DIRECT TESTIMONY
OF
MARK S. ALLEN
ON BEHALF OF
VIRGINIA ELECTRIC AND POWER COMPANY
BEFORE THE
STATE CORPORATION COMMISSION OF VIRGINIA
CASE NO. PUE-2007-_____

Q. Please state your name and position with Virginia Electric and Power Company ("Dominion Virginia Power" or the "Company").

A. My name is Mark S. Allen, and I am Manager, Electric Transmission Line Engineering at the Company.

Q. What is your educational background and experience with the Company?

A. I received a Bachelor of Science Degree in Civil Engineering (Magna Cum Laude) from West Virginia University Institute of Technology in 1981. I am a Registered Professional Engineer in the states of Arizona, Connecticut, Kentucky, Michigan, Ohio, Pennsylvania, Virginia, Utah and West Virginia. I have 25 years of experience with the Company in both Transmission and Distribution. I started my career with Dominion Virginia Power as a Project Engineer in Transmission Engineering in 1981. In 1985, I moved to Distribution Planning as a Planning Engineer in the Eastern Division and then returned to Transmission Engineering in 1989. I have experience in both overhead and underground transmission design.

Q. What are your responsibilities as Manager, Electric Transmission Line Engineering?

A. I am responsible for the coordination of all high voltage transmission designs (overhead and underground) on the Dominion Virginia Power system. This includes all new designs as well as upgrades and relocations. I manage the engineering activities for each project to ensure completion of construction specifications by the established target date.

I am responsible for assuring that all such designs/specifications meet the established criteria for safety, reliability and cost effectiveness.

Q. What is the purpose of your direct testimony?

A. Dominion Virginia Power proposes to build a new 500 kV transmission line approximately 65 miles long, from the Appalachian Trail in Warren County to Loudoun Substation in Loudoun County. At the Appalachian Trail, the line will connect with Allegheny Power's proposed 500 kV line emanating from Meadow Brook Substation. The new line will traverse through Warren, Fauquier, Rappahannock, Culpeper, Prince William and Loudoun Counties. It will be constructed adjacent to or within existing right-of-way and parallel parts of existing 115kV, 230kV and 500kV lines as shown in Attachment II.A.3 of the Appendix. I will describe the design characteristics of the transmission line proposed in the application, and I will provide electric and magnetic field data for the proposed line. I also am sponsoring Sections I.D, I.F, I.G, II.A.3, II.A.5, II.A.6, II.B, II.C and IV.A of the Appendix. Some of the information in these sections has been provided to me by other Company personnel.

Q. Please describe the design of the new transmission line proposed in this application.

A. The new line will be single circuit 500 kV design and operation voltage and rated at 3,464 MVA. The new line will be constructed on a combination of single and double circuit lattice steel towers, single and double circuit steel monopoles, and on single and double circuit steel H-Frame structures with three tri-bundled 1351.5 ACSR (Aluminum Conductor Steel Reinforced) phase conductors in a combination of horizontal and vertical configurations with one fiber optic shield wire and one 7#7 Alumoweld (Aluminum Coated Steel Wire) shield wire. The double circuit structures will be used in

order to accommodate an existing lower voltage circuit and, thus, minimize right of way requirements. The average span length between structures varies as shown in Attachments II.A.3 and II.B.3 of the Appendix. The proposed line is approximately 65 miles long. The project is estimated to cost $243 million.

Q. Will any associated equipment be installed?

A. At Loudoun Substation, the Company will install a new 500kV circuit breaker and associated ancillary equipment to create a new terminal for the proposed Loudoun to Meadow Brook line. Also included at Loudoun Substation will be the replacement of an existing 500kV breaker and switches as required to uprate the new line terminal for 4000 amp capacity. The new circuit breaker will be installed in an existing circuit breaker row and within the existing substation fenced area. No expansion of the existing substation will be required.

Q. Are any special precautions required where the proposed facilities pass near the Flying Circus Aerodrome in Fauquier County?

A. The small non-public use grass airfield operating under the name of "The Flying Circus Aerodrome" is located just east of where existing 115kV Line #183 crosses Route 17 in southern Fauquier County. This transmission line is north of the runway and is centered in a 100' wide right-of-way with wood H-Frame structures that average 71 feet in height and range from 64 to 79 feet in the vicinity of the grass airfield. Due to the proximity of the airfield to the proposed transmission facilities, a 0.51-mile section of these wood H-Frame structures will be removed and replaced with low profile 500kV H-Frames and 115kV single pole structures rather than the taller double circuit structures used elsewhere on this #183 Line right-of-way. To accommodate two separate lines, the

proposed right-of-way will be widened to 180 feet with the additional 80 feet extending to the north away from the Flying Circus. The proposed 500kV line will be constructed on approximately 75-foot single circuit H-Frame structures centered 70 feet inside the proposed northern right-of-way edge, which is 10 feet north (outside) of the existing northern right-of-way edge. The new approximately 75-foot tall, 115kV single circuit line will be centered 75 feet south of the 500kV line and 35 feet inside of the existing southern right-of-way edge. As a private grass strip airfield, this facility does not fall under FAA jurisdiction and is not subject to FAA required lights or markers. However, to assure visibility of these new lines, Dominion Virginia Power will voluntarily install aerial warning markers on the top wire of each transmission line. These orange, yellow and white, 36-inch diameter, marking balls will be installed at 200-foot intervals along this 0.51-mile section. In addition, these marking balls will have reflective tape for night time visibility, although no night time activity is expected at the Flying Circus.

Q. Have you made calculations of the EMF for the proposed line?

A. Yes, and they are shown in Section IV.A of the Appendix for maximum line loading conditions expected to occur, both for the facilities that are currently in the right-of-way and for the facilities that will be there after the new line is completed.

Q. The Company's application also identifies an overhead alternative along the I-66 Route. What is the estimated cost to construct this alternative?

A. The estimated cost of the Alternate Route is approximately $131 million.

Q. The information you have provided in Section IV.A of the Appendix shows the calculated maximum EMF expected to occur at the edge of the rights-of-way. How do the strengths of the maximum expected magnetic fields at the edge of the right-of-way compare to magnetic fields found elsewhere?

A. The magnetic fields that I have calculated for the existing facilities would occur under expected maximum line loading conditions at the edge of the rights-of-way and would range from 10 milligauss (mG) to 227.17 mG. The same calculations for the proposed facilities, which show the combined effect of the existing facilities plus the new facilities, range from 68.45 mG to 257.39 mG. These fields strengths can be compared to those created by other electrical sources. For example, a hair dryer produces 300 mG or more, a copy machine can produce 90 mG or more and an electric power saw can produce 40 mG or more, depending on the circumstances and operation of these devices. The strength of the field received by the person operating these devices would, of course, depend on the distance between the device and the person operating it. Magnetic field strength diminishes rapidly as distance from the source increases. The decrease is proportional to the inverse square of the distance. For example, a hypothetical magnetic field strength of 10 mG at the edge of the right-of-way (defined as 50 feet from the centerline of) would decrease to 2.5 mG at a point 50 feet outside the right-of-way.

Q. Does that complete your prepared direct testimony?

A. Yes.