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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of
PENNSYLVANIA POWER AND LIGHT CO.
AND
ALLEGHENY ELECTRIC COOPERATIVE, INC.
(Susquehanna Steam Electric Station,
Units 1 and 2)

Docket Nos. 50-387
50-388

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NRC STAFF RESPONSE SUPPORTING IN PART AND
OPPOSING IN PART APPLICANTS' MOTION FOR
PARTIAL SUMMARY DISPOSITION OF CONTENTION 17

I. INTRODUCTION

On December 8, 1980, "Applicants' Motion for Partial Summary Disposition of Contention 17" (Motion) was served on the NRC Staff. In that Motion, Applicants move the Board for summary disposition in its favor on the remaining portion of Contention 17 which alleges that Applicants' "ultrahigh voltage (UHV)" transmission lines will "produce noise pollution, cause electrical shock from flashover, create television and radio interference, create electrostatic and electromagnetic fields that adversely affect living organisms along the UHV transmission right-of-way and beyond." Contention 17 further asserts that "the Applicants should be barred from transmitting electricity from the facility, if and when it becomes operational, over UHV lines and should be required to use lines in the range of 138,000 - 230,000 volts maximum. Alternatively, the Applicants should be required to place

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the UHV lines underground, using compressed gas as an insulator." Applicants assert that this portion of Contention 17 presents no genuine issue of material fact and that thus Applicants are entitled to a decision in their favor on this portion as a matter of law.

The NRC Staff supports in part and opposes in part Applicants' Motion. The Staff concludes that Applicants' Motion and its supporting documentation clearly demonstrate the absence of any genuine issue of material fact with regard to noise pollution, electrical shock from flashovers,^{1/} television and radio interference, and the human health effects of magnetic fields. Thus, the Staff believes the Board should dismiss that part of Contention 17 which deals with these issues as a matter of law. The Staff believes, however, that Applicants' Motion and its supporting documentation do not clearly demonstrate the absence of any genuine issue of material fact regarding the human health effects of electric fields. Thus, as the Staff concludes that Applicants have not met their burden of proof with regard to that portion of Contention 17 which raises this issue, the Staff does not support dismissal of this portion of Contention 17 as a matter of law.

Section II of this pleading will discuss generally the law applicable to motions for summary disposition. Section III will set forth the Staff's reasons for concluding that that part of Contention 17 which deals with noise pollution, electrical shock from flashover, television and radio interference, and the human health effects of magnetic fields raises no

^{1/} Paragraphs 24 through 27 of "Applicants' Statement of Material Facts as to Which There is no Genuine Issue to be Heard" set forth facts extraneous to the issue of "electrical shock from flashover" in Contention 17.

genuine issue of material fact. Section IV will set forth the basis for the Staff's conclusion that Applicants' Motion and its supporting documentation do not demonstrate the absence of any genuine issue of material fact regarding the human health effects of electric fields.

II. GENERAL POINTS OF LAW

The Commission's Rules of Practice provide for summary disposition of certain issues on the pleadings where the filings in the proceeding show that there is no genuine issue as to any material fact and that movant is entitled to a decision as a matter of law. 10 CFR § 2.749. As the Commission's summary disposition rule is analogous to Rule 56 of the Federal Rules of Civil Procedure (summary judgment), Federal court decisions interpreting Rule 56 may be relied on for an understanding of the operation of the summary disposition rule.^{2/} Thus, in Adickes v. Kress & Co., 389 U.S. 144, 157 (1970), the Supreme Court held that the party seeking summary judgment has "the burden of showing the absence of a genuine issue as to any material fact."^{3/} To meet this burden, the movant must eliminate any real doubt as to the existence of any genuine issue of material fact.^{4/} To further this goal, the summary disposition rule provides that all material facts, set out in the statement mandatorily accompanying summary disposition motions, will be

^{2/} Alabama Power Company (Joseph M. Farley, Units 1 and 2), ALAB-182, 7 AEC 210, 217 (1974).

^{3/} See also Cleveland Electric Illuminating Co. (Perry, Units 1 and 2), ALAB-433, 6 NRC 741, 752 - 54 (1977).

^{4/} Poller v. Columbia Broadcasting Co., 368 U.S. 464, 468 (1962); Sartor v. Arkansas Natural Gas Corp., 321 U.S. 620, 627 (1944).

deemed to be admitted unless controverted by the opposing party. 10 CFR § 2.749(a).

