216 Va. 774

CLERK
SUPREME COURT OF VIRGINIA
RECEIVED
NOV 24 1975
RICHMOND, VIRGINIA

IN THE

SUPREME COURT OF VIRGINIA

Record Nos. 751084, 751085,
751086 and 751087

RAPPAHANNOCK LEAGUE FOR
ENVIRONMENTAL PROTECTION, INC., Et Al.,

Appellants,

v.

VIRGINIA ELECTRIC AND POWER COMPANY And
POTOMAC EDISON COMPANY OF VIRGINIA,

Appellees.

JOINT APPENDIX I

John F. Kay, Jr.
Angus H. Macaulay
Mays, Valentine, Davenport & Moore
P. O. Box 1122
Richmond, Virginia 23208

Clarence T. Kipps, Jr.
Miller and Chevalier
1700 Pennsylvania Avenue, N.W.
Washington, D. C. 20006

L. Lee Bean
2045 North 15th Street
Arlington, Virginia 22201

Carroll J. Savage
Ivins, Phillips & Barker
1700 Pennsylvania Avenue, N.W.
Washington, D. C. 20006

Counsel for Appellants

Evans B. Brasfield
Joseph M. Spivey, III
Hunton, Williams, Gay & Gibson
P. O. Box 1535
Richmond, Virginia 23212

Richard D. Rogers, Jr.
State Corporation Commission
Blanton Building
P. O. Box 1197
Richmond, Virginia 23209

Randolph W. Church, Jr.
McCandlish, Lillard & Marsh
4069 Chain Bridge Road
Fairfax, Virginia 22030

Andrew P. Miller
Attorney General of Virginia
Henry M. Massie, Jr.
Assistant Attorney General
of Virginia
Supreme Court Building
Richmond, Virginia 23219

Counsel for Appellees

TABLE OF CONTENTS

	Appendix I Page
Application of VEPCO to State Corporation Commission No. 32	1
Application of VEPCO to State Corporation Commission No. 33	13
Application of VEPCO to State Corporation Commission No. 34	28
Application of VEPCO to State Corporation Commission No. 35	41
Application of VEPCO to State Corporation Commission No. 36	56
Application of Potomac Edison Company of Virginia to State Corporation Commission	70
Findings and Final Order of State Corporation Commission	86
Opinion of State Corporation Commission	91
Notice of Appeal and Assignments of Error of Rappahannock League for Environmental Protection, Inc., *et al.*	129
Notice of Appeal and Assignments of Error of Culpepper League for Environmental Protection and Clarence T. Kipps, Jr.	131
Notice of Appeal and Assignments of Error of Carroll J. Savage	132
Notice of Appeal and Assignments of Error of Fauquier County Board of Supervisors	133-A
Testimony of Carroll J. Savage	134
Testimony of C. M. Stallings	145
Testimony of L. H. Weeks	269
Testimony of Lionel O. Barthold	283, 618
Testimony of Bruce Howlett	324, 354, 651

(continued)

TABLE OF CONTENTS (continued)

	Appendix I Page
Testimony of Spencer M. Smith, Jr.	338
Testimony of Donald N. Rice	361, 425
Testimony of Harold D. Kube	420
Testimony of Harry E. Hutchinson	457
Testimony of Samuel Cluts	464
Testimony of R. Philip Irwin	470, 576
Testimony of Fred Chambers	472
Testimony of Allen E. Turner	575
Testimony of Michael J. Ileo	578, 685
Testimony of Ernest M. Jordan, Jr.	592
Testimony of N. McKenzie Downs	611
Testimony of Carroll Wright	613
Testimony of Kenneth C. Strobl	686
Testimony of Robert H. Giles, Jr.	589, 687
Statement of L. Lee Bean	694

VIRGINIA:

STATE CORPORATION COMMISSION

APPLICATION OF VIRGINIA ELECTRIC
AND POWER COMPANY

For Certification of Electrical Facilities	)	Case No. _____
under the Utility Facilities Act	)	Application No. 32

APPLICATION FOR APPROVAL AND CERTIFICATION
OF REMINGTON-WARRENTON TRANSMISSION LINE

Virginia Electric and Power Company (Vepco) respectfully shows as follows:

1. Vepco is a public service corporation organized under the laws of the Commonwealth of Virginia and furnishing electric service to the public within its service territory in Virginia. Vepco also furnishes electric service to the public in portions of North Carolina and West Virginia.

2. Vepco's electric system, consisting of facilities for generation, transmission and distribution of electric energy, as well as associated facilities, is interconnected with the electric systems of neighboring utilities, and is a part of the interconnected network of electric systems serving the continental United States. By reason of its operations in three states and its interconnections with other utilities, Vepco is engaged in interstate commerce.

3. In order to perform its legal duty to furnish adequate and reliable electric service, Vepco must, from time to time, construct new electric facilities. The need for new electric facilities is directly related to the growth in demand for electricity on Vepco's system, and the greater that growth in demand the greater the necessity for new capacity in generation, transmission and distribution facilities.

4. Vepco is presently experiencing a very rapid growth in demand for electricity on its system and, as a result, must construct a number of new electric facilities. One such new electric facility is the proposed Remington-Warrenton transmission line.

5. The proposed Remington-Warrenton transmission line is entirely within the boundaries of Fauquier County. The proposed route of the line is shown on the county maps attached to this Application as Exhibit A.

6. The proposed transmission line is necessary to meet the growth in demand for electricity in Fauquier County and in particular the area around the city of Warrenton and for continued reliability of electric service. This necessity is described in greater detail in Exhibit B to this Application.

7. The proposed transmission line at the proposed location is the best means of meeting the need described in Exhibit B. The factors influencing Vepco's selection of the route of the transmission line and alternate routes considered are described in Exhibit C to this Application.

8. The transmission line will be a single pole structure with upswept arms having conductors, insulators and associated equipment. The line will be constructed to the extent practicable in accordance with the guidelines set forth by the Federal Power Commission in Appendix A, Docket No. R-365, Order No. 414, issued on November 27, 1970. Design data for these facilities, showing approximate size, material and appearance, are given in Exhibit D to this Application.

9. Right of way for the proposed transmission line will be 100 feet wide, and will be cleared to a width of 100 feet. The method of clearing, method of disposal of trees and brush, proposed ground cover and maintenance of right of way after the line is constructed are set forth in Exhibit E to this Application.

10. A list of state agencies which may reasonably be expected to have an interest in the proposed construction is set forth in Exhibit F to this Application.

11. Reliability of service to Warrenton in Fauquier County indicated that this transmission line should be in service by 1972; however, administrative delays by Fauquier County officials have delayed the construction and acquisition of right of way to the point that the earliest possible inservice date will be late 1974 or early 1975. Delays have seriously jeopardized service to the point that extended outages may occur due to interruption to existing distribution facilities serving this area. Existing rights of way cannot adequately serve this need. The proposed route of the line reasonably minimizes adverse impact on the scenic, environmental and historic assets of the area concerned. The public convenience and necessity require that Vepco construct the proposed transmission line.

WHEREFORE, Virginia Electric and Power Company respectfully requests that the Commission grant, under the Utility Facilities Act, a certificate of public convenience and necessity for the portion of the Remington-Warrenton transmission line that is located outside the area certified to Vepco.

Date: August 24, 1972

VIRGINIA ELECTRIC AND POWER COMPANY

By E. B. Crutchfield

E. B. Crutchfield
Senior Vice President

George D. Gibson
Evans B. Brasfield
Joseph M. Spivey, III
Michael W. Maupin
Hunton, Williams, Gay
& Gibson
700 East Main Street
Richmond, Virginia 23212
Counsel for Applicants

STATE OF VIRGINIA }
CITY OF RICHMOND } To-wit

I, Helen R. Reed, a notary public in and for the state and city aforesaid, hereby certify that this day appeared before me E. B. Crutchfield, who, first being duly sworn, made oath and said that he is Senior Vice President of Virginia Electric and Power Company and as such duly authorized to execute and file the foregoing Application, and that the matters contained in such Application are true to the best of his knowledge and belief.

Given under my hand and notarial seal this 24th day of August, 1972. My Commission expires August 24, 1973.

Helen R. Reed
Notary Public

(SEAL)

NECESSITY FOR THE REMINGTON-WARRENTON 115 KV LINE

Load in the vicinity of Warrenton, Virginia has grown at a rate of about 10 percent per year. The 1972 load in the Warrenton area has reached a peak of about 15,000 KW.

The Warrenton area is served by two 34.5 kV circuits, one from Gainsville Substation located 17 circuit miles from Warrenton and the other from Remington Substation 11 miles south of Warrenton.

The load at Warrenton has reached the point where if one 34.5 kV circuit is lost, the other circuit cannot carry the entire load during several months of the year.

We propose to construct a 115 kV circuit from Remington to Warrenton plus a 115-34.5 kV substation at Warrenton to reinforce the supply to this area. The transmission voltage was selected because of the magnitude of the load and the distance involved. Remington is the closest source of 115 kV.

Alternate electrical plans considered were:

1. Reinforce the Warrenton area with an additional 34.5 kV circuit from Remington or from Gainsville. This was discarded because it would be adequate for only a few years.
2. Construct a 115 kV circuit from Gainsville to Warrenton. This would require a longer 115 kV circuit and has the additional disadvantage of adding load to facilities which are supplying Prince William County, which is one of the highest growth rate areas we serve.

3. A third alternate considered was to construct a 115 kV line from near Catlett to Warrenton. It was anticipated that a 115 kV circuit would be constructed to near Catlett to serve a large pumping load which had requested service at this location by 1972. Fauquier County delayed approval of the circuit to this customer to the point where the customer found it necessary to move the pumping station to another location. Therefore, this alternate plan for serving Warrenton is eliminated.

FACTORS INFLUENCING ROUTE OF REMINGTON TO WARRENTON 115 KV LINE

The route for the Remington to Warrenton 115 kV line was selected using Department of Interior geological survey maps together with aerial photograph mosaics. The use of such maps reveals terrain features as well as other geographical features that can be used to advantage to meet route guidelines set forth in a joint publication by the Departments of Interior and Agriculture entitled Environmental Criteria for Electrical Transmission Systems, and the Federal Power Commission Publication Electric Power Transmission and the Environment. The route has been reviewed by Mr. Fred Arnold, an independent consultant, and his report indicated that the line route selected has a minimum intrusion on the landscape. Mr. Arnold was formerly employed as Regional Chief, Division of Resources Management and Visitor Protection, U. S. National Park Service. The line route was also reviewed by Mr. Meade Palmer, Landscape Architect, Warrenton, Virginia, who made some minor recommendations which were investigated and adopted where possible with respect to other constraints that affect line routing. The proposed line route has been reviewed by the Virginia Department of Highways and they indicated that the proposed line does not conflict with any of their foreseeable plans.

The line route extends in a northerly direction and generally parallel to U. S. Routes 15 and 29 from Vepco's existing Remington Substation to a proposed substation southeast of Warrenton, Virginia on Route 670. The entire 11.3 miles of line will be in Fauquier County and traverses rolling country of forest, pasture and farmlands. The proposed transmission line will occupy

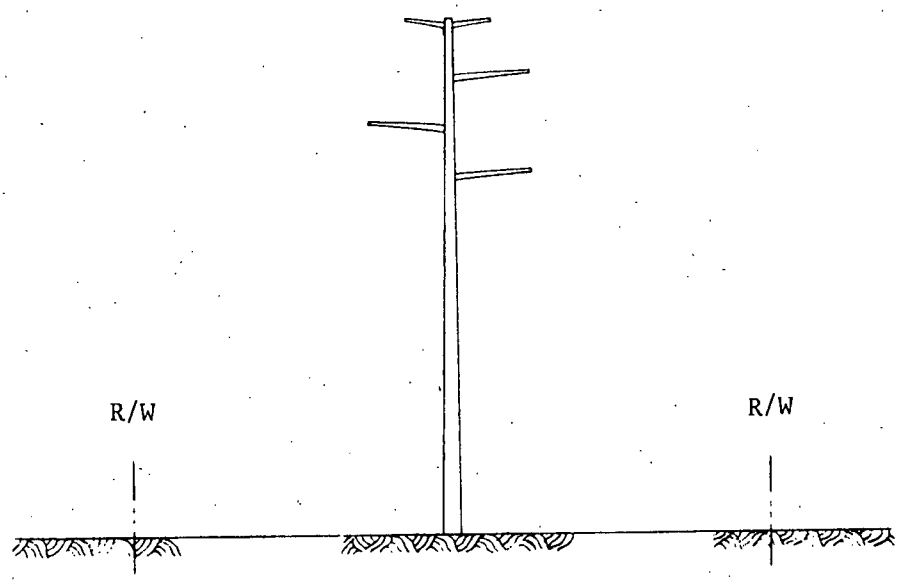
a 100' right of way for a total of 143 acres. The line passes through 2 miles of Northern Piedmont Electric Cooperative's territory. An investigation of an alternate routing which would require an overbuild of distribution lines along U. S. Route 15-29 indicated a much greater visual impact on the area and was discarded for this reason plus considerably greater cost. The existing distribution line along Route 15-29 is so close to some residential buildings as to preclude condemnation proceedings for perfecting our right of way for transmission purposes. If we were unable to negotiate for rights of way, it would be necessary to install unsightly dog legs around such obstacles. A study of possible line routes for extending a transmission line from the proposed Catlett site referred to in Exhibit B under Item 3 of Alternate Electrical Plans had greater environmental impact with respect to the proposed development plans for Fauquier County than the route in this Application. In addition, administrative delays by Fauquier County forced the customer to abandon his development plans for Catlett and hence the need for extending a 115 kV transmission line to Catlett is eliminated.

CASE NO. _____

APPLICATION 32

EXHIBIT D

REMINGTON - WARRENTON
115 KV TRANSMISSION LINE
TYPICAL POLE



MATERIAL: APPROX. 91 PRESTRESSED CONCRETE POLES
APPROX. 10 SELF SUPPORTING STEEL POLES, PAINTED GRAY

STEEL POLE FOUNDATIONS: CONCRETE

AVERAGE POLE HEIGHT 80 FEET

CROSSARM LENGTH 12 FEET

AVERAGE SPAN LENGTH 600 FEET

CONDUCTOR: ALUMINUM

TRANSMISSION LINE CLEARING
REMINGTON-WARRENTON 115 KV

Natural vegetation will be retained for screening in wooded areas. Desirable plant material will be preserved at road crossings in order to screen the transmission facility from the public view. The width of right of way required for this line will be 100 feet and it will be necessary to clear the full 100 feet to provide adequate and safe clearance for the operation of the electric line; however, natural grown ornamental plants such as cedar, dogwood, holly, redbud and sourwood will be retained to the extent practicable in areas subject to general public view.

Clearing Methods

The right of way in wooded areas will be logged where practical to conserve and utilize the natural resources. Merchantable timber and pulpwood will be sold to local sawmills for processing. The remaining debris will be piled and disposed of by burning in order to leave the right of way in an acceptable condition and to have the maximum space available for use by property owners. The disposal by burning shall conform with the rules of the State Air Pollution Control Board.

Property owners will be encouraged to utilize the area for agricultural purposes and Vepco will contribute a maximum of $100 an acre to convert woody brush areas to areas of permanent cultivation. Individual owners have the right to use this right of way area for farming, grazing, growth of ornamental plants or Christmas trees. The owners control public access to their lands. The disturbed areas will be restored after construction. These locations will be limed, fertilized and seeded to establish a ground cover. Such vegetation offers an attractive situation for wildlife habitat. Birds and mammals use the products of the "edge" for food supplies and timber outside

the right of way for shelter. The use of these transmission corridors for wildlife food will tend to increase game and wildlife habitat at a time when the number of small farms and open areas is being reduced.

The periodic maintenance treatments to control woody growth shall consist of hand cutting, machine mowing and chemical treatment. The first treatment would probably be made in 1976. Herbicides will be used to reduce the density of the fast growing hardwood species to an acceptable level. Herbicides used to control woody vegetation are registered with the Environmental Protection Agency and the Virginia Department of Agriculture. The rates that will be used for these applications are recommended by the Agricultural Extension Service of VPI and SU. Herbicides will not be used where the right of way is devoted to agricultural use.

This line is located in a predominantly agricultural area. Gates will be installed at cross-fences in order to provide access to transmission facilities and avoid damage to the fences and roads of the property owners. The property owners may use these gates for entrance to their fields. Areas with a residential-recreational orientation will be managed in a manner consistent with the land use pattern. These areas will be machine mowed on a one to two year cycle. The use of right of way for recreational purposes would be encouraged.

The purpose of the right of way maintenance program will be to prevent interruptions to electric service, provide for access to the rights of way and patrol and make emergency repairs. This program will be accomplished in an aesthetically acceptable manner. The methods used to achieve these objectives will be consistent with the land use pattern for the area.

STATE AGENCIES WHO MAY HAVE AN INTEREST IN THIS APPLICATION

1. Department of Highways
2. Historic Landmarks Commission
3. Department of Conservation and Economic Development
4. Governor's Environmental Council
5. Commission of Outdoor Recreation
6. Division of State Planning and Community Affairs
7. Air Pollution Control Board

The extent to which these agencies have been advised and consulted with respect to the proposed facilities is set forth in Exhibit C.

VIRGINIA:

STATE CORPORATION COMMISSION

APPLICATION OF VIRGINIA ELECTRIC
AND POWER COMPANY

For Approval of Electrical Facilities Under § 56-46.1 of the Code of Virginia and for Certification of such Facilities under the Utility Facilities Act.	))))	Case No. _____ Application No. 33

APPLICATION FOR APPROVAL AND CERTIFICATION
OF MORRISVILLE-BRISTERS TRANSMISSION LINE
AND MORRISVILLE SUBSTATION

Virginia Electric and Power Company (Vepco) respectfully shows as follows:

1. Vepco is a public service corporation organized under the laws of the Commonwealth of Virginia and furnishing electric service to the public within its service territory in Virginia. Vepco also furnishes electric service to the public in portions of North Carolina and West Virginia.

2. Vepco's electric system, consisting of facilities for generation, transmission and distribution of electric energy, as well as associated facilities, is interconnected with the electric systems of neighboring utilities, and is a part of the interconnected network of electric systems serving the continental United States. By reason of its operations in three states and its interconnections with other utilities, Vepco is engaged in interstate commerce.

3. In order to perform its legal duty to furnish adequate and reliable electric service, Vepco must, from time to time, construct new electric facilities. The need for new electric facilities is directly related to the growth in demand for electricity on Vepco's system, and the greater that growth in demand the greater the necessity for new capacity in generation, transmission and distribution facilities.

4. Vepco is presently experiencing a very rapid growth in demand for electricity on its system and, as a result, must construct a number of new electric facilities. Two such new electric facilities are the proposed Morrisville-Bristers transmission line and Morrisville Substation.

5. The proposed Morrisville-Bristers line is a 500 kV transmission line running from a point on the existing Vepco 500 kV Elmont-Loudoun transmission line known as Bristers to a proposed 500 kV substation known as Morrisville. The Morrisville substation will provide switching facilities for the interconnection of several 500 kV lines and will also provide transforming facilities to 230 kV. The proposed route of the line and the location of the proposed substation are all in Fauquier County and are shown on the county map attached to this Application as Exhibit A.

6. The proposed transmission line and Morrisville Substation are necessary to meet the growth in demand for electricity on Vepco's system and for continued reliability of electric service. This necessity is described in greater detail in Exhibit B to this Application.

7. The proposed transmission line and substation at the proposed location are the best means of meeting the need described in Exhibit B. The factors influencing the selection of the route of the transmission line and the location of the substation, and the alternate locations considered for each, are discussed in Exhibit C to this Application.

8. The transmission line will be of conventional 500 kV design, and will consist of foundations, towers, conductors, insulators and associated equipment. The line and substation will be constructed to the extent practicable in accordance with the guidelines set forth by the Federal Power

Commission in Appendix A, Docket No. R-365, Order No. 414, issued on November 27, 1970. The substation is known as a "low profile substation" having minimum heights so as to have the least impact on the environment. Approximate size of the transmission towers, the material to be used and the general appearance of the structures are shown on Exhibit D-1 to this application and similar information relating to the substation, including a plan view and an elevation view, is shown in Exhibits D-2 and D-3.

9. The width of right of way for the proposed transmission line, the width to which it will be cleared, the method of clearing, the method of disposal of trees, brush, proposed ground cover and maintenance of right of way after the line is constructed are all set forth in Exhibit E-1 to this Application. Exhibit E-2 prescribes similar factors associated with the development of Morrisville Substation.

10. A list of state agencies which may reasonably be expected to have an interest in the proposed construction is set forth in Exhibit F to this Application.

11. Vepco is today filing with the Commission similar applications with respect to the following facilities: the North Anna-Morrisville transmission line, the Mt. Storm-Morrisville transmission line, the Morrisville-Remington transmission line and the Remington Substation expansion. To a large extent the necessity for these facilities and the necessity for the Morrisville-Bristers transmission line are interrelated.

12. If Vepco is unable to construct the proposed Morrisville-Bristers transmission line and Morrisville Substation and have them in service by November 1973, reliability of electric service will be severely impaired to many of Vepco's customers. Original studies by Vepco show that these facilities

should be in service by May 1973; however, administrative delays with respect to route approval by Fauquier County officials prevent Vepco from meeting the necessary in service date. Existing rights of way cannot adequately serve this need. The proposed route of the line and location of the substation reasonably minimize adverse impact on the scenic, environmental and historic assets of the area concerned. The public convenience and necessity require that Vepco construct the proposed transmission line and substation.

WHEREFORE, Virginia Electric and Power Company respectfully requests that the Commission

(a) promptly give notice of this Application as required by § 56-46.1 of the Code of Virginia;

(b) if a hearing is required on this Application and on any of the other applications filed this date, consolidate proceedings on all applications for which a hearing is required;

(c) approve pursuant to § 56-46.1 of the Code of Virginia the proposed Morrisville-Bristers transmission line and Morrisville Substation;

(d) grant, under the Utility Facilities Act, a certificate of public convenience and necessity for the Morrisville-Bristers transmission line and Morrisville Substation to be constructed and owned by Vepco.

Date: August 25, 1972

VIRGINIA ELECTRIC AND POWER COMPANY

By _____
E. B. Crutchfield
Senior Vice President

George D. Gibson
Evans B. Brasfield
Joseph M. Spivey, III
Michael W. Maupin
Hunton, Williams, Gay
& Gibson
700 East Main Street
Richmond, Virginia 23212

Counsel for Applicants

STATE OF VIRGINIA }
CITY OF RICHMOND } To-wit

I, Helen R. Reed, a notary public in and for the state and city aforesaid, hereby certify that this day appeared before me E. B. Crutchfield, who, first being duly sworn, made oath and said that he is Senior Vice President of Virginia Electric and Power Company and as such duly authorized to execute and file the foregoing Application, and that the matters contained in such Application are true to the best of his knowledge and belief.

Given under my hand and notarial seal this 25th day of August, 1972. My commission expires August 24, 1973.

Helen R. Reed
Notary Public

(SEAL)

NECESSITY FOR
MORRISVILLE-BRISTERS 500 KV LINE AND MORRISVILLE SUBSTATION

Load in Vepco's Potomac District (north of Fredericksburg and east of Culpeper) has been growing at a rate of over 15 percent per year for the past 20 years. The peak load in this area in 1970 was 1250 megawatts. This load is expected to reach 2500 megawatts by 1975 and 5000 megawatts by 1980. The load for the entire Vepco system in 1970 was only 4850 megawatts.

The principal sources of power supply for the area are two 500 kV lines and the Possum Point Power Station with 560 megawatts of generation. Additional generating units at Mt. Storm and North Anna Power Stations will supply the increase in load in 1973, 1974 and 1975. To deliver this power, additional 500 kV circuits are needed. It is planned to construct a 500 kV circuit from Mt. Storm Power Station to a substation at Morrisville and a 500 kV circuit from North Anna Power Station to Morrisville. At Morrisville, a portion of this power will be stepped down to 230 kV for delivery to the existing transmission system at Remington and the remainder of the power will be delivered to the Loudoun Substation over this 500 kV line proposed from Morrisville to join an existing 500 kV line near Bristersburg at a point being called Bristers. Work now in progress will rearrange the existing 500 kV line so that a section of it from Bristers to Loudoun Substation will be made available for this use.

Morrisville Substation is needed before the summer peak of 1973, but delays in obtaining routing approval of the lines associated with it may delay it until November 1973 or early 1974. The 115 kV line from Charlottesville to Possum Point which supplies Gordonsville, Orange, Culpeper, Warrenton, and several other communities is approaching its thermal and

and voltage limits during the summer peak load period. With this line opened at Charlottesville in the summer of 1972, the voltage is marginally acceptable near the open end. The maximum practical amount of shunt capacitance has been installed at substations along this line to support the drooping voltage. In 1973, the voltage will be intolerable and it may become necessary to drop load if the Charlottesville end of the line is out for any reason at the time of peak load. By the summer of 1974, the line will be thermally overloaded if either end is opened. The Morrisville-Bristers line, the Morrisville-Remington 230 kV line, the Morrisville Substation and the expansion of the Remington Substation are necessary to remedy this situation.

The location of a substation in this general area results in an arrangement requiring a minimum amount of new right of way for a system that is compatible with reasonable reliability standards and has the minimum impact on the environment to satisfy the three requirements involved; namely (1) a 500 kV line from Mt. Storm Power Station into the Northern Virginia area, (2) a 500 kV line from North Anna Power Station into the Northern Virginia area, and (3) reinforcing the Charlottesville-Possum Point 115 kV line.

FACTORS INFLUENCING ROUTE OF
MORRISVILLE-BRISTERS 500 KV LINE
AND LOCATION OF MORRISVILLE SUBSTATION

The locations of the Morrisville-Bristers 500 kV transmission line and the Morrisville Substation are dictated primarily by two sensitive U.S. Government communication stations. Preliminary plans had called for the routing of a 500 kV line from Ox Substation southwest along an expanded transmission corridor to the intersection of the existing Loudoun-Elmont 500 kV line. At this intersection (known as Bristers) the existing line was to be broken and the Elmont section connected to a line proposed to be constructed northward to Ox forming an Ox-Elmont 500 kV line. From this point the new 500 kV construction was to continue southwest, still utilizing an expanded corridor to an existing substation at Remington. This line section would be connected to the section from Loudoun to form a Loudoun-Remington 500 kV line. However, the Company was prohibited from routing its line within 5 miles of the communication stations and this made it necessary to route the new 500 kV line from Ox towards the southern part of Fauquier County, thus moving the present Bristers site 1.6 miles south of the original location on the Elmont-Loudoun line. Plans for a North Anna 500 kV line to terminate at Remington also conflicted with the constraints of one of the communication stations which then made it necessary to eliminate Remington as a 500 kV station and to establish a new 500 kV substation site near Morrisville.

The line route study was limited to a narrow corridor due to the constraints imposed by government communication receiving stations. The selected route through this narrow corridor to the extent possible meets the Federal Power Commission's guide entitled "Electric Power Transmission and

the Environment." The line route does not conflict with any State Highway Department activities nor does it conflict with any plans of the Commission of Outdoor Recreation. It does not pass in the vicinity of any historical landmarks.

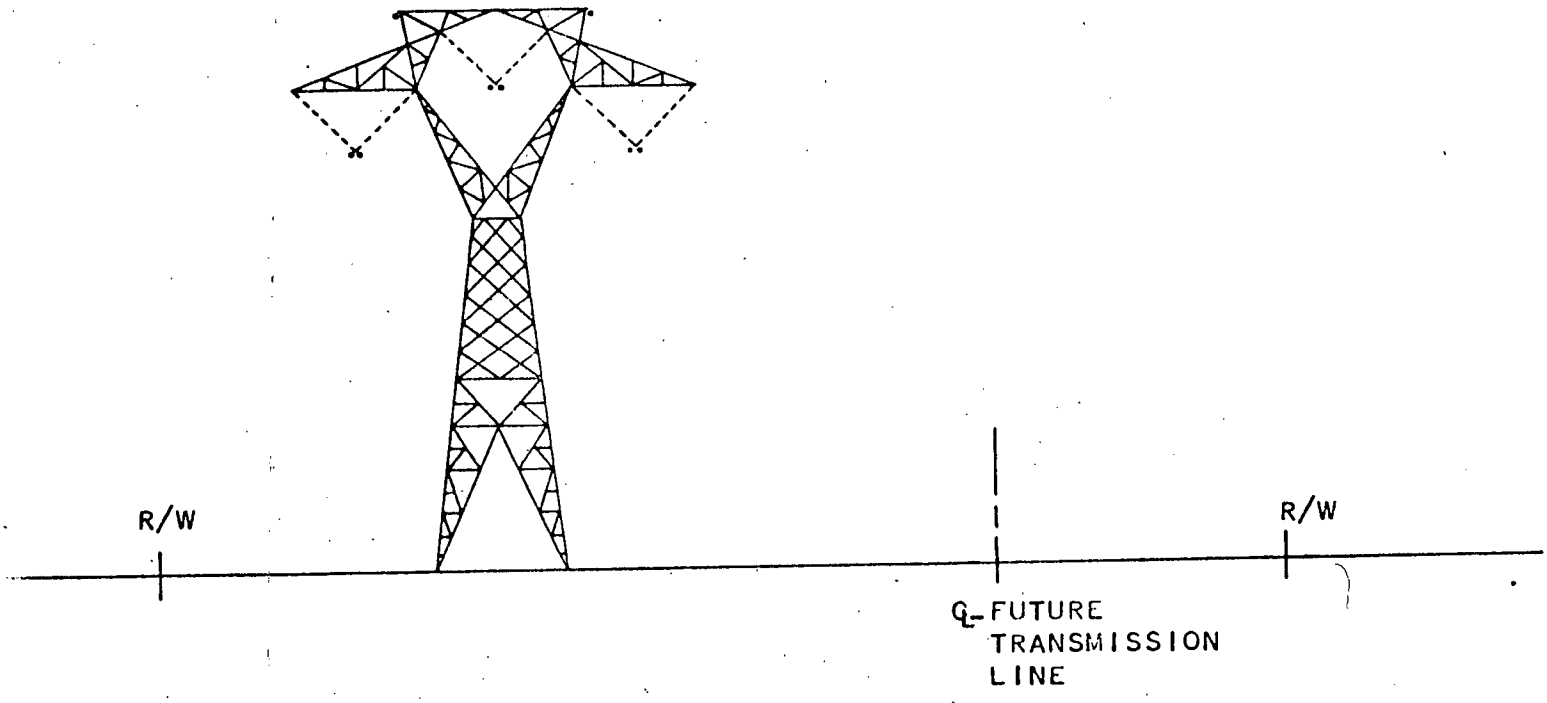
Original line route studies anticipated the expansion of the existing Remington Substation as a 500 kV switching station and a 500 kV to 115 kV substation for reinforcing the Charlottesville-Possum Point 115 kV line. If we had retained the idea of developing only one 500 kV substation located at Remington, it would be necessary to route the 500 kV line to North Anna and the 500 kV line to Loudoun on separate rights of way and through a narrow corridor between the two government communication stations. Separate 500 kV rights of way are essential for reliable service and these two rights of way would have to be wide enough to accommodate lower voltage transmission structures southward so as to serve intermediate loads toward North Anna and Bristers in the future and would require approximately 143 acres more right of way. The immediate cost of two such 500 kV lines is considerably greater than the cost of one 500 kV line and one 230 kV line as proposed in Applications 34 and 35. Environmental and economic considerations indicated that the development of Morrisville Substation was a logical choice.

CASE NO._____

APPLICATION 33

EXHIBIT D-1

MORRISVILLE-BRISTERS 500KV TRANSMISSION LINE



TYPICAL TOWER LOOKING TOWARD MORRISVILLE

MATERIAL: ASTM A588 STEEL, CORROSION RESISTANT, COLOR RUSSET BROWN

FOUNDATIONS: CONCRETE

AVERAGE HEIGHT: 116 FEET WIDTH AT CROSSARMS: 84 FEET

AVERAGE SPAN LENGTH: 1100 FEET

CONDUCTORS: ALUMINUM

TRANSMISSION LINE CLEARING
MORRISVILLE-BRISTERS 500 KV LINE

Natural vegetation will be retained for screening in wooded areas. Desirable plant material will be preserved at road crossings in order to screen the transmission facility from the public view. The width of right of way to be acquired for this line and for future use is 235 feet. The width of the right of way to be cleared for the Morrisville-Bristers 500 kV line will be 150 feet so as to provide adequate and safe clearance for the construction and operation of this line; however, natural grown ornamental plants such as cedar, dogwood, holly, redbud and sourwood will be retained to the extent practicable in areas subject to general public view. The remainder of the right of way will be cleared at a future date when an application is approved for other transmission facilities on this right of way. Special landscape screening will be installed at the Route 17 crossing to improve the appearance of transmission facilities and to screen the transmission line and substation from public view.

Clearing Methods

The right of way in wooded areas will be logged where practical to conserve and utilize the natural resources. Merchantable timber and pulpwood will be sold to local sawmills for processing. The remaining debris will be piled and disposed of by burning in order to leave the right of way in an acceptable condition and to have the maximum space available for use by the

property owners. The disposal by burning shall conform with the rules of the State Air Pollution Control Board.

Property owners will be encouraged to utilize the area for agricultural purposes and Vepco will contribute a maximum of $100 an acre to convert woody brush areas to areas of permanent cultivation. Individual owners have the right to use this right of way area for farming, grazing, growth of ornamental plants or Christmas trees. The owners control public access to their lands. The disturbed areas will be restored after construction. These locations will be limed, fertilized and seeded to establish a ground cover. Such vegetation offers an attractive situation for wildlife habitat. Birds and mammals use the products of the "edge" for food supplies and timber outside the right of way for shelter. The use of these transmission corridors for wildlife food will tend to increase game and wildlife habitat at a time when the number of small farms and open areas is being reduced.

The periodic maintenance treatments to control woody growth shall consist of hand cutting, machine mowing and chemical treatment. The first treatment would probably be made in 1975. Herbicides will be used to reduce the density of the fast growing hardwood species to an acceptable level. Herbicides used to control woody vegetation are registered with the Environmental Protection Agency and the Virginia Department of Agriculture. The rates that will be used for these applications are recommended by the Agricultural Extension Service of VPI & SU. Herbicides will not be used where the right of way is devoted to agricultural use.

Areas with a residential-recreational orientation will be managed in a manner consistent with the land use pattern. These areas will be machine mowed on a one to two year cycle. The use of right of way for recreational purposes would be encouraged.

The purpose of the right of way maintenance program will be to prevent interruptions to electric service, provide for access to the rights of way and

patrol and make emergency repairs. This program will be accomplished in an aesthetically acceptable manner. The methods used to achieve these objectives will be consistent with the land use pattern for the area.

SUBSTATION LOT CLEARING AND GRADING
MORRISVILLE 500 KV SUBSTATION

Natural vegetation will be retained for screening the substation site, where possible. Where natural vegetation is inadequate, supplemental plantings of trees and shrubs will be made to provide screening of the substation site.

The area to be cleared for the construction of the substation and access roads will be logged, where practical, to conserve and utilize the natural resources. Merchantable timber and pulpwood will be sold to local sawmills for processing. The remaining debris will be piled and disposed of by burning to leave the site clear for necessary grading. The disposal by burning shall conform with the rules of the State Air Pollution Control Board.

The grading to be done will only be what is necessary to provide a suitable site for the construction of the substation. The fenced area will be covered with a minimum of 3" crushed stone. Ditches will be constructed to control water run off. Embankments created by grading will be protected from erosion by planting necessary vegetation and constructing adequate ditches at the top of the slope. All off site drainage divides are to be honored.

During construction, necessary steps will be taken to control erosion and the resulting siltation. After construction the aforementioned plantings will provide this control.

STATE AGENCIES WHO MAY HAVE INTEREST IN THIS APPLICATION

1. Department of Highways
2. Historic Landmarks Commission
3. Department of Conservation and Economic Development
4. Governor's Environmental Council
5. Commission of Outdoor Recreation
6. Division of State Planning and Community Affairs
7. Air Pollution Control Board

The extent to which these agencies have been advised and consulted with respect to the proposed facilities is set forth in Exhibit C. Copies of this Application will be sent to each of the above.

VIRGINIA:

STATE CORPORATION COMMISSION

APPLICATION OF VIRGINIA ELECTRIC
AND POWER COMPANY

For Approval of Electrical Facilities	)	
Under § 56-46.1 of the Code of Virginia	)	Case No. _____
and for Certification of such Facilities	)	Application No. 34
under the Utility Facilities Act.	)	

APPLICATION FOR APPROVAL AND CERTIFICATION
OF MORRISVILLE-REMINGTON TRANSMISSION LINE
AND REMINGTON SUBSTATION

Virginia Electric and Power Company (Vepco) respectfully shows as follows:

1. Vepco is a public service corporation organized under the laws of the Commonwealth of Virginia and furnishing electric service to the public within its service territory in Virginia. Vepco also furnishes electric service to the public in portions of North Carolina and West Virginia.

2. Vepco's electric system, consisting of facilities for generation, transmission and distribution of electric energy, as well as associated facilities, is interconnected with the electric systems of neighboring utilities, and is a part of the interconnected network of electric systems serving the continental United States. By reason of its operations in three states and its interconnections with other utilities, Vepco is engaged in interstate commerce.

3. In order to perform its legal duty to furnish adequate and reliable electric service, Vepco must, from time to time, construct new electric facilities. The need for new electric facilities is directly related to the growth in demand for electricity on Vepco's system, and the greater that growth

in demand the greater the necessity for new capacity in generation, transmission and distribution facilities.

4. Vepco is presently experiencing a very rapid growth in demand for electricity on its system and, as a result, must construct a number of new electric facilities. Two such new electric facilities are the proposed Morrisville-Remington transmission line, and the Remington Substation Expansion.

5. The proposed Morrisville-Remington transmission line extends from the proposed Morrisville Substation in southern Fauquier County to the site of Vepco's existing substation near Remington, located in Fauquier County. It is proposed to expand the existing Remington Substation so that facilities can be installed to improve the reliability of the existing 115 kV Charlottesville-Possum Point transmission line which is presently routed through Remington Substation. The proposed route of the transmission line is shown on the county map attached to this Application as Exhibit A.

6. The proposed transmission line and substation are necessary to meet the growth in demand for electricity on Vepco's system and for continued reliability of electric service. This necessity is described in greater detail in Exhibit B to this Application.

7. The proposed transmission line at the proposed location is the best means of meeting the need described in Exhibit B. The factors influencing Vepco's selection of the route of the transmission line and the location of the substation and alternate locations considered are described in Exhibit C to this Application.

8. The transmission line will be of conventional 230 kV design, and will consist of foundations, towers, conductors, insulators and associated

equipment. The addition to the existing Remington Substation will be of low profile design so as to have a minimum impact on the environment. The line and substation will be constructed to the extent practicable in accordance with the guidelines set forth by the Federal Power Commission in Appendix A, Docket No. R-365, Order No. 414, issued on November 27, 1970. Approximate size of the transmission towers, the materials to be used and the general appearance of the structures are shown on Exhibit D-1 to this Application and similar information relative to the substation, including a plan view and an elevation view, is shown in Exhibits D-2 and D-3.

9. The width of the right of way for the proposed line, the width to which it will be cleared, the method of clearing, method of disposal of trees and brush, proposed ground cover and maintenance of right of way after the line is constructed are all set forth in Exhibit E-1 to this Application. Exhibit E-2 describes the same matters as they apply to Remington Substation.

10. A list of state agencies which may reasonably be expected to have an interest in the proposed construction is set forth in Exhibit F to this Application.

11. Vepco is today filing with the Commission similar applications with respect to the following facilities: the North Anna-Morrisville transmission line, the Morrisville-Bristers transmission line and Morrisville Substation and the Mt. Storm-Morrisville transmission line. To a large extent the necessity for these facilities and the necessity for the Morrisville-Remington transmission line and Remington Substation are interrelated.

12. If Vepco is unable to construct the proposed Morrisville-Remington transmission line and Remington Substation and have them in service by November 1973 or early 1974, reliability of electric service will be severely impaired

to many of Vepco's customers. Vepco studies indicate that the Morrisville-Remington transmission line and Remington Substation expansion should be in service by May 1973 in order to assure reliability of service; however, administrative delays with respect to route approval by Fauquier County officials prevent Vepco from meeting the necessary in service date. Existing rights of way cannot adequately serve this need. The proposed route of the line and location of substation reasonably minimizes adverse impact on the scenic, environmental and historic assets of the area concerned. The public convenience and necessity require that Vepco construct the proposed transmission line and expand the Remington Substation.

WHEREFORE, Virginia Electric and Power Company respectfully requests that the Commission

(a) promptly give notice of this Application as required by § 56-46.1 of the Code of Virginia;

(b) if a hearing is required on this Application and on any of the other applications filed this date, consolidate proceedings on all applications for which a hearing is required;

(c) approve pursuant to § 56-46.1 of the Code of Virginia the proposed Morrisville-Remington transmission line and Remington Substation to be constructed and owned by Vepco;

(d) grant, under the Utility Facilities Act, a certificate of public convenience and necessity for the Morrisville-Remington transmission line and Remington Substation expansion to be constructed and owned by Vepco.

Date: August 25, 1972

VIRGINIA ELECTRIC AND POWER COMPANY

By E. B. Crutchfield

E. B. Crutchfield
Senior Vice President

George D. Gibson
Evans B. Brasfield
Joseph M. Spivey, III
Michael W. Maupin
Hunton, Williams, Gay
& Gibson
700 East Main Street
Richmond, Virginia 23212

Counsel for Applicants

STATE OF VIRGINIA
CITY OF RICHMOND } To-wit

I, Helen R. Reed, a notary public in and for the state and city aforesaid, hereby certify that this day appeared before me E.B.Crutchfield, who, first being duly sworn, made oath and said that he is Senior Vice President of Virginia Electric and Power Company and as such duly authorized to execute and file the foregoing Application, and that the matters contained in such Application are true to the best of his knowledge and belief.

Given under my hand and notarial seal this 25th day of August, 1972. My commission expires August 24, 1973.

Helen R. Reed
Notary Public

(SEAL)

NECESSITY FOR MORRISVILLE-REMINGTON LINE

Load on substations connected to the Possum Point-Charlottesville 115 kV line are estimated to reach 98,700 kw in 1972, 125,300 kw in 1973, and 149,000 kw in 1974.

If the Charlottesville end of this line is opened during peak load in 1973 and the entire load on this circuit must be carried from Possum Point, the voltage drop at stations near Charlottesville will be unacceptable and it may become necessary to drop load in order to bring voltage up to minimum acceptable levels. Only marginal service was available the summer of 1972.

Additional reinforcement of this line is essential in order to carry 1973 summer loads under the emergency condition previously described. Loads estimated on this circuit for 1974 and beyond will also thermally overload sections of the line if the entire circuit load must be fed from either end, thereby compounding the problem.

The construction of a 230 kV line from Morrisville to Remington plus a 230-115 kV substation at Remington creates an additional power source near the center of the Possum Point-Charlottesville line and supplies the necessary capacity and voltage support.

FACTORS INFLUENCING THE LOCATION OF MORRISVILLE-REMINGTON 230 KV LINE REMINGTON SUBSTATION

Transmission Line

An existing utility corridor was not available for the construction of this proposed line. Environmental considerations made it obvious that the routing of the Mt. Storm-Morrisville 500 kV line and the Morrisville-Remington line should be such that the two tower lines could occupy the same right of way wherever possible. Vepco was able to accomplish this goal for a distance of approximately 4.2 miles. The last 0.7 miles of right of way, at the Remington end, are separate from the Mt. Storm line. Constraints in the vicinity of Remington prevented the routing of the 500 kV line adjacent to the Remington Substation. A relatively narrow corridor was available between Morrisville and Remington due to constraints which occurred as the result of two U. S. Government owned communication stations in the vicinity. The route was selected using U. S. Department of Interior geological survey maps and aerial photograph mosaics considering terrain features, highways, rivers, residences, schools, airports, churches, points of historical importance and existing utility corridors. The line route selected to the extent possible meets the Federal Power Commission guidelines entitled, "Electric Power Transmission and the Environment."

The terminal points for the transmission line were dictated by the need to reinforce the Charlottesville-Possum Point 115 kV transmission line and the suitability of expanding the existing Remington Substation site which is located on that 115 kV line. The Morrisville Substation site is the best for establishing a source for lower voltage transmission facilities because of the reliability associated with the 500 kV switching station and the ability to take advantage of the proposed substation development at Morrisville rather

than create a second 500 kV substation at Remington or elsewhere in the area. The proposed route best meets the suggested governmental guidelines referenced in the first part of this statement. The line route has been reviewed by the Department of Highways, the Historic Landmarks Commission and the Commission of Outdoor Recreation and no conflicts were indicated by these agencies.

