

**FOLLOW-UP AUDIT OF APR1400 DESIGN SPECIFICATIONS AS PART OF THE APR1400  
DESIGN CONTROL DOCUMENT**

**July 18, 2016 – August 30, 2016**

**APR1400 DESIGN CERTIFICATION  
Korea Hydro and Nuclear Power Co., Ltd. and Korea Electric Power Corporation  
Docket No. 52-046**

Location: NRC Headquarters  
Two White Flint North  
11545 Rockville Pike  
Rockville, MD 20852-2738

Purpose:

The purpose of the audit is to confirm that the design, equipment qualification, and procurement specifications for selected components in support of its reviews of the following SRP sections:

- Section 3.2.1, “Seismic Classification.”
- Section 3.2.2, “System Quality Group Classification.”
- Section 3.9.3, “ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures”
- Section 3.9.6, “Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints.”
- Section 3.10, “Seismic and Dynamic Qualification of Mechanical and Electrical Equipment.”
- Section 3.11, “Environmental Qualification of Mechanical and Electrical Equipment.”

Background:

On March 4, 2015, the U.S. Nuclear Regulatory Commission (NRC) accepted the design certification application for docketing for the Advanced Power Reactor 1400 (APR1400) submitted by Korea Hydro and Nuclear Power Co. (KHNP) (Reference 1). Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, Section 47, “Contents of applications; technical information,” states that:

*The application must contain a level of design information sufficient to enable the Commission to judge the applicant's proposed means of assuring that construction conforms to the design and to reach a final conclusion on all safety questions associated with the design before the certification is granted. The information submitted for a design certification must include performance requirements and design information sufficiently detailed to permit the preparation of acceptance and inspection requirements by the [U. S. Nuclear Regulatory Commission] NRC, and procurement specifications and construction and installation specifications by an applicant. The Commission will require, before design certification, that information normally contained in certain procurement specifications and construction and installation specifications be*

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*completed and available for audit if the information is necessary for the Commission to make its safety determination.*

From August 24, 2015, through August 27, 2015, staff members from the Mechanical Engineering Branch (MEB) of the Division of Engineering in the NRC Office of New Reactors (NRO) conducted a regulatory audit of the APR1400 design and procurement specifications for ASME Code components, including valves; pumps; component supports; dynamic restraints; equipment seismic qualifications; and component classifications. As a result of this audit, the NRC staff had audit observations that are listed in the Summary Audit Report of APR1400 Design Specifications (ML15350A057). This follow-up audit is conducted to resolve the August 2015, audit observations.

#### Regulatory Bases:

The follow-up audit basis is to verify that design and procurement specifications follow the requirements of the ASME *Boiler and Pressure Vessel Code*, as required by 10 CFR 50.55a, and are consistent with the descriptions in the APR1400 design control document (DCD). This regulatory audit is also needed to evaluate the safety conclusions that need to be made regarding Chapter 3, "Design of Structures, Components, Equipment, and Systems," of the APR1400 DCD, and to identify detailed information related to the applicant's principal design criteria.

#### Regulatory Audit Scope and Methodology:

The primary scope of this audit is to review certain design and procurement specifications, and design documents provided by the applicant to resolve the staff's previous observations in an August 2015, audit (Reference 2). Particularly, the audit will confirm that the design, equipment qualification, and procurement specifications for selected components that are used in the design of APR1400, are consistent with the guidance in Standard Review Plans (SRPs) Sections 3.2.1, 3.2.2, 3.9.3, 3.9.6, 3.10, 3.11 and the information in the DCD. The review scope of this audit will be focused to confirm the design and procurement specifications conforms to SRP Sections 3.2.1, 3.2.2, 3.9.3, 3.9.6, 3.10, 3.11 and ASME *Boiler and Pressure Vessel Code* and that the design requirements have been properly translated to design and procurement specifications to ensure construction will conform to the design requirements. The NRC staff will also review supporting documents related to the evaluation of the applicant's response to quality group and seismic classifications.

The staff will conduct this audit in accordance with the guidance provided in NRO-REG-108, "Regulatory Audits" (Reference 3).

#### Information and Documents Necessary for the Audit:

The following documents are to be uploaded into the electronic reading room and made available during the NRC staff's audit:

1. Updated design and procurement specifications that address the observations of the August 2015, audit.

2. Documents addressing the August 2015, audit, observations in the following areas:
  - Design reports and stress analyses for the APR1400 Reactor Pressure Vessel (RPV) and Pressurizer (PR).
  - Stress analyses of nozzles that were attached to major components such as nozzles attached to Reactor Pressure Vessel (RPV), Pressurizer (PR), Steam Generator (SG) and Reactor Coolant Pumps (RCP).

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

Audit Team:

Tuan Le, NRO Mechanical Engineer, Audit Lead  
Thomas G. Scarbrough, Sr. Mechanical Engineer  
Yuken Wong, Sr. Mechanical Engineer  
James Strnisha, Mechanical Engineer  
Nicholas Hansing, General Engineer  
John Vera, Project Manager

Applicant Contact:

Steven Mannon, KHNP

Audit Activities and Deliverables:

The NRC audit team's review will cover the technical areas identified previously in this audit plan. Depending upon how much effort is needed in a given area, the NRC team members may be reassigned to ensure adequate coverage of important technical elements.

This regulatory audit will be scheduled for July 18, 2016 – August 30, 2016, at the Rockville NRC Headquarters. The audit entrance meeting and exit meeting will be scheduled within that timeframe that is convenient for KHNP and the NRC staff

The audit team will perform the audit activities and complete audit reports accordingly. The level of effort for this audit is estimated a total of 184 hours to complete the audit.

The NRC Project Manager will coordinate with KHNP in advance of audit activities to verify specific documents and identify any changes to the audit schedule and requested documents. The NRC staff acknowledges the proprietary nature of the information requested. It will be handled appropriately throughout the audit. While the NRC staff will take notes, the NRC staff will not remove hard copies or electronic files from the audit site.

At the completion of the audit, the audit team will issue an audit summary within 90 days that will be declared and entered as an official agency record in the NRC's Agencywide Documents Access and Management System (ADAMS) records management system. The audit outcome may be used to identify any additional information to be submitted for making regulatory decisions, and it will assist the NRC staff in the issuance of requests for additional information (if necessary) for the licensing review of APR1400 DCD Chapter 3 and any related information provided in other chapters, in preparation of the NRC staff's Safety Evaluation Report.

If necessary, any circumstances related to the conductance of the audit will be communicated to John Vera (NRC) at 301-415-5790 or via email at [John.Vera@nrc.gov](mailto:John.Vera@nrc.gov).

References:

1. "Letter to Korea Hydro and Nuclear Power Co., Ltd., and Korea Electric Power Corporation – Acceptance of the Application for Standard Design Certification of the Advanced Power Reactor 1400," ADAMS Accession Number ML15041A455, issued March 4, 2015.
2. Summary Audit Report of APR1400 Design Specifications, ADAMS Accession Number ML15350A057, issued April 20, 2016.
3. NRO-REG-108, "Regulatory Audits," ADAMS Accession Number ML081910260, issued April 2, 2009.