

TRANSMISSION SYSTEM REVIEW

**KENTUCKY MOUNTAIN POWER
APPLICATION FOR A
CONSTRUCTION CERTIFICATE
TO CONSTRUCT A
MERCHANT ELECTRIC
GENERATING FACILITY**

August 1, 2002

Prepared for:

**Kentucky State Board
on Electric Generation
and Transmission Siting**

Prepared by:

CAI Commonwealth Associates, Inc.
engineers • consultants • construction managers



August 1, 2002

Mr. Robert A. Amato, P.E.
Director, Div. of Engineering
Kentucky Public Service
211 Sower Blvd.
Frankfort, KY 40602

**SUBJECT: TRANSMISSION SYSTEM REVIEW,
KENTUCKY MOUNTAIN POWER PROJECT**

Dear Mr. Amato:

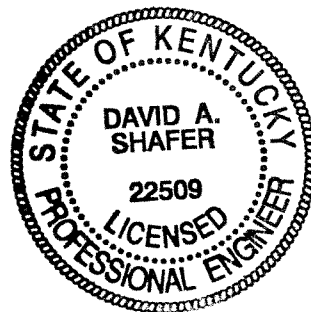
The enclosed report provides a summary of our analysis of the impact of the Kentucky Mountain Power Project on the reliability of the transmission grid, specifically with regard to impact on the reliability of service to retail customers.

From our review and analysis we conclude that the Kentucky Mountain Power Project will not decrease the reliability of service to retail customers.

Please call me if we can provide any additional information.

Sincerely,

David A. Shafer, P.E.
Manager, Electrical Systems
Kentucky License No. 22509



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Prepared by:

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At the offices of
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Approved for submittal:


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Manager, Electrical Systems

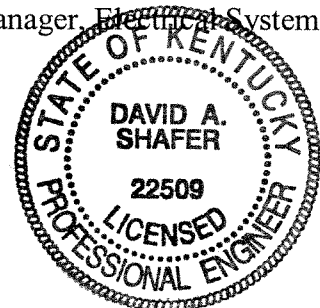


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INTRODUCTION

The General Assembly of the Commonwealth of Kentucky in May 2002 enacted legislation (SB257) to create The Kentucky State Board on Electric Generation and Transmission Siting (Board). The Board is responsible for issue of construction certificates for merchant electric generating facilities.

Obtaining a construction certificate for a merchant electric generating facility requires that an application be filed with the Board. The requirements of the application and the criteria for evaluation are provided in the statute.

Kentucky Mountain Power, LLC (Kentucky Mountain Power) is developing a 520 MW merchant power plant in Knott County near Talcum and has submitted an application to the Board in compliance with the statute.

While the requirements of the application are broad, this report evaluates only one aspect of those requirements, namely, the impact of the merchant power plant on the electric transmission system. According to KRS Chapter 278, Section 4. Paragraph 2.i., the completed application is required to include, “An analysis of the proposed facility’s projected effect on the electricity transmission system in Kentucky.”

The evaluation criterion to be used by the Board is provided in KRS Chapter 278, Section 6. Paragraph 1.f., “Whether the additional load imposed upon the electricity transmission system by use of the merchant electric generating facility will adversely affect the reliability of service for retail customers of electric utilities regulated by the Public Service Commission.”

Commonwealth Associates, Inc. (CAI), an engineering consulting firm that specializes in the analysis and design of high voltage power transmission systems, has been retained by the Board to assist in the evaluation of the affect of the proposed power plant on the electric transmission grid.

DESCRIPTION OF TRANSMISSION INTERCONNECTION

The project description as provided by Kentucky Mountain Power follows:

“Kentucky Mountain Power, LLC intends to construct its nominal 520 megawatt coal fired electrical generating facility in Knott County, 13 miles northeast of Hazard and approximately two miles North of Highway 80. The power plant will be located on a 195-acre knob known as “Potato Knob” and the facility will include an ash landfill approximately one mile South of the plant site on about 550 acres of mined out property leased from Appalachian Realty Company, and will convert an existing coal refuse impoundment into a freshwater reservoir on approximately 125 acres of leased property located 1½miles southwest of the plant site. The power plant will draw water from the North Fork of the Kentucky River through a pipeline to be constructed and will connect to AEP’s electrical grid at the Hazard and Beaver Creek substations via proposed transmission lines to be owned by AEP.”

