

## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 91-7867  
SRP Section: 14.02 – Initial Test Program  
Application Section: 14.02  
Date of RAI Issue: 07/20/2015

---

### Question No. 14.02-4

Consistent with the Regulatory Guidance in RG 1.206, Section C.I.14, "Verification Programs," and RG 1.68, Revision 4 and NRC review and approval of other DC applications, the DC applicant for the APR1400 provided a list of COL responsibilities related to the Initial Test Program in DC Section 14.2.13, Combined Licensee Information. To meet the Regulatory Guidance in RG 1.206, Section C.I.14, SRP Section 14.2 and RG 1.68, the NRC staff also identified some additional administrative control changes to COL applicant responsibilities that should be added to DCD Subsection 14.2.13 in accordance with the following text corrections:

- COL 14.2(1) The COL applicant is to develop the site-specific organization and staffing levels appropriate for its facility **to implement the initial test program. The COL's plant operating and plant technical staff should participate, to the extent practical, in developing and conducting the Initial Test Program and evaluating the test results.**
- COL 14.2(2) The COL applicant is to prepare the site specific **preoperational and startup** test specifications and test procedures and/or guidelines that is to be used for the conduct of the plant ~~startup program~~ **Initial Test Program. The preoperational and startup test procedures should have controls in place to ensure that test procedures include appropriate prerequisites, objectives, safety precautions, initial test conditions, methods to direct and control test performance and test acceptance criteria by which the test is evaluated. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post-test data analysis.** These procedures are to be submitted at least 60 days prior to their intended use to the NRC staff for review as described in Subsection 14.2.11.
- COL 14.2(3) The COL applicant is to prepare a startup administrative manual ~~and also~~

~~provide preoperational and startup test summaries that contain testing objectives and acceptance criteria applicable for its scope of the plant design. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post test data analysis (SAM) which contains administrative controls that govern the conduct of each major phase of the ITP. This description should include the administrative controls used to ensure that necessary prerequisites are satisfied for each major phase and for individual tests. The COL applicant should also describe the methods to be followed in initiating plant modifications or maintenance tasks that are deemed to be necessary to conduct the ITP. This description should include methods used to ensure retesting following such modifications or maintenance. In addition, the description should discuss the involvement of design organizations with the COL applicant in reviewing and approving proposed plant modifications. The COL applicant should also describe in the SAM adherence to approved test procedures during the conduct of the ITP as well as the methods for effecting changes to approved test procedures.~~

- COL 14.2(4) The COL applicant is to perform a review and evaluation of individual test results in a test report made available to NRC personnel after preoperational and startup tests are completed. The specific test acceptance criteria for determining success or failure of a test shall be included in the test report approval of the test results. The test report should also include test results associated with any license conditions in the plant specific Initial Test Program.
- COL 14.2.(6) The COL applicant is to develop a **sequence and** schedule for the development of the plant operating and emergency procedures should allow sufficient time for trial use of the procedure during the Initial Test Program. The **sequence and** schedule for plant startup is to be developed by the COL applicant to allow sufficient time to systematically perform the required testing in each phase.
- COL 14.2(7) The COL applicant is responsible for establishing hold points at selected milestones throughout the power ascension test phase to ensure that designated personnel or groups evaluate and approve relevant test results before proceeding to the next power- ascension test phase. At a minimum, the COL applicant should establish hold points at approximately 25-percent, 50-percent, and 75-percent power-level test conditions for pressurized-water reactors.

The DC applicant should make the following number sequence changes to COL 14.2(78) through COL 14.2(1412) but no text changes are needed.

- COL 14.2(13) The COL applicant is responsible for retaining preoperational and startup test procedures and test results as part of the plant's historical records in accordance with 10 CFR 50.36, "Technical Specification," 10 CFR 50.71, "Maintenance of Records, Making of Reports," 10 CFR 50, Appendix B, Criterion XVII, "Test Records," and RG 1.28, "Quality Assurance Program Criteria (Design and Construction)."

The DC applicant should also revise APR1400 DCD Sections 14.2.2, "Organization and

Staffing," 14.2.3, "Test Procedures," and 14.2.6, "Test Records," to note these changes in COL applicant responsibilities for implementing the Initial Test Program in DCD Section 14.2.13, "COL Information Items."

### **Response**

To meet the Regulatory Guidance in RG 1.206, Section C.I.14, SRP Section 14.2 and RG 1.68, revision 4, DCD Subsection 14.2.13, Combined Licensee information, will be modified based on proposed text corrections.

