

**REPORT OF THE
STATE CORPORATION COMMISSION ON**

**“Wheeling” of
Electricity in
Southwest Virginia**

**TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA**



HOUSE DOCUMENT NO. 39

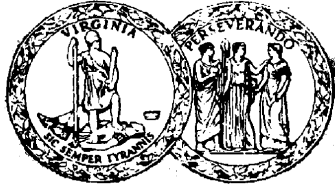
**COMMONWEALTH OF VIRGINIA
RICHMOND
1992**

THEODORE V. MORRISON, JR.
CHAIRMAN

THOMAS P. HARWOOD, JR.
COMMISSIONER

PRESTON C. SHANNON
COMMISSIONER

COMMONWEALTH OF VIRGINIA



WILLIAM J. BRIDGE
CLERK OF THE COMMISSION
P. O. BOX 1197
RICHMOND, VIRGINIA 23209-1197

STATE CORPORATION COMMISSION

January 15, 1992

TO: The Honorable L. Douglas Wilder
Governor of Virginia
and
The General Assembly of Virginia

The report contained herein is pursuant to House Joint Resolution No. 441 of the 1991 Session of the General Assembly of Virginia.

This report comprises the response of the State Corporation Commission to the directive to study the steps which could be implemented in the near future to enable 100 megawatts or more of power, prior to 1998, to be wheeled from electric power plants in Southwest Virginia. The Commission issued an initial interim report to the Virginia Coal and Energy Commission and the Virginia Coalfield Economic Development Authority on June 1, 1991. The second interim report was issued on September 1, 1991.

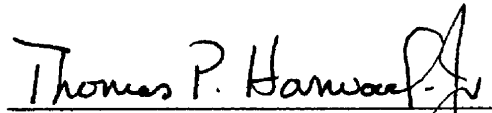
The Virginia Center for Coal and Energy Research issued separate reports for this study as directed by House Joint Resolution No. 441.

We are pleased to submit to you the report prepared summarizing the activities, conclusions and recommendations of the study.

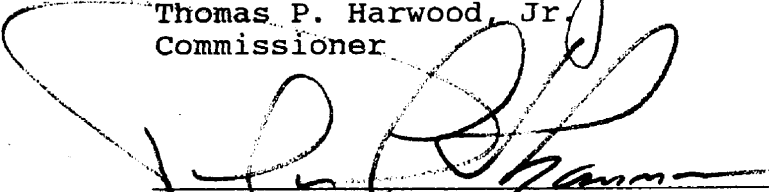
Respectfully submitted,



Theodore V. Morrison, Jr.
Chairman



Thomas P. Harwood, Jr.
Commissioner



Preston C. Shannon
Commissioner

TABLE OF CONTENTS

	PAGE
EXECUTIVE SUMMARY	I
INTRODUCTION	1
AN OVERVIEW OF THE REGIONAL TRANSMISSION SYSTEM	3
HISTORICAL OPERATION OF THE REGIONAL TRANSMISSION NETWORK	7
UTILITY RESPONSES TO TRANSMISSION LIMITATIONS	10
FINDINGS AND CONCLUSIONS	15

Attachment No. 1	House Joint Resolution No. 441
Attachment No. 2	Virginia Code Section 56-46.1
Attachment No. 3	Electric Service Areas in Virginia
Attachment No. 4	AEP/Apco Regional Transmission System
Attachment No. 5	Apco's Generating Units
Attachment No. 6	AEP's Service Area
Attachment No. 7	AEP, APS, PJM, and Virginia Power's Service Areas
Attachment No. 8	Major Transmission Lines in and around Virginia
Attachment No. 9	Reliability Coordination Plan

EXECUTIVE SUMMARY

House Joint Resolution (HJR) No. 441, as adopted by the 1991 session of the Virginia General Assembly, required that the State Corporation Commission *"study what steps could be implemented in the near future to enable 100 MW or more of power, prior to 1998, to be 'wheeled' from electric power plants built in Southwest Virginia."*

Facility improvements made or planned to be made by American Electric Power (AEP), the Pennsylvania-New Jersey-Maryland power pool (PJM), and the Allegheny Power System (APS) will improve west-to-east transfer capability on the regional transmission system. This enhanced capability, coupled with the expiration of several wholesale power contracts, should enable the regional system to accommodate the transfer of up to 250 MW of additional power from Apco to Virginia Power's service area. It appears, however, that the construction of one or more major transmission lines is necessary to further accommodate significant west-to-east power transfers greater than this amount.

The wheeling of power from southwest Virginia may not be 100 percent reliable under current conditions. Any additional power transfer, as well as existing contracts, would be subject to interruptions in the event of facility outages and/or system overloads. Likewise, while the Virginia Power/Apco facility enhancements currently planned will increase transfer capability, if those projects are approved, but are delayed beyond 1998, the reliability of all west-to-

east power transfers will deteriorate as native load growth consumes incremental transfer capability generated by recent facility improvements. In the interim however, the existing Apco system appears capable of providing up to 250 MW of wheeling on a reasonably firm basis.

INTRODUCTION

During the 1991 session of the Virginia General Assembly, House Joint Resolution (HJR) No. 441 was adopted in the interest of promoting the development of coal-fired electric generation facilities in southwest Virginia. A copy of that resolution is presented as Attachment No. 1 to this report. HJR No. 441 recognized that if the current joint efforts of Virginia Power and Appalachian Power Company (Apco) to enhance their existing high voltage transmission systems are successful, the regional west-to-east power transfer capability will be increased by approximately 2,000 megawatts (MW). The resolution also noted that this margin of 2,000 MW is contingent on a number of factors, including improvements to the transmission systems of Allegheny Power System (APS) and the Pennsylvania-New Jersey-Maryland (PJM) power pool. A portion of this 2,000 MW could be made available to accommodate wheeling needs of qualifying facilities and independent power producers located in southwest Virginia that participate in a capacity acquisition program of a regional utility. In fact, the 1991 session of the Virginia General Assembly amended Virginia Code section 56-46.1 to accommodate wheeling of non-utility generation over new transmission lines that meet specific criteria in terms of location, construction, timing and kilovolt (KV) rating. A copy of this Code Section is presented as Attachment No. 2 to this report.

The improvements contemplated on the Virginia Power and Apco systems involve the construction of approximately 110

miles of 765 KV transmission facilities and 105 miles of 500 KV line. These projects represent a total construction investment estimated to be approximately \$410 million in 1998 dollars. Virginia Power and Apco estimate the commercialization date for these facilities to be 1998 with possible delays driven by a number of factors, including a multitude of regulatory approvals. HJR 441 recognizes this fact and seeks to explore the option of *"...what can be done in the near future to enable power to be 'wheeled' from electric power plants in Southwest Virginia."* Accordingly, that resolution directs, among other things, *"that the State Corporation Commission, with support from the Virginia Center for Coal and Energy Research, study what steps could be implemented in the near future to enable 100 MW or more of power, prior to 1998, to be 'wheeled' from electric power plants built in Southwest Virginia."*

That resolution further directs that the Commission provide interim reports to the Coal and Energy Commission and the Coalfield Economic Development Authority by June 1, 1991 and September 1, 1991. Finally, Commission Findings and Recommendations are to be submitted to the Governor and the 1992 session of the General Assembly.

On June 1, 1991, the Commission provided the first of the required interim reports. That report provided a brief overview of the regional American Electric Power (AEP)/Apco transmission system and detailed how that system interconnects with neighboring utilities. That report also explained in general terms how the AEP/Apco transmission system operates in

parallel with transmission systems to the north. Finally, the June 1, 1991 report outlined the approach to be taken by the State Corporation Commission Staff in its analysis of the regional transmission system's ability to accommodate the wheeling of electric power from southwest Virginia.

