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Subject: **Responses to DSS-CD LTR RAIs (TAC No. MC1737)**

In Reference 1, GE issued Revision 5 of the Licensing Topical Report NEDC-33075P, D*ectect and Suppress Solution - Confirmation Density*, November 2005. During a series of phone calls with GE regarding the DSS-CD LTR, the NRC staff requested additional information (RAI) to support their review of the subject LTR. GE's response to each of these requests is provided herein..

The information contained in the enclosed responses does not contain proprietary information in accordance with 10CFR2.390.

If you have any questions, please contact, Mike Lalor at (408) 925-2443 or myself.

Sincerely,

George Stramback
Manager, Regulatory Services

Project No. 710

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D065

Reference:
1. MFN 05-145, Letter from George Stramback (GE) to NRC, December 1, 2005, Revision 5 of DSS-CD LTR

Enclosure:
1. Responses to DSS-CD LTR RAIs

cc: M Harding (GNF/Wilmington)
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ENCLOSURE 1

MFN 05-148

Responses to DSS-CD LTR RAIs

Additional Clarification for NEDC-33075,"Detect and Suppress Solution - Confirmation Density

During the process of review of the GE licensing topical report, NEDC-33075P, "General Electric Boiling Water Reactor Detect and Suppress Solution - Confirmation Density." the NRC staff has identified items (in Rev. 4) required further clarification. RAIs 6 through 11 related to the RAI responses in GE Letter MFN 04-001, dated January 23, 2004.

NRC RAI 1

Any Long Term Solution that relies on the DIVOM methodology (e.g. Solution III) has problems if even a small number of hot channels become unstable before scram. A possible scenario is a recirculation pump trip - when the flow reaches a threshold, the core becomes unstable and responds neutronically; however, due to the detection time delays, the flow continues to decrease and a number of hot channels become unstable as operating condition reaches deeper into the unstable region. Please describe any impact on the DSS-CD solution of this type of scenarios.

GE Response

The DIVOM correlation relies on a relationship between the change in channel CPR and the change in channel power. If the channels are hydraulically unstable, the DIVOM slope will be very steep resulting in OPRM setpoints so low that the Option III might be inoperable. In the DSS-CD solution, no such relationship is assumed. The reactor is tripped at the earliest indication of instability, 10 confirmation counts with amplitude of 1.03 (at or slightly above the noise level). Because the core is neutronically coupled at the inception of instability, and the coupling increases as operating condition reaches deeper into the unstable region, sufficient neutronic response exists to allow the period confirmation count to proceed. Upon instability inception the actual power amplitude tends to immediately increase, thereby, quickly exceeding the DSS-CD amplitude discriminator (i.e., 1.03), resulting in a scram signal with very little delay, and without significant CPR degradation. Therefore, there is no impact on the DSS-CD solution capability to provide SLMCPR protection in entering regions where the core and/or channels are highly unstable.

An additional difference between Option III and DSS-CD is that Option III uses one leading cell as opposed to 5 cells in DSS-CD. The use of 5 cells in DSS-CD enables the solution to distinguish between plant noise and an actual instability event. This allows DSS-CD to have a lower OPRM amplitude set point making the DSS-CD solution more responsive.

NRC RAI 2

Normally a SLO SLMCPR value is 0.01 or 0.02 higher than the TLO SLMCPR value. Please clarify why a same SLMCPR value is used for both Table 4-1 TLO and Table 4-6 SLO in terms of a practical application for DSS-CD MCPR margin.

GE Response

The DSS-CD solution applicability does not depend upon a plant's specific SLMCPR or OLMCPR but on the margin between the two as stated in Section 4.3 of the LTR. For TLO the solution is demonstrated to be applicable for plants whose

$$\frac{OLMCPR_{Rated}\text{-}SLMCPR}{OLMCPR_{Rated}} > 0.067$$

and for SLO the solution demonstrated to be applicable for plants whose

$$\frac{OLMCPR_{SLO}\text{-}SLMCPR}{OLMCPR_{SLO}} > 0.138$$

For the DSS-CD demonstration TRACG cases, a common SLMCPR value of 1.12 is used for both TLO and SLO. However, when determining the applicability of the DSS-CD generic applicability envelope for a specific plant, the above relationships are used with the plant-specific TLO and SLO OLMCPR and SLMCPR.