Also, related subsections show below will be modified to maintain consistency between each subsection.

- DCD Sections 14.2.2, "Organization and Staffing"
- DCD Sections 14.2.3, "Test Procedures"
- DCD Sections 14.2.5, "Review, Evaluation, and Approval of Test Results"
- DCD Sections 14.2.6, "Test Records"
- DCD Sections 14.2.11, "Test Program Schedule"

---

### **Impact on DCD**

DCD Section 14.02 and Table 1.8-2 will be revised as indicated in the attached markups.

### **Impact on PRA**

There is no impact on the PRA.

### **Impact on Technical Specifications**

There is no impact on the Technical Specifications.

### **Impact on Technical/Topical/Environmental Report**

There is no impact on any Technical, Topical, or Environment Reports.

**APR1400 DCD TIER 2**14.2.13 Combined License Information

COL 14.2(1) The COL applicant is to develop the site-specific organization and staffing level appropriate for its facility to implement the initial test program. The COL's plant operating and plant technical staff should participate, to the extent practical, in developing and conducting the Initial Test Program and evaluating the test results.

COL 14.2(2) The COL applicant is to prepare the site-specific preoperational and startup test specifications and test procedures and/or guidelines that is to be used for the conduct of the plant ~~startup program~~ Initial Test Program. The preoperational and startup test procedures should have controls in place to ensure that test procedures include appropriate prerequisites, objectives, safety precautions, initial test conditions, methods to direct and control test performance and test acceptance criteria by which the test is evaluated. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post-test data analysis. These procedures are to be submitted at least 60 days prior to their intended use to the NRC staff for review as described in Subsection 14.2.11.

COL 14.2(3) The COL applicant is to prepare a startup administrative manual ~~and also provide preoperational and startup test summaries that contain testing objectives and acceptance criteria applicable for its scope of the plant design. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post test data analysis.~~ (SAM) which contains administrative controls that govern the conduct of each major phase of the ITP. This description should include the administrative controls used to ensure that necessary prerequisites are satisfied for each major phase and for individual tests. The COL applicant should also describe the methods to be followed in initiating plant modifications or maintenance tasks that are deemed to be necessary to conduct the ITP. This description should include methods used to ensure retesting following such modifications or maintenance. In addition, the description should discuss the involvement of design organizations with the COL applicant in reviewing and approving proposed

**APR1400 DCD TIER 2**

plant modifications. The COL applicant should also describe in the SAM adherence to approved test procedures during the conduct of the ITP as well as the methods for effecting changes to approved test procedures.

COL 14.2(4) The COL applicant is to perform review and evaluation of individual test results in a test report made available to NRC personnel after preoperational and startup tests are completed. The specific test acceptance criteria for determining success or failure of a test shall be included in the test report approval of the test results. The test report should also include test results associated with any license conditions in the plant specific Initial Test Program.

COL 14.2(5) The COL applicant is to develop the detailed description of test and acceptance criteria for the Security System.

COL 14.2(6) The COL applicant is to develop a sequence and schedule for the development of the plant operating and emergency procedures should allow sufficient time for trial use of these procedures during the Initial Test Program. The sequence and schedule for plant startup is to be developed by the COL applicant to allow sufficient time to systematically perform the required testing in each phase.

COL 14.2(7) The COL applicant is responsible for establishing hold points at selected milestones throughout the power ascension test phase to ensure that designated personnel or groups evaluate and approve relevant test results before proceeding to the next powerascension test phase. At a minimum, the COL applicant should establish hold points at approximately 25- percent, 50- percent, and 75-percent power-level test conditions for pressurized-water reactors.

COL 14.2(~~7~~8) The COL applicant is to describe its program for reviewing available information on reactor operating and testing experiences and discusses how it used this information in developing the initial test program. The description is to include the sources and types of information reviewed, the conclusions or findings, and the effect of the review on the initial test program.

**APR1400 DCD TIER 2**

COL 14.2(~~89~~) The COL applicant that references the APR1400 design certification is to identify the specific operator training to be conducted as part of the low-power testing program related to the resolution of TMI Action Plan Item I.G.1, as described in (1) NUREG-0660 - NRC Action Plans Developed as a Result of the TMI-2 Accident, Revision 1, August 1980 and (2) NUREG-0737 - Clarification of TMI Action Plan Requirements.

COL 14.2(~~910~~) The COL applicant is to prepare the pre-operational test of cooling tower and associated auxiliaries, and raw water and service water cooling systems.

COL 14.2(~~1011~~)The COL applicant is to develop the test program of personnel monitors and radiation survey instruments.