The second required interim report, issued on September 1, 1991, also provided an overview of the regional transmission system. Additionally, that report evaluated the historical performance of the regional system, the facility improvements made or planned to be made to enhance that system, specific transmission related operating practices of regional utilities, and the historical and projected loadings of the regional transmission network. The September 1, 1991 report also commented on the ability of the regional transmission system to wheel power from southwest Virginia.

This document represents the final report required by HJR 441. For the purposes of continuity, this report will provide an overview of the Apco/AEP transmission system. It will also update the technical information provided in the September 1, 1991 report. This final document will also specifically address the capability of the regional transmission network to export power from southwest Virginia.

AN OVERVIEW OF THE REGIONAL TRANSMISSION SYSTEM

A brief overview of the Apco generation and transmission system and how that system interacts with neighboring utilities, especially Virginia Power, is a necessary preamble to any discussion of the ability of the regional transmission

system to accommodate the wheeling of 100 MW or more of generating capacity from southwest Virginia. Attachment No. 3 to this report presents the retail service areas of Virginia's electric utilities. Apco, which serves southern West Virginia and southwestern Virginia, is a member of the American Electric Power System. During 1990, Apco's energy sales totaled 29.1 billion kilowatt-hours (Kwh) of which 15.3 billion Kwh (53%) were sales to Virginia customers. Apco's internal peak demand for the winter of 1990/91 was 5,392 MW; of which 2,901 MW was associated with Virginia load. In order to serve its load, Apco currently has generating resources of 5,859 MW (including entitlement of 9 MW of the Sporn plant owned by Ohio Power Company). The majority of Apco's generating facilities (approximately 70%) are located in northern West Virginia with 1,766 MW of capacity located in the Virginia service area. The locations of these facilities are presented on Attachment No. 4 to this report. Attachment No. 5 provides a list of Apco's generating facilities and additional relevant information including unit size, fuel type, and commercialization dates.

Based on the 1990/91 winter peak load of 5,392 MW and on an installed capacity of 5,859 MW, Apco has a current installed reserve margin of 8.7 percent. This reserve margin would be considered grossly inadequate under normal circumstances in terms of providing a cushion for unit outages/curtailments and unexpected load growth. As previously noted, however, Apco is a member of the AEP system and, as a result, has access to and shares the cost associated with an AEP system reserve margin of

approximately 31 percent. As such, Apco does not operate as a single and independent utility. The AEP system, which has eight member companies, is dispatched as a single system and offers each of its member companies distinct advantages in terms of load diversity, access to relatively inexpensive embedded cost capacity, and a sharing of profits associated with sales of power by AEP to neighboring utilities. Attachment No. 6 to this report presents Apco's service area relative to the service area of the AEP system.

The AEP transmission network was designed and constructed to accommodate the operation of its member companies as a single and dispatchable entity. Attachment No. 4 to this report, in addition to locating Apco's generating units, depicts the AEP/Apco regional transmission network and how that network interconnects with neighboring utilities.

As previously indicated, the majority of Apco's generating facilities are located in northern West Virginia. As a result, the Company's transmission system is designed to connect this generation with load centers in southern West Virginia and southwestern Virginia. This system consists of a network of 765 KV, 345 KV and 138 KV transmission lines. As detailed on Attachment No. 4, the 765 KV system includes segments designated as: Baker-Broadford, Broadford-Jackson's Ferry, Jackson's Ferry-Cloverdale, Cloverdale-Joshua Falls, Jackson's Ferry-Axton, and Culloden-Wyoming. In parallel with the 765 KV system, the Company also operates a 345 KV system and an extensive 138 KV network.

In addition to serving the obvious function of connecting generating facilities to load centers, Apco's transmission network operates as part of the AEP system and is interconnected with neighboring utilities to the east and south of Apco's service area. To the east, Apco is interconnected with Virginia Power through a single 500 KV and four 138 KV transmission interconnections. To the south, Apco's transmission system is interconnected with the Tennessee Valley Authority (TVA) via three 500 KV and three 161/138 KV interconnections. Apco is also interconnected with Duke Power Company through two interconnections, one operating at 500 KV and the other at 138 KV. Finally, Apco is interconnected with Carolina Power and Light Company (CP&L) with four 138 KV interconnections.

It should be noted that while the transmission systems of regional utilities are separate and distinct in terms of ownership, in reality these systems cannot be viewed in isolation. For example when the Allegheny Power System (APS) makes a sale to Virginia Power, up to 18 percent of that power moves across Apco's regional transmission system. Likewise an AEP sale to PJM results in parallel flows such that 17% of the power may flow across Apco's regional system. Any sale by Apco to Virginia Power affects the transmission system of neighboring utilities in a similar fashion. Obviously, while an assessment of the export capability of the transmission system serving southwest Virginia must focus on the regional network, that assessment cannot be made in a vacuum because of

the externalities discussed above. For informational purposes, the service areas of the regional utilities are presented as Attachment No. 7 to this report.

The interconnections between the AEP/Apco transmission system and neighboring utilities to the east and the south enhance system reliability as well as economy of operations for all the utilities involved. During periods of system emergency, for example, neighboring systems can share capacity with a system(s) confronting a capacity shortage. Such a shortage is usually associated with the unexpected outage(s) of generating facilities and/or "spikes" in load driven by sustained periods of abnormal weather. In addition, the transmission interconnections allow these utilities to engage in cost-effective wholesale exchanges of power.

HISTORICAL OPERATION OF THE REGIONAL TRANSMISSION NETWORK

It should be noted that the use of the regional transmission network evolved significantly in the late 1970s and throughout the 1980s. Prior to the mid-70s, the regional system was used almost exclusively for connecting generation sources with local load centers and for short term economy and emergency exchanges among utilities. With the advent of rising oil prices in the mid-70s, however, Virginia Power made additional use of the transmission system by purchasing "unit power" and "oil-displacement-power" from AEP. In the mid-80s, Virginia Power further expanded its use of the system as a result of the decision to cancel North Anna No. 3. In 1985,

Virginia Power replaced North Anna No. 3 capacity with two purchase power contracts. A 400 MW contract with the Hoosier Energy Rural Electric Cooperative of Indiana and a 500 MW contract with AEP made long term use of the west-to-east transmission capability. The aforementioned contracts are scheduled to expire at the end of 1999.

The use of the regional transmission network was also impacted by the relative rates of load growth of mid-western versus eastern utilities. Load growth on the East Coast continued unabated throughout the 1980s while a number of western utilities experienced relatively sluggish growth. This created an environment in which excess capacity existed to the west while there was a need for capacity to the east. This scenario resulted in the economic incentive to move large blocks of power from the ECAR utilities¹ to the East Coast. For example, the Potomac Electric Power Company (PEPCO) contracted for 400 MW from Ohio Edison from 1989 to 2005; Old Dominion Electric Cooperative (ODEC) purchased 300 MW from APS from 1988 to 1992 with an extension option; and CP&L contracted for 250 MW from AEP from 1990 to 2010. In addition, PJM routinely imports massive amounts of short term and economy power with daily imports often exceeding 4,000 MW.

This transfer of power from ECAR to the east ultimately introduced voltage stability problems on the regional system.

1. 28 electric companies (19 systems) which operate in the east-central part of the country and are members of the East Central Area Reliability Coordination Agreement (ECAR).

