
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.: 96-8073
SRP Section: 16 – Technical Specifications
Application Section: 16
Date of RAI Issue: 07/22/2015

Question No. 16-2

Paragraph (a)(11) of 10 CFR 52.47 and paragraph (a)(30) of 10 CFR 52.79 states that a design certification (DC) applicant and a combined license (COL) applicant, respectively, are to propose TS prepared in accordance with 10 CFR 50.36 and 50.36a. 10 CFR 50.36 sets forth requirements for technical specifications to be included as part of the operating license for a nuclear power facility. Subsection 52.47(a)(11) requires that technical specifications be provided in the application for design certification of a new reactor design.

NUREG-1432, "Standard Technical Specifications-Combustion Engineering Plants," Rev. 4, provides NRC guidance on format and content of technical specifications as one acceptable means to meet 10 CFR 50.36 requirements.

SRP Section 16.0, Part III.2.A states, in part, "when reviewing a difference between the proposed TS provision and the reference TS provision, verify that the applicant's written technical or administrative reasoning in support of the difference is logical, complete, and clearly written."

The Deviation Report has TS 3.8.1 Condition F as being deleted/unnecessary, yet it is included. Justify the need for TS 3.8.1 Condition F.

Response

As described in B 3.8.1 of the Technical Specifications, a loss of an ESF bus sequencer affects every major ESF system in the train. Therefore, TS 3.8.1 Condition F is applicable to the APR1400 and the above-mentioned deviation can be removed from the Deviation Report (DR).

This correction to the DR will be included in the overall revision of the DR which will be included in KHNP's response to RAI 154-8064.

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 Reports

Technical Report APR1400-K-O-NR-14001-NP, Deviation Report between NUREG-1432 Rev. 4.0 and APR1400 Technical Specifications will be revised.

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Question No. 16-3

The SR 3.8.1.3 acceptance criteria is listed as a “percent of rating,” vs the actual KW rating as listed in the STS. Justify using “percent of rating,” vs the actual KW rating.

Response

Train A and B EDGs are rated at 9,100 kW and train C and D EDGs are rated at 7,500 kW. Since the rated load is not uniform for all EDGs, the specified EDG load range for the surveillance is indicated as a percentage of the ratings rather than the specific value in kW to avoid multiple values and potential misapplication when implementing the requirement.

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 Reports

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

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Question No. 16-4

The SR 3.8.1.7 Notes 2, 3, and 4 are not in the STS and Note 4 is illogical. The Deviation Report, “APR1400-K-O-NR-14001-NP,” does not address the addition of these notes. Justify the Notes or delete them.

Response

The existing SR 3.8.1.7 notes are not correct. KHNP will revise the notes to match the STS. The SURVEILLANCE REQUIREMENTS section of SR 3.8.1.7 will be revised to delete the four current notes and add a note pertaining to engine prelube consistent with the STS.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS Surveillance Requirement 3.8.1.7 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.1.5	Check for and remove accumulated water from each day tank and engine mounted tank.	31 days
SR 3.8.1.6	Verify fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.	92 days
SR 3.8.1.7	<p>----- NOTE -----</p> <p>1. EDG loadings may include gradual loading as recommended by the manufacturer.</p> <p>2. Momentary transients outside the load range do not invalidate this test.</p> <p>3. This Surveillance shall be conducted on only one EDG at a time.</p> <p>4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.7.</p> <p>-----</p> <p>Verify each EDG starts from standby condition and achieves:</p> <p>a. In ≤ 17 seconds, voltage $\geq 3,744$ V and frequency ≥ 58.8 Hz and</p> <p>b. Steady stage voltage $\geq 3,744$ V and $\leq 4,576$ V, and frequency ≥ 58.8 Hz and ≤ 61.2 Hz.</p>	184 days

All DG starts may be preceded by an engine prelube period.

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Question No. 16-5

The STS 3.8.2 ACTIONS Note stating that “LCO 3.0.3 is not applicable,” is missing in the generic TS 3.8.2. Justify this deviation from the STS.

