

REVISED 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.: 112-8015
SRP Section: 13 - Conduct of Operations
Application Section: 13.05
Date of RAI Issue: 07/24/2015

Question No. 13.05.02.01-5

REQUIREMENTS

The paragraph under Section 13.5.2.1.2, "Operating Procedure Program," states:

"The COL applicant is to provide a **program for developing** operating and shutdown procedures (COL 13.5(4), COL 13.5(7))."

Associated COL information items COL 13.5(4) and COL 13.5(7), under Section 13.5.3, "Combined License Information," state:

COL 13.5(4):

"The COL applicant is to provide a **program for developing** operating procedures."

COL 13.5(7):

"The COL applicant is to provide a **program for developing** shutdown procedures."

Standard Review Plan (SRP) Section 13.5.2.1, "Operating and Emergency Operating Procedures," Subsection I.2, states: "The **staff will review the applicant's program for development and implementation** of the operating procedures." SRP Section 13.5.2.1, Subsection I.1, identifies Operating Procedure classifications. Procedures that provide instructions for shutdown operations fall under the General Plant Procedures classification of Operating Procedures. Subsection I.1.B describes General Plant Procedures as: "Procedures that provide instructions for the integrated operations of the plant, e.g., startup, shutting down, **shutdown**, power operation and load changing, process monitoring, and fuel handling."

ISSUE

The cited text above from Sections 13.5.2.1.2 and 13.5.3 of the DCD, **only states that the COL applicant is to provide a program for development** of the Operating and Shutdown

Procedures. **The implementation aspect of the program has not been addressed.** In accordance with SRP Section 13.5.2.1, Subsection I.2, the staff reviews the COL applicant's program for both the development and implementation of these procedures. Note that both the development and implementation aspects of the program for the Emergency Operating Procedures have been addressed in Section 13.5.2.1.3 and associated COL information item COL 13.5(5) in Section 13.5.3.

The cited text above from Sections 13.5.2.1.2 and 13.5.3 of the DCD, appears to make a distinction between Operating Procedures and Shutdown Procedures. **It is unclear whether the reference to Shutdown Procedures in these sections is intended to identify a set of shutdown procedural instructions other than what is described in SRP Section 13.5.2.1, Subsection I.1.B.**

INFORMATION NEEDED

Explain: (1) exclusion of the implementation aspect of the Operating Procedure program that is to be provided by the COL applicant, and (2) whether a set of shutdown procedural instructions other than what is described in SRP Section 13.5.2.1, Subsection I.1.B, exists.

Provide any changes necessary to ensure the completeness and accuracy of the information in Section 13.5.2.1.2, "Operating Procedure Program," and associated COL information items, COL 13.5(4) and COL 13.5(7), in Section 13.5.3, "Combined License Information," for the Operating Procedures.

Response - (Rev. 3)

To be consistent with the SRP, the implementation aspect of operating procedures will be included in the description of COL 13.5(4).

The definition of shutdown procedures was to differentiate between normal operation and shutdown operation. However, based on SRP 13.5.2.1, the definition of operating procedure includes shutdown operation. Therefore, a separate COL item for shutdown procedures is not necessary and will be deleted. COL 13.5(7) will be revised to provide a program for developing and implementing procedures that provide coverage for other safety-related plant operating activities, including related maintenance activities. COL 13.5(6) and associated Section 13.5.2.2 will be revised to ensure the accuracy and consistency of information amongst COL 13.5(6), COL 13.5(7), and Section 13.5.2.2. [COL 13.5\(8\) will remain and be made consistent with the response to RAI 232-7864 for Question 19-6 \(Rev.2\) as indicated in Attachment.](#)

Impact on DCD

DCD Table 1.8-2 and Sections 13.5.2.1.2, 13.5.2.2, and 13.5.3 will be revised as indicated in the attached markup.

