System Impact Study
Phase I – Load Flow Analysis

System Impact Study
to Connect
EnviroPower's
New Generators
to the AEP Transmission Network

Knott County, Kentucky

Transmission System Analysis and Planning

August 2000

AEP: America's Energy Partner℠

1. INTRODUCTION

EnviroPower, LLC (EnviroPower) by letter dated April 4, 2000, requested American Electric Power (AEP) to conduct a limited scope power flow analysis to evaluate the feasibility of connecting a new merchant generating plant to the AEP transmission system in the Beaver Creek-Hazard Area. EnviroPower plans to install a 500 MW plant facility near Hazard, Kentucky. The plant will comprise of two 250 MW base loaded waste-coal fired generation units. As shown in Figure 1, the closest 138 kV transmission facility to the plant site is the Harbert Station on the Beaver Creek-Spicewood 138 kV line. The line is about 8 miles away from the plant site. The Beaver Creek and Hazard 138 kV stations are at a distance of about 26 and 12 miles, respectively. The expected service date for the project is June 1, 2003.

This report addresses the following generation addition scenario:

- 500 MW generation of the new EnviroPower Plant connected near the plant site to a new 138 kV switching station:
    1. The new switching station would be integrated to the AEP transmission system via two new 138 kV lines – one each to Beaver Creek (via Harbert), and Hazard stations (Figure 2); or
    2. The new switching station would be integrated to the AEP transmission system via three new 138 kV lines – two to Beaver Creek Station (one direct and one via Harbert), and one to Hazard Station (Figure 3).

This analysis was conducted for interconnection feasibility purposes only. A complete System Impact Study will be required should transmission service be requested.

2. OVERVIEW OF POWER SUPPLY FACILITIES NEAR THE PROPOSED SITES

The Beaver Creek - Hazard area, the eastern most portion of the Commonwealth of Kentucky, is located within AEP's Southern Transmission Region. Stations on the Beaver Creek-Hazard-Pineville line serve a major portion of the area load. As shown in Figure 1, the transmission facility closest to the plant site is the Harbert Station on the Beaver Creek-Spicewood 138 kV line. This line which is radially connected to the Beaver Creek Station, serves several coal-mining customer loads. The line capacity is limited by the 795 kcm ACSR conductor (Summer normal and emergency ratings 258/345 MVA). The Hazard Station, located at approximately 12 miles south of the proposed plant site, connects to the rest of the AEP transmission system via two transmission lines. These are to the Beaver Creek 138 kV Station and to the Leslie 161 kV Station (connected via three single-phase 45 MVA, 161/138 kV, transformer units). The combined summer normal and emergency thermal capabilities of these two outlets are 327 and 396 MVA, respectively. Hazard Station also serves the local area sub-transmission load via two 138/69 kV Transformers. The Beaver Creek Station, a major switching station in the area is about 26 miles away from the EnviroPower's proposed plant site. The ± 125 MVAr Static VAR Compensator and four (4) 138 kV shunt capacitors at the Beaver Creek Station together with capacitor banks at several other stations provide reactive power and voltage support in the area.

Phase voltage unbalance exists on the AEP transmission system in the Beaver Creek - Hazard area. The unbalance is affected by changes in system conditions, and consequently varies over time. Consequently, it is recommended that EnviroPower plant equipment be rated accordingly.

3. SCOPE OF STUDY

The scope of this study was to develop a load flow base case for the 2003 summer period, and conduct a load flow analysis to determine possible thermal and voltage limits on the transmission system resulting from the proposed EnviroPower generation addition. The study focused on evaluating the feasibility of integrating the proposed 500 MW merchant generating plant into the AEP transmission system at 138 kV, as outlined above. AEP has an existing 161 kV interconnection with Tennessee Valley Authority (TVA) in the area. Therefore, these study results would have to be shared with TVA for review of the impact on their system.

This study did not include short circuit or stability analyses. These studies are presently being conducted by AEP. The results of those studies will be forwarded at a later date. Therefore, the results are preliminary in nature and do not define the full impact of the generation addition. Furthermore, detailed engineering and system studies will be required to clearly define the facilities needed to address potential transmission problems and to integrate the proposed merchant plant into the AEP transmission system. The third phase of the system impact study, namely the facility connection study, will identify specific facility additions needed to integrate the new merchant plant into the AEP network and to address the specific problems identified in the load flow, short circuit, and stability studies (Phase 1 and Phase 2).

Transmission service requests must be made to deliver the output of the merchant plant to specific points of delivery and these transmission service requests must be made in accordance with the AEP Open Access Transmission Tariff (OATT). This study addresses only the feasibility of integrating the merchant plant to the AEP system and does not address the availability of transmission capability to support transmission services to deliver the output of the merchant plant to specific points of delivery.

Furthermore, AEP is in the process of obtaining state certification and federal permits for a 765 kV system reinforcement project in the Southern Transmission Region (STR). The earliest possible date for the completion of the 765 kV project is January 2004. Before the completion of this 765 kV reinforcement project, AEP will not be able to accommodate requests for long-term firm north-to-south transmission service through the Southern Transmission Region. Details of this transmission access policy can be found on AEP's OASIS and is included as Appendix A.

4. TESTING CRITERIA

Both linear and AC load flow analyses were conducted to investigate the impact of the new generation addition on the AEP transmission network and neighboring systems in the vicinity.

Since the impact of the proposed generation addition on the local transmission system facilities is studied for the peak load system condition for the initial year of service only, transmission margin needs to be provided to ensure the reliable delivery of electric power to continuously

changing customer demands under a wide variety of system operating conditions. The level of transmission margin has been quantified using three distinct impact factors – weather, economic conditions (translated to annual load growth), and unpredictable external factors. For a period of five to ten years into the future, a 13% transmission margin is applied by making adjustments to the transmission facility ratings. Consequently, 138 kV and lower voltage sub-transmission facility loadings greater than 87% of the applicable facility ratings are indicated in this report.

For EHV facilities, the normal rating is used to assess normal and single-contingency outage performance, while the emergency rating is used for double-contingency outage conditions. EHV facility loading should be limited to 100% of the applicable rating.

The details of the transmission system thermal and voltage performance test criteria used in this study are included as Appendix B.

5. POWER FLOW BASE CASE DEVELOPMENT

AEP's 1999 series of IPP Study cases was used as the starting point to develop a base case to conduct the load flow studies. The 2003 summer case was utilized for the studies. This case contains a detailed model of AEP's transmission and sub-transmission systems, as well as a peak load forecast of the AEP system for the 2003 summer time period. The outside world (non-AEP) model in this case was developed from the 1999 series of the NERC/MMWG 2003 summer case.

The proposed EnviroPower generating plant was assumed to have a maximum summer capacity of 500 MW with 85% lagging power factor to 95% leading power factor. The study assumed no other generation additions in this area.

Because facility ratings are lower during the summer season as compared to the winter season, and given that summer and winter load levels for the subject area are comparable, the focus of the load flow analysis was on projected 2003 summer conditions. A limited load flow case analysis, however, was conducted for winter peak load condition.

Only one dispatch scenario was developed, due to the already complex nature of this study. Under the modeled dispatch scenario, power from the proposed EnviroPower merchant generating plant was dispatched to serve loads within the AEP system as if the buyer was in the AEP control area. Other dispatch scenarios, not included in this study, could produce somewhat different results. A complete analysis is recommended if EnviroPower's generation addition is confirmed and the information regarding the potential buyer(s) is firmed up.

6. AC POWER FLOW ANALYSIS AND RESULTS

Credible single and double contingency outages were simulated to evaluate the impact of the merchant plant, at the 500 MW generation level, on the AEP transmission and sub-transmission systems. Results of the AC load flow analysis for the projected 2003 summer system conditions are discussed in the following sections:

Section 6.1 – Beaver Creek - Hazard Area Existing System Conditions.
Section 6.2 – EnviroPower generation connected to the AEP 138 kV Transmission System as shown in Figure 2.
Section 6.3 – EnviroPower generation connected to the AEP 138 kV Transmission System as shown in Figure 3.

Section 6.1 – The Beaver Creek - Hazard Area Existing System - Load Flow Analysis:
Power flow patterns on the 138 kV transmission system in the vicinity of the Beaver Creek and Hazard stations are shown in Figures 4.1 and 4.2. These power flow conditions are with all facilities in service, and without the proposed merchant plant generation. Figure 4.1 shows the 138/161 kV line and transformer flows in the vicinity of the Beaver Creek and Hazard stations. As can be seen the majority of the area load – in excess of 200 MW is served via the Beaver Creek-Hazard and Hazard-Pineville lines. These two lines are critical in providing reliable supply of power in the area. Figure 4.2 illustrates the flow of power into the lower voltage sub-transmission system at the Hazard Station. The figures also show the capabilities of critical facilities. All facilities are loaded within their normal ratings and the bus voltages are within the prescribed limits.

Attached Table 1 lists the critical facilities in the area, their normal and emergency ratings and base case loading on these facilities. In addition, it lists several single contingencies that are critical in providing reliable service to this area. The study results indicate that with the exception of one line (which could be improved by enhancing the voltage profile in the area) the single contingency outages would result in transmission system facility loadings well within their respective capabilities.

Section 6.2 - EnviroPower generation connected to the AEP 138 kV Transmission System as shown in Figure 2:

This scenario assumes only two 138 kV plant outlets – one to Beaver Creek Station via Habert Station and the other to Hazard Station. The facilities that are expected to carry heavy loadings due to the generation addition in the area are as follows:

Beaver Creek-Spicewood 138 kV Line
Normal Rating 258 MVA
Emergency Rating 345 MVA
The line has not been sag checked for proper clearance. Consequently, the line could not be operated at loadings above the normal rating.