COL 14.2(~~1112~~)The COL applicant is to develop the test procedure of the communication system.

COL 14.2(13) The COL applicant is responsible for retaining preoperational and startup test procedures and test results as part of the plant's historical records in accordance with 10 CFR 50.36, "Technical Specification," 10 CFR 50.71, "Maintenance of Records, Making of Reports," 10 CFR 50, Appendix B, Criterion XVII, "Test Records," and RG 1.28, "Quality Assurance Program Criteria (Design and Construction)."

#### 14.2.14 References

1. 'Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,' "Domestic Licensing of Production and Utilization Facilities," Energy, Title 10, Code of Federal Regulations, 50, Appendix B, U.S. Nuclear Regulatory Commission, Washington, DC.
2. Quality Assurance Program Requirements (Design and Construction), NRC RG 1.28, Rev. 4, U.S. Nuclear Regulatory Commission, Washington, DC, June 2010.

**APR1400 DCD TIER 2**14.2.2 Organization and Staffing

The specific staff, staff responsibilities, authorities, and personnel qualifications for performing the APR1400 initial test program are the responsibility of the combined license (COL) applicant. This test organization is responsible for the planning, executing, and documentation of the plant initial testing and related activities that occur between the completion of plant, system, and component construction and commencement of plant commercial operation. Transfer and retention of experience and knowledge gained during initial testing for the subsequent commercial operation of the plant is an objective of the test program.

The COL applicant is to develop the site-specific organization and staffing level appropriate for its facility to implement the initial test program. The COL's plant operating and plant technical staff should participate, to the extent practical, in developing and conducting the Initial Test Program and evaluating the test results (COL 14.2(1)).

**APR1400 DCD TIER 2**14.2.3 Test Procedures

The plant operator provides reasonable assurance of the preparation and designate the approval process for Phases I through IV test procedures. Detailed procedure guidelines and procedures provided by the appropriate design organization are used to develop various system test procedures. Thus, test procedures are based on requirements of system designers and applicable NRC Regulatory Guides (RGs).

The COL applicant is to prepare the site-specific preoperational and startup test specifications and test procedures and/or guidelines that is to be used for the conduct of the plant startup program plant initial test program. The preoperational and startup test procedures should have controls in place to ensure that test procedures include appropriate prerequisites, objectives, safety precautions, initial test conditions, methods to direct and control test performance and test acceptance criteria by which the test is evaluated. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post-test data analysis. These procedures are to be submitted at least 60 days prior to their intended use to the NRC staff for review as described in Subsection 14.2.11 (COL Item 14.2(2)).~~The COL applicant is to prepare the site-specific initial test procedures and/or guidelines that are used for the conduct of the initial test program. These procedures are to be submitted at least 60 days prior to their intended use to the NRC staff for review as described in Subsection 14.2.11.~~

The COL applicant is to prepare a startup administrative manual and also provide preoperational and startup test summaries that contain testing objectives and acceptance criteria applicable for its scope of the plant design. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post-test data analysis. (SAM) which contains administrative controls that govern the conduct of each major phase of the ITP. This description should include the administrative controls used to ensure that necessary prerequisites are satisfied for each major phase and for individual tests. The COL applicant should also describe the methods to be followed in initiating plant modifications or maintenance tasks that are deemed to be necessary to conduct the ITP. This description should include methods used to ensure retesting following such modifications or maintenance. In addition, the description should discuss the involvement of design organizations with the COL applicant in reviewing and



**APR1400 DCD TIER 2**

~~approving proposed plant modifications. The COL applicant should also describe in the SAM adherence to approved test procedures during the conduct of the ITP as well as the methods for effecting changes to approved test procedures (COL Item 14.2(3)). COL applicant is to prepare a startup administrative manual and provide preoperational and startup test summaries that contain testing objectives and acceptance criteria applicable for its scope of the plant design. The COL applicant is also to develop a startup administrative manual and supporting documents that delineate plant operational conditions at which tests are to be conducted, testing methodologies to be utilized, data to be collected, and data reduction techniques. The startup administrative manual and supporting documents are to be available for review during the COL application process. Testing performed at other than design operating conditions for systems are to be reconciled either through the test acceptance criteria or post test data analysis. The COL applicant is to provide this information in conjunction with the development of the startup manual.~~