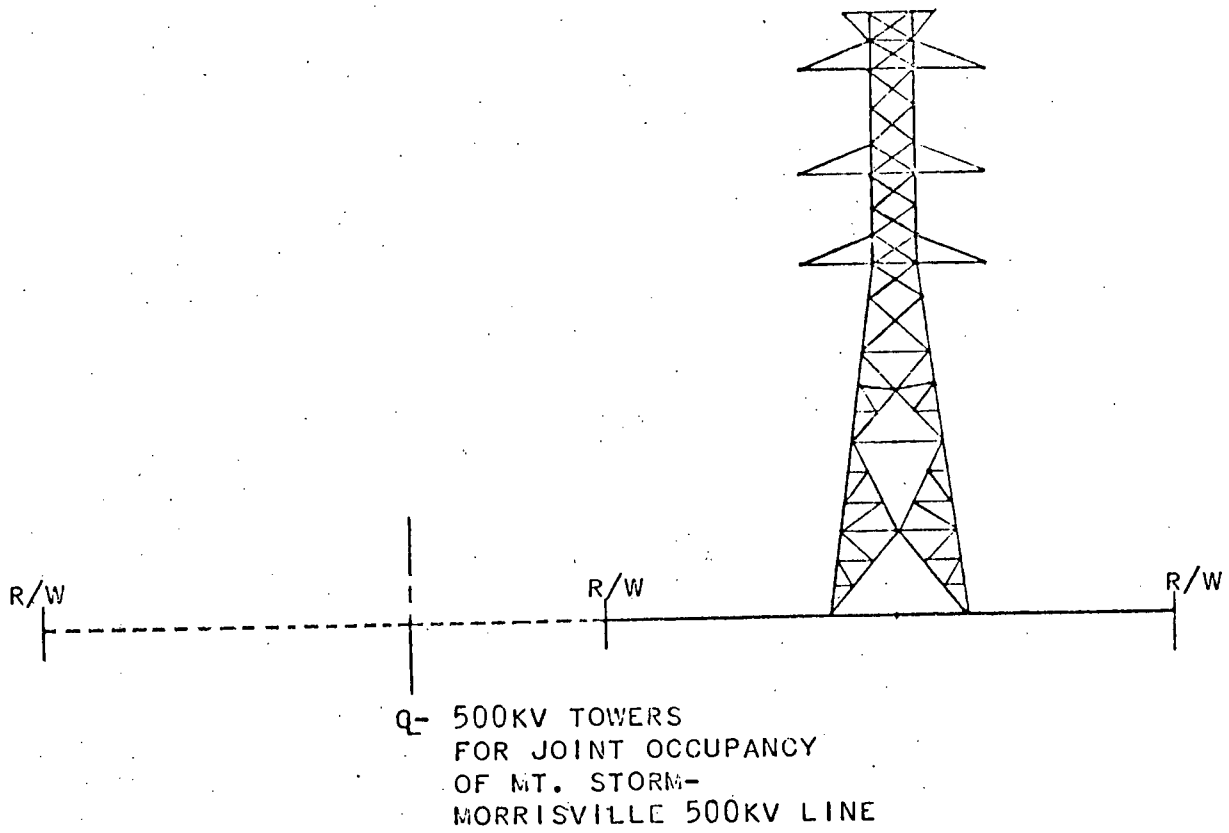
The possibility of rebuilding the present Charlottesville-Possum Point 115 kV line for 230 kV operation was also explored in an attempt to use an existing utility corridor. This line is 93 miles long and would have to be rebuilt for its entire length. Loading conditions already existing on this line will not permit it to be taken out of service for the extended period of time necessary to rebuild it. The purchase of new right of way parallel to it to construct a new line would create a greater impact on the environment than our proposal outlined in this Application. In addition, the cost of such a new line for 93 miles is considerably greater than the approximately 5 mile line between Morrisville and Remington. An additional constraint to rebuilding for 230 kV operation is the two government communication facilities in close proximity to the existing Charlottesville-Possum Point 115 kV line. F.B.I. representatives stated publically that conversion to 230 kV would be opposed by that agency.

CASE NO._____

APPLICATION 34

EXHIBIT D

MORRISVILLE-REMINGTON 230KV TRANSMISSION LINE



TYPICAL TOWER LOOKING TOWARD REMINGTON

MATERIAL: ASTM A588 STEEL, CORROSION RESISTANT, COLOR RUSSET BROWN

FOUNDATIONS: CONCRETE

AVERAGE HEIGHT: 120 FEET WIDTH AT CROSSARMS: 38 FEET

CONDUCTORS: ALUMINUM

TRANSMISSION LINE CLEARING
MORRISVILLE-REMINGTON 230 KV

Natural vegetation will be retained for screening in wooded areas. Desirable plant material will be preserved at road crossings in order to screen the transmission facility from the public view. The width of right of way is 120 feet where not adjacent to the Mt. Storm-Morrisville line. The combined right of way width for the two lines is 235 feet. It will be necessary to clear the full width of right of way to provide adequate and safe clearance for the operation of the electric line; however, natural grown ornamental plants such as cedar, dogwood, holly, redbud and sourwood will be retained to the extent practicable in areas subject to general public view.

Clearing Methods

The right of way in wooded areas will be logged where practical to conserve and utilize the natural resources. Merchantable timber and pulpwood will be sold to local sawmills for processing. The remaining debris will be piled and disposed of by burning in order to leave the right of way in an acceptable condition and to have the maximum space available for use by the property owners. The disposal by burning shall conform with the rules of the State Air Pollution Control Board.

Property owners will be encouraged to utilize the area for agricultural purposes and Vepco will contribute a maximum of $100 an acre to convert woody brush areas to areas of permanent cultivation. Individual owners have the right to use this right of way area for farming, grazing, growth of ornamental plants or Christmas trees. The owners control public access to their lands. The disturbed areas will be restored after construction. These locations will be limed, fertilized and seeded to establish a ground cover. Such vegetation offers an attractive situation for wildlife habitat. Birds and mammals use the

products of the "edge" for food supplies and timber outside the right of way for shelter. The use of these transmission corridors for wildlife food will tend to increase game and wildlife habitat at a time when the number of small farms and open areas is being reduced.

The periodic maintenance treatments to control woody growth shall consist of hand cutting, machine mowing and chemical treatment. The first treatment would probably be made in 1976. Herbicides will be used to reduce the density of the fast growing hardwood species to an acceptable level. Herbicides used to control woody vegetation are registered with the Environmental Protection Agency and the Virginia Department of Agriculture. The rates that will be used for these applications are recommended by the Agricultural Extension Service of VPI and SU. Herbicides will not be used where the right of way is devoted to agricultural use.

This line is located in a predominantly agricultural area. Gates will be installed at cross-fences in order to provide access to transmission facilities in order not to damage the fences and roads of the property owners. The property owners may use these gates for entrance to their fields. Areas with a residential-recreational orientation will be managed in a manner consistent with the land use pattern. These areas will be machine mowed on a one to two year cycle. The use of right of way for recreational purposes would be encouraged.

The purpose of the right of way maintenance program will be to prevent interruptions to electric service, provide for access to the rights of way and patrol and make emergency repairs. This program will be accomplished in an aesthetically acceptable manner. The methods used to achieve these objectives will be consistent with the land use pattern for the area.

SUBSTATION LOT CLEARING AND GRADING
REMINGTON SUBSTATION

Natural vegetation will be retained for screening the substation site, where possible. Where natural vegetation is inadequate, supplemental plantings of trees and shrubs will be made to provide screening of the substation site.

The area to be cleared for the construction of the substation and access roads will be logged, where practical, to conserve and utilize the natural resources. Merchantable timber and pulpwood will be sold to local sawmills for processing. The remaining debris will be piled and disposed of by burning to leave the site clear for necessary grading. The disposal by burning shall conform with the rules of the State Air Pollution Control Board.

The grading to be done will only be what is necessary to provide a suitable site for the construction of the substation. The fenced area will be covered with a minimum of 3" crushed stone. Ditches will be constructed to control water run off. Embankments created by grading will be protected from erosion by planting necessary vegetation and constructing adequate ditches at the top of the slope. All off site drainage divides are to be honored.

During construction, necessary steps will be taken to control erosion and the resulting siltation. After construction the aforementioned plantings will provide this control.

STATE AGENCIES WHO MAY HAVE AN INTEREST IN THIS APPLICATION

1. Department of Highways
2. Historic Landmarks Commission
3. Department of Conservation and Economic Development
4. Governor's Environmental Council
5. Commission of Outdoor Recreation
6. Division of State Planning and Community Affairs
7. Air Pollution Control Board

The extent to which these agencies have been advised and consulted with respect to the proposed facilities is set forth in Exhibit C. Copies of this Application have been sent to each of the above.

VIRGINIA:

STATE CORPORATION COMMISSION

APPLICATION OF VIRGINIA ELECTRIC
AND POWER COMPANY

For Approval of Electrical Facilities	)	
Under § 56-46.1 of the Code of Virginia	)	Case No._____
and for Certification of such Facilities	)	Application No. 35
under the Utility Facilities Act.	)	

APPLICATION FOR APPROVAL AND CERTIFICATION
NORTH ANNA-MORRISVILLE TRANSMISSION LINE

Virginia Electric and Power Company (Vepco) respectfully shows as follows:

1. Vepco is a public service corporation organized under the laws of the Commonwealth of Virginia and furnishing electric service to the public within its service territory in Virginia. Vepco also furnishes electric service to the public in portions of North Carolina and West Virginia.

2. Vepco's electric system, consisting of facilities for generation, transmission and distribution of electric energy, as well as associated facilities, is interconnected with the electric systems of neighboring utilities, and is a part of the interconnected network of electric systems serving the continental United States. By reason of its operations in three states and its interconnections with other utilities, Vepco is engaged in interstate commerce.

3. In order to perform its legal duty to furnish adequate and reliable electric service, Vepco must, from time to time, construct new electric facilities. The need for new electric facilities is directly related

to the growth in demand for electricity on Vepco's system, and the greater that growth in demand the greater the necessity for new capacity in generation, transmission and distribution facilities.

4. Vepco is presently experiencing a very rapid growth in demand for electricity on its system and, as a result, must construct a number of new electric facilities. One such new electric facility is the proposed North Anna-Morrisville transmission line.

5. The proposed North Anna-Morrisville transmission line is a 500 kV transmission line running from Vepco's North Anna Power Station in Louisa County, Virginia to the proposed Morrisville Substation in southern Fauquier County. It will be a major line for transmitting electricity from the North Anna Power Station to the proposed Morrisville Substation which is proposed as a major junction point for other 500 kV transmission lines serving the Northern Virginia load area. The proposed route of the line is shown on the county maps attached to this Application as Exhibit A. Certificates of public convenience and necessity have been previously issued for that portion of the line in Louisa, Orange and Spotsylvania counties; however, a new map for Orange County is included in this Application because the proposed line route has been shifted to miss the historic Germanna Colonies site.

6. The proposed transmission line is necessary to meet the growth in demand for electricity on Vepco's system and for continued reliability of electric service. This necessity is described in greater detail in Exhibit B to this Application.

7. The proposed transmission line at the proposed location is the best means of meeting the need described in Exhibit B. The factors influencing Vepco's selection of the route of the transmission line are described in Exhibit C to this Application.

8. The transmission line will be of conventional 500 kV design, and will consist of foundations, towers, conductors, insulators and associated equipment. The line will be constructed to the extent practicable in accordance with the guidelines set forth by the Federal Power Commission in Appendix A, Docket No. R-365, Order No. 414, issued on November 27, 1970. Approximate size of the transmission structures, the materials to be used and the general appearance of the structures are shown in Exhibits D1, D2, and D3 to this Application.

9. The width of the right of way for the proposed transmission line, the width to which it will be cleared, the method of clearing, method of disposal of trees and brush, proposed ground cover and maintenance of right of way after the line is constructed are all set forth in Exhibit E to this Application.

10. A list of state agencies which may reasonably be expected to have an interest in the proposed construction is set forth in Exhibit F to this Application.

11. Vepco is today filing with the Commission similar applications with respect to the following facilities: the Mt. Storm-Morrisville transmission line, the Morrisville-Bristers transmission line and the Morrisville Substation, the Morrisville-Remington transmission line and the Remington Substation expansion. To a large extent the necessity for these facilities and the necessity for North Anna-Morrisville transmission line are interrelated.

12. If Vepco is unable to construct the proposed North Anna-Morrisville transmission line and have it in service by July 1974, reliability of electric service will be severely impaired to many of Vepco's customers. Existing rights of way cannot adequately serve this need. The proposed route of the line reasonably minimizes adverse impact on the scenic, environmental and historic

assets of the area concerned. The public convenience and necessity require that Vepco construct the proposed transmission line.

WHEREFORE, Virginia Electric and Power Company respectfully requests that the Commission

(a) promptly give notice of this Application as required by § 56-46.1 of the Code of Virginia;

(b) if a hearing is required on this Application and on any of the other applications filed this date, consolidate proceedings on all applications for which a hearing is required.

(c) approve pursuant to § 56-46.1 of the Code of Virginia the proposed North Anna-Morrisville transmission line to be constructed and owned by Vepco;

(d) grant, under the Utility Facilities Act, a certificate of public convenience and necessity for the North Anna-Morrisville transmission line to be constructed and owned by Vepco.

Date: August 25, 1972

VIRGINIA ELECTRIC AND POWER COMPANY

By E. B. Crutchfield

E. B. Crutchfield
Senior Vice President

George D. Gibson
Evans B. Brasfield
Joseph M. Spivey, III
Michael W. Maupin
Hunton, Williams, Gay
& Gibson
700 East Main Street
Richmond, Virginia 23212
Counsel for Applicants

STATE OF VIRGINIA }
CITY OF RICHMOND } To-wit

I, Helen R. Reed, a notary public in and for the state and city aforesaid, hereby certify that this day appeared before me E.B.Crutchfield, who, first being duly sworn, made oath and said that he is Senior Vice President of Virginia Electric and Power Company and as such duly authorized to execute and file the foregoing Application, and that the matters contained in such Application are true to the best of his knowledge and belief.

Given under my hand and notarial seal this 25th day of August, 1972. My commission expires August 24, 1973.

Helen R. Reed
Notary Public

(SEAL)

NECESSITY FOR
NORTH ANNA-MORRISVILLE 500 KV LINE

Vepco is constructing a nuclear power station in the northeast corner of Louisa County that will have a total capability of 3740 megawatts in four generating units which are scheduled to go into service, one each in 1974, 1975, 1977 and 1978. The majority of the output from this plant will flow into Northern Virginia to serve the rapidly growing load in that area.

Two 500 kV lines will be required to deliver the output of the first two generating units to Northern Virginia and a third line will be needed with the last two generating units to supply the same area.

It is proposed to use an existing 500 kV line that connects between the Richmond area and Northern Virginia as one of these lines. This will be done by inserting a switching station in the present line near Ladysmith and constructing a line between North Anna and this switching station. For the second line into Northern Virginia, it is proposed to construct a 500 kV line north from North Anna to the proposed substation at Morrisville and, thence, in a northeasterly direction to connect into the present line near Bristersburg. Previous line rearrangement will have freed the section of the existing line north of Bristersburg to the Loudoun Substation for this use.

In the summer of 1975 with two generating units operating at North Anna, there will be about 1400 megawatts of power flow to Northern Virginia loads. This amount of power is well within the rating of the existing North-South 500 kV line but if this line is out of service for any reason, the underlying 230 kV system will be overloaded. Therefore, the North Anna to Morrisville line is necessary.

FACTORS INFLUENCING ROUTE OF
NORTH ANNA-MORRISVILLE 500 KV LINE

The proposed facility is 32.5 miles of 500 kV transmission line which will serve as a connection between the North Anna Power Station and the proposed Morrisville 500 kV switching station and 500-230 kV substation. The Morrisville Substation is proposed to be a major 500 kV interconnection point, and is referred to in Application 33. The line will traverse portions of the counties of Louisa, Spotsylvania, Orange, Culpeper and Fauquier.

Vepco has consulted with the Virginia Commission of Outdoor Recreation, the Virginia Department of Highways and the U. S. Corps of Engineers to determine how the proposed line influences projects under consideration by them. Their suggestions have been taken into consideration. The route has been reviewed with officials of all the counties involved. Local officials in Fauquier County appear to be opposed to any new transmission lines in the county. The line does not interfere with present or future highway construction.

The general route of the line to the extent practicable has been established in accordance with the Federal Power Commission guidelines entitled, "Electric Power Transmission and the Environment." The route has been adjusted to avoid conflicts with a number of sites of significance.

1. On the north side of the North Anna Reservoir and west of Pigeon Run, the original route was relocated eastward at the suggestion of the Virginia Commission of Outdoor Recreation so as to minimize the impact of the line with respect to the entrance of a planned regional park in this area.

2. The line route has been selected to traverse an area between the historic Germanna Colonies site, Wilderness National Park, and Lake of the Woods Subdivision rather than across the Germanna historical site. There is sufficient natural screening to protect this site and the Community College erected on a portion of the original Germanna Colonies tract of land.
3. The crossing of the Rappahannock River has been located so that it does not conflict with future plans of the Commission of Outdoor Recreation nor the development of the Salem Church project on the river.

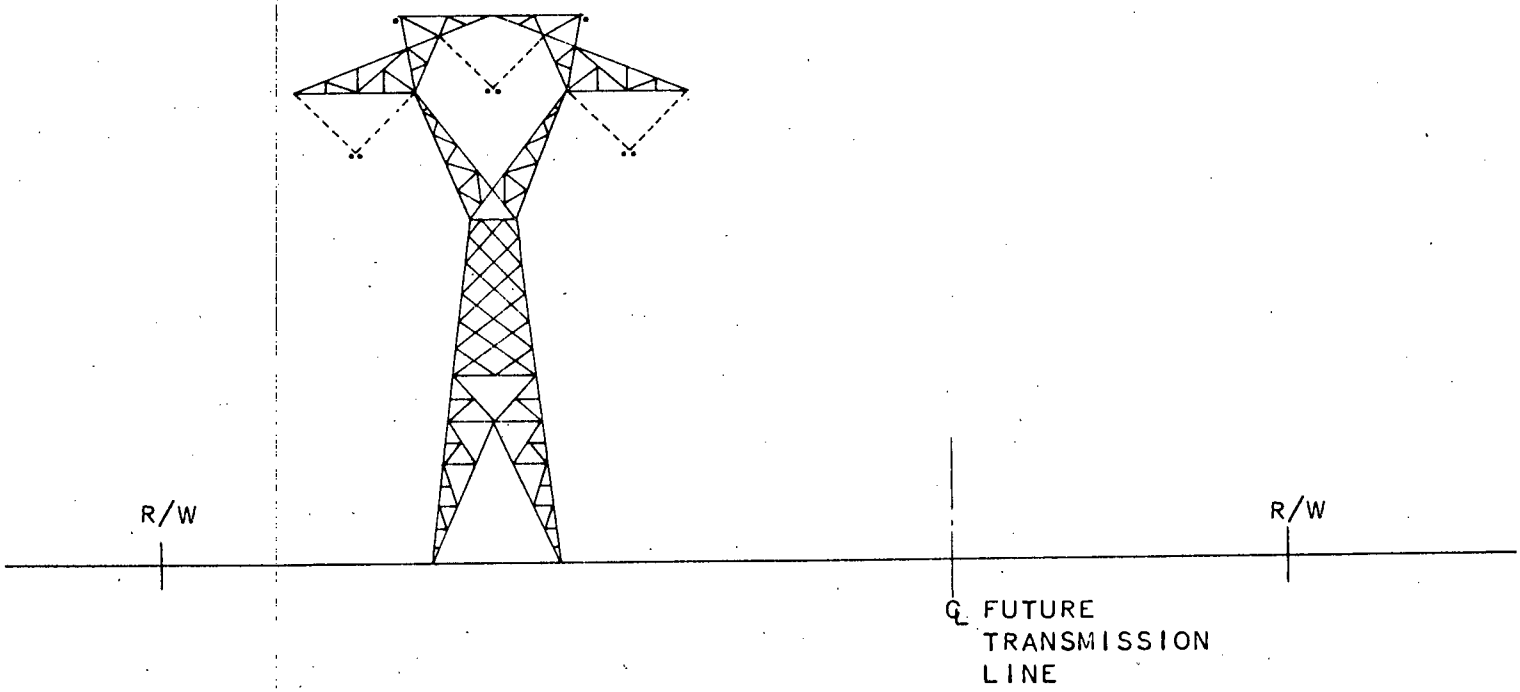
An investigation was made of an alternate route from North Anna that would extend eastward to the existing Elmont-Loudoun 500 kV line and parallel that line to a point near Bristers, referred to in Application 33. Such a route would have to be separate from the North Anna-Ladysmith line in order to meet Atomic Energy Commission requirements. One route investigated would depart from the proposed route in this Application at a point near Robertson Run and extend eastwardly in Spotsylvania County to the Loudoun-Elmont 500 kV line just south of Chancelor. This line routing was discarded because of its proximity to the Fredericksburg-Spotsylvania National Military Park and because of obstacles to the acquisition of right of way northward and parallel to the existing 500 kV line. A second route was studied that departed from the route of this Application in Culpeper County and extended eastwardly to the Elmont-Loudoun line in Stafford County at a point where Alleotti Run intersects with it. A review of this route by the staff of the Commission of Outdoor Recreation indicated that this route conflicted with several potential park sites and would be in close proximity to an area of the Rappahannock River which is "replete with old canal locks and dams, white water rapids, rocks and forests, similar to the river below its confluence with the Rapidan." (Letter from Commission of Outdoor Recreation dated July 20, 1971.)

CASE NO._____

APPLICATION 35

EXHIBIT D-1

NORTH ANNA-MORRISVILLE 500KV TRANSMISSION LINE



TYPICAL TOWER LOOKING TOWARD MORRISVILLE

MATERIAL: ASTM A588 STEEL, CORROSION RESISTANT, COLOR RUSSET BROWN

FOUNDATIONS: CONCRETE

AVERAGE HEIGHT: 116 FEET WIDTH AT CROSSARMS: 84 FEET

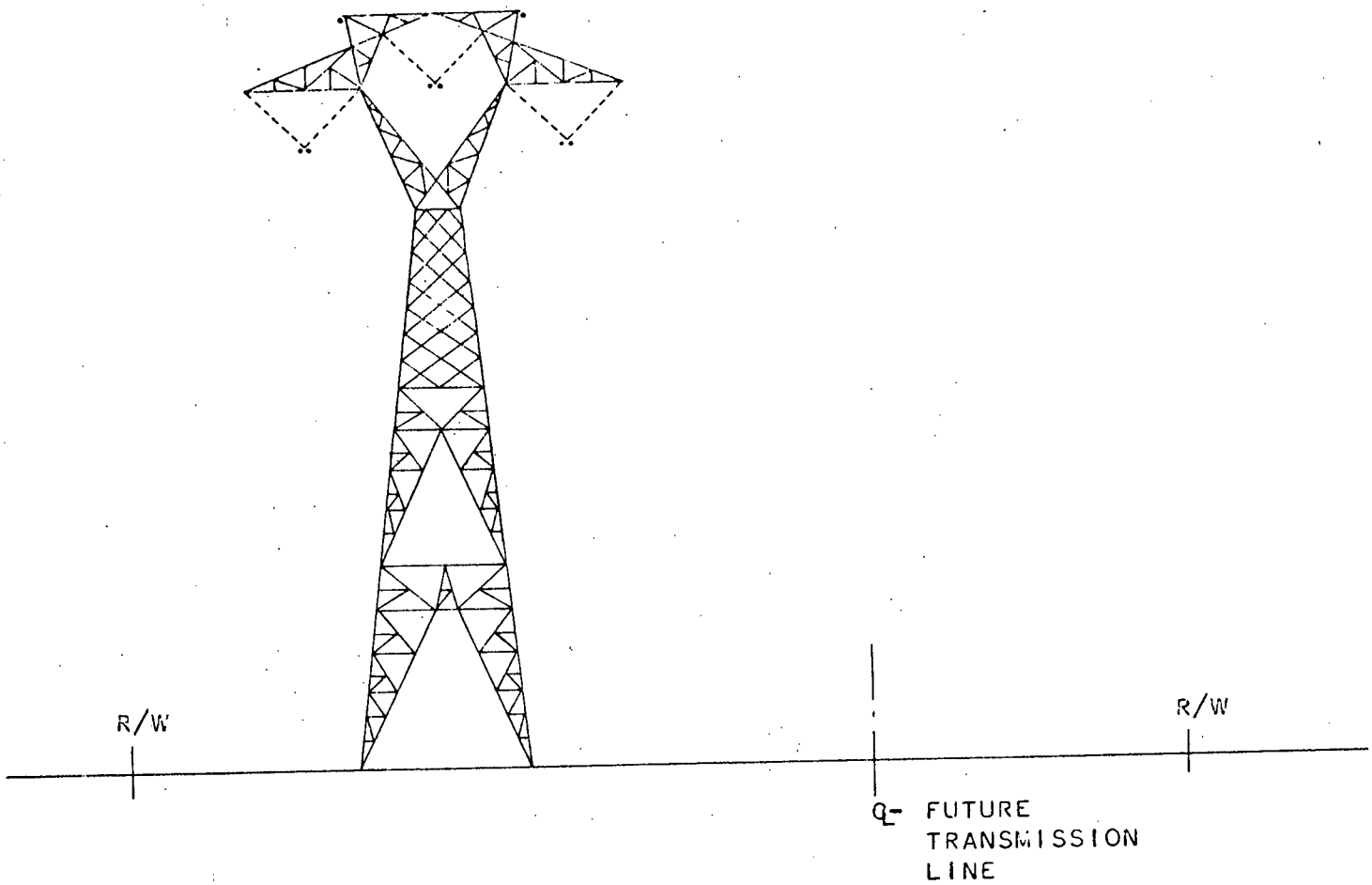
AVERAGE SPAN LENGTH: 1100 FEET CONDUCTORS: ALUMINUM

CASE NO. _____

APPLICATION 35

EXHIBIT D-2

NORTH ANNA-MORRISVILLE 500KV TRANSMISSION LINE



TYPICAL RIVER CROSSING TOWER - RAPPAHANNOCK RIVER

MATERIAL: ASTM A588 STEEL, CORROSION RESISTANT, COLOR RUSSET BROWN

FOUNDATIONS: CONCRETE

AVERAGE HEIGHT: 166 FEET WIDTH AT CROSSARMS: 84 FEET

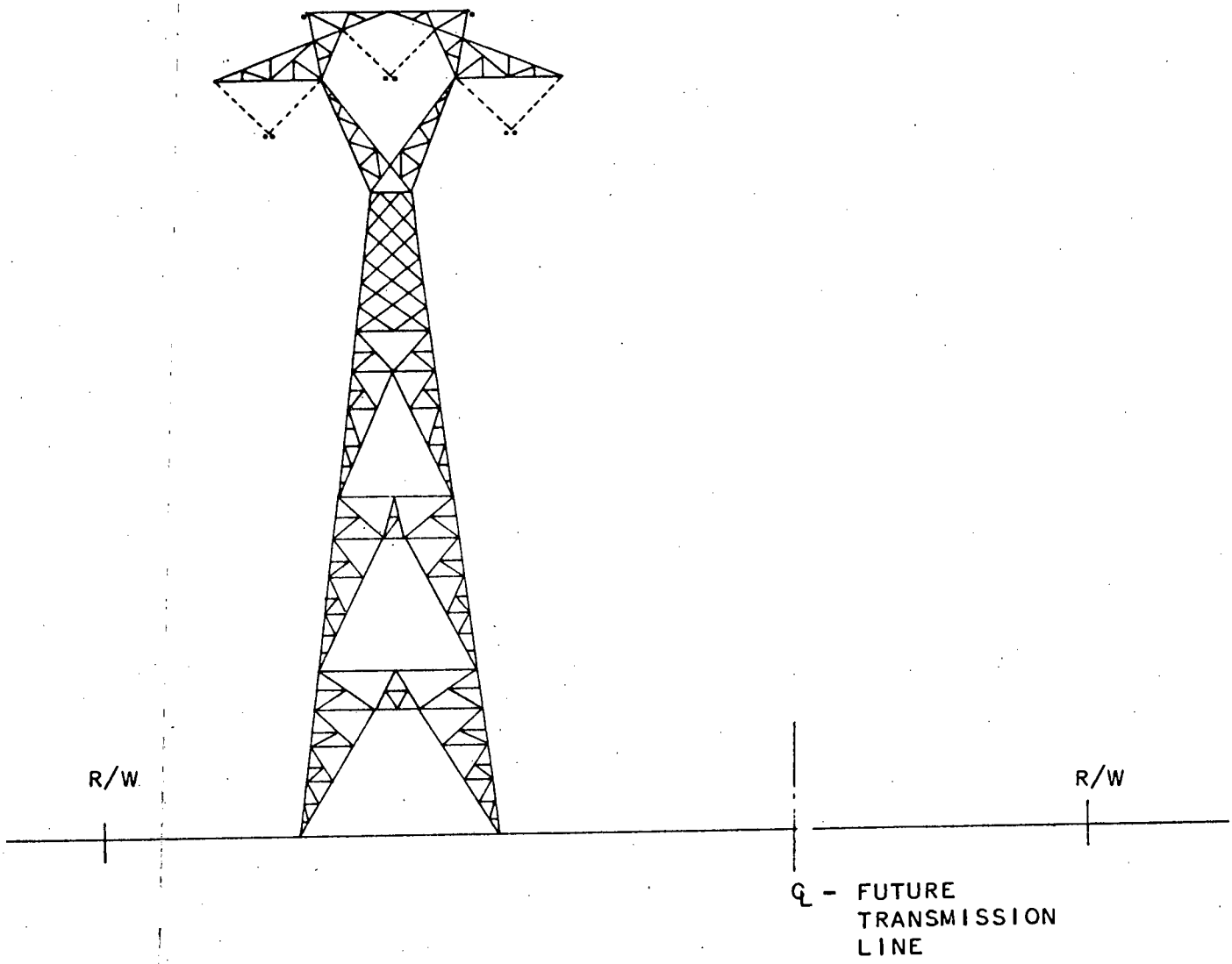
CONDUCTORS: ALUMINUM

CASE NO._____

APPLICATION 35

EXHIBIT D-3

NORTH ANNA-MORRISVILLE 500KV TRANSMISSION LINE



TYPICAL RIVER CROSSING TOWER - RAPIDAN RIVER

MATERIAL: ASTM A588 STEEL, CORROSION RESISTANT, COLOR RUSSET BROWN

FOUNDATIONS: CONCRETE

AVERAGE HEIGHT: 196 FEET WIDTH AT CROSSARMS: 84 FEET

CONDUCTORS: ALUMINUM

TRANSMISSION LINE CLEARING
NORTH ANNA-MORRISVILLE 500 KV

Natural vegetation will be retained for screening in wooded areas. Desirable plant material will be preserved at road crossings in order to screen the transmission facility from the public view. The width of right of way to be acquired for this line and for future use is 235 feet. The width of right of way to be cleared for the North Anna-Morrisville 500 kV line will be 150 feet to provide adequate and safe clearance for the construction and operation of the electric line; however, natural grown ornamental plants such as cedar, dogwood, holly, redbud and sourwood will be retained to the extent practicable in areas subject to general public view. The remainder of the right of way will be cleared at a future date when an application is submitted for other transmission facilities on this right of way.

Clearing Methods

This right of way is in a predominantly wooded area and it will be possible to log timber and pulpwood from most of the properties to conserve and utilize the natural resources. Merchantable timber and pulpwood will be sold to local sawmills for processing. The remaining debris will be piled and disposed of by burning in order to leave the right of way in an acceptable condition and to have the maximum space available for use by the property owners. The disposal by burning shall conform with the rules of the State Air Pollution Control Board.

Property owners will be encouraged to utilize the area for agricultural purposes and Vepco will contribute a maximum of $100 an acre to convert woody brush areas to areas of permanent cultivation. Individual owners have the right to use this right of way area for farming, grazing, growth of ornamental plants or Christmas trees. The owners control public access to their lands. The disturbed areas will be restored after construction. These locations will be

limed, fertilized and seeded to establish a ground cover. Such vegetation offers an attractive situation for wildlife habitat. Birds and mammals use the products of the "edge" for food supplies and timber outside the right of way for shelter. The use of these transmission corridors for wildlife food will tend to increase game and wildlife habitat at a time when the number of small farms and open areas is being reduced.

The periodic maintenance treatments to control woody growth shall consist of hand cutting, machine mowing and chemical treatment. The first treatment would probably be made in 1976. Herbicides will be used to reduce the density of the fast growing hardwood species to an acceptable level. Herbicides used to control woody vegetation are registered with the Environmental Protection Agency and the Virginia Department of Agriculture. The rates that will be used for these applications are recommended by the Agricultural Extension Service of VPI and SU. Herbicides will not be used where the right of way is devoted to agricultural use.

Areas with a residential-recreational orientation will be managed in a manner consistent with the land use pattern. These areas will be machine mowed on a one to two year cycle. The use of right of way for recreational purposes would be encouraged.

The purpose of the right of way maintenance program will be to prevent interruptions to electric service, provide for access to the rights of way and patrol and make emergency repairs. This program will be accomplished in an aesthetically acceptable manner. The methods used to achieve these objectives will be consistent with the land use pattern for the area.

Another alternate route was suggested by a citizen in the Sumerduck area of Fauquier County. This proposal would depart from the route of the line in this Application near the Germanna Colonies site and extend eastward to a crossing of the Rapidan near the confluence of Flat Run. The route would affect potential waterfront lots along Flat Run. The crossing of the Rapidan at the confluence with Flat Run also would be more disruptive to the environment than the Vepco route. The citizen's proposed route would extend east of Richardsville. The area east of Richardsville in Culpeper County is being considered as a major park area and the Commission of Outdoor Recreation recommended that it be avoided when Vepco was studying another alternate route in this area. The routing proposed by the Sumerduck resident would also call for crossing the Rappahannock at the confluence with Sumerduck Run, and would involve 5 spans of conductor over the waters at this confluence when the Salem Dam is built whereas the Vepco route has a direct single span crossing of the Rappahannock River. North of the Rappahannock the line would cross the Southern Fauquier County Dump; however, the environmental impact to the Rappahannock River, Rapidan River and potential park east of Richardsville would greatly exceed the environmental impact of the Vepco route. The Sumerduck citizen route also would require the construction of approximately $400,000 more 230 kV line from the 500 kV switching station to Remington because this alternate route moves the Morrisville Substation approximately 4 miles east.

Vepco believes that the route presented in this Application is the route having the least environmental impact.

STATE AGENCIES WHO MAY HAVE INTEREST IN THIS APPLICATION

1. Department of Highways
2. Historic Landmarks Commission
3. Department of Conservation and Economic Development
4. Governor's Environmental Council
5. Commission of Outdoor Recreation
6. Division of State Planning and Community Affairs
7. Air Pollution Control Board

The extent to which these agencies have been advised and consulted with respect to the proposed facilities is set forth in Exhibit C. Copies of this Application will be sent to each of the above.

VIRGINIA:

STATE CORPORATION COMMISSION

APPLICATION OF VIRGINIA ELECTRIC
AND POWER COMPANY

For Approval of Electrical Facilities Under § 56-46.1 of the Code of Virginia and for Certification of such Facilities under the Utility Facilities Act.	))))	Case No. _____ Application 36

APPLICATION FOR APPROVAL AND CERTIFICATION
OF MT. STORM - MORRISVILLE TRANSMISSION LINE

Virginia Electric and Power Company (Vepco) respectfully shows as follows:

1. Vepco is a public service corporation organized under the laws of the Commonwealth of Virginia and furnishing electric service to the public within its service territory in Virginia. Vepco also furnishes electric service to the public in portions of North Carolina and West Virginia.

2. Vepco's electric system, consisting of facilities for generation, transmission and distribution of electric energy, as well as associated facilities, is interconnected with the electric systems of neighboring utilities, and is a part of the interconnected network of electric systems serving the continental United States. By reason of its operations in three states and its interconnections with other utilities, Vepco is engaged in interstate commerce.

3. In order to perform its legal duty to furnish adequate and reliable electric service, Vepco must, from time to time, construct new electric facilities. The need for new electric facilities is directly related to the growth in demand for electricity on Vepco's system, and the greater that growth in demand the greater the necessity for new capacity in generation, transmission and distribution facilities.

4. Vepco is presently experiencing a very rapid growth in demand for electricity on its system and, as a result, must construct a number of new electric facilities. One such new electric facility is the proposed Mt. Storm-Morrisville transmission line.

5. The proposed Mt. Storm-Morrisville transmission line is a 500 kV transmission line running from Vepco's Mt. Storm Power Station in West Virginia to the proposed Morrisville Substation in southern Fauquier County. It will be used by the Allegheny Power System as well as Vepco, and for this reason a portion of the line, from Mt. Storm to a point in Warren County, will be constructed and owned by the Allegheny Power System, and the remainder will be constructed and owned by Vepco. The proposed route of the portion of the line to be constructed and owned by Vepco is shown on the county maps attached to this Application as Exhibit A.

6. The proposed transmission line is necessary to meet the growth in demand for electricity on Vepco's system and for continued reliability of electric service. This necessity is described in greater detail in Exhibit B to this Application.

7. The proposed transmission line at the proposed location is the best means of meeting the need described in Exhibit B. The line will be constructed to the extent practicable in accordance with the guidelines set forth by the Federal Power Commission in Appendix A, Docket No. R-365, Order No. 414, issued on November 27, 1970. The factors influencing Vepco's selection of the route of the transmission line and alternate routes considered are described in Exhibit C to this Application.

8. The transmission line will be of conventional 500 kV design, and will consist of foundations, towers, conductors, insulators and associated

equipment. Approximate size of the transmission towers, the material to be used and the general appearance of the structures are shown in Exhibit D to this Application.

9. The width of the right of way for the proposed transmission line, the width to which it will be cleared, the method of clearing, method of disposal of trees and brush, proposed ground cover and maintenance of right of way after the line is constructed are all set forth in Exhibit E to this Application.

10. A list of state agencies which may reasonably be expected to have an interest in the proposed construction is set forth in Exhibit F to this Application.

11. Vepco is today filing with the Commission similar applications with respect to the following facilities: the North Anna-Morrisville transmission line, the Morrisville-Bristers transmission line and the Morrisville Substation, the Morrisville-Remington transmission line and Remington Substation expansion. To a large extent the necessity for these facilities and the necessity for the Mt. Storm-Morrisville transmission line are interrelated.

12. If Vepco is unable to construct the proposed Mt. Storm-Morrisville transmission line and have it in service by May 1975, reliability of electric service will be severely impaired to many of Vepco's customers. Original studies by Vepco show that this transmission line should be in service by May 1973; however, joint studies by Vepco and Allegheny Power System engineers indicated that the earliest in service date would be May 1974 in order to make thorough studies on route selection prior to acquiring right of way. Administrative delays by Fauquier County officials with respect to route approval prevent Vepco from meeting the 1974 in service date. Existing rights of way cannot adequately serve this need. The proposed route of the line reasonably minimizes

adverse impact on the scenic, environmental and historic assets of the area concerned. The public convenience and necessity require that Vepco construct the proposed transmission line.

WHEREFORE, Virginia Electric and Power Company respectfully requests that the Commission

(a) promptly give notice of this Application as required by § 56-46.1 of the Code of Virginia;

(b) if a hearing is required on this Application and on any of the other applications filed this date, consolidate proceedings on all applications for which a hearing is required.

(c) approve pursuant to § 56-46.1 of the Code of Virginia the portion of the proposed Mt. Storm-Morrisville transmission line that is to be constructed and owned by Vepco;

(d) grant, under the Utility Facilities Act, a certificate of public convenience and necessity for the portion of the Mt. Storm-Morrisville transmission line that is to be constructed and owned by Vepco.

Date: August 25, 1972

VIRGINIA ELECTRIC AND POWER COMPANY

By E. B. Crutchfield

E. B. Crutchfield
Senior Vice President

George D. Gibson
Evans B. Brasfield
Joseph M. Spivey, III
Michael W. Maupin
Hunton, Williams, Gay
& Gibson
700 East Main Street
Richmond, Virginia 23212

Counsel for Applicants

STATE OF VIRGINIA }
CITY OF RICHMOND } To-wit

I, Helen R. Reed, a notary public in and for the state and city aforesaid, hereby certify that this day appeared before me E.B.Crutchfield, who, first being duly sworn, made oath and said that he is Senior Vice President of Virginia Electric and Power Company and as such duly authorized to execute and file the foregoing Application, and that the matters contained in such Application are true to the best of his knowledge and belief.

Given under my hand and notarial seal this 25th day of August, 1972. My commission expires August 24, 1973.

Helen R. Reed
Notary Public

(SEAL)

NECESSITY FOR
MT. STORM-MORRISVILLE 500 KV LINE

Load in Vepco's Potomac District (north of Fredericksburg and east of Culpeper) has been growing at the rate of over 15 percent per year for the past 20 years. The peak load in this area in 1970 was 1250 megawatts (1,250,000 kilowatts). This load is expected to reach 2500 megawatts by 1975 and 5000 megawatts by 1980. The load for Vepco's entire system in 1970 was only 4850 megawatts.

To supply some of this growing load, Vepco is adding a 560 megawatt generating unit in 1973 at Mt. Storm Power Station in the coal fields of West Virginia. Generation in the coal fields is being added by Allegheny Power System to supply loads in the eastern part of their system also.

The continuing rapid load growth in the Washington, D. C. Metropolitan Area of Virginia and the addition of generation in the coal fields have produced an increasing requirement for transmission capacity between the two areas.

In 1966, Vepco and Allegheny Power System completed a jointly owned 500 kV line from Mt. Storm Power Station to Vepco's Loudoun Substation in Northern Virginia via Allegheny Power System's Doubs 500 kV Substation in Western Maryland. In 1970 Allegheny Power System added a 500 kV line from their Hatfield Ferry Power Station in the coal fields of Southwestern Pennsylvania to their Doubs Substation, thereby increasing the transmission capacity between the coal fields and the load in the east.

Studies indicate that these two 500 kV circuits will be carrying a combined load of over 2000 megawatts in the summer of 1974 if additional circuit capacity is not provided. The present rating of the Mt. Storm-Doubs 500 kV line is 1700 megawatts.

In 1974, the heavy loading of lines that now exist will limit the capability of Vepco to import firm power from neighboring utilities in the

north and west to between 300 and 400 megawatts. The addition of the proposed Mt. Storm-Morrisville 500 kV circuit will increase this limit to between 1100 and 2100 megawatts. The exact figure will depend upon which utility is supplying the power. The additional capacity is essential to reliability of electric service.

FACTORS INFLUENCING THE ROUTE OF
MT. STORM TO MORRISVILLE 500 KV LINE

The proposed facility is 46.02 miles of 500 kV line through portions of Warren, Fauquier, Culpeper and Rappahannock Counties required to interconnect with the remaining portion of the line to Mt. Storm which is to be constructed and owned by the Allegheny Power System. The proposed Vepco Morrisville Substation (Application 33) is located at the point of intersection of the North Anna-Morrisville and the Morrisville-Bristers 500 kV lines, thus making it a logical and economical point for the development of the 500 kV switching station. There are no existing rights of way available in the area that can be used for this line.

The route selected has been reviewed by an independent consultant, the Virginia Commission of Outdoor Recreation, the Historic Landmarks Commission, the Virginia Department of Highways, and officials of Warren, Culpeper, Fauquier and Rappahannock Counties. Their recommendations and suggestions have been adopted where practicable. National forests and parklands were considered and avoided where possible. The general route of the line insofar as practicable has been established in accordance with the Federal Power Commission guidelines entitled "Electric Power Transmission and the Environment." This route as selected minimizes the impact to the scenic and environmental assets of the counties concerned by positioning the line through forested and agricultural areas of low population density. Care has been exercised to avoid dwellings. Efforts were undertaken to avoid known subdivisions.

Initial routing for this line provided for its termination at Remington in Fauquier County for the establishment of a 500 kV switching station at

this location for terminating the proposed transmission line from North Anna as well as for terminating a 500 kV line to be built eastward and parallel to the existing Charlottesville-Possum Point 115 kV transmission line to a point known as Bristers on the existing Loudoun-Elmont 500 kV transmission line. A conflict with a communication station owned by the Federal Government and located at Midland prevented the construction of the proposed Remington-Bristers 500 kV transmission line. The original proposal would have provided 500 kV to 115 kV facilities for improving reliability of service to the Charlottesville-Possum Point line.