Beaver Creek-Hazard 138 kV Line
Normal Rating 153 MVA
Emergency Rating 194 MVA
The line has not been sag checked for proper clearance. Consequently, the line could not be operated at loadings above the normal rating.

Hazard 138/161 kV Transformer

Normal Rating 174 MVA
Emergency Rating 202

Hazard-Leslie 161 kV Line
Normal Rating 182 MVA
Emergency Rating 224 MVA
The line has not been sag checked for proper clearance. Consequently, the line could not be operated at loadings above the normal rating.

Leslie-Pineville 161 kV Line
Normal Rating 172 MVA
Emergency Rating 172 MVA

In addition to the above facilities several other 138/lower-voltage transformer and sub-transmission lines also load heavily during normal and contingency conditions.

Figure 5.1 shows power flow patterns under the same system conditions as in Section 6.1, but with the addition of the proposed 500 MW generation connected to the AEP System via two 138 kV transmission lines as shown in Figure 2. As shown, about 300 MW will flow to Hazard and the remaining 200 to Beaver Creek. All facility loadings remain within their normal ratings. However, single contingency outage of any one of the two plant outlets will result in thermal overloads. For example, an outage of the Hazard line will load the Beaver Creek line to well above its emergency ratings of 345 MVA (Figure 5.2). Similarly the outage of the Beaver Creek line would result in thermally overloading of the Beaver Creek Hazard 138 kV Line (Figure 5.3).

Because of the overload concerns of the thermally limited plant outlets, no additional contingency analysis was carried out for this scenario.

Section 6.3 - EnviroPower generation connected to the AEP 138 kV Transmission System as shown in Figure 3:

This scenario assumes three 138 kV plant outlets – two to Beaver Creek Station (one direct line and one via the Harbert Station) and a third to Hazard Station. The same facilities as listed above in Section 6.2 are expected to carry heavy loadings due to the generation addition in the area.

Figures 6.1 and 6.2 illustrate power flow patterns under the same system conditions as in Section 6.1, but with the addition of the proposed 500 MW generation connected to the AEP System via three 138 kV transmission lines as shown in Figure 3. Figure 6.1 shows the 161/138 kV transformer and line flows in the vicinity of the Beaver Creek and Hazard stations. As can be seen the two 138 kV lines to Beaver Creek carries about 260 MW and the line to Hazard carries about 240 MW. Comparison of Figure 4.1 and Figure 6.1 indicates that all transmission line loadings in the vicinity of the EnviroPower Plant have decreased with the exception of the Beaver Creek-Habert 138 kV line loading. Figure 6.2 shows the transformer and line power flows into the lower voltage sub-transmission system at the Hazard Station. Comparing this to Figure 4.2 indicates increase in flow of about 30 MW into the sub-transmission system. All

facilities, however, are loaded within their normal ratings and the bus voltages are within the prescribed limits.
Attached Table 2 is similar to Table 1. It lists the critical facilities in the area, their normal and emergency ratings and base case loading on these facilities with the EnviroPower generation connected as shown in Figure 3. In addition, it lists the same contingencies that are critical in providing reliable service to this load area. The study results indicate that single contingency Hazard transformer outages would cause heavy sub-transmission transformer and line loadings. The 138/69 kV transformer loading, during the first year of EnviroPower Plant operation, would be as high as 112 % of its emergency capability.

7. SUMMARY AND CONCLUSION

1) The existing Beaver Creek - Hazard transmission system is planned for and maintains reliable service during normal and single contingency conditions. The transmission and the sub-transmission systems are not designed for double contingency outages.
2) Connecting the EnviroPower 500 MW generation facility at AEP's 138 kV system as shown in Figure 2, with two line exits, would result in severe single contingency line over load conditions.
3) Connecting the EnviroPower 500 MW generation facility at AEP's 138 kV system as shown, with three line exits, would provide the needed line capacity to transmit the proposed generation. Hazard 138/69 kV transformer and sub-transmission facilities would experience increased loadings as a result of the generation addition. A new 138/69 kV station or increased transformer capacity, line re-configuration and re-conductoring could be required. Additional sag studies would be needed to determine 138 kV emergency line capabilities.
4) The short circuit and stability studies are presently being conducted by AEP as part of the phase 2 studies. The results of those studies will be forwarded at a later date. The third phase of the system impact study, namely the facility connection study, will identify specific facility additions needed to integrate the new merchant plant into the AEP network and to address the specific problems identified in the load flow, short circuit, and stability studies.
5) This Phase 1 System Impact Study only addresses the feasibility of integrating the merchant plant into the AEP transmission system, and does not address the availability of transmission capacity to deliver the plant output to specific destinations. Transmission service requests would need to be made in accordance with the AEP Open Access Transmission Tariff.
6) This Phase 1 study addresses the impact of the proposed EnviroPower 500 MW generation independent of any other merchant generation additions to the AEP system in the Beaver Creek - Hazard area. If another IPP commits to installing generation in the general vicinity prior to any commitment by EnviroPower, then a new study would be required to assess the EnviroPower generation addition, and the study results contained in this report would no longer be valid.
7) These study results would have to be shared with Tennessee Valley Authority for review of the impact on their system.

APPENDIX A

OASIS POSTING

Transmission Access Policy for AEP System North to South Transmission Corridor

Every transmission network has a finite amount of capability to support the transfer of power. From time to time, the amount of power transfer that the transmission network may be called upon to handle could exceed its capability, which in turn, could lead to the overloading of transmission lines, and potential reliability problems. Until such time as enhancements can be made to increase the capability of the network, the network would need to be operated in recognition of its limitations.

The AEP transmission network, extending from Charleston-Huntington, West Virginia toward Roanoke, Virginia, is dedicated to serving the AEP native load and other loads connected to this network located in the southern West Virginia and southwest Virginia region. This transmission network has a prevailing north-to-south and west-to-east power flow pattern, since generation resources to serve the majority of these customer demands are generally located north of this region. The increase in power demands of customers in this region will result in a corresponding increase in transmission line loading levels in the north-to-south and west-to-east directions. This transmission network has defined limitations, and currently is oftentimes operated near or at its maximum safe operating capability. At those times, emergency operating procedures must be implemented so that the loading levels on certain transmission lines can be reduced to reliable operating levels in the north-to-south and west-to-east directions. AEP has in place a series of emergency operating procedures, which are used to control critical line loadings to safe levels. These operating procedures include, among other measures, the interruption of firm connected customer load to protect the integrity of the bulk transmission network in this area.

AEP is committed to increasing the capability of this constrained transmission interface with the construction of the Wyoming-Cloverdale 765-kV line or the alternative Wyoming-Jacksons Ferry 765 kV line. This major transmission reinforcement was announced by AEP in 1990 for service in the late 1990s. Because of the need for certification from state and federal authorities, which has taken much longer than originally expected, the service date for this transmission reinforcement is not expected now before 2004 at the earliest. Until a 765 kV transmission reinforcement is in place, AEP will need to assure the reliable operation of the critical transmission interfaces by the use of the operating procedures indicated above.

Regarding requests for transmission service through this constrained transmission area in a north-to-south direction, in accordance with FERC Order 888A, AEP will be able to provide non-firm transmission service in varying amounts depending on the determination of available transfer capability (ATC) at the time of the request. Our present outlook is that AEP will not be able to accommodate requests for long-term firm north-to-south or west-to-east transmission service through this area. During the next several years, parties requiring firm transmission service in a north-to-south or west-to-east direction can firm-up available non-firm transmission service by making arrangements for standby generation supplied in areas located to the south or southeast of AEP's constrained transmission interface. This standby generation can be utilized whenever the non-firm north-to-south or west-to-east transmission service needs to be curtailed due to transmission system reliability considerations. This "firming" option will be available to any marketer of generation services, including AEP's own bulk power marketing organization.

Posted on May 23, 1997
Updated on May 10, 2000

APPENDIX B
Generation Connection Studies
Process and Criteria for Evaluating the Impacts on the AEP Transmission System

The underlying premise of American Electric Power's (AEP's) process and criteria to evaluate the integration of new or expanded generating plant facility is that the generation facility owner should be responsible to mitigate any negative transmission system effects on service reliability to existing transmission customer through the reinforcement of the network.

AEP meets its obligation to supply electricity demanded by its transmission customers with a high degree of reliability through a carefully planned transmission system. As it is impossible to anticipate or test for all possible system conditions, the transmission system is designed with margins for contingencies and to deal with other uncertainties such as customer load variations, etc. Availability of these margins is essential to avoid uncontrolled, area-wide power interruptions. Planning an optimal transmission system requires the application of fundamental principles and establishment of criteria, which balances reliability against cost to provide them. Details of the planning practices and criteria used by AEP to insure the continued reliability of the system are described in the AEP Form 715 filing with the FERC. The testing criteria used in the planning of the AEP transmission system are summarized in the following table:

AEP Transmission Planning Criteria
(Steady State Performance)*

Transmission System Configuration	Maximum Facility Loading (Rating)	Minimum Bus Voltage EHV	Minimum Bus Voltage 138 kV
All Facilities in Service	Normal	95%	95%
One Facility out of Service	Normal (1) Emergency (2)	90%	92%
Two Facilities out of Service	Emergency	90%	92%

* Extracted from AEP FERC Form 715 – Annual Transmission Planning and Evaluation Report, 1999 Filing.
(1) Facility planning criteria (EHV facilities.)
(2) Facility planning criteria (138 kV facilities.)