**14.2.3.1 Test Procedure Preparation**

Detailed test procedures for Phase I through IV tests are prepared by the site operator. Each test procedure is prepared using pertinent reference material provided by the appropriate design and vendor organizations, the Final Safety Analysis Report, the Technical Specifications, and the applicable NRC Regulatory Guides (RGs). A test procedure is prepared for each system test to be performed during the four phases of the test program. Each system test procedure contains (at a minimum) the following major topic areas:

- a. Test Objectives
- b. Acceptance Criteria
- c. References
- d. Prerequisites
- e. Precautions and Notes
- f. Test Equipment

**APR1400 DCD TIER 2**14.2.5 Review, Evaluation, and Approval of Test Results

The COL applicant is to review and evaluate individual test results in a test report made available to NRC personnel after preoperational and startup tests are completed. The specific test acceptance criteria for determining success or failure of a test shall be included in the test report approval of the test results. The test report should also include test results associated with any license conditions in the plant specific Initial Test Program (COL Item 14.2(4)).

The COL applicant is responsible for establishing hold points at selected milestones throughout the power ascension test phase to ensure that designated personnel or groups evaluate and approve relevant test results before proceeding to the next power ascension test phase. At a minimum, the COL applicant should establish hold points at approximately 25-percent, 50-percent, and 75-percent power-level test conditions for pressurized-water reactors (COL Item 14.2(7)).

Individual test results are reviewed and approved as provided in the site-specific administrative procedures. Completed procedures and test reports are reviewed for acceptance. The specific acceptance criteria for determining the success or failure of the test are included as part of the procedure and are used during the review. Test deficiencies or results that do not meet acceptance criteria are identified to the affected and responsible design organizations, and corrective actions and retests, as required, are performed.

Test results for each phase of the test program are reviewed and verified as complete (as required) and satisfactory before testing in the next phase is started. Preoperational testing on a system is not normally started until all applicable prerequisite tests have been completed, reviewed, and approved. Prior to initial fuel loading and the commencement of initial criticality, a comprehensive review of required completed preoperational procedures is to be conducted by the COL applicant startup test organization. This review is to provide reasonable assurance that the required plant systems and structures are capable of supporting the initial fuel loading and subsequent startup testing.

**APR1400 DCD TIER 2**14.2.6 Test Records

The COL applicant is responsible for retaining preoperational and startup test procedures and test results as part of the plant's historical records in accordance with 10 CFR 50.36, "Technical Specification," 10 CFR 50.71, "Maintenance of Records, Making of Reports," 10 CFR 50, Appendix B, Criterion XVII, "Test Records," and RG 1.28, "Quality Assurance Program Criteria (Design and Construction)." (COL Item 14.2(13))

A single copy of each test procedure is designated as the official copy to be used for testing. The official copy and information specifically called for in the test procedure, such as completed data sheets, instrumentation calibration data and chart recordings, are to be retained for the life of the plant by the COL applicant in accordance with NRC RG 1.28 (Reference 2) for record retention.

14.2.7 Conformance of Test Programs with NRC Regulatory Guides

Subsection 1.9.1 and Table 1.9-1 discuss compliance with the applicable NRC RGs. Table 14.2-7 provides the matrix of applicable guidance of RG 1.68 (Reference 3) Appendix A (Initial Test program) versus individual test descriptions listed in Subsection 14.2.12, so as to conform the key test parameters systematically.

The intent of the NRC RGs listed below is followed with the noted differences.

14.2.7.1 NRC Regulatory Guide 1.68, "Initial Test Programs for Water-Cooled Reactor Power Plants"

The following exceptions and/or clarifications address only the significant differences between the proposed test program and the applicable Regulatory Position. Minor terminology differences, testing not applicable to the plant design, and testing that is part of required surveillance tests are not addressed. The applicable portions of NRC RG 1.68 (Reference 3) are referenced.

**APR1400 DCD TIER 2**14.2.11 Test Program Schedule

The COL applicant is to develop a sequence and schedule for the development of the plant operating and emergency procedures should allow sufficient time for trial use of these procedures during the Initial Test Program. The sequence and schedule for plant startup is to be developed by the COL applicant to allow sufficient time to systematically perform the required testing in each phase (COL Item 14.2(6)).

The schedule for plant startup is to be developed by the COL applicant to allow sufficient time to systematically perform the required testing in each phase. The applicant is to allow at least nine months for conducting preoperational testing and at least three months for conducting startup testing, including fuel loading, low-power tests, and power-ascension tests.

The scheduling of individual tests or test sequences is done so that systems and components that are required to prevent or mitigate the consequences of postulated accidents are tested prior to fuel loading. Tests that require a substantial core power level for proper performance are performed at the lowest power level commensurate with obtaining acceptable test data.

