93%
Hardin-Daviess EHV	Wilson-3 Terminal	265	61%	95%	80%	110%
Hardin-Daviess EHV	Paradise-3 Terminal	265			69%	95%
Base	Wilson-Reid EHV	598			95%	95%
Base	Hardin-Daviess EHV	600			98%	98%

Appendix E: Line Loadings

No Smelter with 3 terminal to Wilson, New Hardinsburg, and Paradise
Green River 4 Outaged

			Case E		Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Green River	Wilson-3 Terminal	265	56%	97%	78%	118%
Wilson-Green River	Paradise-3 Terminal	265			70%	99%
Wilson-Reid EHV	Reid-Daviess Co	265	50%	104%	61%	102%
Reid-Daviess Co	Wilson-Reid EHV	598			95%	111%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	58%	120%	55%	112%
Hancock-Coleman EHV	Reid-Daviess Co	265	50%	92%	61%	93%
Hardin-Daviess EHV	Coleman-Newtonville	265			50%	92%
Hardin-Daviess EHV	Wilson-3 Terminal	265	59%	95%	78%	109%
Hardin-Daviess EHV	Paradise-3 Terminal	265			70%	97%
Base	Wilson-Reid EHV	598			95%	95%
Base	Hardin-Daviess EHV	600			102%	102%

No Smelter with 3 terminal to Wilson, New Hardinsburg, and Paradise
Paradise 1 Outaged

			Case E		Case F	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Base	Wilson-3 Terminal	265	111%	111%	132%	132%
Base	Paradise-3 Terminal	265	120%	120%	141%	141%
Base	Wilson-Reid EHV	598			102%	102%
Wilson-Green River	Wilson-3 Terminal	265	111%	139%	132%	164%
Wilson-Green River	Paradise-3 Terminal	265	120%	140%	141%	164%
Wilson-Reid EHV	Reid-Daviess Co	265	50%	106%	62%	105%
Wilson-Daviess EHV	Wilson-3 Terminal	265	111%	133%	132%	159%
Wilson-Daviess EHV	Paradise-3 Terminal	265	120%	131%	141%	153%
Coleman-Daviess EHV	Wilson-Reid EHV	598			102%	113%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	60%	124%	57%	116%
Hancock-Coleman EHV	Reid-Daviess Co	265	50%	93%		
Hardin-Daviess EHV	Wilson-3 Terminal	265	111%	144%	132%	162%
Hardin-Daviess EHV	Paradise-3 Terminal	265	120%	150%	141%	167%

Appendix E: Line Loadings

Base (MW loads ratioed at 60%; Mvar loads ratioed at 50%)

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Base	Hardin-Daviess EHV	600			90%	90%
Wilson-Green River	Hardin-Daviess EHV	600			90%	100%
Wilson-Daviess EHV	Reid-Daviess Co	265			60%	93%

Base (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Coleman 1 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Daviess EHV	Reid-Daviess Co	265	56%	95%	66%	102%
Wilson-Green River	Hardin-Daviess EHV	600			84%	94%
Wilson-Reid EHV	Reid-Daviess Co	265			66%	96%
Coleman-Daviess EHV	Hardin-Daviess EHV	600			84%	102%

Base (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Wilson Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Paradise-New Hardinsburg	Wilson-Reid EHV	598	No Issues		89%	90%
Wilson-Reid EHV	Reid-Daviess Co	265			60%	99%
Reid-Daviess	Wilson-Reid EHV	598			89%	103%

Base (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Green 2 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Green River	Hardin-Daviess EHV	600	No Issues		83%	92%

Appendix E: Line Loadings

Base (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Paradise 1 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Green River	Hardin-Daviess EHV	600	No Issues		86%	97%
Wilson-Reid EHV	Reid-Daviess Co	265			61%	91%
Wilson-Daviess EHV	Reid-Daviess Co	265			61%	94%
Coleman-Daviess EHV	Hardin-Daviess EHV	600			86%	91%

Base (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Coleman 1 and 2 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Daviess EHV	Reid-Daviess Co	265	63%	104%	73%	111%
Coleman-Daviess EHV	Reid-Daviess Co	265	63%	100%	73%	105%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	50%	93%	45%	93%
Wilson-Reid EHV	Reid-Daviess Co	265			73%	105%
Coleman-Daviess EHV	Hardin-Daviess	600			79%	91%

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%)

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	50%	108%		
Wilson-Daviess EHV	Wilson-Green River	530	55%	97%	59%	92%
Wilson-Daviess EHV	Reid-Daviess Co	265	50%	96%		
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	49%	91%		
Coleman-Daviess EHV	Coleman-Newtonville	265	70%	95%	75%	101%
Hardin-Daviess EHV	Coleman-Newtonville	265	70%	136%	75%	129%
Gibson-Francisco	Coleman-Newtonville	265			75%	100%
Base	Hardin-Daviess EHV	600			122%	122%
Wilson-Green River	Hardin-Daviess EHV	600			122%	134%

Appendix E: Line Loadings

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Coleman 1 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	56%	114%	61%	95%
Wilson-Daviess EHV	Wilson-Green River	530	52%	96%	58%	91%
Wilson-Daviess EHV	Reid-Daviess Co	265	56%	103%	61%	96%
Wilson-Daviess EHV	Green River 161/138	100	43%	91%		
Wilson-Green River	Hardin-Daviess EHV	600			116%	127%
Reid-Daviess Co	Wilson-Reid EHV	598			76%	91%
Hardin-Daviess EHV	Coleman-Newtonville	265	53%	113%	57%	108%
Reid 345/161	Reid 345/161	336	54%	94%		
Base	Hardin-Daviess EHV	600			116%	116%

No Smelter (MW loads ratioed at 60%; Mvar loads ratioed at 50%)
Green River 4 Outaged

			Case G		Case H	
Contingent Element	**Monitored Element**	**Rating**	**Pre-Cont.**	**Post-Cont.**	**Pre-Cont.**	**Post-Cont.**
Wilson-Reid EHV	Reid-Daviess Co	265	50%	109%		
Wilson-Daviess EHV	Wilson-Green River	530	63%	103%	68%	99%
Wilson-Daviess EHV	Reid-Daviess Co	265	50%	93%		
Wilson-Daviess EHV	Green River 161/138	100	60%	104%	64%	100%
Wilson-Green River	Hardin-Daviess EHV	600			119%	133%
Reid-Daviess Co	Wilson-Reid EHV	598			77%	91%
Coleman 161-Coleman EHV	Coleman 161-Coleman EHV	265	45%	92%		
Coleman-Newtonville	Hardin-Daviess EHV	600			119%	128%
Coleman-Daviess EHV	Coleman-Newtonville	265	67%	94%	73%	101%
Hancock-Coleman EHV	Reid-Daviess Co	265				
Hardin-Daviess EHV	Coleman-Newtonville	265	67%	131%	73%	126%
Hardin-Daviess EHV	Wilson-Green River	530	63%	93%		
Gibson-Francisco	Coleman-Newtonville	265			73%	98%
Reid 345/161	Reid 345/161	336	55%	95%		
Base	Hardin-Daviess EHV	600			119%	119%

Appendix B: Voltages

Wilson and Green 2 Unit Outage		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.024	0.890	1.031	0.920	1.032	0.919	1.029	0.917
	Daviess Co	1.002	0.912	1.012	0.939	1.013	0.939	1.010	0.936
	Ensor	1.010	0.903	1.018	0.933	1.019	0.932	1.016	0.929
	Newman	0.990	0.899	1.000	0.926	1.001	0.926	0.998	0.923
Reid-Daviess Co	Daviess Co	1.002	0.951						
	Newman	0.990	0.938					0.998	0.948

Base with CSN Load Addition		Case A		Case B		Case C		Case D	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Case Diverged							No Issues	
Reid-Daviess Co	Daviess Co	1.006	0.944	1.008	0.952	1.010	0.957		
	Newman	0.994	0.931	0.996	0.939	0.998	0.944		

No Century		Case A		Case B		Case C	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.069	0.934	1.069	0.939	1.066	0.938
	Daviess Co	1.039	0.956	1.040	0.960	1.038	0.960
	Ensor	1.048	0.947	1.048	0.952	1.046	0.951
	Newman	1.027	0.943	1.028	0.948	1.027	0.947

No Smelters with New Hardinsburg-Paradise Looped through Wilson and CSN Load (Hancock Service)		Case A		Case B		Case C	
Contingent Element	Monitored Facility	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.	Pre-Cont.	Post-Cont.
Hancock-Coleman EHV	Hancock Co	1.065	0.784	1.064	0.793	1.062	0.792
	CSN	1.064	0.783	1.063	0.793	1.061	0.791
	Daviess Co	1.049	0.861	1.047	0.869	1.046	0.868
	Ensor	1.051	0.822	1.049	0.831	1.048	0.830
	Newman	1.038	0.847	1.036	0.855	1.035	0.854

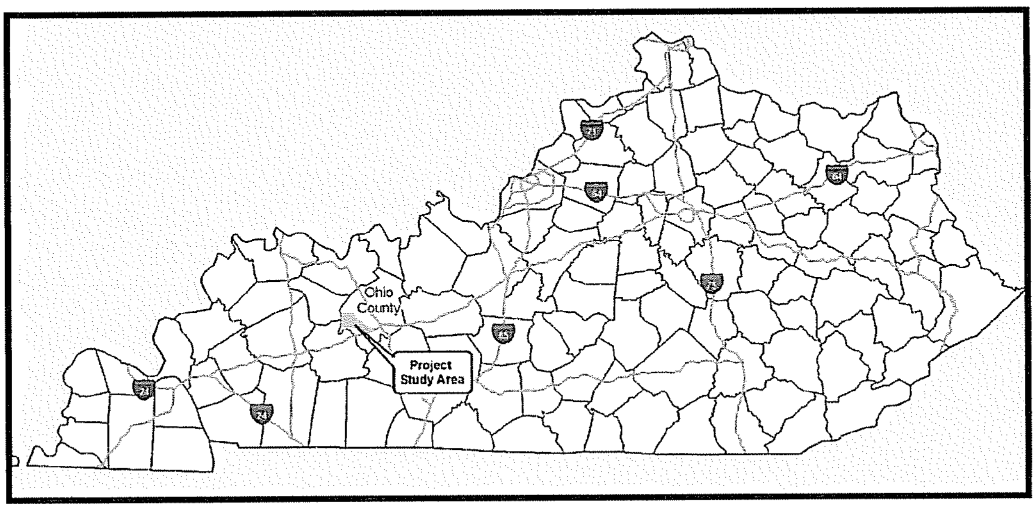
EXHIBIT B

The EPRI Overhead Electric Transmission Line Siting Methodology Results

For

Big Rivers Electric Corporation's

Line 19 F - Wilson to Line 7B Tap
161 kV Transmission Line



May 30th, 2007

Table of Contents

List of Figures

List of Tables

1. Introduction:

The EPRI/GTC Overhead Electric Transmission Line Siting Methodology was used for this project. The suitability model developed during the Kentucky workshop held on February 28^{th}, 2006 was used to identify Alternative Corridors. This document reports the results of this process. Any departure from the methodology or weights and values is documented, and the reason for deviation is explained in this report. Details concerning the siting methodology can be found in the document titled "EPRI – GTC Project Report: Standardized Methodology for Siting Overhead Electric Transmission Lines". Details regarding the criteria from the workshop to calibrate the model for use in Kentucky can be found in the document titled "Kentucky Transmission Line Siting Model – Project Report".

2. Macro Corridors:

The first step in this methodology is Macro Corridor creation, which defines an area for more detailed study. Typically for this stage, the best available land cover dataset based on 30m LandSat imagery is used (see Figure 2a). In the case of this area, the best available is from 1992. In addition to the land cover dataset, existing electric transmission corridors acquired from the Kentucky Public Service Commission, the road network, and high slope areas (greater or equal to 30 degrees) derived from 7.5 minute USGS digital elevation models are incorporated as well.

The Macro Corridor analysis produced a study area approximately 51 square miles. After evaluating the Macro Corridor results, it was determined that areas south and west of the Macro Corridors should be included in the study area due to a co-location opportunity with existing transmission line corridors (see Figure 2b). This increased the study area to approximately 64 square miles.