Any other party may serve an answer supporting or opposing the motion for summary disposition. 10 CFR § 2.749(a). Attached to a motion opposing summary disposition must be a separate, short, and concise statement of the material facts as to which it is contended that there exists a genuine issue to be heard. 10 CFR § 2.749(a). The opposing party need not show that it would prevail on the issues but only that there are genuine issues to be tried.^{5/} Furthermore, the record and affidavits supporting and opposing the motion must be viewed in the light most favorable to the party opposing the motion.^{6/} Finally, the proponent of a motion for summary disposition must meet its burden of establishing that it is entitled to judgment as a matter of law even if the opponent of such a motion fails to submit evidence controverting the conclusions reached in documents submitted in support of the motion.^{7/}

III. STAFF ARGUMENT IN SUPPORT OF PART OF APPLICANTS' MOTION

The lines proposed for use by Applicants are designed for alternating current (AC) transmission and are further classified by their maximum design voltage, 550 kV, as "extra high voltage" (EHV) lines. The alternating

^{5/} American Manufacturers Mut. Ins. Co. v. American Broadcasting - Paramount Theaters, Inc., 388 F.2d 272, 280 (2d Cir. 1976).

^{6/} See Public Service Co. of New Hampshire (Seabrook Station, Units 1 and 2), LBP-74-36, 7 AEC 877 (1974).

^{7/} Cleveland Electric Illuminating Co., (Perry, Units 1 and 2), ALAB-443, 6 NRC 741, 753 - 54 (1977).

current transmission lines associated with the Susquehanna plant dissipate energy from the surfaces of the conductors via a mechanism known as corona loss. This loss occurs by ionization of air in the immediate vicinity of the conductor surface when it is energized, when a large potential difference exists between the conductor and the air. The design of modern EHV transmission lines is such that this loss is negligible under fair weather conditions. However, when the conductor surface becomes wet, as during fog, rain, ice, or snow, the rate of corona discharge is increased. Corona discharges result in audible noise. (Affidavit of John C. Lehr at 2). Additionally, corona discharges result in the production of ozone and radio and television interference. (Affidavit of Gerald Gears at 4).

A. Noise Pollution

The alternating current (AC) transmission lines associated with the Susquehanna Steam Electric Station will produce audible noise as a result of corona discharge only during wet weather conditions. (Lehr at 2). This noise will be a buzzing, hissing, and/or crackling sound calculated by Applicants to be 52.5 dBA over all transmission line segments. (Lehr at 3-4). Applicants' predicted average value is within the range predicted by studies conducted on this matter. (Lehr at 3-4). Of these, one study, based on actual experience with transmission line operation, found a low probability of complaints being registered for an audible noise level of 52.5 dBA or less, measured 100 feet from the centerline of the transmission line. (Lehr at 5). Further, an annual average day-night equivalent sound level (L_{DN}) of 52.9 dBA may be computed for the Susquehanna lines using inclement

weather data and the maximum noise level predicted by Applicants for the edge of the right-of-way (57.1 dBA). (Lehr at 5). This level is below the L_{DN} value of 55 dBA published by EPA for "residential areas with outside space and farm residences." (Lehr at 5). EPA established this value pursuant to the Noise Control Act which requires EPA to publish information on levels of environmental noise, the attainment and maintenance of which are requisite to protect the public health and welfare with an adequate margin of safety. 42 U.S.C. § 4904(a)(2). Finally, even these acceptable levels of noise will be reduced by transmission loss due to passage of sound through the walls and windows of a home/building and through space. Tests on 500 kV lines have shown an attenuation of 3 to 4 dBA for each doubling of distance from the 50 foot mark on either side of the centerline of the transmission line. (Lehr at 6-7). Based on the above, the Staff concludes that the audible noise which will be produced by the Susquehanna transmission lines under wet weather conditions will not cause significant indoor activity interference or annoyance.

B. Electrical Shock from Flashover

Flashovers are electrical discharges occurring around the edge or over the surface of a transmission system's insulators. As these disruptive electrical discharges may cause permanent damage to the insulator, transmission systems are designed to reduce the probability that a flashover might occur. For example, lines undergoing flashovers are de-energized instantaneously by circuit breakers. The presence of circuit breakers makes it highly improbable that a person would experience a serious shock or other

adverse health effect from a flashover; thus, the Staff concludes that the possibility of electrical shock from flashover does not pose a significant threat to persons in the vicinity of the transmission lines. (Gears at 5).

C. Television and Radio Interference

In addition to the production of audible noise and ozone, corona discharges cause radio and television interference which can disrupt AM radio and television reception. While degradation of AM radio and television reception may occur, the Staff concludes that the overall impact on radio and television reception resulting from operation of the Susquehanna 500 kV transmission lines will be negligible because Susquehanna's 500 kV lines traverse primarily rural areas with sparse populations. (Gears at 4).