Response

Since LCO 3.0.3 is only applicable in MODES 1, 2, 3, and 4 and the generic TS 3.8.2 is applicable in MODES 5 and 6, LCO 3.0.3 is not applicable to the generic TS 3.8.2.

KHNP will add the statement, “LCO 3.0.3 is not applicable,” to the generic TS 3.8.2.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS 3.8.2 will be revised as shown in the attachment.

Impact on Technical/Topical/Environmental Reports

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

3.8 ELECTRICAL POWER SYSTEMS

3.8.2 AC Sources – Shutdown

- LCO 3.8.2 The following AC electrical power sources shall be OPERABLE:
- a. One qualified circuit between the offsite transmission network and the onsite Class 1E AC electrical power distribution system required by LCO 3.8.10, “Distribution Systems – Shutdown” and
 - b. One division of emergency diesel generators (EDGs) capable of supplying one division of the onsite Class 1E AC Electrical Power Distribution System required by LCO 3.8.10.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	----- NOTE ----- Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required division de-energized as a result of Condition A.	
	A.1 Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	<u>OR</u> A.2.1 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	

ACTIONS

----- NOTE -----
LCO 3.0.3 is not applicable.

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Question No. 16-6

The LCO section of the Bases for generic TS 3.8.2 is missing the second paragraph that is in the STS. The missing paragraph discusses capabilities of a qualified offsite circuit. Justify this difference or include the missing STS 3.8.2 Bases paragraph.

Response

The second paragraph of the STS 3.8.2 Bases is as follows:

“The qualified offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified offsite circuits are those that are described in the FSAR and are part of the licensing basis for the unit.”

Since the above paragraph is applicable to the generic TS B 3.8.2 for the APR1400, KHNP will add the statement to the TS B 3.8.2.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS B 3.8.2 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

BASES

APPLICABLE SAFETY ANALYSES (continued)

During MODES 5 and 6, performance of a significant number of required testing and maintenance activities is also required. In MODES 5 and 6, the activities are generally planned and administratively controlled. Relaxations from MODE 1, 2, 3, and 4 LCO requirements are acceptable during shutdown modes based on:

- a. The fact that time in an outage is limited. This is a risk prudent goal as well as a utility economic consideration.
- b. Requiring appropriate compensatory measures for certain conditions. These may include administrative controls, reliance on systems that do not necessarily meet typical design requirements applied to systems credited in operating MODE analyses, or both.
- c. Prudent utility consideration of the risk associated with multiple activities that could affect multiple systems.
- d. Maintaining, to the extent practical, the ability to perform required functions (even if not meeting MODE 1, 2, 3, and 4 OPERABILITY requirements) with systems assumed to function during an event.

In the event of an accident during shutdown, this LCO ensures the capability to support systems necessary to avoid immediate difficulty, assuming either a loss of all offsite power or a loss of all onsite emergency diesel generator (EDG) power.

The AC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution division of LCO 3.8.10, "Distribution Systems – Shutdown," ensures that all required loads are powered from offsite power. Two OPERABLE EDGs, associated with a distribution system division required to be OPERABLE by LCO 3.8.10, ensures a diverse power source is available to provide electrical power support, assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and EDG ensures the availability of sufficient AC sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents involving handling irradiated fuel).

add

The qualified offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the Engineered Safety Feature (ESF) bus(es). Qualified offsite circuits are those that are described in Section 8.2 (Reference 1) and are part of the licensing basis for the unit.

BASES

**SURVEILLANCE
REQUIREMENTS**SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.8 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.12 and SR 3.8.1.19 are not required to be met because the ESF actuation signal is not required to be OPERABLE. SR 3.8.1.17 is not required to be met because the required OPERABLE EDG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with EDG(s) that are not required to be OPERABLE.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE EDG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during performance of SRs, and to preclude deenergizing a required 4,160V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC Sources available, a single event could compromise both the required circuit and the EDG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the EDG and offsite circuit is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

REFERENCES

None



1. DCD Tier 2, Section 8.2

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Question No. 16-7

The ACTIONS section of the Bases for TS 3.8.3 refer to and inoperable EDG subsystem. The Bases for TS 3.8.1 refer to EDG Trains. Explain the difference between EDG subsystem and EDG Train.