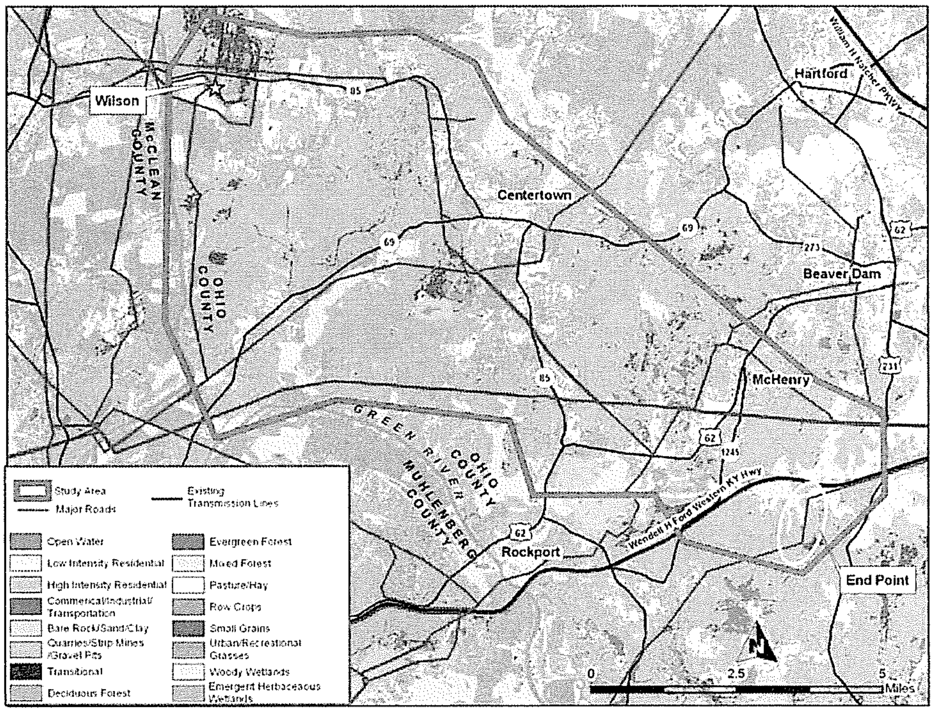


Figure 2a – Study Area

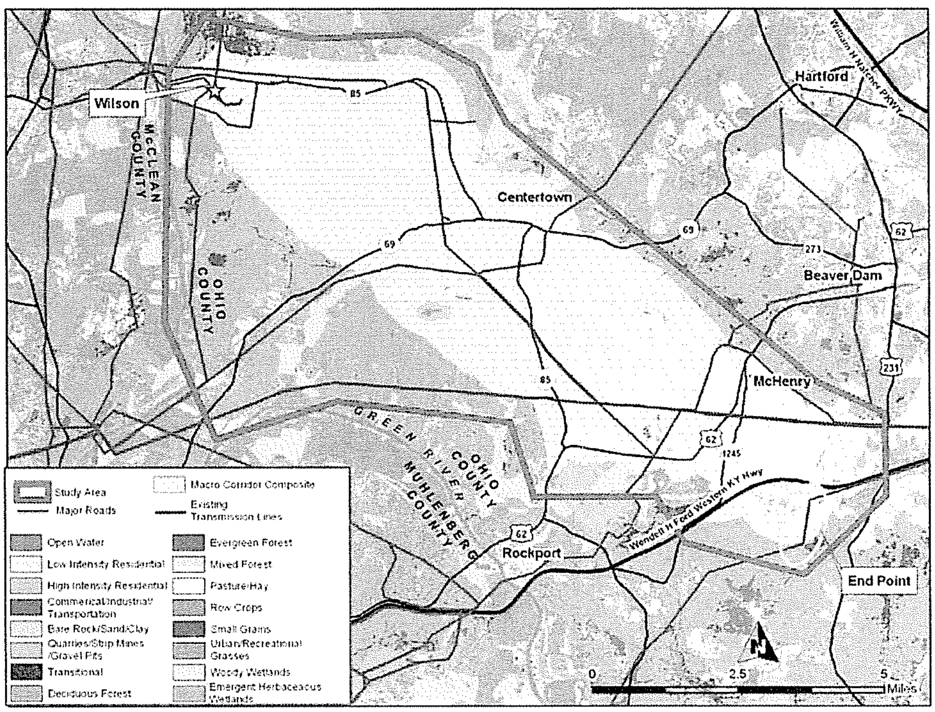


Figure 2b– Study Area with Macro Corridors

3. Alternative Corridors:

Once the Macro Corridors were identified, detailed datasets were developed for siting purposes. The primary source for project specific data was aerial photography from the National Agriculture Imagery Program (NAIP), dated 2004 (see Figure 3a as an example of some of the data collected). Weight and values used to build the suitability models were assigned based on the results of the Kentucky Transmission Line Siting Model workshop.

The only deviation from the criteria set by the Kentucky Transmission Line Siting Model was the modeling of noncontiguous sections of transmission line easements. These easements had been purchased for a past transmission line project that didn't come to fruition. The utilized easements where given the same weight as the opportunity to parallel an exiting transmission line in the Linear Infrastructure layer in the Engineering model.

The chart on the next page (Table 3) shows the criteria that were present in the study area and their adjusted weights and values. When some criteria are not present in a study area, the weights and values must be adjusted. Weights for layers (green items) that are present in the study area must equal 100%. Each feature (yellow items) in each layer must have at least one feature that equals 1 and one that equals 9. This gives statistic soundness to the suitability models that are derived from adding these perspectives together and ensures that some layers and features hold the intensity within the suitability models that the stakeholders intended. Layers and features not present in this study area are shown in gray. Figures 3b, 3c, 3d, & 3e illustrate the suitability models for each perspective that are used to create the Alternative Corridors.

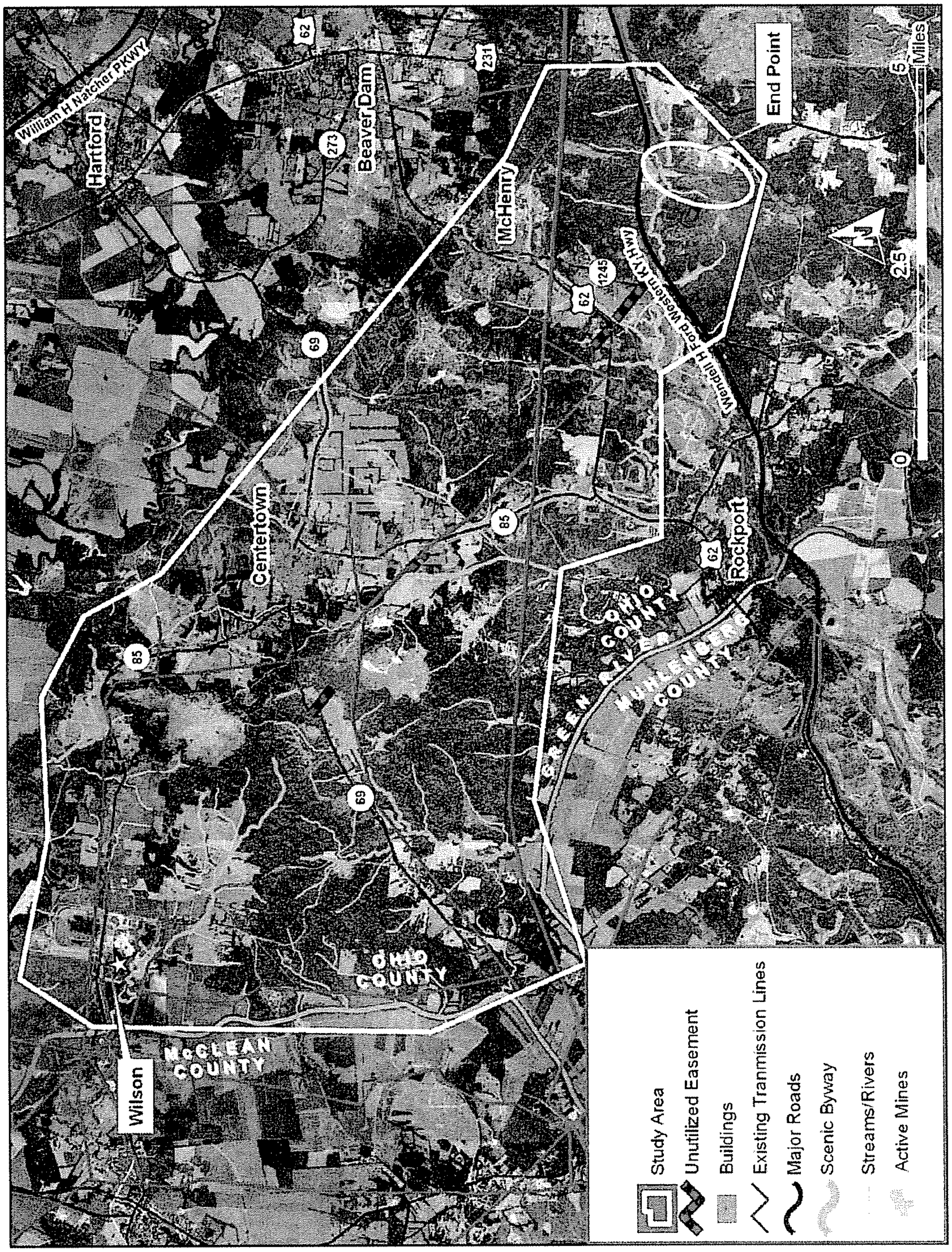


Figure 3a – Example of some of the data used to create the suitability models

Engineering		Natural Environment		Built Environment			
Linear Infrastructure	86.2%	Floodplain	4.6%	Proximity to Buildings	17.5%	Proximity to Eligible Historic and Archeological Sites	32.2%
Parallel Existing Transmission Lines	1	Background	1	Background	1	Background	1
Rebuild Existing Transmission Lines (good)	2.2	100 Year Floodplain	9	900-1200	3.4	900-1200	4.6
Background	4.4	Streams/Wetlands	29.2%	600-900	5.7	600-900	7.9
Parallel Interstates ROW	4.7	Background	1	300-600	8	0-300	8.6
Parallel Roads ROW	5.4	Streams < 5cfs	6.4	0-300	9	300-600	9
Parallel Pipelines	5.6	Rivers/Streams > 5cfs	7.3	Building Density	8.7%	*AVOIDANCE AREAS*	
Future DOT Plans	5.6	Wetlands + 30' Buffer	9	0 - 0.05 Buildings/Acre	1	Listed Archaeology Sites & Dist.	
Parallel Railway ROW	6.1	Outstanding State Resource Waters	9	0.05 - 0.2 Buildings/Acre	3.1	Listed NRHP Districts and Buildings	
Road ROW	7.2	Public Lands	17.7%	0.2 - 1 Buildings/Acre	5.9	City and County Parks	
Rebuild Existing Transmission Lines (bad)	8.6	Background	1	1 - 4 Buildings/Acre	9	Day Care Parcels	
Scenic Highways ROW	9	WMA - Not State Owned	9	> 4 Buildings/Acre	9	Cemetery Parcel s	
Slope	13.8%	USFS (proclamation area)	6.2	Proposed Development	0.0%	School Parcels (K-12)	
Slope 0-15%	1	Other Conservation Land	7.8	Background	1	Church Parcels	
Slope 15-30%	4	USFS (actually owned)	9	Proposed Development	9		
Slope 30-40%	6.7	State Owned Conservation Land	9	Spannable Lakes and Ponds	4.2%		
Slope >40%	9	Land Cover	19.8%	Background	1		
AVOIDANCE AREAS		Developed Land	1	Spannable Lakes and Ponds	9		
Non-Spannable Waterbodies		Agriculture	4.6	Land Use	37.4%		
Mines and Quarries (Active)		Forests	9	Commercial/Industrial	1		
Buildings		Wildlife Habitat	28.7%	Agriculture (crops)	3.5		
Airports		Background	1	Agriculture (other livestock)	4.6		
Military Facilities		Species of Concern Habitat	9	Silviculture	6		
Center Pivot Irrigation		*AVOIDANCE AREAS*		Other (forest)	6.7		
		EPA Superfund Sites		Agriculture (horse farms)	8		
		State and National Parks		Residential	9		
		USFS Wilderness Area					
		Wild/Scenic Rivers					
		Wildlife Refuge					
		State Nature Preserves					
		Designated Critical Habitat					

Table 3 – Project Specific Criteria for each Perspective of the Alternative Corridor Analysis