This communication restraint made it necessary to terminate the 500 kV transmission line at a point near Morrisville where a 500 kV line could be constructed eastward to the Loudoun-Elmont line and not interfere with the operation of the communication facility at Midland. If we had retained Remington for the switching station, two 500 kV transmission lines on separate rights of way for reliability reasons would have to be built southward from Remington to the vicinity of Morrisville. Such a proposal would have a greater impact on the environment than one line route between these two points as presented in this Application and Application 34.

Among the alternate routes considered were: (1) A 500 kV line from the Mt. Storm-Dooms (Waynesboro) line near Harrisonburg to Morrisville Substation. This was in conjunction with the Marble Valley Pumped Storage Power Station. The route was discarded because it did not sufficiently relieve the loading of the Mt. Storm-Doubs line and would have had a greater environmental impact due to crossing the Shenandoah National Park. (2) A 500 kV line paralleling the existing Mt. Storm-Doubs-Loudoun line. This was discarded because it sacrificed reliability by placing two of the principal supply lines to Northern Virginia on a common right of way. There are many places along

this line where additional right of way could not be acquired due to conflict with dwellings and other obstacles. Additional lines would be needed to reinforce the upper end of the Shenandoah Valley and to support the Charlottesville-Possum Point 115 kV line at Remington.

(3) To provide reliability comparable to the proposed Mt. Storm-Morrisville line, consideration was given to construction of a second 500 kV line from Mt. Storm to Dooms to Elmont to Loudoun plus a second Mt. Storm-Doubs-Loudoun line, thus, double circuiting the original 500 kV loop. This is economically impractical and has the problem of many obstacles to the acquisition of additional right of way adjacent to present lines, as well as the environmental disadvantage of widening 361 miles of existing right of way from 150 feet to 250 feet. The additional acreage utilized this way would be 1965 acres more than a new right of way from Mt. Storm to Morrisville.

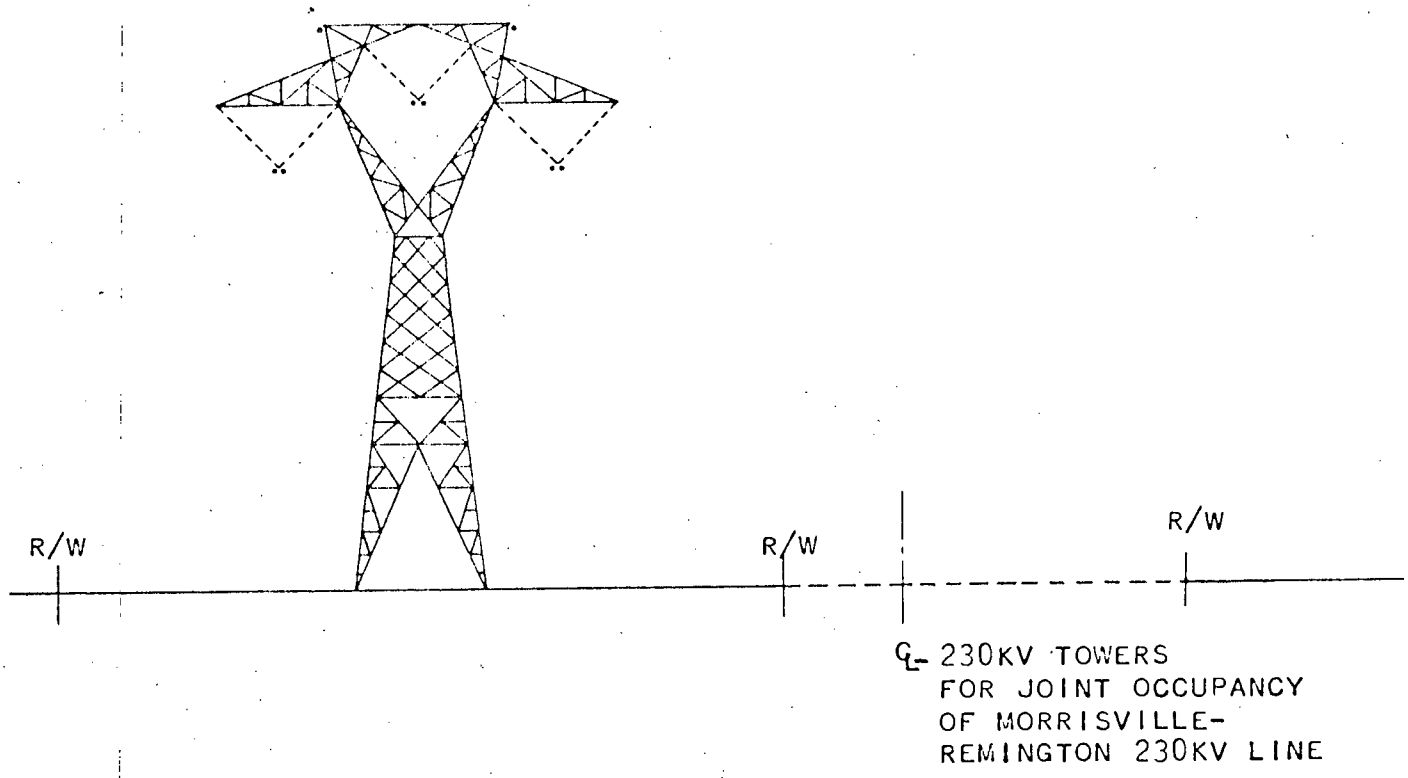
The proposed routing has the least impact on the environment and has the added advantage of providing a means of supporting the existing Allegheny Power System transmission network and the northern end of the Vepco transmission system in the Shenandoah Valley at some future time in the vicinity of Front Royal.

CASE NO._____

APPLICATION 36

EXHIBIT D

MT. STORM-MORRISVILLE 500KV TRANSMISSION LINE



TYPICAL TOWER LOOKING TOWARD MT. STORM

MATERIAL: ASTM A588 STEEL, CORROSION RESISTANT, COLOR RUSSET BROWN

FOUNDATIONS: CONCRETE

AVERAGE HEIGHT: 116 FEET WIDTH AT CROSSARMS: 84 FEET

AVERAGE SPAN LENGTH: 1100 FEET

CONDUCTORS: ALUMINUM

TRANSMISSION LINE CLEARING
MT. STORM-MORRISVILLE 500 KV

Natural vegetation will be retained for screening in wooded areas. Desirable plant material will be preserved at road crossings in order to screen the transmission facility from the public view. The width of right of way from Warren County to a point near Remington in Fauquier County is 150 feet. Between Remington and Morrisville, the width of the right of way is 235 feet for 4.2 miles so as to accommodate the proposed Morrisville-Remington transmission line. It will be necessary to clear the full width of the right of way to provide adequate and safe operation of the transmission line; however, natural grown ornamental plants such as cedar, dogwood, holly, redbud and sourwood will be retained to the extent practicable in areas subject to general public view. An exception to clearing the entire right of way will be provided where the proposed line crosses deep ravines and existing growth will not interfere with the construction and safe operation of the transmission line.

Clearing Methods

This right of way is in a predominantly wooded area and it will be possible to log timber and pulpwood from most of the properties to conserve and utilize the natural resources. Merchantable timber and pulpwood will be sold to local sawmills for processing. The remaining debris will be piled and disposed of by burning in order to leave the right of way in an acceptable condition and to have the maximum space available for use by the property owners. The disposal by burning shall conform with the rules of the State Air Pollution Control Board.

Property owners will be encouraged to utilize the area for agricultural purposes and Vepco will contribute a maximum of $100 an acre to convert woody brush areas to areas of permanent cultivation. Individual owners have the right

to use this right of way area for farming, grazing, growth of ornamental plants or Christmas trees. The owners control public access to their lands. The disturbed areas will be restored after construction. These locations will be limed, fertilized and seeded to establish a ground cover. Such vegetation offers an attractive situation for wildlife habitat. Birds and mammals use the products of the "edge" for food supplies and timber outside the right of way for shelter. The use of these transmission corridors for wildlife food will tend to increase game and wildlife habitat at a time when the number of small farms and open areas is being reduced.

The periodic maintenance treatments to control woody growth shall consist of hand cutting, machine mowing and chemical treatment. The first treatment would probably be made in 1976. Herbicides will be used to reduce the density of the fast growing hardwood species to an acceptable level. Herbicides used to control woody vegetation are registered with the Environmental Protection Agency and the Virginia Department of Agriculture. The rates that will be used for these applications are recommended by the Agricultural Extension Service of VPI and SU. Herbicides will not be used where the right of way is devoted to agricultural use.

Areas with a residential-recreational orientation will be managed in a manner consistent with the land use pattern. These areas will be machine mowed on a one to two year cycle. The use of right of way for recreational purposes will be encouraged. Special screening with nursery plants will be considered at major highways including Routes 211, 522, 55, 15 and 29 to enhance the appearance of transmission facilities.

The purpose of the right of way maintenance program will be to prevent interruptions to electric service, provide for access to the rights of way and patrol and make emergency repairs. This program will be accomplished in an aesthetically acceptable manner. The methods used to achieve these objectives will be consistent with the land use pattern for the area.

STATE AGENCIES WHO MAY HAVE INTEREST IN THIS APPLICATION

1. Department of Highways
2. Historic Landmarks Commission
3. Department of Conservation and Economic Development
4. Governor's Environmental Council
5. Commission of Outdoor Recreation
6. Division of State Planning and Community Affairs
7. Air Pollution Control Board

The extent to which these agencies have been advised and consulted with respect to the proposed facilities is set forth in Exhibit C. Copies of this Application will be sent to each of the above.

VIRGINIA:

STATE CORPORATION COMMISSION

APPLICATION OF THE POTOMAC EDISON
COMPANY OF VIRGINIA

For Approval of Electrical Facilities Under § 56-46.1 of the Code of Virginia and for Certification of such Facilities under the Utility Facilities Act.	))))	Case No. _____

APPLICATION FOR APPROVAL AND CERTIFICATION
OF MT. STORM - MORRISVILLE TRANSMISSION LINE

The Potomac Edison Company of Virginia (Potomac) respectfully shows as follows:

1. Potomac is a pubic service corporation organized under the laws of the Commonwealth of Virginia and furnishing electric service to the public within its service territory in Virginia. Potomac is a part of an integrated electric system which also furnishes service to the public in portions of Maryland, Ohio, Pennsylvania and West Virginia. Potomac is a subsidiary of The Potomac Edison Company (Potomac Edison), a Maryland corporation. Potomac Edison has two other subsidiaries, The Potomac Edison Company of Pennsylvania and The Potomac Edison Company of West Virginia. Potomac Edison is in turn a subsidiary of the Allegheny Power System (Allegheny Power). Allegheny Power has two other operating subsidiaries, Monongahela Power Company and West Penn Power Company.

2. Potomac's electric system, consisting of facilities for generation, transmission and distribution of electric energy, as well as associated facilities, is interconnected with the electric systems of its

affiliated companies and neighboring utilities, and is a part of the interconnected network of electric systems serving the continental United States.

3. In order to perform its legal duty to furnish adequate and reliable electric service, Potomac must, from time to time, construct new electric facilities. The need for new electric facilities is directly related to the growth in demand for electricity on Potomac's system, and the greater that growth in demand the greater the necessity for new capacity in generation, transmission and distribution facilities.

4. Allegheny Power companies, including Potomac, are presently experiencing a very rapid growth in demand for electricity on their systems and, as a result, must construct a number of new electric facilities. One such new electric facility is the proposed Mt. Storm-Morrisville transmission line.

5. The proposed Mt. Storm-Morrisville transmission line is a 500 kv transmission line running from the Mt. Storm Power Station of Virginia Electric and Power Company (VEPCO) in West Virginia to VEPCO's proposed Morrisville Substation in southern Fauquier County. It will be used by Allegheny Power Companies and VEPCO. A portion of the line, from Mt. Storm to the West Virginia/Virginia border will be constructed and owned by Monongahela Power Company. That part from the West Virginia/Virginia line to a point in Warren County, will be constructed and owned by Potomac, and the remainder will be constructed and owned by VEPCO. The proposed route of the portion of the line to be constructed and owned by Potomac is shown on the county maps attached to this Application as Exhibit A.

6. The proposed transmission line is necessary to meet the growth in demand for electricity on Potomac Edison's system and for continued reliability of electric service. This necessity is described in greater detail in Exhibit B to this Application.

7. The proposed transmission line at the proposed location is the best means of meeting the need described in Exhibit B. The line will be constructed to the extent practicable in accordance with the guidelines set forth by the Federal Power Commission in Appendix A, Docket No. R-365, Order No. 414, issued on November 27, 1970. The factors influencing Potomac's selection of the route of the transmission line and alternate routes considered are described in Exhibit C to this Application.

8. The transmission line will be of conventional 500 kv design, and will consist of foundations, towers, conductors, insulators and associated equipment. Approximate size of the transmission towers, the material to be used and the general appearance of the structures are shown in Exhibit D to this Application.

9. The width of the right of way for the proposed transmission line, the width to which it will be cleared, the method of clearing, method of disposal of trees and brush, proposed ground cover and maintenance of right of way after the line is constructed are all set forth in Exhibit E to this Application.

10. A list of state agencies which may reasonably be expected to have an interest in the proposed construction is set forth in Exhibit F to this Application.

11. If the proposed Mt. Storm-Morrisville transmission line is not constructed and in service by May 1975, reliability of electric service will

be severely impaired to many customers. Original studies by VEPCO show that this transmission line should be in service by May 1973; however, joint studies by VEPCO and Allegheny Power engineers indicated that the earliest in service date would be May 1974 in order to make thorough studies on route selection prior to acquiring right of way. Administrative delays by Fauquier County officials with respect to route approval prevent meeting the 1974 in service date. Existing rights of way cannot adequately serve this need. The proposed route of the line reasonably minimizes adverse impact on the scenic, environmental and historic assets of the area concerned. The public convenience and necessity require construction of the proposed transmission line.

WHEREFORE, The Potomac Edison Company of Virginia respectfully requests that the Commission

(a) promptly give notice of this Application as required by § 56-46.1 of the Code of Virginia;

(b) approve pursuant to § 56-46.1 of the Code of Virginia the portion of the proposed Mt. Storm-Morrisville transmission line that is to be constructed and owned by Potomac;

(c) grant, under the Utility Facilities Act, a certificate of public convenience and necessity for the portion of the Mt. Storm-Morrisville transmission line that is to be constructed and owned by Potomac.

Date: Nov 30, 1972

THE POTOMAC EDISON COMPANY OF VIRGINIA

By J. M. McCardell

J. M. McCardell
Executive Vice President and General Manager

Evans B. Brasfield
Joseph M. Spivey, III
Michael W. Maupin
Hunton, Williams, Gay & Gibson
700 East Main Street
Richmond, Virginia 23212

Counsel for Applicants

STATE OF MARYLAND)
To-wit
COUNTY OF WASHINGTON)

I, Hilda W. Stoner, a notary public in and for the state and county aforesaid, hereby certify that this day appeared before me J. M. McCardell, who, first being duly sworn, made oath and said that he is Executive Vice President and General Manager of The Potomac Edison Company of Virginia and as such duly authorized to execute and file the foregoing Application, and that the matters contained in such Application are true to the best of his knowledge and belief.

Given under my hand and notarial seal this 30th day of Nov, 1972. My commission expires July 1, 1974.

Hilda W. Stoner
Notary Public

(SEAL)

Exhibit A

STATEMENT OF PURPOSE & NECESSITY
MT. STORM-MORRISVILLE 500 KV LINE

Investigations of the Allegheny Power 500 kv system transmission requirements for the 1974 period show the need for a new 500 kv circuit from generation in West Virginia and Western Pennsylvania to supply the growing load in an area generally west and north of Washington, D.C., in its eastern Potomac Edison Company service area.

Concurrent with VEPCO's need to provide for additional generation to be installed at Mt. Storm, joint studies by Allegheny Power and VEPCO representatives indicate that these transmission requirements can best be supplied by a single new 500 kv circuit from Mt. Storm Power Station to a proposed substation near Morrisville, Virginia. The proposed circuit will tie into a 500 kv circuit from the North Anna Power Station to the VEPCO Loudoun Substation which is in turn tied to the Allegheny Power Doubs Substation.

The present transmission system of Allegheny Power and VEPCO across this area consists of three 500 kv circuits: Hatfield-Doubs, Mt. Storm-Doubs, and Mt. Storm-Dooms. Based on a single contingency loss, effective load transfer capability is about 2550 MW.

With completion of a new 560 MW generating unit at Mt. Storm in 1973, VEPCO will need to transfer 1670 MW from the Mt. Storm area into their load area. Potomac Edison serves a growing eastern area load estimated to be about 1000 MW in 1975. Thus, the combined needs of VEPCO and Potomac Edison will exceed the 2550 MW limit in 1975 without a Mt. Storm-Morrisville 500 Kv Line in service, and each year thereafter, the deficiency in effective capability will increase.

With the addition of the Mt. Storm-Morrisville circuit, the

single contingency capability of the transmission path would be increased to a range of 3500 to 3800 MW depending on the distribution of load on the transmission network.

A second and equally important need for the Mt. Storm-Morrisville Line is the substantial increase in the capability of Allegheny Power and Potomac Edison to import firm power from outside utility systems. This maintains reliability of service when internal generating capacity emergency conditions occur.

The import capability is essentially dependent on interregional power transfer capabilities. Studies have shown that if the new 500 kv circuit could be installed by 1974, it would increase such power transfer capabilities from the mid-Atlantic area systems to the Allegheny Power System affiliated group from 1000 MW to 2500 MW. This increase is considered essential since interregional transfers in the order of 1500-1800 MW have been experienced during emergency conditions, greatly exceeding the single-contingency limit of 1000 MW projected for 1974.

Two independent alternates to the joint Mt. Storm-Morrisville Line were examined by Allegheny Power-Potomac Edison that would meet its electric power transmission requirements. These alternates were: (1) a 75-mile 500 kv line from a point southwest of Cumberland, Md., to a proposed substation generally north of Martinsburg, W.Va. This served only Allegheny Power-Potomac Edison needs and would require advancing construction of another 27-mile 500 kv line as well as other bulk power facilities proposed for the Potomac Edison area. Net total cost to Potomac Edison alone would be increased by approximately one-half and VEPCO's needs would not be served thus forcing increased expenditures on its part to consummate independent plans; (2) A 500 kv line paralleling the existing Mt. Storm-Doubs Line. This puts two principal power supply lines to a major load area on a common right of way greatly increasing possibilities of simultaneous outage jeopardizing

service reliability. This alternate in itself does not provide for adequate additional power transfer capabilities nor a potential power supply source to the northern Shenandoah Valley area transmission network without substantial additional 500 kv extensions or 230 kv transmission facilities.

Independent planning for those requirements satisfied by the joint Mt. Storm-Morrisville Line would have a much larger impact on the environment and would be more costly and wasteful of material and land resources.

Exhibit C

FACTORS INFLUENCING THE ROUTE OF THE MT. STORM-MORRISVILLE 500 KV LINE

The proposed facility is 17.88 miles of 500 Kv line through portions of Frederick and Warren Counties required to interconnect with the remaining portions of the line connecting the Mt. Storm Power Station in West Virginia with the proposed Morrisville Substation to be constructed and owned by Virginia Electric and Power Company (VEPCO Application No. 33). The portion of line in West Virginia north and west of the facility covered in this Application will be constructed and owned by Monongahela Power Company, a subsidiary of Allegheny Power. The portion south and east will be constructed and owned by VEPCO (VEPCO Application No. 36). The line proposed in this Application will parallel Potomac's existing Riverton-Cumberland 138 Kv Line for 1.8 miles in Warren County and 9.05 miles in Frederick County to a point approximately 2500 feet northeast of Funkhouser Knob. From this point to the West Virginia line (7.03 miles of right of way) no existing rights of way are available which could be used by this line.

An alternate route that was originally studied passed through the George Washington National Forest in West Virginia, crossed the dam of Warden Lake in West Virginia and crossed Cedar Creek in Virginia four times. The Division of State Planning & Community Affairs has tentatively identified Cedar Creek as a "Critical Environmental Area," and The Commission of Outdoor Recreation recommended a route avoiding the Cedar Creek area. The Federal Power Commission Guidelines entitled "Electric Power Transmission and the Environment" recommends avoiding parks and recreational areas where possible. The Guidelines also recommend

paralleling existing utility rights of way where possible. The route presented herein has been modified to avoid the environmentally important areas referenced above and to utilize to a maximum the utility corridor concept. These modifications established the point of entrance into Frederick County from West Virginia.

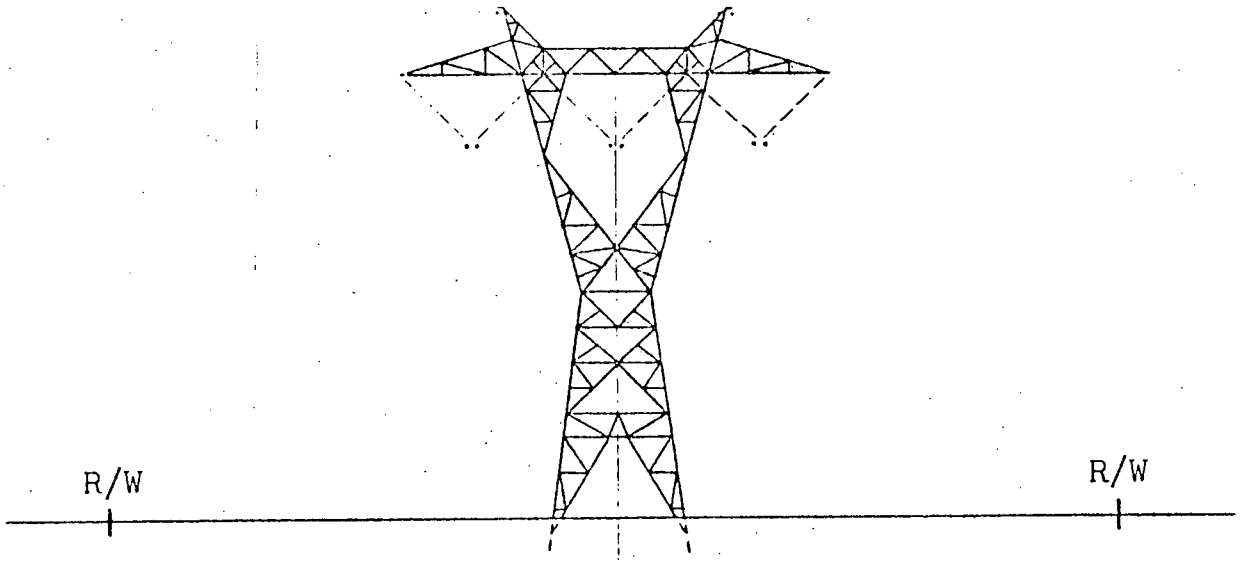
The route presented has been reviewed by The Virginia Commission of Outdoor Recreation, the Historic Landmarks Commission, the Virginia Department of Highways, and officials of Frederick and Warren Counties. Recommendations of the Commission of Outdoor Recreation have been incorporated in the presented route. The Historic Landmarks Commission has indicated no conflict with historically important sites or buildings, and the Department of Highways has indicated only one road project in the area of the line, State Secondary Highway 628 in Frederick County. Proper tower placement in this area will preclude any conflict. Other recommendations and suggestions have been adopted where possible. The general route of the line has been established insofar as practicable in accordance with FPC Guidelines.

The route selected minimizes impact on scenic assets of the area and minimizes adverse environmental effects by positioning the line through forested and agricultural areas of low population density, by avoiding mountain top crossings, and by utilizing the utility corridor concept where possible. Care has been taken to avoid dwellings and known subdivisions.

The proposed routing has the least adverse impact on the environment, provides a means of supporting the existing Allegheny Power transmission network, gives Potomac a potential major source of power needed in the vicinity of Front Royal, and will provide support for the northern end of the VEPCO transmission system in the Shenandoah Valley at some future time.

EXHIBIT D

MT. STORM-MORRISVILLE 500 KV TRANSMISSION LINE



TYPICAL TOWER LOOKING TOWARD MT. STORM

MATERIAL:	ASTM A36 - GALVANIZED A572 COLOR GRAY
FOUNDATIONS:	CONCRETE
AVERAGE HEIGHT:	105 FEET - WIDTH AT CROSSARM: 84 FEET
AVERAGE SPAN LENGTH:	1150 FEET
CONDUCTORS:	ALUMINUM CABLE STEEL REINFORCED

Exhibit E

TRANSMISSION LINE CLEARING
MT. STORM-MORRISVILLE 500 KV LINE

The width of right-of-way in Warren County (1.8 miles) and Frederick County (9.05 miles) parallel to the Riverton-Cumberland 138 kv line will be 175 feet additional width. The remainder of the right-of-way in Frederick County (7.03 miles) to the West Virginia line will be 200 feet wide. The right-of-way generally will be cleared 75 feet on both sides of the centerline where the transmission line traverses normal terrain. It will be necessary to clear a 150 ft. width of the 200 ft. right-of-way to provide adequate and safe operation of the transmission line, except that natural growth will be maintained for a distance of 100 ft. on both sides of roadways to provide a screening for the line. Where natural screening does not exist at the major highways, U.S. 11 and I-81, screening will be considered by planting nursery plants to enhance the appearance of the transmission facilities. Also, ornamental trees and shrubs of the varieties listed below will be maintained on the right-of-way wherever they do not interfere with actual construction:

Blueberry
Cedar
Deer Tongue Grass
Dogwood
Ferns
Hazelnut
Holly
Huckleberry
Meadowsweet
Mountain Laurel
Nine Bark
Redbud
Rhododendron
Sourwood
Spice Bush
Steeple Bush
Sweet Fern
Wild Hydrangea
Witch Hazel

Wherever the transmission line traverses deep ravines, it will be possible to leave the right-of-way uncleared as the trees will not interfere with the safe operation of the line.

Clearing Methods

The right-of-way is in a predominantly wooded area, and it will be possible to log timber and pulpwood from most of the properties to conserve and utilize the natural resources. The remaining debris will be windrowed at the edge of the right-of-way or piled and compacted at selected locations in order to leave the right-of-way in acceptable condition and to have the maximum space available for use by the property owners. Any disposal by burning shall conform with the rules of the State Air Pollution Control Board.

The right-of-way will be preserved and restored at the completion of construction by removing and leveling all construction ruts, seeding areas where ground cover has been destroyed, installing water bars where required to prevent erosion, and generally leaving the right-of-way in an acceptable condition. The land owner will be encouraged to utilize the cleared land for agricultural purposes, such as farming, grazing or growing of ornamental shrubs or trees. The cleared area through timber lands will tend to increase the game and wildlife habitat since game food-producing species will increase at the edge of the right-of-way, and the adjacent timber will provide shelter. The land owners control the public access to their lands.

The use of the right-of-way for recreational purposes will be encouraged, and the right-of-way will be maintained consistent with the land use pattern. This maintenance will consist of machine mowing, necessary hand cutting of trees and chemical treatment. The machine mowing will apply in areas oriented to residential or recreational purposes. The hand cutting will be used to maintain adequate safe clearances from invading tall-growing species on the right-of-way. Chemical treatment will consist of herbicides applied to tall-growing tree species where required. The herbicides used are those registered with the Environmental Protection Agency and the Virginia Department of Agriculture. The rates that will be used are those recommended by the Agricultural Extension Service of VPI and SU. Herbicides will not be used where the right-of-way is devoted to agricultural use.

The purpose of the right-of-way maintenance program is to provide for a continuity of electric service and access to the right-of-way for patrol and emergency repairs. The maintenance program will be accomplished in an aesthetically acceptable manner.

Exhibit F

STATE AGENCIES WHO MAY HAVE INTEREST IN THIS APPLICATION

1. Department of Highways
2. Historic Landmarks Commission
3. Department of Conservation & Economic Development
4. Governor's Environmental Council
5. Commission of Outdoor Recreation
6. Division of State Planning & Community Affairs
7. Air Pollution Control Board

The extent to which these agencies have been advised and consulted with respect to the proposed facilities is set forth in Exhibit C. Copies of this application will be sent to each of the above.

AT RICHMOND, MAY 15, 1975

FINDINGS AND FINAL ORDER
OF THE COMMISSION

BY APPLICATIONS filed with this Commission on August 24, 1972, and November 30, 1972, Virginia Electric and Power Company (Vepco) and Potomac Edison Company of Virginia (Potomac Edison), respectively, requested the Commission to issue Certificates of Public Convenience and Necessity authorizing the construction of certain transmission facilities and substations, to-wit:

> Vepco application for a 115 kv transmission line from an existing substation at Remington in Fauquier County to a proposed 115-34.5 kv substation at Warrenton in Fauquier County.
>
> Vepco application for a 500 kv substation at Morrisville in Fauquier County and a 500 kv transmission line from the proposed substation to a point near Bristers Junction in Fauquier County where the proposed line interconnects with an existing 500 kv transmission line.
>
> Vepco application for a 230 kv transmission line from the proposed Morrisville substation to the site of Vepco's existing substation near Remington. Vepco proposes to expand the capacity of the substation at Remington.
>
> Vepco application for a 500 kv transmission line from Vepco's North Anna Nuclear Generating Station in Louisa County to the proposed Morrisville substation.

Vepco application for a 500 kv transmission line from proposed Vepco Morrisville substation in Fauquier County, extending to a point in Warren County.

Potomac Edison application for construction of a continuation of Vepco's 500 kv transmission line from the point in Warren County to the Virginia-West Virginia boundary.

The 500 kv line will then be extended from the Virginia-West Virginia boundary to Vepco's Mt. Storm generating station in West Virginia.

The Commission has considered the foregoing applications in a consolidated proceeding because the proposed locations of all lines and substations are interdependent. In accord with prior public notice, a public hearing was held on March 28 and 29, 1973, respectively, in the Circuit Court rooms at Warrenton and Washington, Virginia. The hearing was continued in the Commission's Courtroom at Richmond on April 30, 1973. At the latter session, the Commission's Staff requested, and was granted, additional time to conduct further investigations relative to certain of the Applicants' proposals, namely, to investigate the feasibility of using existing transmission corridors and/or to determine if alternate locations might have less adverse impact upon the environment than the locations proposed by Vepco and Potomac Edison. To permit these investigations, the hearing was continued to October 4, 1973.

Following additional public notice of the Staff's investigation and the attendant continuance, the hearing was resumed on October 4, 1973, and continued thereafter on the 5th, 10th, 11th, 12th, 15th, 16th, 17th, and 18th

of that month, on November 5 and 6, December 18, 19, 20, and 21, 1973, and into 1974, on January 23 and 25, and on February 20. The following appearances were entered by counsel for the parties indicated: Evans B. Brasfield, Joseph M. Spivey, III, and Randolph W. Church, Jr., for the Applicants; John F. Kay, Jr., and Angus H. Macaulay for the Rappahannock League of Environmental Protection, the Frederick County League for Environmental Protection, the Warren League for Environmental Protection, and several individuals; Henry M. Massie, Jr., Assistant Attorney General for the Commonwealth of Virginia; L. Lee Bean for the Fauquier County Board of Supervisors; Clarence T. Kipps, pro se, and the Culpeper League for Environmental Protection; and Richard D. Rogers, Jr., for the Commission's Staff. By leave granted, briefs were filed on or around May 1, 1974, by the Applicants, the Rappahannock League for Environmental Protection, et al., the Fauquier County Board of Supervisors, the Culpeper League for Environmental Protection, and Carroll J. Savage, an intervener.

It appearing to the Commission:

That, pursuant to Title 56, Chapter 10.1, Code of Virginia, as amended ("Utility Facilities Act"), the Commission must determine if the facilities proposed for construction by Vepco and Potomac Edison are required to serve public convenience and necessity;

That, pursuant to Section 56-46.1, Code of Virginia, the Commission must determine that the corridor or route to be followed by the proposed transmission lines ". . . will reasonably minimize adverse impact on the

scenic and environmental assets of the area concerned . . . .," and ". . . that existing rights-of-way cannot adequately serve the needs . . ." of Vepco and Potomac Edison.

Now, THEREFORE, upon consideration of the evidence of record, and preliminary to a detailed opinion, the Commission finds:

(1) That construction of the proposed facilities by Vepco and Potomac Edison, hereinabove identified, is necessary to serve public convenience and necessity;

(2) That the corridors or routes to be followed by the required lines, as proposed by Applicants, will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned;

(3) That existing rights-of-way cannot adequately serve the needs, herein established, of Vepco and Potomac Edison.

In accordance with the foregoing findings IT IS ORDERED:

(1) That Vepco and Potomac Edison be, and each hereby is, authorized to construct the facilities herein identified on the locations proposed by said Applicants;

(2) That Certificates of Public Convenience and Necessity evidencing the authority hereby granted be issued to Vepco and Potomac Edison.

Commissioner Bradshaw, dissenting, in part: I agree with the majority's finding that construction of the proposed facilities is necessary to serve the public convenience and necessity. However, I do not agree with the finding that the corridors or routes proposed by the Applicants

should be approved in total. In my opinion the investigation by the Commission's Staff using the "computer method" and alternatives suggested by the parties interested in the Community of "Sumerduck" provided departures which are less costly and have less environmental impact.

SCC-59—6-30-61—10M—(Thick)

COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION
RICHMOND

SEPTEMBER 12, 1975

APPLICATION OF

VIRGINIA ELECTRIC AND POWER COMPANY CASE NO. 11655

and

APPLICATION OF

POTOMAC EDISON COMPANY OF VIRGINIA CASE NO. 10758

For approval of Electrical Facilities Under §56-46.1 of the Code of Virginia and for Certification of such Facilities Under the Utility Facilities Act

Opinion of the Commission; Commissioner Bradshaw, dissenting, in part:

By applications filed with this Commission on August 24 and 29, 1972, Virginia Electric and Power Company (Vepco, or, collectively, with the Potomac Edison Company of Virginia, also referred to as Companies or Applicants) requested the Commission to issue Certificates of Public Convenience and Necessity authorizing the new construction of the following electric facilities:

1. A 115 kv transmission line from an existing substation at Remington in Fauquier County to a proposed 115-34.5 kv substation at Warrenton in Fauquier County. (Remington - Warrenton)

2. A 500 kv substation at Morrisville in Fauquier County and a 500 kv transmission line from the proposed substation to a point near Bristers Junction in Fauquier County where the proposed line interconnects with an existing 500 kv transmission line. (Morrisville - Bristers)

3. A 230 kv transmission line from the proposed Morrisville Substation to the site of Vepco's existing substation near Remington. Vepco proposes to expand the capacity of the substation at Remington. (Morrisville - Remington)

4. A 500 kv transmission line from Vepco's North Anna Nuclear Generating Station in Louisa County to the proposed Morrisville Substation. (North Anna - Morrisville)

5. A 500 kv transmission line from the proposed Vepco Morrisville Substation in Fauquier County, extending to a point in Warren County.

By application filed November 30, 1972, The Potomac Edison Company of Virginia[1] (Potomac Edison, or, collectively, with Vepco, also referred to as Companies or Applicants) also requested this Commission to issue a Certificate of Public Convenience and Necessity authorizing the new construction of a continuation of Vepco's proposed 500 kv transmission line (No. 5, above) from the proposed point in Warren County to the Virginia-West Virginia boundary.[2]

The five Vepco applications were all assigned Case No. 11655 and Potomac Edison's application was assigned Case No. 10758, but all

---

[1]Since the institution of this proceeding, The Potomac Edison Company of Virginia was merged into The Potomac Edison Company, which surviving electric utility is now providing electric service in the area formerly served by The Potomac Edison Company of Virginia.

[2]Outside State Corporation Commission jurisdiction is the proposed extension of this line from the State boundary to Vepco's Mt. Storm generating plant located in West Virginia.

applications were considered in a consolidated proceeding because the location and operation of all the proposed facilities are interdependent.[3]

Following public notice, hearings were held away from Richmond on March 28 and 29, 1973, respectively, in the Circuit Courtroom at Warrenton and Washington, Virginia, in an effort to give greater opportunity to interested members of the public to offer comments on the proposed lines. The hearing was continued in the Commission's Courtroom at Richmond on April 30, 1973. At this session, the Commission's staff was granted a request for additional time to conduct further investigations into the feasibility of using existing transmission corridors and also to determine if alternate transmission corridors might have less adverse impact on the environment than those proposed by Vepco and Potomac Edison. To accommodate these investigations, the hearing was continued to October 4, 1973, and public notice was so given.

Following its resumption on October 4, 1973, the hearing continued on the 5th, 10th, 11th, 12th, 15th, 16th, 17th, and 18th of that month, on

[3]To orient the reader, attached hereto is a diagram, from which the reader can generally understand the relative lengths of the transmission lines subject of these applications and the portions of the states affected.

November 5 and 6, December 18, 19, 20, and 21, 1973, and into 1974, on January 23 and 25, and February 20th. The following appearances were entered by counsel for the parties indicated: Evans B. Brasfield, Joseph M. Spivey, III, and Randolph W. Church, Jr., for Applicants; John F. Kay, Jr., and Angus H. MacCaulay for the Rappahannock League for Environmental Protection, the Warren League for Environmental Protection, the Frederick County League for Environmental Protection, and several individuals; Henry M. Massie, Jr., Assistant Attorney General for the Commonwealth of Virginia; L. Lee Bean for the Fauquier County Board of Supervisors; Clarence T. Kipps, pro se, and the Culpeper League for Environmental Protection; and, Richard D. Rogers, Jr., for the Commission's Staff. By leave granted, briefs were filed on or around May 1, 1974, by Applicants, the Rappahannock League for Environmental Protection, et al., the Fauquier County Board of Supervisors, the Culpeper League for Environmental Protection, and Carroll J. Savage, an intervener.

By order entered herein on May 15, 1975, the Commission made the following findings:

> (1) That construction of the proposed facilities by Vepco and Potomac Edison . . . is necessary to serve public convenience and necessity;

(2) That the corridors or routes to be followed by the required lines, as proposed by Applicants, will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned;

(3) That existing rights-of-way cannot adequately serve the needs, herein established, of Vepco and Potomac Edison.

The aforesaid order of May 15, 1975, then directed the appropriate Certificates of Public Convenience and Necessity be issued to Vepco and Potomac Edison and authorized them to begin construction. The order contemplated the issuance of an opinion at a later date.

SCOPE OF INVESTIGATION

Virginia Code Section 56-265.2, et seq., requires prior Commission approval for the construction of electric facilities except for "ordinary extensions" or "improvements in the usual course of business." Code §56.46.1 requires like approval of the location of ". . .electrical transmission line [s] of two hundred kilovolts or more. . .," together with a determination ". . .that the corridor or route the line is to follow will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned."

Applicants propose to construct five distinct transmission lines and associated facilities along five different routes. The 230 kv Morrisville - Remington line, approximately 4.9 miles long, would follow the

same route as the Mt. Storm - Morrisville 500 kv line, except for a distance of 0.7 mile. That portion of the common route would occupy a 235 feet wide right-of-way, while the 0.7 mile for the 230 kv line would occupy a separate right-of-way having a width of 120 feet. The Remington - Warrenton route carries a 115 kv transmission line, which need not be approved under pertinent Code provisions, but the route was considered in the Commission's overall investigation because of its relationship to the other facilities under investigation. No objection was made to consideration of the Remington - Warrenton route, and evidence was offered regarding its impact on the environment which was evaluated by the Commission in making its decision in this proceeding.

The testimony received at the hearings in Warrenton and Washington, Virginia, was primarily from persons owning property in the vicinity of the proposed lines and from persons concerned with protecting the beauty and historic features of the counties to be traversed. Many citizens were understandably concerned that the proposed towers and lines would cause damage to scenic beauty and diminishment in land values, along with other objections. It is the testimony of these witnesses which makes the Commission acutely aware of the grave responsibility conferred on it by §56-46.1 of the Code. It serves also to highlight and emphasize the clash in values

so much a part of today's society. On the one hand we seek growth in industry, business, and home conveniences requiring greater consumption of energy, particularily electric energy. On the other hand, society today attributes great value to our natural environment and historic features. While society tries to balance the two values, it seems unavoidable that the former continually encroaches upon the latter. In reaching its present decision, the Commission fully recognizes the importance society places on the preservation of the environment, but it must likewise recognize the importance of electric energy to our way of life with its attendant demands for new generating stations, transmission lines, and associated facilities.

Vepco witness, C. M. Stallings, outlines the following purposes to be served by the transmission facilities proposed for approval in this proceeding:

> (1) reinforcement of the distribution system serving Fauquier County through a centrally located transmission substation, (2) reinforcement for an overloaded transmission line serving loads in the counties of Fauquier, Culpeper, Greene, Madison, Rappahannock, Spotsylvania, Orange and Louisa, (3) additional transmission capacity between a nuclear generating station in Louisa County and the growing demand in northern Virginia and the Washington, D.C. Metropolitan area, and (4) additional transmission capacity between generating plants in the West Virginia and Pennsylvania coal fields and growing demand in northern Virginia and the Washington, D.C. Metropolitan area.

From the evidence it is obvious that the transmission facilities are not intended to serve identifiable load centers, i.e., particular towns, cities, or counties, with the exception of the 115 kv Remington - Warrenton transmission line which is intended to serve the growing electric load in the area of Warrenton. Otherwise, the facilities represent a major upgrading in the Companies' ability to transmit large amounts of power from major generating stations to points where it can be fed into distribution systems serving vast portions of northern and central Virginia. Company witnesses contend that the facilities are needed to reinforce the present system for improved reliability and to provide the capability of importing power into fast growing load centers from Vepco's Mt. Storm Generating Station and from other generating stations situated in the coal fields of West Virginia and Pennsylvania. Vepco also asserts that it needs the capability to transmit power to northern Virginia from its four scheduled generating nuclear units of the North Anna Power Station, situated in Louisa County, which power will also reinforce the supply in the counties in and around Charlottesville, Virginia. Potomac Edison, which proposes to build a portion of the Mt. Storm - Morrisville 500 kv transmission line, declares that this line is necessary to feed the growing load upon its lower voltage lines.

In preparing this opinion, we have chosen to give particular emphasis to the method of route selection chosen by the Companies and to the nature of the investigation of the Commission's Staff which sought to determine the reasonableness of the Companies' proposed routes. Less attention is devoted to the actual features of each route approved and to alternate routes which were rejected. It is the completeness of the investigations by Applicants and Staff which provided the Commission with sufficient evidence to determine whether the transmission line routes proposed by Applicants would reasonably minimize adverse environmental impact, whether alternate routes should be approved, or whether additional routes should be investigated.

Donald N. Rice, Chief Electrical Engineer, for Vepco, outlined the scope of the Companies' investigation in locating transmission facilities. He testified that the routes were selected by using coast and geological survey maps, aerial photographs, and by actual field studies. Further, the routes were selected to conform to the Federal Power Commission Guidelines entitled "Electric Power Transmission and the Environment." The latter prescribes line route selection, construction, and maintenance procedures intended to minimize adverse impact on the environment and on people.

Mr. Rice gave a full explanation of the steps which were then taken to explore the reasonableness of the routes initially selected by Vepco's personnel. These routes were explored with federal agencies and with state agencies such as the Commission of Outdoor Recreation and the Division of State Planning and Community Affairs. The routes were also presented at the local level at public hearings and to local officials such as the Planning Commission of Fauquier County. Mr. Rice portrayed the alternate routes which were considered and the reason for rejection. He further explained why certain existing rights-of-way were not to be used in constructing the subject facilities.

Bruce Howlett, Inc., a firm of environmental planning consultants, was employed by Companies to review the environmental impact of the proposed routes. The scope of the review was explained by Bruce Howlett, President of the firm. In his presentation, he made extensive use of large and small maps, with a series of overlays, to show the scope of their review and to illustrate the bases of their conclusion that the proposed facilities, if properly constructed and maintained, were located so as to minimize adverse impact on the environmental assets of this State.

Within the confines of this opinion, we cannot hope to set forth the scope and detail of the Howlett study. Only a limited description will be attempted. A study area was selected consisting of 27 counties in Virginia, 4 in West Virginia and 2 in Maryland. The features and characteristics of this study area were then accumulated. In an exhibit, Mr. Howlett lists more than 40 federal, state, regional (state), and local (state) agencies and government representatives contacted by his firm to obtain information for the study. In a bibliography introduced as an exhibit, Mr. Howlett lists well over 100 sources of information utilized in compiling an inventory of zoning laws, proposed land use plans, soil surveys, forest areas, water locations, scenic assets, historic places, parks, national forests, and other features within the study area. The data collected was assigned to one of five classes, namely, existing land use, proposed land use, proposed critical environmental areas, physiographic regions, and scenic contrast. This data was placed on giant maps of the region, and on a number of overlays, to permit Companies to exhibit to the Commission the environmental assets of the region studied and to show various combinations of the data. These maps, and others, were of great help to the Commission because they showed existing rights-of-way and substations,

the relationship of proposed facilities to existing facilities, and the locations of both existing and proposed facilities relative to the environmental assets of the study region. The maps further provided the Commission with a perspective of the entire region within which it could evaluate the individual lines. Mr. Howlett concluded that the lines had been properly located within the study region.