Response

The EDG system is a safety related system consisting of four EDG trains, each of which serves Train A, Train B, Train C, or Train D onsite power distribution systems, respectively. Each EDG train is comprised of a diesel generator and its supporting subsystems, such as fuel oil, lube oil, engine cooling water, starting air, and combustion air intake and exhaust systems.

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 Reports

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

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Question No. 16-8

The TS 3.8.4 Logical Connector between Required Actions D.1 to “Be in MODE 3,” and D.2 to “Be in MODE 4,” is “AND” in the STS but is “OR” in the APR1400 TS 3.8.4. The Deviation Report, “APR1400-K-O-NR-14001-NP,” does not address this difference. Justify this change or replace the Logical Connector “OR” between Required Actions D.1 and D.2 with “AND.”

Response

To be consistent with the Required Actions D.1 and D.2 for TS 3.8.4, KHNP will replace the Logical Connector “OR” between the Required Actions D.1 and D.2 with “AND.”

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

The Required Action section of TS 3.8.4 will be revised as shown in the attachment.

Impact on Technical/Topical/Environmental Reports

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

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 The Division I and Division II DC electrical power systems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two battery charger(s) on one division inoperable.	A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	<u>AND</u>	
	A.2 Verify battery float current \leq 2 amps.	Once per 12 hours
	<u>AND</u>	
	A.3 Restore battery charger(s) to OPERABLE status.	72 hours
B. One or two batteries on one division inoperable.	B.1 Restore batter(y)(ies) to OPERABLE status.	2 hours
C. One DC electrical power system division inoperable for reasons other than Condition A or B.	C.1 Restore DC electrical power subsystem to OPERABLE status.	2 hours
D. Required Action and Associated Completion Time not met.	D.1 Be in MODE 3.	6 hours
	OR AND ←	
	D.2 Be in MODE 5.	36 hours

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Question No. 16-9

SR 3.8.4.3 is missing its "SR 3.8.4.3" identifier; add.

Response

KHNP will add the "SR 3.8.4.3" identifier to the applicable surveillance requirement in TS 3.8.4.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS Surveillance Requirement 3.8.4.3 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to minimum established float voltage.	7 days
SR 3.8.4.2	<p>Verify battery chargers A and B supply 700 amps and battery chargers C and D supply 1,200 amps at greater than or equal to the minimum established float voltage for ≥ 8 hours.</p> <p><u>OR</u></p> <p>Verify each battery charger can recharge the battery to the fully charged state within 24 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.</p>	18 months
	<p>----- NOTE -----</p> <p>1. The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of SR 3.8.4.3.</p> <p>2. This Surveillance shall not normally be performed in MODE 1, 2, 3, or 4. However, portions of the Surveillance may be performed to reestablish OPERABILITY provided an assessment determines the safety of the plant is maintained or enhanced. Credit may be taken for unplanned events that satisfy this SR</p> <p>-----</p> <p>Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.</p>	18 months

↑
add
SR 3.8.4.3

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Question No. 16-10

TS 3.8.5 Condition A is not properly indented; correct.

Response

KHNP will correct the improper indentation for generic TS 3.8.5 Condition A.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS 3.8.5 will be revised as shown in the attachment.

Impact on Technical/Topical/Environmental Reports

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

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 DC electrical power system division shall be OPERABLE to support the DC electrical power distribution system division(s) required by LCO 3.8.10, “Distribution Systems – Shutdown.”

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

----- NOTE -----
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two battery chargers on one division inoperable. <u>AND</u> indent The redundant division batteries and chargers OPERABLE.	A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	<u>AND</u> A.2 Verify battery float current ≤ 2 amps.	Once per 12 hours
	<u>AND</u> A.3 Restore battery charger to OPERABLE status.	72 hours

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Question No. 16-11

The TS 3.8.5 Condition B brackets around "for reasons other than Condition A" are not needed. Justify the brackets in TS 3.8.5 Condition B around "for reasons other than Condition A," or remove.

Response

KHNP will remove the TS 3.8.5 Condition B brackets around "for reasons other than Condition A."