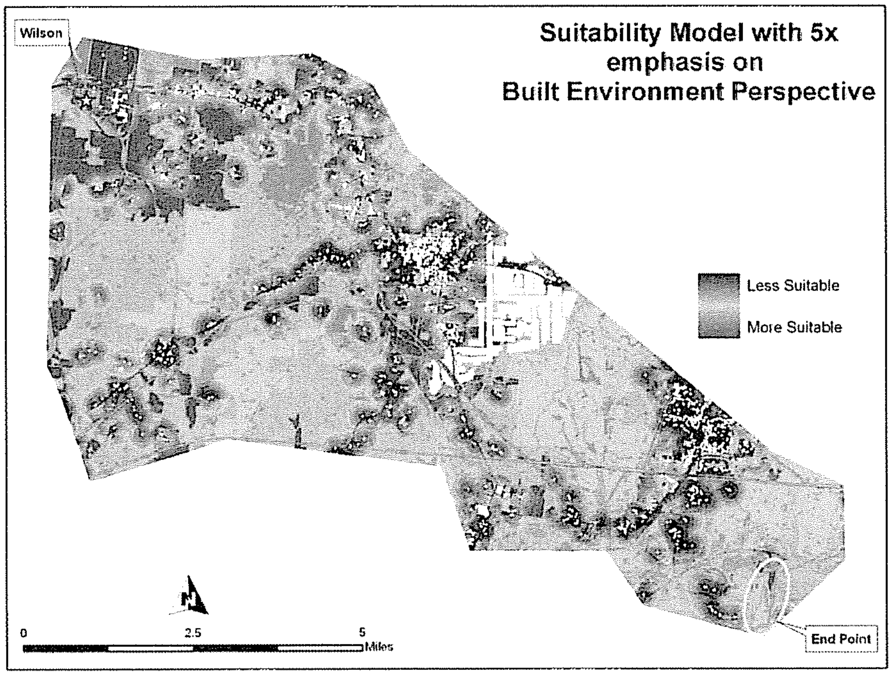


Figure 3b – Built Environment Perspective Suitability Model

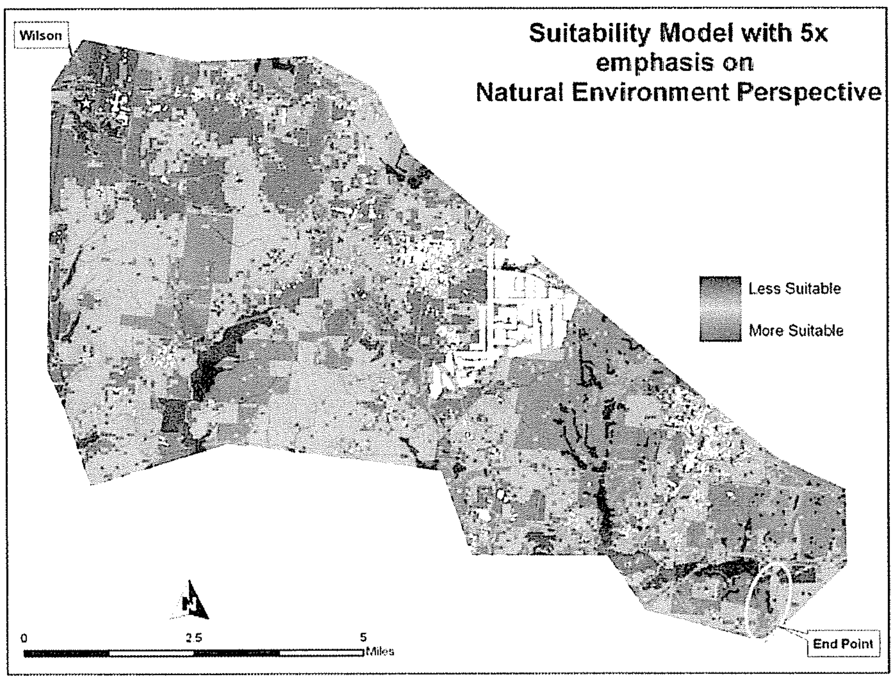


Figure 3c – Natural Environment Perspective Suitability Model

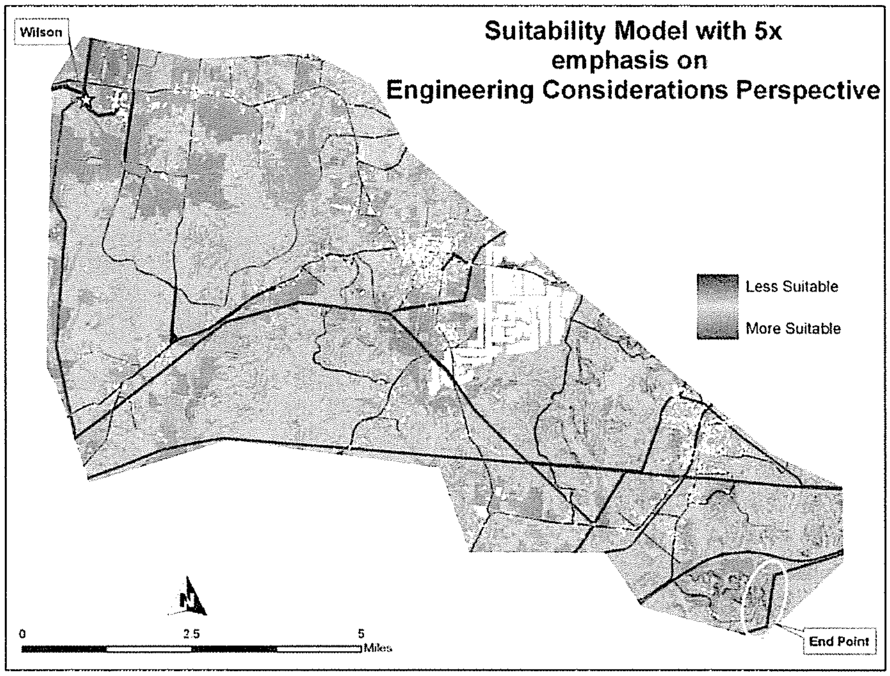


Figure 3d – Engineering Consideration Perspective Suitability Model

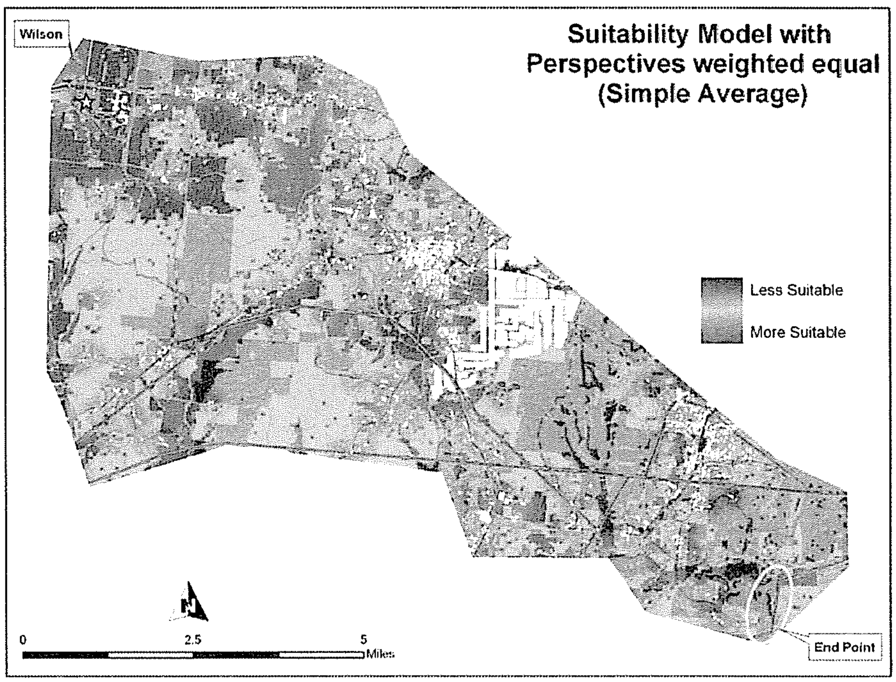


Figure 3e– Engineering Consideration Perspective Suitability Model

3.1. Built Environment Corridor:

The Built Environment Corridor leaves the Wilson Plant area in a southeasterly direction heading in almost a direct route to the destination area. Along the way, the corridor crosses mainly forested area (some of which is in the Peabody Wildlife Management Area) and some agricultural areas. It utilizes the segments of unutilized transmission line easements, while also paralleling a section of 69 kV transmission line for approximately 3 miles and an east/west corridor with two 138 kV transmission lines for approximately 2 miles. This corridor minimally impacts developed areas by avoiding the more dense areas near Centertown and McHenry. It only comes in close proximity to developed areas at State Route 69, State Route 85, State Route 1245, and US Highway 62 crossings. The general length of this corridor is approximately 13 miles. See Figure 3.1 below.

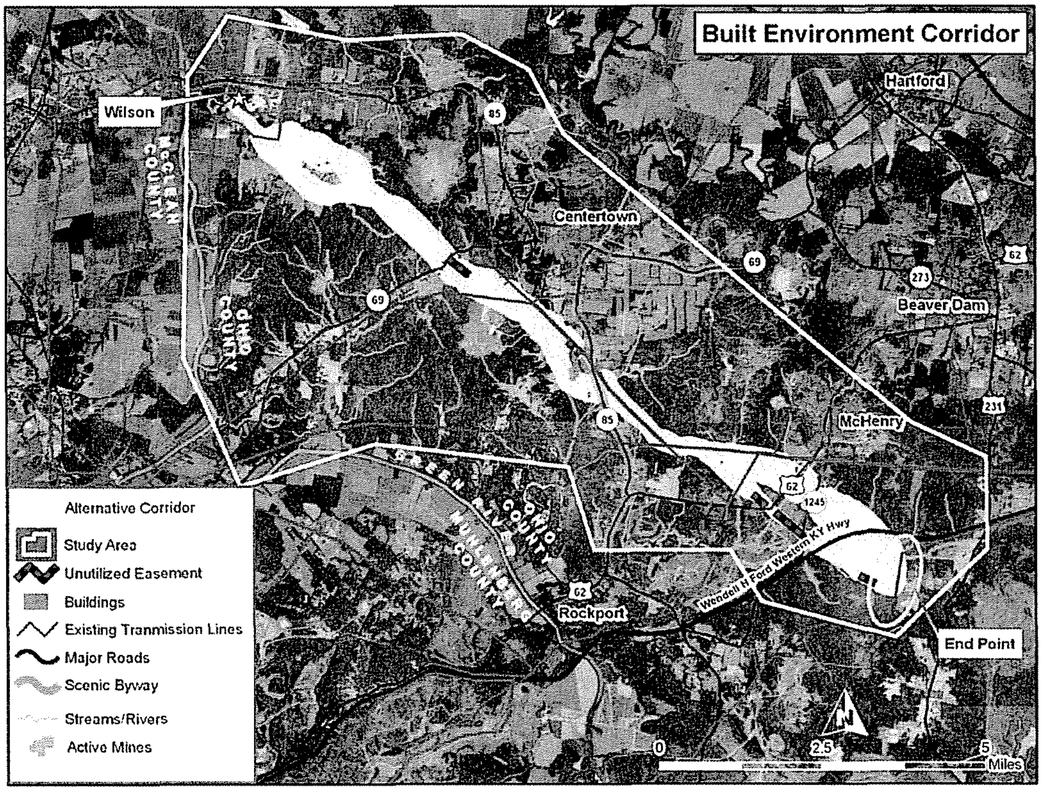


Figure 3.1 – Built Environmental Alternative Corridor

3.2. Natural Environment Corridor:

The Natural Environment Corridor leaves the Wilson Plant area in a more easterly direction than the Built Environment Corridor, minimizing impact to a stream system and causing it to take a less direct path at the beginning. This corridor passes through more agriculture areas and rural residential areas in order to minimize impacts to forested areas and some of the Peabody Wildlife Management Area. After approximately 5 miles this corridor begins to mimic the Built Environment Corridor utilizing the 69 kV parallel opportunity and most of the unutilized transmission line easement. However the natural model uses the 69 kV transmission line for approximately 1 mile longer than the Built Environment Corridor. The general length of this corridor is approximately 13.5 miles. See Figure 3.2 below.

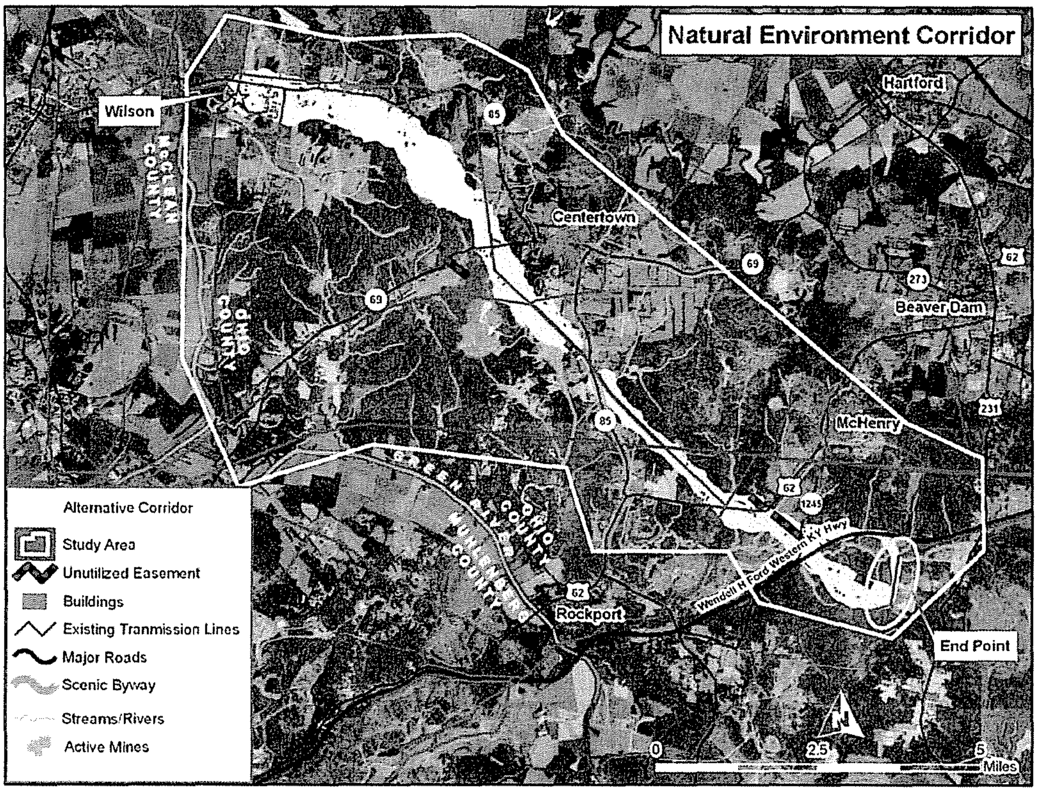


Figure 3.2 – Natural Environmental Alternative Corridor

3.3. Engineering Concerns Corridor:

The Engineering Corridor takes two main paths. One takes a path similar to the Built Environment Corridor; utilizing the 69 kV parallel opportunities and the unutilized transmission line easement, mimicking the Natural Environment Corridor for approximately the last 4 miles. The general length of this path of the corridor is approximately 13 miles.

The other takes a less direct route by heading south out of the Wilson Plant along an existing 161 kV transmission line near the Green River for approximately 5.5 miles, which brings it close to an archeology site that is on the National Register. It then travels cross county for approximately 0.5 miles, until reaching an existing east/west transmission corridor, which it utilizes for approximately 6.0 miles. Finally, it rejoins the other path. Both travel to the destination area by using a path similar to the Natural Environment Corridor. The general length of this path of the corridor is approximately 17 miles.

In addition to the two distinct paths, a narrow crossover path also developed between the two paths. This path utilizes a 138 kV transmission line corridor with runs in a northeasterly direction. The general length of this branch of the corridor is approximately 18 miles. See Figure 3.3 below.

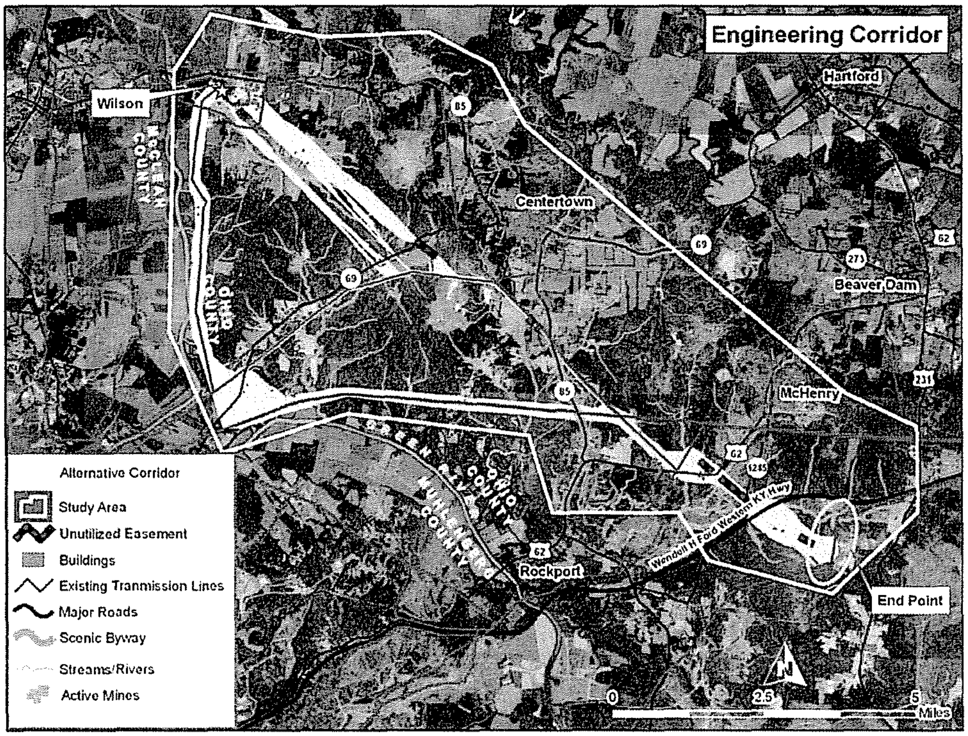


Figure 3.3 – Engineering Consideration Alternative Corridor

3.4. Simple Average Corridor:

The Average Corridor most mimics the Built Environment Corridor for approximately the first 8.5 miles. After which, it takes similar paths to both the Built Environment Corridor and the Natural Environment Corridor for the last few miles while also utilizing more of the east/west 138 kV corridor than any of the other corridors. See Figure 3.4 below.

