

PMSTPCOL PEmails

From: Tai, Tom
Sent: Wednesday, July 20, 2011 10:44 AM
To: Price, John E
Cc: STPCOL
Subject: FW: ACSTIC2 Computer Code (Revised Attachment)
Attachments: ACSTIC2_Justification for Application to ABWR_070711_Revised.pdf

John,

EMB2's comments on additional information NINA sent on July 7 related to ACSTIC2.

Tom Tai
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(301) 415-8484
Tom.Tai@NRC.GOV

From: Wu, Cheng-Ih
Sent: Tuesday, July 19, 2011 9:51 AM
To: Tai, Tom
Cc: Dixon-Herrity, Jennifer; Joseph, Stacy
Subject: RE: ACSTIC2 Computer Code (Revised Attachment)

Tom,

I reviewed the applicant's response regarding the justification of ACSTIC2 application to ABWR. The following is my comments.

The ACSTIC2 pump pulsation analysis assumes the water-steam interface to be a zero pressure amplitude boundary condition. The applicant states that this is a typical boundary condition used in acoustical analyses when the working fluid (the water in the ABWR reactor vessel) interfaces with a large volume or region containing a low density, low sound speed fluid, such as the steam volume in the ABWR. The applicant needs to explain what it means "typical". However, there is no evident to demonstrate this assumption being valid and applicable to the ABWR system which has two phase flow at the water-steam interface region while ACSTIC program was developed 30 years ago for PWR single phase sub-cool system. For verification, the applicant needs to show good agreement in comparison of the ACSTIC2 calculated results to the test data from K6 or other BWR plants.

John

From: Tai, Tom
Sent: Thursday, July 07, 2011 12:28 PM
To: Wu, Cheng-Ih
Cc: Dixon-Herrity, Jennifer; Joseph, Stacy
Subject: FW: ACSTIC2 Computer Code (Revised Attachment)

John,

Attached for your review is additional information on ACSTIC2 resulting from your June 22, 2011 audit.

I sent an earlier message relating the same information on this topic but withdrew because of the below. If you still have an earlier version of this message, please ignore.

Please let me know if you have any questions.

Regards

Tom Tai
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(301) 415-8484
Tom.Tai@NRC.GOV

From: Price, John E [<mailto:jeprice@STPEGS.COM>]
Sent: Thursday, July 07, 2011 12:22 PM
To: Tai, Tom; Joseph, Stacy
Cc: Head, Scott; Maurer, Bradley F.
Subject: ACSTIC2 Computer Code (Revised Attachment)

Tom/Stacy,

The attached is a revision to the discussion provided in a previous email. Please disregard the previous email attachment. The only change was to correct the notation for the “Reference Japanese ABWR (RJ-ABWR)”.

If you have any questions, please give me a call.

John E. Price

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Hearing Identifier: SouthTexas34Public_EX
Email Number: 2969

Mail Envelope Properties (0A64B42AAA8FD4418CE1EB5240A6FED132ABF9D1A9)

Subject: FW: ACSTIC2 Computer Code (Revised Attachment)
Sent Date: 7/20/2011 10:44:27 AM
Received Date: 7/20/2011 10:44:29 AM
From: Tai, Tom

Created By: Tom.Tai@nrc.gov

Recipients:
"STPCOL" <STP.COL@nrc.gov>
Tracking Status: None
"Price, John E" <jeprice@STPEGS.COM>
Tracking Status: None

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MESSAGE	2623	7/20/2011 10:44:29 AM	
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Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
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Justification for Application of ACSTIC2 to the ABWR

On June 22, 2011, the NRC conducted an audit of the ACSTIC2 computer code which has been used in the flow induced vibration (FIV) analysis for STP 3&4. At the close of the audit, the NRC auditor noted that the code was developed for use on PWRs and the validation is based, in part, on pre-op test data from a PWR plant. Since PWRs operate in a subcooled regime, justification should be provided for application to a BWR, which operates in a saturated regime. The following discussion provides this justification.

In the ACSTIC2 pump pulsation analysis, the water-steam interface is treated as a zero pressure amplitude boundary condition. This means only that the oscillatory component of the pressure is zero (the system pressure is at the nominal operating condition). This is a typical boundary condition used in acoustical analyses when the working fluid (the water in the ABWR reactor vessel) interfaces with a large volume or region containing a low density, low sound speed fluid, such as the steam volume in the ABWR. The fluctuating displacement of the working fluid – in this case, water — into such a region will not experience a significant reaction force due to the small stiffness of such a region. This kind of behavior of the water-steam interface essentially constitutes a zero pressure amplitude boundary condition.

The Reference Japanese ABWR (RJ-ABWR) is an operating ABWR and has essentially the same reactor internals design as STP 3&4. Test data taken during the startup of the RJ-ABWR included pressure transducer data in the water region of the reactor vessel. In the STP-3 analysis, the use of the zero pressure amplitude boundary condition yielded acoustic modes in the water region on the order of 20 and 40 Hz. This behavior is consistent with the pressure amplitude peaks observed in the measured RJ-ABWR pressure transducer data. These acoustic modes are also consistent with hand calculations of the lowest order open-open acoustic modes in the vessel annulus and core. This agreement further demonstrates that the use of the zero pressure amplitude boundary condition in the STP-3 ACSTIC2 model appropriately represents the pump pulsation behavior in the ABWR reactor.