From: David Terao
Sent: Thursday, October 23, 2008 12:02 PM
To: Pumza.Damba@pbmr.co.za
Cc: Michael Mayfield; Wallace Norris; Laura Dudes; Allen Howe; Mohamed Shams; Nihar Ray; Makuteswara Srinivasan; Elizabeth Doolittle
Subject: Response to Questions Regarding ASME Code Case N-499

Ms. Pumza Damba
Pebble Bed Modular Reactor (Pty) Ltd
1279 Mike Crawford Avenue, Centurion, South Africa
P.O. Box 9396 Centurion, 0046, South Africa

Dear Ms. Damba:

This email responds to your inquiry to Mr. Michael Mayfield (USNRC) that you posed at the October 2008 ASME workshop held in Johannesburg, South Africa regarding the Nuclear Regulatory Commission's position on the use of American Society of Mechanical Engineers (ASME) Code Case N-499. Specifically, you questioned why this Code Case is not currently accepted by the U.S. Nuclear Regulatory Commission (NRC). Mr. Mayfield requested that you transmit your questions via email so that an adequate response could be provided.

In your email dated October 17, 2008 (below), you submitted the following two questions. The NRC staff's response is provided after each question.

Question: Does the NRC pick Code Cases to review for acceptability randomly or do they review and determine acceptability as they are recorded in license applications?

NRC Response: The ASME issues Section III Code Cases through quarterly supplements to each edition. The NRC staff reviews the Code Cases in each supplement except for those pertaining to high-temperature gas-cooled reactors, certain requirements in Section III, Division 2, that are not endorsed by the NRC, liquid metal reactors, and submerged spent fuel waste casks. These Code Cases are generally not reviewed by the NRC staff because they have very limited or no applicability to existing power reactors regulated by the NRC or to new reactor license applications submitted to the NRC for approval. These exceptions are listed in a footnote in Regulatory Guide 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III." This regulatory guide lists all of the Section III Code Cases that the NRC has approved or conditionally approved.

Question: Are all the Code Cases reviewed so far related only [to] Pressurised Water Reactors or have they reviewed any Code Cases related to High Temperature Gas Reactors?

NRC Response: To date, only those Code Cases addressing light-water reactors (i.e., pressurized water reactors and boiling water reactors) are reviewed for approval in Regulatory Guide 1.84. The NRC staff plans to review the adequacy of other Code Cases (e.g., Code Case N-499) under the specific combined operating license application as applicable.

It should be noted that when the Pebble-Bed Modular Reactor (PBMR) was first considered for design review by the NRC about 7 years ago, the NRC staff initiated a review of elevated-temperature design requirements as specified in the ASME Boiler and Pressure Vessel Code, Section III, Subsection NH, "Class 1 Components in Elevated Temperature Service." This

Subsection provides specialized design and construction provisions when temperatures exceed 800°F (427°C). The review was an extensive and costly review requiring specialized contractor expertise. When the PBMR review was postponed, the NRC's review of elevated-temperature design requirements was also suspended because the time and expenses for such a review could not be justified in light of other higher priority issues. During this time period, the NRC staff also initiated reviews of ASME Code Cases N-499-1 as well as N-201-4 for their applicability to the materials and environments for high-temperature gas-cooled reactors (HTGRs). The staff found that these Code Cases were not sufficient to address many of the materials, higher-temperature issues, and environmental effects associated with HTGRs. The results are documented in NUREG/CR-6816, "Review and Assessment of Codes and Procedures for HTGR Components," dated June 2003.

It should also be noted that even though the NRC staff suspended the overall review of ASME Code, Subsection NH, the staff did review and approve a portion of Subsection NH, and included its acceptabilty in an amended final rule to 10 CFR 50.55a issued on October 1, 2004 (69 FR 58804). The final rule included a new requirement in 10 CFR 50.55a(b)(1)(vi) to allow the application of Subsection NH to Type 316 stainless steel pressurizer heater sleeves only where service conditions do not cause the component to reach temperatures exceeding 900°F (482°C). At temperatures below 900°F (482°C), the staff found that many years operating experience in the U.S. indicated that pressurizer heater sleeves have not experienced significant creep and relaxation effects. Consequently, the NRC staff found that the reduced stress allowable values for 316 stainless steel material at lower elevated temperatures as provided in Subsection NH provided designers of pressurizer heaters with technically acceptable design requirements to ensure adequate protection to the public health and safety.

Lastly, the NRC staff is continuing to monitor and participate in Codes and standards activities related to elevated temperature design for HTGRs.

If you have any further questions, please do not hesitate to contact us. Thank you for your interest in these matters.

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From: Pumza Damba [mailto:Pumza.Damba@pbmr.co.za]
Sent: Friday, October 17, 2008 1:46 AM
To: Michael Mayfield
Cc: Neil Broom
Subject: Code Case Justification inquiry

Dear Michael

An inquiry on Code Case N-499-1/2
Let me give a bit of a background, PBMR is doing code case justification for N-499-1/2 for acceptance by the NNR (South African Regulator). In their response to PBMR's initial submission the NNR required legastic justification for the Code Case including reasons why this Code Case is not currently accepted by the NRC. We need assistance on what steps or procedure does the NRC follow reviewing Code Case including response to the questions below:

Does the NRC pick Code Cases to review for acceptability randomly or do they review and determine acceptability as they are recorded in license applications?
Are all the Code Cases reviewed so far only related only Pressurised Water Ractors or have they reviewed any Code Cases related to High Temperature Gas Reactors?

Regards,

Pumza Damba
Code Engineer

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