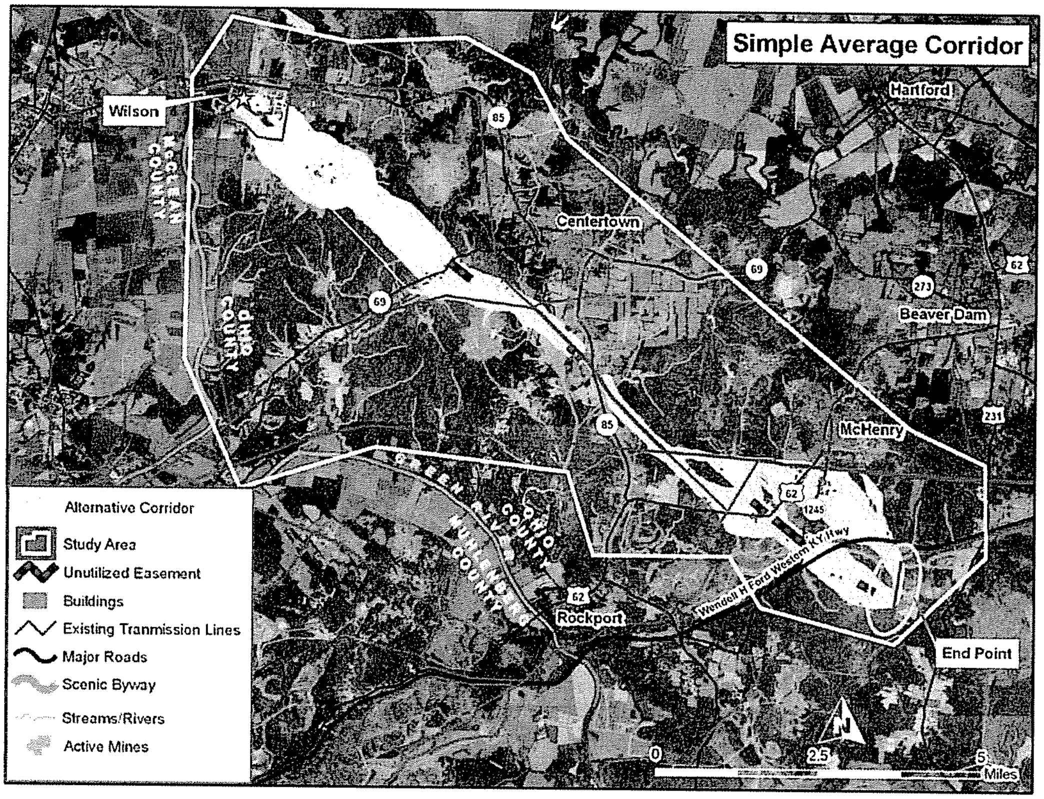


Figure 3.4 – Simple Average Alternative Corridor

4. Alternative Routes:

The siting team analyzed the alternative corridors and identified alternative routes within the alternative corridors. These alternate routes were compared using the Alternative Route Evaluation Matrix.

An additional route which paralleled a 34.5 kV transmission line outside the alternative corridors in the northern portion of the study area was also identified by the routing team to ensure that all reasonable co-location opportunities were evaluated.

Eight alternative routes were identified: A, B, C, D, E, F, G, and H (see Figure 4 below)

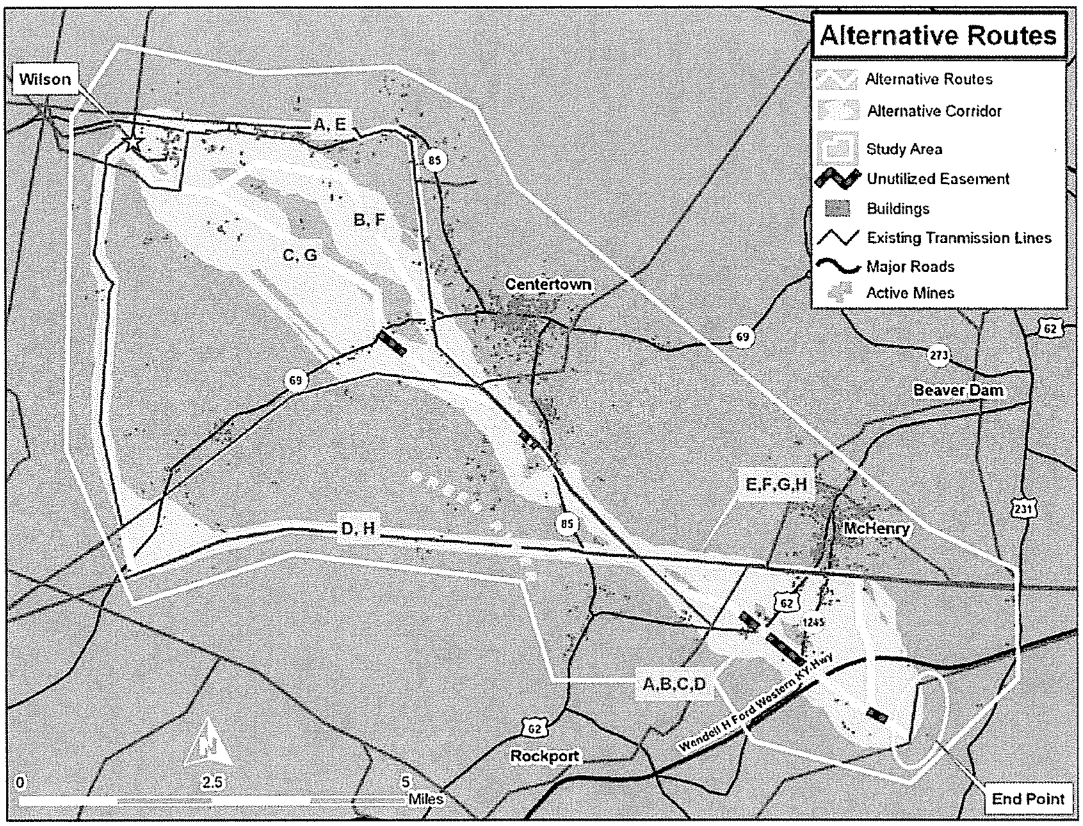


Figure 4 – Alternative Routes

5. Alternative Route Evaluation

Statistics are collected for each route. The statistics are divided into three categories similar to the Alternative Corridor perspectives (Built Environment, Natural Environment, and Engineering Considerations). The statistics are normalized (see Table 5.2a) and weights are applied that the internal siting team determined. Likewise, emphasis is applied to each of the perspective (see Tables 5.3.1, 5.3.2, 5.3.3, and 5.3.4).

5.1. Relative Cost Evaluation

Assumptions Used for Relative Cost Evaluation:

- Cost per mile for new single circuit construction = $300,000
- Additional Angle Cost
  - 0 – 7deg= $2,000
  - 7 – 25deg = $3,000
  - 25 – 40deg = $9,000
  - 40+deg = $15,000
- Clearing Cost per Acre of Forest = $3,800
- Land Cost = 90% of the Fair Market Value (FairCash) from the Ohio County Tax Digest. Some parcels did not contain value information. For tracts that were abandoned coal fields, $1,000 per acre was used. For tracts that appeared to be primarily agriculture in use, $3,000 per acre was used.

Table 5.1 shows the break down of each costs considered for each Alternative Routes.

	ROUTE A	ROUTE B	ROUTE C	ROUTE D	ROUTE E	ROUTE F	ROUTE G	ROUTE H
LENGTH	15.5	13.8	13.2	16.8	16.5	14.8	14.1	17.7
Cost per Single Circuit Length	$4,650,000	$4,140,000	$3,960,000	$5,040,000	$4,950,000	$4,440,000	$4,230,000	$5,310,000
Angle Cost	$170,000	$111,000	$113,000	$115,000	$195,000	$136,000	$138,000	$110,000
Forested Acres	70.5	69.0	82.9	90.2	68.0	66.5	80.4	87.8
Clearing Cost	$267,900	$262,200	$315,020	$342,760	$258,400	$252,700	$305,520	$333,640
FMV	$213,236	$203,848	$191,161	$256,211	$218,887	$209,500	$196,812	$261,863
90% FMV	$191,912	$183,463	$172,045	$230,590	$196,998	$188,550	$177,131	$235,677
Total	**$5,279,812**	**$4,696,663**	**$4,560,065**	**$5,728,350**	**$5,600,398**	**$5,017,250**	**$4,850,651**	**$5,989,317**

Table 5.1 – Cost Worksheet

5.2. Raw Statistics and Normalized Statistics

Built	Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H
Feature	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Relocated Residences (within 100' Corridor)	0	0	0	0	0	0	0	0
Normalized	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proximity to Residences (300')	16	6	3	5	15	6	4	6
Normalized	1.0	0.2	0.0	0.2	0.9	0.2	0.1	0.2
Proposed Developments	0	0	0	0	0	0	0	0
Normalized	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proximity to Commercial Buildings (300')	0	0	0	0	0	0	0	0
Normalized	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proximity to Industrial Buildings (300')	0	0	0	0	0	0	0	0
Normalized	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
School, DayCare, Church, Cemetery, Park Parcels (#)	0	0	0	0	1	1	1	1
Normalized	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0	0	0	0	0	0	0	0
Normalized	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural								
Natural Forests (Acres)	70.5	69.0	82.8	90.2	68.0	66.5	80.3	87.8
Normalized	0.2	0.1	0.7	1.0	0.1	0.0	0.6	0.9
Stream/River Crossings	22	22	21	25	21	21	20	24
Normalized	0.4	0.4	0.2	1.0	0.2	0.2	0.0	0.8
Wetland Areas (Acres)	5.9	6.3	5.7	11.9	3.7	4.2	3.6	9.7
Normalized	0.3	0.3	0.3	1.0	0.0	0.1	0.0	0.7
Floodplain Areas (Acres)	31.1	28.7	28.7	56.1	25.1	22.7	22.7	50.0
Normalized	0.3	0.2	0.2	1.0	0.1	0.0	0.0	0.8
Engineering								
Length (Miles)	15.5	13.8	13.2	16.8	16.5	14.8	14.1	17.7
Normalized	0.5	0.1	0.0	0.8	0.7	0.4	0.2	1.0
Percent of Rebuild with Existing T/L*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Normalized	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Inverted	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent of Co-location with Existing Utility*	72.3	36.2	35.6	74.4	81.8	49.3	40.4	87.6
Normalized	0.7	0.0	0.0	0.7	0.9	0.3	0.1	1.0
Inverted	0.3	1.0	1.0	0.3	0.1	0.7	0.9	0.0
Number of Parcels	75	68	57	72	84	77	66	81
Normalized	0.7	0.4	0.0	0.6	1.0	0.7	0.3	0.9
Total Project Costs	$5,279,812	$4,696,663	$4,560,065	$5,728,350	$5,600,398	$5,017,250	$4,850,651	$5,989,317
Normalized	0.5	0.1	0.0	0.8	0.7	0.3	0.2	1.0

Table 5.2a – Raw Statistics and Normalized Statistics

Figure 5.2a compares the difference between the number of parcels crossed between each alternative route.

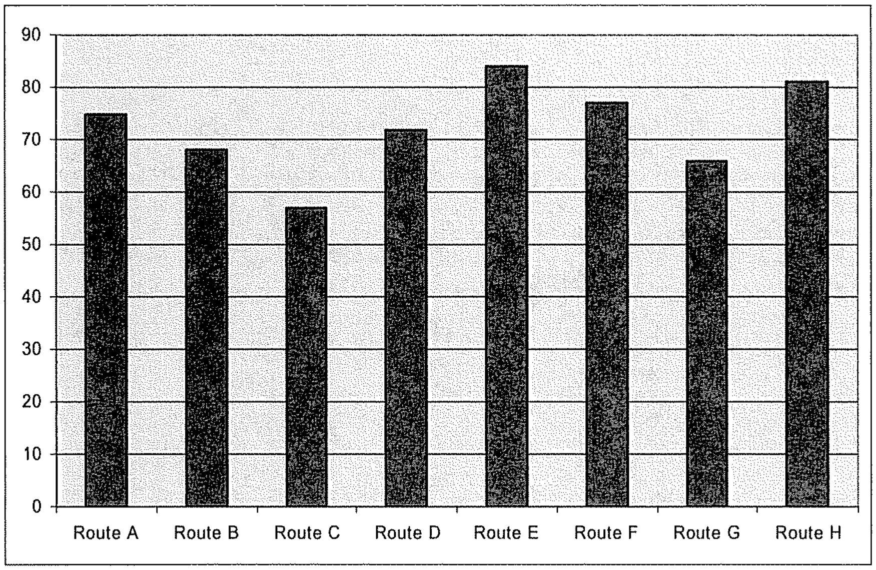


Figure 5.2a – Number of Parcels Crossed

Figure 5.2b compares the difference between the relative cost between each alternative route.

