TRANSNUCLEAR
AN AREVA COMPANY

March 13, 2013
E-34975

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Subject: ASME Code Alternative Request
Docket No. 72-1027 (TAC No. L24714)

Reference: TN Letter E-34603 from Clark Vanderniet (TN) to Document Control Desk, "ASME Code Alternative Request, Docket No. 72-1027," dated February 27, 2013

Based on recent discussions with the NRC, this submittal provides supplemental input regarding the RAI (request for additional information) response referenced above. Enclosure 1 herein provides the supplemental input.

Should the NRC staff require additional information to support review of this application, please do not hesitate to contact Mr. Don Shaw at 410-910-6878 or me at 410-910-6933.

Sincerely,

Don Shaw

for Clark Vanderniet
Director, Regulatory Affairs

cc: B. Jennifer Davis (NRC SFST)
10814 file

Enclosure:

1. Supplemental Input

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Supplemental Input:

Regarding how many years it would take to reach the allowable crack size of 1 inch described in Reference 1:

The maximum thermal stress at the location of the postulated crack ranges from 1,382 to 1,561 psi, for the 100 °F to -20 °F daily average ambient temperature conditions, respectively [Reference 2, Table 3A.2.3-9]. Therefore, the range of the thermal stress is approximately 0.2 ksi.

From the equation specified in Reference 1, a stress intensity factor of 52.93 ksi$\sqrt{in}$ was calculated for a flaw size of 1.16 inch with an applied stress of 23.0 ksi for the maximum flaw size calculation. Also, from the stress intensity factor equation, it can be seen that the stress intensity factor is directly proportional to the applied stress. Therefore, a stress range that is approximately 100 times lower (23.0 ksi to 0.2 ksi) will result in a ΔK_I, the range of the stress intensity factor for thermal stress, of approximately 0.53 ksi$\sqrt{in}$ (52.93 ksi$\sqrt{in}$/100).

A conservative ΔK_{th} for carbon and low alloy ferritic steels is given as $\Delta K_{th} = 5.0(1-0.8R)$ in ASME Section XI, Article A-4000 [Reference 3], where ΔK_{th} is the threshold ΔK_I value below which the fatigue crack growth rate is negligible, and R is the K_{min}/K_{max} ratio. By using this equation, assuming a worst-case scenario for R as R=1, the ΔK_{th} is calculated to be 1.0 ksi$\sqrt{in}$, which is twice the expected value of 0.53 ksi$\sqrt{in}$ for thermal cycling.

In conclusion, a temperature change resulting from -20 °F to 100 °F ambient conditions yields a very low range of the applied stress intensity factor, which is below the threshold value required for crack growth. Therefore, the postulated crack will not grow during storage due to day-and-night transients or due to annual seasonal transients.

References:

1. TN Letter E-34603 from Clark Vanderniet (TN) to Document Control Desk, "ASME Code Alternative Request, Docket No. 72-1027," dated February 27, 2013.

2. "TN-68 Dry Storage Cask Updated Final Safety Analysis Report," Revision 6, May 14, 2012.

3. ASME Boiler and Pressure Vessel Code, Section XI, Division I, Article A-4000, 2007 Edition with 2008 Addenda.