Phase I test procedures are scheduled to be approved and available for review by the NRC inspectors at least 60 days prior to their scheduled performance date. The Phase II through Phase IV test program administrative control procedures, the majority of the individual test procedures, and the following milestone controlling procedures: Fuel loading, Post-core HFT, Initial criticality, Low-power physics test, and Power ascension, are scheduled to be approved and available for review at least 60 days prior to fuel load. The remaining individual test procedures are scheduled for approval and available for review by the NRC inspectors at least 60 days prior to their intended performance date.

14.2.11.1 Testing Sequence

The COL applicant is to specify the testing sequence to provide reasonable assurance that safety of the plant is not compromised during the test program. The test sequence

## APR1400 DCD TIER 2

Table 1.8-2 (24 of 29)

Item No.	Description
COL 13.5(6)	The COL applicant is to describe how other operating and maintenance procedures are classified, which group or groups within the operating organization have the responsibility for following each class of procedures, and the general objectives and character of each class and subclass.
COL 13.5(7)	The COL applicant is to provide a program for developing shutdown procedure.
COL 13.6(1)	The COL applicant is to develop a physical security plan, training and qualification plan, and safeguards contingency plan. The COL applicant is to address site-specific information related to the physical security, contingency, and guard training and qualification plans. These documents are categorized as SGI and are withheld from public disclosure pursuant to 10 CFR 73.21. The COL applicant is to address site-specific physical security ITAACs as applicable.
COL 13.6(2)	The COL applicant is to develop an access authorization program that meets the requirements of 10 CFR 73.56, and conformance with the requirement is to be specified in the physical security plan.
COL 13.6(3)	The COL applicant is to develop a cyber security plan and implementation program in accordance with 10 CFR 73.54. The plan document is categorized as SGI and is to be withheld from public disclosure pursuant to 10 CFR 2.390(d)(1). <span style="border: 1px solid red; padding: 2px;">Replace with insert 1</span>
COL 13.7(1)	The COL applicant is to develop the description of the fitness-for-duty programs during construction and for the operating plant.
COL 14.2(1)	The COL applicant is to develop the site-specific organization and staffing level appropriate for its facility.
COL 14.2(2)	The COL applicant is to prepare the site-specific test procedures and/or guidelines that are to be used for the conduct of the plant startup program.
COL 14.2(3)	The COL applicant is to prepare a startup administrative manual and also provide preoperational and startup test summaries that contain testing objectives and acceptance criteria applicable for its scope of the plant design. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post-test data analysis.
COL 14.2(4)	The COL applicant is to perform review and evaluation of individual test results.
COL 14.2(5)	The COL applicant is to develop the detailed description of test and acceptance criteria for the Security System.
COL 14.2(6)	The COL applicant is to develop a schedule for the development of the plant operating and emergency procedures that should allow sufficient time for trial use of these procedures during the initial test program. The schedule for plant startup is to be developed by the COL applicant to allow sufficient time to systematically perform the required testing in each phase.
COL 14.2(7)	The COL applicant is to describe its program for reviewing available information on reactor operating and testing experiences and discusses how it used this information in developing the initial test program. The description is to include the sources and types of information reviewed, the conclusions or findings, and the effect of the review on the initial test program.

**APR1400 DCD TIER 2**

Replace with insert 1

Table 1.8-2 (25 of 29)