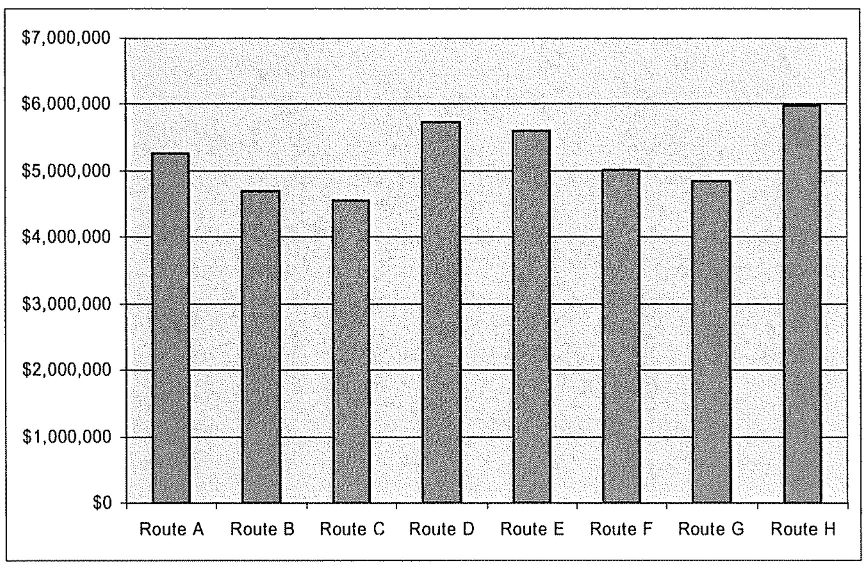


Figure 5.2b – Relative Cost

5.3. Alternative Route Evaluation Matrix

The internal siting team that developed the alternative routes also determined a set of weights for the criteria within the Alternative Route Evaluation Matrices.

5.3.1. Emphasis on Built Environment

Built	72%	Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Residences within the ROW	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	60.0%	1.00	0.23	0.00	0.15	0.92	0.23	0.08	0.23
Weighted		0.60	0.14	0.00	0.09	0.55	0.14	0.05	0.14
Proposed Residential Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	40.0%	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Weighted		0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.60	0.14	0.00	0.09	0.95	0.54	0.45	0.54
WEIGHTED TOTAL		0.43	0.10	0.00	0.07	0.69	0.39	0.32	0.39
Natural	14%								
Natural Forests (Acres)	25.0%	0.17	0.11	0.69	1.00	0.06	0.00	0.58	0.90
Weighted		0.04	0.03	0.17	0.25	0.02	0.00	0.15	0.22
Stream/River Crossings	10.0%	0.40	0.40	0.20	1.00	0.20	0.20	0.00	0.80
Weighted		0.04	0.04	0.02	0.10	0.02	0.02	0.00	0.08
Wetland Areas (Acres)	40.0%	0.28	0.33	0.25	1.00	0.01	0.07	0.00	0.73
Weighted		0.11	0.13	0.10	0.40	0.00	0.03	0.00	0.29
Floodplain Areas (Acres)	25.0%	0.25	0.18	0.18	1.00	0.07	0.00	0.00	0.82
Weighted		0.06	0.04	0.04	0.25	0.02	0.00	0.00	0.20
TOTAL	100.0%	0.26	0.24	0.34	1.00	0.06	0.05	0.15	0.80
WEIGHTED TOTAL		0.04	0.03	0.05	0.14	0.01	0.01	0.02	0.11
Engineering	14%								
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Co-location with Existing T/L*	33.4%	0.29	0.99	1.00	0.25	0.11	0.74	0.91	0.00
Weighted		0.10	0.33	0.33	0.08	0.04	0.25	0.30	0.00
Total Project Costs	66.6%	0.50	0.10	0.00	0.82	0.73	0.32	0.20	1.00
Weighted		0.34	0.06	0.00	0.54	0.48	0.21	0.14	0.67
TOTAL	100.0%	0.43	0.39	0.33	0.63	0.52	0.46	0.44	0.67
WEIGHTED TOTAL		0.06	0.06	0.05	0.09	0.07	0.06	0.06	0.09
SUM OF WEIGHTED TOTALS		0.53	0.19	0.09	0.29	0.77	0.46	0.40	0.59
RANK		**6**	**2**	**1**	**3**	**8**	**5**	**4**	**7**
* Inverted for calculations									

Table 5.3.1 – Alternative Route Evaluation Matrix with Emphasis on the Built Environment

5.3.2. Emphasis on Engineering Concerns

Built	14%	Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Residences within the ROW	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	60.0%	1.00	0.23	0.00	0.15	0.92	0.23	0.08	0.23
Weighted		0.60	0.14	0.00	0.09	0.55	0.14	0.05	0.14
Proposed Residential Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	40.0%	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Weighted		0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.60	0.14	0.00	0.09	0.95	0.54	0.45	0.54
WEIGHTED TOTAL		0.08	0.02	0.00	0.01	0.13	0.08	0.06	0.08
Natural	14%								
Natural Forests (Acres)	42.6%	0.17	0.11	0.69	1.00	0.06	0.00	0.58	0.90
Weighted		0.07	0.04	0.29	0.43	0.03	0.00	0.25	0.38
Stream/River Crossings	12.0%	0.40	0.40	0.20	1.00	0.20	0.20	0.00	0.80
Weighted		0.05	0.05	0.02	0.12	0.02	0.02	0.00	0.10
Wetland Areas (Acres)	41.9%	0.28	0.33	0.25	1.00	0.01	0.07	0.00	0.73
Weighted		0.12	0.14	0.11	0.42	0.01	0.03	0.00	0.31
Floodplain Areas (Acres)	3.5%	0.25	0.18	0.18	1.00	0.07	0.00	0.00	0.82
Weighted		0.01	0.01	0.01	0.04	0.00	0.00	0.00	0.03
TOTAL	100.0%	0.24	0.24	0.43	1.00	0.06	0.05	0.25	0.82
WEIGHTED TOTAL		0.03	0.03	0.06	0.14	0.01	0.01	0.03	0.11
Engineering	72%								
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Co-location with Existing T/L*	33.4%	0.29	0.99	1.00	0.25	0.11	0.74	0.91	0.00
Weighted		0.10	0.33	0.33	0.08	0.04	0.25	0.30	0.00
Total Project Costs	66.6%	0.50	0.10	0.00	0.82	0.73	0.32	0.20	1.00
Weighted		0.34	0.06	0.00	0.54	0.48	0.21	0.14	0.67
TOTAL	100.0%	0.43	0.39	0.33	0.63	0.52	0.46	0.44	0.67
WEIGHTED TOTAL		0.31	0.28	0.24	0.45	0.38	0.33	0.32	0.48
SUM OF WEIGHTED TOTALS		0.43	0.34	0.30	0.61	0.52	0.41	0.41	0.67
RANK		**5**	**2**	**1**	**7**	**6**	**4**	**3**	**8**

* Inverted for calculations

Table 5.3.2 – Alternative Route Evaluation Matrix with Emphasis on Engineering Concerns

5.3.3. Emphasis on Natural Environment

Built	14%	Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Residences within the ROW	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	60.0%	1.00	0.23	0.00	0.15	0.92	0.23	0.08	0.23
Weighted		0.60	0.14	0.00	0.09	0.55	0.14	0.05	0.14
Proposed Residential Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	40.0%	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Weighted		0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.60	0.14	0.00	0.09	0.95	0.54	0.45	0.54
WEIGHTED TOTAL		0.08	0.02	0.00	0.01	0.13	0.08	0.06	0.08
Natural	72%								
Natural Forests (Acres)	42.6%	0.17	0.11	0.69	1.00	0.06	0.00	0.58	0.90
Weighted		0.07	0.04	0.29	0.43	0.03	0.00	0.25	0.38
Stream/River Crossings	12.0%	0.40	0.40	0.20	1.00	0.20	0.20	0.00	0.80
Weighted		0.05	0.05	0.02	0.12	0.02	0.02	0.00	0.10
Wetland Areas (Acres)	41.9%	0.28	0.33	0.25	1.00	0.01	0.07	0.00	0.73
Weighted		0.12	0.14	0.11	0.42	0.01	0.03	0.00	0.31
Floodplain Areas (Acres)	3.5%	0.25	0.18	0.18	1.00	0.07	0.00	0.00	0.82
Weighted		0.01	0.01	0.01	0.04	0.00	0.00	0.00	0.03
TOTAL	100.0%	0.24	0.24	0.43	1.00	0.06	0.05	0.25	0.82
WEIGHTED TOTAL		0.18	0.17	0.31	0.72	0.04	0.04	0.18	0.59
Engineering	14%								
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Co-location with Existing T/L*	33.4%	0.29	0.99	1.00	0.25	0.11	0.74	0.91	0.00
Weighted		0.10	0.33	0.33	0.08	0.04	0.25	0.30	0.00
Total Project Costs	66.6%	0.50	0.10	0.00	0.82	0.73	0.32	0.20	1.00
Weighted		0.34	0.06	0.00	0.54	0.48	0.21	0.14	0.67
TOTAL	100.0%	0.43	0.39	0.33	0.63	0.52	0.46	0.44	0.67
WEIGHTED TOTAL		0.06	0.06	0.05	0.09	0.07	0.06	0.06	0.09
SUM OF WEIGHTED TOTALS		0.32	0.24	0.36	0.82	0.25	0.18	0.30	0.76
RANK		5	2	6	8	3	1	4	7
* Inverted for calculations									

Table 5.3.3 – Alternative Route Evaluation Matrix with Emphasis on the Natural Environment

5.3.4. Equal Consideration of Categories (Simple Average)

Built	33%	Route A	Route B	Route C	Route D	Route E	Route F	Route G	Route H
Feature		Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit
Residences within the ROW	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Residences (300')	60.0%	1.00	0.23	0.00	0.15	0.92	0.23	0.08	0.23
Weighted		0.60	0.14	0.00	0.09	0.55	0.14	0.05	0.14
Proposed Residential Developments	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Commercial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Proximity to Industrial Buildings (300')	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School, DayCare, Church, Cemetery, Park Parcels (#)	40.0%	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Weighted		0.00	0.00	0.00	0.00	0.40	0.40	0.40	0.40
NRHP Listed/Eligible Strucs./Districts (1500' from edge of R/W)	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.0%	0.60	0.14	0.00	0.09	0.95	0.54	0.45	0.54
WEIGHTED TOTAL		0.20	0.05	0.00	0.03	0.31	0.18	0.15	0.18
Natural	33%								
Natural Forests (Acres)	42.6%	0.17	0.11	0.69	1.00	0.06	0.00	0.58	0.90
Weighted		0.07	0.04	0.29	0.43	0.03	0.00	0.25	0.38
Stream/River Crossings	12.0%	0.40	0.40	0.20	1.00	0.20	0.20	0.00	0.80
Weighted		0.05	0.05	0.02	0.12	0.02	0.02	0.00	0.10
Wetland Areas (Acres)	41.9%	0.28	0.33	0.25	1.00	0.01	0.07	0.00	0.73
Weighted		0.12	0.14	0.11	0.42	0.01	0.03	0.00	0.31
Floodplain Areas (Acres)	3.5%	0.25	0.18	0.18	1.00	0.07	0.00	0.00	0.82
Weighted		0.01	0.01	0.01	0.04	0.00	0.00	0.00	0.03
TOTAL	100.0%	0.24	0.24	0.43	1.00	0.06	0.05	0.25	0.82
WEIGHTED TOTAL		0.08	0.08	0.14	0.33	0.02	0.02	0.08	0.27
Engineering	33%								
Percent of Rebuild with Existing T/L*	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weighted		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent of Co-location with Existing T/L*	33.4%	0.29	0.99	1.00	0.25	0.11	0.74	0.91	0.00
Weighted		0.10	0.33	0.33	0.08	0.04	0.25	0.30	0.00
Total Project Costs	66.6%	0.50	0.10	0.00	0.82	0.73	0.32	0.20	1.00
Weighted		0.34	0.06	0.00	0.54	0.48	0.21	0.14	0.67
TOTAL	100.0%	0.43	0.39	0.33	0.63	0.52	0.46	0.44	0.67
WEIGHTED TOTAL		0.14	0.13	0.11	0.21	0.17	0.15	0.14	0.22
SUM OF WEIGHTED TOTALS		0.42	0.25	0.25	0.57	0.51	0.35	0.37	0.67
RANK		5	2	1	7	6	3	4	8
* Inverted for calculations									

Table 5.3.4 – Alternative Route Evaluation Matrix with all Perspectives considered equal

5.4. Top Routes:

After evaluating all routes within the network of alternatives, Route B and C (see Figure 5.4b) surfaced to be the most suitable. Figure 5.4a demonstrates which routes score better. Route B and Route C score visibly better in every category except for the Natural Environment Perspective.

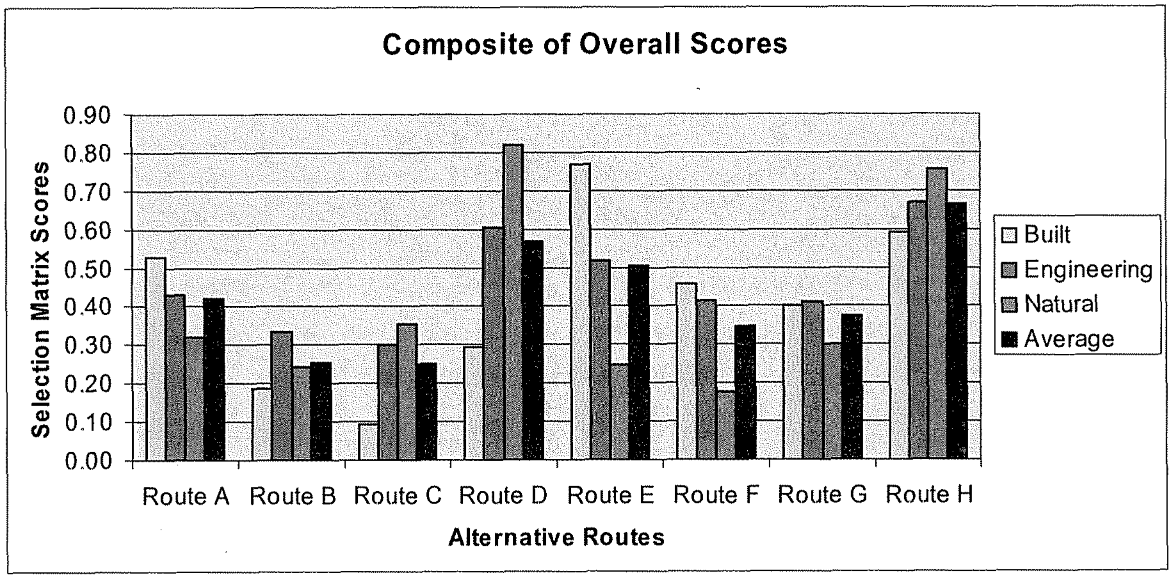


Figure 5.4a – Comparison of Overall Scores from each Alternative Route Evaluation Matrices