D. Human Health Effects of Magnetic Fields

Current flow in a conductor gives rise to a surrounding magnetic force field.^{8/} Magnetic field strength is described in terms of flux density, usually expressed in units of gauss (G). Transmission line magnetic fields are low. Extra high voltage (EHV) systems similar to the Susquehanna 500 kV lines produce a magnetic field at ground level of 0.3 G or less. Recommended

^{8/} Transmission lines produce both electric and magnetic fields. The Staff's use of the term, "electric field," corresponds to the use of the term "electrostatic field" in Contention 17. Similarly, the Staff's use of the term, "magnetic field," corresponds to the use of the term, "electromagnetic field," in Contention 17.



exposure standards are two to three orders of magnitude (100 to 1000 times) greater. Based upon the extremely low magnetic fields generated by operating EHV systems in comparison with recommended exposure standards, the Staff concludes that the magnetic fields produced by the Susquehanna 500 kV lines will not cause adverse biological effects. (Gears at 5-6).

IV. STAFF ARGUMENT IN OPPOSITION TO PART OF APPLICANTS' MOTION

Electric fields from EHV transmission lines cause currents to flow and voltages to be developed within persons, animals and plants. The possible biological effects of these induced currents and voltages are very controversial. The experimental procedures necessary to adequately establish the influence of such fields on life forms are highly complex. Various experiments have provided evidence that some biological subjects may sense, or respond to low electric field levels, similar to transmission line frequency. These preliminary indications of response in test animals are indicative of interaction of the fields with central nervous system functions or manifestations of chronic stimulation. There is strong disagreement among researchers in this area as to the significance of these responses. (Gears at 3). Thus, the Staff cannot conclude that, with respect to this aspect of Contention 17, there is no genuine issue of material fact.

V. CONCLUSION

Based on the foregoing, the NRC Staff believes it is clearly demonstrated that there is no genuine issue as to any material fact regarding that portion of Contention 17 which relates to noise pollution; electrical shock from flashovers, television and radio interference, and the human

health effects of magnetic fields. Thus, the Staff believes that summary disposition in favor of the Applicants should be granted as a matter of law in accordance with 10 CFR § 2.749 on this portion of Contention 17. The Staff does not, however, believe that Applicants' Motion and its supporting documentation clearly demonstrate the absence of any genuine issue of material fact regarding the human health effects of electric fields. Accordingly, the Staff does not believe that summary disposition in favor of the Applicants should be granted on that portion of Contention 17 dealing with this issue.

Respectfully submitted,

Jessica H. Lavery
Jessica H. Lavery
Counsel for NRC Staff

Dated at Bethesda, Maryland
this 9th day of January, 1981.

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SUPPLEMENT TO APPLICANTS' STATEMENT OF MATERIAL FACTS

1. Based on industry experience, noise levels are potentially of concern beyond the edge of the right-of-way only when voltage is 500 kV or above.
2. The noise levels predicted to be produced by the Susquehanna transmission lines at the edge of the right-of-way have a maximum calculated average annual day night sound level that is below the EPA identified level associated with adverse effects on public health and welfare. Outdoor speech and activity interference and annoyance are not expected to be significant in areas adjacent to the rights-of-way.
3. Transmission line audible noise will attenuate beyond the edge of the right-of-way, reducing levels at residential structures on lands adjacent to the right-of-way. Field measurements have shown this attenuation to be 3-4 dBA per doubling of distance beyond 50 ft from the outside phase of the transmission line.

4. Interior noise levels in residences along the rights-of-way due to transmission line operation in wet weather will be reduced below the exterior levels due to transmission loss through walls and windows. Using conservative loss factors, the likely interior noise levels due to the transmission lines are predicted to be below the EPA identified level associated with adverse effects on public health and welfare. Indoor activity interference or disruption of sleep would not be expected in residences located in areas adjacent to the rights-of-way due to transmission line audible noise.



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STATEMENT OF MATERIAL FACT AS TO WHICH IT IS CONTENDED THAT
THERE EXISTS A GENUINE ISSUE TO BE HEARD

1. While the experimental procedures necessary to adequately establish the influence of such fields on life forms are highly complex, various experiments have provided preliminary evidence that some biological subjects may sense, or respond to electric fields. In some cases, response was obtained at quite low field levels similar to those found in the vicinity of transmission lines. These preliminary indications of response in test animals are indicative of interaction of the fields with central nervous system functions or manifestations of chronic stimulation.