Item No.	Description
COL 14.2(8)	The COL applicant that references the APR1400 design certification is to identify the specific operator training to be conducted as part of the low-power testing program related to the resolution of TMI Action Plan Item I.G.1, as described in (1) NUREG-0660, "NRC Action Plans Developed as a Result of the TMI-2 Accident," Revision 1, August 1980 and (2) NUREG-0737, "Clarification of TMI Action Plan Requirements."
COL 14.2(9)	The COL applicant is to prepare the pre-operational test of cooling tower and associated auxiliaries, and raw water and service water cooling systems.
COL 14.2(10)	The COL applicant is to develop the test program of personnel monitors and radiation survey instruments.
COL 14.2(11)	The COL applicant is to develop the test procedure of the communication system.
COL 14.3(1)	The COL applicant is to provide the ITAAC for the site-specific portion of the plant systems specified in Subsection 14.3.3.
COL 14.3(2)	The COL applicant is to provide the proposed ITAAC for the facility's emergency planning addressed in Subsection 14.3.2.10.
COL 14.3(3)	The COL applicant is to provide the proposed ITAAC for the facility's physical security hardware addressed in Subsection 14.3.2.12.
COL 14.3(4)	The COL applicant is to provide a DAC closure schedule for implementing the piping DAC.
COL 15.0(1)	The COL applicant is to perform the radiological consequence analysis using site-specific $\chi/Q$ values, unless the $\chi/Q$ values used in the DCD envelop the site-specific short-term or long-term $\chi/Q$ values of the DCD, and to show that the resultant doses are within the guideline values of 10 CFR 50.34 for EAB and LPZ and that of 10 CFR Part 50, Appendix A, GDC 19 for the MCR and TSC.
COL 17.4(1)	The COL applicant is to develop and implement Phases 2 and 3 of the design RAP, including QA requirements. In Phase 2, the plant's site-specific information is to be subjected to the design RAP process, and the site-specific risk-significant SSCs are combined with the APR1400 design risk-significant SSCs into one list for the plant. Phase 2 is to be performed during the COL application phase and updated/maintained during the COL license holder phase. In Phase 3, procurement, fabrication, construction, and test specifications for the SSCs within the scope of the RAP provide reasonable assurance that key assumptions, such as equipment reliability, are realistic and achievable. The QA requirements are implemented during the procurement, fabrication, construction, and pre-operational testing of the SSCs within the scope of the RAP. Phase 3 is to be performed during the COL license holder phase and prior to initial fuel loading. The COL applicant is to propose a method for incorporating the objectives of the reliability assurance program into other programs for design or operational errors that degrade non-safety-related, risk-significant SSCs.


 Insert 1

Item No.	Description
COL 14.2(1)	The COL applicant is to develop the site-specific organization and staffing level appropriate for its facility to implement the initial test program. The COL's plant operating and plant technical staff should participate, to the extent practical, in developing and conducting the Initial Test Program and evaluating the test results.
COL 14.2(2)	The COL applicant is to prepare the site-specific preoperational and startup test specifications and test procedures and/or guidelines that are to be used for the conduct of the plant initial test program. The preoperational and startup test procedures should have controls in place to ensure that test procedures include appropriate prerequisites, objectives, safety precautions, initial test conditions, methods to direct and control test performance and test acceptance criteria by which the test is evaluated. Testing performed at other than design operating conditions for systems is to be reconciled either through the test acceptance criteria or post-test data analysis. These procedures are to be submitted at least 60 days prior to their intended use to the NRC staff for review as described in Subsection 14.2.11.
COL 14.2(3)	The COL applicant is to prepare a startup administrative manual (SAM) which contains administrative controls that govern the conduct of each major phase of the ITP. This description should include the administrative controls used to ensure that necessary prerequisites are satisfied for each major phase and for individual tests. The COL applicant should also describe the methods to be followed in initiating plant modifications or maintenance tasks that are deemed to be necessary to conduct the ITP. This description should include methods used to ensure retesting following such modifications or maintenance. In addition, the description should discuss the involvement of design organizations with the COL applicant in reviewing and approving proposed plant modifications. The COL applicant should also describe in the SAM adherence to approved test procedures during the conduct of the ITP as well as the methods for effecting changes to approved test procedures.
COL 14.2(4)	The COL applicant is to perform review and evaluation of individual test results in a test report made available to NRC personnel after preoperational and startup tests are completed. The specific test acceptance criteria for determining success or failure of a test shall be included in the test report approval of the test results. The test report should also include test results associated with any license conditions in the plant specific Initial Test Program.
COL 14.2(5)	The COL applicant is to develop the detailed description of test and acceptance criteria for the Security System.
COL 14.2(6)	The COL applicant is to develop a sequence and schedule for the development of the plant operating and emergency procedures should allow sufficient time for trial use of these procedures during the Initial Test Program. The sequence and schedule for plant startup is to be developed by the COL applicant to allow sufficient time to systematically perform the required testing in each phase.