As early as 1983, APS experienced low voltage on its 500 KV system on the Hatfield-Bedington-Doubs corridor (see Attachment No. 8). In the summer of 1987, ECAR transfers to the east were curtailed numerous times because of voltage problems on the APS system. This situation was further exacerbated during the summer of 1988. Abnormally high loads coupled with the outages of one nuclear unit on the Virginia Power system and three on the PJM system increased the need for higher levels of power transfers from ECAR to the east. This situation resulted in unacceptable flows and voltages on the regional transmission network. As a result, scheduled ECAR transfers to the east were curtailed on 38% of the days during the summer of 1988, with curtailments reaching 2850 MW. In fact, Virginia Power's long term firm power purchases from AEP and Hoosier were curtailed such that 13,120 mega watt hours (Mwh) of energy were not delivered because of transmission constraints.

Transmission problems continued during the summer of 1989. Again, weather-driven load coupled with nuclear outages on the East Coast resulted in higher levels of power transfers from ECAR to the east. This resulted in unacceptable flows and voltages on limiting facilities and required curtailments of west-to-east transfers. During the summer of 1989, scheduled transfers were curtailed on 55% of the days. Again, Virginia Power was unable to import more than 60,000 Mwh associated with its Hoosier and AEP contracts. During the summer of 1990, curtailments continued with scheduled transfers interrupted on

66% of the days. During the 1991 summer, scheduled transfers were interrupted on 23% of the days.

As previously indicated, the voltage stability problems experienced in recent years have, especially during peak periods, severely limited the ability of AEP/Apco to export power to the Virginia Power service territory. While much of the voltage stability problem has stemmed from the inability of the APS system to accommodate massive power transfers from ECAR to the east, this has also affected AEP/Apco's export capability because of the parallel flow concept previously discussed. AEP/Apco's export capability also has been affected by "limiting facilities" within its own system. For example, on many days during the summer of 1988, the anticipated contingency loading² of the Amos-Funk 345 KV line reached or exceeded 90 percent of its capability. On those occasions, operator corrective actions were employed to reduce loading limits to acceptable values. Such actions included redispatching generation facilities, reduction of power transfers, and/or purchasing emergency power from neighboring systems.

UTILITY RESPONSES TO TRANSMISSION LIMITATIONS

The regional utilities have responded in essentially two fashions to the limitations in the ability of the transmission system to accommodate higher power transfers. The utilities'

2. The loading of the Amos-Funk line if the Baker-Broadford 765 KV line is out of service.

responses can be simply classified as operational changes and facility improvements. Operational responses began as early as 1983 when the APS Emergency Voltage Control Program (EVCP) was established because of low voltage problems along the Hatfield-Bedington-Doubs corridor. Participants in the program included APS, PJM, Virginia Power, Ohio Edison, Duquesne Light, Cleveland Electric Illuminating and AEP. This program monitored specific line flows and provided for transfer curtailment based on excessive line flow or excessive voltage drop at the Bedington substation.

As voltage problems continued in the late 1980s, an "APS/PJM/Virginia Power" study group was organized. The purpose of this group was twofold:

- to develop an operating procedure to deal more effectively with voltage drop problems; and
- to study facility enhancements that would accommodate more west-to-east power transfers on a continuous and reliable basis.

The above referenced study group identified a number of facility improvements that would enhance the capability and reliability of the regional transmission system. Those facility enhancements will be addressed later in this report. The study group also developed a Reliability Coordination Plan (RCP). This plan established a system for curtailing transfers in case of heavy transmission loading and also established a load shedding procedure for dealing with emergency or anticipated emergency conditions on the regional system. The RCP established four critical loading thresholds (levels) that result in specific curtailment actions by regional utilities.

Those thresholds are presented as Attachment No. 9 to this report. The RCP also established, for importing utilities, a methodology for sharing the curtailment of imports under various levels of the RCP. The above-referenced importing utilities include PJM, Virginia Power and ODEC.

In addition to the operating practices developed by the APS/PJM/Virginia Power study group, several utilities have developed independent and utility-specific operating practices to respond to excessive transmission loadings. For example, APS currently has in place a 300 MW sales contract with ODEC. During peak loading conditions, APS will "back down" generation to the west and replace that generation with its share of the Bath County Pumped Storage Project. This, of course, assumes that Bath County is not operating at full output. This practice essentially provides ODEC with output from an eastern generating facility and, as a result, reduces west-to-east power transfers by 300 MW. Apco follows a similar practice with its 565 MW Smith Mountain facility as AEP/Apco facilities are heavily loaded during peak periods. Likewise, Virginia Power will dispatch three Possum Point units regardless of economic dispatch when the actual Virginia Power system load reaches a specified level. Each of these actions represents a departure from the principles of economic dispatch, but are necessary responses for the maintenance of transmission reliability pending the construction of additional transmission lines.

As previously indicated, the APS/PJM/Virginia Power study group recommended several facility enhancements. While a number of options were considered, it was ultimately concluded in September of 1989 that the most cost effective transmission facility enhancements that could be made over the short term involved the installation of capacitors at the APS Bedington and Black Oak substations (see Attachment No. 8). It also was concluded that additional capacitors were needed on the PJM system to enhance near-term transmission transfer capability. The study recognized, however, that the long range solution to the transfer capability limitations involved the addition of major extra-high voltage (EHV) transmission lines from the mid-west to the east. The study identified a number of potential lines for future evaluation.

As a result of the APS/PJM/Virginia Power study, in May of 1991, APS installed a 325 megavar shunt capacitor at the Bedington substation. A similar capacitor was installed at the Black Oak substation by July, 1991. Additionally, in 1992, PJM will install a total of 1,200 megavars of capacitors at a number of 500 KV and 230 KV substations. Each of the above referenced reactive power supplies will support voltage on the APS and PJM systems during periods of heavy power transfers from west-to-east.

While the transmission systems of APS and PJM affect AEP/Apco's export capability to the Virginia Power service area, Apco facilities also limit export capability during peak loading periods. In recognition of this fact, AEP/Apco has

implemented or has planned a number of system reinforcements which, when completed, will improve its system in order to better serve native load and to more reliably accommodate existing levels of west-to-east power transfers. A description of these facility enhancements is detailed below:

- In June, 1989, as part of a two-step program, the Kanawha River 345 KV switching station was established to integrate the Amos-Funk 345 KV line with the Sporn-Kanawha 345 KV line. This reconfiguration increased the loadability of this line and provided the foundation for the installation of a series capacitor.
- As part of an on-going program, all limiting terminal equipment (circuit breakers, switches, line traps, station conductors, etc.) on heavily loaded 138 KV transmission circuits have been replaced so that the installed line conductor thermal capability of such 138 KV lines could be fully utilized.
- On December 18, 1991, series capacitors were added at the Kanawha River Station in the Kanawha River-Funk 345 KV circuit, increasing the loadability of that limiting facility. In addition to relieving possible overloads of this circuit, the series capacitors have diverted power flows away from other potentially limiting 138 KV circuits within Apco and provided some relief of heavy loadings of RCP-limited facilities within APS.
- The Axton-Person 500 KV Interconnection with CP&L, scheduled for service in December, 1997, will provide back-up support to the eastern Apco area, thereby reducing contingency power flows on Apco's critical internal transmission facilities. Furthermore, this reinforcement provides another alternative path for power transfers from AEP to Virginia Power and PJM, providing some relief to the critical RCP-limited facilities in APS.
- The Nagel-Cane River 230 KV Interconnection with CP&L, scheduled for service in December, 1992, will replace the existing Holston-Cane River 138 KV tie, which has been a limit to AEP/Duke and CP&L transfers. This reinforcement also increases the direct tie capacity between AEP and CP&L.