Mr. Howlett's study of each of the five proposed line locations was conducted in more detail than had been the regional study. To study the environmental impact along each line, his firm studied a 5 mile wide corridor extending approximately 2 1/2 miles to each side of the proposed route. Again, by a combination of maps with overlays, the Commission was shown the location of each proposed line in relation to the environmental features and character of the land within each 5 mile wide corridor. Aerial photography supplied considerable detail for the preparation of these maps. The corridor maps showed residential, commercial, industrial, and recreational land use, in addition to estate and farm centers, historic sites, parks and recreational facilities, radio and TV towers, and land areas devoted to orchards, forestry, and agriculture. Proposed land use was shown. Local plans for land use were shown when

available. Highways, river crossings, flood plains, the shape and character of the land surface (slope, mountains, etc.), major land forms (mountains, plains, etc.), along with other relevant information, were also depicted by the maps.

The overall study undertaken by Vepco and presented to the Commission permitted a full review of the locations proposed by the Companies.

Commission staff members, with the aid of outside consultants, also undertook a comprehensive and complete investigation of the need for the subject facilities and of the reasonableness of the routes proposed. Virginia Polytechnic Institute and State University and Technical Associates, Inc., a private consulting firm, entered into contracts with the Commission to develop a computer-based program to provide a means of investigating alternative routes for high voltage transmission facilities. In addition, Technical Associates, Inc. was requested to investigate the need for the additional facilities; however, at this point we shall focus primarily on the methodology employed by the staff and their consultants to investigate and evaluate feasible transmission line routes.

The Staff's computer analysis was explained by Dr. Robert Giles of VPI&SU and by Dr. Michael J. Ileo and Kenneth C. Strobl of Technical Associates, Inc. Their computer program was offered to measure trade-offs

between transmission line costs and environmental impact. Selection of a route which absolutely minimizes environmental impact, without consideration of the cost of constructing the line, may be entirely too costly and result in rate increases to customers which would be unacceptable. On the other hand, construction of a line which absolutely minimizes cost will, in all probability, have environmental consequences which are unacceptable. Staff's program was offered to determine environmentally acceptable transmission line routes while recognizing construction costs as a constraint.

The Staff first identified the study area in which transmission line facilities could be located and still satisfy the power supply requirements. All beginning and ending points for the lines were accepted for the purposes of the Staff study - such as the North Anna Generating Station, the Mt. Storm Generating Station, and the proposed location of the planned substation. This study area, comprising nearly one-third of the Commonwealth, was divided into 25 acre grids, or cells. Two broad areas of information related to the study area were then collected, catalogued, and identified for each cell.

Environmental information was gathered and catalogued under the direction of Dr. Giles, who assigned it to each cell on the basis of location.

The information gathered included locations of registered historic sites, transmitter zones, airports, scenic easements, national parks, public parks and recreational areas, public game lands and national areas, national forests, submerged marshes, national resource areas, private recreational areas, possible erosion areas, recreational trails, recommended historic sites, proposed scenic easements, proposed recreational areas, potential historic sites, proposed public parks, proposed natural areas, proposed recreational areas, beaches, boat landings, swamps and wooded marshes, orchards, residential areas, urban areas, etc. All of this environmental data was assigned to one of six groups of "constraints." The six groups of constraints were assigned an order of environmental importance. The first order constraints were deemed to be the most important under the priority system adopted to protect against the encroachment of transmission lines; second order constraints were of lesser importance, and so on, with the sixth order constraints being the least important on the priority scale.

Cost data was obtained under the direction of Dr. Ileo. Average costs of constructing and maintaining transmission lines, with adjustments for different types of towers, were determined from data provided by Companies and then assigned to each 25 acre cell as determined by

the terrain of each cell. Real estate records were used in determining property acquisition costs for each cell. Construction costs, based on a thirty-year life, were added to annual maintenance costs, property taxes, income taxes, and interest and equity costs, to determine the annual cost to Companies of constructing and maintaining a transmission corridor in each 25 acre cell. The sum of the costs in each cell was used to estimate the probable costs electric customers would have to bear should the transmission line traverse that cell. To express the cost estimates in terms of current dollars, the annual costs were discounted to determine the total present value of the cost of constructing and maintaining transmission lines in each 25 acre cell.

With the cost and environmental data assigned to each cell, the Staff's computer program was then used to seek those transmission corridors which minimized costs, and avoided, to the extent possible, in the order of priority determined by the six constraints, those cells containing environmental factors. The Staff's data and computer program were used for four broad purposes: (a) to determine a corridor having the least adverse environmental impact, while recognizing cost restraints, (b) to analyze the routes proposed by Companies, both as to costs and as to environmental impact, (c) to analyze the costs

and environmental impact of routes proposed by other parties, and (d) to enable Dr. Giles to offer expert opinion as to the relative effect on the environment of the various proposed corridors.

Rappahannock League for Environmental Protection, Inc., Warren League for Environmental Protection, et al., (RLEP) opposed construction of the Mt. Storm - Morrisville line. RLEP contended that the transmission of power could be accomplished by constructing a 500 kv transmission line parallel to an existing transmission line running from Mt. Storm to Doubs to Loudoun (See Attachment).

In response to the above, Applicants contend that placing this second 500 kv transmission line on the Mt. Storm - Doubs - Loudoun corridor would unreasonably jeopardize reliability of electric service by concentrating critical transmission capacity within a single right-of-way. It is further argued that constructing the new transmission line adjacent to the existing Mt. Storm - Doubs - Loudoun line would expose both lines to simultaneous outage from a single cause, and that the failure of both lines would cause power loss of tremendous proportions, which should be avoided at all costs. Applicants also respond that parallel construction would breach the planning-purposes criteria of the Regional Reliability Councils which was adopted to avoid mass power outages.

RLEP argues in its brief that Companies fail to show that reliability of electric service would be unreasonably jeopardized by constructing the new 500 kv line parallel to the existing line, and thus fail to carry the burden imposed by Code §56-46.1 to ". . .provide adequate evidence that existing rights-of-way cannot adequately serve the needs of said company." RLEP argues that parallel construction would result in less damage to the environment and in less cost to Applicants. RLEP says that Companies fail to show that the proposed Mt. Storm - Morrisville corridor reasonably minimizes adverse impact on the scenic and environmental assets of the affected areas.

Culpeper League for Environmental Protection and Clarence T. Kipps, Jr. (Culpeper), argue on brief that the Commission should deny all of Vepco's applications, and in particular its application to construct a 500 kv transmission line along the North Anna - Morrisville corridor. In support thereof, it is claimed that Vepco has failed to prove that ". . .substantial use of existing rights-of-way would not adequately serve its needs." Culpeper maintains that, in the alternative, Vepco could construct the aforesaid 500 kv line along a route that ". . .commences at the North Anna Plant, follows Vepco's proposed

route . . . about 12 miles to a point near Robertson Run in Spotsylvania County, thence easterly substantially along existing telephone rights-of-way for about 11 miles to Vepco's existing Ladysmith - Bristers 500 kv line, thence on and adjacent to these existing rights-of-way for about 21 miles to Bristers. . . ." Culpeper maintained that its proposed North Anna - Robertson Run - Bristers route would not jeopardize reliability of service, would make use of existing rights-of-way as prescribed by Code §56-46.1, and would minimize environmental impact.

Fauquier County Board of Supervisors (Fauquier) objected to the proposed location of the substation at Morrisville. This proposed location will serve as a center point for Companies' proposed Mt. Storm - Morrisville 500 kv line, North Anna - Morrisville 500 kv line, Morrisville - Bristers 500 kv line, and Morrisville - Remington 230 kv line. Fauquier contends that use of existing rights-of-way would eliminate the need for the Morrisville Substation. Fauquier, like Culpeper, takes the position that a 500 kv line could be constructed along the North Anna - Robertson Run - Bristers route, thereby making use of an existing corridor, rather than constructing along the proposed North Anna - Morrisville corridor. On brief, Fauquier contends that a single substation

could then be constructed at Bristers, and a transmission line constructed from Bristers to Remington along an existing right-of-way; the Remington Substation could then be enlarged to permit additional capacity to the Warrenton area of Fauquier County through a new transmission line, and to permit reinforcement of the existing Possum Point-Remington - Charlottesville line. Fauquier expresses the opinion that the proposed Morrisville Substation is not needed as a termination point on the proposed North Anna - Morrisville corridor because the line could be constructed on the Mt. Storm - Doubs - Loudoun existing right-of-way, as advocated by RLEP, or it could be constructed on a more direct route between Mt. Storm and Loudoun.

Objection was offered to the proposed corridors by others who appeared as interveners at the local hearings and at the hearing in Richmond. Alternative solutions were proposed by these parties and considered by the Commission, although not specifically identified in this opinion.

Three basic issues must be resolved by the Commission in considering Companies' proposed facilities and the location thereof:

(a) Is construction of the proposed facilities necessary for service to the public?

(b) If construction of the proposed facilities is found necessary, will existing rights-of-way adequately serve the needs of Applicants?

(c) As mandated in Code §56-46.1, the Commission ". . . shall give consideration to the effect of [the proposed facilities] on the environment and establish such conditions as may be desirable or necessary to minimize adverse environmental impact . . ." and ". . . determine that the corridor or route the line is to follow will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned."

NEED FOR THE PROPOSED FACILITIES

While there was no stipulation by the parties that the subject facilities are needed, the preponderance of the evidence supports our conclusion that growth in electric loads on Vepco and Potomac Edison systems requires construction of the facilities. Additional generating capacity is being made available at Vepco's new generating station on the North Anna River. Similar capacity is to be transported from Vepco's Mt. Storm Station and other generating stations to the west

of the Vepco system. Obviously, generating capacity cannot be utilized unless facilities are available to transmit the available power to the areas where needed. Reliable electric service requires strong interconnection of major generating facilities. No electric utility operates as an independent entity, but coordinates its power supply and transmission with neighboring electric utilities. Regional planning and cooperation of the several electric utilities has become the foundation of service for the individual utilities. Providing dependable service not only requires adequate interconnections of generation stations with load demand within an electric utility system, but it is equally dependent upon strong interconnections among the several systems of a region. Evidence was offered by both Vepco and Potomac Edison, and by the Commission's Staff, to show that reinforcement of Applicants' transmission system is needed to make available new generating capacity, and to upgrade reliability of service in large areas of northern Virginia.

C. M. Stallings, Executive Manager of Power Supply and Production Operation for Vepco, testified that the historic growth in demand in the area of Warrenton, Virginia, and in the Counties of Culpeper, Greene, Madison, Rappahannock, Spotsylvania, Orange and Louisa has been at

a rate of approximately 10%, compounded annually, and a high growth rate is expected to continue. The power supply to these counties is delivered by the existing Possum Point - Remington - Charlottesville 115 kv line via the distribution systems of Vepco and Potomac Edison. Mr. Stallings states that construction of the 230 kv line from the proposed Morrisville Substation to Remington, with the addition of a 230-115 kv transformer at the present Remington Substation, is needed to reinforce the 115 kv line and to provide for transmission of additional power to the Warrenton area via the proposed Remington - Warrenton 115 kv line. According to this witness, Companies have already had critical load problems on the existing 115 kv line which Vepco proposes to reinforce.

Mr. Stallings describes load growth in Vepco's northern Virginia area. The area is described roughly as consisting of the Cities of Alexandria and Falls Church, and the Counties of Arlington, Fairfax, Prince William, Loudoun, and Fauquier. Exhibits were offered showing that electric load in this area has grown at an annual rate of over 15% for the past 20 years. The 1970 peak load was shown to be 1,250 megawatts, with the load projected to reach about 2,500 megawatts by 1975, and 4,500 megawatts by 1980. Objections were raised to the rate of growth used by Companies;

however, no one disputed that the demand for electric power will continue to grow at a substantial rate.

L. H. Weeks, Executive Director of Planning Service for Alleghany Power Service, testified that Potomac Edison has been experiencing load growth in its service area in northwest Virginia of approximately 10%, compounded annually.

Lionel O. Barthold, President of Power Technologies, Inc., testified for Applicants that construction of the facilities is required to improve the ability to exchange electric power with neighboring systems under both normal and emergency conditions. He maintains that construction of the 500 kv lines is required to provide an adequate and reliable supply of power to the northern Virginia area. In regard to the proposed 230 kv transmission line along the Morrisville - Remington corridor and the 115 kv line from Remington to Warrenton, he expresses the opinion that their construction is critical. He states that:

> Warrenton presently has service from two 34.5 kv lines. Because of the length involved, two such lines are not adequate to maintain reasonable standards of service in the Warrenton area. This load is now about 15,000 kw at peak periods. VEPCO has extended the adequacy of these lines by installing voltage regulators in them. In one of the lines, regulators have been installed at two points and one is up to its current carrying limit. At

> this point, even with regulators there is no way of maintaining satisfactory service to Warrenton during even minor emergencies or maintenance periods.

Dr. Michael J. Ileo, President of Technical Associates, Inc., testified for the Commission's Staff that he concurred with Companies' conclusion that the new facilities are needed to supply growing electrical demands in the northern Virginia area. Dr. Ileo, at one point in his testimony, commented on his study of the northern Virginia load growth as follows:

> Demand in all parts of VEPCO's service area appears to be growing at a considerable pace as indicated in Exhibit MJI-2. Between 1968 and 1972, megawatt hours sold rose by 42.3 percent. Demand in VEPCO's Northern Division, which includes the Northern Virginia area, grew by 51.2 percent which is considerably more than total system growth. On a yearly basis, megawatt hours sold in the Northern District increased at an average rate of 11 percent. This is substantially higher than the average yearly rate of growth for VEPCO's total system or any of the remaining Divisions. Based on this data, it is reasonable to conclude that demand growth in Northern Virginia is the primary reason for the widening divergence between internal capacity and load requirements.

Dr. Ileo testified that load demand could be expected to continue to grow at a high rate in the northern Virginia area.

Ernest M. Jordan, Director of the Commission's Division of Public Utilities testified that, not only were the subject facilities needed,

but further expressed the opinion that the facilities should be constructed as soon as practicable because time was an important factor.

Witnesses for RLEP and Fauquier agreed that additional electric facilities were needed. Fred Chambers, principal Engineer for Boray Engineers, Inc., a witness for RLEP, concluded that there is a need for all the facilities Companies propose to construct. Fauquier stated in its brief that it participated in this case ". . . not to question the ultimate need but to question the proposed locations of the electric facilities."

The evidence in this proceeding is clear and convincing that facilities of the type proposed by Applicants are needed.

ARE EXISTING RIGHTS-OF-WAY ADEQUATE

Applicants oppose the use of existing rights-of-way, or such rights-of-way, widened, to accommodate additional lines. Four general reasons may be stated for this opposition, namely: (1) that concentration of two or more principal lines on a single right-of-way would jeopardize reliability of service, (2) that the location of certain lines on existing rights-of-way would not permit adequate service of growing loads and would probably require new lines to serve such loads, (3) that, in some instances, placing new lines parallel to existing lines would be more detrimental to the

environment than the use of new corridors, and (4) the use of existing corridors is prohibitive because of the additional cost.

The issue of reliability was one of Companies' primary arguments against the Protestants request that the Mt. Storm - Morrisville route be denied and that the 500 kv transmission line be placed parallel to an existing 500 kv line on the Mt. Storm - Doubs - Loudoun corridor. Companies contend that the parallel placement of this second 500 kv line would subject both lines to simultaneous outage from a single cause, which could result in power failure, not only in the Vepco and Potomac Edison systems, but into neighboring systems as well.

It is obvious from the testimony that the probability of an accident to transmission lines, such as an airplane crash, a wind storm of unusual force, an earthquake, etc., cannot be expressed with mathematical precision. Expert witnesses appear to be in general agreement that there is no certain definition of reliability, nor any agreed formula as to its measure, and that it is a matter for subjective judgment. Any conclusion of the Commission to accept the possibility of a simultaneous outage, although its probability is not susceptible to measurement, will depend in part upon the consequence of such an outage. Typical of the comments offered by witnesses opposing paralleling are those of Applicants' witness Barthold:

> If the Mt. Storm - Loudoun transmission line were to be paralleled by another 500 kv line on adjacent and contiguous rights-of-way, Vepco would have to design and build the remainder of its transmission system to withstand the simultaneous loss of both of these lines. It is for this reason I have stated that the entire 500 kv loop would need to be paralleled with a 500 kv line. If a transmission line parallel to the existing Mt. Storm - Loudoun line is to be considered as an alternative, doubling up the whole loop would enable the Company to withstand the loss of both circuits at any particular location.

Mr. Barthold's conclusion is that paralleling the existing 500 kv Mt. Storm - Doubs - Loudoun line would seriously impair system reliability unless rectified by completion of an entire parallel loop via Elmont - to Dooms - to Mt. Storm (See Attachment).

Mr. Jordan, testifying for the Commission's Staff, said that he was in favor of the use of rights-of-way for multiple circuits whenever it was possible to do so without jeopardizing power supply reliability. However, with regard to paralleling the existing Mt. Storm - Doubs - Loudoun 500 kv line, he stated that:

> I cannot agree with RLEP's suggestion that additional 500 kv lines be put on the same right-of-way with existing 500 kv lines. This would make a great deal of Vepco's capacity vulnerable to a disaster such as a tornado, airplane crash or sabotage. Such a disaster could not only knock out electric power to Virginia, but to neighboring states as well.

He further testified that:

> . . . if the loss of both lines would result in a cascading outage under any anticipated operating conditions. This is a risk that I don't believe any prudent engineer would take, no matter what the odds.

While the probability of a simultaneous outage, and the consequences of such an outage, was debated, there was little, if any, evidence that would cause the Commission to decide that paralleling is an acceptable alternative. Mr. Barthold presented the most definitive evidence of the consequences of a double outage by means of a study of a network model of the transmission system utilizing parallel 500 kv lines. He subjected the model to a double outage, and after reviewing the results, concluded that, under electric load conditions anticipated for 1980, such an outage would lead to cascading failure in the transmission network.

The Commission finds that the public need for reliable electric service would not be served by construcing the second 500 kv transmission line parallel to others. While the need for reliable service was the primary reason for not approving parallel construction, we did consider other consequences of such construction. Testimony was offered regarding the environmental impact of the parallel construction

of a 500 kv line as compared to the construction of such a line along a new corridor. The evidence failed to show any environmental advantage to be gained by parallel construction.

Potomac Edison testified that construction of the North Anna - Morrisville line would permit it to furnish electric power to its northern Virginia customers. Marc A. Jansen, Director of System Facilities Planning for the Alleghany Power Service Corporation, testified for Potomac Edison that construction of this line would provide:

> . . . the means for continuing to serve Potomac Edison's Northern Virginia customers with adequate power and reliability by tapping the line in the Northern Shenandoah Valley area where such reinforcement is requested.

Moving a transmission line location away from the electric load it is to serve, in an effort to maximize use of existing rights-of-way, can cause undesirable effects to the environment and accompanying higher costs. Blind determination to use existing rights-of-way ultimately can mean that additional, and longer, lines must be constructed to serve customers far removed from generating sources.

After considering the evidence on reliability of service, environmental impact, the public's need for power, and estimates of construction cost, we are satisfied that the public interest would not be served by

requiring that the 500 kv transmission line from Mt. Storm be constructed parallel to the existing line along the Mt. Storm - Doubs - Loudoun corridor.

Protestants also request that the Commission deny Vepco's application to construct a 500 kv transmission line from the new North Anna Generating Station along the proposed North Anna - Morrisville corridor and to require it to use the existing Elmont - Ladysmith - Bristers corridor. A transmission line is already planned to extend from North Anna Generating Station eastward to a point of intersection with the Elmont - Bristers line at Ladysmith. To satisfy reliability and safety factors, a second corridor should leave North Anna and remain separate for a reasonable distance. The evidence of record does not proscribe, for either environmental or reliability reasons, the 500 kv transmission line proceeding from North Anna on a northerly route, for a reasonable distance, then following an easterly course until the Elmont - Bristers line is intersected, then following the existing corridor north. Such a route was proposed by Culpeper and described earlier herein as the North Anna - Robertson Run - Bristers route.

At the hearing, and on brief, Vepco maintains that its proposed North Anna - Morrisville corridor should not be replaced by the North

Anna - Robertson Run - Bristers route. Three primary reasons are given for this. First, construction along the route proposed by Culpeper would be more costly. Second, the present use of the Elmont - Bristers corridor would only delay the future need to acquire a right-of-way along the proposed route of the North Anna - Morrisville line. Vepco witnesses testified that, in the early 1980's, a 230 kv transmission line will be needed to serve local loads along the latter proposed route. If the 500 kv line is now built along that route, the corridor will be available for the later construction of the 230 kv line. Third, as Vepco argues in its brief, the approval of the Fauquier-proposed route would ". . . require the relocation of Morrisville Substation to Bristers which would in turn require an otherwise unnecessary 230 kv line from Bristers to Morrisville (to join with the Morrisville - Remington transmission line that will support the Remington Substation . . . ."

Having reached this point, the reasonableness of the proposed location of the Morrisville Substation should be resolved. Earlier, we commented on the interlocking nature of the facilities and the fact that the location of all the transmission facilities was dictated, in large part, by the location of the Morrisville Substation. If justified by the evidence, the Commission is of the opinion that it has the authority,

and the duty, to deny location of a substation at the proposed Morrisville site. In Board of Supervisors of Campbell County, et al. v. Appalachian Power Company, et al. decided June 13, 1975, the Virginia Supreme Court confirmed the Commission's action approving a transmission line corridor and substation site different from that proposed by the electric utility.

The type facilities, and their electrical configuration, proposed by Companies are geared to location of a substation in the vicinity of Morrisville. Facilities keyed to the Morrisville Substation are 500, 230, and 115 kv transmission lines, and substations with capabilities to transform voltages of 500, 230, 115, and 34.5 kv. Relocation of a facility, different from the electrical configuration proposed by Companies, or utilization of an existing right-of-way, generally requires structuring a different electrical configuration. A number of changes were offered by the Protestants in this proceeding. One such change was to relocate the substation proposed at Morrisville to the vicinity of Bristers on the Elmont - Bristers corridor. This change was suggested to support Protestants' contention that Companies should utilize the existing corridors of Mt. Storm - Doubs - Loudoun, Elmont - Bristers, and Bristers - Remington, in whole, or in part.

The Commission spent considerable time considering the record to determine whether the Morrisville Substation should be eliminated, or whether its basic function should be served from a substation located at an alternate site, such as at Bristers. Alternate electrical configurations were considered, with the view in mind that, if justified, the Commission would either direct Vepco to implement an alternative or it would require further investigation into the merits of such an alternative. After consideration of the environmental impact, the electric power requirements of the public, and the cost estimates of various electrical configurations, we find that the Morrisville Substation site, and the electrical configuration controlled in large part by that site, will best serve the public interest and satisfy the requirements of controlling statutes.

Having found that the proposed Morrisville Substation site is reasonable, it necessarily follows that utilization of the Elmont - Ladysmith - Bristers and Bristers - Remington corridors will be considered no further.

The use of an existing right-of-way not yet considered in this opinion is that between Remington and Warrenton for the construction of the additional 115 kv line. Earlier, we observed that Code §56-46.1, which applies only to lines of 200 kv or more, does not require Commission consideration of the environmental impact of the 115 kv line. A 34.5 kv line presently follows

the Remington - Warrenton corridor, which runs along U.S. Routes 17 and 29. Witnesses for Vepco testified that use of this corridor would require rebuilding the present structures so that the 34.5 and 115 kv lines could be placed on the same structures. Vepco contends that this would unreasonably jeopardize reliability of service to the Warrenton area. The present 34.5 kv line has been out on a number of occasions because of highway accidents. If the 115 kv and 34.5 kv lines were placed on the same structures along the highway, and knocked out of service because of an accident, the remaining 34.5 kv line could not carry the Warrenton area electric load. Vepco, also cited clearance problems for the heavier structures which would be needed to carry the additional 115 kv line along the existing corridor. Also, it is questionable whether larger utility structures adjacent to the highways would not be environmentally objectionable. After due consideration, the Commission finds that construction of the 115 kv line along the proposed new corridor should be approved.

On consideration of the evidence, we are of the opinion that existing rights-of-way are not available for building the additional facilities. Perhaps a word of caution to Applicants is in order at this time, however. The Commission intends to see that future plans for construction of transmission line facilities are formulated sufficiently in advance to assure

that all rights-of-way acquisition and planning will allow maximum reasonable concentration of facilities on common corridors.

WILL THE CORRIDORS PROPOSED BY APPLICANTS AND THE CONDITIONS FOR CONSTRUCTION REASONABLY MINIMIZE ADVERSE IMPACT ON THE SCENIC AND ENVIRONMENTAL ASSETS OF THE AREA CONCERNED?

Having accepted the Mt. Storm Generating Station, the North Anna Generating Station, Bristers, and the proposed Morrisville Substation site as end points, it is incumbent upon the Commission to determine if routes between these points are reasonable (the Remington - Warrenton route was decided earlier). As pointed out by Protestants, the routes were essentially established by Companies prior to the employment of the Bruce Howlett, Inc. consulting firm to study the environmental impact of the proposed routes and to prepare and present justification of the routes in this proceeding. However, as earlier noted, the study presented by Mr. Howlett enabled the Commission to review the route selection of Vepco within the northern area of Virginia, and to review in more particular detail the attending conditions within an approximate five-mile wide corridor.

Also, as noted, the Commission's Staff conducted an area-wide study presupposing the end points which we have found reasonable, but

providing the benefit of a wide area analysis for our review. The methodology of the Staff was sufficently detailed to permit us to judge the merits and limitations of its review.

Using its independent study, the Staff located corridors between North Anna and Morrisville, Morrisville and Bristers, and Mt. Storm and Morrisville. It also used its review to evaulate the corridors proposed by Companies. The staff-developed routes and those proposed by the Companies were closely aligned, and in some instances they were virtually the same. This should not be surprising, of course, if sound methodology is employed in both cases.

A comparision by the Staff of the cost of routes proposed by Companies and Staff was favorable to the former. However, this difference in cost cannot be considered a factor because of the tolerances and assumptions built-in to the Staff's method.

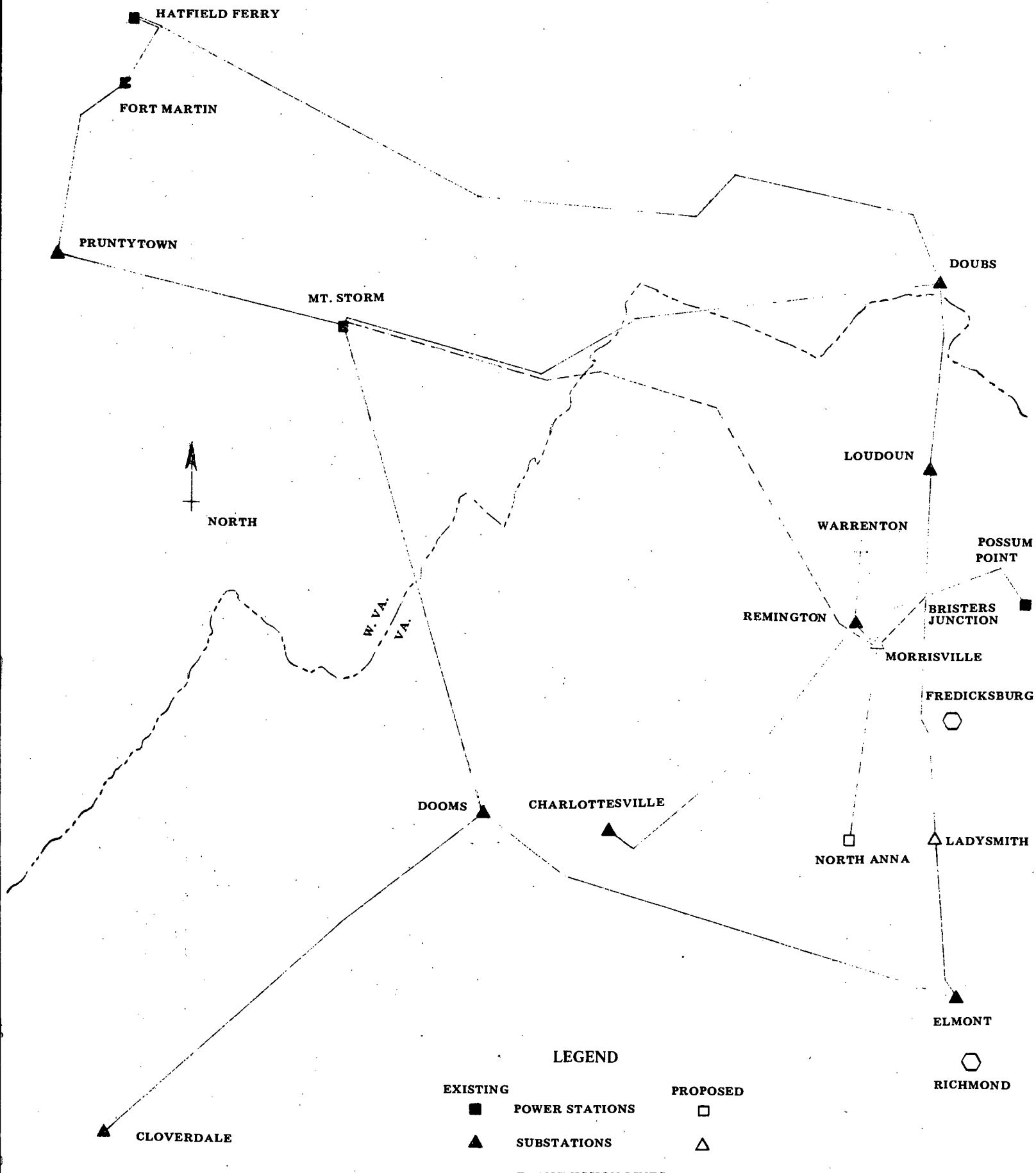
The conclusions of Dr. Giles, testifying for the Staff, are significant. He testified that neither the North Anna - Morrisville or Morrisville - Bristers routes, as proposed either by Applicants or by the Commission's Staff, raised "environmental problems," and that the Mt. Storm - Morrisville route proposed by Applicants was the environmental equal of that proposed by Staff.

For the foregoing reasons, predicated upon the evidence of record, it is our opinion that Companies' proposed routes should be approved.

CONCLUSION

As noted earlier, an order was entered in this cause on May 15, 1975, granting Companies' applications. Therein we stated that a detailed opinion stating the reason for our decision would be forthcoming. Accordingly, a copy of this opinion shall be sent forthwith to all parties of record.

Commission Bradshaw, dissenting in part: I agree with the majority's finding that construction of the proposed facilities is necessary to serve public convenience and necessity. However, I do not agree with the finding that the corridors, or routes, proposed by Applicants should be approved in total. In my opinion, the investigation by the Commission's Staff using the "computer method," and the alternatives suggested by the parties interested in the Community of "Sumerduck," provided departures which are less costly and have less environmental impact.


HATFIELD FERRY
FORT MARTIN
PRUNTYTOWN
MT. STORM
DOUBS
LOUDOUN
NORTH
WARRENTON
POSSUM POINT
W. VA.
VA.
REMINGTON
BRISTERS JUNCTION
MORRISVILLE
FREDICKSBURG
DOOMS
CHARLOTTESVILLE
NORTH ANNA
LADYSMITH
ELMONT
RICHMOND
CLOVERDALE
LEGEND
EXISTING
PROPOSED
POWER STATIONS
SUBSTATIONS
TRANSMISSION LINES
SCALE 1" = APPROXIMATELY 30 MILES

NOTICE OF APPEAL AND ASSIGNMENTS OF ERROR OF INTERVENORS

NOTICE OF APPEAL

Notice is hereby given of (i) an appeal by Intervenors, Rappahannock League for Environmental Protection, Inc., Warren County League for Environmental Protection, and Frederick County League for Environmental Protection, et al. (all herein called "Intervenors"), from the Findings and Final Order of the State Corporation Commission dated May 15, 1975 granting Certificates of Public Convenience and Necessity to the Applicants in these cases to construct certain electric lines and substations and (ii) Intervenors' intention to petition the Supreme Court of Virginia for a writ of supersedeas from such Final Order dated May 15, 1975 in the event that the Commission does not suspend execution of such Final Order pending the appeal from it.

ASSIGNMENTS OF ERROR

Intervenors assign the following as errors by the Commission:

1. The finding that the construction of the proposed facilities by Applicants is necessary to serve public convenience and necessity.

2. The finding that the corridors or routes to be followed by the proposed transmission lines will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned.

3. The finding that existing rights-of-way cannot adequately serve the needs of the Applicants.

4. The sustaining of an objection by Applicants' counsel to a question on cross-examination of Mr. Bruce Howlett, an expert witness employed by Applicants, such question relating to the fee or compensation received by Mr. Howlett from Applicants in connection with these cases.

5. The failure to require Technical Associates, Inc., consultants employed by the Staff of the Commission, to study the transmission line route from Mt. Storm to Doubs to Loudoun, as proposed by Intervenors.

6. The granting of Certificates of Public Convenience and Necessity to Applicants in these cases.

NOTICE OF APPEAL AND ASSIGNMENTS OF ERROR OF INTERVENORS CULPEPER LEAGUE FOR ENVIRONMENTAL PROTECTION AND CLARENCE T. KIPPS, JR.

Intervenors Culpeper League For Environmental Protection and Clarence T. Kipps, Jr., hereby file their Notice of Appeal from the Findings and Final Order of The Commission in Applications of Virginia Electric and Power Company (Case No. 11655) and Potomac Edison Company of Virginia (Case No. 10758) issued May 15, 1975.

The Commission erred in all of its findings and in authorizing and granting Certificates to VEPCO and Potomac Edison. More particularly, the Commission erred in finding:

(1) That construction of the proposed facilities by VEPCO and Potomac Edison is necessary to serve public convenience and necessity;

(2) That the corridors or routes to be followed by the required lines, as proposed by Applicants, will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned; and

(3) That existing rights-of-way cannot adequately serve the needs, herein established, of VEPCO and Potomac Edison.

The Commission further erred in authorizing the construction of the facilities herein identified on the locations proposed by Applicants and in granting Certificates of Public Convenience and Necessity evidencing such authority.

COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

APPLICATIONS OF

VIRGINIA ELECTRIC AND POWER COMPANY CASE NO. 11655

and

APPLICATION OF

POTOMAC EDISON COMPANY OF VIRGINIA CASE NO. 10785

For Approval of Electrical Facilities Under §56-46.1 of the Code of Virginia and for Certification of Such Facilities Under the Utility Facilities Act

NOTICE OF APPEAL AND ASSIGNMENTS OF ERROR OF INTERVENOR CARROLL J. SAVAGE

Intervenor Carroll J. Savage hereby files this Notice of Appeal from the Findings and Final Order of The Commission in Applications of Virginia Electric and Power Company (Case No. 11655) and Potomac Edison Company of Virginia (Case No. 10758) issued May 15, 1975.

The Commission erred in all of its findings and in authorizing and granting Certificates to VEPCO and Potomac Edison. More particularly, the Commission erred in finding:

(1) That construction of the proposed facilities is necessary to serve public convenience and necessity;

(2) That the corridors or routes proposed by Applicants will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned; and

(3) That existing rights-of-way cannot adequately serve the needs of VEPCO and Potomac Edison.

The Commission further erred in authorizing the construction of the facilities herein identified on the locations proposed by Applicants and in granting Certificates of Public Convenience and Necessity evidencing such authority.

Respectfully submitted,

Carroll J. Savage
1700 Pennsylvania Avenue, N.W.
Washington, D. C. 20006

Dated: June 9, 1975

COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

APPLICATIONS OF

VIRGINIA ELECTRIC AND POWER COMPANY — CASE NO. 11655

and

APPLICATION OF

POTOMAC EDISON COMPANY OF VIRGINIA — CASE NO. 10758

For Approval of Electrical Facilities Under §56-46.1 of the Code of Virginia and for Certification of Such Facilities Under the Utility Facilities Act

NOTICE OF APPEAL AND ASSIGNMENTS OF ERROR OF INTERVENOR FAUQUIER COUNTY BOARD OF SUPERVISORS

Comes now Intervenor Fauquier County Board of Supervisors, by its counsel, pursuant to Rule 5:18 of the Supreme Court of Virginia, and files its Notice of Appeal and Assignments of Error from the Findings and Final Order of the State Corporation Commission in Application of Virginia Electric and Power Company (VEPCO) (Case No. 1165 and Potomac Edison Company of Virginia (PECO) (Case No. 10758), issued May 15, 1975, respectfully assigning the following errors in said Findings and Final Order:

1) That construction of the proposed facilities by VEPCO and PECO is necessary to serve public convenience and necessity.

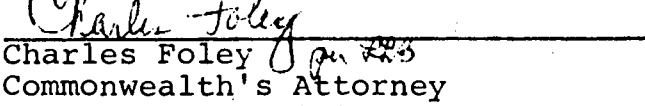
2) That the corridors or routes to be followed by the lines, as proposed by the applicants, will reasonably minimize adverse impact on the scenic and environmental assets of the area concerned.

3) That existing rights-of-way cannot adequately serve the alleged needs of the applicants with respect to these applications.

4) In authorizing VEPCO and PECO to construct the facilities described in their applications.

5) In authorizing the issuance of Certificates of Public Convenience and Necessity to VEPCO and PECO for construction of the facilities proposed in these two cases.

Respectfully submitted,



Charles Foley
Commonwealth's Attorney
Warrenton, Virginia 22186

L. Lee Bean
Co-Counsel for Fauquier Board of Supervisors
2045 15th Street North
Arlington, Virginia 22201

June 13, 1975

CERTIFICATE OF SERVICE

This is to certify that a copy of the above Notice of Appeal and Assignments of Error was mailed, postage prepaid, on June 13, 1975, to the following counsel for the Commission, the Attorney General, the appellee and the intervenors, pursuant to Rule 5:18(b) of the Rules of the Supreme Court of Appeals.

Richard D. Rogers, Jr., Esq.
General Counsel, State Corporation Commission
P. O. Box 1197
Richmond, Virginia 23209

Henry M. Massie, Jr., Esq.
Assistant Attorney General
Supreme Court Building
1101 East Broad Street
Richmond, Virginia

Evans B. Brasfield, Esq.
Joseph M. Spivey, III, Esq.
Hunton, Williams, Gay & Gibson
P. O. Box 1535
Richmond, Virginia 23212

Randolph W. Church, Jr., Esq.
McCandlish, Lillard, Church & Best
4069 Chain Bridge Road
Fairfax, Virginia 22030

CARROLL J. SAVAGE,

a witness introduced as an Individual Intervener, being first duly sworn, testified as follows:

WITNESS: I have prepared a summary of what I wanted to say, and I would like to hand out the maps and photographs attached to my statement.

DIRECT EXAMINATION

BY MR. ROGERS

Q State your name and address, and whom you represent?

A My name is Carroll J. Savage, and I am a resident of Alexandria, Virginia, and I am right in the the middle of the area to be supplied by the Mount Storm to to Morrisville line, so I am a consumer at home. I am a stockholder of Vepco, and I am also a property owner in Fauquier County. I am here to oppose very vigorously the proposed Mount Storm to Morrisville line application No. 36.

My land is located in an area which I don't believe has been discussed this afternoon, and maybe it is

1 a forgotten county -- excuse me, a forgotten corner of
2 Fauquier County -- as far as this proceeding so far. It is
3 up in the Northwest portion of Fauquier in the mountains, the
4 Blue Ridge mountains, not far from Lindon and Front Royal,
5 but still this side of the Warren County Line.
6 That is a heavily wooded area.
7 COMMISSIONER SHANNON: Is that mountainous
8 land?
9 A That is mountainous land. I would like to
10 describe it a little bit to you. I have a hundred and sixty-
11 seven acres there. It is right on the path of this line
12 which cuts it just about half in two. The property is
13 entirely of a wooded valley. It has steep hills on each
14 side, and my property line goes right at the top of the ridge
15 on each side, and there is a stream running down the middle,
16 called Fiery Run, which is a tributary of the Rappahannock.
17 There is a stream and a waterfall down through the woods,
18 and the proposed 500 KV line would pull across one ridge on
19 one side of the property at the southern end, and at about
20 1250 feet when it hits the ridge, and then it would drop
21 right down to about 250 feet right into the stream bed which
22 occupies the whole valley, and the property runs right up
23 the stream bed and cross off at the other end of the property.
24 It goes from there off of my property and it
25 crosses Fiery Run three times, and then it turns and goes up

1 the side of High Knob, which is the high point that you can
2 see from the gap where the Blue Ridge crosses Route 55.
3 It goes up to 1750 feet on the northern side of High Knob
4 before it starts coming down again near Front Royal.
5 It crosses the Appalachian Trail about half
6 a mile from my property at an altitude of about 1500 feet
7 in a heavily wooded area, and about half a mile north from
8 the trail on Mosby Shelter, which is a shelter for the hikers
9 to stop there. It is the first one after you leave Shennandoah
10 National Park going north.
11 This whole area as I say is heavily wooded,
12 and it abounds in deer and other wildlife. There is a wide
13 variety of trees and shrubs and wildflowers. There are
14 horseback riding and hiking trails throughout the area.
15 In the exhibits which I handed up there,
16 Exhibit A which will be the first one, shows the path of the
17 line coming through, and I marked the boundaries of my property
18 in red and you can see Fiery Run in blue running down through
19 there, and you can see the hills going up the side of it,
20 and then the Appalachian Trail is marked in green a little
21 further up there, and then Exhibit No. 2 is the plat of my
22 property.
23 COMMISSIONER HARWOOD: That would be your
24 Exhibit B?
25 A Exhibit B, yes, sir, excuse me.

1 And then the exhibits after that are photographs. The first
2 one, Exhibit C, is the point, well, there are two ridges in
3 the background. The line would run from one ridge to the
4 other. As far as I could tell a tower on each ridge, and
5 that is what you would see there, and you go on over to
6 Exhibit D is another picture of that same point looking at
7 the other direction. Which this will give you an idea of
8 what that area looks like. Then Exhibit E, the last one,
9 is the actual area around Fiery Run that will be clear-cut
10 and treated with insecticides. This is a picture that is
11 actually in the proposed right-of-way.
12 The reason I bought that property was that
13 I wanted -- as how I live in the urban nightmore there that
14 Mr. Willingham referred to -- I wanted to have a wooded
15 retreat that I could go to and preserve in its natural
16 state. I had intended to build a little cottage up along
17 Fiery Run, but I couldn't do that if this goes through. I
18 was going to give an open space easement over the remainder
19 of the property to the Virginia Historic Landmarks Commission,
20 the Commission of Outdoor Recreation, or one of thse authorized
21 by the General Assembly to accept easements to prevent further
22 development of the property and leave it in its natural state.
23 And the possibilty of extending hiking trails through the
24 property. Again, there is not much point in doing that if
25 it cuts up this way.