Insert 1



Item No.	Description
COL 14.2(7)	The COL applicant is responsible for establishing hold points at selected milestones throughout the power ascension test phase to ensure that designated personnel or groups evaluate and approve relevant test results before proceeding to the next powerascension test phase. At a minimum, the COL applicant should establish hold points at approximately 25-percent, 50-percent, and 75-percent power-level test conditions for pressurized-water reactors.
COL 14.2(8)	The COL applicant is to describe its program for reviewing available information on reactor operating and testing experiences and discusses how it used this information in developing the initial test program. The description is to include the sources and types of information reviewed, the conclusions or findings, and the effect of the review on the initial test program.
COL 14.2(9)	The COL applicant that references the APR1400 design certification is to identify the specific operator training to be conducted as part of the low power testing program related to the resolution of TMI Action Plan Item I.G.1, as described in (1) NUREG-0660 - NRC Action Plans Developed as a Result of the TMI-2 Accident, Revision 1, August 1980 and (2) NUREG-0737 - Clarification of TMI Action Plan Requirements.
COL 14.2(10)	The COL applicant is to prepare the pre-operational test of cooling tower and associated auxiliaries, and raw water and service water cooling systems.
COL 14.2(11)	The COL applicant is to develop the test program of personnel monitors and radiation survey instruments.
COL 14.2(12)	The COL applicant is to develop the test procedure of the communication system.
COL 14.2(13)	The COL applicant is responsible for retaining preoperational and startup test procedures and test results as part of the plant's historical records in accordance with 10 CFR 50.36, "Technical Specification," 10 CFR 50.71, "Maintenance of Records, Making of Reports," 10 CFR 50, Appendix B, Criterion XVII, "Test Records," and RG 1.28, "Quality Assurance Program Criteria (Design and Construction)."



## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 91-7867  
SRP Section: 14.02 INITIAL PLANT TEST PROGRAM  
Application Section: 14.02.06  
Date of RAI Issued: 07/20/2015

---

### **Question No. 14.02-5**

The NRC staff determined that DCD Section 14.2.6 does not meet the guidance in RG 1.68, Staff Regulatory Guidance C.9, "Test Reports." DCD Section 14.2.6 states: "A single copy of each test procedure is designated as the official copy to be used for testing. The official copy and information specifically called for in the test procedure, such as completed data sheets, instrumentation calibration data and chart recordings, are to be retained for the life of the plant by the COL applicant in accordance with NRC RG 1.28 (Reference 2) for record retention."

The NRC staff determined that RG 1.28 only covers preoperational tests under the ITP **but does not cover startup tests**. NRC RG 1.68, Staff Regulatory Guidance Section C.9, "Test Reports," states:

"The preoperational and startup testing procedures and test results should be retained as part of the plant's historical record in accordance with 10 CFR 50.36, "Technical Specification," 10 CFR 50.71, "Maintenance of Records, Making of Reports," and 10 CFR 50, Appendix B, Criterion XVII, "Test Records." The test reports should also include test results associated with license conditions in the plant specific ITP. In addition, a summary of the startup testing should be included in a startup report. This summary should include the following information:

1. a description of the method and objectives for each test;
2. a comparison of applicable test data with the related acceptance criteria, including the systems' responses to major plant transients (such as reactor scram and turbine trip);
3. design- and construction-related deficiencies discovered during testing, system modifications and corrective actions required to correct those deficiencies, and the schedule for implementing these modifications and corrective actions unless previously reported to the NRC;

4. justification for acceptance of systems or components that are not in conformance with design predictions or performance requirements; and
5. conclusions about system or component adequacy.”

The NRC staff determined that DCD Section 14.2.6 should be revised to address retention of startup testing procedures and startup test results as part of the plant’s historical records in accordance with RG 1.68, Staff Regulatory Guidance C.9, “Test Reports.”

### **Response**

To meet the Regulatory Guidance in RG 1.68, Staff Regulatory Guidance C.9, “Test Reports,” DCD Subsection 14.2.6, Test Records, will be modified to include the specific contents that need to be included in the startup test report.

---

### **Impact on DCD**

DCD Tier 2 Section 14.2.6 will be revised as indicated in the attached markup.

### **Impact on PRA**

There is no impact on the PRA.

### **Impact on Technical Specifications**

There is no impact on the Technical Specifications.

### **Impact on Technical/Topical/Environmental Report**

There is no impact on any Technical, Topical or Environmental Report.

## APR1400 DCD TIER 2

Completed procedures and test reports are reviewed for acceptance. The specific acceptance criteria for determining the success or failure of the test are included as part of the procedure and are used during the review. Test deficiencies or results that do not meet acceptance criteria are identified to the affected and responsible design organizations, and corrective actions and retests, as required, are performed.

Test results for each phase of the test program are reviewed and verified as complete (as required) and satisfactory before testing in the next phase is started. Preoperational testing on a system is not normally started until all applicable prerequisite tests have been completed, reviewed, and approved. Prior to initial fuel loading and the commencement of initial criticality, a comprehensive review of required completed preoperational procedures is to be conducted by the COL applicant startup test organization. This review is to provide reasonable assurance that the required plant systems and structures are capable of supporting the initial fuel loading and subsequent startup testing.