The power plant will use two circulating fluidized bed (CFB) boilers that will burn a mixture of high-grade coal and waste coal. The steam will be supplied to a single steam turbine that will drive a 520 megawatt generator.

The utility transmission provider is Kentucky Power Company, an operating company of the American Electric Power (AEP) System. The plant is proposed to be interconnected to the AEP transmission grid via new 138 kV transmission lines as described below and as shown on the transmission map, provided as Exhibit 1.

1. Talcum Switching Station - A new 138 kV switching station will be constructed near the plant site and will connect the proposed generating plant to the following three new 138 kV circuits:
2. Talcum-Hiner-Hazard 138 kV Circuit: On new right-of-way, construct a new 9.75 mile single-circuit wood H-frame 138 kV line from Talcum to Hiner and a new 2.6 mile single-circuit wood H-frame 138 kV from Hiner to Hazard. On existing right-of-way between Hazard and Hiner remove 2.25 miles of existing 69 kV wood H-frame and construct a new double-circuit steel lattice line to carry the existing 69 kV line and the new 138 kV line.
3. Talcum-Harbert-Consolidated Coal-Beaver Creek 138 kV Circuit: On new right-of-way, construct a new 3.9 mile double-circuit steel lattice tower line between Talcum and Harbert. Remove 9.97 miles of existing wood H-frame 138 kV line between Consolidated Coal and Beaver Creek and replace it with a double-circuit 138 kV steel lattice line.
4. Talcum-Beaver Creek Circuit: This circuit will utilize the above listed double-circuit line sections between Talcum and Harbert and between Consolidated Coal and Beaver Creek to create a second circuit to Beaver Creek, including 9.25 miles of new wood H-frame single-circuit 138 kV line on parallel right-of-way between Harbert and Consolidated Coal.
5. Hiner Substation - A new 138/69 kV substation will be constructed near Bulan and connected to the new Talcum-Hiner-Hazard 138 kV line and to the existing Bonnyman-Hazard 69 kV Line.

In addition to the above listed system upgrades, additional upgrades are required at Harbert Substation, Beaver Creek Substation, and Hazard Substation and/or to the existing 138 kV and 69 kV transmission lines in the vicinities of these substations.

ANALYSIS

AEP prepared load flow, short circuit, and transient stability studies to evaluate the transmission interconnection of the power plant to the system. Copies of these studies are included in the Kentucky Mountain Power application. These studies are the basis of the Interconnection and Operating Agreement (Operating Agreement) between Kentucky Power Company (AEP) and Kentucky Mountain Power.

These studies and the operating agreement define in detail the required transmission facilities, the ownership, operation and maintenance responsibilities, cost responsibilities, and compliance requirements with regulatory requirements for reliability and safety.

Retail customers in the vicinity of the Kentucky Mountain Power project are served by a 69 kV and 138 kV transmission grid. The significant 138 kV substations are Consolidated Coal, Yellow Mountain, Harbert, and Spicewood (refer to Exhibit 1). A single radial 138 kV power line serves these customers from Beaver Creek Substation. As described above, the Kentucky Mountain Power project will interconnect into this circuit via the Harbert substation. This will provide a source of power to these substations from the west, in addition to the existing source from Beaver Creek, increasing the reliability of service to the customers served by this transmission line.

Also as described above, a proposed 138 kV transmission line will be constructed from the Kentucky Mountain Power plant to Hiner and Hazard. Hiner is a proposed 138/69 kV substation. This proposed line and substation at Hiner will reinforce the existing 69 kV transmission grid and improve the reliability of service to the customers presently served via the 69 kV.

The transmission map (Exhibit 1) shows a long transmission path from Beaver Creek to Pineville that operates at 138 and 161 kV. The purpose of this transmission line is to serve customers in Knott, Perry, and Leslie Counties via substations at Topmost, Beckham, Vicco, Hazard, and Leslie. These 138 kV substations support the underlying 69 kV transmission grid. The Kentucky Power Plant project provides an injection of power at Hazard, which is near midpoint of this long transmission path. This will increase the reliability of the 138 kV grid serving these locations.