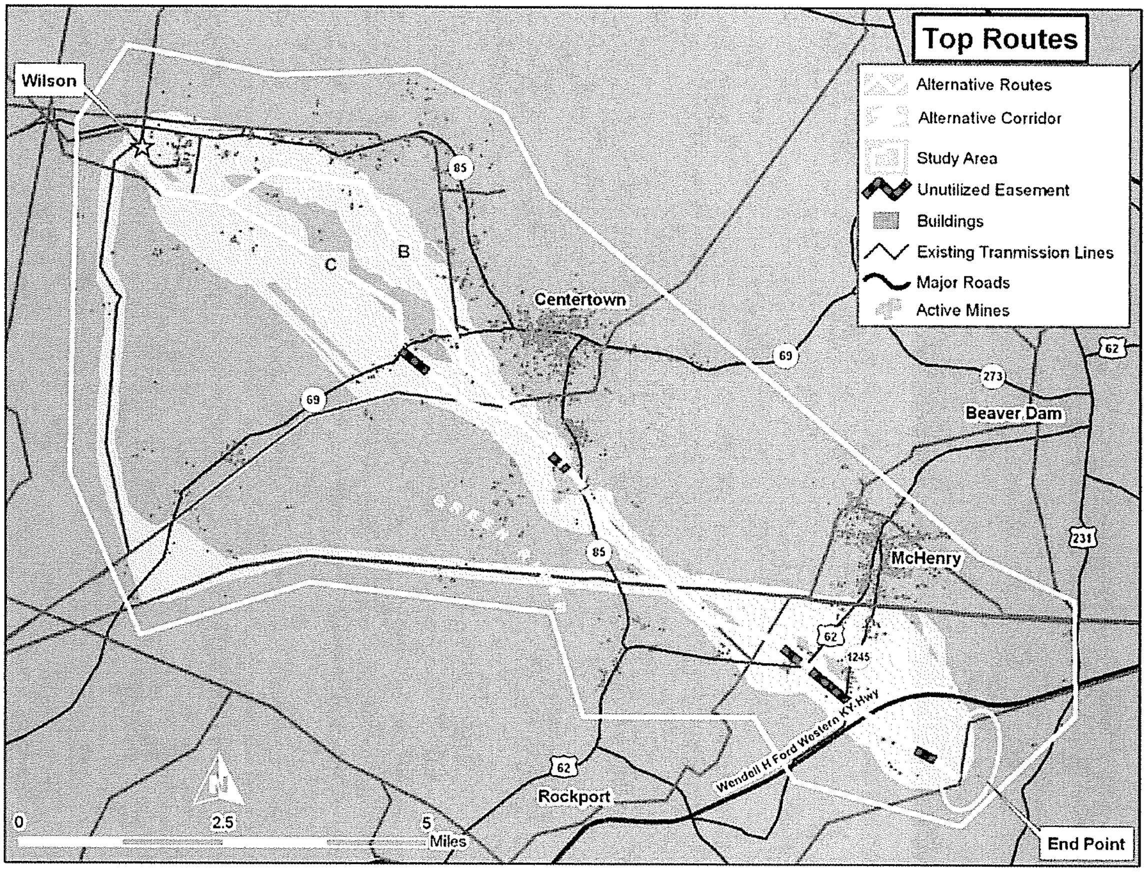


Figure 5.4b – Top Routes

5.4.1. Route B:

Route B scores best in the Simple Average Selection Matrix. It scores second best in the Built Environment Emphasis Selection Matrix, Engineering Concern Emphasis Selection Matrix, and Natural Environment Emphasis Selection Matrix.

Route B most closely resembles the Natural Environment Corridor. It has the second lowest cost of all the routes, it crosses the third lowest number of parcels, and it is the second shortest route.

5.4.2. Route C:

Route C scores best in all Selection Matrices except the Natural Environment Emphasis, where it ranks sixth.

Route C most closely resembles the Built Environment Corridor. Route C is the shortest route, has the lowest cost, impacts the least parcels, and is in close proximity to the lowest number of residents.

5.5. Expert Judgment:

In the Expert Judgment Matrix (see Table 5.5), the top routes from the Route Selection Matrix are examined by the routing team. For this project the team determined that Schedule Delay Risks was the greatest concern to this project followed by Construction and Maintenance Accessibility Issues and Community Issues being equal. The lowest emphasis was placed on Visual Issues.

Both Route B and C are very similar in all of the Expert Judgment issues. Approximately 64% of their length is the same.

For Schedule Delay Risk, Route B received a 1.5 and Route C received a 1. Route C follows the same alignment as the canceled East Kentucky Power Cooperative project, Wilson - Aberdeen. Much of the field surveys, design, material purchase, and some of the easement have been acquired. Therefore, there is less work (time) required to develop this project along this same alignment. In the area where Route B and C differ, Route B takes a different path through more agricultural areas than Route C. Since much of the surveys, design, and land negotiations have been completed, Route C received a more favorable score.

Route B was given a score of 1.5 (in between a low impact and medium impact) for visual issues. The section that differs from Route C is in a more open environment and closer to a road and homes. This makes this section more visible to the community than Route C. This route also received a 1.5 in Community Issues for the same reasons. Route C received a 1 for both of these issues since this section of the route is further away from people and is in a more forested environment. Also, due to the previous study most of the land owners along Route C are already aware of a future transmission line project for Route C.

For Construction/Maintenance Accessibility Issues, Route B received a 1 and Route C received a 1.5. Since Route B is in a more open environment it will be more easily accessed and would have less clearing. However, there could be some limitations to the construction window due to cultivation activities in the agricultural areas.

EXPERT JUDGMENT 1 = Low Impact 2 = Medium Impact 3 = High Impact

	Per Project	Route B	Route C
Visual Issues	10%	1.5	1
Weighted		0.15	0.1
Community Issues	25%	1.5	1
Weighted		0.375	0.25
Schedule Delay Risk	40%	1.5	1
Weighted		0.6	0.4
Construction/ Maintenance Accessibility	25%	1	1.5
Weighted		0.25	0.375
TOTAL			
	100%	1.375	1.125

Table 5.5 – Expert Judgment Matrix

6. Conclusion:

Overall, Route C (see Figure 6.1) scores the best in Expert Judgment Matrix and is therefore the preferred corridor.

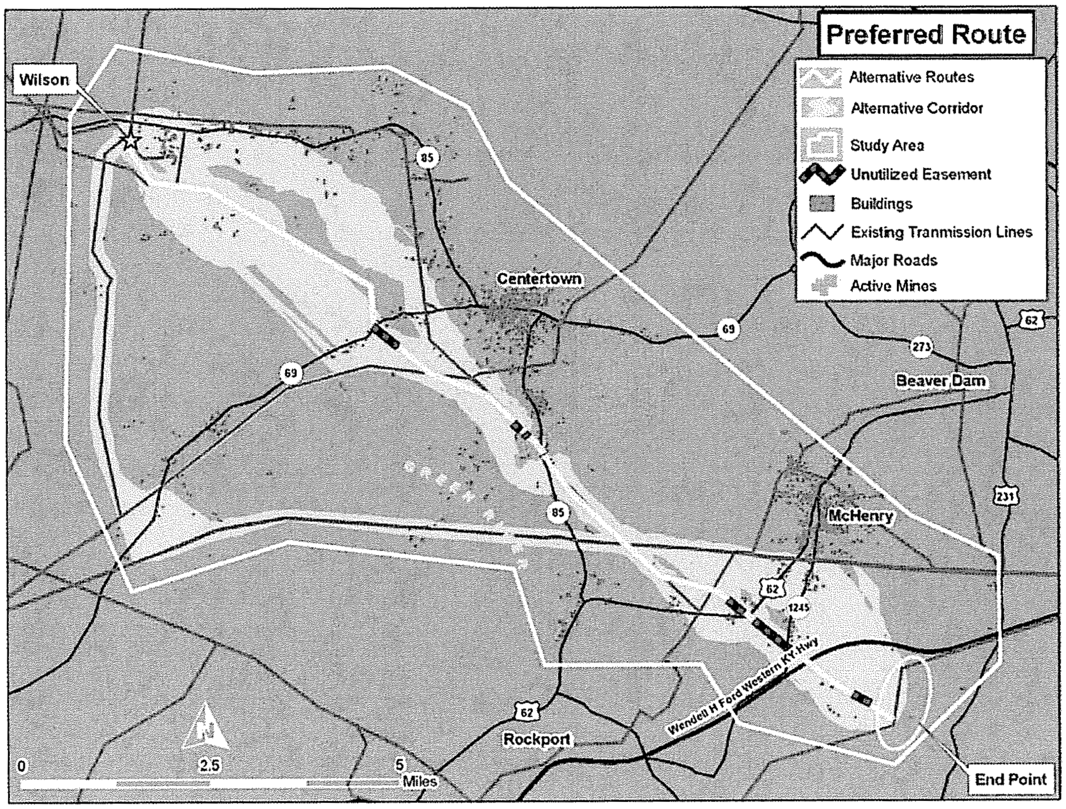
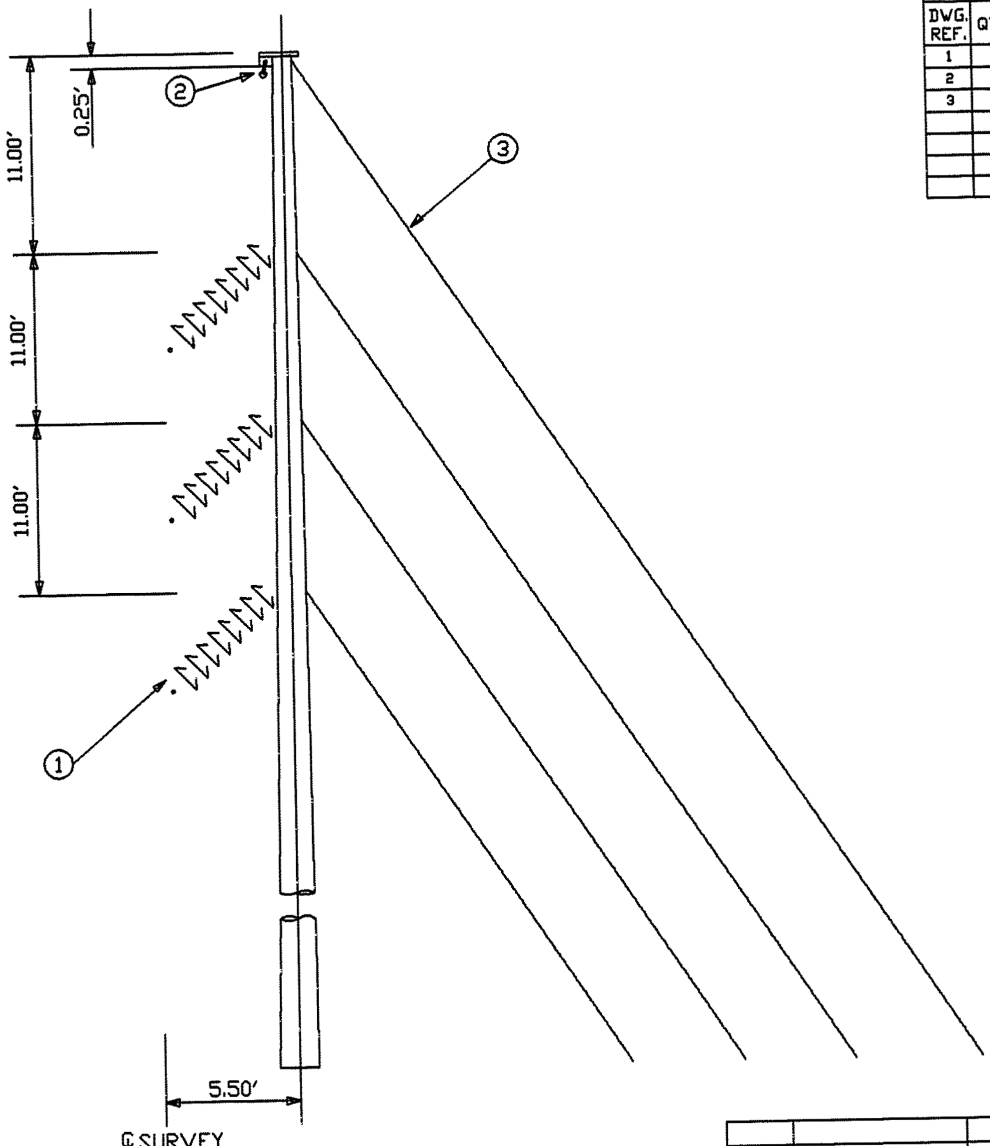
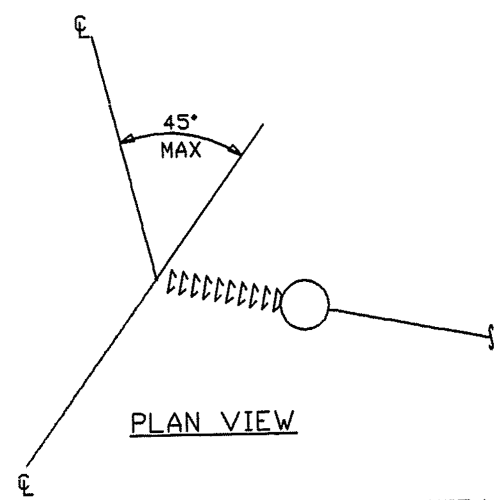


Figure 6.1 – Preferred Route



TS-4S-161		LIST OF MATERIALS			
DWG. REF.	QTY	DESCRIPTION	ITEM	DET.	CODE
1	3	INSULATOR ASS'Y ANGLE		TM-1C2-161	
2	1	OPGW SUSPENSION ASSEMBLY		TM-SD	
3	4	GUY ATTACHMENT ASSEMBLY		TG-31A	

