Progress Energy

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United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING EXEMPTION FROM 10 CFR 50.68, "CRITICALITY ACCIDENT REQUIREMENTS"

Ladies and Gentlemen:

In a letter dated February 22, 2005, Progress Energy Carolinas, Inc. (PEC), also known as Carolina Power and Light Company, requested an exemption from specific requirements of 10 CFR 50.68, "Criticality accident requirements," for H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2. In a facsimile dated March 28, 2005, the NRC provided PEC with a Request for Additional Information (RAI) related to the exemption request. The attachment provides the response to the RAI.

If you have any questions concerning this matter, please contact Mr. C. T. Baucom at (843) 857-1253.

Sincerely,

J Lucas

Jan F. Lucas
Manager – Support Services – Nuclear

RAC/rac

Attachment

c: Dr. W. D. Travers, NRC, Region II
Mr. C. P. Patel, NRC, NRR
NRC Resident Inspector

A001

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
Hartsville, SC 29550

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING EXEMPTION FROM 10 CFR 50.68, "CRITICALITY ACCIDENT REQUIREMENTS"

NRC Question 1

Please show in detail the numerical calculation which gives the 75,530 gallons of water needed to reduce the boron concentration by the factor of 0.73.

Response 1

The time required to reach the reduced boron concentration necessary to give a calculated value of k_{eff} of just under 1.0 was calculated directly using the following formula:

$t = (V/F) \ln (C_0/C_t)$

where,

t = time required to reach the critical boron concentration (minutes)
V = volume of water in the spent fuel pool = 240,000 gallons
F = flow rate of unborated dilution water – variable – use the 1330 gpm case for this example
C_0 = initial boron concentration
C_t = boron concentration at time t

For the limiting case, the critical boron concentration as determined by the criticality calculation will be 0.73 times C_0.

Therefore, the calculated time in this case is:

$t = (240{,}000/1330) \ln (C_0/0.73C_0) = 56.79$ minutes

The value of 75,530 gallons was not calculated as an intermediate value in determining the time requirement, which is the parameter of interest. Rather, once the time was calculated for each dilution flow rate assumed, the volume of water was calculated to give an indication of how much water, in addition to time, would be required and hence how easy it would be to detect such a volume of water.

The volume was calculated by multiplying the dilution flow rate times the calculated time, which for the example above gives:

1330 gpm x 56.79 min = 75,530 gallons

NRC Question 2

What is the maximum excess reactivity that is being held down by the required minimum boron concentration in the DSC?

Response 2

The criticality analysis, as described in the February 22, 2005 letter, was revised to calculate the value of k_{eff} with no boron in the water. Using the same conservative assumptions (e.g., no credit for burnup), the calculated value for k_{eff} is 1.23 for the bounding case, which is for Westinghouse 15x15 fuel, 4.60 weight percent U-235, in a Type A basket.