In the evaluation of generating plant connection to the AEP transmission system, the planning criteria outlined in the table above must be adhered to not only for the initial year when the plant is scheduled to be placed in service but for a period of at least 5 to 10 years thereafter. In addition, the evaluation must also recognize that the EHV and high voltage transmission systems were not originally designed with the intent to accommodate generating plant connections. The EHV transmission system was designed to transmit electric power from remotely located large base-loaded power plants to local area loads. The 138 kV and the lower voltage local transmission systems were designed to distribute this power from the point of connection with the EHV transmission system to the point of consumption (i.e., directly connected customer facilities, distribution system, etc.). While the EHV transmission system in some areas may have capacity to accommodate moderate levels of new generation without significant system impacts, the local transmission, with normally smaller capacities, may not have margin available to easily integrate the new generation. New generating capacity may be typically an order of magnitude greater than the connected loads (e.g., 300 MW Plant vs. 10-30 MW of connected load at a single node). In addition, circuit breakers may become over dutied, as the new generating facilities will add to the fault current.

The AEP 138 kV and lower voltage transmission systems are designed to provide margins for specific and distinct changing conditions. These can be grouped as changes in economic conditions within the service areas where local customer loads are connected, changes in weather conditions, and other unpredictable factors. All these result in changing customer load patterns. The study process for determining and implementing future facility modifications or additions takes into consideration a 5 to 10-year load growth. These analyses are conducted for normal peak load and contingency conditions to ensure continuous and reliable power delivery to the local transmission system customers.

To provide a timely response to generating facility owners, the impacts of the new generation capacity additions are studied for peak load system conditions for the initial year of connection only. Therefore, a transmission margin must be maintained to ensure reliable delivery of electric power to the continuously changing customer demands. Based on a five to ten year planning horizon and a moderate load growth rate of about 1.2 to 2.5 % per year, a minimum of 13 % transmission margin is required. This value is applied in these criteria by making transmission facility rating adjustments, i.e., thermal loading during normal and contingency conditions shall remain within 87 % of line or transformer emergency capabilities during the first year of generating plant operation.

As part of the process to evaluate new capacity addition requests for connection to the transmission system, the cost responsibility of the generating plant must be assessed by applying AEP's planning criteria over a reasonable planning horizon. The application of AEP's criteria in examining generating plant connection is consistent with the existing AEP practices and criteria that are used in defining potential problems and implementing future system modifications or additions. **The intent of the process in applying AEP's criteria in the evaluation of new generating capacity connection to the system is to maintain a level of service reliability, with the new generating capacity in service, comparable to the level that existed prior to the new generating capacity connection.** The process described below is designed to maintain the prevailing level of service reliability and quality to existing customers.

The process to apply AEP's planning criteria in determining cost responsibility for system enhancements associated with the connection of new generating capacity is detailed below:

Transmission Line Loading:

- For testing the bulk transmission system, facility normal ratings should not be exceeded for normal or single contingency conditions. Normal capabilities are used to compensate for the greater variability and uncertainty associated with bulk transmission loading patterns. For double contingency on the bulk transmission system, no facilities should exceed their emergency rating. This is consistent with the FERC Form 715 - Annual Transmission Planning and Evaluation Report. Therefore, if, as a result of the added generation, the loading on an EHV line would exceed its normal capability, during normal or single contingency conditions, the generating plant owner shall be responsible for all system modifications required to restore the line loading to within the normal capability. Likewise, if as a result of additional generation, the loading on an EHV facility would exceed its emergency rating during double contingencies, the generating plant owner shall be responsible for the necessary system modifications to restore the EHV facility loading to within emergency capability.
- If, as a result of the added generation, 138 kV transmission line loadings exceed the normal rating of the conductor during normal or contingency conditions and the line has not been checked for safe conductor clearance, the generating plant owner shall pay AEP to conduct a study to check for appropriate sag clearance. Conductor thermal ratings, assuming that adequate line clearance can be maintained, are based on mechanical considerations (i.e., conductor breaking strength). Conductor normal ratings are based on thermal loading conditions, which would results in no loss of strength. AEP planning criteria and operating procedures do permit AEP's 138 kV circuits to be loaded well above the normal rating (i.e. up to the AEP emergency conductor capabilities) following contingency outages of other facilities. Circuit loadings above the normal ratings, however, require sag check for

adequate line clearances. If the sag checks indicate any sag violations that limit the line to less than the conductor emergency capability, the generating plant owner shall pay for the removal of those limitations.

- If, as a result of the added generation, a 138 kV transmission line loading exceeds 87% of emergency rating of the line, during either normal or contingency conditions, the generating plant owner shall be responsible for all system modifications to restore the line loadings to within 87% of emergency rating or to the line loading level which would occur without the generation, whichever is higher. In some cases, limiting terminal equipment must be replaced in order to increase the capability of the line. In other cases, system improvements may be required.

- If, as a result of the added generation, transmission lines operated below 138 kV are loaded above 87% of the respective conductor capability during either normal or contingency conditions, the generating plant owner shall be required to pay for the system improvements, including the replacement of limiting station facilities, that will lower the line loading to below 87% of the line capability or to the line loading level which would occur without the generation, whichever is higher.

Transformer loading:

- If, as a result of the added generation, the loading on an EHV/EHV transformer would exceed its normal capability, during either normal or single contingency condition, the generating plant owner shall be responsible for all system modifications required to restore the transformer loading to within the normal capability or to the transformer loading level which would occur without the generation, whichever is higher.

- If, as a result of the added generation, the loadings on any EHV/138 kV or lower voltage transformer exceeds 87% of its emergency rating, during either normal or contingency conditions, the generating plant owner shall be responsible for reducing the transformer loadings to below the 87% of the transformer emergency rating, or to the loading level which would occur without the generation, whichever is higher. System improvements may be required to achieve this goal.

Short Circuit Duty:

- If the short circuit duty of any existing circuit breaker would exceed its rating due to the installation of the new generating capacity addition, the generating plant owner shall be responsible for the cost to replace the affected equipment. In addition, short circuit margins exist at many stations on the AEP System to accommodate future system modifications (such as addition of a transformer, lines, etc.) which may be required within the 5 to 10 year planning horizon to accommodate load growth. If the installation of the new generating facility depletes these margins, the generating plant owner shall be responsible for the cost on a pro rated basis (percent of margin depleted by the installation of the new generating capacity addition) to replace these margins. The margins are to be calculated based on the difference between the existing short circuit duty and the projected short circuit duty with the next planned facility in service.

Transmission system improvements may be required to accommodate the new generating capacity connection to the transmission system in order to avoid negative reliability impacts to the local customers connected to the AEP transmission system. Additional system improvements may also be required to transmit the output of the new generating capacity across the existing transmission system. The latter is referred to as transmission service under the FERC OATT. The OATT specifies the types of transmission service available and the procedure to evaluate the transmission system performance and associated system improvements in order to permit the transmission of power across the network. Separate studies can be requested by the generating plant owner to evaluate the ability of the overall transmission system to transmit the output of their generation to the point of delivery and to secure the appropriate transmission service.