### 14.2.6 Test Records

~~A single copy of each test procedure is designated as the official copy to be used for testing. The official copy and information specifically called for in the test procedure, such as completed data sheets, instrumentation calibration data and chart recordings, are to be retained for the life of the plant by the COL applicant in accordance with NRC RG 1.28 (Reference 2) for record retention.~~

### 14.2.7 Conformance of Test Programs with NRC Regulatory Guides

Subsection 1.9.1 and Table 1.9-1 address the conformance of test programs with the applicable NRC RGs. Table 14.2-7 is a matrix of the applicable guidance in NRC RG 1.68 (Reference 3) Appendix A (Initial Test Program) and the test descriptions listed in Subsection 14.2.12 to conform the key test parameters systematically.

The intent of the NRC RGs listed below is followed with the noted differences.

The preoperational and startup testing procedures and test results are to be retained for the life of the plant by the COL applicant (COL14.2(13)). The startup test reports should include test results associated with license conditions in the plant specific ITP.

A summary of the startup testing is to be included in a startup report. This summary should include the following information;

- a description of the method and objectives for each test
- a comparison of applicable test data with the related acceptance criteria, including the systems' responses to major plant transients (such as reactor trip and turbine trip)
- design- and construction-related deficiencies discovered during testing, system modifications and corrective actions required to correct those deficiencies, and the schedule for implementing these modifications and corrective actions
- justification for acceptance of systems or components that are not in conformance with design predictions or performance requirements
- conclusions about system or component adequacy

## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

### APR1400 Design Certification

Korea Electric Power Corporation / Korea Hydro & Nuclear Power Co., LTD

Docket No. 52-046

RAI No.: 91-7867  
 SRP Section: 14.02 INITIAL PLANT TEST PROGRAM  
 Application Section: 14.02  
 Date of RAI Issued: 07/20/2015

### **Question No. 14.02-9**

In DCD Table 1.9.1, "APR1400 Conformance with NRC Regulatory Guides," the table contains the following information related to NRC RG 1.20:

NRC Regulatory Guides	Revision/ Issue Date	Conformance or Summary Description of Deviation	DCD Tier 2 Section
1.20 Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing	Rev. 3 03/2007	The APR1400 conforms with this NRC RG.	11.5, 12.3.4, TS Part 3, 5.0

The NRC staff noted that this reference to RG 1.20 does not contain any references to APR1400 DCD Subsections 14.2.12.1.41, "Internal Vibration Monitoring System Test," 14.2.12.1.42, "Loose Parts Monitoring System Test," 14.2.12.1.43, "Acoustic Leak Monitoring System Test," and 14.2.14.4.18, "Baseline Nuclear Steam Supply System Integrity Test." These three preoperational tests and the power ascension test contain test objectives, prerequisites, methods, and acceptance criteria related to compliance with RG 1.20. Please add references to these test abstracts in DCD Table 1.9.1 and/or Subsection 14.2.7 related to APR1400 compliance with RG 1.20.

### **Response**

RG 1.20 is a Comprehensive Vibration Assessment Program (CVAP) and is used to verify the structural integrity of reactor internals for flow-induced vibration prior to commercial operation. Test results are compared to the analysis and/or inspection program results. Since an analysis program and an inspection program are being implemented for the APR1400 and the

results are being assessed to those programs, implementation of a vibration measurement program is not necessary in accordance with RG 1.20. Reactor internal vibration test is excluded from CVAP because APR1400 is classified as a non-prototype category I plant in accordance with the guidance provided in RG 1.20 and as described in section 14.2.7.1.6.

However, NIMS (IVMS, LPMS, and ALMS) is used to verify the proper operation of the vibration monitoring of these systems and the test results are used to establish alarm set-points and to evaluate the adequacy of the system design parameters. Also, NIMS is a non-safety related test. (e.g., LPMS is designed to meet RG 1.33).

Therefore, since the system tests for IVMS, LPMS, and ALMS are not related to RG 1.20 testing, it is not necessary to include reference to Sections 14.2.12.1.41, 14.2.12.1.42, 14.2.12.1.43, or 14.2.14.4.18 in Table 1.9.1 for RG 1.20 applicability.

---

#### **Impact on DCD**

There is no impact on the DCD.

#### **Impact on PRA**

There is no impact on the PRA.

#### **Impact on Technical Specifications**

There is no impact on the Technical Specifications.

#### **Impact on Technical/Topical/Environmental Report**

There is no impact on any Technical, Topical or Environmental Report.