Other facilities that are planned by the neighboring utilities which will help the west-to-east transfer capability are listed below.

- The Beaver Valley (DLCO) - Three Mile Island (GPU) 500 KV Interconnection, scheduled for service in 1996, will be utilized to transfer 500 MW of generating capacity from the Pittsburgh area to eastern Pennsylvania and New Jersey. An additional 1000 MW of interconnection capacity is available beyond the 500 MW commitment. This line will further reinforce the west-to-east interface.
- Baltimore Gas & Electric placed in service, during the summer of 1991, the new 640 MW Brandon Shores Unit No. 2. PEPCO added 382 MW of combustion turbines at Chalk Point. These generating facilities will reduce critical west-to-east transmission line loadings and will provide additional reactive power resources.

FINDINGS AND CONCLUSIONS

The ultimate determination as to whether transmission capacity exists to wheel power from southwest Virginia requires the consideration of three major factors:

- the capability of the AEP/Apco transmission system to support existing and expected native load as well as off-system firm power transfer obligations;
- the impact of AEP/Apco transmission operation on the systems of other utilities because of the parallel flow concept discussed earlier in this report; and
- the "contract path" or actual physical interconnection capability that exists between Apco and Virginia Power.

With regard to the capability of Apco's regional transmission system to support native and existing transfer obligations, that capability was increased modestly by the Kanawha River switching station installed in June of 1989. The capability further increased by the installation of series

capacitors at the Kanawha station in December of 1991. The combination of these facility improvements has enhanced Apco's ability to serve its native load from existing Apco/AEP generation sources. These facility improvements have also positively affected the capability of the Apco/Virginia Power interface in terms of transfer capability. In fact, the transfer capability on that interface, after taking into account the increased transfer loading associated with the use of the series capacitors, has increased by approximately 200 MW. It should be noted that as Apco's native load increases, this increment of export capability will be consumed.

With regard to limitations on the APS system associated with parallel flows, these limitations were reduced with the installation of shunt capacitors at the Bedington and Black Oak substations. The planned installation of shunt capacitors on the PJM system also will help relieve constraints on the RCP-limited facilities. In fact, the combined effect of the APS and PJM programs is expected to be an increase in west-to-east transfer capability of 800-1000 MW. While this represents a significant increase in transmission capacity, power transfers will continue to be limited by facilities on the APS/PJM transmission systems. This is illustrated by the fact that over the last three years Virginia Power/PJM exports from ECAR have been curtailed by as much as 2,350-3,750 MW.

The west-to-east transfer capability also has been impacted by the termination of several contracts. At the end of 1990, an AEP sale to General Public Utilities (GPU) for 560

MW was terminated and was not replaced by another wholesale exchange as expected. This resulted in decreased loadings within the Apco system of approximately 100 MW. The APS system was unloaded by approximately the same amount. In 1993, the APS/ODEC contract for 300 MW will terminate; the extension option will not be exercised. This will reduce Apco's transmission loadings by approximately 60 MW.

Another factor that positively affects west-to-east transfer capability is the addition of approximately 1000 MW of generation capacity in the southern part of the PJM system. This makes PJM less dependent on imported power and will free-up west-to-east transmission capacity until load growth on the PJM system consumes this incremental generation.

As a result of facility improvements, the termination of several wholesale contracts, and the addition of significant generation within PJM, it appears that there is transmission capability that can be dedicated to the export of a block of power from southwest Virginia. While it is impractical to quantify this increment precisely, it appears that roughly 200-250 MW of transmission capability will be available to transfer power from southwest Virginia to Virginia Power's service area. In fact, Apco/AEP has tentatively agreed to wheel up to 250 MW of power from Apco's Virginia and West Virginia service areas to Virginia Power's service territory. This 250 MW increment of transmission capacity is sufficient to support transmission agreements with one or more non-utility power generation projects that may be developed in southwest

Virginia. One such project that is being pursued is the proposed 107 MW Toms Creek Fluidized Bed Coal Gasification Project which is being developed by TAMCO Power Partners in Wise County, Virginia. This project has been selected to receive federal funding through the Clean Coal Technology Program of the United States Department of Energy.

It should be noted, however, that no wheeling arrangement is 100 percent reliable. In the event that the 500 KV interconnection between Virginia Power and Apco is out of service, wheeling services obviously will cease. Likewise, in the event of system overloading, wheeling transactions would be curtailed prior to Apco's shedding of native load or already committed firm off-system sales. Similarly, a sale to Virginia Power by a non-utility generator would, as are existing contracts, be subject to interruption per the RCP agreement discussed earlier in this report. Finally, while the high voltage transmission enhancements proposed by Virginia Power and Apco will increase west-to-east transfer capability, if those projects are approved but are delayed beyond 1998, the reliability of wheeling from southwest Virginia, as well as existing power transfers, would be increasingly degraded as native load growth consumes transfer capability generated by the recent changes discussed in this report.

With regard to House Joint Resolution No. 441, it appears that the regional utilities have rigorously pursued viable options to increase the capability of the transmission system to export power from southwest Virginia. It further appears

that the construction of major transmission lines would be necessary to significantly improve the transfer capability of the regional transmission system.

GENERAL ASSEMBLY OF VIRGINIA--1991 SESSION
HOUSE JOINT RESOLUTION NO. 441

Requesting the State Corporation Commission and the Virginia Center for Coal and Energy Research to study means available, prior to 1998, to "wheel" power produced by electric power plants in Southwest Virginia.

Agreed to by the House of Delegates, February 22, 1991
 Agreed to by the Senate, February 21, 1991

WHEREAS, in March 1990, Virginia Power and Appalachian Power Company (APCO) announced joint plans to construct a series of new high-voltage power lines in Virginia and West Virginia; and

WHEREAS, one such power line would originate at Wyoming, West Virginia, and end near Roanoke, Virginia, and another would originate near Lynchburg and end at North Anna, Virginia; and

WHEREAS, Virginia Power and APCO anticipate, if all contingencies are met, that these new lines will increase the east-west electricity transmission capacity available through Virginia by 2000 megawatts or more; and

WHEREAS, Virginia Power and APCO indicate that if the proposed lines are built, a portion of this increased transmission capacity could be used to "wheel" power from proposed electric power plants constructed in Southwest Virginia; and

WHEREAS, APCO and Virginia Power indicate that the Allegheny Power System (APS) and Pennsylvania Jersey Maryland (PJM) power pool must also enhance their electricity transmission systems for the projected increases in transmission capacity, upon which the promised "wheeling" services from Southwest Virginia depend, to be fully realized; and

WHEREAS, the proposed lines may not be constructed until approved by the Virginia State Corporation Commission, the State of West Virginia and the appropriate federal agencies; and

WHEREAS, the Virginia Center for Coal and Energy Research reported in May 1990, that each 100 megawatts coal-fired electric power generation facility constructed in the Virginia coalfields would produce \$137 million in capital investment, 125 construction jobs, \$1.32 million in annual operating plant wages, \$750,000 annually in property taxes, secure jobs for substantial numbers of coal miners, power plant operators and service industry personnel, and significantly increase Virginia coal sales; and

WHEREAS, numerous private, nonutility developers desire to construct power plants ranging in size from 100 megawatts to 400 megawatts each in Southwest Virginia; and

WHEREAS, Virginia Power and APCO are also considering siting new electric power plants in Southwest Virginia; and

WHEREAS, APCO and Virginia Power estimate the increased capacity created by the proposed lines to "wheel" power from such power plants in Southwest Virginia will be available in 1998, but recognize that the actions required of APS and the PJM power pool and the approvals required from state and federal agencies could cause the increased "wheeling" capacity to not be available until later than 1998; and