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS 3.8.5 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

ACTION (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>B. One or more required DC electrical power system division(s) inoperable [for reasons other than Condition A.]</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time of Condition A not met.</p>	<p>B.1 Declare affected required feature(s) inoperable.</p> <p><u>OR</u></p> <p>B.2.1 Suspend movement of irradiated fuel assemblies.</p> <p><u>AND</u></p> <p>B.2.2 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.</p> <p><u>AND</u></p> <p>B.2.3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.</p>	<p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>Immediately</p>

inoperable for reasons other than Condition A.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.5.1 ----- NOTE -----</p> <p>The following SRs are not required to be performed: SR 3.8.4.2 and SR 3.8.4.3.</p> <p>-----</p> <p>For DC sources required to be OPERABLE, the following SRs are applicable:</p> <p>SR 3.8.4.1 SR 3.8.4.2 SR 3.8.4.3</p>	<p>In accordance with applicable SRs</p>

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Question No. 16-12

The Logical Connectors between TS 3.8.5 Required Actions B.2.1 “AND” B.2.2 “AND” B.2.3 are not properly indented; properly indent.

Response

KHNP will correct the improper indents in the Required Actions for TS 3.8.5.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS 3.8.5 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

ACTION (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME	
<p>B. One or more required DC electrical power system division(s) inoperable [for reasons other than Condition A.]</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time of Condition A not met.</p>	<p>B.1 Declare affected required feature(s) inoperable.</p>	<p>Immediately</p>	
	<p><u>OR</u></p>	<p>B.2.1 Suspend movement of irradiated fuel assemblies.</p>	<p>Immediately</p>
	<p><u>AND</u> indent</p>	<p>B.2.2 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.</p>	<p>Immediately</p>
	<p><u>AND</u> indent</p> <p>B.2.3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.</p>	<p>Immediately</p>	

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.5.1 ----- NOTE -----</p> <p>The following SRs are not required to be performed: SR 3.8.4.2 and SR 3.8.4.3.</p> <p>-----</p> <p>For DC sources required to be OPERABLE, the following SRs are applicable:</p> <p>SR 3.8.4.1 SR 3.8.4.2 SR 3.8.4.3</p>	<p>In accordance with applicable SRs</p>

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Question No. 16-13

TS 3.8.6 Condition C and required Action C NOTES are "was" in the STS and not "is below the top of plates," as stated in the APR1400 TS 3.8.6. The Deviation Report, "APR1400-K-O-NR-14001-NP," does not address this difference. Justify this deviation or make it consistent with the STS.

Response

KHNP will make the TS 3.8.6 Condition C and Required Action C NOTES consistent with the STS. Additionally, the improper Logical Connector "OR" between Required Actions C.1 and C.2 will be replaced with "AND."

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS 3.8.6 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

ACTION (continued) CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>C. <u>NOTE</u> Required Action C.2 shall be completed if electrolyte level is below the top of plates.</p> <p>One or two batteries on one division with one or more cells electrolyte level less than minimum established design limits.</p>	<p><u>NOTE</u> Required Actions C.1 and C.2 are only applicable if electrolyte level is below the top of plates.</p> <p>C.1 Restore electrolyte level to above the top of plates.</p> <p>OR</p> <p>C.2 Verify no evidence of leakage.</p> <p><u>AND</u></p> <p>C.3 Restore electrolyte level to greater than or equal to minimum established design limits.</p>	<p>8 hours</p> <p>12 hours</p> <p>31 days</p>
<p>D. One or two batteries on one division with pilot cell electrolyte temperature less than minimum established design limits.</p>	<p>D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.</p>	<p>12 hours</p>
<p>E. One or more batteries in redundant division with battery parameters not within limits.</p>	<p>E.1 Restore battery parameters for batteries in one division to within limits.</p>	<p>2 hours</p>
<p>F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met.</p> <p><u>OR</u></p> <p>One or two batteries on one division with one or more battery cells float voltage < 2.07 V and float current > 2 amps.</p>	<p>F.1 Declare associated battery inoperable.</p>	<p>Immediately</p>

was

was

AND

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Question No. 16-14

The generic TS SR 3.8.6.6 NOTE addresses MODES 1, 2, 3, and 4, while the Bases for SR 3.8.6.6 only discuss MODES 1 and 2. The Bases for SR 3.8.6.6 should discuss MODES 3 and 4, in addition to MODES 1 and 2.