DCD Section 13.5.2.1.2 and Table 19.1-4 will be revised as indicated in the attached markup. Changed Markups in Table 1.8-2, Section 13.5.3 of this response were already reflected in DCD Rev.2. Furthermore, COL 13.5(7) in DCD Rev.2 will be revised to make the consistency with the revised response to AI 19-142 (#PRA -135) (Rev.1) as indicated in the Attachment (8/11).

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

There is no impact on the Technical Specification.

Impact on Technical/Topical/Environmental Report

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

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RAI 112-8015 Q 13.05.02.01-5 Rev.1

RAI 112-8015 Q 13.05.02.01-5 Rev.2

RAI 112-8015 Q 13.05.02.01-5 Rev.3

13.5.2.1.1 Procedure Classification

The COL applicant is to describe the different classifications of procedures the operators use in the MCR and locally in the plant for plant operations. The COL applicant is to identify the group in the operating organization that is responsible for maintaining the procedures and is to describe the general format and content of the different classifications (COL 13.5(3)). Each applicant's procedures do not necessarily conform precisely to the same classification because the objective is to provide reasonable assurance that procedures are available to the plant staff to accomplish the functions in NRC RG 1.33.

13.5.2.1.2 Operating Procedure Program

The COL applicant is to provide a program for a developing operating procedures (COL 13.5(4), COL 13.5(7)). The applicant is to develop target dates for completion of program elements.

(COL 13.5(4), COL 13.5(8)).

COL 13.5(8)

13.5.2.1.3 Emergency Operating Procedure Program

The COL applicant is to provide a program for developing and implementing emergency operating procedures (COL 13.5(5)). The applicant also is to develop target dates for completion and submittal to the NRC (as required) of program elements. The procedure-generation package includes the following:

- a. Plant-specific technical guidelines
- b. Plant-specific writer's guide
- c. Description of the program for verification and validation
- d. Description of the program for training operators

13.5.2.2 Maintenance and Other Operating Procedures

~~The COL applicant is to describe how other operating and maintenance procedures are classified, which group or groups within the operating organization have responsibility for~~

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→ following each class of procedures, and the general objectives and character of each class and subclass (COL 13.5(6)).

13.5.3 Combined License Information

COL 13.5(1) The COL applicant is to describe the administrative and operating procedures that the operating organization (plant staff) use to provide reasonable assurance that routine operating, off-normal, and emergency activities are conducted in a safe manner. The COL applicant is to provide a brief description of the nature and content of the procedures and a schedule for the preparation of appropriate written administrative procedures (Reference 1 through 3).

COL 13.5(2) The COL applicant is to develop a description of administrative procedures that provide administrative control over activities that are important to safety for operation of the facility. NRC RG 1.33 contains guidance on facility administrative policies and procedures. The COL applicant is to determine whether the portions of NRC RG 1.33 applicable to plant procedures are followed. If the guidance is not followed, the COL applicant is to develop a description of alternative methods that will be used and the manner of implementing them.

COL 13.5(3) The COL applicant is to describe the different classifications of procedures the operators use in the MCR and locally in the plant for plant operations. The COL applicant is to identify the group within the operating organization responsible for maintaining the procedures and describe the general format and content of the different classifications

and implementing

COL 13.5(4) The COL applicant is to provide a program for developing operating procedures.

COL 13.5(5) The COL applicant is to provide a program for developing and implementing emergency operating procedures.

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This subsection pertains to procedures that provide coverage for other safety-related plant operating activities (i.e., operating activities not procedurally covered under the operating or emergency operating procedure programs), including related maintenance activities. COL applicant responsibilities include providing a description of the nature, content, and development process for these procedures, and providing preliminary schedules for preparation and target dates for completion. The COL applicant is also responsible for describing how the maintenance and other operating procedures are classified, describing the general format and content of the various classifications, identifying the group(s) within the operating organization responsible for performing and maintaining the procedures, and providing a program for procedure development and implementation (COL 13.5(6), COL 13.5(7)). ANSI/ANS 3.2-2012, Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors" (Reference 2), lists typical safety-related activities that should be covered by written procedures, but does not provide a complete listing of needed procedures. Appendix A may be used as guidance to ensure the minimal procedure coverage.