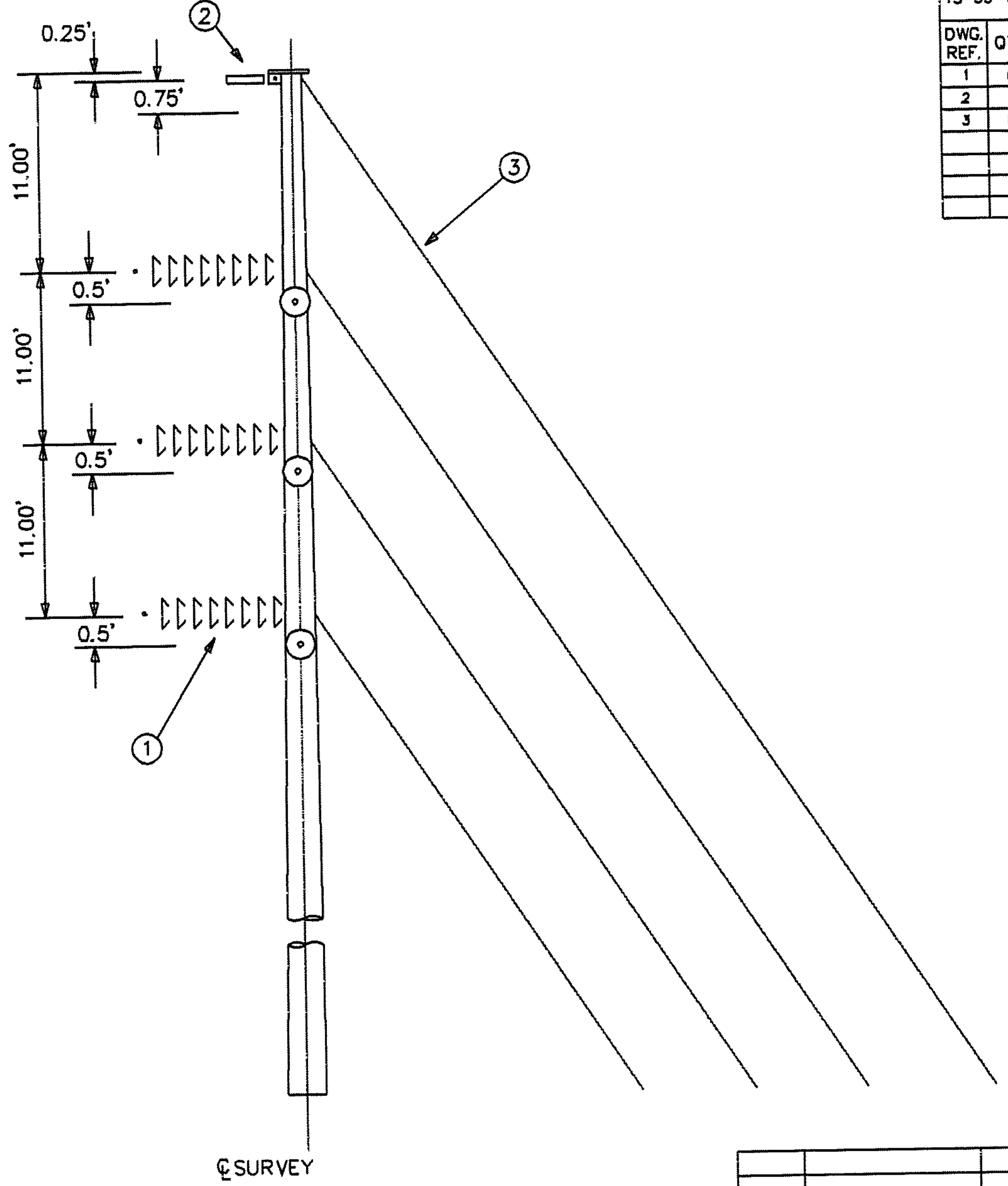


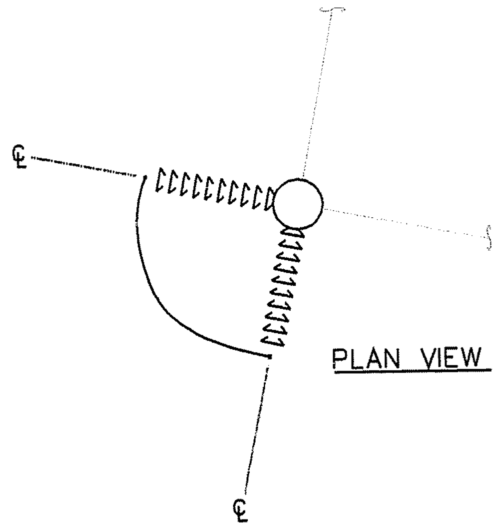
PLAN VIEW

EXHIBIT C SHEET 1

TRANSMISSION LINE STEEL STRUCTURE		
VERTICAL MEDIUM ANGLE		
NO. / REVISION / DATE	DWN T. MUMM; DATE 6/24/05; CHECKED G. HARVEY	TS-4S-161

TS-5S-161	LIST OF MATERIALS				
DWG. REF.	QTY	DESCRIPTION	ITEM	DET.	CODE
1	6	DEADEND INSULATOR ASSEMBLY		TM-1D-161	
2	1	OPGW DEADEND ASSEMBLY		TM-DE2	
3	8	GUY ATTACHMENT ASSEMBLY		TG-31A	





PLAN VIEW

EXHIBIT C SHEET 2

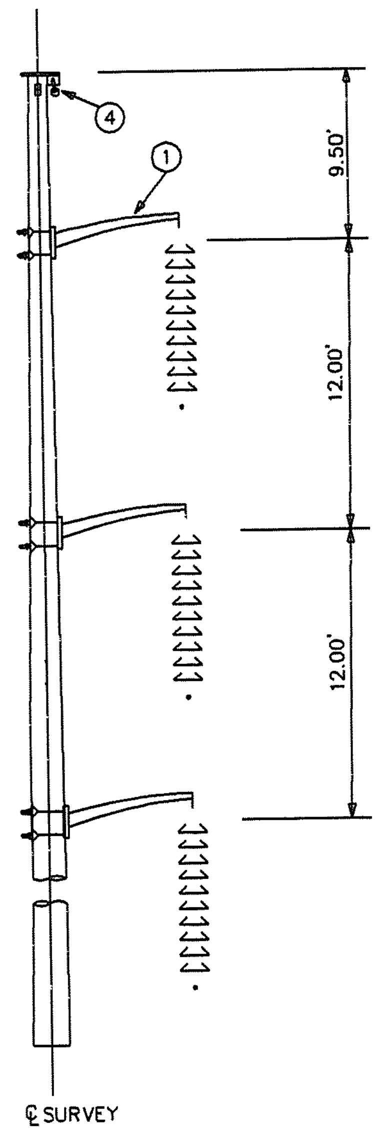
TRANSMISSION LINE STEEL STRUCTURE

VERTICAL DOUBLE DEADEND

NO.	REVISION	DATE

DWN T. MUMM
DATE 6/24/05
CHECKED G. HARVEY

TS-5S-161



TU-1AAS-161	LIST OF MATERIALS			

DWG. REF.	QTY	DESCRIPTION	ITEM	DET.	CODE
1	1	STEEL ARM ASS'Y HEV DUTY, 10 FT.		TM-115C	
2	2	STEEL ARM ASS'Y HEV DUTY, 9 FT.		TM-115C	
3	3	INSULATOR ASS'Y TANGENT		TM-1B-161	
4	1	OPGW ASSEMBLY, TANGENT		TM-S	

EXHIBIT C SHEET 3

TRANSMISSION LINE STEEL STRUCTURE

TANGENT STEEL UPSWEEP ARMS

NO.	REVISION	DATE

DWN T. MUMM
DATE 6/24/05
CHECKED G. HARVEY

TU-1AAS-161

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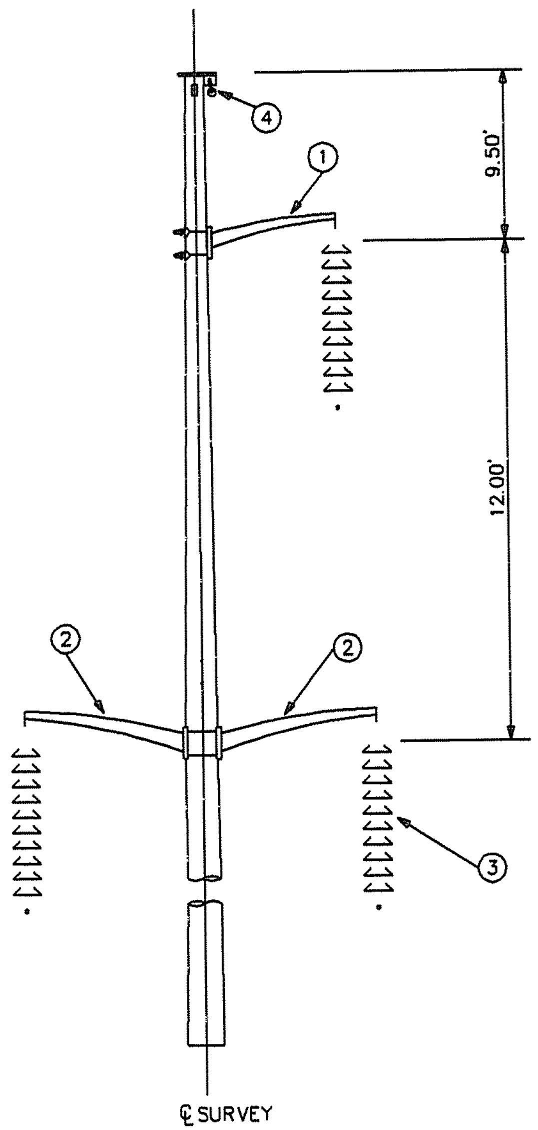

TU-1AS-161		LIST OF MATERIALS			
DWG. REF.	QTY	DESCRIPTION	ITEM	DET.	CODE
1	1	STEEL ARM ASS'Y HEV DUTY, 8 FT.		TM-115C	
2	2	STEEL ARM ASS'Y HEV DUTY, 9 FT.		TM-115C	
3	3	INSULATOR ASS'Y TANGENT		TM-1B-161	
4	1	OPGW ASSEMBLY, TANGENT		TM-S	

EXHIBIT C SHEET 4

TRANSMISSION LINE STEEL STRUCTURE

TANGENT STEEL UPSWEEP ARMS

NO.	REVISION	DATE

DWN T. MUMM
DATE 6/24/05
CHECKED D. HARVEY

TU-1AS-161

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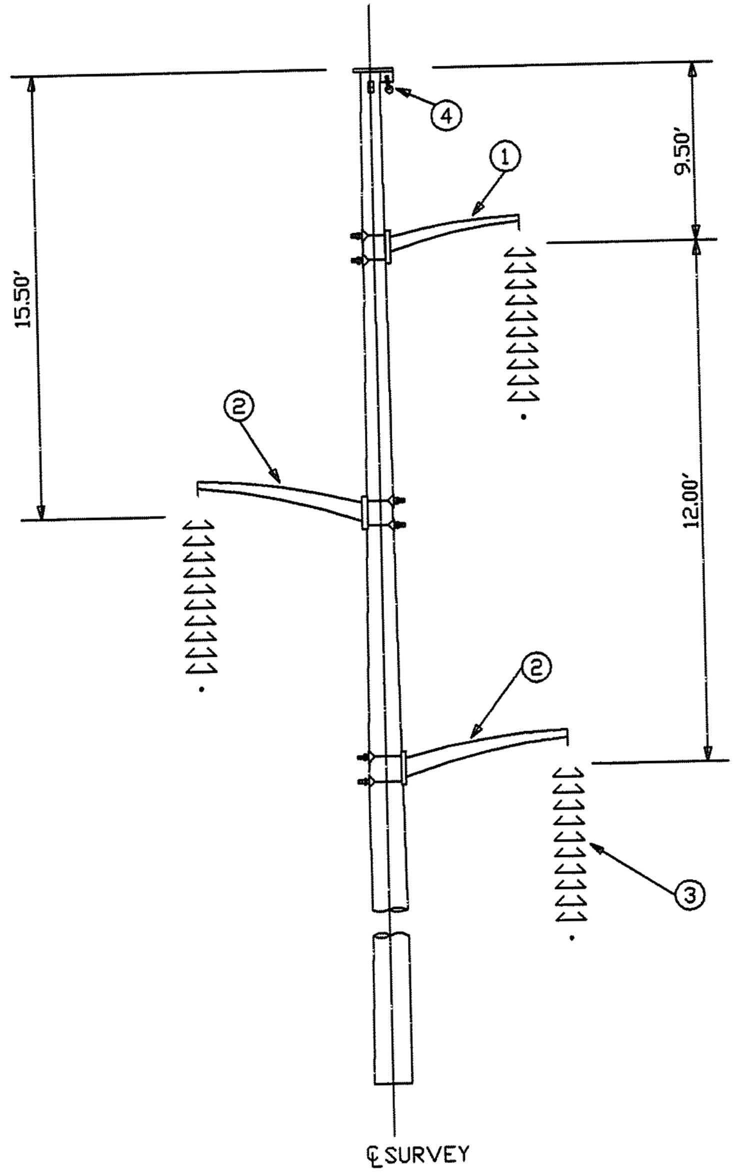

TU-1S-161		LIST OF MATERIALS			
DWG. REF.	QTY	DESCRIPTION	ITEM	DET.	CODE
1	1	STEEL ARM ASS'Y HEV DUTY, 8 FT.		TM-115C	
2	2	STEEL ARM ASS'Y HEV DUTY, 9 FT.		TM-115C	
3	3	INSULATOR ASS'Y TANGENT		TM-1B-161	
4	1	OPGW ASSEMBLY, TANGENT		TM-S	

EXHIBIT C SHEET 5

TRANSMISSION LINE STEEL STRUCTURE

TANGENT STEEL UPSWEEP ARMS

NO.	REVISION	DATE

DWN T. MUNN
DATE 6/24/03
CHECKED G. HARVEY

TU-1S-161

Exhibit D-1

June 12, 2007

A.P. Vaught Trust
J. Vince Vaught co-trustee
Linda Vaught, widow co-trustee
Barry Vaught co trustee
4788 State Route 85W
Centertown, KY 42328

RE: Notice of Proposed Electric Transmission Line Construction Project

Dear Mr. Vaught, Ms. Vaught and Mr. Vaught:

Big Rivers Electric Corporation ("Big Rivers") proposes to construct a 13 mile 161 kilovolt ("kV") transmission line in southwestern Ohio County, Kentucky. The purpose of the proposed transmission line is to increase Big Rivers' capability to transfer electrical power into, out of, and within its system for the benefit of the customers of its three member distribution cooperatives. This transmission line is part of the transmission line construction project for which East Kentucky Power Cooperative ("East Kentucky") previously obtained a certificate of public convenience and necessity. Although East Kentucky has cancelled its project, Big Rivers still needs to construct this 13 mile segment.