The proposed transmission facilities that will interconnect the Kentucky Mountain Power plant will provide increased reliability whether or not the power plant is running.

Power Plants provide voltage support to the transmission grid. There are no existing power plants in the vicinity of the Kentucky Mountain Power plant. The presence of this plant will provide voltage regulating capability, which improves the power quality to customers in the area.

Exhibit 2 is a summary of two power flow models. The first is an AEP power flow model of 2002 Summer conditions prior to the Kentucky Mountain Power project in-service. This case is posted on the AEP OASIS page as the current year model for assessing the summer peak load conditions. The second case is based on an ECAR 2005 Summer case, but modified by a utility Task Force that was assembled by the Kentucky Public Service Commission to study the impact of the proposed merchant plant generation on the Kentucky transmission grid. This case was used by CAI to provide an independent review for the Kentucky Public Service Commission. CAI submitted this review in a report in December 2001.

The December 2001 report describes various models prepared to study all proposed merchant plants in Kentucky, including the Kentucky Mountain Power project. In the December report the

eastern Kentucky area was studied as Case 600 and included 2002 MW of proposed merchant generation located in Knott, Lawrence, and Martin counties. The study concluded that all 2002 MW could be accommodated without decreasing the reliability of the transmission grid.

CAI prepared additional analysis that compared existing 2002 Summer conditions without the KMP plant, and 2005 Summer conditions with and without the KMP plant. The power flows on the transmission system in the immediate vicinity of the plant are shown on Exhibit 2. The KMP plant injects 500 MW of power at the Talcum Substation. The normal power flows from Talcum are 139.9 MW to Harbert, 125.4 MW to Beaver Creek, and 234.7 MW to Hiner (Hazard). The transmission system can accommodate this level of power flow for both normal and single contingency conditions.

Transmission line losses on the lines in the vicinity of the KMP plant and for all of Kentucky are summarized on Exhibit 2. Increased power flows on the lines in the vicinity of the plant cause increases in transmission line losses on these lines, as would be expected. However, when the losses on all Kentucky transmission lines are calculated, total losses are reduced by approximately 20 MW. A reduction in overall line losses indicates that the power plant is located in a load area and, in general, is reducing overall transmission power flows into the area. This is an indication that the transmission system is less stressed.

CONCLUSIONS

On the basis of the review of information provided in the application, in telephone conversations with AEP, and from an independent power flow analysis, CAI concludes that the addition of a 520 MW power plant in Knott County near Talcum will not adversely impact the reliability of service to retail customers. Our conclusion is that the addition of the proposed power plant and the proposed transmission lines will improve the reliability of the transmission system that serves the substations identified in the "analysis" section of this report. This will increase reliability of service to those customers served by these substations, though the improvement will, most likely, be unnoticed by the customer. For other retail customers served by transmission lines and substations remote from those listed above, there would be no increase or decrease in the expected reliability of the transmission system.

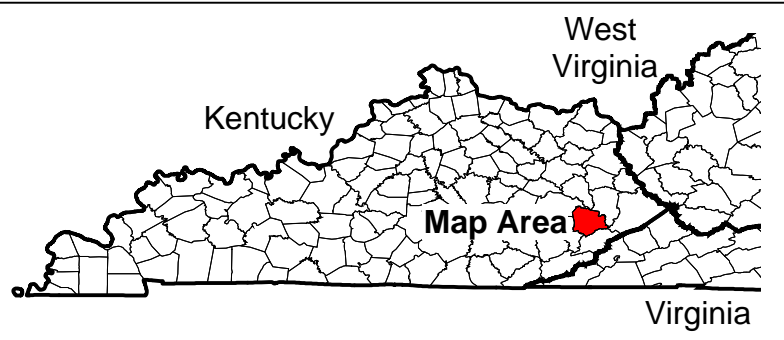
The studies and documentation provided by Kentucky Mountain Power provide evidence that the power plant can be reliably interconnected into the transmission grid. In addition to interconnection requirements, the merchant power plant will be required to arrange for transmission service for the delivery of the power generated to specific points of receipt. Depending upon the delivery point, additional transmission system improvements could be required. The Kentucky Mountain Power intent is to sell the power to a broker who in turn will sell the power to end-users and acquire the necessary transmission paths to accommodate the sales.