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~~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 13.5(8)

13.5.4 References

1. COL 13.5(8) The COL applicant is to provide a program for developing shutdown procedure including the installation and removal order of the pressurizer manway and the nozzle dam.

Rev. 3, U.S. Nuclear Regulatory Commission, June 2013.

2. ANSI/ANS 3.2, "Managerial, Administrative, and Quality Assurance Controls for Operational Phase of Nuclear Power Plants," American Nuclear Society, 2012.
3. NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures," U.S. Nuclear Regulatory Commission, 1982.
4. NUREG-0737, "Clarification of TMI Action Plan Requirements," U.S. Nuclear Regulatory Commission, 1980.

COL 13.5(6) The COL applicant is to describe the procedures that provide coverage for other safety-related plant operating activities (i.e., operating activities not procedurally covered under the operating or emergency operating procedure programs), including related maintenance activities. The COL applicant is to provide a description of the nature, content, and development process for the maintenance and other operating procedures, including preliminary schedules for preparation and target dates for completion. In addition, the COL applicant is to describe how these procedures are classified, describe the general format and content of the various classifications, and identify the group(s) within the operating organization responsible for performing and maintaining the procedures.

COL 13.5(7) The COL applicant is to provide a program for developing and implementing procedures that provide coverage for other safety-related plant operating activities (i.e., operating activities not procedurally covered under the operating or emergency operating procedure programs), including related maintenance activities.

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Table 1.8-2 (23 of 29)

Item No.	Description
COL 13.3(3)	The COL applicant is to address an emergency classification and action level scheme as required by 10 CFR 50.47(b)(4).
COL 13.3(4)	The COL applicant is to develop the security-related aspects of an emergency plan.
COL 13.3(5)	The COL applicant is to develop a multi-unit site interface plan depending on the location of the new reactor on or near an operating reactor site with an existing emergency plan.
COL 13.3(6)	The COL applicant is to develop emergency planning inspections, tests, analyses, and acceptance criteria.
COL 13.4(1)	The COL applicant is to develop operational programs and provide schedules for implementation of the programs, as defined in SECY-05-0197. The COL applicant is to provide commitments for the implementation of operational programs that are required by regulation. In some instances, the programs may be implemented in phases, where practical, and the applicant is to include the phased implementation milestones.
COL 13.4(2)	The COL applicant is responsible for developing a leakage monitoring and prevention program for the systems, as specified in Subsection 5.5.2 in Chapter 16, Technical Specifications. The leakage monitoring and prevention program is to provide suitable methods and acceptance criteria as defined in NUREG-0737, Item III.D.1.1.
COL 13.5(1)	The COL applicant is to describe the administrative and operating procedures that the operating organization (plant staff) use to provide reasonable assurance that routine operating, off-normal, and emergency activities are conducted in a safe manner. The COL applicant is to provide a brief description of the nature and content of the procedures and a schedule for the preparation of appropriate written administrative procedures.
COL 13.5(2)	The COL applicant is to develop a description of administrative procedures that provide administrative control over activities that are important to safety for operation of the facility. NRC RG 1.33 contains guidance on facility administrative policies and procedures. The COL applicant is to determine whether the portions of NRC RG 1.33 applicable to plant procedures are followed. If the guidance is not followed, the COL applicant is to develop a description of alternative methods that will be used and the manner of implementing them.
COL 13.5(3)	The COL applicant is to describe the different classifications of procedures the operators use in the MCR and locally in the plant for plant operations. The COL applicant is to identify the group within the operating organization responsible for maintaining the procedures and describe the general format and content of the different classifications.
COL 13.5(4)	The COL applicant is to provide a program for developing operating procedures.
COL 13.5(5)	The COL applicant is to provide a program for developing and implementing emergency operating procedures.



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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).
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.