FIGURE 1

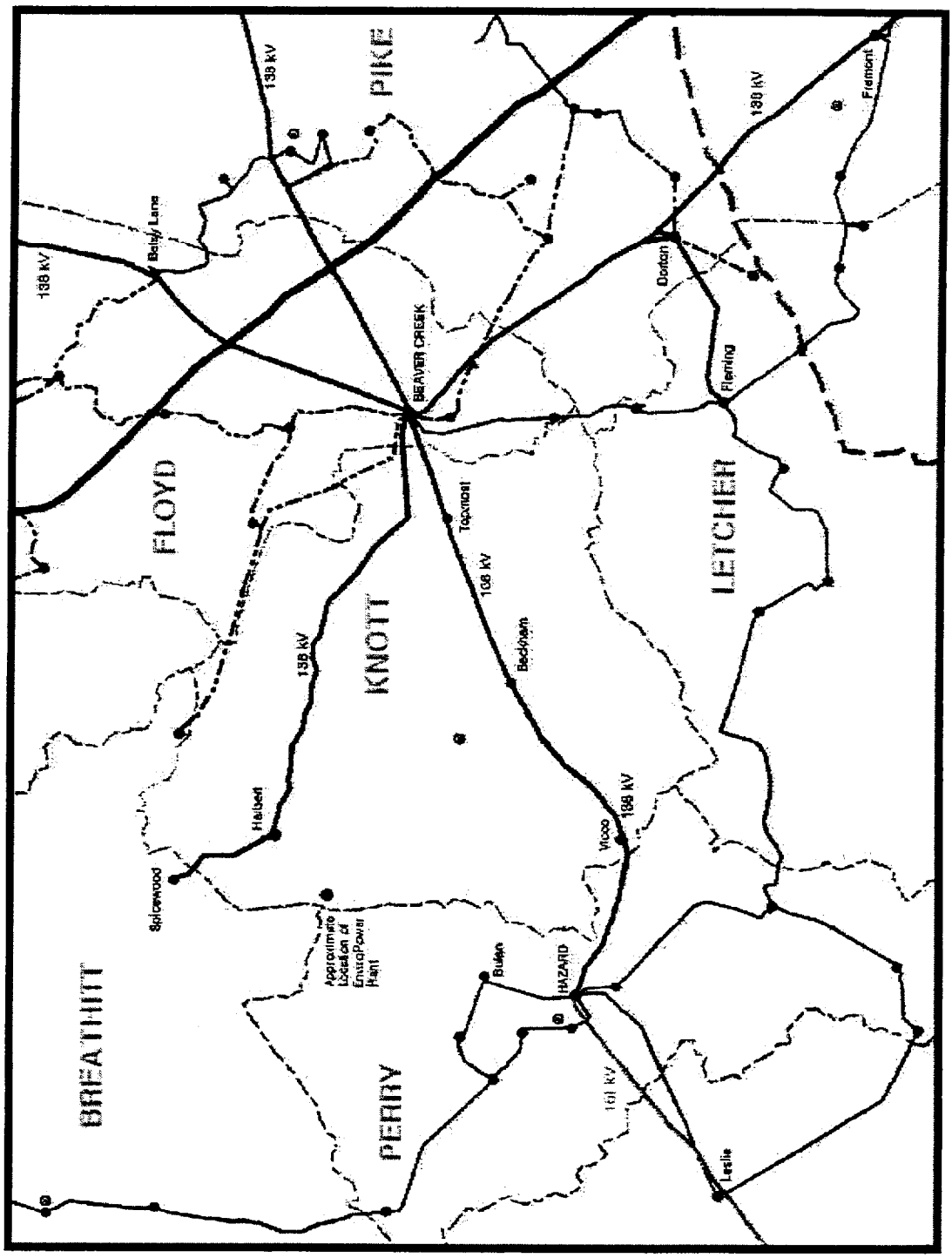
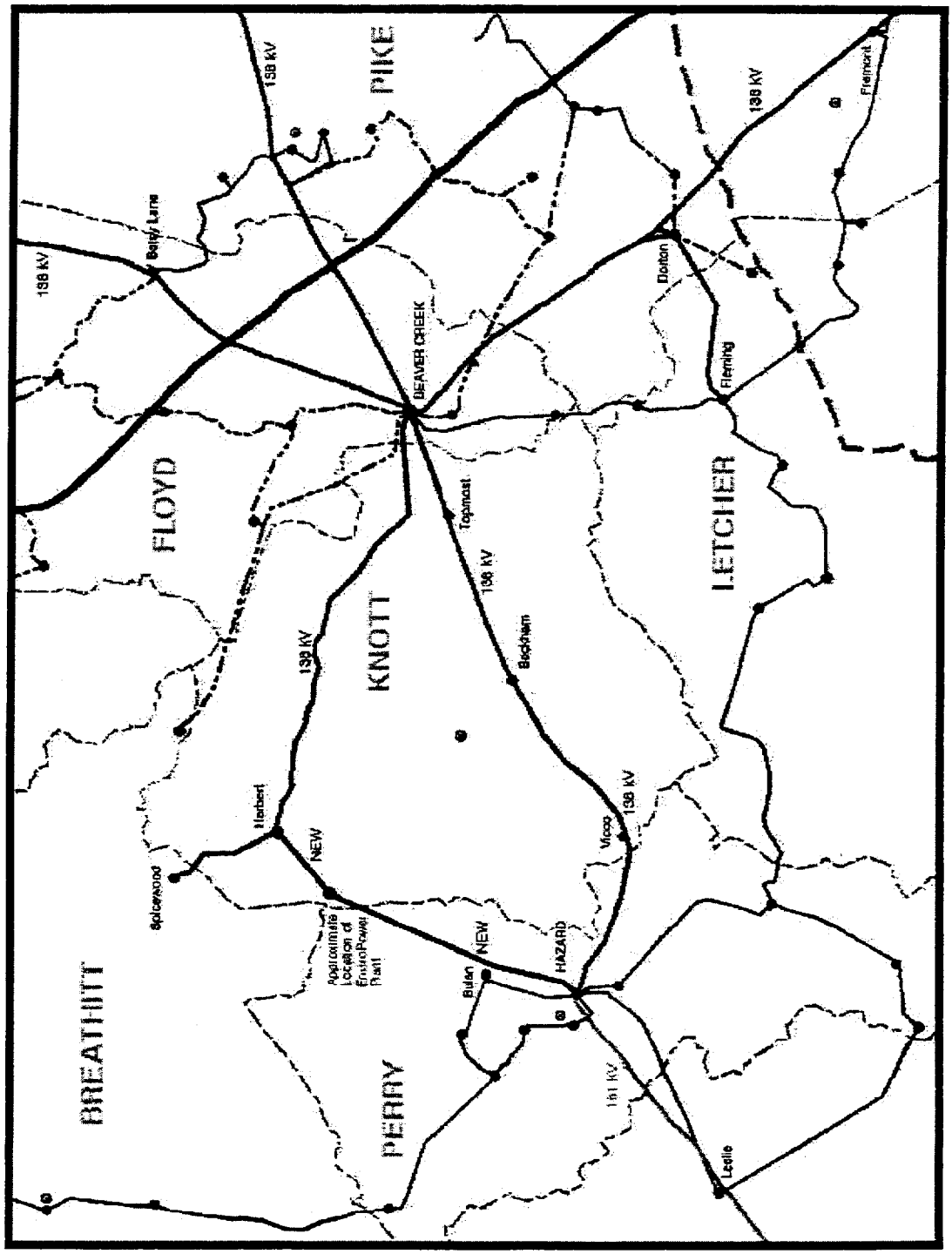

PIKE
FLOYD
KNOTT
LETCHER
PERRY
BREATHITT
138 kV
BEAVER CREEK
Belfry Lane
Dorton
Fleming
Fremont
Topmost
Beckham
Hazard
Wooo
Hebert
Splendwood
Approximate Location of EnviroPower Plant
Buljan
HAZARD
Leslie

FIGURE 2


PIKE
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LETCHER
BREATHITT
PERRY
138 kV
Belfry Lane
BEAVER CREEK
Dorton
Fleming
Fremont
Topmost
Beckham
Herbert
NEW
Solomonds
Approximate Location of EnviroPower Plant
Bulan
HAZARD
Vicco
161 kV
Leslie

