

April 18, 2011

**DESIGN CERTIFICATION SECTION 6.3
EMERGENCY CORE COOLING SYSTEM AUDIT PLAN**

April 21, 2011

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

Location: Mitsubishi Nuclear Energy Systems, Inc.
1001 19th Street North, 7th Floor
Arlington, VA 22209

Purpose:

The purpose of this audit is to review, verify and identify information and documentation that is related to the calculation of acceptance criteria used in the United States - Advanced Pressurized Water Reactor (US-APWR) core inlet blockage (CIB) testing. The audit will review and evaluate supporting pressure drop calculations used to develop Table 3-2 of technical report MUAP-10021-P, "US-APWR Core Inlet Blockage Test."

Background:

In June 2010, Mitsubishi Heavy Industries, Ltd. (MHI) conducted, and the U.S. Nuclear Regulatory Commission (NRC) staff audited, CIB testing to support Design Certification (DC) Section 6.3, "Emergency Core Cooling System," and in response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," and Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors." The test results were submitted to the NRC in MUAP-10021-P, dated November 2010. This report also included the acceptance criteria used in the test and high-level equations used in calculating these criteria. In order to complete its review, the NRC staff requests to see the detailed calculations which implemented the overall methodology to develop the resultant acceptance criteria.

Regulatory Audit Basis:

General Design Criteria (GDC) 35 of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, "Emergency Core Cooling," requires that the emergency core cooling system design has the capability to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

In accordance with 10 CFR 50.46(b)(5), the NRC staff reviews applications against the requirements for long-term cooling, including adequate fuel cooling in the presence of loss-of-coolant accident generated and latent debris.

Regulatory Audit Scope:

The audit scope will focus the review on MHI's acceptance criteria related calculations for the CIB test program. Specifically, the NRC staff plans to review the documentation related to the calculation of the pressure drop values in Table 3-2 of MUAP-10021-P. These calculations should provide the step by step development of the acceptance criteria beginning with the equations described in Section 3.2 of MUAP-10021-P. The sources for the values used in the calculations should be identified and available as well.

Information and Other Material on Hand for the Audit:

The NRC staff requests that all CIB acceptance criteria calculations and internal documentation used to develop Table 3-2 of MUAP-10021-P are made available during the audit. Unless otherwise detailed in the calculation documentation, the source for values used in the calculations should be identified and made available.

Audit Team:

Chris Van Wert - Lead Auditor
Vesselin Palazov - Team Member
Ed Throm - Team Member
Ruth Reyes - Project Manager
Jessica Colon - Project Manager

Logistics:

The audit will be conducted at the Mitsubishi Nuclear Energy Systems, Inc., office in Arlington, Virginia. The audit is scheduled to begin at 9:00 a.m. Participating individuals will meet at the audit location. Appropriate handling and protection of proprietary information shall be acknowledged and observed throughout the audit.

Special Requests:

None.

Deliverables:

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 DC, Section 6.3.

References:

1. US-APWR, Design Control Document, Revision 2.
2. Technical Report MUAP-08013-P, Revision 1, "US-APWR Sump Strainer Downstream Effects."
3. Technical Report MUAP-10021-P, Revision 0, "US-APWR Core Inlet Blockage Test."

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References:

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