

June 22, 2010

**DESIGN CERTIFICATION SECTION 6.2 AND 6.3  
GSI-191 DOWNSTREAM EFFECTS TEST AUDIT PLAN**

**June 28 - 30, 2010**

**US-APWR DESIGN CERTIFICATION  
Mitsubishi Heavy Industries, Ltd.  
Docket No. 52-021**

Location: Mitsubishi Heavy Industries, Ltd.  
Takasago Machinery Works  
1-1, Arai-Cho Shinhama 2-Chome  
Takasago, Hyogo 676-8686, Japan

Purpose:

The purpose of this audit is to observe downstream effects testing, review, verify and identify information and documentation that is related to downstream effects testing associated with containment spray/residual heat removal and safety injection pumps. The audit will review and evaluate testing methods and implementation for the Mitsubishi Heavy Industries, Ltd. (MHI) Design Certification Section 6.2.2, Containment Heat Removal Systems and Section 6.3, Emergency Core Cooling Systems (ECCS), as well as related Technical Report MUAP-08013-P, Revision 0, "US-APWR Sump Strainer Downstream Effects."

Background:

MHI submitted to the U.S. Nuclear Regulatory Commission (NRC), a Final Safety Analysis Report for its application of the United States - Advanced Power Reactor (US-APWR) on December 31, 2007. MHI submitted Technical Report MUAP-08013-P, Revision 0, "US-APWR Sump Strainer Performance" in December, 2008. This technical report assesses the systems and components downstream of the containment sump strainers of the standard US-APWR sump strainer, and supports the US-APWR Design Control Document (DCD), Chapter 6, Subsections 6.2 "Containment Systems" and 6.3 "Emergency Core Cooling Systems."

MHI plans to conduct US-APWR plant specific downstream effects testing to qualify their system performance design. The audit is necessary to assess the adequacy of the applicant's basis for determining post-accident core coolability.

Regulatory Audit Basis:

To satisfy the requirements of Generic Design Criteria 38 and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.46(b)(5), regarding the long-term cooling and ECCS, adequate coolant must be ensured. The design of the fuel assemblies (including the bottom nozzle, debris filters, and grids), is a critical element in ensuring long-term recirculation cooling capability. Therefore, adequate fuel design consideration of potential debris bed forming locations is necessary.

Regulatory Audit Scope:

The scope for the regulatory audit will be observing downstream effects testing and focusing on the attributes listed below:

1. Test plan (protocol) and test matrix.
2. Quality assurance procedure.
3. Test data processing.
4. Scaling analysis.
5. Debris generation (source term).
6. Debris transport.
7. Debris preparation, sequencing, and addition.
8. Debris accumulation.
9. Chemicals and coatings.
10. Test apparatus and measurement equipment.

Information and Other Material Necessary for the Regulatory Audit:

Plant-specific analyses that provide design basis information used to support downstream effects testing should be available. For example, information related to all design inputs into downstream effects test protocol such as debris generation, debris bypass fraction, strainer, etc., should be available.

Team Assignments:

Chris Van Wert - Lead Auditor  
Diego Saenz - Team Member  
Erv Geiger - Team Member  
Jeff Ciocco - Team Member and Project Manager

Logistics:

The audit is planned for the week of June 28, 2010, at MHI's Takasago Machinery Works facility located in Takasago, Japan.

Special Requests:

Appropriate handling and protection of proprietary information shall be acknowledged and observed throughout the audit.

Deliverables:

The NRC staff will conduct the review during the week of June 28 - 30, 2010. NRC may request an ad-hoc extension of the audit if findings during the ongoing audit reveal the need for

additional time. Such an extension will be requested before the audit is adjourned on June 30, 2010, by the NRC staff responsible for the audit.

An audit report will be generated after completion of the audit. The audit outcome will be used to identify any additional information to be submitted for making regulatory decisions. The audit will assist the NRC staff in the preparation and issuance of further Requests for Additional Information for the licensing review of the US-APWR Design Certification Application, Section 6.2 and 6.3.

References:

1. US-APWR DCD Revision 2.
2. Technical Report MUAP-08013-P, Revision 0, "US-APWR Sump Strainer Downstream Effects."
3. Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," U.S. Nuclear Regulatory Commission, Washington, DC, September 13, 2004.
4. NRC NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants." (ADAMS Accession Number ML090580432.)

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7. Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," U.S. Nuclear Regulatory Commission, Washington, DC, September 13, 2004.
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