GARRETT L WILLIAMS

1 I am an attorney actually, not specializing
2 in anything that gives me any expertise in this area, but
3 I know enough about it as I have read some government
4 publications about transmission line siting, and Federal
5 Power Commission guidelines, and I have -- everything I have
6 seen is that new transmission facilities should be confined
7 to existing corridors, and these guidelines also state that
8 rights-of-way should avoid scenic, wildlife, recreational
9 land, steep slopes and prime or scenic timber areas, all of
10 which describe the area that I am speaking about. It seems
11 to me in view of this and the guidelines saying where the
12 lines should go and where it shouldn't go, both of these
13 are being violated in this proposal, then the Commission should
14 place a very heavy burden on Vepco to show that there is no
15 other way that they can reasonably do this, even if it costs
16 them a little more, which I doubt, or a little less reliable,
17 which I doubt. There is no justification for such a massive
18 destruction of such a beautiful area.
19 As far as cost is concerned, I think in
20 comparing the proposed route with the routes paralleling the
21 present line coming from Mount Storm south through Loudoun
22 and the northern Virginia urban corridor, or the southern way,
23 whichever way seems better to the experts -- couldn't you run
24 lines alongside of those. It would seem to be you would avoid
25 the problem that people are complaining about tonight. Not only

1 the land that is being taken, but also the land that is not
2 being taken; the land that is being depreciated by this.
3 In the case of my property it is a hundred
4 and sixty-seven acres, and only about twenty acres of it is
5 any good for anything, and they will run the line right across
6 that. It would affect the value of a hundred acres, and not
7 just the ten acres or so they want to take. That is the
8 thing you are going to get that you would not get if you
9 parallel existing corridors.
10 Then I have been told,and it was the surveyors
11 that told me, and I guess they are not authorized to speak for
12 electrical engineers, but they told me that it is going to be
13 unreliable to parallel existing corridors, so then there would
14 be only two corridors coming from Mount Storm. Well, back
15 a few years ago there was only one. Now some of them have
16 three. I don't understand that, and it seems to me that there
17 has got to be a lot of showing to convince anybody that they
18 have to have three when they can live with one -- or could
19 live with one ten years ago.
20 About the only legal expertise that I do have
21 that bears on this, is that I am a tax lawyer principally,
22 and I ran across a tax case not too long ago entitled, "Vepco
23 vs. United States", which was a case in the U. S. Court of
24 Claims, where the Company was trying to convince the Court of
25 Claims that it should be allowed to depreciate its extra high

1 voltage transmission line right-of-way. That is, claim a
2 tax deduction for them each year because they have a limited
3 life, and they put on some very convincing experts. All of
4 the testimony that was given in this opinion, and it was
5 accepted by the court finally that the overhead transmission
6 lines, these right-of-ways would be entirely obsolete in 27
7 years, by the turn of the century, and they are by that time
8 all new transmission facilities are going underground.
9 Well, if that is true, then this is just a
10 temporary expedience. Twenty-seven years may be a long time
11 by some standards, but it is a very short time when it comes
12 to ecological changes and the change in the destruction of the
13 environment. If they can get it underground in 27 years, then
14 maybe then they can live with something that is a tenth of a
15 percent less reliable for the next 27 years so that we can
16 preserve its natural beauty. Once they cut that swarth through
17 there it will never be able to be returned to its natural
18 state. There is no going back.
19 And I have seen -- I was in Canada not too long
20 ago and I have seen corridors of just one line after another
21 -- maybe five or six abreast across the highway, and then you
22 go for a hundred miles and you don't see any. If Canada
23 can do it, I don't see why Virginia can't.
24 COMMISSIONER SHANNON: Those were substantially
25 wider?

1 A Oh, yes. Well, it may be that they will
2 have to widen the existing corridor.
3 COMMISSIONER SHANNON: But they were wider --
4 A Oh, yes. They may be five hundred feet
5 wide or more. This is only one area that is being affected
6 though, rather than having a checker board pattern of criss-
7 crossing. If they need three routes from Mount Storm, then
8 later on I guess they are going to need four and then five,
9 so pretty soon you are not going to have any way to turn.
10 You will have transmission lines everywhere
11 you look. I just urge that the Commission place a heavy
12 burden here. As I say, as a consumer and a stockholder, I
13 still take the preservation of the countryside.
14 COMMISSIONER HARWOOD: Does the court reporter
15 have a copy of the statement you just made?
16 A No, sir. I have this here --
17 COMMISSIONER HARWOOD: Why don't you give that
18 to Mr. Rogers, and it will be received as Exhibit
19 W-6, and the exhibits attached thereto will be
20 appendices 1 through 5.
21 MR. ROGERS: I have been assured by counsel
22 that they will help me find the case that you just
23 mentioned.
24 A I have a citation of it here. The experts
25 were Mr. Alexander Kooska, and the Vice President of Vepco

1 who spent his entire career specializing in transmission lines.

2 COMMISSIONER SHANNON: Can you site the case?

3 A It is 188, Court of Claims, 120, and it

4 was decided in 1969.

3-A 5 I have one other thing. The property to the

6 north of me is 916 acres, which can also be seen -- it

7 occupies most of the area on Exhibit A. I haven't got it

8 marked off, but it is a large tract of land.

9 COMMISSIONER HARWOOD: That would be Appendix 1,

10 to Exhibit W-6.

11 A Yes. It is Appendix A.

12 MR. ROGERS: Obviously from what you have

13 said, your feelings are based more on the environmental impact

14 than the loss of money?

15 A Yes, sir.

16 MR. ROGERS: If this goes through your 167 acres,

17 what would you do with your land?

18 A I will sell it for what I can get for it.

19 Now, on the Appensix A, it is owned by a

20 corporation, International Capital Corporation. I have never

21 been able to get out of them what they have it for, but I am

22 impressed by the fact that they told me, but I asked them

23 whether it was an investment and they said no, and I said

24 a development, and they said no, and I said what, and they

25 said let's say for non-economic reasons. I never have found

1 out why, but at the present time it is cut up into bridal
2 paths and all through it is horseback riding, hiking, and the
3 Appalachian Trail runs through it. And I called the Company,
4 whose offices are right across the street from mine, yesterday
5 and asked them if they were appearing, and they said they
6 were afraid they weren't, but they did want me to bring a
7 statement in opposition to the line, and submit it, so I
8 will submit that. They say they are opposed to the construction
9 of the power line because they figure it will disfigure the
10 countryside, and drastically reduce the potential uses of our
11 property. It is signed Gerald L. Olmstead, Secretary,
12 International Capital Corporation.
13 COMMISSIONER HARWOOD: That will be Exhibit
14 No. W-7.
15 MR. BRASFIELD: I would like a moment to
16 look at the appendices to this exhibit.
17 COMMISSIONER SHANNON: Do you know whether
18 International Capital is a Virginia corporation?
19 A I assume it is, but I really don't know.
20 MR. DAVIS: I was very much interested in
21 Mr. Savage's comment as to the location of his land.
22 Tomorrow, we will develop the history of where his land is
23 located. I should appear in tomorrow's hearing.
24 WITNESS: This line passes through Fauquier,
25 and then it goes into Rappahannock, and then into Culpeper,

1 and then it comes back into Fauquier.

2 COMMISSIONER SHANNON: Did you take those

3 pictures, Mr. Savage?

4 A Yes, sir, I did.

5 COMMISSIONER SHANNON: Thank you very much.

6 MR. ROGERS: Mrs. Mary B. Jones?

7 COMMISSIONER SHANNON: Mrs. Fliver I believe

8 spoke for Mrs. Jones.

9 WITNESS STOOD ASIDE.

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

TESTIMONY OF C. M. STALLINGS

Q Please state your name and occupation.

A My name is C. M. Stallings. I am Executive Manager of Power Supply and Production Operation for Virginia Electric and Power Company and have served in that capacity since April 1, 1973.

Q What is your previous professional experience?

A After graduating from North Carolina State University with a bachelor of electrical engineering degree in July, 1949, I was employed by Virginia Electric and Power Company as an Engineering Assistant in Newport News.

I was transferred to Richmond in 1952, and served in the System Engineering Department, and in the system planning group in various capacities until 1957.

Since that time I have served as District Engineer in South Boston, District Superintendent in Williamston, N.C., Superintendent of Power Supply, Director of Power Supply Engineering, Manager of Power Supply and Executive Director of Power Supply and Planning.

I assumed my present responsibilities in April, 1973.

Q What were your responsibilities as Executive Director of Power Supply and Planning?

A I was responsible for supervision of the System Planning Department. This department develops plans

for additions to the transmission and distribution systems needed to serve the projected load growth and to deliver power from existing and new generating stations to the customers.

I was also responsible for the supply of bulk power to the Vepco system, the hour-by-hour and day-by-day operation of the generation and transmission systems.

Q What have been the responsibilities of you and the System Planning Department in connection with the electric facilities that are the subject of this proceeding?

A The System Planning Department forecasts the magnitude and location of the electric power requirements for future years and studies the power flows that will result with these future loads supplied by the then existing system.

As the load increases in successive years, and as generation is added to supply this increased load, the transmission system must be reinforced to carry the larger power flows. When a future deficiency in the transmission system is discovered, all practical alternate plans for relieving the deficiency are investigated. These plans may involve rearranging, uprating or replacing present facilities or adding new facilities.

We consult with other departments concerning the cost estimates and potential problems associated with each plan. Then after an economic analysis, and after

1 considering reliability, routing problems and construction
2 problems, the best plan is recommended to our management for
3 approval.
4 The Planning Department specifies only the
5 terminal points for new circuits. The exact routing of the
6 circuit is done by the System Engineering Department after
7 a detailed study.
8 Q Are all of the facilities involved in this
9 proceeding transmission facilities?
10 A Yes. No generation or distribution
11 facilities are involved, although since the function of
12 transmission facilities is to transport power from the
13 source of generation to the distribution system, transmission
14 facilities are necessarily related to generation and
15 distribution facilities.
16 Q Do you have a map showing the facilities
17 in Vepco's electric system?
18 A Yes, I have a standard system map of Virginia
19 Electric and Power Company that the Company uses for many
20 purposes.
21 Q What does this map show?
22 A This map shows the areas in Virginia, North
23 Carolina and West Virginia served by Vepco at retail or at
24 wholesale. The location of major generating facilities is
25 also shown, and superimposed on the map is a schematic

representation of Vepco's transmission system.

Distribution facilities are too numerous to be shown in detail on such a map, but they are located throughout the Company's service territory.

The transmission facilities involved in this proceeding have been shown in red, yellow and green, so that one may clearly see how they fit into the existing transmission system.

The North Anna to Ladysmith line, shown in red, has recently been approved, and therefore it is not involved in this proceeding.

Q Do you have a map showing the proposed facilities in greater detail?

A Yes. A larger scale map showing the facilities to be discussed has been prepared under the direction of Donald N. Rice, Vepco's Chief Electrical Engineer, who will testify later in this proceeding. I refer to the map in my testimony so I offer it at this point.

Q Please identify the separate projects that are involved in this proceeding.

A This proceeding involves 5 transmission projects, each of which is covered by a separate application filed by Vepco. These projects are:

Application No. 32, a 115kV transmission line from Remington Substation in Fauquier County to a new

1 substation, to be built at Warrenton. (Indicate on Exhibit
2 No. CMS-2).
3 Application No. 33, a 500 kV transmission line from
4 a new substation near Morrisville in Fauquier County (the
5 Morrisville Substation) to a point on Vepco's existing 500 kV line
6 near Bristersburg in Fauquier County (Bristers), and the
7 Morrisville Substation. (Indicate on Exhibit No. CMS-2).
8 Application No. 34, a 230 kV transmission line from
9 the Morrisville Substation to the existing 115 kV substation at
10 Remington, and an expansion of Remington Substation. (Indicate
11 on Exhibit No. CMS-2).
12 Application No. 35, a 500 kV transmission line from
13 Vepco's Power Station in Louisa County to the Morrisville
14 Station. (Indicate on Exhibit No. CMS-2).
15 Application No. 36, a 500 kV transmission line
16 to be constructed from Vepco's Mt. Storm Power Station in Grant
17 County, West Virginia to the proposed Morrisville Substation. A
18 portion of this line will be constructed and owned by Allegheny
19 Power System (Potomac Edison Company of Virginia) and they are a
20 party to this proceeding with respect to their portion of this
21 transmission line. (Indicate on Exhibit No. CMS-2).
22 Q Mr. Stallings, why are the proposed facilities necessary?
23 A Speaking generally, these facilities will
24 satisfy four separate public needs, but they have been
25 integrated to result in the minimum practical construction to

1 produce a reliable system.

2 These needs are (1) reinforcement of the
3 distribution system serving Fauquier County through a centrally
4 located transmission substation, (2) reinforcement for an
5 overloaded transmission line serving loads in the counties
6 of Fauquier, Culpeper, Greene, Madison, Rappahannock,
7 Spotsylvania, Orange and Louisa, (3) additional transmission
8 capacity between a nuclear generating station in Louisa County
9 and the growing demand in northern Virginia and the Washington,
10 D.C. metropolitan area and (4) additional transmission
11 capacity between generating plants in the West Virginia and
12 Pennsylvania coal fields and growing demand in northern
13 Virginia and the Washington, D.C. metropolitan area.

14 The growth in demand for electricity necessitates
15 all of these facilities. The need for reinforcement of the
16 distribution system serving Fauquier County results from a
17 growth in electric load in that area of about 10% per year.
18 The need to reinforce the transmission line serving loads in
19 the counties enumerated results from a similar growth in
20 load in those counties. The load growth in the northern
21 Virginia area as a whole has been even greater.

22 All of these trends are expected to continue
23 in the future, and reliable electric service cannot continue
24 to be furnished without new facilities to meet this load.
25 There has been some effort by communities to restrict populatio

growth; but even if they could attain a zero population growth, the average use per residential customer continues to grow at about 6% per year.

Q Mr. Stallings, please review the necessity for each of the transmission projects individually.

A The Remington to Warrenton 115 kV line, and the Warrenton Substation, are necessary to serve the increased load in the vicinity of Warrenton. As I indicated, this load has grown at a rate of about 10% per year, and in 1972 it was about 15,000kw.

This growing load is presently served by two 34.5 kV circuits, one from Gainesville Substation located 17 circuit miles from Warrenton and the other from Remington Substation, 11 miles south of Warrenton. (Indicate on Exhibit No. CMS-2).

Under present conditions of load, if one of these circuits were to be lost the other one could not carry the entire load during the months of heaviest demand. Under such circumstances, customers in the Warrenton area would be without power until the damaged circuit was repaired.

The load in the area has grown to such an extent that a 115 kV transmission line and a new step-down substation are now needed to serve the area. Remington is the closest source of 115 kV power, and the Warrenton Substation is located in the center of the load.

1 Mr. Rice, the Company's Chief Electrical
2 Engineer, will testify concerning the routing of the line
3 from Remington to the proposed Warrenton Substation. He also
4 will testify on the design of all of the proposed lines.
5 Q Were any alternatives considered for meeting
6 this need?
7 A Yes, several alternatives were considered
8 for reinforcing the Warrenton power supply. We considered
9 reinforcing the area with an additional 34.5 kV circuit
10 from Remington or from Gainesville. This was discarded
11 because it would be adequate only for a few years, and would
12 not be as reliable as a 115 kV circuit.
13 We also considered the possibility of
14 constructing a 115 kV circuit from Gainesville to Warrenton
15 (Indicate on Exhibit No. CMS-2). This has two disadvantages:
16 it would require a longer 115kV circuit, thereby affecting
17 more of the environment, and it would add load to facilities
18 that are presently supplying Prince William County, which is
19 one of the highest growth rate areas which we serve.
20 We also considered constructing a 115 kV line
21 from near Catlett to Warrenton. (Indicate on Exhibit No.
22 CMS-2). This alternative was considered at the time we
23 expected to have a 115 kV line constructed to Catlett in
24 order to serve a large pumping station of Colonial Pipeline
25 Company. Unfortunately, Fauquier County delayed approval of

1 the line to this customer to such an extent that the customer
2 found it necessary to move the pumping station to another
3 location, and therefore the 115 kV line to Catlett was not
4 built. With no 115 kV at Catlett, we abandoned the Catlett
5 to Warrenton alternative.
6 Q What is the necessity for the Morrisville to
7 Bristers transmission line and the Morrisville Substation?
8 A These facilities constitute an essential link
9 in the total project. The power transmitted from the coal
10 fields via the Mt. Storm-Morrisville transmission line and
11 from the new North Anna nuclear power station via the North
12 Anna-Morrisville transmission line will in turn be transmitted
13 from Morrisville to the northern Virginia load center through
14 switching facilities at the Morrisville Substation and the
15 Morrisville to Bristers transmission line.
16 At Bristers the transmission line connects
17 with existing transmission facilities into northern Virginia.
18 Thus, one purpose for this line and substation is to complete
19 the link between the new generating capacity and the demand for
20 electricity in northern Virginia. (Indicate on Exhibit
21 No. CMS-2).
22 The Morrisville Substation also will contain
23 transformers to step power down from 500 kV to 230 kV; this
24 power will then be transmitted to Remington via the
25 Morrisville to Remington 230 kV transmission line (Indicate on

on Exhibit No. CMS-2).

The substation is necessary for this purpose, and until the Mt. Storm to Morrisville and North Anna to Morrisville lines are completed, the Morrisville to Bristers transmission line is necessary to prove the power from the existing 500 kV loop to energize the Morrisville-Remington line.

The necessity for the Morrisville-Bristers line and the Morrisville Substation will become more apparent as I explain the necessity for the other proposed facilities that are connected to them.

Q What alternate plans were considered to meet this need?

A It was originally planned for the Morrisville Substation to be at Remington, where maximum use could be made of existing transmission rights of way into the load area. Such a location was dependent upon the construction of a new 500 kV line adjacent to the existing 115 kV line through the area. (Indicate on Exhibit CMS-2).

As other witnesses will testify, we learned of a sensitive government communications station that at that time made it impossible for this plan to be carried out. We have now learned that the communications facility is to be phased out, and Mr. Rice will testify further concerning this alternative.

Consideration was also given to placing the Morrisville Substation to the east, on the existing 500 kV line from the Richmond area to northern Virginia. (Indicate on Exhibit No. CMS-2). To do this would have required increased line construction and additional right of way, with no useful purpose being served by the additional expense.

Mr. Rice will testify more precisely concerning the routing and location of these proposed facilities.

Q Explain in more detail the need to reinforce the transmission line serving load in the counties of Fauquier, Culpeper, Greene, Madison, Rappahannock, Spotsylvania, Orange and Louisa.

A The power supply to these counties presently comes from the Charlottesville-Possum Point 115 kV transmission line and is delivered to the users either through Vepco's distribution system or through the system of the Allegheny Power System (Potomac Edison Company of Virginia). (Indicate on Exhibit No. CMS-2).

The total load on this line was 97 megawatts in 1972 and is estimated to be 125 megawatts in 1973 and 149 megawatts in 1974.

The load has grown so rapidly that the line has reached its limit; with the Charlottesville end of the line open in the summer of 1972 the voltage for substations near that end was only marginally acceptable.

In 1973, the voltage level under such circumstances would have been intolerably low, and it might have become necessary to drop load if the Charlottesville end of the line had been out for any reason at the time of the peak load.

By the summer of 1974 the line will be overloaded to the extent that operation of it will be completely unreliable, and there will be some danger of losing the line altogether, if either end should be opened.

We have had some experience with these conditions. In the summer of 1972 when repair of flood damage was in progress at the Bremo transmission substation, this line was opened at the Charlottesville end to avoid the possibility of overloading the line which supplies Charlottesville from the west. We received so many complaints from customers supplied by the line that it was necessary to reclose the circuit and risk the potential overload of the line from the west.

Q How does the Company propose to reinforce the Charlottesville to Possum Point transmission line?

A We propose to reinforce this line by constructing a 230 kV line from the proposed Morrisville Substation to Remington Substation, and by adding a 230-115 kV transformer at the Remington Substation. (Indicate on Exhibit No. CMS-2). This will enable the 115 kV transmission

line to be reinforced at Remington.

Mr. Rice will testify concerning the design and routing of the transmission line.

Q What alternate plans were considered for reinforcing the Charlottesville-Possum Point transmission line?

A We considered rebuilding the existing 115 kV line for 230 kV operation. The line, however, is 93 miles long and would have to be rebuilt for its entire length to eliminate the problem we now have. This is not economically practical.

Moreover, as other witnesses will testify in more detail, we learned that we would be prohibited from rebuilding the line for 230 kV operation in two areas where the United States government had sensitive radio receiving facilities.

As Mr. Rice will testify in more detail, one of these facilities is to be phased out, but the continued operation of the other facility will still not allow the line to be rebuilt for 230 kV. Thus, the relatively short length of line from Morrisville Substation to Remington Substation appeared to be the most satisfactory solution.

Q What is the necessity for the proposed North Anna to Morrisville transmission line?

A Basically this line is necessary to transmit power to be generated at the new nuclear power station at

1 North Anna to the northern Virginia load area.

2 Q What is the magnitude of the load growth in

3 Vepco's northern Virginia service area?

4 A It is well recognized that the metropolitan

5 areaof Washington, D.C. is one of the most rapidly

6 developing areas in the country. Vepco serves the major

7 portion of this metropolitan area south of the Potomac River.

8 This area is regarded by the company as its northern

9 Virginia load area and consists of the cities of Alexandria and

10 Falls Church, plus Arlington, Fairfax, Prince William, Loudon,

11 and Fauquier Counties. The northern Virginia load area is

12 shown on Exhibit CMS-1 as the area north of Fredericksburg

13 in the Northern Division. We have prepared a chart of the load

14 growth in this area.

15 Q What does this exhibit show?

16 A It shows that electric load in northern

17 Virginia has grown at a rate of over 15% per year for the past

18 20 years. The 1970 peak load in this area was 1250 megawatts

19 and we expect this load to reach about 2500 megawatts by

20 1975 and 4500 by 1980.

21 The 1980 load in northern Virgia will be

22 almost as large as the 1970 load of 4852 megawatts which we

23 experienced for the entire Vepco system.

24 Allegheny Power System serves the area

25 northwest of Washington and similar load development is

occurring in their area.

Q What will be the effect of this load growth?

A One effect will be the necessity of having additional transmission facilities to serve the growth. These facilities must bring power from new generating sources in the south (North Anna) and in the west (Mt. Storm and APS generating stations). (Indicate on Exhibit No. CMS-2).

Q Please discuss the need for facilities to bring power from North Anna in the south.

A The North Anna Power Station will have a capability of 3740 megawatts when completed in 1978. There are four generating units to be in service, one each in 1975, 1976, 1977 and 1978.

The Commission held extensive licensing proceedings in connection with this project and has approved it for the ultimate proposed capacity.

Most of the output of this plant will flow into the northern Virginia load area. Two 500 kV lines will be required to deliver the output of the first two generating units to northern Virginia, and a third line will be needed to that area with the last two generating units. One of the first two lines will be provided by connecting into the existing north-south 500 kV line at Ladysmith. This line has been approved and is now under construction. The second line is the North Anna-Morrisville line.

In the summer of 1976, with two generating units operating at North Anna, there will be about 1250 megawatts of power flowing from North Anna to northern Virginia loads. Unless the North Anna-Morrisville transmission line is in service at that time, an outage on the other 500 kV transmission line (from Ladysmith to northern Virginia) will cause the underlying 115 and 230 kV transmission system to be overloaded.

Q Are there any other factors which were considered in determining how to get the power from North Anna to northern Virginia?

A Yes. The North Anna Power Station is in the center of a large triangular shaped area that is now supplied by low voltage lines only. This is bounded by the Charlottesville-Possum Point 115 kV line on the west (Indicate on Exhibit No. CMS-2), the Elmont-Fredericksburg-Possum Point 230 kV line on the east (Indicate), and a 115 kV line from the Richmond area to Charlottesville on the south (Indicate).

We are approaching the time when the distribution circuits supplying the load in this area must be reinforced by building transmission lines through the area with step-down substations connected to this transmission. By routing the North Anna-Morrisville transmission line through this area, we will establish a corridor that can be utilized at a later date by 230 kV facilities serving the

load distribution network.

As Mr. Rice will testify, Vepco is acquiring sufficient right of way along this route to meet both of these needs.

Q Were alternative methods of transporting the power from North Anna to northern Virginia considered?

A Yes. We considered the possibility of extending the line from North Anna to northern Virginia north along the North Anna-Morrisville right of way for some distance and then east to the present Elmont-Loudoun line, from which point we would have proceeded north parallel to the present line to Bristers.

That plan was rejected for several reasons. It would have required the relocation of Morrisville Substation to Bristers, and, since we must support Remington Substation with a 230 kV circuit, it would have required a 230 kV line from Bristers to the Morrisville Substation location, not now proposed under our plan.

It is not good utility engineering practice to locate two transmission circuits serving the same function adjacent to one another, since they would then be vulnerable to catastrophes such as airplane crashes, forest fires, tornadoes, ice storms and sabotage.

Also, the cost of routing the line on such a new route would be several million dollars more than on

1 the proposed North Anna-Morrisville route because of its
2 greater length, and many more acres of right of way would be
3 required for the facility.
4 Finally, even if we did relocate the North Anna-
5 northern Virginia line parallel to the present 500 kV line, we
6 would still require a 230 kV line in the vicinity of the North
7 Anna-Morrisville route in the future to serve loads in that area.
8 Mr. Rice will cover the cost of this
9 alternative and the additional right of way requirements in
10 his testimony.
11 Q Mr. Stallings, the last facility to be
12 considered is the Mt. Storm to Morrisville transmission line.
13 Why is that line necessary?
14 A The Mt. Storm to Morrisville 500 kV line,
15 which is a joint project of Allegheny Power System and Vepco,
16 is necessary to deliver the power generated in the coal
17 fields to the rapidly growing loads of both Allegheny and
18 Vepco in the Washington metropolitan area.
19 Exhibit No. CMS-3 shows the magnitude of
20 this growth within the portion of that area served by Vepco.
21 Presently the power generated in the coal
22 fields is brought into this area via the Hatfield Ferry-Doubs
23 line of the Allegheny Power System and the Mt. Storm-Doubs-
24 Loudoun line owned jointly by Allegheny and Vepco.
25 Of course, additional power from Vepco

1 generating plants is brought into the area by existing
2 facilities to the south, and the proposed North Anna-Morrisville
3 and Morrisville-Bristers lines will increase this capability.
4 Nevertheless, the continued load growth
5 and the addition of generating capacity in the coal fields,
6 such as Vepco's 1973 addition at Mt. Storm, requires that
7 additional line capacity be provided.
8 Q What will happen if the additional transmission
9 capacity is not constructed?
10 A The proposed transmission line will meet
11 several needs, and if not built, those needs will go unmet.
12 The most immediate need is to provide a
13 transmission system which will have a reasonable capability
14 to import power from neighboring systems to the north and
15 west.
16 Because of breakdowns in generating equipment
17 and delays in construction of generating units which inevitably
18 occur, the Vepco transmission system should have the strength
19 to import at least 2000 megawatts from the north and west in
20 1974.
21 The Mt. Storm-Morrisville line will provide
22 this capability, but without it the import capability will be
23 about 400 megawatts, which would be totally inadequate.
24 Unless the Mt. Storm-Morrisville line is placed in service,
25 the loss of the transmission line between Doubs and Loudoun

1 during the peak load period in 1974 will overload the 230 kV
2 system and result in low voltage for several thousand
3 customers and, as a result, ultimately the dropping of load.
4 Somewhat further into the future, the failure
5 to have such a facility in service would expand the hazard
6 to such an extent that if the Hatfield Ferry-Doubs transmission
7 line of APS were lost in the peak load period, the remaining
8 Mt. Storm-Doubs line would be forced to carry more than its
9 capability, resulting in the loss of this line also, which
10 would cause low voltage and load dropping over a widespread
11 area.
12 Of lesser importance, but nevertheless worthy
13 of consideration, is the fact that construction of the
14 Mt. Storm-Morrisville transmission line will permit
15 reinforcing the supply to new loads that are developing in
16 the northern Shenandoah Valley with a minimum of new
17 transmission line construction.
18 Finally, this line along with the North Anna-
19 Morrisville line and the Morrisville Substation will provide
20 an economical means for reinforcing the Charlottesville-Possum
21 Point 115 kV line and thereby eliminate the need for a
22 transmission line to be built by APS through Rappahannock
23 County to serve the Madison and Greene County area.
24 Q What alternate methods of meeting these needs
25 were considered?

1 A Numerous alternatives were considered for
2 meeting these critical needs. We first considered increasing
3 the capability of the existing facilities.
4 The maximum capacity of the Mt. Storm-Doubs
5 500 kV line was about 1700 megawatts in 1972. That line's
6 capacity was increased to about 2100 megawatts in 1973, but
7 this relatively modest increase in capacity is insufficient
8 to eliminate or substantially mitigate the problems to which
9 I have referred.
10 At one time we considered another plan to
11 construct a new 500 kV line to northern Virginia from a
12 switching station to be added in the Mt. Storm-Dooms 500 kV line
13 near Harrisonburg. (Indicate on Exhibit No. CMS-2). This
14 plan was discarded because the line did not sufficiently
15 relieve the loading on the Mt. Storm-Doubs line. (Indicate)
16 We also considered paralleling the existing
17 500 kV system in two ways: first, we investigated the
18 construction of a second 500 kV line adjacent to the present
19 Mt. Storm-Doubs-Loudoun 500 kV line.
20 This was unsatisfactory from a planning point
21 of view because it sacrificed reliability by placing two of
22 the principal supply lines to northern Virginia on a common
23 right of way, thereby exposing them to simultaneous outage.
24 With lines of this size and importance to the system, such
25 doubling up on one right of way is contrary to sound utility

1 practice.

2 If we were to build a 500 kV line from

3 Mt. Storm to Loudoun along the route of the present Mt. Storm

4 to Loudoun circuit, and we were to lose all the lines on that

5 right of way, voltages in the northern Virginia load area

6 would be so intolerably low that service to our customers

7 would be unsatisfactory.

8 An additional source of major transmission

9 into northern Virginia would be necessary to eliminate this

10 problem and enable Vepco, under such circumstances, to

11 furnish the reliability and quality of service that it is

12 required to furnish. Thus, additional transmission would be

13 required and nothing is gained by the paralleling of the

14 Mt. Storm-Loudoun line.

15 Paralleling the Mt. Storm-Loudoun line also

16 would require more line construction to reinforce the northern

17 end of the Shenandoah Valley. In addition, such a line

18 would encounter severe right of way problems, about which

19 Mr. Rice will testify.

20 The second paralleling of existing 500 kV

21 facilities that we considered was a proposal that the

22 entire 500 kV loop from Mt. Storm be paralled. This would

23 eliminate the danger to reliability that would result from

24 paralleling only a portion of the loop, but the cost of this

25 alternate rendered it totally impractical.

[TR. P. 47]

As Mr. Rice will testify, our studies indicate that the cost of such construction would be $52,980,000 more than the cost of the proposed Mt. Storm-Morrisville line, and much more land would have to be acquired than under the proposed plan.

The proposed Mt. Storm-Morrisville transmission line is, we believe, clearly preferable to all of the alternatives that have been considered or suggested.

[TR. PP. 66-67]

It was suggested that we consider an alternative, which from the outset we did not like or approve, but considered, from Mt. Storm parallel to the present Mt. Storm-Doubs line and thence to Loudoun, which is our terminus of the Mt. Storm-Doubs-Loudoun line. There were several objections to following that parallel route.

The first and foremost in my mind is the danger to reliability of service. If we should have these two lines paralleled in 1974, which seems almost impossible, and we should lose the right away across the Potomac River, which is right in the flight path of National Airport, as you know if you have flown to Pittsburgh, then the lights in northern Virginia are going out for many people as early as 1974.

To avoid that problem, we said, okay, if we are to consider this northern route, then we must, from our responsibility to provide reliable service, consider paralleling the entire loop around here so that if this section goes out, this section will be capable of replacing it.

That alternative of paralleling the entire loop was also discarded, because as you saw in the figure I just changed for you, the additional cost over doing this job from Remington -- I mean, from Mt. Storm to Morrisville is some 53 million dollars, and we just don't believe that we should spend 53 million dollars of our customers' money in that manner.

[TR. PP. 75-77]

COMMISSIONER SHANNON: Well, the idea, I suppose, what you are striving for is close to 100 per cent reliability as you can possibly have in designing your system.

THE WITNESS: No, sir. I don't think that the consumers of Virginia could afford 100 per cent reliability. 100 per cent reliability would mean that this light would never go out.

COMMISSIONER SHANNON: I realize that's an ideal. You probably never achieve it. But what is the percentage of reliability that you all strive for?

THE WITNESS: We have no figure for percentage of total reliability to a given customer. We operate under the criteria which has been adopted through -- by most utilities -- I guess all utilities. I know all utilities have some criteria, and our criteria says that we should not have a single contingency resulting from a cascading outage, so that if we had a single outage and that single outage may be a multiple facility, we should not have cascading.

That means we should not have the next line trip and the next one and the next one so the whole cotton-picking thing blacks out. We want to avoid that sort of thing, but that may be a different requirement in each case you study. That's the reason we have a Planning Department and a computer. They study what given situations are at given time periods to determine what is necessary to avoid cascading outage, and what is -- what results in the cascading outage today may not result in cascading outage tomorrow, because other facilities are added.

This electric utility system is not a simple thing. It's not a static thing. It's dynamic. It's growing. It becomes more complex each day, and it must be continually studied, and what you may find

concerning the system today may not be true tomorrow; and since we know that, we always look at tomorrow. We can't assume it's going to be the same as today was

The schedule for the Mt. Storm to Morrisville circuit is what -- the need for Mt. Storm-Morrisville circuit is the summer of 1973, which is back there. Its need is anytime between now and the time we get it constructed that we can possibly put it in service. The sooner, the better.

It is needed in the 1974 summer, and we don't know that we can build it that soon. We'd like to try, and if we don't have it, and if we have some of the contingencies that could occur, then there are going to be some lights out in northern Virginia.

If we do attempt to build it and don't make it, and those same contingencies occur, that same situation will occur.

Later on, in the 1980's, without that circuit, there's a possibility we will cascade that to the eastern seaboard.

BY MR. BRASFIELD:

Q Mr. Stallings, is it your testimony that avoiding a cascading outage is VEPCO's sole criterion?

A No, sir.

Q You are not satisfied -- are you satisfied with reliability?

A That's not the sole criteria for reliability. That was just in answer to his question.

[TR. PP. 31-32]

BY MR. MASSIE:

Q The only other question I want to ask you, the Commissioners just went into it with you a little bit, and I want to, short of arguing, get some of the additional facts that relate to the words you said, "it's not good practice -- good utility practice to build in the same corridor."

I'd like to begin, briefly, by saying it's true that many utility lines, many utility companies do build many utility lines in the same corridor, and as a matter of fact it's done a good deal out west; is it not?

A It's done a good deal right here in Virginia.

Q Well, could you explain your reasons, in addition to the ones you have given, as to why this is not good practice?

A I hope the record will show what I said is that lines of the same voltage serving the same purpose shouldn't be on the same right of way.

Q Is it true that this is not done?

A This is avoided wherever possible.

We do parallel transmission lines on the same right of way, undoubtedly.

For instance, I have already said that --

Q Yes, I understand that.

A -- across the river here we have a 500 kV line, and directly parallel to it there's a 230 kV line.

[TR. PP. 132-133]

Q Well, what I have a problem with is the words, "it's not good practice"?

Q All right, let me try to explain that. I hope I can do it successfully.

If I have two lines which are both necessary to do a job, and I put them on separate routes --

Q Yes.

A -- either one of the lines can do the job. If I lose one of them, the job continues to be done.

If I take those same two lines, either one of which is capable of doing the job, and put them both on the same right of way, and I lose them both, and that's all I had to do the job, well then the job can't be done.

If you follow me, that's the reason for saying lines of the same voltage serving the same purpose shouldn't

be on the same right of way, because if they are both lost you can't get a job done. If you separate them, you could.

[TR. PP. 134-137]

A Oh, yes. There are cases where lines can be on the same right of way and not voltage reliability problems. Each is studied individually, and where it's not a problem to put them on the same right of way, they can be put there.

Q And where is this particular area, for instance, significantly dangerous or high risk area for running in the same right of way for two 500 kV's?

A Let me give you an example. Let's suppose these were adjacent.

Q Right. Okay.

A And that's what you're talking about?

Q That's right.

CONTINUED

1 A If these two lines were built on adjacent
2 right of ways, and as I have said before, if we lost this
3 right of way in 1974, we will have to drop load in this area
4 to avoid low voltage to all customers. We'd have to drop load
5 of about 35 per cent of the customers in that area to get the
6 voltage back to the level where we could supply it to the
7 remaining customers and not damage their equipment.
8 Q Well, the if is what I am talking about.
9 A Sir?
10 Q The if they are both lost. I want to know
11 what is the risk of that?
12 You said that in some areas this can be done.
13 Why can it be done in some areas and not in this area?
14 A Let me refer to the reliability criteria that
15 is used in the Southeast Electric Reliability Council, which
16 VEPCO is involved with, and it tells you what we should --
17 the criteria we should follow in designing lines.
18 Each of a certain number of systems will be
19 designed to avoid cascading upon the occurrence of the
20 following contingencies. And it lists those things that are
21 to be studied and guarded against, and one of those is sudden
22 loss of all lines on a common right of way.
23 So we took a look at losing all the lines on
24 any right of way in our studies.
25 If you follow this close, once you build this

1 line, it's there for its life, and its life is what,
2 thirty-five, forty years? Once that line is put there, then
3 you must look at what the situation is farther out into the
4 future, and if this same occurrence comes about in 1980, then
5 we have a real problem. If this line and this line on this
6 right of way get lost together in 1980, this line becomes
7 overloaded, and it will open.
8 MR. BRASFIELD: Which line is that?
9 THE WITNESS: Oh, excuse me. The line from
10 Hatfield Ferry in the APS system to Doubs in the
11 APS system. These two lines, the Mt. Storm to Doubs
12 and the Hatfield Ferry to Doubs are all on the same
13 line, are all simultaneous. Therefore, Hatfield
14 Ferry-Doubs would be lost, and when that line is
15 lost, our computer won't converge. It won't tell us
16 what happens next.
17 You get a pretty good idea that it separates
18 the eastern seaboard, and that is just something that
19 we cannot build into our system;knowing ahead of time
20 that we have a possibility of cascading outages
21 throughout the eastern seaboard is something that we
22 just could not plan for.
23 Q And that is something particular to this line?
24 A Yes. These two lines together on this
25 right of way lost at the same time would in turn lose this line,

and when this line goes, the system is split up.

[TR. PP 137-139]

THE WITNESS: Yes, sir, but when this occurrence happens, these two lines on this right of way, and they are lost in 1980, our studies show that the load on this line, this line will try to take the power that these two will carry; and when it tries to carry that power east it will burn down, and when it does, then the power that it was carrying and that these two were carrying has got to go somewhere else, and the somewhere else path continues to get smaller, but the load it tries to carry doesn't diminish.

COMMISSIONER SHANNON: But all the load that's

CONTINUED

1 being carried on the Doubs to Loudoun and the Mt. Storm
2 line, Mt. Storm to Remington line, assuming it's
3 built, that wouldn't be transferred over to the Allegheny
4 Power System line?
5 THE WITNESS: Yes, sir, and to this line.
6 COMMISSIONER SHANNON: That's right. That's
7 what you say you have got the line coming down from
8 the south to take up some of it.
9 THE WITNESS: Right, you would.
10 COMMISSIONER SHANNON: Aren't there some other
11 systems in there that would pick up part of it?
12 THE WITNESS: Yes, sir. This line goes on
13 up into the PJM system, and there are some lines
14 that go around and that come back in through here.
15 COMMISSIONER SHANNON: Come back in through
16 the back door?
17 THE WITNESS: Certainly, they would take
18 part of the power, but there would be enough left on
19 this line that it would burn down.
20 Now, when it does, then the power it was
21 carrying wants to go this way, too, and around this
22 way and back around down through. All of it is an
23 integrated system. Certainly, you are right. Power
24 is going to flow wherever it's going to flow, because
25 this power doesn't have any name tag on it. It's

power going from a generating source to a load, and it's trying to get there over any path that's available.

[TR. PP. 140-141]

Q Well, I don't want to argue -- I want to avoid at all costs arguing. The only question that I really am not clear on is: given the fact that it's acceptable in some situations and legislated to look at in Virginia and the Federal Power Commission has said -- are you aware the Federal Power Commission has said that it should be considered whether lines can be put in the same corridor?

A Yes, that's right.

Q Well, given all of those criteria and the fact that it has been done successfully, why in this case it absolutely cannot be done -- and I understand your point that this other line might be -- might burn out and cause a nationwide or East Coast cascading?

A Well, that's the only reason I have for it.

Q That's the only reason?

A The only electrical reason.

[TR. PP. 144-147]

BY MR. KAY:

Q Mr. Stallings, before we get started here, would you produce for me the studies that you just referred to that show the situation in 1980?

A Yes, sir.

Q Would you produce them now, please?

A Yes. These, of course, are studies that you already have, and I can refer to them. You can have copies

CONTINUED

of this.

Q Well, if you would show me what you are talking about. You say I have them. Where did I get them? From you all?

A Well, they were made available wherever the things were made available that the intervenors asked for.

Q Well, there was a truck load of stuff made available, but nobody would identify what it was.

A I will give you the case numbers, and then you can have copies of these.

The first case is 80S-100 B-3. The second is 80S-115 B-3. The third is 80S-300 B-1. The fourth is 80S P104. And the last is 80S P104A.

Q When were these made, sir, these studies made?

A Let's see. I will take them in the order I gave them to you. 100 B-3 is a sheet from the 1980 summer study of ECAR,MAAC VACAR, and I don't have the date of that study right here, but I believe it was 1970.

Now, 1970 --

Q May I see that? Maybe if you'd show me that, maybe I could identify it.

MR. BRASFIELD: While he's doing that, would you spell it out for the court reporter?

THE WITNESS: Yes. ECAR is East Central Area

of Reliability Council. I can't name all the companies in it, but it involves American Electric and Power Company, the Allegheny Power System, Cleveland Electric.

MR. BRASFIELD: Excuse me. I just meant for you to give her the letters so she can get the letters straight.

THE WITNESS: ECAR is East Central Area of Reliability. MAAC is --

MR. BRASFIELD: E-C-A-R?

THE WITNESS: East Central Area of Reliability.

MR. BRASFIELD: Okay.

THE WITNESS: MAAC is Mid Atlantic Area Committee on Reliability. And VACAR is Virginia Carolina Area of Reliability Council.

COMMISSIONER SHANNON: And you used the term here, for the record, PJM systems.

THE WITNESS: Oh, PJM is the Pennsylvania, New Jersey, Maryland interconnection, and it's synonymous with MAAC. PJM is the operating group; MAAC is the reliability group; and they report to one another and are so intertwined that I don't understand it.

BY MR. KAY:

Q Is this an extra copy?

A No, it isn't. You may have a copy of it, in addition to the copy you already have.

COMMISSIONER SHANNON: The Bailiff can make you a copy.

THE BAILIFF: How many do you need, sir?

MR. KAY: Just one.

MR. ROGERS: We will need about six.

BY MR. KAY:

Q You say, "in addition to the copy you already have?"

A Well, I mean that you may have from what you saw.

Q Mr. Stallings, if I had copies of every piece of paper you all made available to me in response to my request, I'd still be copying them.

A That's right.

[TR. P. 151]

Q Now, sir, when did the planning within your company for the routes here under consideration commence?

A It was tentatively discussed in early '69, and I think, as I already said, it was picked finally sometime during the summer of 1969.

[TR. PP. 159-160]

COMMISSIONER SHANNON: Excuse me, Mr. Kay.

Let me ask you what is the generating capacity of Mt. Storm as of today?

THE WITNESS: You picked a bad day, Judge Shannon, but the installed capacity -- the first two units are 565, I believe.

COMMISSIONER SHANNON: Megawatts?

THE WITNESS: Yes, sir. And the third unit is 560. So that's 1130 and 560 must be 1690.

COMMISSIONER SHANNON: 1690 megawatts?

THE WITNESS: Yes, sir.

[TR. PP. 161-166]

Q Now, when was the decision actually first made that the Morrisville area would be the terminal point for the Mt. Storm line?

A After we determined that we could not go

CONTINUED

1 through the FBI radio installation.

2 Q Well, I am talking about the area in general.

3 Remington, when was that selected?

4 A Well, of course, when we first found that there

5 was a problem getting power to northern Virginia, and that was

6 sometime prior to 1969, it was obvious that we had to get

7 a circuit to northern Virginia.

8 Q Well, I mean, when did you first decide that

9 the Remington area was to be the terminal point for this

10 Mt. Storm, new Mt. Storm line?

11 A In the area of 1969.

12 Q Now, what again -- you have touched on this

13 earlier, but what -- before making your decision in 1969 as

14 to the Remington area, what alternative terminal points did

15 you consider?

16 A Alternative terminal points?

17 I'm not sure that there was an alternative

18 terminal point considered until we received suggestions that

19 we double up on this side and double up on this side. I mean,

20 this was -- the initial terminal point was Remington.

21 Q So that was the only point you were thinking

22 about then; wasn't it?

23 A That was the initial terminal.

24 Q And it wasn't until after people made

25 suggestions that you considered paralleling the existing line

1 that you considered those as alternatives?

2 A Right, because we did not consider that to be

3 a viable solution to the problem.

4 Q All right, sir.

5 A Either electrically or economically.

6 Q Well, you say you didn't consider it to be a

7 viable alternative. I thought you said you didn't even

8 consider it until somebody else suggested that you consider it.

9 A We didn't look it, because on the surface we

10 could tell it wasn't viable.

11 Q You just rejected it out of hand?

12 A Yes.

13 Q Based on no studies?

14 A Based on experience and judgment.

15 Q What experience do you refer to?

16 A Based on the knowledge that you couldn't

17 lose both lines and survive in this area.

18 Q How did you know you couldn't lose both of

19 those lines and survive?

20 A From just good engineering judgment.

21 Q You weren't even in the department at that

22 time, so Mr. Rawls made it just based on experience over the

23 years. No computer studies at that time?

24 A I am not sure that there was computer studies,

25 but a computer study would have shown that.

