Progress Energy

Serial: RNP-RA/04-0146

DEC 0 2 2004

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 TECHNICAL SPECIFICATIONS REVISION OF PRESSURE/TEMPERATURE LIMITS

Ladies and Gentlemen:

In a letter dated August 19, 2004, Progress Energy Carolinas, Inc. (PEC), also known as Carolina Power and Light Company, requested a Technical Specifications amendment for H. B. Robinson Steam Electric Plant, Unit No. 2, related to the Reactor Coolant System pressure/temperature limits. In a telephone call between the NRC and PEC on November 18, 2004, the NRC finalized a Request for Additional Information (RAI) related to the amendment request. Attachment II provides the required response to this RAI.

Attachment I provides an Affirmation in accordance with the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f).

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

Sincerely,

Jan F. Lucas
Manager – Support Services – Nuclear

RAC/rac

Attachments: I. Affirmation
II. Response to NRC Request for Additional Information Regarding Technical Specifications Revision of Pressure/Temperature Limits

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

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

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AFFIRMATION

The information contained in letter RNP-RA/04-0146 is true and correct to the best of my information, knowledge and belief; and the sources of my information are officers, employees, contractors, and agents of Progress Energy Carolinas, Inc., also known as Carolina Power and Light Company. I declare under penalty of perjury that the foregoing is true and correct.

Executed On: 12/02/04

W. G. Noll
Director – Site Operations
H. B. Robinson Steam Electric Plant, Unit No. 2

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

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING TECHNICAL SPECIFICATIONS REVISION OF PRESSURE/TEMPERATURE LIMITS

NRC Question 1

Table 22 of WCAP-15827 indicated that the limiting material at the high temperature portion (highlighted by bolded numbers) of the cooldown limits is the circumferential weld 10-273, while the limiting material at the low temperature portion of the cooldown limits is the upper shell plate W10201-1. It appears that the opposite is true. At low temperatures, the reduction in stress intensity factor due to the circumferential flaw assumption for the circumferential weld is not pronounced because the pressure is low. Therefore, the circumferential weld with an Adjusted Reference Temperature (ART) value of 242°F, as compared with 167°F for the plate, tends to be limiting at low temperatures. At high temperatures, the reduction in stress intensity factor due to the circumferential flaw assumption for the circumferential weld is significant because the pressure is high. Hence, the circumferential weld may lose its role as the limiting material. Please clarify this by providing the pressure, the pressure stress intensity factors, and the thermal stress intensity factors at 60°F and 250°F for both plate W10201-1 and weld 10-273 to demonstrate that you have selected the right limiting material for the cooldown curves.

Response 1

The requested information is as follows:

1. 35 EFPY Cooldown (100°F/hr) for plate W10201-1

- Reactor Pressure Vessel Bulk Water Temperature = 60°F
- 1/4T Metal Temperature = 88.9°F
- 1/4T K_{IT} = 18.5977 KSI square root inches
- 1/4T K_{IP} = 9.4741 KSI square root inches
- Allowable Pressure = 400 psig

- Reactor Pressure Vessel Bulk Water Temperature = 250°F
- 1/4T Metal Temperature = 282.6°F
- 1/4T K_{IT} = 21.6628 KSI square root inches
- 1/4T K_{IP} = 110.4902 KSI square root inches
- Allowable Pressure = 4670 psig

2. 35 EFPY Cooldown (100°F/hr) for the circumferential weld 10-273

- Reactor Pressure Vessel Bulk Water Temperature = 60°F
- 1/4T Metal Temperature = 88.9°F
- 1/4T K_{IT} = 18.5977 KSI square root inches
- 1/4T K_{IP} = 7.7837 KSI square root inches
- Allowable Pressure = 688 psig

- Reactor Pressure Vessel Bulk Water Temperature = 250°F
- 1/4T Metal Temperature = 282.6°F
- 1/4T K_{IT} = 21.6628 KSI square root inches
- 1/4T K_{IP} = 29.1328 KSI square root inches
- Allowable Pressure = 2574 psig

Where, K_{IT} is the Thermal Stress Intensity Factor
K_{IP} is the Pressure Stress Intensity Factor

Also note that K_{IT} and the Reference Stress Intensity Factor (K_{IC}) are calculated first, and then the following equation is solved for K_{IP}:

$2K_{IP} + K_{IT} = K_{IC}$
$K_{IP} = M_m * pR_i/t$

Where, R_i = Radius to the Clad Base Metal Interface = 77.969 inches
t = Vessel Thickness = 9.313 inches
M_m for Circumferential Weld = 1.352
M_m for Plate = 2.825

Thus, Allowable Pressure, $p = (K_{IC} - K_{IT})/[2*M_m*(R_i/t)]$.

Use of the above values supports the limiting materials specified in WCAP-15827.