FIGURE 3

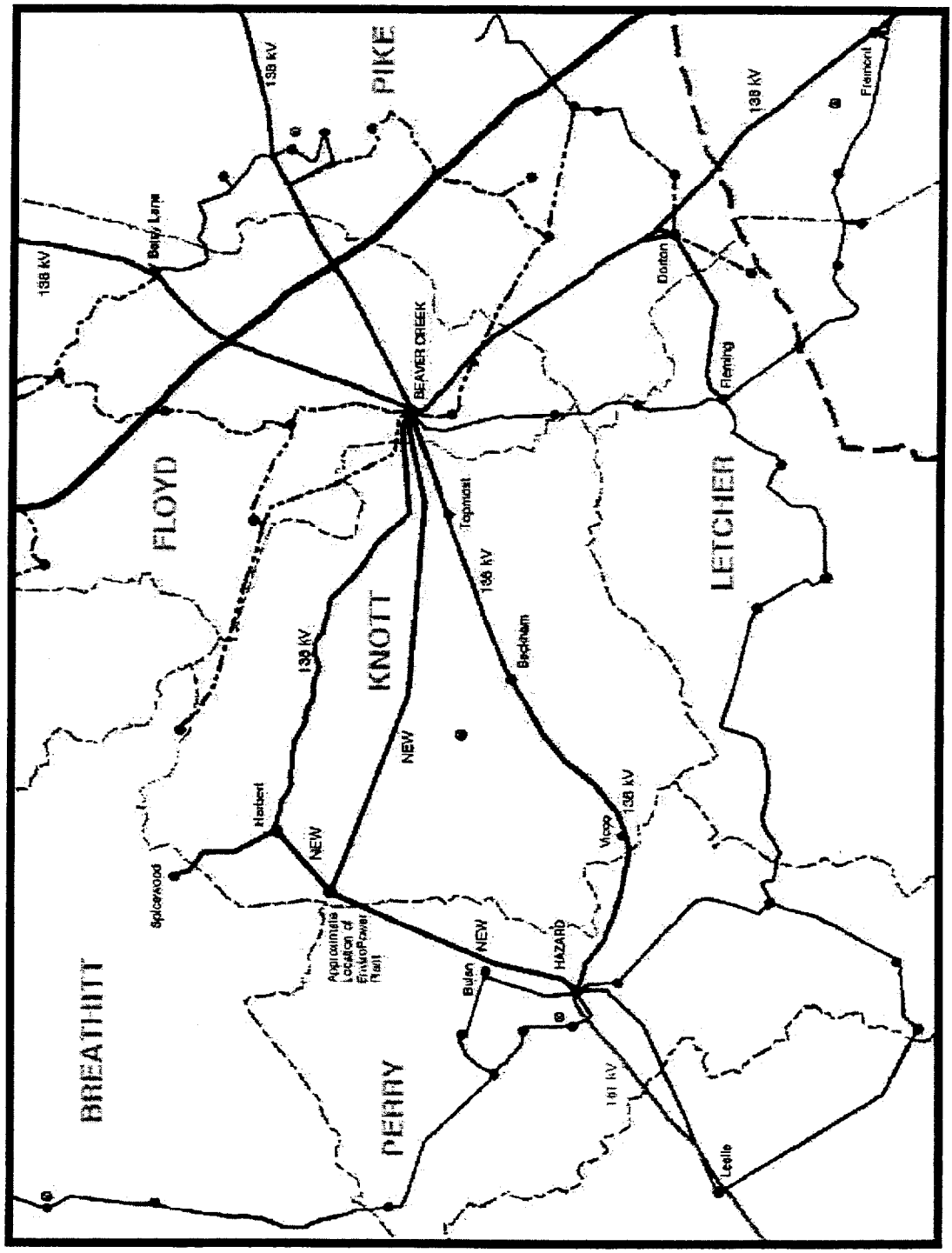
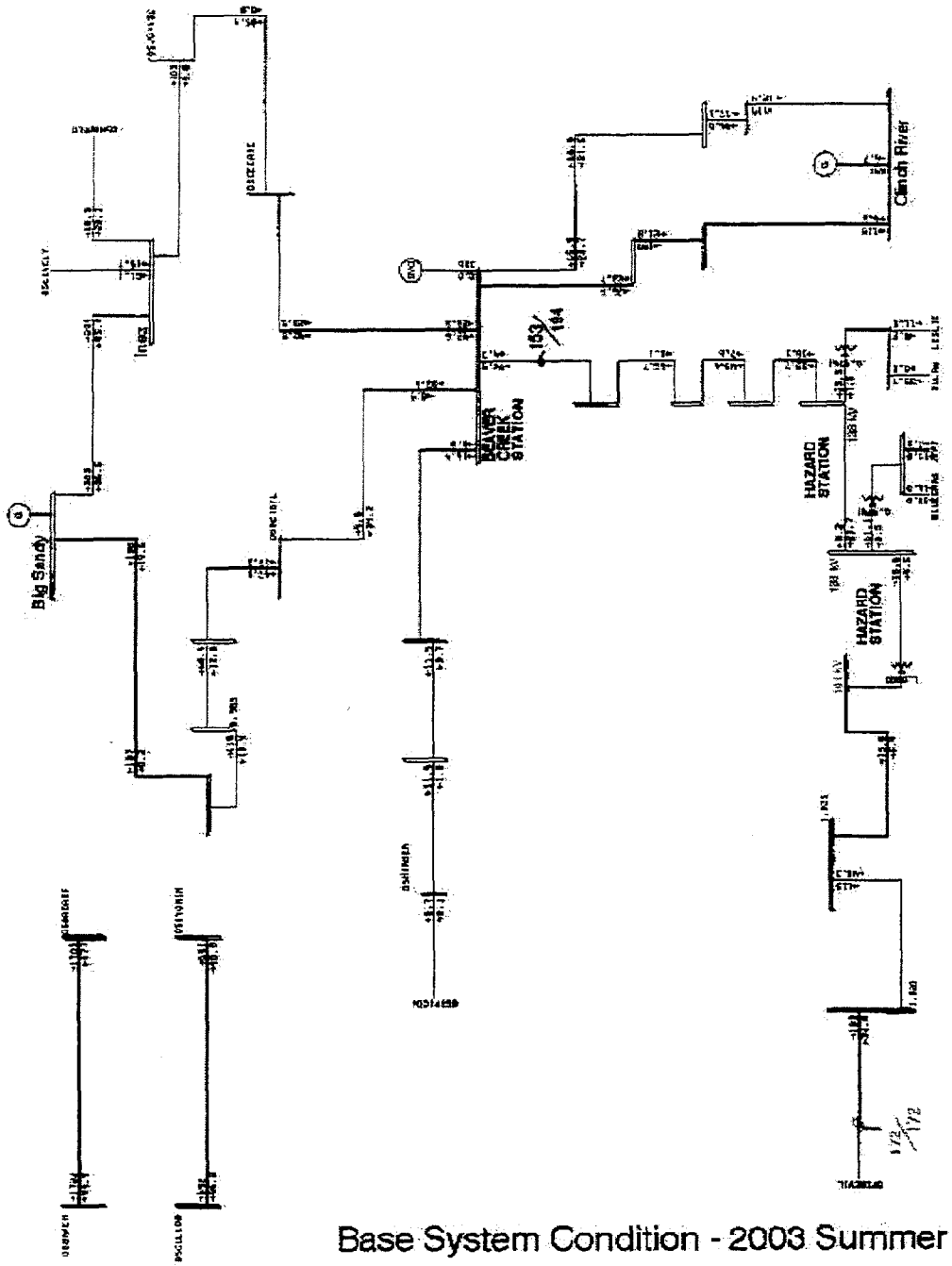
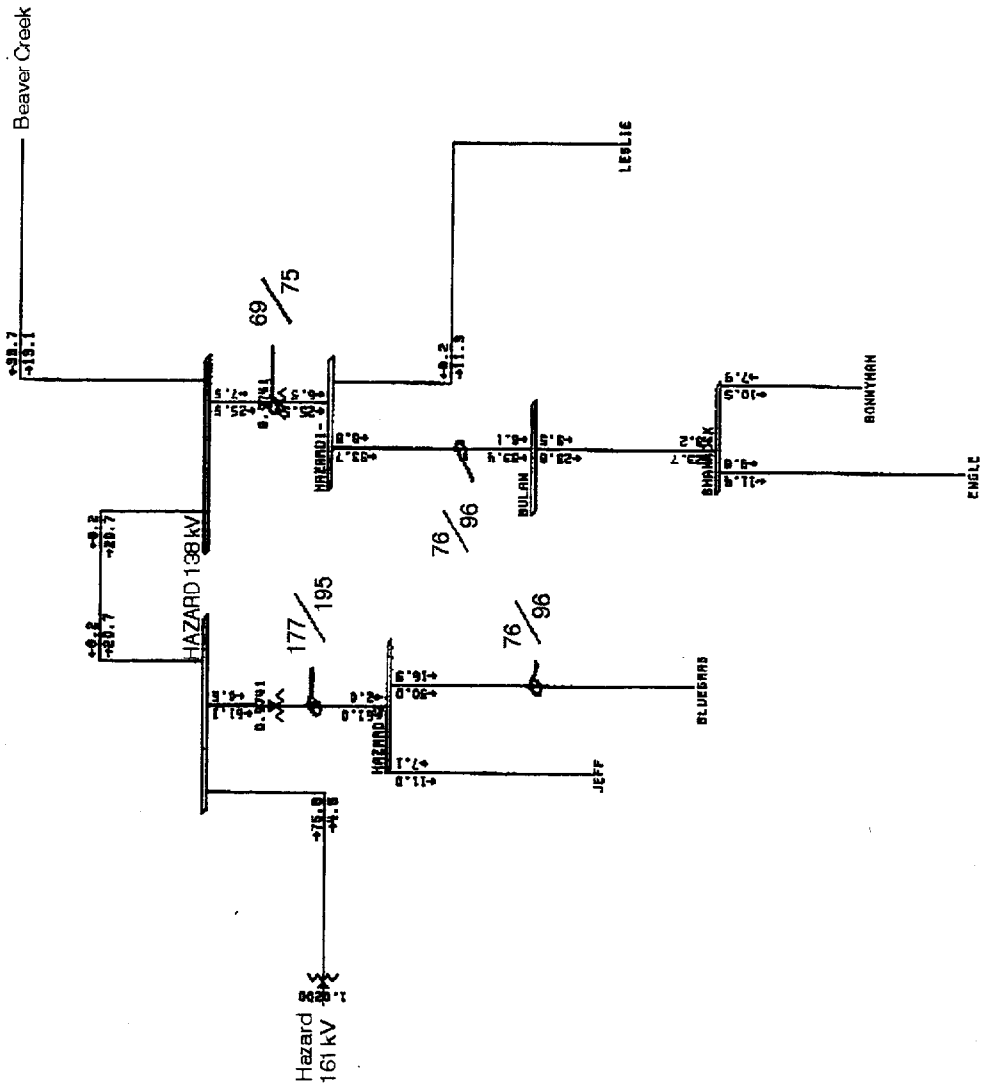

PIKE
FLOYD
KNOTT
LETCHER
PERRY
BREATHITT
138 kV
Betty Lane
BEAVER CREEK
Dorton
Fleming
Fremont
Topmost
Beckham
NEW
Harbert
Spicewood
Approximate Location of EnviroPower Plant
Bulan
HAZARD
Viper
Leslie
161 kV