1 Q Well, I am not asking you that. I am asking
2 you at the time that the decision was made for the Remington
3 area to be the terminal point, that was the only point you
4 all considered?
5 A Yes.
6 Q All right, sir. Now, when was your consultant,
7 Mr. Barthold, employed for this project?
8 A I'd have to look that up. I don't know.
9 Q Approximately?
10 A After 1969.
11 Q How far after 1969?
12 A I don't know.
13 Q Would it take you long to find that out?
14 A I'd have to go back to the office. I can let
15 you know tomorrow.
16 Q You have to go back to the office to find
17 that out?
18 A Yes, because obviously you want an exact date,
19 and I am not going to give you an exact date.
20 Q No, I said approximately. I said approximately,
21 Mr. Stallings.
22 A And I said after we got into the project.
23 Q Well, let me ask it to you this way: was it
24 after the planning had been done?
25 A After the planning had been begun. I am not

1 sure the planning has been done yet all the way.

2 Q Sir?

3 A I say after the planning was begun, yes, sir.

4 Q Well, was it --

5 A We normally don't do our own planning. We

6 don't normally hire consultants to do our planning.

7 Q And so he was not in on the planning?

8 A Not entirely.

9 Q You had selected the Mt. Storm-Morrisville terminal

10 point and the North Anna-Morrisville terminal point of that

11 area before Mr. Barthold was employed?

12 A Yes.

13 Q He had no part in that decision?

14 A No. Consultants don't make our decisions.

15 They make recommendations to us.

16 COMMISSIONER SHANNON: It's 3:00. The

17 Commission will recess for ten minutes.

18 (Recess)

19 BY MR. KAY:

20 Q I think we had stopped with establishing that

21 Mr. Barthold was not in on the selection of the Morrisville

22 area as a terminal point for the line?

23 A Yes.

24 Q Is that also true of Mr. Howlett, your

25 environmental expert; he was not in on that either; was he?

A I think that's true.

Q When was the final decision made by VEPCO, Potomac Edison for Morrisville as the terminal point?

A Well, it was in the area of 1969. It was, as I say, after we found we couldn't go through the FBI installation, and I think that that was probably during the early summer of 1969.

Q Now, sir, your application in No. 36, which I think is the Mt. Storm to Morrisville application, states that the route selected had been reviewed by an independent consultant.

This was after the route had been selected; was it not?

A I think it was.

Q And this consultant had no voice in the initial selection of that terminal point?

A I think not.

Q Nor in the alternatives that were to be considered?

A He did review the alternatives, yes.

Q These were alternatives within the limits of those terminal points?

A Yes.

[TR. PP. 170-171]

Q But those studies all show on them, do they not, Mt. Storm to Morrisville line?

A I'd have to confirm that. I think they do, Mt. Storm to Morrisville on that one. Yes.

Q So they showed the line from Mt. Storm to Morrisville. The decision had been made by that time?

A That's right, but --

Q All right, now, sir, do you have any studies that show an effort to see how you might accomplish the same purpose by upgrading the Mt. Storm to Doubs to Loudoun line? Do you have any base case studies from those?

A From these studies, we can determine the result if we put these lines together.

Q But the decision had been made at that time

CONTINUED

1 to take the line to Morrisville, so you start out with that
2 premise?
3 A Yes, sir, and I don't mean -- I am not trying
4 to be argumentative. What I am trying to say is that that
5 doesn't change the electrical result. It doesn't change the
6 fact, because from these very studies here, we did not, for
7 the purpose you state, make that investigation. From those
8 studies there, we can prove to ourselves and to you, I think,
9 that that would not work electrically.
10 Q Well, I won't concur that you can prove it to
11 me.
12 A Well, I know, sir. I will take that back, too.
13 COMMISSIONER SHANNON: Let me interrupt you.
14 You said, "would not work electrically"?
15 THE WITNESS: Yes, sir.
16 COMMISSIONER SHANNON: Would you elucidate on
17 that a little bit?
18 THE WITNESS: Yes, sir. Because of the things
19 that I discussed a little while ago, in 1980 --
20 COMMISSIONER SHANNON: You are talking about
21 reliability now.
22 THE WITNESS: Yes.
23 COMMISSIONER SHANNON: I get you. Okay.
24 THE WITNESS: That's what I mean by wouldn't
25 work electrically.

[TR. PP. 182-183]

Q All right, sir, I am getting to that.

Now, as I understand it, you didn't determine that it was not possible to do until after you had determined that you wanted the line to go to Remington?

A As I told you earlier, we studied the thing after it was suggested, even though we didn't think it was a viable alternative from our judgment and experience.

Q But you didn't start out -- this is an honest statement; you didn't start out and try to figure out a way to get the line from Mt. Storm to Doubs to Loudoun in an electrically feasible manner; did you?

A That's right.

Q You did not?

A Did not, because it was not a viable alternative.

Q But you didn't know that at the time, Mr. Stallings, until after you studied it, and you didn't study it until after you had made your decision; isn't that right?

A That's your statement. I think we did.

Q And it's your statement?

A No, sir. I think we knew it. We didn't know it --

Q I hate to keep beating a dead horse.

A We didn't know it because we had made a specific study on that particular point, but there are lots of things that we don't study that we know won't work before we study them.

Q And then you set out to justify your original decision after somebody suggested that you might do that?

A And I think we have been eminently successful.

[TR. PP. 224-225]

Q Now, does VEPCO have any compiled data indicating the number of outages, the duration of outages and the causes for those outages for its 500 kV lines that are now in service?

A We have system operators interruption reports, which I believe were furnished in answer to your interrogatories.

Q Yes, sir, but my question was: do you have any compiled data?

A They are compiled on those reports, yes.

Q Well, do you have those with you?

A There's a report for each day, and these circuits have been in service since 1966, so there are seven

years of daily reports.

Q Do you have some of those with you?

A No.

MR. BRASFIELD: I have brought the documents that we furnished to you that you requested. Mr. Stallings doesn't have them here in the courtroom.

MR. KAY: Well, I'd like to -- just so the Commission might see what we are talking about, if I could see some of those interruption reports.

BY MR. KAY:

Q While we are waiting for that, Mr. Stallings, I take it, then, the only information you have on the outages, duration and causes is in these interruption reports?

A The only information I have is, yes.

Q And so you have never compiled it on a common basis to say that there are so many per hundred miles per year for any particular cause? You don't know that?

A I have never compiled that.

Q And VEPCO hasn't to your knowledge?

A Not that I know of. It may have been compiled.

[TR. PP. 226-227]

Q But there is no place that you have taken the data for the years that the 500 kV line has been in service or in fact the 230 kV's and gone through these interruption reports and gathered together the number of incidents of lightning outages, for example?

A There's no instance for which I have done that. It's entirely possible that for some other purpose somebody in planning has done that, but I don't know about it.

Q It wasn't used by you or by Mr. Rawls, to your knowledge, in the planning of the lines we are talking about here?

A No. Well, of course, in the planning of the lines, the information wasn't available because the lines didn't exist. They couldn't have gone out if they didn't exist.

Q Well, you did have planning for -- I assume, for your proposed Mt. Storm to Morrisville line?

A Yes, but what I am saying, there would be no interruption record on a line that wasn't in service.

Q I know, sir, but I am asking you the experience of interruptions on your 500 kV line that was in service that you might have utilized in your thinking in planning the other lines.

A No. I see what you are saying. No, I don't know of any.

Q And you have one of those big books for each year?

A Yes.

[TR. PP. 234-235]

Q So the answer would be the same with multiple structures on a common right of way; you don't have any experiences as to when only one would go out as compared to both of them out?

A I don't have any experiences of it, you say?

Q You don't have any record of your experience.

A Yes. I've got the system operator interruption reports; and from that, it would be possible, I think, to determine what your outage is.

Q Well, let's get it straight. You don't have any compiled records. You haven't compiled --

A We haven't looked at the thing you are asking for specifically and made a compilation of those answers.

Q And you don't have any one single record that you could go to and look at it and say in 1966 on right of way such and such there were five occasions in which the service was interrupted because of lightning for a duration of so many minutes?

A I don't have; but, as I say, it's entirely possible that somebody in some of your isolated studies may have looked at that. I don't have such a study.

Q And you haven't used this raw data then in making your decisions concerning the route applied for here?

A No, sir.

Q Now, in considering the alternatives to Mt. Storm to Morrisville lines and the North Anna to Morrisville lines, the alternative which would involve paralleling of existing lines, has VEPCO made any study to project the frequency of outages of those lines as paralleled?

A You mean the one that does it and the one that isn't built yet?

Q Assuming that one would be paralleled with the other, have you made any projections as to the frequency of outages?

A No, and I don't know of any way we could project frequency of outages. It only takes one to tear the system up, and that one we want to avoid because of the criteria of keeping the lights on when one single contingency happens.

[TR. PP. 237 - 238]

Q But if the chances of that line from Doubs to Loudoun being put out of service are 5 million to one, if those are the chances, would you still -- would VEPCO still be opposed to the double -- to the paralleling of that circuit?

A If the result is what we know it to be , in 1980 a break-up of the utility, electric utility systems in the eastern seaboard, yes, sir. We don't want to break up the eastern seaboard's electric system and put the lights out on the whole eastern seaboard.

Q All right, if the chances were 10 to 1.

A If there was one chance of any sort.

Q So you are designing for 100 per cent reliability?

A No, sir. We are not designing for 100 per cent reliability. We are designing our bulk power transmission system so that no one single contingency will disrupt the system. Any one single contingency must be prepared for.

[TR. PP. 238-239]

Q Have you made any current studies to evaluate or project the performance of the alternatives of paralleling lines under various assumed conditions?

A Would you ask that one more time?

I tried to follow that, and I am not sure I did.

Q All right. Again, considering the alternatives of paralleling Mt. Storm to Doubs and North Anna up the Elmont line, considering those alternatives, have you made any studies to evaluate or project the performance of those

CONTINUED

alternatives under assumed contingencies?

A Yes, sir.

Q What's that?

A We sure have, and I mentioned one of those studies yesterday.

Q Well, before you point them out to me, will you produce them for me?

A I gave you a copy of them yesterday.

Q Is that what you are talking about, the document you gave me yesterday?

A That's the one study I am talking about, yes.

Q All right, go ahead.

A And you can determine from that study that if this Mt. Storm to Doubs line is paralleled and you use both these circuits in 1980, the results would be -- and when I say, "lose the circuit," I mean the circuits go out of service, are interrupted, open at both ends.

Q Wait just a minute. Let me interrupt you, sir. I don't know that you understood my question.

A Yes. You asked me about studies performed, any studies, and I am going to tell you.

Q I asked you if you have performed any studies to evaluate the performance of the paralleling?

A This is what I am describing to you. You asked me to describe it.

1 Q Well, yesterday, sir, when I asked you about
2 that, you acknowledged that these studies did not show any
3 parallel lines. They show the Mt. Storm to Morrisville line.
4 A They show the result if the lines were
5 paralleled.
6 Q But the studies weren't made for the purpose
7 of assessing the reliability of the parallel lines; were they,
8 sir?
9 A Why do you think we looked at both of them
10 out? They had to be parallel. We assumed simultaneous
11 outages.
12 Q You didn't assume the parallel lines,
13 though, Mr. Stallings? They are not paralleled on this
14 thing.
15 A The assumption is that they are paralleled
16 and lost simultaneously. That's what the assumption is,
17 Mr. Kay. There's no other reason for assuming that they go
18 out simultaneously.
19 Q Well, if the assumption is that they were
20 parallel, why don't your base case studies show the line
21 being paralleled rather than showing the line from Mt. Storm
22 to Morrisville?
23 A We show they went out simultaneously.
24 Q But you don't show them in that location;
25 do you?

A Well, that sketch is not geographic. That's an electric diagram.

Q But Morrisville is geographic; isn't it?

A Yes, that's right.

Q And you show the line from Mt. Storm to Morrisville?

A Let me satisfy your desire by saying that that was not drawn parallel. That's right.

Q All right, sir.

A But the study was performed assuming the loss of both these lines at the same time, because we were assuming parallelism here, adjacent parallelism.

Q Where in the base case studies that you showed me yesterday do you assume the loss of those lines at the same time?

A If you will permit me to pull that study out, I will show you very easily.

Q All right, sir, I'd like you to.

COMMISSIONER SHANNON: Is that study in the record?

THE WITNESS: This, yes, sir.

I don't know that it's in the record, but you had a copy of it yesterday. I gave it to him, and he made Xerox copies.

MR. BRASFIELD: Why don't we make it an

[TR. P. 242]

exhibit, CMS whatever the next exhibit number is.

COMMISSIONER SHANNON: Let's make it an exhibit and let's give me a copy of it, too. This would be thenext number.

THE BAILIFF: Judge, I want to make a couple more copies, but I need another one for the record.

MR. KAY: Here, I have got an extra one here, if you can read it. I made a copy from a copy.

COMMISSIONER SHANNON: Now, this will be CMS --

MR. ROGERS: 4.

THE BAILIFF: This will be CMS-4, sir.

COMMISSIONER SHANNON: All right.

(Copy of base case studies numbered 80S-100 B-3, 80S-115 B-3, 80S-300 B-1, 80SP 104 and 80SP 104-A were marked Exhibit CMS-4 and received in evidence.)

[TR. PP. 248-252]

Q Wait a minute, Mr. Stallings. Let me just interrupt you a minute.

I thought I understood you to say that you had a base case study showing the two lines --

A Just --

Q -- showing the two lines out at the same time.

A We do have. It's not this study. This one shows -- I am going through this one to show you the principle and then we ran another study to confirm this, yes.

Q Ran another study? When?

A Oh, let me see when. Sometime in June, July of this year, to confirm the calculations we had made from this previous study.

CONTINUED

I was trying to explain to you how we made these calculations in that previous study.

Q Why didn't you give me that one yesterday?

A I didn't have it with me yesterday.

MR. KAY: We have been trying to get documents, Your Honor, from the very outset of this proceeding. Mr. Rogers has copies of all the requests, of all the interrogatories.

Mr. Brasfield has been very cooperative. He's put me in a room about this size piled up with this kind of book and said, "you can dig it out of there." So we tried to do it as best we could.

Now, six, eight months later we find ourselves being faced with new studies that we have never seen on the most critical part of this case, reliability; and I just don't -- I think we ought to have additional time, perhaps, to study these so that we can examine Mr. Stallings properly on them.

MR. BRASFIELD: May it please the Commission, the studies that Mr. Stallings has been testifying to so far were made available to Mr. Kay. He took copies of them, I believe.

The study that Mr. Stallings has just now referred to was run after we received the testimony of the intervenors where Mr. Chambers testified that

1 we had not run sufficient studies to make this
2 determination.
3 Mr. Stallings is now in the process of showing
4 that as of that time, from the studies furnished
5 Mr. Kay, we had made sufficient studies; but to be
6 doubly safe, we, since that time, have made a confirming
7 study; and that's not the only thing we have done
8 since that time.
9 COMMISSIONER SHANNON: Now, Mr. Kay hasn't
10 been given a copy of the confirmation study; has he?
11 MR. BRASFIELD: He hasn't asked for one until
12 this moment.
13 MR. KAY: Well, I haven't asked for it? I
14 have been asking for them for eight months.
15 COMMISSIONER SHANNON: I think, in order for
16 Mr. Kay to properly present his case -- this is
17 information, of course, that is peculiarly within the
18 control of the applicant, and I think it should be
19 made available to him. I assumed that you would do
20 that, and I think Mr. Kay would have to have a
21 reasonable period of time to look it over to see if
22 there were any questions on this.
23 MR. KAY: We may want to recall Mr. Stallings
24 at the conclusion.
25 MR. BRASFIELD: We have no objection.

1 COMMISSIONER SHANNON: I think that's a
2 fair request on it, and I think you ought to give him
3 a copy of it, and any other counsel that desires, so
4 that they may look the record over and make an adequate
5 report.
6 MR. MASSIE: We'd like a copy.
7 BY MR. KAY:
8 Q All right, go ahead. I do want to pin down
9 this just so there will be no misunderstanding.
10 MR. BRASFIELD: I wonder if I may just make
11 this comment, so I hope the record will be clear, that
12 there has been no impropriety on VEPCO's part.
13 VEPCO is constantly in the process of making
14 studies and confirming the calculations that it derives
15 from other studies, and particularly when the
16 conclusions that the company reaches from a particular
17 set of studies is challenged in a case this important,
18 we want to do what we can to confirm it. So I don't
19 believe that there has been any impropriety. We were
20 just trying to show the Commission that the conditions
21 we believe will happen, will happen.
22 COMMISSIONER SHANNON: All right. Well, I
23 think we can cure the problem by providing Mr. Kay
24 with the study and giving him sufficient time to look
25 it over. That would be acceptable to you; wouldn't it?

MR. KAY: Certainly. Certainly.

[TR. PP. 252-260]

BY MR. KAY:

Q But getting back to CMS-4, and I want you just to answer this question very precisely, if you would, please: there is no base case study in this data that shows the simultaneous outage of Mt. Storm-Doubs, Mt. Storm-Morrisville?

A The study was not made for the purpose of showing that simultaneous outage.

Q So it doesn't show it?

A It can be made to show it.

Q Mr. Stallings, it's a simple question, and I request a simple answer.

It doesn't show it; does it?

A The study I have made here, this calculation study does show it, yes, very vividly.

Q I don't know how I can ask it any more clearly. There is no base case study in these documents that show what I just asked you.

MR. BRASFIELD: I suggest he's answered the question, Your Honor.

MR. KAY: Well, I suggest that he hasn't.

COMMISSIONER SHANNON: Can you answer it yes or no?

THE WITNESS: Yes, sir.

COMMISSIONER SHANNON: If you take this study

right here now --

THE WITNESS: These cases which were made right here were not a base case study made for the purpose of showing the simultaneous outage of these lines.

BY MR. KAY:

Q So it doesn't show it, and the answer is, no.

A The base case itself doesn't. That's right.

Q That's all I am asking.

Now, sir, first of all, the base case, or these studies that you have here, do not show a study, as such, of the parallel lines we have been talking about, the parallel lines from Mt. Storm?

A Which case are you talking about now?

Q I am talking about any of them in here.

COMMISSIONER SHANNON: Just so the record will be clear, when you say, "parallel lines," you mean parallel --

MR. KAY: From Mt. Storm to Doubs.

COMMISSIONER SHANNON: Parallel, 500 kV transmission lines from Mt. Storm to --

MR. KAY: The same right of way.

COMMISSIONER SHANNON: The same right of way?

MR. KAY: Yes.

COMMISSIONER SHANNON: I just wanted to make

sure the record is clear on that.

MR. KAY: Yes, sir.

BY MR. KAY:

Q There is no base case study in here on that.

A Mr. Kay, I don't want to be evasive. I am trying my best not to be evasive, but you want me to say something that I don't believe.

Q Well, show it to me, Mr. Stallings.

A I was right in the middle of it when you stopped me.

Q Show it to me on the exhibit. That's all I'm asking you. I am asking you, do you have an exhibit here that shows it?

A That's what I was doing, sir.

This base case is not made for that purpose. That's exactly right.

Q All right. That's all I want to know.

A But we took the base case, and from these cases we made calculations which proved what I am saying, but I didn't get through with the proof.

Q Well, we will get to that, Mr. Stallings, and I think we will get to it much quicker if you confine your answers to my questions.

A I will do that.

Q One of these studies postulates that the

Mt. Storm to Doubs line is out? That's a separate study; is it not, a separate base case in here?

A It's a part of these cases, yes.

Q But it's a separate -- it's a variation of --

A Yes, right.

Q It's a variation of 80 S-115 -- 80 S 100 B-3 is the base case, and the postulated case is 80 S-115 B-3, which postulates Mt. Storm to Doubs out?

A That's true.

Q Now, the base case 80 SP 104 --

A Right.

Q The postulated case to which is 80 SP 104-A --

A Yes.

Q -- shows the Mt. Storm to Morrisville line out?

A Yes.

Q And you don't have one that shows both of them out?

A You are so right.

Q And each is based on a different contingency; isn't it?

A Well, don't let me say that either. Don't let me say we don't have them, because I just told you we did have.

Q But you don't have them in here?

A Yes, I have got it. I don't have them right here, yes, but we do have one that shows it.

Q Let's confine ourselves to this.

THE BAILIFF: This is a new exhibit?

MR. BRASFIELD: That will be.

COMMISSIONER SHANNON: Let's go ahead and identify it right now. This will be CMS-5.

THE BAILIFF: Is that the only copy of it?

MR. BRASFIELD: That's the only copy. If we could get copies made --

COMMISSIONER SHANNON: Tell me in simple terms what CMS-5 is. I haven't seen it yet.

THE WITNESS: It's a study which shows the simultaneous outage of both the Mt. Storm-Doubs line and the Mt. Storm-Morrisville line.

COMMISSIONER SHANNON: Thank you.

(A copy of a study showing simultaneous outage of Mt. Storm-Doubs and Mt. Storm-Morrisville lines was marked Exhibit CMS-5 and received in evidence.)

BY MR. KAY:

Q But anyway, back to CMS-4, so we won't get confused -- let's take one step at a time, because I have trouble following this.

A Yes. Is that that group of studies I gave you yesterday?

Q Yes. That's CMS-4.

A I am going to mark that.

Q And those base case studies were made, one of them, in October 1972, I think?

A That's right.

Q And one of them in 1970 and revised on January 1, 1971?

A I can't find the dates on that. I see the October '72 on here, SP 104 and 104-A.

Q On 115, 80 S 115 B-3, it's down at the very bottom right-hand corner.

A Oh, yes. Right.

Q January. So they were made at two different times even?

A Yes.

Q Then your testimony yesterday came from the top sheet of these exhibits, of those documents, which bears the date September 25, 1973?

A Yes.

Q So a week ago, roughly, you tried to put together the two independent base studies to support a conclusion that you reached four years ago?

A And did it successfully. This did prove that.

Q But the answer is correct, you didn't do this at the time the decision-making process was being carried out?

A This was done when Mr. McKay, who is manager of Planning, was attempting to give me the information he had come up with.

Q You said you made the decision on this line in '69 or '70, and these things weren't done in '70?

A That's right. I said that.

Q Now, none of these studies take into account the -- none of these studies take into account the outage of the Doubs to Loudoun line; do they?

A These studies right here?

Q Yes.

A No, sir.

Q Now, are you saying, sir, that the Mt. Storm to Doubs line being out and the Mt. Storm to Morrisville line being out is the same thing as two Mt. Storm to Doubs lines going out, electrically?

A I would like to try to tell you what --

Q Can you answer that question?

A I will try to. If we, in the study, have a line connected from Mt. Storm to Morrisville and a line connected from Mt. Storm to Doubs, can we convert to, instead, take this line and build it actually in the field alongside this line all the way, and we were to lose both those lines

that we just built on this right of way, it's the same as not having this line and not having that line.

Q Even though they go to different terminal points?

A Yes.

Q And you are saying then in your considered opinion that the system responses would be identical in those two situations?

A I think they would be closely enough identical to produce the result that we found.

Q You think they would be close enough. You are not saying that they would be identical?

A I am not saying that they would be absolutely identical, no.

Q You don't know what the differences would be; do you?

A We have not put the two lines absolutely along that right of way to those points and taken them both out.

Q Until you do that, you don't know what the system responses will be?

A Yes, sir. I think we do. I think we know within the degree of reasonableness that will tell us that if they are put there and lost, the systems in the eastern part of the United Statesare going to separate, and we are going to

have a massive blackout.

Q Come on now, Mr. Stallings. I want to see from -- for a statement as drastic as that, I think there ought to be some hard studies and not, yes, I think there might be, based on experience.

A I didn't say I think there will be. I said our judgment is that if both these lines are on this right of way, we think these studies that we have performed are sufficient to show that result.

Q All right, sir. If that's what your testimony is --

A That's it.

[TR. PP. 261-263]

THE WITNESS: We agreed in the SERC -- well, SERC is Southeastern Reliability Council, and you understand that's a group of utilities in the whole area.

COMMISSIONER SHANNON: Yes, I understand.

THE WITNESS: --have agreed that to prevent cascading outages we will consider in our planning that lines on the same right of way can go out, and we will plan our systems to avoid the results of that outage if it should occur.

Now, we are not saying that the lines are absolutely going out, but we do say that it's possible if they are on the same right of way, and since it's possible, we must plan for the system to collapse if that does happen.

We sincerely hope it won't.

COMMISSIONER HARWOOD: Mr. Stallings, let me

CONTINUED

express my ignorance and ask you a question based on that. When you make the studies, you hypothecate one contingency, a line being out, and then see what will happen; and this is predicated on 1980.

THE WITNESS: Yes, sir.

COMMISSIONER HARWOOD: It's also shown in here any upgrading or improvements in the adjoining systems of other companies, or do you take what you have today, put in what you plan to use and use that for 1980?

THE WITNESS: Oh, no. These are the systems-- and they are rather extensive, as you saw from the Carolina to the Canadian border-- they are the systems which are expected to exist by the systems participating in the studies.

In other words, we provide our data and PJM provides its data and the New York people all provide their own data and say this is what my system is going to be at this time, and this is what the load is that we expect to be imposed on it. So we apply that load to that system to see how it operates.

For the normal base case, that is with everything in service and with the load normal, for contingency cases within that same instance we take out whatever contingency we assume and determine

what the result is. If the result is outages, then we must do something to prevent that result for that occurrence.

[TR. P. 271]

A If I understand your question to be, did we make a study specifically to take these two lines out of service from between Mt. Storm and Doubs, there was no specific study of that particular case run, to my knowledge.

[TR. PP. 275- 289]

Q Well, when do you propose to do that, from Bristers over?

A I don't have the schedule right on the tip of my tongue for that.

CONTINUED

Q What size line would go from Bristers over there that you're talking about?

A What size line? I'm not sure what the conductor size is, but it's whatever conductor size.

Q It would be 500?

A It would be 500 kV, yes.

Q It would be a 500 kV line. Is that in Virginia?

A Oh, yes.

Q But you don't have an application here for that now?

A No. It's not a part of the applications here.

Q Well, I thought the need was to get the power from North Anna to northern Virginia; and, yet, you don't get it any farther than Bristers, as I understand it?

A Well, there are many -- we have many plans for many things which have not been completely finalized and the applications haven't been submitted for.

Q Well, isn't it -- it seems to me when you are talking about this particular general area and you are talking about lines of the size that we are talking about that the Commission ought to have before it your complete plans for this area in the foreseeable future, because before they can really make an intelligent decision on this point --

A I believe that's a statement; not a question. That's the reason I haven't said anything.

Q You don't agree with that, or do you agree with that?

A I don't know what you expect me to say. You said it would seem --

Q Isn't it true that the whole object of getting power from North Anna and Morrisville to northern Virginia ought to be all one integrated package for the foreseeable future?

A Well, it's integrated in our plans to a large extent.

For instance, we have not included here the circuit that we talked about yesterday that we fully expect to build from North Anna to Possum Point, or the circuit from North Anna to Midlothian.

Q Well, when are you going to build the North Anna to Possum Point line that you talked about yesterday?

A I don't know. I believe it's '78 or 9, in that area.

Q And you are in the Planning Department?

A That's right.

Q So you ought to have a pretty good idea when you are doing it.

If you were to build that line now, rather than the Mt. Storm to Morrisville line now, then electrically you'd be well off; wouldn't you?

A Electrically, I would not have even served the same purpose, no, sir. Electrically, I would have made a large mistake.

Q Well, maybe I didn't phrase that right.

You could parallel, in order to get your Mt. Storm power to northern Virginia, you could parallel Mt. Storm to Doubs; and in order to get your reliability that you are talking about, you could build your line from North Anna to Possum Point, because yesterday I understood you to tell Mr. Massie that that would provide the same kind of reliability that you need, that this double circuit all the way around the horn would.

A You misunderstood what I told Mr. Massie.

Q Well, what did you tell Mr. Massie?

A I told him that it would not provide the same reliability.

(Discussion between counsel.)

BY MR. KAY:

Q My understanding was the same as Mr. Massie's, that you did say that.

Well, anyway, you have testified. But one of the main purposes that's in this prepared testimony from beginning to end is that you want to get power from North Anna to northern Virginia; and, yet, the applications here before this Commission only get it to Bristers, as I understand

you. Am I correct?

A No, sir.

Q All right, now, how are you going to get it immediately when you build the line from North Anna to Morrisville to Bristers? How are you going to get power to northern Virginia?

A I wasn't very successful in my most recent explanation, but I tried to explain that to you.

Let me try one more time and see if I can get that across.

Q I think I understood what you said, that you were going to build it?

A That's how we are going to do it.

Q Well, why wasn't that included in this application if that's where you are trying to get the power?

A We have asked for permission to build a circuit from Morrisville to -- from North Anna to Morrisville and from Morrisville to Bristers.

Now, when we get to Bristers, we are going to reconnect the circuit right here at this point, which I explained a moment ago, and I thought you understood.

Q I understand.

A And that will provide a circuit from North Anna to Morrisville to northern Virginia, and I don't know how else, really, to explain that.

Q You mean you have got enough capacity, present capacity, from Bristers to northern Virginia to take this additional capacity that you are going to be pumping out of North Anna?

A There will be some additional capacity beyond that, because the other end of this split line will be turned and brought around here to Ox, which will provide a parallel path in this area, see.

Q But immediately upon completion -- before you build the Ox line, you can carry some of this North Anna power from Bristers up to Loudoun?

A You see, we have a circuit now to Ladysmith and a circuit across here, so in effect there is a parallel in here electrically.

Q Well, that's what I don't understand; how you can take the power -- and maybe this is elementary to you all -- but how you can take the power from North Anna to two separate 500 kV lines and merge it and then carry that same capacity only on one 500 kV line from Bristers on up?

A Well, as I have said, at this point this line will be broken and the red line will go north here, and this black line will go here.

I shouldn't be saying "here." Excuse me. The 500 kV line from Elmont to Loudoun will be broken, split, cut open at Bristers Junction.

Q But before you split it, where is it going to go?

A Let me finish with that explanation, because I will forget what I said, and then I will be accused of not saying it right.

The line from Elmont to Loudoun will be cut in two at Bristers Junction, leaving a tag end to the north and a tag end to the south. The northern end from Loudoun down to Bristers will be connected to the Bristers-Morrisville-North Anna circuit.

The tag end from Elmont to Bristers will be connected to a circuit which goes to Ox and thence to Loudoun.

So that, in effect, then there will be a circuit from Elmont to Ox and a circuit from North Anna to Loudoun.

COMMISSIONER SHANNON: What is the purpose in putting that off-sheered over to Ox and around?

THE WITNESS: To provide back-up at Ox, and that's a very good question.

At the moment, the line from Loudoun to Ox is a radial line. We have transformer capacity here.

COMMISSIONER SHANNON: By radial, you mean a stub end?

THE WITNESS: Stub end, that's right.

At Loudoun, there is transformation capacity down to 230, and Ox there's transformation capacity down to 230.

At the moment, we can lose this line and --

MR. BRASFIELD: Which line?

THE WITNESS: The line from Loudoun to Ox, the radial line can be lost, and the transformer capacity at Loudoun will provide the capacity needed to the 230.

As loads grow, the time will come when that is no longer true, and at that point we need something to back Ox up so that if we lose the Loudoun-Ox 500 kV line, there will be an alternate 500 kV line feeding Ox to provide service into Ox there.

COMMISSIONER SHANNON: You completed the loop into Ox.

THE WITNESS: We routed it to complete the loop, yes.

BY MR. KAY:

Q But until that line from Bristers to Ox is built, you are not getting any more capacity from Bristers into northern Virginia by these applications here; are you?

A Yes, sir. From Mt. Storm.

Q From Mt. Storm. Well, Mr. Stallings, you have got, right now, as I understand it, one 500 kV line from

Bristers to Loudoun?

A Oh, that's right.

Q Is that right?

A Yes.

Q Now, you propose to bring in -- I don't know how many megavolts from Mt. Storm to Morrisville to Bristers.

A Five.

Q Sir?

A Five.

Q Then you are trying to bring in some from North Anna to Morrisville to Bristers?

A Yes.

Q And you are going to transmit all of that over an existing 500 kV line that's there now?

A No, because timing is off, as we said the other day. This was needed this past summer, the summer of 1973, the line from Mt. Storm to Morrisville; and had we progressed in our normal process of planning needed facilities and installing needed facilities to keep the service adequate to our consumers, then this circuit would be in service next summer.

This circuit from North Anna to Morrisville, however, was not planned to be in service until early 1975, and I testified yesterday that there is a possibility -- we are reviewing the schedule for construction of North Anna.

There's a possibility that this may be delayed.

By that time, we should have a circuit here in service from Bristers to Ox, and then we have two parallel paths to northern Virginia.

Q I am sorry that I can't make myself more clear, and I apologize for it, but I still don't see.

Right now you have got a 500 kV line going from Elmont to Ladysmith to Bristers to Loudoun; correct?

A Elmont to Ladysmith to Bristers to Loudoun. That's right.

Q And it's carrying a load today?

A That's right.

Q Now you propose to build another 500 kV line from North Anna to Morrisville to Bristers to carry load?

A In 1975.

Q All right. And you propose a line from Mt. Storm to Morrisville to Bristers to carry back up to Loudoun?

A 1973, yes.

Q How then, without building additional transmission facilities from Bristers to Loudoun, can you get that power up there?

A I just got through telling you. We are going to build additional facilities from Bristers to Loudoun, and it's going to be that blue dotted line from Bristers

over to Ox to Loudoun, and I don't know how to say that any different. That's how it's going to be. It's going to be 500 kV.

Q What I am trying to get at: the applications presently before this Commission --

A This is not a part of the applications before this Commission.

Q So the applications presently before this Commission don't get any more power to northern Virginia?

A Oh, they do. From Mt. Storm. (Demonstrating)

Q How is it going to get up that line? Is there enough capacity left on that line to carry it?

A This power flowing north in the line from Elmont to Loudoun comes from many sources, and power from Mt. Storm comes around this way, too, to Loudoun. An additional circuit through here will provide --

MR. BRASFIELD: To where?

THE WITNESS: Excuse me. Additional circuit from Mt. Storm to Morrisville to Bristers will provide another path for west to east transfer of power.

BY MR. KAY:

Q Do you have any present plans for building any more lines directly from Bristers to Loudoun?

A Directly from Bristers to Loudoun?

Q Yes.

A Not that I know of, no, sir.

Q And you'd know if there were?

A I hope so. I think I would.

Q Thank you.

COMMISSIONER SHANNON: Well, actually, until you build your Ox line, you are not going to really have any greater volume, if I can use that word; I know that's not proper -- greater volume of power being transmitted from Bristers to Loudoun, but you will have an additional source of power because of this short circuit loop that's coming across Rappahannock County there?

THE WITNESS: This?

COMMISSIONER SHANNON: Yes.

THE WITNESS: From Mt. Storm to Morrisville, Yes, sir.

And, you see, this line from North Anna to Morrisville is planned presently for two years later in-service date than we had asked for this line.

COMMISSIONER SHANNON: Yes.

THE WITNESS: Which is ample time to come back with this, so there is no inconsistency in the time.

COMMISSIONER SHANNON: Well, I suppose Mr. Kay's question really would be reduced down to

why did you file all five applications simultaneously here?

MR. KAY: Well, I think, why didn't he file, as long as they were going to do all of them -- why didn't he do the sixth one and put the Cx line in so that we would have the whole picture?

THE WITNESS: Well, of course, the logical extension of that is why didn't we include the seventh and then the eighth and then the ninth, and we didn't. We had to stop somewhere.

BY MR. KAY:

Q You have a seventh, eighth and ninth line planned for northern Virginia area?

A I wish I hadn't said that.

We have got plans for lots of other things that are not included in the applications presently before the Commission, yes, sir. We must, in order to provide service for the customers in Virginia today which they should have, we have got to continuously plan.

Q Well, it just seems to me that they ought to be shown, perhaps, on these maps.

A It's a question of where do you stop. You have got to stop somewhere.

Q But getting back again, I think Judge Shannon phrased it much better than I did, and that is that you have

gotten -- by what you are doing, you are not getting any more transmission capacity; you are getting more generating sources to get to northern Virginia.

A Until this is built, there is no more transmission from Bristers to Loudoun, yes.

Q And yet, the purpose of this application is to get it there?

A Yes.

Q And you left out one link that's necessary to get it there?

A Not to get this power there.

Q Well, I think --

A That provides another path from west to east.

Q You don't get any more up there. You have another source, but you don't get any more up there until you build that other line?

A You don't get any more capacity, but you may well get more power.

You see, I may have a Cadillac sitting in the driveway. It's capacity for transportation, but if I don't use it, I haven't had any more transportation.

Q Yes, sir, but your own testimony states that the reasons were to get additional transmission capacity. That's your word, not mine.

A Right.

Q Between the generating plants in West Virginia and Pennsylvania to northern Virginia, and to get additional transmission capacity again from North Anna to northern Virginia, and you just said that you are not going to do it by these applications.

A I submit to you that the Mt. Storm to Morrisville to Bristers circuit is additional capacity, transmission capacity, between generation in the west and loads in the east.

Also, the circuit from North Anna to Morrisville to Bristers is additional transmission capacity between North Anna nuclear generation and loads in the north.

Q I misunderstood you to say a minute ago it wasn't additional capacity under these applications.

A Not between North Anna -- not between Bristers and Loudoun.

Q Okay. So not between Bristers and northern Virginia then?

A Well, where does northern Virginia start?

Q Well, that's your word; not mine.

A I believe Morrisville is a part of northern Virginia.

LTR. PP 303-3001

BY MR. KAY:

Q You plan to add, you say on page 16 of your testimony, you plan to add a 230 kV line from North Anna to Morrisville at a later date?

A That's about line 5, on page 16?

That's right. Yes, sir.

Q When do you envision that that will be necessary?

CONTINUED

A The need for that facility will depend to some extent on the development of loads in this triangular area that are bound by the line from Bristers to Charlottesville, from Charlottesville back to Elmont, from Elmont up to Bristers, in that triangular area, which includes North Anna in the center.

Loads now generally there are rural and are served, to a large extent, by the cooperatives in the area.

We would project that in sometime in the late 70's to mid 80's it would be necessary to reinforce this area with 230 through it.

The exact date would depend, of course, on the growth of load in that area.

Q Right. I know, based on your best projections, that it may be as late as 1985 or '86 before you do it?

A I don't know that it will be that late. It's possible if the loads don't develop, but one thing that we think will cause some growth in this area that wouldn't have been there otherwise is the recreational facility at North Anna. There is some development which will occur, we think, because of that facility.

Q But your best estimate at this stage is the late 70's or mid 80's?

A I think I said in this testimony here, and I believe the date was 1980, but I'd have to search through here

to find it, and you have been searching. Have you found it?

Q I don't think I did. I didn't at this point, anyway, because that's why I asked the question.

A I think the date is about 1980.

Q Well, your testimony a minute ago was the mid 80's as an outside point?

A Well, I said late 70's to mid 80's, and 1980 is precisely in the center of that estimate.

Q If the North Anna to Morrisville line were not to be built in the location -- North Anna to Morrisville line in the location that you propose, would you explore other ways of getting that 230 power in there where you are talking about?

In other words, you wouldn't build a 230 line from North Anna to Morrisville on that route if you hadn't already built a 500 kV line there; would you?

A I think we would, because you see that's where the 230 kV line is needed. That's one reason for building the North Anna-Morrisville line in that location is that later on there will be a need in that location for 230, and that would enable us to use a common right of way for those two circuits.

[TR. P. 313]

COMMISSIONER SHANNON: Let me -- at the risk of stirring things up again, let me ask you this question: Mr. Kay has developed in his cross-examination that until such time as you get the so-called Bristers Junction to Ox line in, you actually won't have parallel lines completing the circuit into Loudoun.

Now, assuming that you built a parallel line along the Mt. Storm to Doubs corridor, isn't it a fact that until such time as you completed that Ox extension that you'd be able to get more power into the northern Virginia, the Washington metropolitan area by paralleling from Mt. Storm to Doubs?

THE WITNESS: Yes, sir, for that one moment.

[TR. PP. 314-315]

BY MR. KAY:

Q Is it your opinion that reliability should be considered above everything else in deciding where to route these lines?

A No, sir. Reliability is of the utmost importance in the operation of an electric system; but economy, of course, is also a prime consideration in the design and operation of an electric system; and the two must be married conveniently.

Q Well, isn't there a third, and that's environmental consideration?

A Yes, sir, there is. I wasn't enumerating all of them.

Q Well, do you think that reliability is more important than environmental consideration?

A I would like to quote to you what the FPC thinks, and if you will give me the FPC booklet, I have xeroxed the front, the frontispiece of the FPC booklet entitled "Electric Power Transmission and the Environment," produced by the Federal Power Commission, its guidelines for the protection of natural, historic, scenic and recreational values in the design and location of rights of way and transmission facilities.

And the first paragraph standing out on the frontispiece of this booklet says:

> "It's intended that these guidelines provide an indication of the basic principles and elements of good practice which, if applied in a reasonable manner to planning and design of particular facilities, will provide the most acceptable answers from an environmental standpoint, taking account also of such factors as safety, reliability of service, land use planning, economics and technical feasibility."

So that the FPC didn't blindly tell us to consider any one facet without regard for the other, and all of those factors must be considered.

Q Has any portion of the line from -- the proposed line that you were talking about this morning from Bristers to Ox or Possum Point, has any of it been built?

A Yes, sir.

Q It has been?

A Yes, sir. Parts of it, yes.

You see, this line from Bristers to Ox, though is not a part of the application before this Commission at the moment. It has been applied for, and there is no problem from Bristers to Ox with approvals for the line.

It has local approval from Ox to the Fauquier County line, and it has Planning Commission approval from the Fauquier County line to Bristers.

Q Does it have the approval of this Commission?

A No, it doesn't. I say approval of local authorities in these areas.

Q When was that line constructed?

A Before the law was passed which said it had to be approved.

Q I certainly got the impression -- obviously an erroneous one -- when we were talking this morning that this construction was sometime off in the future?

A It's off in the future because it hasn't been completed.

Q How much of it has been completed?

[TR. P. 320]

A I really don't know, but the portion roughly paralleling this No. 2 line back in here in this area, I'd have to refer that to the Construction Department. I don't know how much of it they have gotten done.

This is needed, you see, to back up Ox, which I said this morning was on a radial stub; and when this line is turned in to Ox, it will provide backup for the Ox to Loudoun load.

Q Have you acquired all your right of way?

A I don't know, but I don't think so.

Q Well, sir, are you familiar with the provisions of the law under which we are operating here?

A Yes, sir, and that's the reason we stopped our construction. The moment the law was passed, we were no longer able to continue that construction.

Q Well, then you will need the approval of this Commission?

A Oh, yes, and there is an application on file with this Commission for that line. I just found it out at lunch. I don't file these applications.

Q Do you know when it was filed?

A No, I don't, but within the last couple of weeks, I think.

[TR. P. 338]

A Well, that depends on where it happens and who it happens to.

If, for instance, we should parallel 500 kV lines from Mt. Storm to Doubs, and it should happen there, the figure is too high, because if it happened there in a peak season we'd burn down -- we'd interrupt the Hatfield-Doubs line and stand the distinct possibility of cascading utility service in the eastern United States.

I don't think you'd put up with that.

Q You indicated this morning if the chances were only five hundred million to one the chances would be too high?

A So I am saying I don't care what your figure is, it's too high for me.

Q You want as near perfect reliability on that as you can?

A No, sir. I want no single contingency to disrupt service in the eastern United States.

[TR. P. 344]

Q So all the needs that you speak of could be met by building from Mt. Storm to Doubs rather than Mt. Storm to Morrisville, if you take out, as I have asked you to assume, the reliability issue?

A Yes, sir. The need to move power from the generation in the west to the load in the east could be met by parallel line from Mt. Storm to Doubs if ignoring reliability.

Q And the other three reasons for the line, too, could also be met?

A Yes. This load could be served from up here, and this reinforcement of the No. 2 line could be made at Bristers.

[TR. PP. 367-368]

Q All right, sir, we will ask Mr. Barthold.

Now, in considering how you would back up a parallel and adjacent line from Mt. Storm to Doubs, you said that you considered double looping the Dooms-Elmont-Loudoun line?

A Yes.

Q Was any consideration given to, rather than coming down there and double looping that, to move up and double loop the Hatfield to Doubs line?

A You mean to build back this way and then up and in toward the load?

Q No. Really, just to build, perhaps, straight up?

A Oh, you mean like across here and then around?

Q Yes.

A No, sir, not that I know of.

Q You didn't give any consideration to that?

A No.

Q That would be a much shorter distance; would it not, than to go from Mt. Storm to Dooms to Elmont and back up and to Loudoun?

A It would appear to be from looking at the map.