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COL 13.5(6)	The COL applicant is to describe the procedures that provide coverage for other safety-related plant operating activities (i.e., operating activities not procedurally covered under the operating or emergency operating procedure programs), including related maintenance activities. The COL applicant is to provide a description of the nature, content, and development process for the maintenance and other operating procedures, including preliminary schedules for preparation and target dates for completion. In addition, the COL applicant is to describe how these procedures are classified, describe the general format and content of the various classifications, and identify the group(s) within the operating organization responsible for performing and maintaining the procedures.
COL 13.5(7)	The COL applicant is to provide a program for developing and implementing procedures that provide coverage for other safety-related plant operating activities (i.e., operating activities not procedurally covered under the operating or emergency operating procedure programs), including related maintenance activities.
COL 13.5(8)	The COL applicant is to provide a program for developing shutdown procedure.

COL 13.5(8) The COL applicant is to provide a program for developing shutdown procedure including the installation and removal order of the pressurizer manway and the nozzle dam.

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- COL 13.5(4) The COL applicant is to provide a program for developing and implementing operating procedures.
- COL 13.5(5) The COL applicant is to provide a program for developing and implementing emergency operating procedures.
- COL 13.5(6) The COL applicant is to describe the procedures that provide coverage for other safety-related plant operating activities (i.e., operating activities not procedurally covered under the operating or emergency operating procedure programs), including related maintenance activities. The COL applicant is to provide a description of the nature, content, and development process for the maintenance and other operating procedures, including preliminary schedules for preparation and target dates for completion. In addition, the COL applicant is to describe how these procedures are classified, describe the general format and content of the various classifications, and identify the group(s) within the operating organization responsible for performing and maintaining the procedures.
- COL 13.5(7) The COL applicant is to provide a program for developing and implementing procedures that provide coverage for other safety-related plant operating activities (i.e., operating activities not procedurally covered under the operating or emergency operating procedure programs), including related maintenance activities.

Delete

- ~~The risk can be minimized by appropriate outage management, administrative controls, procedures, and operator knowledge of plant configuration during plant shutdown operation. For example, the removable walls and slabs between areas in a division for equipment replacement must remain intact during plant shutdown operation. Any SSC maintenance that requires these removable walls and slabs to be removed must be performed during the defueled condition. Also, the foreign material exclusion (FME) program should direct that the covers be installed over the trash racks on the inlet to the holdup volume tank (HVT) during refueling outages.~~


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Table 19.1-4 (23 of 27)

No.	Insight	Disposition
Risk Insights from PRA Models		
55	<p>Passive autocatalytic recombiners (PARs) and igniters are normally placed to cope with at-power accidents, but hydrogen control should also be considered for LPSD configurations.</p> <p>The COL applicant should provide reasonable assurance that there is sufficient hydrogen control during a severe accident condition when the RCS is open (e.g., pressurizer manway, etc.).</p>	<p>COL 13.5(7) ← COL 13.5(8)</p>
56	<p>Solid state switching devices and electro-mechanical relays resistant to relay chatter are used in the safety I&C platforms. Use of these devices and relays either eliminates or minimizes the mechanical discontinuities associated with mechanical relays at operating reactors.</p>	Subsection 7.4.2.5
57	<p>The COL applicant is to perform a seismic walkdown to provide reasonable assurance that the as-designed and as-built plant conforms to the assumptions in the PRA-based seismic margins analysis and that seismic spatial systems interactions do not exist. Details of the seismic walkdown are to be developed by the COL applicant.</p>	COL 19.1(4)
58	<p>The fire PRA assumes that the fire barrier management procedures used during LPSD will include directions to provide reasonable assurance that breached risk-significant fire barriers can be closed in sufficient time to prevent the spread of fire across the barrier. The procedural direction is to include the use of a fire watch whose duties are commensurate with the risk associated with the barrier. For example, for fire barriers that separate two fire compartments that both contain no equipment or cables necessary to prevent core damage or large release during LPSD conditions, or have been demonstrated to have low risk significance, there will at least be a roving fire watch to check the barrier during rounds. For fire barriers separating fire compartments that contain equipment or cables necessary to prevent core damage or large release during LPSD conditions, and have been demonstrated to be risk significant with respect to fire, a permanent fire watch will be established until the barrier is reclosed. In the latter case, the fire barrier management procedure is to direct that hoses or cables that pass through a fire barrier use isolation devices on both sides of a quick-disconnect mechanism that allow for reclosure of the barrier in a timely fashion to re-establish the barrier prior to fire spread across the barrier.</p>	<p>Subsection 19.1.6.3.1.2 COL 19.1(15)</p> <p>COL 19.1(14)</p>