FIGURE 4.1



Base System Condition - 2003 Summer

FIGURE 4.2



Base System Condition - 2003 Summer

FIGURE 5.1

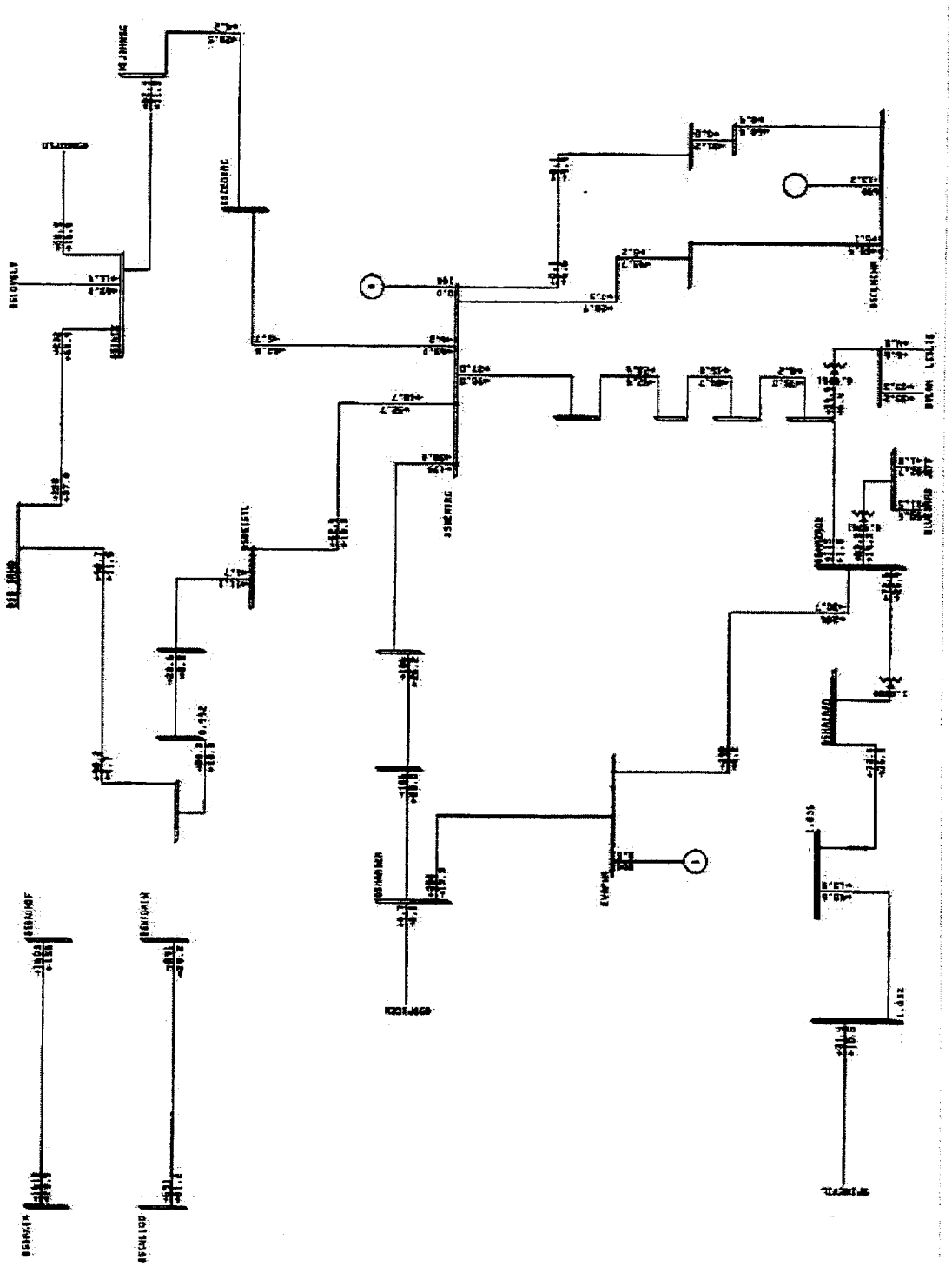


FIGURE 5.2

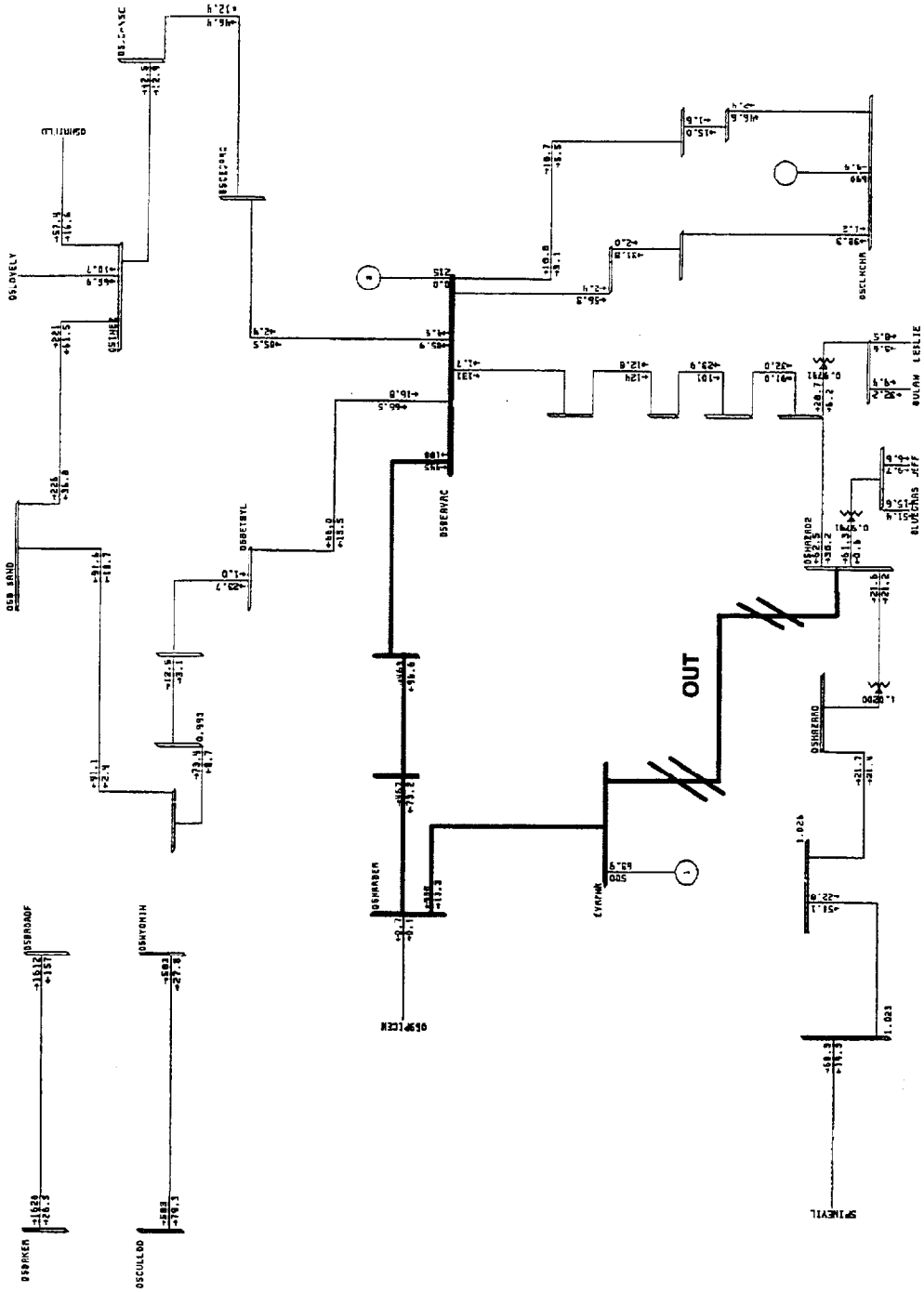


FIGURE 5.3

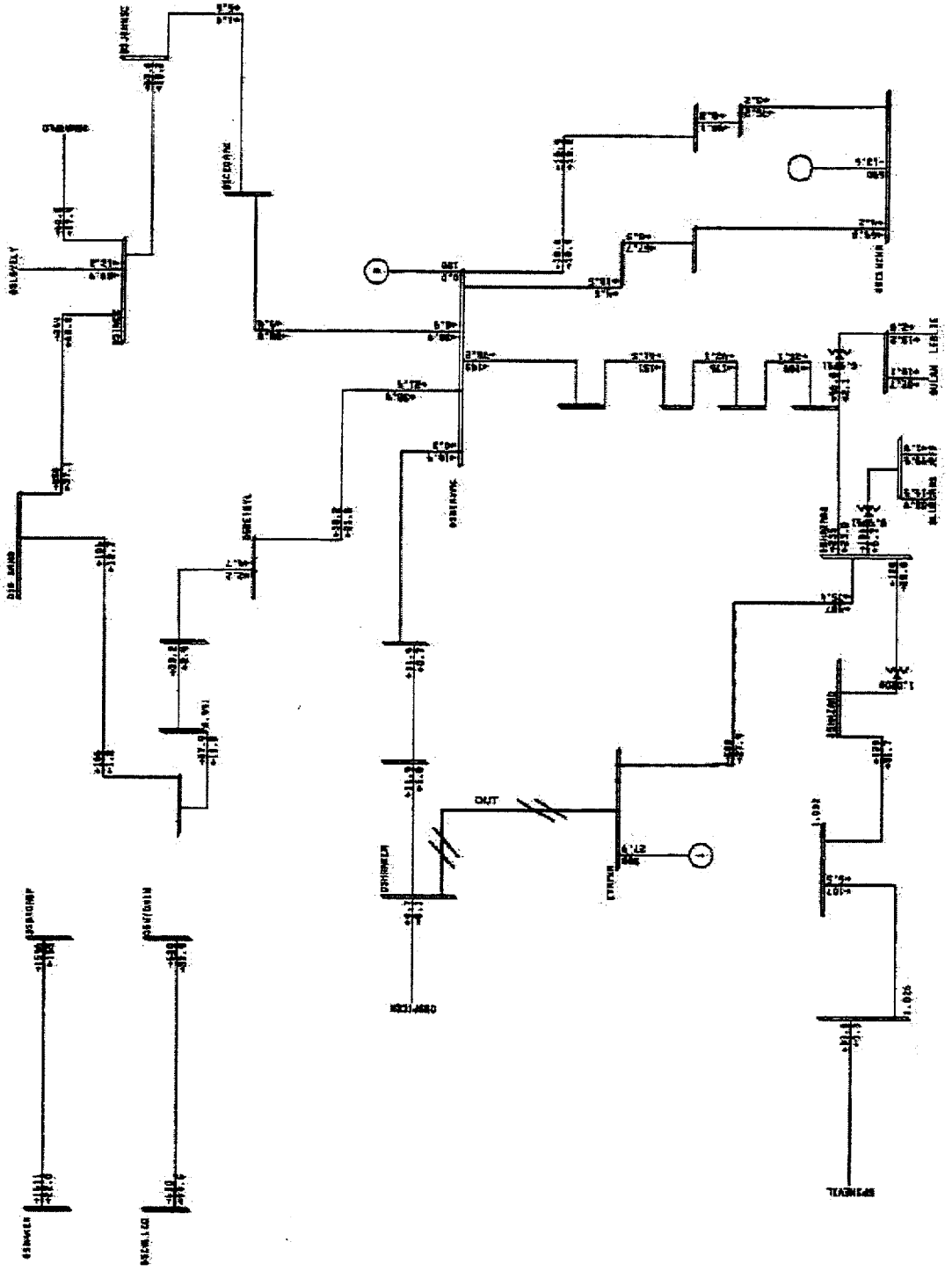
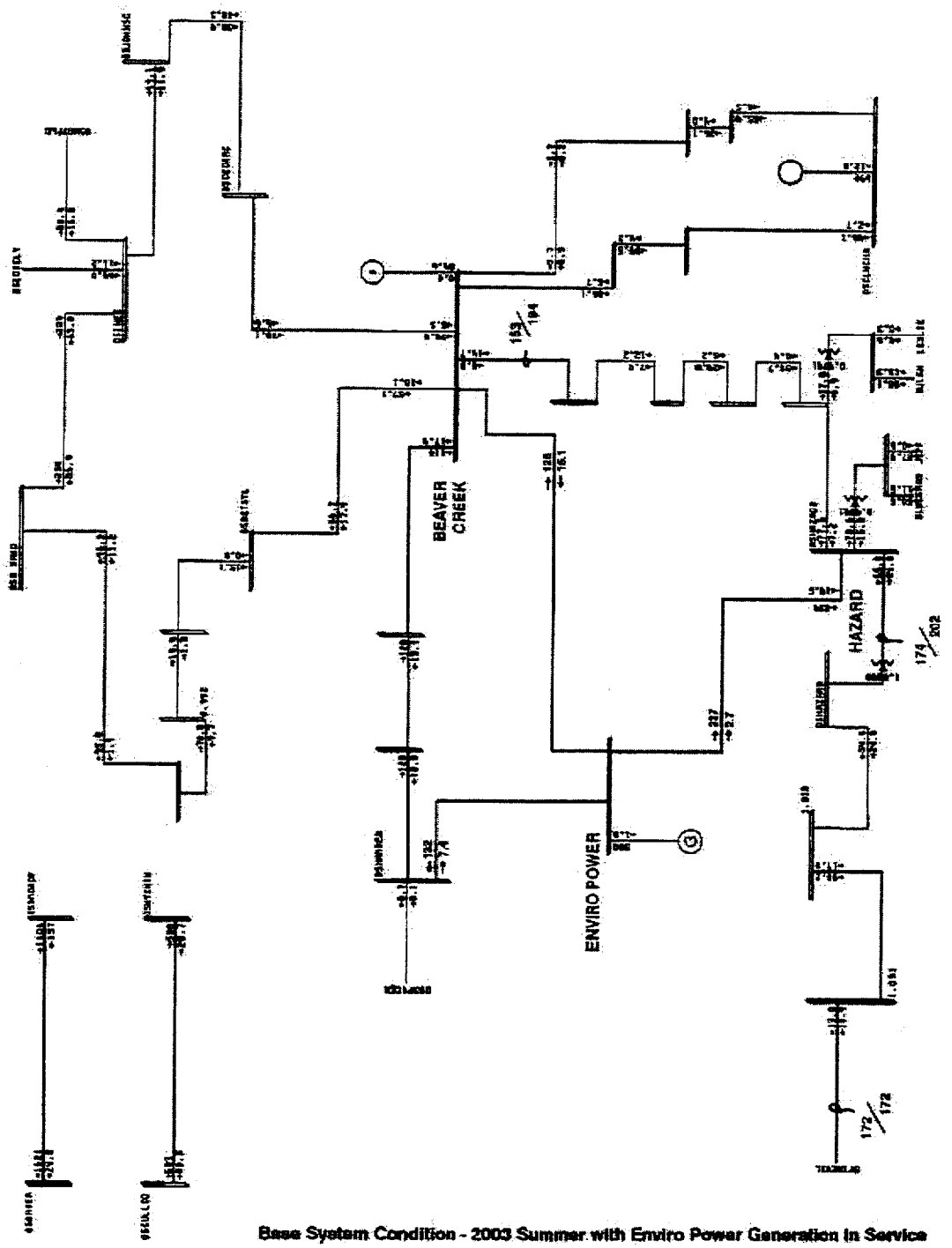
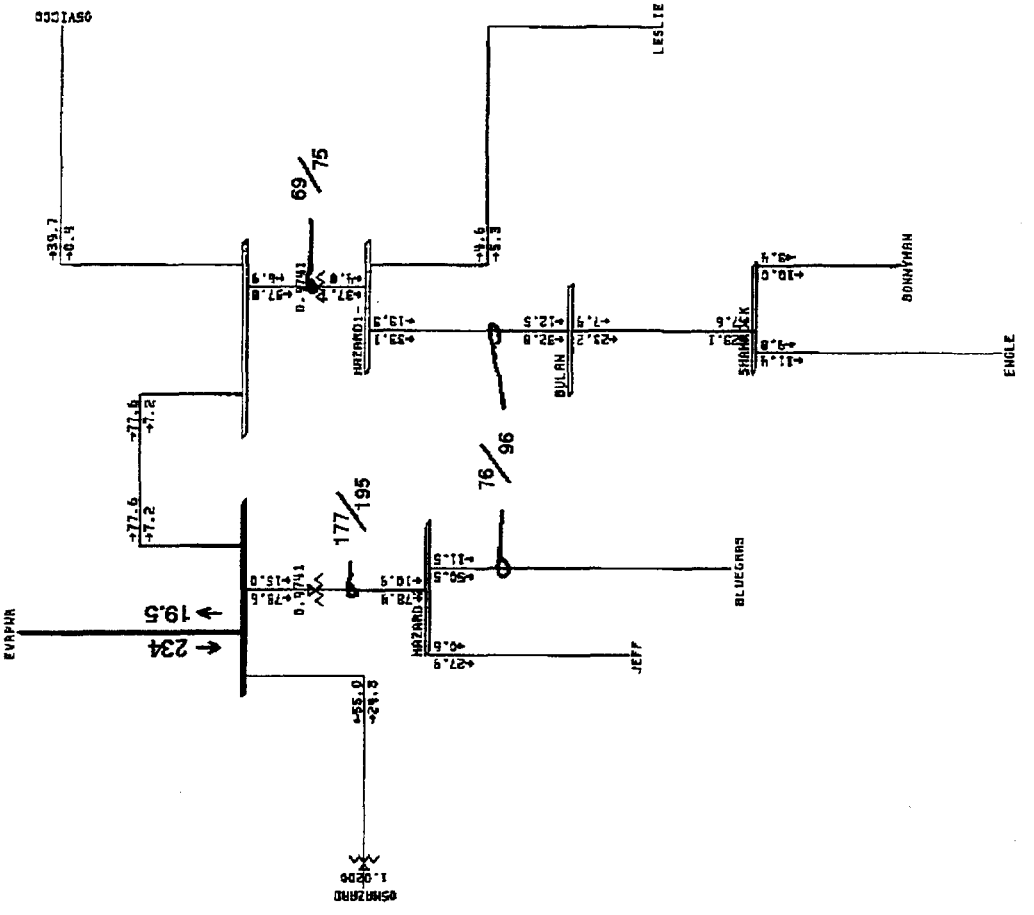


FIGURE 6.1



Base System Condition - 2003 Summer with Enviro Power Generation in Service

FIGURE 6.2



Base System Condition - 2003 Summer with Enviro Power Generation In Service

Table 1 (Existing System Condition - No Merchant Plant in Service)

	Beaver Ck.-Hazard 161 kV		Leslie-Pineville 161 kV		Beaver Ck-Spicewood 138 kV		Hazard 138/69 kV # 1		Hazard 138/69 kV # 2		Hazard-Blue Grass 69 kV		Hazard-Shamrock 69 kV	
Rating (SN/SE) in MVA	153 / 194		172 / 172		258 / 345		69 / 75		177 / 195		76 / 76		76 / 76	
System Condition	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal
Base Condition - All Facilities in Service	70	46%	137	80%	16	6%	27	39%	61	34%	53	70%	34	45%
Beaver Ck - Hazard 138 kV Out	0	0%	177	103%	16	6%	23	33%	42	24%	54	71%	23	30%
Leslie-Pineville 161 kV Out	187	122%	0	0%	16	6%	31	45%	54	31%	56	74%	21	28%
Hazard 138/69 kV # 1 Out	62	41%	134	78%	16	6%	0	0%	75	42%	23	30%	58	76%
Hazard 138/69 kV # 2 Out	68	44%	137	80%	16	6%	58	84%	0	0%	68	89%	10	13%
Baker-Broadford 765 kV Out	84	55%	123	72%	16	6%	27	39%	61	34%	53	70%	24	32%
Big Sandy-Inez 138 kV Out	53	35%	152	88%	16	6%	26	38%	61	34%	52	68%	24	32%
Clinch River Generation Out	53	35%	163	95%	16	6%	26	38%	64	36%	52	68%	25	33%