Q Yes.

A However, you recall that when this line was built by APS, there was a great deal of problem with the routing of that line through what I believe was a Civil War battlefield, or something of this sort, and through this park down here; and APS would have to address that route.

Q But they did go through it some way?

A They got the first line through some way, yes.

Q Now, as we pointed out earlier, the Mt. Storm to Doubs segment, really, isn't just hanging there by itself. You have got several lines that are supporting it even now?

A Yes.

[TR. P. 372]

Q So your really only problem that you have testified to so far as reliability of double circuiting is that one little short segment of the Hatfield-Doubs line which you call in your base case studies -- I have forgotten what it is -- Beddington - something?

A Black Oak.

Q Black Oak, yes. That's where you foresee the problem?

A That's where the problem finally becomes an overload to separate the system; but the problem, the initiating problem, is not in a short section. It's a loss of two lines between Mt. Storm and Doubs, which I testified is about a hundred miles.

Q Yes, sir, but that's where the problem manifests itself?

A That's where it finally shows up back up in here. That's where the fiber starts.

[TR. P. 375]

Q Now, so far as the Mt. Storm No. 3 unit, was the information that you gave, the 9 per cent forced and 8.7 per cent planned, based on your experience from other units?

A It was based on experience from other units at Mt. Storm.

Q At Mt. Storm?

A Yes.

Q And that's exclusive of shakedown time? This is what they experienced after they got in operation?

A I believe this is based on a mature unit. They are generally a little greater with an immature unit.

Q So that out of three units, one of them is going to be out about 50 per cent of the time, anyway? If each of them is going to be 18 per cent of the time, 18 times 3 is 54.

A 18 times 3 is 54, yes.

Q Right. Yet, you're building your transmission reliability for the capacity for the three units running all the same time?

A That's right, because that would leave 46 per cent of the time they would be all running at the same time.

[TR. Pp. 433-434]

BY MR. BRASFIELD:

Q Mr. Stallings, last week during cross-examination by Mr. Kay there was introduced Exhibit Number CMS4, consisting of some of the load flow diagrams that had been earlier made available to the Intervenors.

I don't believe you ever got a chance to complete your explanation of how these particular documents show the reliability problems that you have referred to, and I would like you now to explain how these documents do show that.

A Well, I think the problem we discussed was the fact that we have not made a study to show that when the Mt. Storm - Morrisville line relocated to the Mt. Storm - Doubs - Loudoun route was lost simultaneously with the Mt. Storm - Doubs line, that the loss of these lines interrupted this line.

Q What is that line?

A Excuse me. The Hatfield Ferry - Doubs line. We said that's right. We said, therefore, we have not made a study of that particular thing, but we had gleaned from studies which had been made earlier that that was a result.

[TR. PP. 439-440]

BY MR. BRASFIELD:

Q Now, Mr. Stallings, using the methodology that you have just explained and calculating from the studies that had been run, what the load on Hatfield Ferry would be under the circumstances of the loss of both circuits, did you find the Hatfield Ferry to Doubs line to be overloaded?

A Yes, sir. We found that the Hatfield Ferry to Doubs line, in the section between Black Oak and Bennington, to be subjected under the conditions of this study to 2774 megawatts, which is beyond its half hour emergency capability rating.

[TR. PP. 445-446]

BY MR. BRASFIELD:

Q Now, Mr. Stallings, did you subsequently run the study with both lines out simultaneously to confirm you conclusions determined from Exhibit CMS4?

A Yes, sir.

Q And is that shown in CMS5?

A I didn't mark these sheets. I think the sheets I have have been designated CMS5.

[TR. PP. 446-449]

Mr. Stallings, in both of these studies, your drawing shows, does it not, that you took out lines from Mt. Storm to Doubs and Mt. Storm to Morrisville?

Neither shows two lines from Mt. Storm to Doubs; is that correct?

A In CMS5, that is correct.

Q Now, can you explain why you get the same

result proceeding the way you did rather than testing for two lines from Mt. Storm to Doubs?

A I will certainly attempt that.

Q Try to use the names, if you can.

A I'll do my best.

In one case I have a sketch here which shows lines from Hatfield Ferry to Doubs, Mt. Storm to Doubs and Mt. Storm to Morrisville, with the rest of the system shown sketched out here on the side.

In the other case, I've shown the suggestion that this line not be run here but be run -- excuse me -- not be run from Mt. Storm to Morrisville, but be run fairly on adjacent to the Mt. Storm - Doubs - Loudoun line.

Now, it was questioned that when we made our study we didn't show them on the sketch run from Mt. Storm to Doubs to Loudoun parallel, but instead, to determine the effect, we took the Mt. Storm - Doubs line out of service and the Mt. Storm - Morrisville line out of service, and we got a result, which we said indicated we would have trouble on the Hatfield Ferry - Doubs line and have cascaded failure.

COMMISSIONER SHANNON: Does that assume that we are on a peak load day?

THE WITNESS: Sir?

COMMISSIONER SHANNON: Does this assume that all systems in the grid are on a peak load operation?

THE WITNESS: It assumes our peak.

COMMISSIONER SHANNON: Your peak.

THE WITNESS: They may not be absolutely at their peak. The peaks are seldom coincidental to the hour, but the peak situation does prevail on the other systems, though they may not be absolutely at their peak.

COMMISSIONER SHANNON: So this would be a peak situation?

THE WITNESS: Peak situation, yes, sir. You can see that if we took these two lines out of service right here, what we would have left --

BY MR. BRASFIELD:

Q Which two are they?

A If you took the line from Mt. Storm to Doubs out of service and the line from Mt. Storm to Morrisville out of service, what you would have left would be a line from Mt. Storm to Hatfield Ferry to Doubs to Loudoun to Ladysmith to North Anna to Morrisville and back.

Similarly, if we say two lines were taken out of service --

Q Which are they?

A Excuse me. The circuits on the same right of way between Mt. Storm and Doubs, if they were taken out of

[TR. P. 449]

service, you would have an identical system left. Mt. Storm to Hatfield Ferry to Doubs to Loudoun to Ladysmith to North Anna to Morrisville and back.

So, it's the system that is left that we are concerned with, not where it ran to before it was taken out of service.

[TR. PP. 450-452]

Q And what again is the half hour rating of that line?

A The half hour rate of that line is 2340 MVA. It is loaded some 700 megavars above its capability.

Q And is that an overload that could be withstood by that line?

A No, sir.

Q And what would be the consequences of an overload of that magnitude under such circumstances?

A That line would be tripped out of service and the results are unpredictable.

They are so bad as to be beyond our immediate comprehension.

Q Well, would there be any change in either the generation in the west or the load in the east as a result of that?

A We think there would be a great change in the

load in the east.

We think it would be de-energized to a large degree, yes, sir.

Q You are anticipating my line of questioning, I think.

A I don't mean to do that. But these systems would separate. When this line trips the angle, and you can see it on this study, between Mt. Storm and Doubs is a difference between 3.6 and 95.9, a difference of 92.3 degrees, the angle between the generators and the load.

Q Would there be adequate capacity remaining from west to east over other lines to make up the deficiency that has been created?

A Let me finish answering the first question you asked about what would happen to load and the generation.

The generation would very probably become unstable because of this large angle between the generation and the load, and we would probably lose some of the generation in the west as well as some of the load in the east.

I think we would have a general breakup of systems, and I think what you would have is a brand new New York.

Q What do you mean when you say "generation becomes unstable"?

A Well, it doesn't rotate synchronously with the

[TR. P. 452]

system in producing its power.

It surges back and forth, and on one of these surges, it may surge out and not back.

Q Now, what is the system breakup that would be caused by this?

A A separation of systems occurs when the transmission lines between the systems trip out and stay out, when the circuits are open, so the power can't flow over it.

Q Would this be a cascading item?

A This would be a cascading item, yes, sir, it would. It has cascaded from this line, this line, to that line, and would cascade further.

[TR. P. 455]

Q Mr. Stallings, you mentioned cascading as the result shown by these studies.

Is cascading your only reliability concern if these lines are to be built adjacent and parallel?

A No, sir. It is the situation which results in an extended loss of service in the Eastern Seaboard. But we would have extreme problems in the northern area of Virginia without the cascading.

If the Hatfield Ferry line did not trip -- we think it would, that we have proved that it would -- but even if it didn't trip, we would have extreme problems of

low voltage and loss of load in the Northern Virginia area as a minimum.

Q You are assuming perhaps an outage other than peak conditions?

A An outage under other conditions other than peak.

Q Less severe conditions other than those you have illustrated?

A Less severe conditions could leave the Hatfield Ferry line in, but leave us with extreme low voltage and a loss of load in the Northern Virginia area.

[TR. PP. 457-464]

Q Now, are there other publications of the Federal Power Commission to your knowledge that deal with matters relevant to this question, the question of where the Mt. Storm to Morrisville lines should be located and whether or not it should be located parallel to the Mt. Storm - Doubs - Loudoun line?

A They don't address themselves specifically to those lines, but in general terms there are two reports at least which do address themselves to that general proposition.

The first is titled "The Prevention of Power Failures," Volume 1, Report of the Commission.

That's the Federal Power Commission. A report to the President by that Commission, July, 1967; and on Page 90 of that volume, Item Number 9 says "Special attention should

be paid to transmission line routing and to switching arrangements at generating centers and at principal interconnections in the transmission network to provide maximum reliability in emergencies. The economic growth of the industry will of necessity require the concentration of large amounts of power at generating centers and the movement of large blocks of power on transmission rights of way. Particular care should be taken to avoid excessive concentration of critical circuits which would expose the system unnecessarily to large loss of capability."

Q Now, that is a document of the Federal Power Commission itself; is that correct?

A Yes, sir.

Q What other document do you have that relates to this subject matter?

A There was an advisory committee which reported on the reliability of electric bulk power supply, and it was included, even though not made by the Federal Power Commission, included by the Federal Power Commission in its report to the President on "Prevention of Power Failure."

Q This report of the advisory committee was to whom?

A It is an advisory committee to the Federal Power Commission and its report was made part of the Federal Power Commission's report to the President.

Q What do you find in there that is relevant to this question?

A On Page 12, under the general title, "Broad Principles of Bulk Power Supply Planning," the first paragraph reads: "The fundamental objective of bulk power supply planning should be the elimination of any possibility of cascading or propagating outages. All systems should plan and design toward this end. This objective is achievable technologically if the broad principles discussed below are followed. The transmission of these principles into numerical quantities and specific criteria must be determined after thorough study of each individual situation with due regard for the environmental constraints that may apply. The more important of these principles are," and there are several listed.

Number Four principle is the concentration of transmission capacity.

"Notwithstanding the increased difficulty of securing transmission line rights of way, recognition should be given to the need for constructing lines on separate rights of way to assure the maximum possible reliability. Maximum reliability can only be obtained by avoiding excessive concentration of transmission capacity on a given right of way with the attendant greater risks of curtailment of system capability in the event of the forced loss of all such capacity. The use of HV transmission will assist in providing adequate

capability by separate line routes by conserving the land required for rights of way."

Q Do you have anything else?

A Yes, sir. There's a great deal more, but that was the most pertinent.

Q Now, you indicated on cross-examination, I believe, that your company had not made a study or an analysis of the frequency of double circuit outages on its system. But you also pointed out that double circuit outages have occurred.

Can you tell me if there is general agreement in the industry that double circuit outages are sufficiently probable to be guarded against?

A Well, obviously that is the consensus of industry, because industry has included the criteria for its studies that includes the consideration of double circuit outages, outages of all transmission on one common right of way. That in itself indicates that the industry does consider that to be a possibility.

Q What double circuit outages do you know about that might relate to this possibility?

A Well, there are many, though I have not seen it myself. I do know that Mr. Barthold has contacted many companies and gotten a summary of those types of outages.

I happen to have some that I personally know

about, which I have already testified to some of those. The interruption on the Georgia Power System when an airplane flew through two 500 KV lines I've already told you about.

I told you about the tornado which tore down the two same lines at a different time.

In addition --

COMMISSIONER SHANNON: Where was that, that tornado?

THE WITNESS: That was Norcross, Georgia.

COMMISSIONER SHANNON: How long ago?

THE WITNESS: I have their interruption report here.

Let me see. It's right on the tip of my tongue.

March 31, 1973.

A (Continuing.) And it happened on the Union City - Clondike - Norcross 500 KV line.

The typed up thing says March 3, 1973, and the other thing says March 31st. There's a conflict in date.

COMMISSIONER SHANNON: I guess we can be sure it was in March.

THE WITNESS: It was in March of 1973, yes, sir.

A (Continuing.) And there is a description of the whole outage there.

In addition, there was an outage on the Pacific Gas and Electric System where a brush fire swept across an area where two 500 KV lines were separated by 150 feet between tower centers, and both lines were tripped because of the dense smoke and flame.

In addition, on that system, and I'm not familiar with where this line is, Mountain Vicard to Dixon, 500 KV lines, a crop dusting plane was dusting a tomato crop. He passed over the field. At the edge of the field his plane hit a 12 KV distribution line, and then he flew 400 feet more and hit a 500 KV line, 400 feet away, and disrupted service on the 500 KV line.

He broke a conductor. The change in the physical stress on the conductors tore down two towers. Tower 216 collapsed, and the shock set up a mechanical travelling wave on the conductor which it damaged 217, 215, 218 and 219.

The plane hit the line on July 10 at 6:41 in the morning, and the line, according to this report, is expected to be available for service on July the 20th.

So, it was about six days to repair that damage.

Here's a note. "Line was back in service at 5:12 on the 15th."

It only took five days, or six days to repair it.

On the Duke Power Company System, when they reported to us on what they call their alternate week, in one week a gamma ray balloon caught in one of their 100 KV tower lines, and an airplane hit another one. The balloon did not cause a trip out, but they had to shut the line down to get all the plastic off the line.

If the weather had been wet, of course, there would have been quite a different story. The plane accident did shut down both circuits of the line which it hit, and there are newspaper articles from the Charlotte News covering those, and an interruption report from Duke Power.

BY MR. BRASFIELD:

Q Do you have more?

A One more.

This is a pictorial story from up in the Southern Maryland area.

A plane crashed near Damascus and Olney, Maryland, December 27, 1972, and my story has nothing to do with the nativity or what Christmas is, which is part of this headline, but the plane crashed, went through several voltage electrical facilities and crashed at the base of a 230 KV tower which had a double circuit on it.

Had it gone a few feet further before it hit the ground and hit the tower instead, the people would have been

[TR. P. 464]

in worse shape inside the airplane and the line would have been out of service.

So, all that goes to show you is that it is possible and it does happen. I, of course, have those interruption reports involved on the lines on our system which I, of course, have testified to.

[TR. PP. 470-471]

BY MR. BRASFIELD:

Q Is there anything in Kay Exhibit Number 5 that you believe bears on the issue before the Commission that you would invite the Commission's attention to?

A Yes, sir.

10.4, transmission system alternatives, which is just ahead of the paragraph that Mr. Kay and I discussed. We didn't discuss this one, but I can read it to you.

"Good practice dictates that the number and width of transmission corridors be minimized to reduce ecological impacts as well as cost. From the standpoint of reliability, however, two circuits which carry a substantial percentage of the power supply should be widely separated so that a falling

tower, an airplane or a lightning streak will not disable both circuits. The Staff believes that the Applicant has properly followed these concepts in choosing 500 KV rather than a lower voltage, so as to minimize the number of circuits required to carry the power generated at the station, and in planning for three separate rights of way for the four 500 KV lines. Each of these corridors will also be used for lower voltage lines to distribution substations."

Q Now, in that quotation, who is referred to by the words "the Staff and the Applicant"?

A Well, Virginia Electric and Power Company is the Applicant, and the Staff is the Staff of the United States Atomic Energy Commission, Director of Licensing.

[TR. PP. 498-506]

Q Okay. Now, as I understand it, these studies

CONTINUED

CMS4 and CMS5, start out with certain base conditions?

A That's right.

Q And then you assume outages under those conditions and see what happens?

A Right.

Q Is 80 S 100B3, which is in your Exhibit 4, a normal base case? Is that a normal condition?

A 80 S 100B3 did you say?

Q Yes, sir.

A That's a base case with, I believe, no transfers, whereas, 80 S 300B1 is a normal base case with a transfer of power from ECAR to MAAK.

Q Which one has the transfer?

A 80 S 300B1.

Q All right, sir. What does it mean on 80 S 100B3? What does it mean PS-NY ties, block loaded?

A 80 S 100B3?

Q Yes.

A Oh. That's a condition in the Public Service of New Jersey to New York area where they have a situation where they fix the load on the flow between the system, so that they don't allow but so much to flow because of an overload condition in that general area.

Q So this isn't a normal case, is it?

A Well, they normally have those tied block

loaded.

Q So that's the normal situation?

A Yes, in that area.

Q All right. On 80 SP104, which is a base case, does that assume the same block loaded condition?

A For that system, yes.

Q It doesn't show it on there, does it?

A No, it doesn't, because we are concentrating on a situation right here, and the whole study is set up with the situation which is to exist in whatever area it exists in.

Q We are talking about the same area here, aren't we?

A Yes.

Q Now, sir, on 80 S 300B1, which is the last sheet of Exhibit 4 -- excuse me -- 80 S 1003B is not the last one. That's the one we were talking about that you said was a normal base case. 80 S 100B3.

A Right.

Q Now, that is to show a normal condition, right?

A That's the normal condition without any transfers, right.

Q And it shows from Mt. Storm to Morrisville a flow of 865 megawatts, right?

A That's right.

Q And that's a normal condition?

A That's right, sir.

Q All right, sir. Now, looking at 80 SP104.

A All right.

Q And again looking from Mt. Storm to Morrisville, that shows a normal flow of 641 megawatts, doesn't it?

A Right.

Q Sir?

A Right.

Q And so there are two different normal conditions, then, are there not, used in your study?

A That's right.

Q All right, sir. Now, looking at 80-300B1, the last thing in Exhibit 4.

A All right.

Q From Black Oak to Bennington, it shows 1954 megawatts, does it not?

A That's right.

Q Then 80 SP104, from the same area, from Black Oak to Bennington, shows 1462 megawatts, does it not?

A That's right.

Q And 80 S 100B3, again another base case, shows 1315 megawatts from Black Oak to Bennington, right?

A That's right.

Q Now, looking at the Mt. Storm to Doubs line,

80 SP104, shows 1149 megawatts, does it not?

A That's right.

Q Let's see, now. 80 S 100B3, from Mt. Storm to Doubs, shows 1190 megawatts?

A That's right.

Q So 80 SP104 and 80 S 100B3 don't start with the same base case conditions, do they?

A That's right.

Q Now, looking at your Exhibit CMS5, and again directing your attention to the three segments of line in which we are interested, Black Oak to Bennington, Mt. Storm to Doubs, and Mt. Storm to Morrisville.

A All right.

Q In each instance the megawatts shown for those three lines varies from each of the other three base cases to which we have just referred, does it not?

A That's right.

Q So the base case conditions for CMS Exhibit 5 are not the same as any of those in CMS Exhibit 4, are they?

A That's right.

Q And yet you take all of these and put them together and come up with your conclusion?

A Right.

Q Now, sir, looking at 80 S 300B1, which is in CMS4 again, that's the last study, and that postulates a

5,000 megawatt transfer from ECAR to MAAK?

A That's right.

Q And that transfer is not postulated in the other base case studies that you refer to, is it?

A That's right.

Q And in CMS5, that postulates a 5,000 megawatt transfer from ECAR to PJM?

A Yes.

Q So, again, the same transfers are not postulated for these studies?

A PJM and MAAK are synonomous.

Q Right. But you don't have them in the transfer in each of the base cases is what I'm saying?

A The base case for CMS5, we postulate that.

In the case from which we got the flow on the Bennington line with both the others out, we postulated a 5,000 transfer, and that's 800 S 300B1.

Q But on SP104 and 100, whatever it is, 100B3, you don't show it?

A Right, because we use those for a different purpose.

Q Now, sir, you've testified that in your judgment the studies show that there would be a cascading under the positions postulated in these two exhibits?

A Yes.

Q And that's because of an overload on the Black Oak to Bennington segment under these conditions?

A Right.

Q Now, what could be done to the system to prevent that overload?

A Anything that would prevent the simultaneous outage of the two lines which we took out.

Q Well, assuming the simultaneous outage of the two lines, what other steps could be taken to prevent the overload?

A The installation of another facility which would not be taken out at the same time as, say, a line on some other route from Mt. Storm into the Northern Virginia area.

Q It wouldn't necessarily have to be from Mt. Storm, though, would it?

A No, sir. It could be from some APS generating station or from some other location also.

Q If the Black Oak - Bennington line, or the Hatfield to Doubs line were beefed up, that would take care of it, too, wouldn't it?

A You mean so that it would not fail with that overload?

Q Right.

A If it were beefed up to that extent, yes.

Q Now, sir, you told Mr. Massie, if I recall

your testimony correctly, that when talking about the computer and the use of the computer that they are used in planning to see what happens in certain assumed conditions?

A Right.

Q And if I further recall correctly, so that you can plan how to avoid any problems that show up as a result of these computer studies; is that correct?

A Yes, sir.

Q But here you didn't put parallel and adjacent lines from Mt. Storm to Doubs in your computer in the planning stage, did you?

Just answer my question, please, sir.

A I'm trying to understand the question.

I think we did.

Q I think it's clear. I said during the planning stage you did not put the parallel and adjacent lines from Mt. Storm to Doubs in your computer?

A No, sir.

Q So you didn't, in the planning stage, use the computer to find out what would happen with the simultaneous outage of those two lines?

A Right.

Q And, therefore, you didn't use the computer to help you plan how to correct any problems that might have resulted from the simultaneous outage of those two lines, did

[TR. P. 506]

you?

A No, sir.

Q You have used the computer in an effort to support conclusions that you already reached?

A Successfully.

Q Just answer yes or no, if you are able to, please, sir.

A Yes, sir.

TESTIMONY OF L. H. WEEKS

[TR. PP. 534-537]

Q Please state your name and occupation?

A My name is L. H. Weeks and I am Executive Director, Planning for the Allegheny Power Service Corporation which provides engineering, construction and management services for the Allegheny Power System and its subsidiary companies; Monongahela Power Company, The Potomac Edison Company and West Penn Power Company.

Q How long have you been in this position and what previous experience have you had?

A I have been in this position since June 1, 1973. From January 1970 to June 1973 I served as Manager of Special Planning Studies and from January 1968 to January 1970 I served as Manager of Transmission Planning. Previous to that, from

1963 to 1968, I was Manager of Engineering Planning for Monongahela Power Company in which position I was responsible for system planning studies. Before that I worked for 15 years in various engineering positions within Monongahela Power Company involving various degrees of responsibility for distribution design and system planning.

Q Is the Allegheny Power System planning to construct a portion of the Mt. Storm - Morrisville 500 KV

CONTINUED

transmission line?

A Yes, the section from Mr. Storm to a point in Warren County.

Q Will APS and its customers benefit from this line?

A Yes, in two principal ways. First, it will provide a needed increase in line capacity to transmit power from our major generation sources in the West Virginia and Western Pennsylvania coal fields to load centers in the East.

Q Please identify and locate these major generation sources.

A These are shown, circled in red, on an Allegheny Power System major facilities map as Fort Martin, Hatfield's Ferry and Harrison generating stations.

Q What is the second way that APS and its customers will benefit from this line?

A The line will provide the additional power import capability needed to maintain adequate service reliability during large generator outage emergencies.

Q With respect to both needs, do you now have adequate capacity?

A Yes, we do. However, the Potomac Edison load is growing at a rate higher than the APS load as a system, with two areas northwest of Washington, D. C. at rates of about 10%. Such load growth accelerates the need

for advance planning and construction of new system facilities to maintain reliability.

Q In order to meet the APS - Potomac Edison needs, when do you think the Mt. Storm - Morrisville line is required?

A To maintain adequate power import capacity for generating source outage emergencies beyond our own available reserves, the in-service year of the line should be no later than 1975. To maintain adequate transmission of APS generation from internal sources to the Potomac Edison load areas, the additional capacity of the Mt. Storm - Morrisville line is needed by the 1976 peak load period.

Q Explain briefly the timing necessary to meet these needs.

A By the end of 1975, operating capacity reserve istuations due to combinations of maintenance and emergency outage conditions can impose reliance on substantial regional power transfer capabilities. The Mt. Storm - Morrisville line increases the emergency capacity transfer capability from Mid-Atlantic Area systems to the East-Central Area systems by 150% -- from 1000 MW to 2500 MW. The reserve emergency capacity transfer capability is improved by more than 300% from 500 MW to well in excess of 1500 MW.

By the end of 1976, the West-to-East 500 KV lines will be transmitting about 1000 MW of power for the

eastern Potomac Edison area customers. A single contingency loss of APS' Hatfield - Doubs 500 KV line will reduce load transmission capability to that of the remaining two lines -- Mt. Storm - Doubs and Mt. Storm - Dooms. This is about 2550 MW in effective capability because of unequal loading of lines in the regional network. Thus, APS' 1000 MW plus VEPCO's Mt. Storm station output of 1670 MW exceeds this capability and this condition will worsen with subsequent years' load growth. The Mt. Storm - Morrisville line will increase the effective load transfer capability to as much as 3800 MW which will provide adequate capacity through approximately 1985.

Q Will this proposed line have any other benefits to your Company?

A Yes, it will provide a strong and reliable supply to the VEPCO system at Remington and allow them to continue supplying power to The Potomac Edison Company at Gordonsville as well as a future supply point in the Culpeper area, thus eliminating the need for a 138 KV transmission line from Riverton Power Station near Front Royal, Virginia to Boston, Virginia formerly proposed to be constructed through parts of Warren and Rappahannock Counties. In addition, it will provide the means for continuing to serve Potomac Edison's Northern Virginia customers with adequate power and reliability by tapping the line in the Northern Shenandoah Valley area when such reinforcement is required.

[TR. PP. 568-570]

Q But isn't it true, Mr. Weeks, that the studies that have been made have been made of every line except the line we are interesed in?

Now, isn't it true before you can accurately predict what will happen if the double circuit parallel adjacent Mt. Storm to Doubs line goes out that you have got to make studies to know what happens?

A I would say that if you take the one line out and you find that you are overloaded on one line, then putting a second line in and taking the second line out and have both lines out, there is no difference.

Q I haven't seen any tests that shows what happens when you take the first line out?

A We have, I think, proven or shown in some of our testimony that we do have overloads, and Mr. Barthold will testify later as to the effect of these.

Q But all these were made after the fact.

You didn't set out with the objective of trying to find a way to build a line from Mt. Storm to Doubs, did you?

A It was eliminated from the consideration

because of the ECAR criteria that required us to test for the loss of the line, both lines, which was the same as the loss of one line.

Q And you didn't test for it, did you?

A We did not make a particular test for that because of judgment. You use judgment, at least, as to the results of these.

Q Well, sir, with all due respect to judgment and experience, I've heard a great deal today about the use of the computer.

Now, I take it that if you are going to use judgment and experience, you've spent an awful lot of money on computers that was not necessary.

I suggest to you that if ECAR, or SERC, or somebody says that you ought to test these lines to see the effect of it, and you haven't done so, then you cannot testify with definiteness as to the effect of the loss of this parallel and adjacent line?

A I do not have any tests of both lines out.

Q And studies would have to be made before you could come to any firm and precise conclusions as to the effect of those lines being out. Isn't that true?

A That is true, but there is one other condition that you must remember.

One of the lowest transfer capabilities was

[TR. P. 570]

not due to that line.

It was due to the loss of the Doubs - Loudoun line. The first element that we ran into on the studies was the loss of the Doubs - Loudoun line. Not the loss of the Mt. Storm - Doubs line. And, therefore, bringing a separate line or an additional line will only aggravate that problem. This is part of the judgment that was applied in this case.

[TR. PP 595-596]

Q And then you say also on Page 4 that provides a means for continuing to serve Potomac Edison's Northern Virginia customers with adequate power and reliability by tapping the line in the Northern Virginia - Shenandoah Valley.

That's not needed now, I understand you to testify?

A Yes. We projected that substation will be needed in 1980, or shortly thereafter.

Q And you wouldn't build a 500 KV line just to perform that function, would you?

A Yes. We project that we will need a 500 KV line into this area.

We have an alternate plan for this, which would involve about 30 miles of additional 500 KV line, if this line is not required and not provided in that area.

Q Well, you have three 138 KV lines going in there now, don't you?

A Yes.

Q They could be upgraded, couldn't they?

A At the time we are talking about we need in the order of 600 megawatts, and we don't have any way to inforce those lines to that extent.

COMMISSIONER SHANNON: Do I understand that 600 megawatts is the projected capacity that you need in the Northern Virginia area, in your Northern Virginia service area?

THE WITNESS: It would be in 1980, about 600 megawatts.

[TR. PP. 600-602]

COMMISSIONER SHANNON: I see. Let me

CONTINUED

interrupt you, Mr. Kay.

Mr. Weeks, you indicated that your company by 1980 will have a need of 600 megawatts in the Northern Virginia area, and I think that you proposed a 138 KV transmission line from Riverton to Boston.

Now, did you ever consider that suppose the Mt. Storm to Morrisville line should be moved over another route. Suppose for some reason it shouldn't be built. Then what alternatives would you have to get that 600 megawatts into the Northern Virginia service area?

THE WITNESS: We've considered one alternate, which would tap either the present line, or an additional --

COMMISSIONER SHANNON: When you say present line, what do you mean?

THE WITNESS: The present line, the Mt. Storm to Doubs line, or a new line that might be built in this vicinity, and bring it down into a 500 KV line, 15 miles, or a loop, really, 15 miles down, 15 miles back, preferably on separate right of ways, and putting a 500 to 138 KV step-down on it, in the Winchester area, and extending 230 down into the Strasburg area, as well as some 138 KV lines in addition to pick up the reinforcement into Riverton

[TR. P. 602]

and into Winchester.

COMMISSIONER SHANNON: Now, my next question is you indicated that sometime around 1980, rather than do what you just described, you are going to tap onto the proposed Mt. Storm - Morrisville line; is that correct?

THE WITNESS: Our plan that we would envision here would be to tap the line at Vaucluse, which is right on the proposed route.

COMMISSIONER SHANNON: Where is that, Frederick County?

THE WITNESS: Yes. Frederick County, near Strasburg.

And there would be no additional 500 KV line involved in this, but there would be some 138, however less 138's than it would if you came from Winchester.

COMMISSIONER SHANNON: You would have to have a substation?

THE WITNESS: A 500 to 138 KV substation, and for VEPCO's use we may have a separate transformer to 230, 500 to 230, to supply the northern Shenandoah Valley area.

[TR. PP. 603-606]

THE WITNESS: I could give you a copy of the two plans, or I could submit a copy of the two plans that we have developed showing the alternates.

COMMISSIONER SHANNON: That might be helpful to have that, if Mr. Brasfield would like to put those in.

MR. KAY: Just happen to have those ready.

MR. BRASFIELD: Just happened to have them ready.

THE BAILIFF: LHW2.

COMMISSIONER SHANNON: All right. Are there two here?

CONTINUED

MR. BRASFIELD: There are two sheets to this. Alternate A and Alternate B.

COMMISSIONER SHANNON: All right. Why don't we receive them together as LHW2.

(Documents marked and received as Exhibit LHW2.)

COMMISSIONER SHANNON: Give me an extra copy.

MR. KAY: Both of these are going to be LHW2?

COMMISSIONER SHANNON: Yes. Collectively. They will be LHW Number 2.

THE WITNESS: Could I explain these, if there is any questions with regard to the plans as shown here?

BY MR. KAY:

Q All right, sir.

A Alternate A would involve a substation at Vaucluse, northeast of Strasburg. It would be a 500 to 138, and a 500 to 230 KV step-down.

We would have about, in the 1980-'81 period, about 600 megawatts of load.

In addition to this load, VEPCO has a load in the northern Shenandoah area would also be served from this point.

The 138 KV lines that are needed for reinforcement are shown as dotted lines with two running back towards a line shown as Red Bud to Double Tollgate, which is in the Winchester area.

We estimate the cost of these facilities at about three and a half million dollars. That's exclusive of the substation cost, because the substation is common to both plans.

Alternate B would involve building a line from the vicinity of Stonewall to a point marked Substation, which is immediately east of the Winchester, Virginia area, with 138 KV reinforcement to the Millville to Double Tollgate line, and extending a line that runs from the substation to Riverton, into Riverton, and the 230 KV line from the substation to Strasburg, along with a parallel 138 KV line.

The estimated cost of this reinforcement, exclusive of the substation cost, is about $9.9 million.

COMMISSIONER SHANNON: Nine point nine?

THE WITNESS: Yes, sir.

COMMISSIONER SHANNON: Almost $10 million?

THE WITNESS: Yes. A difference of about 6.14.

Alternate B involves 30 miles of additional 500 KV line, and 45.8 miles of 138 and 230 KV lines.

Alternate A involves no 500 KV additions,

[TR. P. 606]

and 26.6 miles of 230 and 138 KV line.

MR. BRASFIELD: Which is based on the VEPCO - Potomac Edison proposal to Mt. Storm? Alternate A or B?

THE WITNESS: Alternate A is based on Mt. Storm to Morrisville via the Riverton - Strasburg area.

TESTIMONY OF LIONEL O. BARTHOLD

[TR PP 632-635]

Q Please state your name and address.

A My name is Lional Barthold. I live at 7 Parkwood Drive, Burnt Hills, New York 12027.

Q What is your present professional position?

A I am President of Power Technologies, Inc. of Schenectady, New York. I have served in this capacity since August, 1969, and was instrumental in the organization of the firm. Power Technologies, Inc. is a firm of consulting engineers specializing in advanced technical work in power system planning, design, and operation.

Q Would you summarize your previous professional experience.

A After a short assignment with Public Service Co of Indiana, I joined General Electric in 1952. I held a variety of assignments, most of them involving the analysis of large power systems and, in particular, problems relating to the design of high voltage lines. In 1963, I was named Technical Director of Project EHV, a research station for development of 500 KV and 765 KV transmission line design information. I was later instrumental in converting this to an ultra-high voltage research program, extending tests to 1500 KV. This research is continuing under industry-wide

CONTINUED

sponsorship. In 1965, I was named Manager of Transmission Engineering for the Electric Utility Engineering Operation of General Electric, where my responsibilities covered most of the technical and economic areas dealing with power transmission. I served in that capacity until leaving to form Power Technologies, Inc. in 1969.

Q What is your educational background?

A I have a Bachelor degree in Physics from Northwestern University in 1950. I have since completed quite a number of specialized courses in power, but have pursued no further degree programs.

Q What other professional involvements or qualifications bear on your qualifications to testify in this proceeding?

A I am a licensed professional engineer in the State of New York, and active in a number of U. S. and international standardization groups and professional societies. I was recently elected to Fellow Grade in the Institute of Electrical and Electronic Engineers, the main professional association for power engineers in this country.

Q Would you cite some of the types of work done by Power Technologies.

A Our work is quite varied, but I will try to give you some examples. In system planning, we review load growth forecasts and make recommendations on the timing

and type of new generation facilities, and do pretty much the same thing for transmission additions. I should point out that in this case, as in others I will cite, we work in several ways. Oftentimes we simply perform the studies and make specific recommendations. In other cases we work on the development of methods for solutions, usually colminating in a digital computer program. In some cases our role is mainly educational.

PTI has also been quite active in preparing computer programs for system operating centers. These programs help operators decide when generators should start up, how the load should be shared by generators, and include programs which assess the ability of a system to survive the unexpected loss of large generators, important transmission lines, etc. I might add that both planning and operating studies are deeply concerned with questions of system reliability.

In other areas, our firm studies the design criteria for both overhead and underground transmission lines. For overhead this would normally result in recommendations for the wire size, height of towers, and things of that nature. In underground it might lead to the recommendation of cable size and types. In both areas we are quite active in research projects seeking reduction to practice of new principles or improved efficiency.

Q Is your work mostly for electric utility

[TR. P. 635]

companies?

A Most of our work is. However, a significant portion of it is for electrical manufacturers serving the utility industry. Some is for power pools or other large groups of utilities. We also do work for government agencies, industrial plants, and for architectural consulting firms. Incidentally, about half our work is within the United States, the balance being overseas - mostly in Latin America.

Q Have you previously testified in court or in commission proceedings?

A Yes, in the State of Pennsylvania during development of the first 500-KV lines there.

Q What is your relation with the present hearing?

A I have been retained by VEPCO and APS to review the general system planning work on which the need for new transmission facilities is based, and to comment on those plans particularly with respect to system reliability.

[TR. PP. 637 - 649]

Q Does proper reserve generation eliminate the need for interconnections with other areas?

A Theoretically, if a company had a very high level of reserve, say in excess of 30%, interconnections would

be less important, but apart from being an extremely expensive way to build a system, it would require the construction of many more plants than is the case when a system is interconnected with its neighbors. Although interconnected companies do not normally plan to depend primarily on reserve capacity of neighboring systems, interconnections serve as important "backup" for unexpected power plant construction delays, or to meet unusually severe contingencies. Of course, interconnections serve other purposes too. They allow the sale of electric energy from one utility to another where economic advantages can be gained from this.

Q Are there other aspects of electrical service quality which benefit from strong interconnections?

A Yes, there are. Apart from reducing the risk of "blackouts" or total shutdowns, a strong transmission system reduces the effect that emergencies often have on excursions in voltage or frequency. Such excursions can damage equipment both on the power system and within the user's premises.

Q When you speak of interconnections, do you mean the transmission lines which go from a substation of VEPCO or Potomac Edison, for example, and terminate at another company's substation?

A Such lines are, of course, what are mainly thought of as interconnections, but in order for a utility to make use of these interconnections, it must have sufficient

transmission capacity internally to be able to accept imported power in emergencies without overloading its own facilities.

Q Is there any way of measuring the adequacy of interconnections with other companies?

A There are several ways of doing this. The most meaningful is probably in terms of an "emergency transfer limit"; that is, the amount of power which a system such as VEPCO or APS can effectively import from other companies during a sudden emergency -- above and beyond the normally scheduled import or export of power. Incidentally I use the words "effectively import" since the limit to imports is most often determined by the danger of overload or failure of one or more elements of the system.

Q How do you determine what an adequate emergency transfer limit really is?

A There is no precise, generally accepted method for assigning a value. For most systems I would say it should range from 15% to 25% of importing systems peak load depending on, among other things, the amount and type of generating reserves within a system itself.

Q Have you examined some of these reliability indices insofar as the VEPCO system is concerned?

A Yes I have. Because of delays in new facilities and unscheduled outages of equipment all beyond the company's control VEPCO had no generation reserve at the time

of the 1972 summer peak. Continuing to operate with inadequate reserve will inevitably result in blackouts and extended service interruptions.

According to VEPCO plans, anticipated reserve levels will vary from 11.5% to 19% over the next seven years if all presently planned generation can be installed on schedule. Delay of any generating units would reduce the reserve anticipated. For reserve levels as low as are anticipated in the next several years, I would consider it important that VEPCO maintain an emergency import capability equal to at least 25% of system peak load. This would require the ability to import an extra 2000 MW beyond normally scheduled flows in 1974.

Q What is the limit as the system stands now?

A System studies performed by VEPCO indicate that without new transmission lines, this limit will be less than 400 MW in 1974. While we did not make independent studies of this, I have reviewed with VEPCO engineers some of the critical cases they have studied and have no reservations whatsoever as to the accuracy of the calculations or the general assumptions made.

Q What will this combination of import limits and reserve level mean insofar as VEPCO customers are concerned if no additional transmission is constructed?

A It would appear to me that VEPCO will be

exposed to undesirably high risk during the 1974 summer peak, even if the transmission lines that are the subject of this proceeding were approved today. But, the necessary facility cannot be completed in time for the 1974 summer peak. So the real question is how severe the problem is likely to be, and whether it can be corrected in time to provide normal service reliability in 1975.

Q Of the transmission line additions requested by VEPCO and APS, which are important to the improvement of this emergency transfer limit?

A The most important is certainly the Mt. Storm to Morrisville 500 KV line. This line, when completed, will bring the emergency transfer limits to somewhat in excess of 2000 MW. Of course, to make this line operative requires construction of the terminal station at Morrisville and its interconnection with major buses in the northern portion of the VEPCO system.

Q Is this the main justification for the construction of this line?

A Probably an even more fundamental function of this line is to provide reasonably reliable delivery of the output from the third generating unit at Mt. Storm to VEPCO load centers as well as from APS generation to the Potomac Edison load centers.

Q Have you reviewed the alternatives to the

Mt. Storm - Morrisville line?

A Yes, I have. A number of proposals have been looked at by VEPCO and APS, both jointly and independently, but the only alternative that I feel to be comparable in function is the doubling up of the entire northern and southern portions of the 500-KV loop.

Q Would you consider it a reasonable alternative to double up only the Mt. Storm - Loudoun portion of the 500 KV loop?

A No, it would not provide sufficient reliability to be considered an alternative to the plan proposed by VEPCO and APS. For example, the Federal Power Commission stated in its July, 1967 Report to the President entitled "Prevention of Power Failures" the following:

"Special attention should be paid to transmission line routing, and to switching arrangements at generating centers and at principal interconnections in the transmission network to provide meximum reliability in emergencies.

The economic growth of the industry will, of necessity, require a concentration of large amounts of power at generating centers and the movement of large blocks of power on transmission rights of way. Particular care should be taken to avoid excessive concentration of critical circuits which would expose the system unnecessarily to large loss of capability."

The industry generally complies with this admonition by planning its system so as to be able to survive the loss of all transmission lines located on a single right of way. If the Mt. Storm - Loudoun transmission line were to be paralleled by another 500 KV line on adjacent and contiguous rights of way, VEPCO would have to design and build the remainder of its transmission system to withstand the simultaneous loss of both of these lines. It is for this reason I have stated that the entire 500 KV loop would need to be paralleled with a 500 KV line. If a transmission line paralleled to the existing Mt. Storm - Loudoun line is to be considered as an alternative, doubling up the whole loop would enable the company to withstand the loss of both circuits at any particular location.

Q Do you see any disadvantages in this alternative from a system viewpoint?

A Only from the standpoints of cost and land use. It would appear to be a substantial waste of resources. I am advised by Mr. Donald N. Rice, who will testify in this proceeding, that the additional cost of this alternative above the cost of the Mt. Storm - Morrisville line would exceed $50 million. Based on my experience with 500 KV construction, this factor appears to be accurate. In addition, Mr. Rice advises that it would require some 1,965 acres of additional right of way which would of course, have to be

cleared of trees and obstructions. I consider this a very poor engineering alternative to the plan developed by VEPCO and APS.

Q Are there opportunities to upgrade circuits to a higher voltage instead of clearing new rights of way for the Mt. Storm - Morrisville line?

A I believe there are short sections of 138 KV line along this route but apart from the fact that they do not represent a significant part of the distance, there are overriding system problems which would not permit conversion or replacement of these lines as part of the 500 KV system.

Q What are these considerations?

A A transmission system is analogous in many ways to a system of roads. In both cases, the functions served divide themselves naturally into echelons. It would be foolish, for example, if a new interstate highway which was to pass near a rural road were diverted to take over the road's right of way; even if the right of way were wide enough. The need for the rural road would remain and a new one would just have to be built.

This is probably a fair analogy to 500 KV and 138 KV power lines. The 500 KV line can carry about 15 times as much power as a 138 KV line, and they serve totally different functions in the system.

Incidentally, the fact that they do serve

different functions, makes it more reasonable to have lines of different voltage level share a common right of way than to have two lines of the same voltage do so -- particularly where the two lines in the latter case are a part of the "backbone" of the system.

Q The Mt. Storm - Morrisville line is also to be partly built by APS. Does this line benefit their system too?

A Yes. As I explained previously, nearby utility companies gain substantial mutual advantage by interconnections. Each company gains a more reliable supply, reduces its cost of production, and builds fewer power plants.

Q What specific aspects of APS system operation will be served by the new line?

A I'll answer that in two parts, the first dealing with internal operation of the APS system. A portion of the APS load is in the Northern Virginia area. There is very little generation capacity there and very little potential for developing any. It is essential then that adequate transmission capability exist from the APS central system to this load area. The Mt. Storm - Morrisville line will serve as a needed addition to APS East-West 500 KV facilities in Pennsylvania and Maryland which by the mid-1970's will be fully utilized for normal transfer to loads in their Eastern System.

Q Will the line also serve APS in their relationship to other utilities?

A Yes, it will. I previously explained the role this line plays in allowing VEPCO to import power from APS during emergencies. Of course, this benefit is reciprocal. Furthermore, corresponding benefits in emergency transfer limits accrue between APS and VEPCO vis-a-vis other surrounding utilities and power pools.