WHEREAS, if approved, constructed and used for the purposes proffered by Virginia Power and APCO, the proposed electricity transmission lines represent a positive, long-term solution to the need to "wheel" power from Southwest Virginia power plants; and

WHEREAS, the present economic development needs of Southwest Virginia establish the need to study what can be done in the near future to enable power to be "wheeled" from power plants in Southwest Virginia earlier than 1998; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the State Corporation Commission, with the support of the Virginia Center for Coal and Energy Research, is hereby requested to study what steps could be implemented in the near future to enable 100 megawatts or more of power, prior to 1998, to be "wheeled" from electric power plants built in Southwest Virginia. The study should include, but need not be limited to, an examination of: (i) how much transmission capacity currently existing on the transmission system serving Southwest Virginia could feasibly be allocated for such a purpose, and (ii) what enhancements could be made for such a purpose to the existing Southwest Virginia transmission system; and, be it

RESOLVED FURTHER, That the Virginia Center for Coal and Energy Research, with comment and review by the State Corporation Commission, examine the feasibility, in addition to the lines proposed by Virginia Power and APCO, of constructing a new electricity transmission line directly from the Virginia coalfields for such a purpose; and, be it

RESOLVED FINALLY, That Virginia Power and APCO are hereby requested to fully cooperate with the State Corporation Commission and the Virginia Center for Coal and Energy Research in the conduct of these studies and to provide any information requested by the Commission or the Center which is necessary to complete such studies. The Commission and the Center shall take all necessary steps to protect the confidentiality of any proprietary information provided by Virginia Power and APCO for this purpose.

The Commission and the Center should present two interim reports each on their respective studies to both the Virginia Coal and Energy Commission and the Virginia Coalfield Economic Development Authority by June 1, 1991, and September 1, 1991.

The Commission and the Center shall complete their work in time to submit their findings and recommendations to the Governor and the 1992 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.

§ 56-46.1. Commission to consider environmental factors in approving construction of electrical utility facilities; approval required for construction of certain electrical transmission lines; notice and hearings. — A. Whenever the Commission is required to approve the construction of any electrical utility facility, it shall give consideration to the effect of that facility on the environment and establish such conditions as may be desirable or necessary to minimize adverse environmental impact. In such proceedings it shall receive and give consideration to all reports that relate to the proposed facility by state agencies concerned with environmental protection; and if requested by any county or municipality in which the facility is proposed to be built, to local comprehensive plans that have been adopted pursuant to Article 4 (§ 15.1-446.1 et seq.) of Chapter 11 of Title 15.1.

B. No overhead electrical transmission line of 150 kilovolts or more shall be constructed unless the State Corporation Commission shall, after at least thirty days' advance notice by publication in a newspaper or newspapers of general circulation in the counties and municipalities through which the line is proposed to be built, and written notice to the governing body of each such county and municipality, approve such line. Such approval shall not be required for transmission lines constructed prior to January 1, 1983, for which the Commission has issued a certificate of convenience and necessity. Such notices shall include a written description of the proposed route the line is to follow, as well as a map or sketch of the route. As a condition to approval the Commission shall determine that the line is needed and that the corridor or route the line is to follow will reasonably minimize adverse impact on the scenic assets, historic districts and environment of the area concerned and, in the case of any application which is filed with the Commission in the years 1991 and 1992, for approval of a line of 500 kilovolts or more, any portion of which is proposed for construction west of the Blue Ridge Mountains, that the applicant will reasonably accommodate requests to wheel or transmit power from new electric generation facilities constructed after January 9, 1991.

C. If, prior to such approval, any interested party shall request a public hearing, the Commission shall, as soon as reasonably practicable after such request, hold such hearing or hearings at such place as may be designated by the Commission. In any hearing the public service company shall provide adequate evidence that existing rights-of-way cannot adequately serve the needs of the company.

If, prior to such approval, written requests therefor are received from twenty or more interested parties, the Commission shall hold at least one hearing in the area which would be affected by construction of the line, for the purpose of receiving public comment on the proposal. If any hearing is to be held in the area affected, the Commission shall direct that a copy of the transcripts of any previous hearings held in the case be made available for public inspection at a convenient location in the area for a reasonable time before such local hearing.

D. For purposes of this section, "interested parties" shall include the governing bodies of any counties or municipalities through which the line is proposed to be built, and persons residing or owning property in each such county or municipality and "environment" or "environmental" shall be deemed to include in meaning "historic", as well as a consideration of the probable effects of the line on the health and safety of the persons in the area concerned.

For purposes of this section, "qualifying facilities" means a cogeneration or small power production facility which meets the criteria of 18 C.F.R. Part 292; "public utility" means a public utility as defined in § 56-265.1; and "reasonably accommodate requests to wheel or transmit power" means:

1. That the applicant will make available to new electric generation facilities constructed after January 9, 1991, qualifying facilities and other nonutilities, a minimum of one-fourth of the total megawatts of the additional transmission capacity created by the proposed line, for the purpose of wheeling to public utility purchasers the power generated by such qualifying facilities and other nonutility facilities which are awarded a power purchase contract by a public utility purchaser in compliance with applicable state law or regulations governing bidding or capacity acquisition programs for the purchase of electric capacity from nonutility sources, provided that the obligation of the applicant will extend only to those requests for wheeling service made within the twelve months following certification by the State Corporation Commission of the transmission line and with effective dates for commencement of such service within the twelve months following completion of the transmission line.







2. That the wheeling service offered by the applicant, pursuant to subdivision D 1 of this section, will reasonably further the purposes of the Public Utilities Regulatory Policies Act of 1978 (P. L. 95-617), as demonstrated by submitting to the Commission, with its application for approval of the line, the cost methodologies, terms, conditions, and dispatch and interconnection requirements the applicant intends, subject to any applicable requirements of the Federal Energy Regulatory Commission, to include in its agreements for such wheeling service.

