



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

February 21, 2017

Mr. Victor M. McCree  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**SUBJECT: INTERIM LETTER: CHAPTERS 2, 5, 8, 10, AND 11 OF THE NRC STAFF'S  
SAFETY EVALUATION REPORT WITH OPEN ITEMS RELATED TO THE  
CERTIFICATION OF THE APR1400 DESIGN**

Dear Mr. McCree:

During the 640<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards, February 9-11, 2017, we met with representatives of the Korea Electric Power Corporation and Korea Hydro & Nuclear Power Company Ltd. (KHNP) and the NRC staff to review the following chapters of the safety evaluation report (SER) with open items associated with the APR1400 design certification application:

- Chapter 2, "Site Characteristics"
- Chapter 5, "Reactor Coolant System and Connected Systems"
- Chapter 8, "Electric Power Systems"
- Chapter 10, "Steam and Power Conversion System"
- Chapter 11, "Radioactive Waste Management"

Our APR1400 Subcommittee also reviewed these chapters during meetings on September 21-22, October 4, November 29, and December 14, 2016. Technical aspects of the APR1400 design were discussed at those meetings. We also had the benefit of the referenced documents.

#### **CONCLUSION & RECOMMENDATIONS**

1. Our reviews to date have not identified any issues that would significantly impact the overall review.

2. The staff should confirm that a shutdown cooling pump can provide automatic containment spray flow during conditions when the suction paths for the associated containment spray pump are isolated.
3. The design certification should be explicit that it is for a single unit plant with base load operation.

## **BACKGROUND**

KHNP submitted a design certification application for the APR1400 on December 23, 2014. The application included the design control document (DCD) and topical and technical reports that detail aspects of the design and analyses. The staff reviewed the DCD following the guidelines in the Standard Review Plan and applicable regulatory guides. The staff Phase 2 SER related to the APR1400 design certification application includes open items. In addition to a description of the staff review and their bases for acceptance of the design certification application, the SER also identifies the information a combined license applicant must provide.

We have agreed to review the SER on a chapter-by-chapter basis to identify technical issues that may merit further consideration by the staff. This process will aid the resolution of concerns and facilitates timely completion of the design certification review. Accordingly, the staff has provided Chapters 2, 5, 8, 10, and 11 of the SER with open items for our review. The staff's SER and our review of these chapters addressed DCD, Revision 0 and supplemental material, including KHNP responses to staff requests for additional information.

## **DISCUSSION**

The current open items from these SER chapters identify technical issues that must be resolved during the staff's final review. As part of our reviews, we have requested additional information about specific details of the APR1400 design. For this interim report, we note the following observations on selected elements of the design addressed in these chapters. We did not identify any other issues that merit special attention at this time.

The APR1400 design is intended to facilitate interchangeable use of the containment spray pumps and the shutdown cooling pumps. During our review, we identified a concern about implementation of that design. In particular, inspections or maintenance on a containment spray pump may require isolation of the pump suction flow path. The containment spray pumps do not have local suction valves which can be used for that purpose. To achieve the necessary isolation, plant personnel must close a valve that provides the intended suction flow path from the in-containment refueling water storage tank to the shutdown cooling pump. We were also

informed that the open position of that valve provides the permissive for signals to automatically start the shutdown cooling pump in the spray mode (for the Division 1 pumps, the subject valve is motor-operated valve SI-340, as shown on DCD Figure 6.3.2-1). The staff should confirm that a shutdown cooling pump can provide automatic containment spray flow during conditions when the suction paths for the associated containment spray pump are isolated.

Chapter 10 states that the turbine generator is capable of load-following and Chapter 5 mentions several features of the pressurizer that accommodate load-following. During our meetings, KHNP clarified that the APR1400 has load-change capabilities for normal power maneuvers and unexpected load transients, and the application is limited to base load operation. The design certification should be explicit that it is for a single unit plant without reactor power variations to match electrical generator load following.

Sincerely,

*/RA/*

Dennis Bley  
Chairman

## REFERENCES

1. Korea Electric Power Corporation and Korea Hydro & Nuclear Power Company, Ltd., "Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd Application for Design Certification of the APR1400 Standard Design," December 23, 2014 (ML15006A098).
2. U.S. Nuclear Regulatory Commission, "APR 1400 Design Certification (DCD) Tier 2, Chapter 2 - Site Characteristics - SE without OIs - Phase 2," August 26, 2016 (ML16225A443).
3. U.S. Nuclear Regulatory Commission, "APR1400 Chapter 5 Reactor Coolant Systems and Related Systems, Phase 2 SER," August 30, 2016 (ML16237A389).
4. U.S. Nuclear Regulatory Commission, "Advanced Power Reactor 1400 Design Certification Application – Safety Evaluation with Open Items for Chapter 8, Electric Power System," October 21, 2016 (ML16293A861).
5. U.S. Nuclear Regulatory Commission, "Advanced Power Reactor 1400 Design Certification Application – Safety Evaluation with Open Items for Chapter 10, Steam and Power Conversion System," September 9, 2016 (ML16251A036).
6. U.S. Nuclear Regulatory Commission, "Advanced Power Reactor 1400 Design Certification Application – Safety Evaluation with Open Items for Chapter 11, Radioactive Waste Management," September 8, 2016 (ML16245A828).

informed that the open position of that valve provides the permissive for signals to automatically start the shutdown cooling pump in the spray mode (for the Division 1 pumps, the subject valve is motor-operated valve SI-340, as shown on DCD Figure 6.3.2-1). The staff should confirm that a shutdown cooling pump can provide automatic containment spray flow during conditions when the suction paths for the associated containment spray pump are isolated.

Chapter 10 states that the turbine generator is capable of load-following and Chapter 5 mentions several features of the pressurizer that accommodate load-following. During our meetings, KHNP clarified that the APR1400 has load-change capabilities for normal power maneuvers and unexpected load transients, and the application is limited to base load operation. The design certification should be explicit that it is for a single unit plant without reactor power variations to match electrical generator load following.

Sincerely,  
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Dennis Bley  
Chairman

**REFERENCES**

1. Korea Electric Power Corporation and Korea Hydro & Nuclear Power Company, Ltd., "Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd Application for Design Certification of the APR1400 Standard Design," December 23, 2014 (ML15006A098).
2. U.S. Nuclear Regulatory Commission, "APR 1400 Design Certification (DCD) Tier 2, Chapter 2 - Site Characteristics - SE without OIs - Phase 2," August 26, 2016 (ML16225A443).
3. U.S. Nuclear Regulatory Commission, "APR1400 Chapter 5 Reactor Coolant Systems and Related Systems, Phase 2 SER," August 30, 2016 (ML16237A389).
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5. U.S. Nuclear Regulatory Commission, "Advanced Power Reactor 1400 Design Certification Application – Safety Evaluation with Open Items for Chapter 10, Steam and Power Conversion System," September 9, 2016 (ML16251A036).
6. U.S. Nuclear Regulatory Commission, "Advanced Power Reactor 1400 Design Certification Application – Safety Evaluation with Open Items for Chapter 11, Radioactive Waste Management," September 8, 2016 (ML16245A828).

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