October 18, 2000

MEMORANDUM FOR: File

FROM: Jack N. Donohew, Senior Project Manager, Section 2
Project Directorate IV & Decommissioning **/RA/**
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

SUBJECT: RESPONSE TO QUESTIONS ON LICENSE AMENDMENT REQUEST REGARDING REACTOR PRESSURE HEAD (RPV) HEAD CLOSURE BOLTS (TAC NO. MA9990)

On October 3, 2000, an email was received from Steve Wideman, Principal Engineer, Licensing, related to questions on the licensee's request for an amendment dated September 15, 2000 (WO 00-0036). The amendment request concerned the RPV head closure bolts and Table 1.1-1, "Modes," of the Wolf Creek Technical Specifications. Attached are the responses that clarify statements made in the licensee's application dated September 15, 2000.

At the end of the e-mail, an error on page 6 of 10 of Attachment I to the application was identified.

Docket No. 50-482

Attachment: E-mail dated October 3, 2000

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Project Directorate IV-2 & Decommissioning **/RA/**
Division of Licensing Project Management
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NAME	JDonohew:lcc	EPeyton	SDembek
DATE	10/16/00	10/13/00	10/17/00

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EMAIL DATED OCTOBER 3, 2000

From: Wideman Steven G <stwidem@WCNOC.com>
To: "'Donohew, Jack (NRC PM)'" <JND@nrc.gov>
Date: Tue, Oct 3, 2000 4:33 PM
Subject: LAR TS Table 1.1-1, Response to Questions

Jack - provided below are responses to the questions associated with the amendment request to revise TS Table 1.1-1, "MODES."

> 1. Where is it stated in the application or the USAR that there is a
> total of 54 closure bolts in the RPV head?
>

Response:

The amendment request does not specifically discuss the total number of reactor vessel head closure studs. USAR Table 1.3-1, Sheet 3, "Design Comparison," which provides a comparison between WCGS and other plants identifies the number of reactor vessel head closure studs. Additionally, Table 5.3-2, "Reactor Vessel Design Parameters," specifies the number of closure studs.

> 2. How is the nut/washer/stud placed in the PRV head and flange and fully
> tensioned.
>

Response:

The stud/nut and washer are placed in the reactor vessel head with a crane then a turning tool with compensating support are used to turn the stud in to the vessel flange. Initial stud elongations are measured. The studs are tensioned utilizing a system which places a tension on the stud and compressive force on the closure flange. The nut is turned down flush with the flange. After the tensioning is complete, final elongations are measured. Adjustments are made if required. USAR Figure 5.3-1 provides a picture of the reactor vessel and a closure stud.

> 3. Is not the amendment a application to startup and operate at full
> power with on RPV head closure bolt not fully tensioned?
>

Response:

The amendment application would allow plant startup and operation with an untensioned stud or failed stud (not fully tensioned).

> 4. What are the differences between the cases of (1) one closure bolt
> untensioned and (2) one closure bolt failed in service? For these two
> cases, is the one bolt assumed to carry no load?

> Response:

The difference between the two cases is in the initial preload condition for the studs. For the untensioned case, one stud is untensioned from the beginning so the effect of the untensioned stud on the neighboring studs is adjusted when elongation measurements are made. For the failed in service case, all studs are initially tensioned to the proper elongations. Then one stud is "broken" (removed from the analysis mode). This has the effect of slightly increasing the preload in neighboring studs.

> 5. Does the explanation of the finite element analysis also explain how
> the stresses are calculated in the closure bolts?
>

The finite element analysis does explain the way the studs are modeled. they are modeled as beams so that tension and bending stresses can be calculated. The ASME Code has limits only on tension and bending for bolting. Stresses in the threads are not explicitly calculated in the model, but a calculation is done to verify that there is sufficient length of engagement to transfer the load from the stud to the vessel flange. In the model, the nuts are assumed to be rigid such that the studs must bend to conform to the rotational deflection of the head flange when it is loaded.

During the development of these responses, an error was noted in the submittal. In Attachment I, page 6 of 10, Item 4 should read: "The maximum stud stress, including axial and bending stresses but ignoring stress concentrations, must not exceed 3 Sm."

Also, if you are working on drafting the Safety Evaluations, we have a contractor on site assisting during the outage that is familiar with the evaluation and calculations performed on the closure studs. Therefore, we could set up a telecon if needed to address questions/comments.

Steve Wideman
WCNOC Licensing
phone: 316-364-4037
fax: 316-364-4138
e-mail: stwidem@wcnoc.com