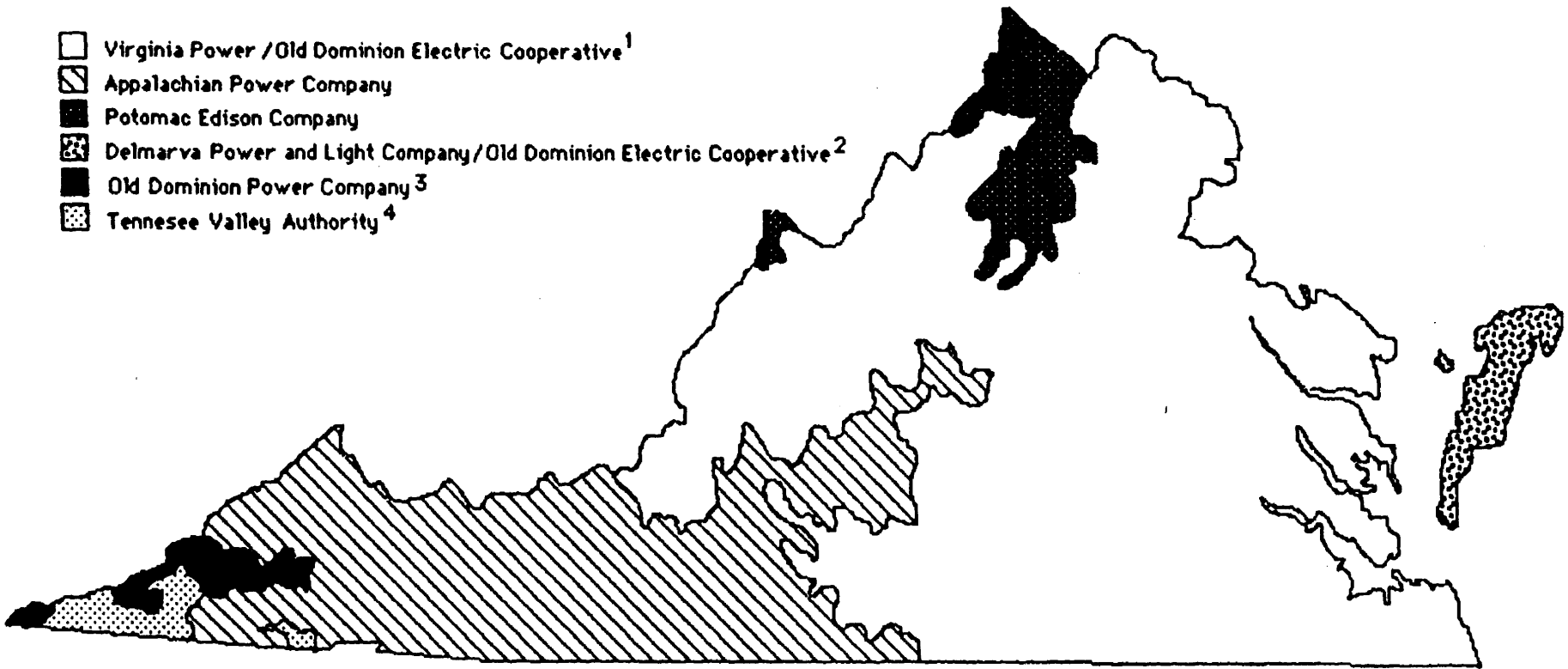
E. In the event that, at any time after the giving of the notice required in subsection B of this section, it appears to the Commission that consideration of a route or routes significantly different from the route described in the notice is desirable, the Commission shall cause notice of the new route or routes to be published in accordance with subsection B of this section. The Commission shall thereafter comply with the provisions of this section with respect to the new route or routes to the full extent necessary to give interested parties in the newly affected areas the same protection afforded interested parties affected by the route described in the original notice.

F. Approval of a transmission line pursuant to this section shall be deemed to satisfy the requirements of § 15.1-456 and local zoning ordinances with respect to such transmission line. (1972, c. 652; 1973, c. 307; 1974, c. 498; 1983, c. 438; 1984, cc. 287, 562; 1985, c. 282; 1991, cc. 90, 148.)

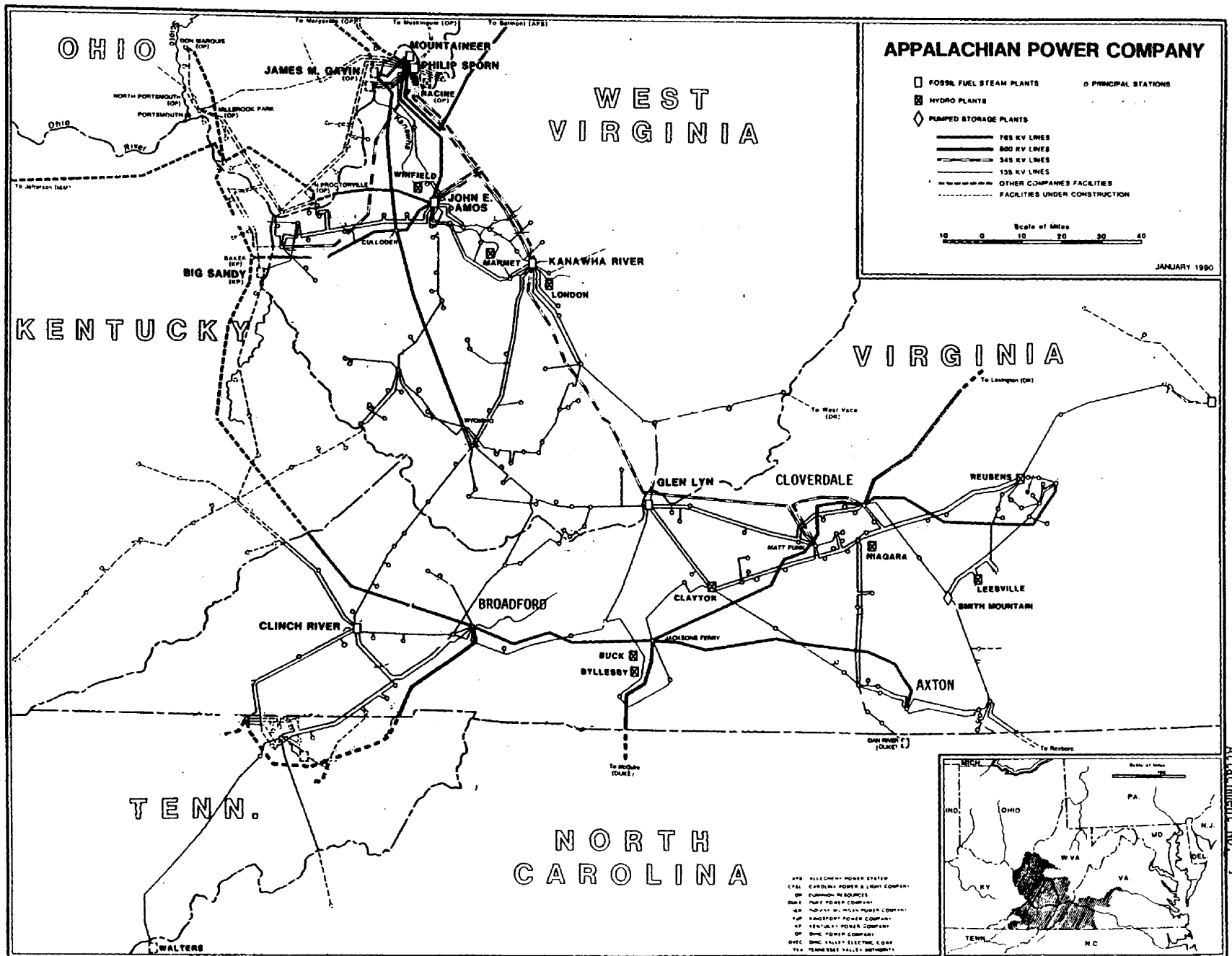
The 1991 amendments. — The 1991 amendment by c. 90 added the language beginning "and, in the case of any application which is filed with the Commission in the years 1991 and 1992" in the last sentence of subsection B, and in subsection D, added the second paragraph and subdivisions 1 and 2. The 1991 amendment by c. 148 inserted "historic districts" in the last sentence of subsection B.

Electric Service Areas in Virginia

-  Virginia Power / Old Dominion Electric Cooperative¹
-  Appalachian Power Company
-  Potomac Edison Company
-  Delmarva Power and Light Company / Old Dominion Electric Cooperative²
-  Old Dominion Power Company³
-  Tennessee Valley Authority⁴



1. Electric Cooperatives which serve in this area are supplied power by Old Dominion Electric Cooperative.
2. Electric Cooperative which serves in this area is supplied power by Old Dominion Electric Cooperative.
3. Purchases all energy from Kentucky Utilities.
4. Service provided by Powell Valley Electric Cooperative which purchases all its energy from TVA.



