RS 705-4

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Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, D. C. 20505

Attention: Docketing and Service Branch

Dear Sir:

We have reviewed the Draft Regulatory Guide and Value/Impact Statement, Task RS 705-4, August, 1979. Summarized below are some of the major concerns. These concerns were previously enumerated in memos dated April 16, 1979 and April 19, 1979 from R. E. Stade to Mr. G. A. Arlotto, copies of which were sent to Mr. R. F. Fraley.

1. Throughout the paper, the authors have confused the usage of lightning stroke with lightning surge. The Standard Dictionary of Electrical and Electronic Terms (IEEE Std. 100-1977) defines a Lightning Stroke as "A single lightning discharge or series of discharges following the same path between cloud regions or between cloud regions and earth." A Lightning Surge is defined as "A transient electric disturbance in an electric circuit caused by lightning." A Surge is defined as "A transit wave of current, potential or power in the electric circuit... It will be propagated along the length of the circuit."

   In summary, a lightning stroke is an electric discharge through the atmosphere, whereas a lightning surge is an electric wave travelling along a conductor. The distinction is crucial for the difference in magnitude is extremely large.

2. The Draft states "lightning surges----of 200,000 amperes" whereas the intent was in reference to lightning strokes as illustrated by an example:

   > The surge impedance of the overhead transmission lines varies between 300 and 500 ohms and depends on the line configuration. A 200,000 ampere surge flowing in a 400 ohm line would develop an 80,000,000 (80,000 kV) volt wave. In

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terms of a modern transmission line, an insulator string of 25 units on a 500 kV line would have a dry flashover (insulation breakdown) rating of about 2200 kV. With the assumed surge impedance of 400 ohms, flashover would limit the maximum possible lightning surge to 5500 amperes (2200 kV divided by 400 ohms). This value is a long way from the 200,000 ampere surge assumed in the draft.

3. Furthermore, a high intensity (200,000 amperes) lightning stroke terminating on a transmission line will immediately be dissipated by a combination of multiple flashovers and induced current in other conductors. The resultant lightning surges as controlled by the line flashover rating will be well within existing lightning arrester ratings. The 200,000 ampere surge is not credible. An explanation of the above is available in Sections 14-49 and 27-6 of the Standard Handbook for Electrical Engineers by Fink and Beatty, McGraw-Hill, 11th Edition.

If you have any questions regarding these concerns, please contact Mr. T. Matsumoto, Chief Electrical Engineer, Bechtel Power Corporation, 520 South Post Oak Road, Post Office Box 2166, Houston, Texas, 77001

Very truly yours,

A. L. Cahn
Manager of Engineering
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