EXHIBITS

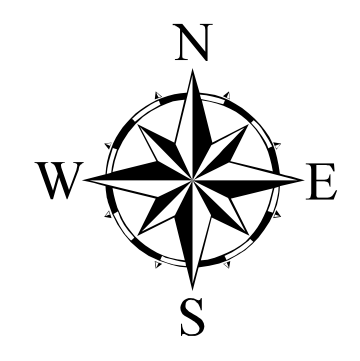
Kentucky Mountain Power, LLC

Knott County, Kentucky

07/26/2002



- 765 kV Transmission Line*
 - 500 kV Transmission Line*
 - 161 kV Transmission Line*
 - 138 kV Transmission Line*
- * Transmission line placements on map are approximate. Only selected transmission lines are shown on map.



- Substation
- Proposed Kentucky Mountain Power Generating Facility
- Fossil Fuel Steam Plant
- Park
- Knott County

CAI Commonwealth Associates, Inc.
engineers • consultants • construction managers

Base Map Source: Environmental Systems Research Institute (ESRI).

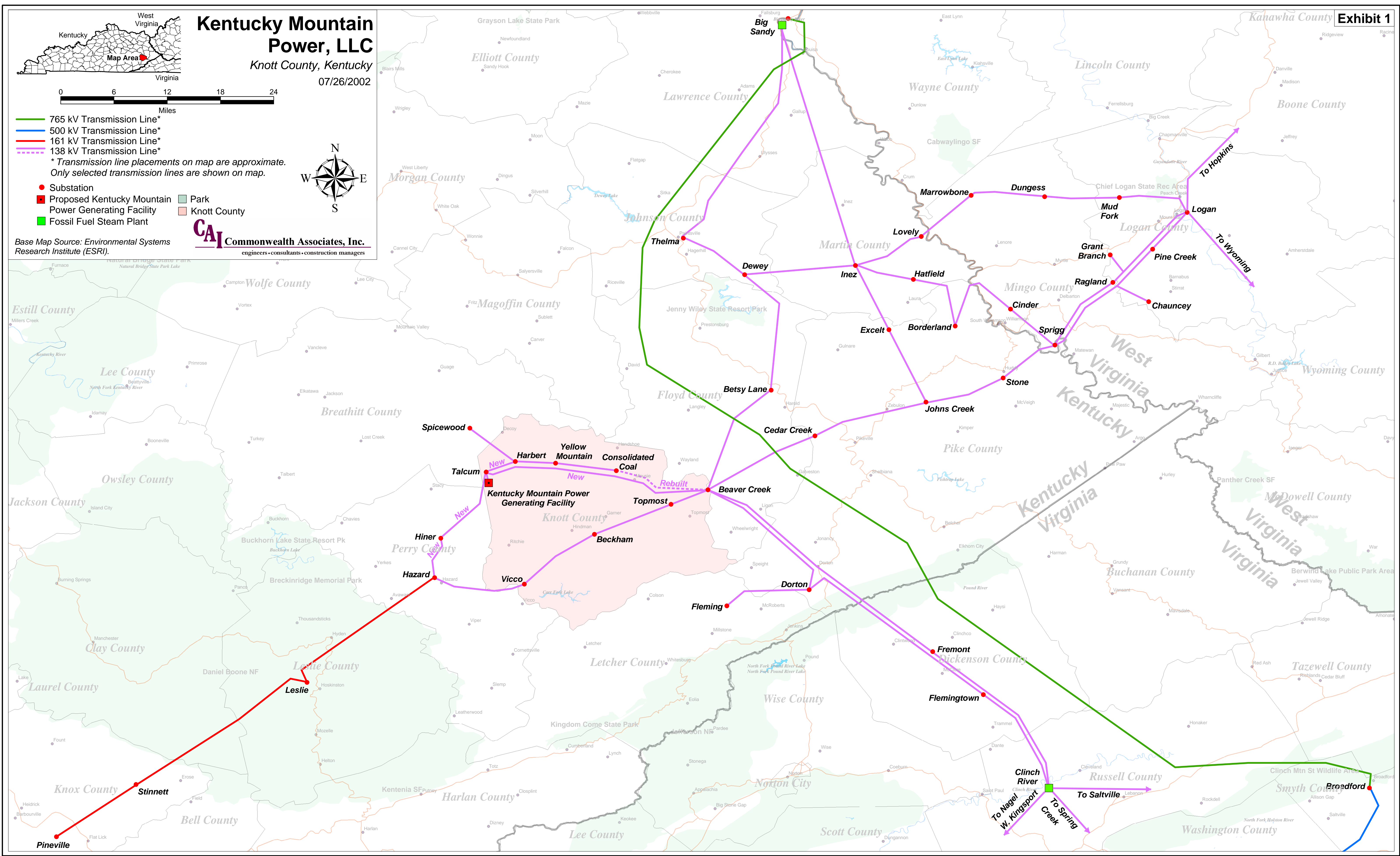


Exhibit 2
138 and 161 kV Transmission Power Flows and Losses
in the Vicinity of the Kentucky Mountain Power (KMP) Project

Description	kV	AEP 2002 Summer ¹ Without KMP		ECAR 2005 Summer ² Without KMP		ECAR 2005 Summer ² With KMP	
		Power Flow MW	Losses MW	Power Flow MW	Losses MW	Power Flow MW	Losses MW
Beaver Creek - Consolidated Coal Tap	138	15.809	0.0150	16.970	0.0173	-121.579	0.9473
Consolidated Coal Tap - Consolidated Coal	138	4.288	0.0001	4.603	0.0001	4.603	0.0001
Consolidated Coal Tap - Yellow Mountain	138	11.506	0.0020	12.350	0.0023	-126.433	0.2500
Yellow Mountain - Harbert	138	11.504	0.0050	12.348	0.0057	-127.067	0.6344
Harbert - Spicewood	138	0.664	0.0000	0.713	0.0000	0.713	0.0000