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Table 19.1-4 (25 of 27)

No.	Insight	Disposition
Risk Insights from PRA Models		
62	<p>The LPSD PRA assumes that Pressurizer manway is opened before midloop conditions are reached. In order to assure that the nozzle dam design pressure limit is not exceeded during reduced inventory operations with boiling conditions in the reactor vessel, the APR1400 design includes a requirement that will be imposed to establish a mid-loop vent pathway via the pressurizer manway before operating in reduced inventory. The nozzle dams are installed in the cold legs first and in the hot legs second. The nozzle dams are removed in the hot legs first and in the cold legs second. Before cold leg nozzle dam installation or removal and cold leg maintenance, the steam generator hot leg manway and its associated hot leg pipe should be kept open. When the manway is opened to the containment atmosphere, the surge line provides sufficient venting capacity to prevent RCS pressurization and subsequent nozzle dam failure</p>	<p>Subsection 19.2.2.2 COL 13.5(7)</p>  <p>← COL 13.5(8)</p>
63	<p>Mid-loop operation should be started at least 4 days after shutdown and equal to or less than 57.2 °C (135 °F) of initial hot leg temperature.</p>	TS 3.4.8
64	<p>The LPSD SFIA assumes that procedural guidance is developed to ensure that in fire compartments containing post-seismic or post-fire safe shutdown equipment that:</p> <ul style="list-style-type: none"> • the seismic ruggedness of temporary ignition sources is adequate, or that the duration that these temporary ignition sources are in these areas is minimized, • the seismic ruggedness of temporary equipment such as scaffolding in fire compartments containing potential seismic-fire ignition sources, or near fire protection equipment is adequate, and • either the duration of activities which could impact manual firefighting is minimized, or alternative firefighting equipment (e.g., pre-stage portable smoke removal equipment, prestage additional firefighting equipment, etc.) is supplied. 	<p>Subsection 19.1.6.3.1.3 COL 19.1(21)</p>
65	<p>The probability of IRWST suction strainer plugging is not increased relative to the power operation PRA model. The IRWST design characteristics (e.g., large, separation between suction lines, debris filtering capability) and plant procedures (e.g., foreign material control) are expected to provide reasonable assurance that this probability is low.</p>	Subsection 19.1.6.1.2.5

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Table 19.1-4 (27 of 27)

No.	Insight	Disposition
Risk Insights from PRA Models		
67	The flood PRA assumes that maintenance-induced flooding events is an insignificant contributors to overall flood risk.	Subsection 19.1.5.3.1.5 Subsection 19.1.6.4.1.2 COL 19.1(17)
68	The core exit thermocouples (CETs) provide representative indications of the core exit temperature when shutdown cooling system (SCS) is operational, including reduced inventory operations. Continuous, redundant narrow range RCS water level indication is operational during reduced inventory operations.	Subsection 19.1.6.1.1.5
69	The HG design is composed of 30 PARs and 8 igniters. The LPSD Level 2 PRA assumes that the 25% of the PARs are unavailable due to test and maintenance. The remaining 75% of the PARs and all of the igniters are available during LPSD conditions.	Subsection 19.1.6.1.1.5 COL 13.5(7) COL 19.2(3)

COL 13.5(8)