

## **Enclosure 2**

### **MFN 12-040, Revision 2**

### **Final Response to RAI 3.9-274**

#### **Public Version**

This is a non-proprietary version of Enclosure 1, from which the proprietary information has been removed. Portions of the document that have been removed are identified by white space within double brackets, as shown here [[ ]].

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**NRC RAI 3.9.274**

*GEH is requested to describe the resolution of the main steam line (MSL) strain gage calibration errors in support of the ESBWR design certification application. GEH should include the 'pipe and beam' calibration report and the procedure used to correct for differences between benchmark and future plant strain gage models and installation configurations. GEH is requested to specify applicable ITAAC to confirm the accuracy of the strain gages prior to plant startup.*

**Revised GEH Response:**

In GEH Letter MFN 12-130, dated December 12, 2012 (ML12348A139), GEH explained that the approach [[  
]] is being removed from the ESBWR licensing basis documents. GEH originally proposed to use this method for non-prototype ESBWR steam dryers following an initial prototype steam dryer, which has been through startup testing with measurements obtained from on-dryer instruments. GEH has determined that the non-prototype method will not be part of the ESBWR design certification. Refer to the response to RAI 3.9-270.

On this basis, certain information in the previous response to RAI 3.9-274 is no longer applicable to the ESBWR design certification, most specifically, to the extent that the information applies to the approach [[  
]]. In addition, the efforts on vibration assessment for the GGNS replacement steam dryer have been completed and results have been submitted to the NRC. Therefore, this response is revised below and the previous draft response is superceded.

See responses to RAIs 3.9-272 and 3.9-292 for additional information regarding strain gauges and licensing basis changes related to calibration.

*GEH is requested to describe the resolution of the main steam line (MSL) strain gage calibration errors in support of the ESBWR design certification application.*

The ESBWR is no longer subject to these MSL strain gauge calibration errors.

*GEH should include the 'pipe and beam' calibration report and the procedure used to correct for differences between benchmark and future plant strain gage models and installation configurations.*

For the ESBWR on-dryer instrumentation, GEH will work with the strain gauge manufacturer to ensure proper installation and calibration of the strain gauges used in the ESBWR measurement program. If instrumentation is similar to strain gauges used in the past, [[

]] Uncertainties will be evaluated for the specific strain gauges and will be accounted for in the final assessment.

The installation and data acquisition procedures for the ESBWR on-dryer instrumentation will follow the procedures used at GGNS, to the extent applicable to the specific gauges, and will incorporate operating experience from those measurement sessions. To the extent applicable to the type and model of strain gauges used in the ESBWR measurements, [[

]] The installation procedure, data acquisition procedure, instrumentation acceptance criteria, and instrumentation startup report from the previous work will be updated as part of the implementation of the RG 1.20 comprehensive vibration assessment program.

*GEH is requested to specify applicable ITAAC to confirm the accuracy of the strain gages prior to plant startup.*

### **Specific ITAAC Criteria**

Section 2.1.1, Reactor Pressure Vessel and Internals, of DCD Tier 1, Item (13) describes the strain gauges installed on the Steam Dryer. ITAAC 13 is a specific ITAAC related to the strain gauges. The Design Commitment of this ITAAC is as follows:

(13) The number and locations of strain gauges and accelerometers installed on the steam dryer for startup testing are capable of monitoring the most highly stressed components, considering accessibility and avoiding discontinuities in the components.

Section 3.9.2.3, which is designated as Tier 2\*, describes the performance criteria of the strain gauges. Sections 3.9.2.4 and 14.2.8.2.8 further amplify the Initial Startup testing requirements, including a discussion of the process, using the guidance of Regulatory Guide 1.20, for analyzing and using the information from these strain gauges.

In addition Section 3.9.2.4 of the DCD, Tier 2 states "*The Combined License (COL) Applicant will classify its reactor per the guidance in RG 1.20 and provide a milestone for submitting a description of the inspection and measurement programs to be performed (including measurement locations and analysis predictions) and the results of the vibration analysis, measurement and test program (COL 3.9.9-1-A).*" COL item 3.9.9-1-A states:

***“3.9.9-1-A Reactor Internals Vibration Analysis, Measurement and Inspection Program***

*The COL Applicant will classify its reactor per the guidance in RG 1.20 and provide a milestone for submitting a description of the inspection and measurement programs to be performed (including measurement locations and analysis predictions) and the results of the vibration analysis, measurement and test program (Subsection 3.9.2.4).”*

RG 1.20 (Revision 3) specifies that a description of the vibration measurement phase of the comprehensive vibration assessment program should be submitted to the NRC prior to implementing the measurement phase during power ascension testing. At that time, the specific types and models of strain gauges will have been selected and the installation and calibration procedures would be available.

DCD and LTR Impact

In addition to information added to the DCD for addressing strain gauge calibration in response to RAI 3.9-272, the following information will be added to NEDC-33408P-A. Refer to RAI 3.9-292 for the final content and marked-up pages.

*“In addition, for the ESBWR on-dryer instrumentation, the strain gauge manufacturer will be involved to ensure proper installation and calibration of the strain gauges used in the ESBWR measurement program during plant startup testing. If instrumentation is similar to strain gauges used in the past, [[*

*]]*

*Uncertainties will be evaluated for the specific strain gauges and will be accounted for in the final assessment.*

*The installation and data acquisition procedures for the ESBWR on-dryer instrumentation will follow the procedures used at GGNS, to the extent applicable to the specific gauges, and will incorporate operating experience from those measurement sessions. To the extent applicable to the type and model of strain gauges used in the ESBWR measurements, [[*

*]] The installation procedure, data acquisition procedure, instrumentation acceptance criteria, and instrumentation startup report from the previous work will be updated as part of the implementation of the RG 1.20 comprehensive vibration assessment program.”*