Table 2 (Enviro Power Merchant Plant in Service - System Configuration based on Figure 2)

System Condition	Envirpower - Beaver Ck. # 1 138 kV MVA	Envirpower - Beaver Ck. # 2 138 kV (via Herbert St.) MVA	Envirpower - Hazard. 138 kV MVA
Base Condition - All Facilities in Service	133	130	237
Envirpower - Beaver Ck. # 1 138 kV Out	0	202	298
Envirpower - Beaver Ck. # 2 138 kV Out	202	0	298
Envirpower - Hazard 138 kV Out	248	252	0

	Beaver Ck.-Hazard 161 kV		Leslie-Pineville 161 kV		Beaver Ck-Spicewood 138 kV		Hazard 138/69 kV # 1		Hazard 138/69 kV # 2		Hazard-Blue Grass 69 kV		Hazard-Shamrock 69 kV	
Rating (SN/SE) in MVA	153 / 194		172 / 172		258 / 345		69 / 75		177 / 195		76 / 76		76 / 76	
System Condition	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal	MVA	% of Normal
Base Condition - All Facilities in Service	15	10%	19	11%	116	45%	39	57%	80	45%	52	68%	25	33%
Beaver Ck - Hazard 138 kV Out	0	0%	17	10%	117	45%	38	55%	80	45%	52	68%	25	33%
Leslie-Pineville 161 kV Out	15	10%	0	0%	119	46%	38	55%	80	45%	51	67%	25	33%
Hazard 138/69 kV # 1 Out	17	11%	16	9%	117	45%	0	0%	102	58%	73	96%	6	8%
Hazard 138/69 kV # 2 Out	18	12%	19	11%	120	47%	77	112%	0	0%	20	26%	67	88%
Baker-Broadford 765 kV Out	15	10%	33	19%	111	43%	40	58%	81	46%	52	68%	52	68%
Big Sandy-Inez 138 kV Out	20	13%	18	10%	121	47%	37	54%	79	45%	52	68%	52	68%
Clinch River Generation Out	23	15%	27	16%	123	48%	38	55%	82	46%	51	67%	51	67%

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June 29, 2001

AMERICAN ELECTRIC POWER

David P. Boergers
Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Dear Secretary Boergers:

Kevin F. Duffy
Assistant General Counsel - Regulatory Services
(614) 223-1617
(614) 223-2950 (fax)

Enclosed herewith for filing are an original and six (6) copies of an Interconnection and Operation Agreement ("IA") between Kentucky Power Company ("the Company") and Kentucky Mountain Power, L.L.C. ("Generating Company"). The agreement provides for the interconnection to the American Electric Power transmission system of the EnviroPower Generating Station located in Hazard, Kentucky ("the Facility"). The Facility is expected to be placed into service in June, 2004.

Background.

The Company is an operating company of the American Electric Power ("AEP") System, an integrated public utility holding company system which, *inter alia*, provides transmission service pursuant to an open access transmission tariff (OATT) filed with this Commission. The OATT also includes procedures for the interconnection of generators to the AEP transmission system.[1] In accordance with the Commission's guidance provided in its order on the Southwest Power Pool's interconnection procedures,[2] this IA is being filed as a service agreement under the AEP OATT.

Generating Company is the developer of the Facility and is not affiliated with AEP.

The IA provides for establishment of an interconnection between the Facility and AEP's transmission system at 138 kilovolts. The IA also contains requirements for system operation, covers interconnection costs and billing, defaults and remedies, insurance, liability and indemnification,

[1] *See American Electric Power Service Corporation, ("AEPSC")* 91 FERC ¶ 61,308 (2000); Order on Rehearing, 94 FERC ¶ 61,166 (2001).

[2] *See Southwest Power Pool, Inc.,* 92 FERC ¶ 61,109 (2000)

dispute resolution, representations and warranties and general provisions. The IA was negotiated at arms length between the Company and Generating Company. Generating Company's assent to the terms and conditions of the IA is indicated by its execution of the document.

The IA supercedes a letter agreement between the parties which provided for the performance of certain pre-construction activities by the Company. The letter agreement was accepted for filing by letter order dated March 27, 2001 in Docket No. ER01-1172-000.

Cost Information:

The following information is submitted in support of the cost and cost responsibility under the IA:[3]

1. Description of the Facility. The Facility will be in Hazard, Kentucky and will have a net capability of approximately 500 megawatts.

2. Facility Ownership. The Facility will be owned by Kentucky Mountain Power, L.L.C.

3. One-Line Diagram. A One-Line diagram of the Facility and the surrounding system facilities is included in Appendix A to the IA.

4. Direct Assignment of Costs. The costs that are to be directly assigned to the Generating Company consist of the facilities necessary to physically and electrically interconnect the generating facility to the Transmission System and System Upgrades necessary to remove overloads resulting from the connection of the Facility to the network. Such facilities are included in the definition of direct assignment facilities accepted by the Commission in *AEPSC, supra.* The Direct Assignment Facilities are set forth on Appendix A to the IA.

   The Agreement provides that Generating Company shall be eligible for a credit for transmission service in an amount equal to the costs borne by Generating Company for system upgrades necessary to remove overloads. The crediting

[3] *See Entergy Services Inc.*, 91 FERC ¶ 61,149 (2000).

provision is subject to changes ordered by the Commission in *AEPSC, supra.*

5. Identification of Direct Costs, Indirect Costs and Carrying Charges. The estimated project costs are set forth on Appendix E to the IA. Under the IA, Generating Company is responsible for actual costs, but must approve any change in the scope of the work which would increase the cost by 10% or more. Attached as Exhibit 1 to this filing is an identification of the direct costs, indirect costs and carrying charges.

6. Facilities With Similar Characteristics and Costs. No comparable data is available. The most recent integration of generation on the AEP System was in the mid 1980's on the EHV network. Such costs would not be comparable to the project. Further, each project is unique with respect to required facilities and configuration.

7. Cost Support for Services. The only service to be provided by the Company and charged to Generating Company under the IA, beyond construction of the necessary facilities, is the performance of operation and maintenance on the Company Interconnection Facilities. The cost of this service will be governed by a formula set forth in Appendix G to the IA, which the Commission has accepted on numerous occasions for similar services.[4]

Effective Date:

AEP requests an effective date of August 31, 2001. AEP also requests waiver of any filing requirements with which this filing does not comply.

Service, Notices and Correspondence:

Copies of this filing have been served upon the Kentucky Public Service Commission. Any correspondence regarding this matter should be directed to:

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[4] *See, e.g.,* Letter Order, May 18, 2000 in Docket No. ER00-2232-000; Letter Order February 17, 2000 in Docket No. ER00-1131-000.

Kevin F. Duffy
Assistant General Counsel – Regulatory Services
American Electric Power Service Corporation
1 Riverside Plaza
Columbus, Ohio 43215

Dennis W. Bethel
American Electric Power Service Corporation
1 Riverside Plaza
Columbus, Ohio 43215

In addition, AEP requests that the Commission provide that copies of correspondence also be sent to representatives of Generating Company, as follows:

Director Project Management
Kentucky Mountain Power, LLC
2810 Lexington Financial Center
250 West Main Street
Lexington, Kentucky 40507

Arthur Thomas
Kentucky Mountain Power, LLC
2810 Lexington Financial Center
250 West Main Street
Lexington, Kentucky 40507

Peter Brown
EnviroPower, LLC
2810 Lexington Financial Center
250 West Main Street
Lexington, Kentucky 40507

List of Documents Submitted:

Submitted with this filing are the following documents, which are submitted in hard copy and electronic form:

1. This letter of transmittal;

2. Interconnection and Operation Agreement between Kentucky Power Company and Kentucky Mountain Power, L.L.C. (First Revised Service Agreement No. 312, Supercedes Original Service Agreement No. 312 under AEP's OATT);

3. Exhibit 1 – Cost Breakdown; and

4. A form of Notice for publication in the *Federal Register*.

Respectfully submitted,

Kevin F. Duffy

KFD:bas
Enclosures

Cost Description		Interconnection Facilities			System Upgrades		
		Bill Amount $ (000)	Bill Amount % of Total	Average Loading Rate	Bill Amount $ (000)	Bill Amount % of Total	Average Loading Rate
1. Materials (M)							
(a) Stores Material (SDM)		**$2,947**	**20%**		**$781**	**33%**	
(b) Stores Expenses (SE)		**$300**	**2%**		**$70**	**3%**	
	Total Materials	**$3,247**	**22%**		**$851**	**36%**	
II. Labor (L)							
(a) Direct Charges (DL)		**$7,859**	**52%**		**$1,017**	**43%**	
(b) Fringe Exp.(FL)		**$352**	**2%**		**$91**	**4%**	
	Total Labor	**$8,211**	**55%**		**$1,108**	**47%**	
III. Transportation (E)		**$219**	**1%**		**$45**	**2%**	
IV. Subtotal I, II, III		**$11,677**	**78%**		**$2,004**	**85%**	
V. Engr. and Administrative (O)							
(a) Company Const. (IE)		**$2,352**	**16%**		**$159**	**7%**	
(b) AEP Engr. (AE)		**$994**	**7%**		**$187**	**8%**	
	Total Engr. & Adm.	**$3,346**	**22%**		**$346**	**15%**	
VI. Subtotal I, II, III and IV		**$15,023**	**100%**		**$2,350**	**100%**	
VII. AFUDC		**$0**	**0%**		**$0**	**0%**	
	Total I, II, III, V and VII	**$15,023**	**100%**		**$2,350**	**100%**	