This line is expected to cross your property on an easement conveyed by you to East Kentucky. This easement has been purchased by Big Rivers.

The route for the proposed line begins at Big Rivers' Wilson Power Plant located approximately 6 miles west of Centertown in western Ohio County and extends 13 miles to the southeast to an existing Big Rivers 161 kV transmission line located approximately 3 miles southeast of McHenry in southern Ohio County. The proposed transmission line will typically be constructed using single steel pole structures. A map showing the route of the proposed line is attached to this letter.

Big Rivers plans to file an application with the Kentucky Public Service Commission ("Commission"), on or about June 25, 2007, seeking a certificate of public convenience and necessity authorizing this project. The purpose of the Commission's review of Big Rivers' application is to determine whether the proposed transmission line is required by the public convenience and necessity. You have the right to move to intervene and participate in the proceeding. You also have the right to request the Commission to conduct a public hearing on that application in Ohio County.

To request to intervene in the Commission's proceeding on Big Rivers' application for a certificate of public convenience and necessity, or to request a public hearing in that case, you should contact the Executive Director, Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602, telephone number (502) 564-3940. The docket number under which this application will be processed is 2007-00177. If you have any questions for me, you may reach me at (270) 827-2561.

Sincerely yours,

BIG RIVERS ELECTRIC CORPORATION

Robert M. Warren
Engineering Supervisor

Exhibit D-2

June 12, 2007

Rex Igleheart and Margaret Igleheart
295 Kirtley River Lane
Centertown, KY 42328

RE: Notice of Proposed Electric Transmission Line Construction Project

Dear Mr. and Mrs. Igleheart:

Big Rivers Electric Corporation ("Big Rivers") proposes to construct a 13 mile 161 kilovolt ("kV") transmission line in southwestern Ohio County, Kentucky. The purpose of the proposed transmission line is to increase Big Rivers' capability to transfer electrical power into, out of, and within its system for the benefit of the customers of its three member distribution cooperatives. This transmission line is part of the transmission line construction project for which East Kentucky Power Cooperative ("East Kentucky") previously obtained a certificate of public convenience and necessity. Although East Kentucky has cancelled its project, Big Rivers still needs to construct this 13 mile segment.

This line is expected to cross your property. Terril Riley, Real Estate Agent at Big Rivers or another representative from Big Rivers will be in contact with you to discuss purchasing an easement from you across your property for the proposed electric line.

The route for the proposed line begins at Big Rivers' Wilson Power Plant located approximately 6 miles west of Centertown in western Ohio County and extends 13 miles to the southeast to an existing Big Rivers 161 kV transmission line located approximately 3 miles southeast of McHenry in southern Ohio County. The proposed transmission line will typically be constructed using single steel pole structures. A map showing the route of the proposed line is attached to this letter.

Big Rivers plans to file an application with the Kentucky Public Service Commission ("Commission"), on or about June 25, 2007, seeking a certificate of public convenience and necessity authorizing this project. The purpose of the Commission's review of Big Rivers' application is to determine whether the proposed transmission line is required by the public convenience and necessity. You have the right to move to intervene and participate in the proceeding. You also have the right to request the Commission to conduct a public hearing on that application in Ohio County.

To request to intervene in the Commission's proceeding on Big Rivers' application for a certificate of public convenience and necessity, or to request a public hearing in that case, you should contact the Executive Director, Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602, telephone number (502) 564-3940. The docket number under which this application will be processed is 2007-00177. If you have any questions for me, you may reach me at (270) 827-2561.

Sincerely yours,

BIG RIVERS ELECTRIC CORPORATION

Glen Thweatt
Manager of Engineering and Energy Control

EXHIBIT E

Easements

Wilson 161 kV Line 19-F to 7-B Tap

Property Owner Name	Map Parcel	Address - Street	Address - City, State Zip	Easement Status
VAUGHT AP FAMILY TRUST	422	4788 State Route 85W	Centertown, KY 42328	S
IGLEHEART REX	417	295 Kirtley River Lane	Centertown, KY 42328	OG
IGLEHEART REXFORD F & MARGARET	413	296 Kirtley River Lane	Centertown, KY 42329	OG
IGLEHEART REX ETAL	411	297 Kirtley River Lane	Centertown, KY 42330	OG
HARREL LW ESTATE	408	312 North Vine Street	Haubstadt, IN 47639	OG
CENTRAL STATES COAL RESERVES	407	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	406	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	405	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
BEAVER DAM COAL COMPANY	404	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
WEST WALKER ONEIL	403	3914 Highway 764	Utica, KY 42376	S
WEST WALKER ONEIL	395	3915 Highway 764	Utica, KY 42377	S
Sanderfur Tyson C.	391	1449 Livermore Road	Hartford, KY 42347	S
SPINKS HAYWARD & NANCY	387	192 Windward Lane	Hartford, KY 42347	OG
CENTRAL STATES COAL RESERVES	385	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	381	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	380	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	376	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	375	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	374	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	373	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
GRIDER DENNIE LEE &	371	2515 Rockport Ceralvo Road	Centertown, KY 42328	S
WHITEHEAD EDWIN	365	1940 State Route 85E	Centertown, KY 42328	S
HOSKINS JERRY M & LINDA L	361	1783 Highway 85E	Centertown, KY 42328	S
NANCE ANN & RICK	357	1828 Highway 85E	Centertown, KY 42328	OG
GRIDER MIKEL R & CAROLYN M	356	854 State Route 85E	Centertown, KY 42328	S
NANCE ANN C & RICK E	355	1828 Highway 85E	Centertown, KY 42328	OG
CENTRAL STATES COAL RESERVES	354	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	353	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	351	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	347	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	346	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
BEAVER DAM COAL COMPANY	344	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	343	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG

LEGEND

S - Signed

OG - On Going

Easements
Wilson 161 kV Line 19-F to 7-B Tap

Property Owner Name	Map Parcel	Address - Street	Address - City, State Zip	Easement Status
JEFF STENBERG	342	7161 State Route 62W	Centertown, KY 42328	OG
CENTRAL STATES COAL RESERVES	339	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	337	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	334	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	331	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
CENTRAL STATES COAL RESERVES	330	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
DANIEL, NANCY K	329	5252 U. S. Highway 62W	Beaver Dam, KY 42320	S
DANIEL, NANCY K	316	5253 U. S. Highway 62W	Beaver Dam, KY 42321	S
CENTRAL STATES COAL RESERVES	314	7100 Eagle Crest Boulevard, Suite 200	Evansville, IN 47715-8152	OG
BLACK AG, LLC	306	701 Sharon Depoy Road	Greenville, KY 42345	OG
NBH, Lot 7	305c	5252 U. S. Highway 62W	Beaver Dam, KY 42320	S
NBH, Lot 6	305b	5253 U. S. Highway 62W	Beaver Dam, KY 42321	S
NBH, Lot 5	305a	5254 U. S. Highway 62W	Beaver Dam, KY 42322	S
STONE BRANDON	289a	789 Render Road	Beaver Dam, KY 42320	S
BAIZE RICK	289	1849 Highway 1245	Beaver Dam, KY 42320	S
N. B. H. INC	287	9824 Christi Ridge Way	Knoxville, TN 37931	S
TEMPLETON LAND, LLC	283	3948 Templeton	Lake Wales, FL 33898	OG
SCHROADER LILBURN	281	591 Happy Hollow Road	Beaver Dam, KY 42320	OG
SCHROADER LEONARD D & BETTY	278	119 W. 8th Street	Beaver Dam, KY 42320	S
TEMPLETON LAND, LLC	276	3948 Templeton	Lake Wales, FL 33898	OG
SAILING GILBERT & FLORA	275	1708 State Route 1245	Beaver Dam, KY 42320	S
SAILING GILBERT & FLORA	274	1708 State Route 1245	Beaver Dam, KY 42320	S
TEMPLETON LAND, LLC	272	3948 Templeton	Lake Wales, FL 33898	OG
TEMPLETON LAND, LLC	269	3948 Templeton	Lake Wales, FL 33898	OG
TEMPLETON LAND, LLC	268	3948 Templeton	Lake Wales, FL 33898	OG
BURDEN JOHN A	267	3743 Boulder Lane	Owensboro, KY 42303	OG

LEGEND
S - Signed
OG - On Going

EXHIBIT F-1

June 11, 2007

Notice of Proposed Electric Transmission Line Construction Project

Big Rivers Electric Corporation, a Western Kentucky electric generation and transmission cooperative ("Big Rivers") proposes to construct a 13 mile 161 kilovolt ("kV") transmission line in southwestern Ohio County, Kentucky. The purpose of the proposed transmission line is to increase Big Rivers' capability to transfer electrical power into, out of, and within its system for the benefit of the customers of its three member distribution cooperatives.

The route for the proposed line begins at Big Rivers' Wilson Power Plant located approximately 6 miles west of Centertown in western Ohio County and extends 13 miles to the southeast to an existing Big Rivers 161 kV transmission line located approximately 3 miles southeast of McHenry in southern Ohio County (see Proposed Line Route map below). This transmission line will be part of a transmission line construction project for which East Kentucky Power Cooperative ("East Kentucky") previously obtained a certificate of public convenience and necessity. Although East Kentucky has cancelled its project, Big Rivers still needs to construct this 13 mile segment. The transmission line will typically be constructed using single steel pole structures. Big Rivers either has or will send a letter to each property owner (according to Property Valuation Administrator records) over whose property the transmission line is expected to cross.

Big Rivers plans to file an application with the Kentucky Public Service Commission ("Commission"), on or about June 25, 2007, seeking a certificate of public convenience and necessity authorizing this project. The purpose of the Commission's review of Big Rivers' application is to determine whether the proposed transmission line is required by the public convenience and necessity. Interested persons have the right to move to intervene and participate in the proceeding. They also have the right to request the Commission to conduct a public hearing on that application in Ohio County.

Interested parties may request to intervene in the Commission's proceeding on Big Rivers' application for a certificate of public convenience and necessity, or may request a public hearing in that case by contacting the

Executive Director, Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602, telephone number (502) 564-3940. The docket number under which this application will be processed is 2007-00177. You may also direct questions to Big Rivers by contacting Glen Thweatt, Big Rivers Manager of Engineering & Energy Control, at (270) 827-2561.

[INSERT MAP]

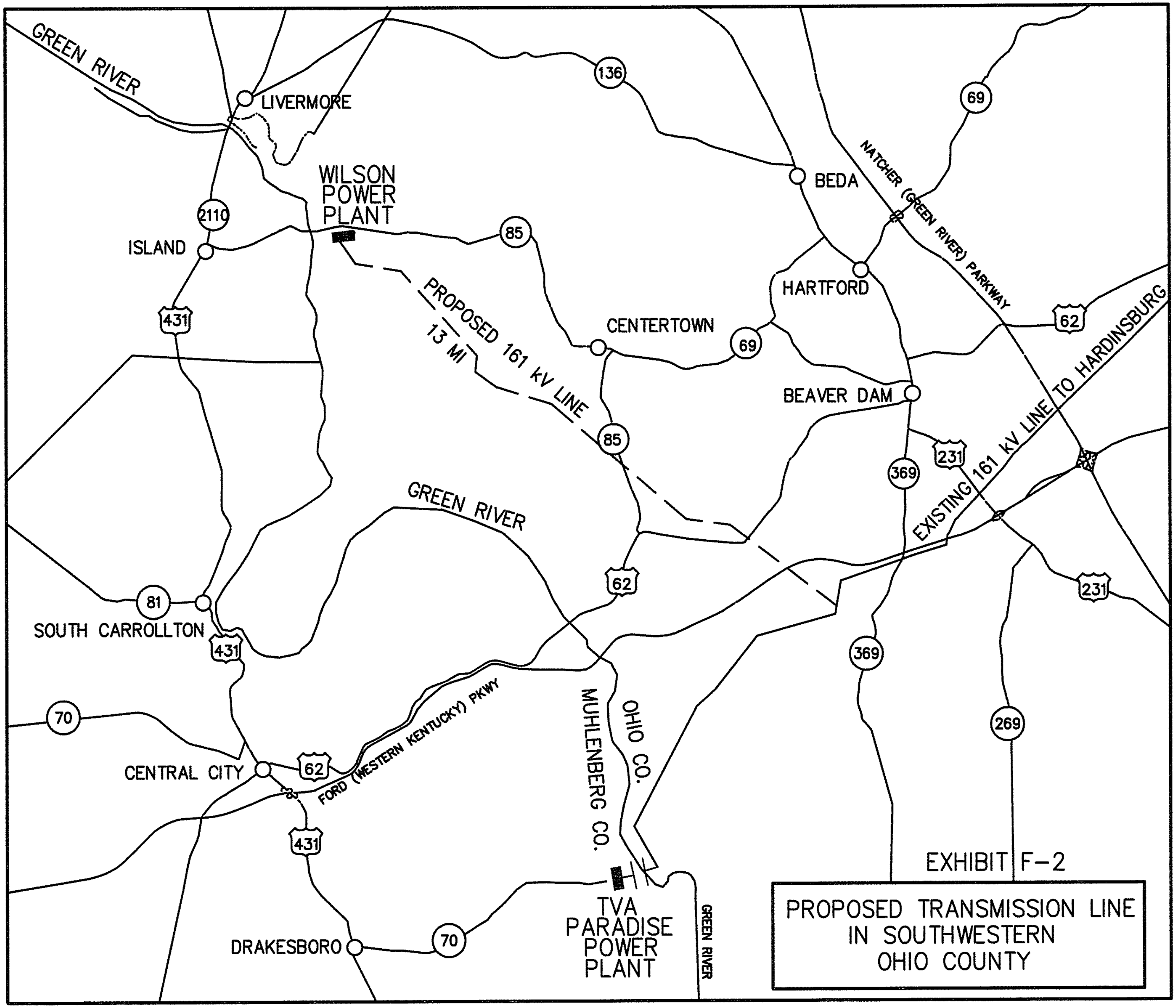

EXHIBIT F-2

PROPOSED TRANSMISSION LINE IN SOUTHWESTERN OHIO COUNTY