NRC RAI 3
On page 7-5, a typo shows that A' should be A in Figure 7-1.

GE Response
This is not a typo. The BSP methodology for Region II (Controlled Entry Region) is for the stability criterion associated with 0.8 core and channel decay ratios to be applied to point B' and the stability criterion associated with 0.6 core and channel decay ratios to be applied to point A'. Figure 7-1 correctly shows BSP Regions I and II and the associated points A, B, A', and B'. The 0.6 criterion is used for point A' rather than 0.8 to provide additional stability margin for operation at off-rated conditions.

NRC RAI 4
On page 9-1, References 8 and 9 should be reviewed and approved by NRC.

GE Response
References 8 and 9 have been submitted to and were reviewed as part of the approval of NEDE-32906P-A, which is Reference 7 in the DSS-CD LTR.

NRC RAI 5
On page A-3, final position statement for I.3 should be included.

GE Response
Revision 5 of the DSS-CD LTR was issued in GE Letter, MFN 05-145, dated December 1, 2005, includes revised proposed Technical Specifications to address NRC comments regarding Action I.3. The revision to the proposed Technical Specification reflects that an extended period of operation without automatic trip capability for protection against instability events is not justified. Consequently, the proposed Technical Specifications were revised to address the use of an Automated BSP as part of the standard DSS-CD equipment.

NRC RAI 6

On page 1 of 58, GE response should be elaborated especially to include the review status and brief content of the review.

GE Response

The referenced response contains GE's commitment to provide a Licensing Topical Report (LTR) documenting the qualification of TRACG for DSS-CD stability application. The LTR, NEDE-33147P, *DSS-CD TRACG Application*, was issued in GE Letter, MFN 04-019, dated February 23, 2004.

The TRACG code is used to confirm the Minimum Critical Power Ratio (MCPR) margin during reasonably limiting instability event simulations for DSS-CD applications. LTR NEDE-33147P justifies the use of TRACG for modeling instabilities in the DSS-CD process.

The review of NEDE-33147P is presently ongoing. In letter dated July 2, 2003 (MFN 03-047), the NRC stated that the staff could approve the DSS-CD LTR while the review of the TRACG methodology is being completed.

NRC RAI 7
On page 2 of 58, GEXL 14 Correlation for GE14 Fuel, NEDC-32851P, Revision 2 should be docketed.

GE Response
The GEXL Correlation for GE 14 fuel was submitted in GNF Letter, FLN-2001-018, dated September 25, 2001.

NRC RAI 8
On page 4 of 58, Table 3.5-2 should be included in this response.

GE Response
The referenced RAI response refers to Table 3.5-2, but the table was not included in the response. For completeness, the table will be incorporated into the RAI response when the RAIs are included in the approved version of the DSS-CD LTR.

NRC RAI 9

On page 26 of 58, GE Response should be elaborated to include a brief status report.

GE Response

The subject response refers to GE Letter, MFN 03-016, dated March 11, 2003, which transmitted the following to the NRC:

1. BWR/4 - Brunswick files
   - Compact disk containing Brunswick TRACG Analysis Inputs for DSS-CD Application
2. Fuel Files for TRACG ATWS Instability Analysis
   - Compact disk containing fuel files for TRACG ATWS Instability Analsis
3. COLPS Channel Group - Revision 1
   - Process for the COLPS Channel Grouping Calculations for ODYSY

NRC RAI 10

On page 27 of 58, GE Response should be elaborated to include the content and review status.

GE Response

The subject response refers to GE Letter, MFN 03-118, dated October 31, 2003. That letter transmitted information on the PANACEA Harmonic calculation describing the approach used to generate the harmonic modes of the neutron flux distributions.

NRC RAI 11

On page 34 of 58, GE Response should be elaborated to include the content.

GE Response

The response to the RAI was based on the then current Revision 3 of the DSS-CD LTR. The LTR has been revised and is currently at Revision 5. In Revision 4 of the LTR, Table 7-2 was added to address item a of the RAI and Section 7.3.1 was added to address items b, c, and d of the RAI. For completeness, the RAI response on page 34 of 58 will be updated when the RAIs are included in the approved version of the DSS-CD LTR to reflect the changes made in Revision 4.