Q You have cited a number of benefits for this line beyond its basic role as a means for transmitting energy from the Mt. Storm plant directly to the VEPCO system and transfer of energy from the APS system to the Potomac Edison load area. Aren't these functions mutually exclusive? Can they all be served simultaneously?

A In fact, they are all served simultaneously. Emergency transfer capacity for example is based on changes in power flows beyond the scheduled normal flows. Emergency transfer, like all risk minimizing, is based on probabilities. Obviously, if APS and VEPCO had large generators fail at the same instant, emergency transfer capacity between them would be of little consequence. But even in as extreme a cst as that, the Mt. Storm - Morrisville line, the Morrisville - Bristers line, and the Morrisville Substation would help the two systems get support from surrounding systems.

Q Have you looked at the proposed routing of

the North Anna to Morrisville 500 KV circuit?

A Yes. To begin with, there is no question but that the output of the North Anna plant will initially require two 500 KV circuits to the North. It is certainly preferable and considered normal engineering practice to seek at least two independent rights of way for lines emanating from a given plant, and to terminate these lines in different substations of the system. The VEPCO proposal, with two entirely separate right of way (North Anna - Morrisville and North Anna - Ladysmith), is certainly a more satisfactory way of dealing with reliable integration of the North Anna plant into the system.

Q Do you conclude that the plans for the 500 KV lines that you have discussed as prepared by VEPCO and APS are sound ones?

A Yes. It is a very efficient way of accomodating load growth with a minimum of new construction. The proposed plan will really serve three purposes.

(1) It will allow an adequate supply of power to Northern Virginia under normal conditions.

(2) It will maintain reasonable reliability of supply to that area, and

(3) It will enhance VEPCO's ability to exchange power with neighboring systems to the north and will simultaneously benefit APS in the same way.

I am not aware of any signel alternative plan that could achieve these three requirements that these companies face.

Q Have you reviewed the other transmission additions requested by VEPCO; namely the Morrisville - Remington 230-KV line?

A Yes. It is apparent that some means of additional supply capacity to Remington is critically needed. The 230-KV circuit suggested appears to be the most practical solution.

Q Another specific request being made by VEPCO is for a new 115-KV line from Remington to Warrenton. Can you comment on the need for this particular line?

A Yes. Warrenton presently has service from two 34-KV lines. Because of the length involved, two such lines are not adequate to maintain reasonable standards of service in the Warrenton area. This load is now about 15,000 KW at peak periods. VEPCO has extended the adequacy of these lines by installing voltage regulators in them. In one of the lines, regulators have been installed at two points and one is up to its current carrying limit. At this point, even with regulators there is no way of maintaining satisfactory service to Warrenton during even minor emergencies or maintenance periods.

Q Does the proposed 115-KV line represent the

[TR. P. 649]

best solution to this problem?

A It is almost an obvious next step. At the growth rate of loads in the Warrenton area, an additional 34-KV line would be far too short-term a solution. A new 115-KV line will more than double the power that can be supplied to this area and at the same time improve both reliability and voltage quality.

[TR. PP. 653-654]

Q Mr. Barthold, would you please give us your overall evaluation of the proposal put forward by VEPCO and APS.

A It is clear that VEPCO and APS have need for the transmission capability they have proposed to construct. Without such capability, VEPCO will be unable to reliably transport the power from the new generating units at Mt. Storm and North Anna and will also be unable to import necessary additional capacity from neighboring utilities. Without them, APS will be unable to serve its loads in the Potomac area. Without these lines, the reliability of both systems will be reduced and power failures and shortages can be anticipated.

The studies performed by VEPCO and APS to define their system requirements are quite thorough. Their engineers have examined alternatives to each of their requirements and in my opinion have done a very good job in planning additions to their transmission facilities. These plans have been very closely coordinated with neighboring power companies and power pools to assure that construction of new facilities, both power plants and transmission lines, are kept to a minimum consistent with reasonable standards of electric service. The facility additions, now the subject of this proceeding, will do an excellent job in meeting the needs of VEPCO and APS customers.

[TR. PP. 656-657]

One of the most fundamental tasks of whether they do achieve the same function is whether their reliability is equivalent to the system and as has been pointed out, various reliability councils in the United States, including SERC, have, through their experience, come up with criteria for measurement of the reliability of interconnections between systems.

This involves the cascading criteria, which I mentioned, which is common, incidentally, to all nine of the

reliability councils in the United States, as well as similar interconnecting groups in Europe.

In the present case, if the west to east line is built on an independent right of way, the system will meet that criteria. If it is built on a common right of way with existing facilities, it will not meet that criteria, and therefore is not an equivalent solution unless other facilities are built.

[TR. PP. 659-660]

Q All right. And the purpose really of your study and your testimony is to confirm Mr. Stallings' offering that the 500 line is needed for internal loads, for transfer capability, and should not be on the same line?

A That's correct.

[TR. PP. 662-667]

Q The reliability you look for or the reliability that you propose the company attain by certain design features depends on the contingency you are guarding against?

A That's right. In fact, it is the contingencies which you design to define the measure of reliability.

Q And, for instance, whether we are concerned with a single house, a town, a city or state --

A That would be an example of criteria which you could set, yes, sir.

Q And I believe Mr. Stallings has spoken of concern with the Eastern Seaboard?

A It is my opinion that that's the scope of the issue in these facilities, yes.

Q Could you expand on that comment, just what we are guarding against, geographically, companywise?

A Yes. I have been asked to prepare independently,

CONTINUED

or to do some studies in preparation for rebuttal testimony for November 1st.

Some of this work has been completed, and if I can demonstrate -- if I can introduce some figures, what those studies so far have shown in the 1980 system.

Would it be appropriate to do that?

Q I would like to hear them.

A I believe there are about nine sheets here, which comprise part of this work.

THE BAILIFF: LOB1, sir.

COMMISSIONER SHANNON: LOB1.

(Document marked and received Exhibit LOB1.)

THE WITNESS: This was prepared for rebuttal testimony, so it is a part of studies which have not yet been complete, and I just picked these up before I came down on Wednesday.

Shall I go through and explain the content of these?

MR. ROGERS: I would like to hear them.

MR. BRASFIELD: Does the Commission have copies?

COMMISSIONER SHANNON: Yes.

A The first sheet is quite simple and illustrates a very basic principle of transfer from one area to another.

In the top set of figures you see three lines

connecting two areas. They might be analogous to the two main existing east to west lines, the one from Hatfield Ferry to Doubs, and the Mt. Storm - Doubs line, and the third line would be a proposed additional line.

It shows that with the contingency, one right of way lost, the overload on the other lines would be about 50%.

The second set of figures just illustrates that if that new line is put on the right of way with one of the existing lines, and the right of way is lost, the overload is three to one on the single remaining line.

Now, this is a very simplified approach, and the analogy is made more detailed in the figures which follow.

I should point out, perhaps, by way of background that these were run on our own computer, independently. They were based on information which we derived or got from both APS and VEPCO, and this particular computer system is capable of following a disturbance a little bit further down into the disaster area before it gives up.

I also should point out that the cases we ran here represented conditions which would not normally be studied in a system planning study, because to an experienced planner many of them would be obvious. But I thought they would be illustrative in this case.

Case A represents what you might call a base

case, where everything is rosy. Its transfer represents a 5,000 megawatt transfer from ECAR to PJM with all of the planned facilities for 1980 in place.

I've shown in the figure the current corresponding to the megawatt flow in the Black Oak - Doubs line, that one being critical.

Case B, which supposes the Morrisville alternative, shows that right of way lost and shows the Black Oak flow increased to 2,235 amperes, and about at the continuous rating limit of that line.

Case C shows the alternative that has been discussed with a parallel line, or contiguous line from Mt. Storm - Doubs - Loudoun not tied in at Doubs.

With the loss of that right of way, the Black Oak - Doubs line increases to about 45% over its emergency short-time rating, and the underlying 138 KV lines in that region are very heavily loaded.

They are not shown on this illustration.

The logical result of that condition would be fairly rapid tripping of the underlying 138 KV lines in that area, and that is shown on Case D.

The current now in the Black Oak - Doubs line is up to 3800 amps, or about 63% over its emergency rating, and from that point you can hypothesize one of two things, neither of them very optimistic.

With that current level there is very little time to correct the situation. If there were time, as shown in Case E, if 40% of the load in the northern division were dropped, then the loading on that line, the Black Oak - Doubs line, would drop to 2650 amperes, which is its present half hour rating.

Having been already loaded up by the previous current, it is doubtful that that line would stay in service and would eventually trip itself -- be tripped itself, and that would lead to Case F, where that line is tripped.

Now, you will see the voltages appear to be restored to normal in Case F, but what happens here is that in the transition, and with the opening of that line, the angle between those two parts of the system changes suddenly by 40 degrees which indicates clearly that there will be a split in the system starting here and propagating north, probably up to New York and south some equal distance, and probably further along the general pattern that we had in New York in 1965.

So, this is without question a cascading condition.

In this case, and in an attempt to further explore some ideas, we ran Case G, where, supposing that the problem could be solved by tripping generation at Mt. Storm simultaneously with taking those lines out, we tripped the

[TR. P. 667]

two circuits and two units at Mt. Storm, but the reduction in loading on the Black Oak line was very slight, and one might expect that the power flow which was formerly supplied by Mt. Storm is now being supplied by ECAR to the west. So that is not a viable alternative. That is sometimes useful on completely radial systems where a power plant has only one route and it is supplied to a system.

In Case H and I, they merely repeat the condition originally tested but with the transfer to ECAR reduced to 3,000 megawatts, and these cases show that the problem is still there at 3,000 megawatts.

Our indications are that it would take the reduction to something like 2,000 megawatts to provide a safe transfer.

That's a long answer to your question.

[TR. P. 667-668]

BY MR. ROGERS:

Q You didn't venture or didn't study with any detail what would happen after the Hatfield Ferry - Doubs line, or do we need to go any further?

A There is no need to go any further. It would require modeling the entire Eastern Seaboard and it would show the sequential breakup. It would show the path that the split would take, and you could demonstrate within the broken system what parts. But it would be similar to the propagation in 1965, except with Washington as the center instead of New York City.

Q You say the split path to follow, you mean following the tripping circuits?

A Yes. The circuits would trip.

COMMISSIONER SHANNON: Mr. Barthold, when they had that blackout, I believe in the fall of 1965, in the northeast, was that as a result of a cascading situation such as you were describing here?

THE WITNESS: Yes. Exactly. It began with the tripping of -- I believe they were 230 KV circuits in Canada and propagated down through the 345 KV system in New York State.

[TR. PP. 670 - 681]

BY MR. MASSIE:

Q Mr. Barthold, I just want to inquire a second

on something Mr. Rogers went into.

Now, when you were employed, and I want to quote this on alternates, really, you were asked to confirm the VEPCO study or to not confirm it.

A I was asked to examine it and come up with a conclusion as to whether I thought it was responsive to the problem.

Q And at that time you were also asked to examine alternates?

Well, you were at some time asked to examine alternates?

A I've forgotten. I'm not sure that a specific scope was written down. I interpreted my scope as examining alternates, or asking whether alternates had been considered, yes.

Q Well, that is really my question.

Now, did you make any attempt, or were you asked to make any attempt to propose alternates, or were you asked to examine alternates that had already been considered, or was it within your scope to propose an alternate if in fact --

A I think that in the course of discussions with the planning engineers in VEPCO, I principally asked a series of questions of whether something was considered and so forth, and developed through that method the background

of the problem to the extent that I was engaged to examine it.

I did not go into detail, for example, on the alternate locations of Morrisville - Remington - Bristers, and that kind of question.

I was more concerned with the basic bulk supply problem in the VEPCO area.

Q All right. Well, what I'm really getting at is, if we can focus on -- anything really will do.

This is your Case A.

MR. MASSIE: Is this an exhibit or is it not?

THE BAILIFF: Yes, it is.

MR. MASSIE: What is it?

THE BAILIFF: LOB1.

BY MR. MASSIE:

Q Your Case A, just for illustrative purposes, I note in your testimony your thoughts as to the alternate, the alternate of paralleling, or of coming up with the paralleling and adjacent line from Mt. Storm - Dooms - Elmont through Loudoun to Doubs?

A Yes.

Q And your conclusion, of course, was very similar to Mr. Stallings.

Is that the only alternative you considered to backing up this Mt. Storm to Doubs line if it were done that

way? Did you make any attempt independently to determine if there were any other ways this reliability could be had?

A I did challenge each solution of that type. I can't recite a history of what my alternate suggestions were, because this was in a conversational mode.

Q I understand.

A As I recall, the question of reinforcing the system through the northern route came up, but this actually aggravates another problem, that is, the problem of voltage in the Loudoun area.

Q Exactly where does that aggravate the problem?

Now, let me point out exactly what question I'm asking you.

I took it to mean that you recall discussing the alternate rather than bringing the adjacent line down to Dooms, of going from Mt. Storm to Black Oak to Doubs, and completing the loop in that manner?

A Yes.

Q And now you are going to tell us exactly where it complicates the problem to do that?

A Right.

Q Okay. Could you do that?

A Yes. If I can introduce another -- I did look at that, because that was of concern to me, and if I can introduce another exhibit, I can illustrate this.

THE BAILIFF: LOB2, sir.

THE WITNESS: I can illustrate this point, I think.

COMMISSIONER SHANNON: I inadvertently referred to the first exhibit as LB. It's LOB.

That was LOB1. This will be LOB2.

(Document marked and received as Exhibit LOB2.)

A Now, this exhibit is based on 1974 loads, but it illustrates the points you bring up, I think, quite well.

There are three replicas of the same system area, principally the Doubs to Loudoun area with a little bit of the 230 KV in that area illustrated, also.

By the way, this set of diagrams is based on a 600 megawatt import by VEPCO, which is a very light-weight import for a system of this size.

The top illustration would be a base case for normal flow.

The second case, the center one, shows the Doubs - Loudoun line tripped out, although the Dickerson - Pleasant View line at 230 is on the same right of way, and it is not yet tripped out.

That line is over its rating, the Dickerson - Pleasant View 230, and would have to be tripped, and the lower figure shows that line tripped and shows the voltage at Pleasant

View down to 89%.

Unfortunately, the diagram doesn't show further into the 230 KV system where the voltage does down at Arlington, I believe, to about 87%, well below the tolerance level.

So, this shows the problem that VEPCO is confronting right now.

If one were to reinforce the system at the northern end, this problem would be aggravated rather than solved.

If the system is reinforced at the southern end, it will achieve all the other objectives I have been talking about in addition to solving this voltage problem.

Q All right. Now, I would like to ask you about this base case just a second, and to do that, could he have MAJ1, which is LDH1, the original, the colored map.

THE BAILIFF: LHW1.

MR. MASSIE: LHW1.

BY MR. MASSIE:

Q Now, I would like to ask you two questions, and I presume you will probably answer my second one first, but if you can just answer the questions it will be simpler.

In this base case study that you have shown us on LOB2, did you assume the 500 KV from Possum Point through Burches Hill, Chalk Point, Calvert Cliffs, Chapel, Brighton,

to be in existence?

A Which ones are these?

Q It's in the southeast corner of that map.

A Well, these --

Q Well, just answer that question. I'm going to then ask you the question you probably want to answer.

A The base case which I ran assumed existing facilities. This is a 1974 system.

Q Would that make any difference?

A I have no way of telling that without studying it specifically.

Q Do you think that it might? Does it appear that maybe some of that load -- that some of that pressure would be relieved by the existence of that route?

A That's possible, but I couldn't confirm it without a study.

Q Well, you note that they say that they are authorized 500 KV lines, at least that map shows that.

Do you see that?

A Yes.

Q And I gather that what you are saying is that this LOB2 did not -- you are certain that that did not -- that base case did not contain those lines since they are not existing lines?

A That's correct. We did do a study for 1980

conditions, which does represent those facilities and shows the same problem.

Q Where is that study?

A I have --

Q It shows the same aggravation at that area, even with the looping from the north?

A Yes. I can show this on this diagram, if I may introduce this.

THE BAILIFF: LOB3.

BY MR. MASSIE:

Q This shows the looping in the north, the existence of these lines over here, and the consequent aggravation at the Loudoun area?

A Yes.

THE BAILIFF: LOB3.

COMMISSIONER SHANNON: This will be LOB3.

(Document marked and received Exhibit LOB3.)

A (Continuing.) This diagram represents studies to test the ability of VEPCO to import 2,000 megawatts, which is a fairly low level for the 1980 system, and it does it with the two alternatives that have been most discussed here. One, the Mt. Storm - Morrisville line, and another one the Mt. Storm - Doubs - Loudoun line.

This assumes all the 1980 facilities in place.

The column on the left, the Mt. Storm - Morrisville line, shows the outage of the Doubs - Loudoun circuit, shows the Dickerson - Pleasant View line overloaded, and the center figure, Figure B, and then Figure C shows it tripping but with no consequent problem on voltage in the northern division area.

On the right it shows a looping to the north on a contiguous right of way with the existing line, same system conditions. The loss in Figure E shows the loss of those two circuits, and the consequent and heavier overload of the Dickerson - Pleasant View line. F shows that line tripping, with the drop of Pleasant View voltage to 87%, and I don't have the figure with me, but I presume the voltage at Arlington is even worse.

This is a consequence of having strengthened the line to the northern system through the northern route.

Q You mean that was a specific assumption of this, or it just doesn't make any difference whether it strengthens it there?

Is there an explicit underlying assumption of LOB3 that it is strengthened in the northern loop that I just postulated, or are you saying that this would happen whether or not that was done?

A I think it is clear that if -- from this second column, the one where I show the doubling of the loop.

Q Okay. Go ahead.

A I think it is clear from that that with those two circuits, the double circuit out, if the northern part of the system were even stronger by virtue of having doubled up something in there, that the overload in the Dickerson area would be even worse.

Q And what you would have is a picture of Figure F showing the line rather than coming south, going north? Is that correct?

A What is that again?

Q Figure F.

A Yes.

Q The bottom line that represents the Mt. Storm to Doubs circuit going south --

A Yes. The left over system would show a line going north from Doubs, yes.

Q And then you would have the situation of the Doubs to Loudoun line out?

A Right.

Q And you are saying the identical situation would occur?

A That's my estimate. I have not run specific cases to demonstrate that.

Q You are saying there is no other way that the load could be relieved in that area by the fact that this

is -- well, let me ask you this: You would not have the problem of the cascading outage presented on the Hatfield Ferry - Doubs line that we've heard so much about?

A Let me look at my own exhibit.

Q Would you?

A What you say appears to be correct.

Q So, then, the problem to deal with under that circumstance is the low voltage in the Loudoun area?

A Right.

Q Okay.

A But at that point you've already built two lines to solve the same problem that would have been solved by one.

Q All right. Now, let me just inquire a second about reliability.

Mr. Rogers has been over it. Everybody has been over it. But just to put the reliability question in perspective.

I gather that it is just a basic rule, accepted everywhere, that in designing a case or a system, where you have adjacent lines, you have to plan for those lines going out at the same time?

A That's correct.

Q And the percentages of whether or not it will happen are irrelevant; the fact is that it is just a basic ,

[TR. P. 681]

accepted axiom of planning?

A Yes. The probability is relevant only to the judgment point where it happens often enough that people feel it should be designed for.

If it were an academic instance, it probably would not be in the criteria that people use.

[TR. P. 687]

BY MR. KAY:

Q Mr. Barthold, when were these studies that are represented by your four exhibits made?

A Some of this material was finished as late as last Wednesday.

These were prepared as a part of some work that we were doing for rebuttal testimony submission.

Q When did you start on them? After you got the prefiled testimony from the Intervenors?

A Yes, sir.

Q And I think you said that the studies are not yet complete.

What remains to be done?

A I can't cite what cases we are anticipating yet, because it has been so recent that we completed these. We are just reviewing them to see if there are additional cases that would supply more information on the problem.

[TR. P. 695]

Q And on Page 4 of your testimony, Line 11, you recite that your assignment was to review the general system planning work upon which the need for new transmission facilities is based, and to comment on those plans, particularly with respect to reliability; is that right?

A That's correct.

Q But at the time you were engaged, VEPCO and APS, the Applicants here, had already determined that a line should be built from Mt. Storm to the Morrisville area; is that correct?

A Yes.

Q In fact, I suppose by that stage Morrisville itself had been selected?

A It had been identified as the suggested termination.

Q So you were not engaged to do any of the planning work itself but merely to review the planning done by the Applicants?

A That's correct.

[TR. PP. 699-700]

Q And so your assignment then was not to assist VEPCO in trying to develop a way to use the existing rights of way for the new transmission needs that we have, was it?

A No, it was not.

Q And prior to, say, April of this year, did you make any independent studies concerning the feasibility of using existing rights of way?

A If the term "study" means duplicate computer simulation, the answer is no, we did not.

But I might point out that our simulation did overlap cases which VEPCO has run sufficient to confirm that we are getting the same result, so I would construe examination of their cases and of the assumptions as a study, in which case the answer to your question would be yes.

[TR. PP. 713-715]

Q Did you, independently, attempt to come up with a reasonable alternative which would permit the use of the existing or expanding corridor, other than come around that whole circle?

A I'm sure I suggested or, in the process of trying to understand what the problem was, in the discussion involved, implied other alternatives, such as the doubling circuiting of one line to Doubs and the busing of it at that point and so on.

This was done in discussions. It was not done by specific computer studies on our part.

Q So the answer is you did not attempt to set out affirmatively to try to find a reasonable alternative to this entire loop and still use existing right of way?

A I don't know what you mean by affirmatively.

CONTINUED

I believe that I examined the cases and conclusions in a sufficiently inquisitive and skeptical vein to have sought out what alternatives would be sensible and to test the assumptions and reasoning that led to the ones that were presented here.

Q Well, your assignment was to review the route already tentatively arrived upon by VEPCO, was it not?

A Yes.

Q Your assignment was not to try to find a way to use the existing right of way from Mt. Storm to Doubs to Loudoun to accomplish the same purpose?

A These to me mean exactly the same thing.

If I'm asked to review a certain solution, that means to me to examine alternatives. I don't know how you can critique a solution without examining and looking for alternates that will do the same job.

Q But as I understand it, the alternates that you reviewed, according to your testimony, were the ones that VEPCO had proposed?

A Well, if you mean did I come up with any solution that involved neither double circuiting or an independent line, no, I did not.

Q Did you try to?

A Yes.

Q You did try to?

[TR. P. 715]

A Sure.

TESTIMONY OF BRUCE HOWLETT

[TR. PP. 757-764]

Q Please state your name and address.

A My name is Bruce Howlett and my business office is located at 2 Marvin Avenue, Brewster, New York.

Q What is your present professional position?

A I am President of Bruce Howlett Inc., environmental planning consultants.

Q Would you summarize your previous professional experience?

A I have been engaged in regional planning and environmental studies for over twenty years. I have directed regional open space and other planning studies in the Chicago region and in metropolitan Seattle. Prior to establishing a

CONTINUED

consulting practice in 1970, I was Associate Executive Director of the Hudson River Valley Commission of New York where I directed a large interdisciplinary staff in environmental planning studies and the review of projects within the Hudson River Valley corridor.

Q What is your educational background?

A I have a Master's Degree in Regional Planning from Harvard University. I also studied planning at the University of Chicago and engineering at the University of Alberta, Canada.

Q What other professional involvements or qualifications bear on your qualifications to testify in this hearing testimony?

A I am a member of the American Institute of Planners, the American Society of Planning Officials and the Regional Science Association. I am a founding member of the Hudson River Environmental Society.

Q Would you cite some of the types of work done by you and your firm?

A We have been employed by several utility companies to undertake environmental studies of high voltage transmission lines ranging from 115 KV to 500 KV in New York, Connecticut and Arizona. I have prepared an environmental impact statement for the Lake Tahoe Basin and have collaborated in environmental, recreational and planning studies for Ross

Lake in the Ross Lake National Recreation Area and Lake Anna, created by Virginia Electric and Power Company in connection with its North Anna nuclear power station.

I have directed a course in environmental siting of transmission lines and have written articles and publications on the topic, including "Power Lines and Scenic Values" which was prepared during my tenure as Associate Executive Director of the Hudson River Valley Commission. I have testified on environmental aspects of transmission line siting before the Probate Court for County of Lapeer in Lapeer, Michigan, appeared in Federal District Court as a witness for the State of New York in the Hudson River Expressway case and appeared as an expert witness on the environment before the Solandt Commission, established by the Province of Ontario, Canada to study a 500 KV corridor proposed by Ontario Hydro around metropolitan Toronto.

Q Is your work primarily for electric utility companies?

A No. While we have undertaken several studies for utility clients, our firm has also prepared comprehensive planning studies for a county and for a small community. In addition, we have also undertaken environmental studies and reports for the Rockefeller Foundation, the Corps of Engineers, the Central Arizona Project Association, the New York State Atomic and Space Development Authority and the Lake Tahoe

Regional Planning Agency. Some of these studies were undertaken in association with other firms.

Q What is your relation to the present hearings?

A I have been retained by Virginia Electric and Power Company to review the environmental impact of their proposed routes including: North Anna to Morrisville, Morrisville to Bristers, Mount Storm to Morrisville (VEPCO portion only), Morrisville to Remington and Remington to Warrenton. I have also been retained by Potomac Edison Company of Virginia to review the environmental impact of its portion of the Mount Storm to Morrisville transmission line.

Q Would you explain your approach to the preparation of environmental impact studies?

A From the environmental standpoint, transmission planning can be broken into three steps: systems level, in which the entire generation and transmission system is considered; line level, in which the problem becomes one of adding a line or link within the system; detail level, where the exact location of the future line is specified. In this application we are dealing with studies at the system and line level in order to determine potential environmental impacts of proposed transmission routes.

The process followed in this evaluation was to inventory a number of environmental factors in mapped form. First, at the systems level, we made an inventory for a

regional area of about 18,000 square miles covering the northern portion of VEPCO's system, the bulk of Potomac Edison's system in Virginia, and adjacent portions of the Allegheny Power System. Then we made a more detailed inventory for a corridor area about 5 miles wide along the route of each proposed transmission line. Factors that were inventoried in the corridors include existing land use such as residential, commercial, industrial, parks and other uses; proposed land use, largely derived from comprehensive plans, zoning ordinances and state agency plans; natural characteristics such as ridges, slopes, streams and rivers; and visual characteristics including areas visible from principal thoroughfares as well as areas where a transmission line might be exposed to view because of topography.

Q How do you prepare and analyze this information?

A A simple mapping of these data sets was used. Data were prepared on a base map and on transparent overlays over the base map, one for each of the principal sets of data in the inventory.

Q What is the relationship between this approach and the F.P.C. Guidelines which are to be followed, to the extent practicable, as called for in the State Corporation Commission's memorandum of 14 July 1972?

A The F.P.C. Guidelines for the Protection of Natural, Historic, Scenic, and Recreational Values in the

Design and Location of Rights-of-Way and Transmission Facilities describe some aspects of the environment which may be affected by transmission lines and includes suggestions for proper design methods. The Guidelines consist of a collection of 59 items generally pointing out practices either to be followed or to be avoided. These guides are arranged into six categories:

"The Selection and Clearing of Right-of-Way Routes,"

"The Location of Transmission Towers and Overhead Lines,"

"The Design of Transmission Towers,"

"The Maintenance of Transmission Line Right-of-Way,"

"Possible Secondary Uses of Rights-of-Way," and

"The Location of Appurtenant Above Ground Facilities."

Whereas the Guidelines cover all aspects of facility location including design, construction and management, the overlay mapping process provides a method that can be used both in siting decisions and in identifying the location and character of environmental design problems. The overlay mapping process takes all of the Guideline's itemized locational constraints (together with other relevant siting criteria) and places these in a rational spatially organized format. The scope and scale of overlay provide a check on the environmental compatibility of the selected lines and aids in preparing detailed design and management practices.

Q Have you prepared for VEPCO and Potomac Edison environmental studies using the approach you have described?

A Yes. As I indicated I have made studies of environmental impact on a regional basis and on a line by line basis.

Q Please summarize the procedure you followed and the data sources you used to undertake the regional study of the proposed lines.

A While much of the data included in the regional scale study is refined and detailed at the line level, because of the differences in scale, information is more general at the regional than at the line scale in keeping with the different purposes of each study. At the regional scale, the concern is with the entire high voltage transmission system in the north-central portion of Virginia within a broad environmental context. At the line level, the concern is with the location of every house, road, hill and scenic vista as it may be affected by the proposed transmission lines.

In order to evaluate the environmental effects of the proposed lines, a study area was selected extending on the west side from the vicinity of Mount Storm south to a point south and west of Staunton, and on the east side from east of Washington, D. C. to a point southeast of Richmond. The study area includes 27 counties in Virginia, 4 in West Virginia and

[TR. P. 764]

2 in Maryland.

Within this study area it was first necessary to identify broad scale features of the environment that are sensitive to transmission facilities and then evaluate the environmental effects associated with the proposed lines.

To accomplish the evaluation, five sets of environmental data were defined as possessing sensitivity to transmission lines and were inventoried and studied. The five sets of data include: Existing Land Use; Proposed Land Use; Proposed Critical Environmental Areas; Physiographic Regions; and Scenic Contrast. These data are shown on a base map, which I have identified as Exhibit BH-1 and five overlays identified as R-1 through R-5. Overlay mapping was adopted as the most effective method for inventorying and analyzing the five sets of environmental data; it gives maximum flexibility by permitting the consideration of different types of environmental data either separately or in combination. For the purpose of pre-filing my prepared testimony and exhibits, photographs have been taken of the base map, the base map with each of the overlays and the base map with all of the overlays. These photographs are included in the pre-filed material.

[TR. P. 768]

Q Once you inventoried the environmental features on your base map and overlays, what use did you make of that information?

A Of course, the objective of the regional study is to evaluate, from an environmental standpoint, the general corridors selected by VEPCO and Potomac Edison for their transmission facilities. The base map shows these corridors, and the base map and overlays show the environmental features. By putting these together it is possible to determine what environmental features are encountered.

[TR. PP. 771-773]

Q Mr. Howlett, does your regional study enable you to express any opinion concerning the general corridors selected by VEPCO and Potomac Edison for the facilities involved in this proceeding?

A Yes, in a general sort of way. If you look at all of the overlays on the base map at the same time you will get some idea of the difficulties involved in routing a facility such as a transmission line that must cover great distances. I am advised that the principal problem facing the companies was to transport the substantial power to be generated at the North Anna and Mount Storm Power Stations to the

load centers in northern Virginia and the Washington metropolitan areas. Accepting, therefore, the necessity of constructing facilities from Mount Storm and North Anna into that area it is my opinion, subject to detailed analysis, that the corridors selected represent a reasonable accommodation with the significant mapped environmental features found within the region.

Q Have you made the detailed analysis to which you refer?

A Yes, as I indicated, my testimony covers an analysis at the line level as well as at the system level, and

CONTINUED

the line level study is the detailed analysis to which I refer.

Q Please describe the procedure you followed and the data sources you used for your detailed analysis.

A The five proposed transmission lines that were evaluated include the North Anna - Morrisville 500 KV line (32 miles long), the Morrisville - Bristers 500 KV connection to a previously approved point of linkage with the existing 500 KV system (7.75 miles long), the Morrisville - Mount Storm 500 KV line (the VEPCO portion and the Allegheny Power System portion located within Virginia) (46.0 miles long), a 230 KV line to parallel the Morrisville - Mount Storm line from Morrisville to the Remington Substation, (4.9 miles long) and a 115 KV line from Remington to Warrenton (11.3 miles long.)

As I stated previously, to evaluate the environmental impact of these lines, a study corridor 5 miles wide was selected, extending approximately 2 1/2 miles on either side of the proposed alignment. In order to provide an adequate definition of the environmental features to be encountered within these corridors, mapping of all data was done at the 1:24,000 scale (1 inch + 2,000 feet) on U. S. Geological Survey 7 1/2 minute quadrangle sheets. These sheets are sufficiently detailed to show buildings or structures, roads, paths, vegetation, and land contours at 20 (or 10) foot intervals.

As was done for the regional study inventories

of environmental data were prepared on four separate transparent acetate sheets which are overlayed on the base maps. The four inventory overlay maps are titled: Existing Land Use; Proposed Land Use; Natural Features; and Visual-Scenic.

[TR. PP. 778-779]

Q With the base map and overlays completed, how did you proceed with your evaluation?

A Taking each line in turn, we traced its path over the base map and overlays and noted every instance where an environmental impact might occur. Then, following the FPC "Guidelines", we suggested which particular guideline should be used to ameliorate the impacts we found.

[TR. P. 780]

~~in accord with guideline 32.~~ Vegetative screening should be maintained on the north side crossing of Route 20 in accord with guideline 6. A small airstrip about 3300 feet east of the line near the county border should be checked for flight path approach zone.

[TR. P. 787]

After recrossing the Rappahannock River into Fauquier County, the line continues north across Route 635 and over the moderately rugged terrain of a steep hills area which extends to the north of the Blue Ridge Mountains. The line turns northwest again just before crossing into Warren County and continues across ridges and hilly terrain. Particular care should be taken in these areas of high topographic relief. Guidelines 14, 22, 25, 26, 30 and 31 should be closely followed.

[TR. PP. 794-795]

Q What do you conclude from the detailed study of the proposed facilities that you have just described?

A It is my opinion that the line routing proposed by VEPCO and Potomac Edison is such as to generally minimize environmental impact. It is clear from the line location maps, as it was in the case of the regional study, that there is no route that can be selected for any of the facilities that will entirely avoid all environmental conflicts. But these maps also show that the routes proposed by VEPCO generally avoid such conflicts. There might be one or two places where ground inspection might suggest some minor

deviation, but on the whole it is clear that VEPCO and Potomac Edison have done a good job, from the environmental point of view, in selecting the routes they propose.

In my detailed study of the routing I have made suggestions for compliance with FPC guidelines. If these suggestions are followed, and I am assured that they will be, it is my opinion that VEPCO and Potomac Edison will have satisfied the applicable environmental requirements.

SUPPLEMENTAL TESTIMONY OF BRUCE HOWLETT

[TR. PP. 818-819]

COMMISSIONER SHANNON: How long did it take you, Mr. Howlett, to complete your study?

THE WITNESS: Oh, for all of the area it was a matter of, I would say, about four months, five months, something on that order.

COMMISSIONER SHANNON: And when were you commissioned to make this study?

THE WITNESS: This was last fall. Last summer. Pardon me.

COMMISSIONER SHANNON: That would be the summer of '72?

THE WITNESS: That's correct.

[TR. P. 820]

Q With respect to the Mt. Storm - Morrisville line, which is shown on BH5, would you state for the Commissioners the conclusions you have reached regarding that line and especially the environmental impact by that line?

A It is my conclusion that the line has a reasonable environmental impact.

Q And would you tell the Commissioners why you have reached that conclusion?

A Well, the line for the most part avoids some of the areas which I feel are quite significant environmentally and it appears to me possible to ameliorate those impacts which remain by following the appropriate FPC Guidelines.

TESTIMONY OF SPENCER M. SMITH, JR.

[TR. P. 845]

Q Dr. Smith, please state your name and occupation.

A My name is Spencer M. Smith, Jr., and I am presently President of Consulting Services, Inc., a firm dealing in policy relating to economics and public affairs.

[TR. PP. 849-852].

Q Do you have an opinion concerning the overall impact of the proposed route for the Mt. Storm to Morrisville and North Anna to Morrisville lines from an environmental standpoint and, if so, please state it.

A The particular area chosen for the placement of transmission lines from an environmental standpoint could hardly be worse. Certain areas have natural phenomena and uses that can be found in many other parts of the state or region. Also, many areas of the general environment are comparable to other areas regarding the lack of intense general development.

The issue here, however, is the total pattern involving all such factors in a given area. Whatever set of criteria would be adopted for the evaluation of the environmental impact, be it the general criteria as announced by the Council on Environmental Quality, the procedures for lessening environmental impact by the FPC, the joint analysis upon environmental criteria by the U. S. Department of Interior and the U. S. Department of Agriculture, or the

CONTINUED

study of Virginia's Critical Environmental Areas as prepared by the Division of State Planning and Community Affairs -- the final judgment must encompass the total impact upon the total area. The application of particular criteria to particular areas would, in and of itself, be insufficient.

The relevant philosophical consideration is evident from all sources, however, in dealing with economic development and the environment. In analyzing the environmental criteria, the joint study by the Departments of Interior and Agriculture have indicated that,

> "The Nation no longer can afford the profligate use of its land resources. Improved long-range land use planning, the most extensive use of utility corridors and the upgrading of existing systems will help to alleviate this problem . . . . Just as reliability became a criteria against which plans and actions of the industry are measured, another criteria of equal importance must now be given comparable status -- the environment."

It is our contention that in the instant case, the availability of alternatives by the use of existing corridors must be considered preferable in view of the significant and irreparable environmental harm that will be done in the proposed placement of the transmission lines and

towers.

While companies may take what environmental precautions are available to them in the construction of the towers and in extending the lines, the present route would have to be criticized seriously in terms of the environmental considerations given before the selection of such a route.

It is one thing to choose a route with environmental considerations as tantamount to all others as opposed to choosing a route based upon economic, engineering and other technical decisions, at the conclusion of which an effort is then made to justify, after the fact, the environmental consequences of this act and/or to take precautions that must be taken to the best of one's technical ability in order to alleviate the environmental impact.

From an examination of the environmental report, but most importantly from the actual route proposed, one can only conclude that the routes could not have been chosen with environmental considerations tantamount to all other considerations.

An area traversing a distance of 111 miles, with a corridor width of 150 feet for approximately 45 miles and for approximately 66 miles with a corridor width of 200 feet in a relatively undeveloped area representing a number of areas listed as environmentally critical within the State of Virginia, tends to offer some basic parameters

[TR. P. 852]

in analyzing the nature of the problem.

Additionally, from topographical maps, as well as the specifications indicated, many corridors will be in areas having grades well over 20%. Likewise, from visual contact, topographical maps, and forest woodlot analyses, approximately 55 to 65% of the areas traversed range from heavy to moderate timber growth.

[TR. PP. 861-864]

Q Can you make a comparison in the environmental impact resulting from transmission lines where (1) existing corridors or routes of transmission lines are upgraded or widened; and where (2) an additional corridor or route is constructed far removed from existing corridors or routes?

CONTINUED

A Yes, I can make such a comparison. I think several factors are obvious.

In the first place, less actual area should be involved in upgrading or widening existing corridors than when an additional corridor or route is constructed. This means a significant difference in the amount of ground cover that will be removed.

Secondly, the problem of access roads has, for the most part, been determined and whatever damage has been occasioned by such determination is past when existing corridors are upgraded or widened.

To open a new corridor inevitably means facing the access road problem anew, which by and large causes a denuding of a far greater number of areas.

Third, there is the destruction of scenic resources. An existing corridor widened is quite different from a fresh new slash through essentially undisturbed stands of timber.

Fourth, the lesser area involved in utilizing the existing corridors has a profound impact on the sedimentation deposited in the streams and rivers.

Sedimentation has already occurred to a considerable extent in the vicinity of existing corridors -- not so in the area of new corridors.

Q Please summarize your conclusion.

A A value which defies complete quantification is the environmental value lost in the construction and subsequent maintenance of a new transmission corridor.

Real estate appraisers, economists, and those with special expertise in ascertaining land values, or market values for land, are never able to accurately determine such value in its totality. This is one of the reasons why land use measures have been introduced in the Congress of the United States.

Additionally, some States are taking back from localities and zoning authority once delegated to those localities. Florida is an example.

Also, a number of States are making an inventory or critical examination of their environmental areas. A major thrust of these efforts is to say that the determination of market value is not enough -- it is impossible to accomplish the total assessment of environmental values to the public.

One can count or "quantify" the number of people who go to a particular spot and look at the sunset. There is no way, however, that the pleasure and enjoyment of those people, or the total worth of the sunset, can be anything but subjective. To suggest that if a factor cannot be quantified it cannot be considered would eliminate many pleasurable opportunities for mankind everywhere.

[TR. P. 864]

The establishment of critical environment areas by the State of Virginia is a specific effort to add to the dimensions of this very problem. The placement of a transmission line versus the enjoyment of a scenic view cannot be reconciled on a determination of dollar value.

There is no other corridor for the lands, foliage, waters, and vistas which would be lost by the building of transmission lines. However, there is an alternative to the transmission line now proposed.

It would seem that existence of this alternative would be a major factor in the decision of this case. Certainly the problems of increasing consumption of energy and the delivery of it in the future will be significant. The future will no doubt find it necessary on certain occasions to sacrifice some benefits and pleasures of a natural and scenic environment in order to accomplish goals that have higher priority.

Since we know these sacrifices may have to take place in the future, we are deeply obligated when in the present we do have an alternative to enormous environmental damages.

[TR. P. 867]

Q I think, also, you referred in your testimony to scenic lands and rivers. Would you refer to that?

A Well, yes, a good example is the fact that on two occasions right there at Kelly's Ford, at the confluence of the Rapidan and Rappahannock, the scenic rivers have already been put in as possibly qualifying under the federal statute for scenic rivers. The State of Virginia has asked that they be considered for that qualification.

Well, if we run transmission towers across both of them, that could immediately jeopardize the possibility of them even being included because of the criteria for scenic rivers.

[TR. P. 902]

I know I can tell you one crossing in a critical area is the confluence of the Rappahannock and the Rapidan.

[TR. PP. 905-907]

BY MR. SPIVEY:

Q Can you find the confluence of the Rappahannock and the Rapidan River on CMS-2?

A Well, I have got a map at home that's quite different from this, and I can find it. But I think that I

would beg indulgence of the Commission. This is a cut-out of a map. It's got certain existing lines in it, certain other things with which I am not familiar. I am not familiar with some mountains and some rivers and so forth.

But it's very disorienting to look at something with which you are not familiar and go up there and point to something and find that you have got the Mongolian instead of the Rappahannock, and I know counsel wants me to go up there so he can lead me through this map, but I would be very disoriented in looking at this particular map, and it would be very difficult for me to find things.

Now, I would, perhaps, should have brought a map with which I had various things pinpointed and utilized that; but I am reluctant to do that.

The evidence is in. Whether counsel's choice of words, Rapidan and Rappahannock are at confluence, I don't think that's a question, a point of difficulty or point of argument. Everyone knows where they are. I have been there physically.

COMMISSIONER SHANNON: You have physically seen the confluency?

THE WITNESS: Yes.

BY MR. SPIVEY:

Q You just can't find it on this poor old GS map over there?

[TR. P. 907]

A I am just not going to attempt to try and do it, sir.

Q So you are just not going to try and do that?

A No.

Q All right, sir, by the same token, then, I guess you wouldn't be able to tell us how far the line is from Kelly's Ford; is that correct?

A Well, the line from Kelly's Ford, I couldn't point it out on a map.

It can't be -- well, I'd hesitate to make a distance judgment, because I walked there.

Q So I take it you refuse to go to the map to show us that also?

A Yes. Yes. I think you have got that.

[TR. PP. 941-944]

Q Dr. Smith, are you familiar with the legislation creating the C & O National Park?

A Yes, I am.

Q Do you know where that park is?

A The C & O CanalNational Historic Park?

Q Yes.

A If I may be pardoned, gentlemen, I wrote the first draft of that legislation; so I am somewhat convinced as to where it is. It extends from Cumberland and ends in Washington, D.C. It traverses down through Maryland and comes through part of Westport in Pennsylvania.

If you want an historical treatise on that, I will be happy to give it to the Commission, but I have a feeling you may not.

Q Your answer then is you do know where it is?

A Ya, I do.

Q I don't suppose you could attempt to find it on that map?

A No. For all I know, counsel may have been very careful to make sure it isn't there.

Q Do you want to take a chance at taking a look?

A No. I see no purpose in doing that.

Q I didn't think so.

Would you propose that additional transmission lines be run across that park?

A Across the C & O Canal Park?

Q Yes.

A No. I would not propose that such a transmission line should be run across the park. Hopefully, that they won't be.

This is a matter for discussion, I understand, at the present time.

Q Well, are you aware that the proposal you are advocating here today does just that?

A It's already there, if you are talking about the one --

Q I am talking about a parallel.

A Well, are you talking about the adjacent line?

Q Yes, sir. Adjacent or separated by two or four thousand feet, either one?

A No. I'm sorry; I will not accept counsel's discussion that adjacent or two or three thousand feet from an existing --

Q Well, tell me what you will accept, and I will get you to answer the question that way. Suit yourself.

A All right. I will accept the fact that there is an existing line there now. I will accept the fact that adjacent to that existing line is room for an expansion in order to have other lines placed in there. The corridor is there.

Now, the extent that that corridor goes across the C & O Canal and already crosses it, or is involved in that, then something going right along the same side of it isn't going to make any difference; and this is what I am trying to say constantly is the fact that in most instances these corridors