APPALACHIAN POWER COMPANY

GENERATING UNITS

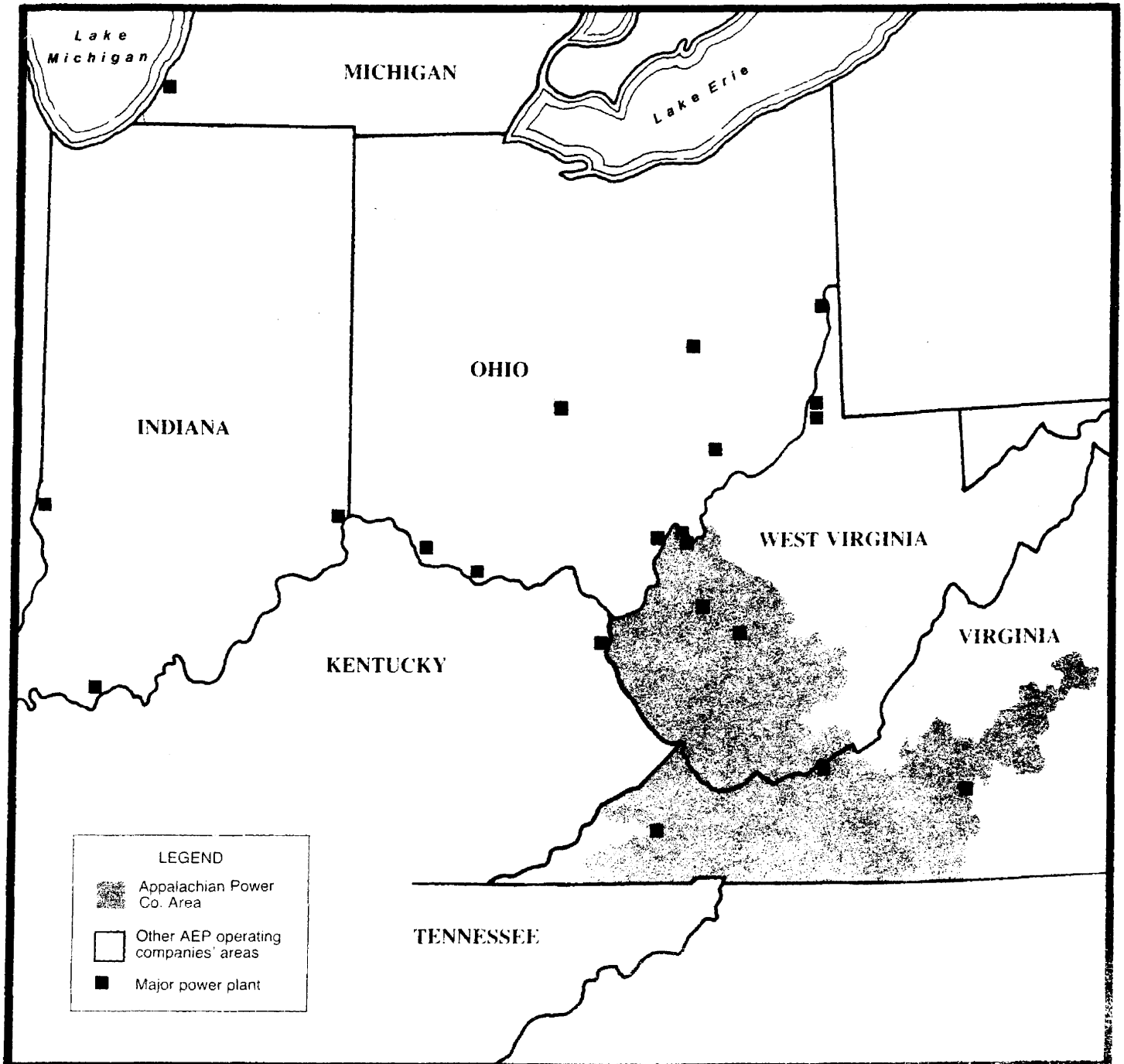
<u>Station</u>	<u>Unit</u>	<u>Unit¹ Type</u>	<u>Commercial Date</u>	<u>Location</u>	<u>Fuel Type</u>	<u>MDC² (MW)</u>	<u>Ownership (MW)</u>
Amos	1	ST	09-01-71	Putnam Co., W.Va.	Coal	800	800
Amos	2	ST	06-06-72	Putnam Co., W.Va.	Coal	800	800
Amos	3	ST	10-22-73	Putnam Co., W.Va.	Coal	1300	433
Clinch River	1	ST	09-30-58	Russell Co., Va.	Coal	235	235
Clinch River	2	ST	12-31-58	Russell Co., Va.	Coal	235	235
Clinch River	3	ST	12-31-61	Russell Co., Va.	Coal	235	235
Glen Lyn	5	ST	06-01-44	Giles Co., Va.	Coal	95	95
Glen Lyn	6	ST	05-20-57	Giles Co., Va.	Coal	240	240
Kanawha River	1	ST	07-16-53	Kanawha Co., W.Va.	Coal	200	200
Kanawha River	2	ST	12-31-53	Kanawha Co., W.Va.	Coal	200	200
Mountaineer	1	ST	09-15-80	Mason Co., W.Va.	Coal	1300	1300
Sporn*	1	ST	01-01-50	Mason Co., W.Va.	Coal	150	150
Sporn*	3	ST	08-01-50	Mason Co., W.Va.	Coal	150	150
Smith Mountain	1	PS	12-16-65	Pittsylvania Co., Va.		70	70
Smith Mountain	2	PS	12-16-65	Pittsylvania Co., Va.		160	160
Smith Mountain	3	PS	06-26-80	Pittsylvania Co., Va.		105	105
Smith Mountain	4	PS	02-01-66	Pittsylvania Co., Va.		160	160
Smith Mountain	5	PS	02-01-66	Pittsylvania Co., Va.		70	70
Buck	1-3	HY	1925	Carroll Co., Va.		10	10
Byllesby	1-3	HY	1925	Carroll Co., Va.		20	20
Claytor	1-4	HY	08-01-39	Pulaski Co., Va.		76	76
Leesville	1-2	HY	02-01-64	Campbell Co., Va.		40	40
London	1-3	HY	12-01-35	Kanawha Co., W.Va.		16	16
Marmet	1-3	HY	12-01-35	Kanawha Co., W.Va.		16	16
Niagara	1-2	HY	06-04-54	Roanoke Co., Va.		3	3
Windfield	1-3	HY	01-01-38	Putnam Co., W.Va.		19	19
Reusens	1-5	HY	1903	Lynchburg, VA		12	12
Total						6717	5850