Subtotal Losses			<u>0.0221</u>		<u>0.0254</u>		<u>1.8318</u>
Talcum - Harbert	138			outaged		139.902	0.4931
Talcum - Beaver Creek	138			outaged		125.371	2.3651
Talcum - Hiner	138			outaged		234.727	2.6486
Hiner - Hazard	138					232.078	<u>1.4531</u>
Subtotal Losses							<u>6.9599</u>
Beaver Creek - Topmost	138	81.598	0.3872	110.311	0.6998	39.884	0.1065
Topmost - Beckham	138	77.330	0.5494	105.445	1.0163	35.612	0.1313
Beckham - Vicco	138	55.644	0.3340	81.744	0.7229	12.796	0.0251
Vicco - Hazard	138	45.890	0.1984	70.912	0.4802	2.661	0.0033
Hazard - Leslie	161	-55.473	0.1687	-39.548	0.0842	92.233	0.4269
Leslie - Stinnett	161	-94.594	0.2859	-78.651	0.1965	71.775	0.1622
Stinnett - Pineville	161	-111.492	1.6746	-96.677	1.2573	53.784	0.3994
Subtotal Losses			<u>3.5982</u>		<u>4.4572</u>		<u>1.2547</u>
Total Losses on Transmission in Vicinity of KMP Plant			<u>3.6203</u>		<u>4.4826</u>		<u>10.0464</u>
Total Losses on all Kentucky Transmission			1182.5420		1264.5110		1245.1380
					System Loss change -->		-19.3730

Notes:

1. AEP 2002 Summer Power Flow model
2. ECAR 2005 Summer Power Flow model with Kentucky Mountain Power Plant model included. Case 600 as used in CAI's review of Task Force Study, dated Dec. 5, 2001. Outaged of 500 MW KMP generation dispatched to all other Kentucky generators by factor of 1.0086