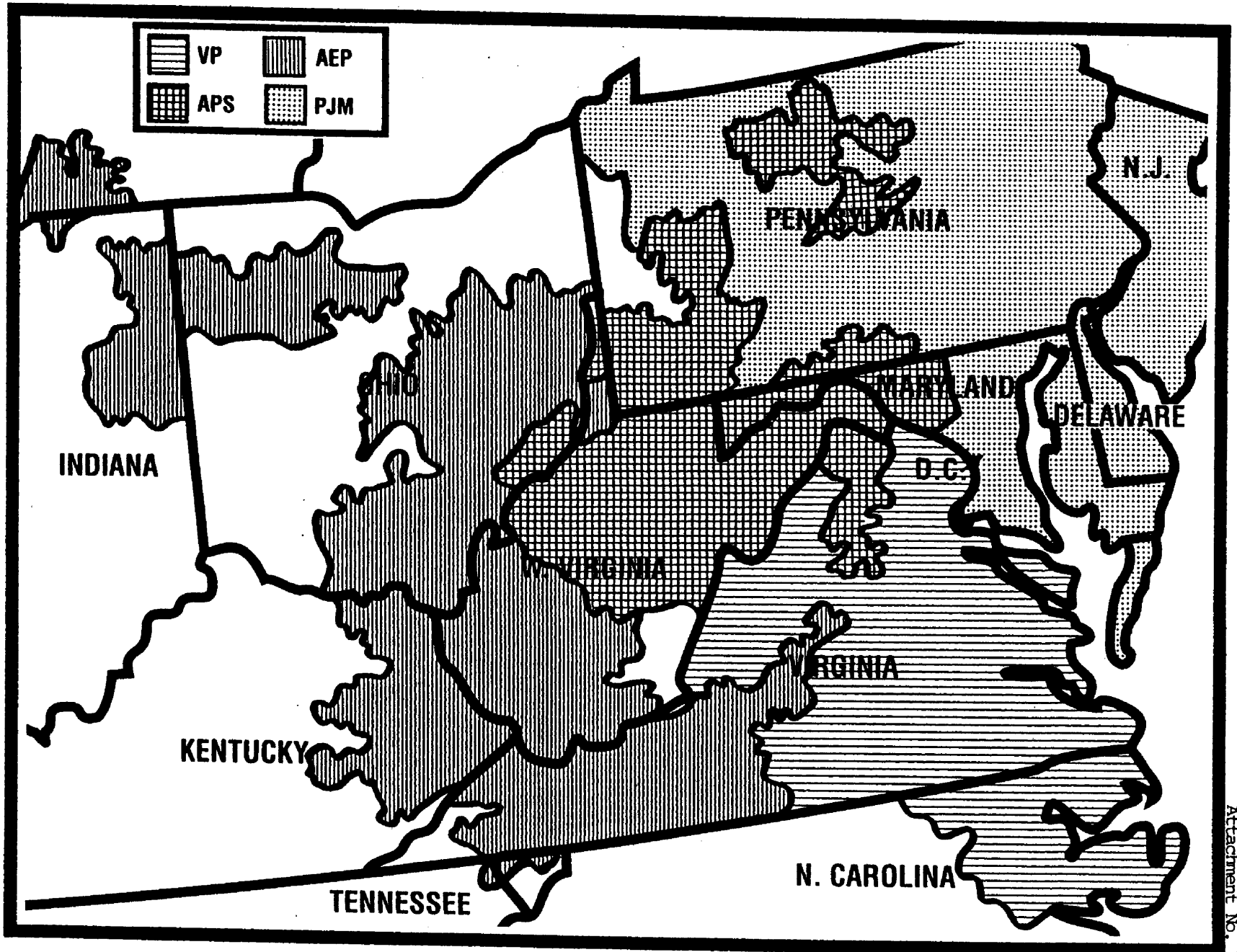
Notes:

1. ST = Steam Turbine, HY = Hydro, PS = Pumped Storage
2. Net Summer Maximum Dependable Capacity

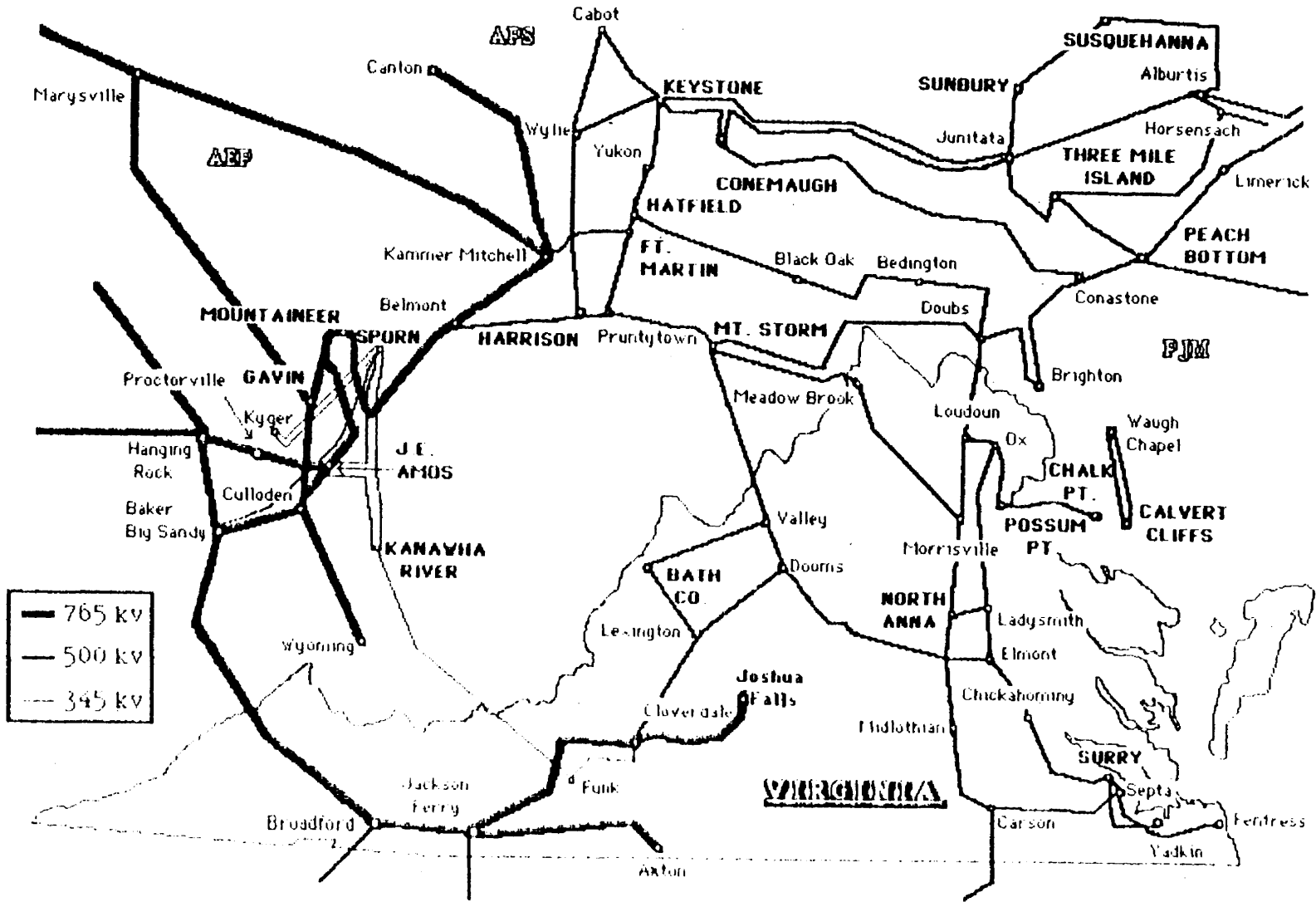
*Apco's contractual entitlement of the total Sporn capacity is 309 MW.

Appalachian Power Service Area and the American Electric Power System





ELECTRIC TRANSMISSION LINES



RELIABILITY COORDINATION PLAN

PARTICIPANTS: AEP, APS, CEI, DL, OE, ORNS, PJM, AND VP.

COVERS: VOLTAGE, THERMAL, AND STABILITY CONTINGENCIES

LEVEL I: Request no additional transfers be loaded that will increase west to east/south loading on the limiting facilities without prior consent.

LEVEL II: Freeze west to east or request small block curtailments of approximately 500 MW total from PJM and VP.

LEVEL III: Request large block curtailments of approximately 1000 MW total from PJM and VP.

LEVEL IV: IV-A: pre-contingency IV-B: post contingency
IV-A: Emergency operations - PJM and VP must curtail 1000 MW even if it results in load shed. After approximately 20 min. load must be shed.
IV-B: Immediate load shed of equal MW on APS, PJM, and VP.