Response

To be consistent with the generic TS SR 3.8.6.6, KHNP will change “MODE 1 or 2” in the bases for generic TS SR 3.8.6.6 to “MODE 1, 2, 3, or 4.”

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS B 3.8.6 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

BASES

MODE 1, 2, 3, or 4

SURVEILLANCE REQUIREMENTS (continued)

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. This restriction from normally performing the Surveillance in ~~MODE 1 or 2~~ is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment. Credit may be taken for unplanned events that satisfy this SR.

REFERENCES

1. DCD Tier 2, Chapter 8.
 2. DCD Tier 2, Chapter 6.
 3. DCD Tier 2, Chapter 15.
 4. IEEE Standard 450-2002.
 5. IEEE Standard 485-1997.
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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.: 96-8073
SRP Section: 16 – Technical Specifications
Application Section: 16
Date of RAI Issue: 07/22/2015

Question No. 16-15

STS LCO 3.8.7 NOTE is not included in either the generic TS or Bases and is not discussed in the Deviation Report. Justify not including STS LCO 3.8.7 NOTE in the generic TS and Bases, or include it.

Response

The STS LCO 3.8.7 NOTE is applicable to the generic TS 3.8.7. In addition, the following discussion pertaining to the NOTE in the Bases for STS LCO 3.8.7 is also applicable to the generic TS B 3.8.7.

“This LCO is modified by a Note that allows [one/two] inverters to be disconnected from a [common] battery for ≤ 24 hours, if the vital bus(es) is powered from a [Class 1E constant voltage transformer or inverter using internal AC source] during the period and all other inverters are operable. This allows an equalizing charge to be placed on one battery. If the inverter(s) were not disconnected, the resulting voltage condition might damage the inverter(s). These provisions minimize the loss of equipment that would occur in the event of a loss of offsite power. The 24-hour time period for the allowance minimizes the time during which a loss of offsite power could result in the loss of equipment energized from the affected AC vital bus while taking into consideration the time required to perform an equalizing charge on the battery bank.

The intent of this Note is to limit the number of inverters that may be disconnected. Only those inverters associated with the single battery undergoing an equalizing charge may be disconnected. All other inverters must be aligned to their associated batteries, regardless of the number of inverters or unit design.”

KHNP will add the STS LCO 3.8.7 NOTE and the associated discussion in the Bases for STS LCO 3.8.7 in the LCO sections of the generic TS 3.8.7 and TS B 3.8.7.

Impact on DCD

Same as changes described in Impact on Technical Specifications section.

Impact on PRA

There is no impact on the PRA.

Impact on Technical Specifications

TS 3.8.7 and B 3.8.7 will be revised as shown in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters – Operating

LCO 3.8.7 The required Division I and Division II inverters shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One inverter inoperable.	<p>----- NOTE ----- Enter applicable Conditions and Required Actions of LCO 3.8.9 "Distribution Systems – Operating," with any vital bus de-energized. -----</p> <p>A.1 Restore inverter to OPERABLE status.</p>	24 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3.	6 hours
	<p><u>AND</u></p> <p>B.2 Be in MODE 5.</p>	36 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.7.1	Verify correct inverter voltage, frequency, and	7 days

----- NOTE -----
One inverter may be disconnected from its associated DC bus for ≤ 24 hours to perform an equalizing charge on its associated battery, provided:
a. The associated AC vital bus is energized from its Class 1E regulating transformer, and
b. All other AC vital buses are energized from their associated OPERABLE inverters.

add

BASES

LCO The inverters ensure the availability of AC electrical power for the systems instrumentation required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Maintaining the required inverters OPERABLE ensures that the redundancy incorporated into the design of the RPS and ESFAS instrumentation and controls is maintained. The four battery powered inverters (two per division) ensure an uninterruptible supply of AC electrical power to the AC vital buses even if the 4.16 kV safety buses are de-energized.

OPERABLE inverters require the associated vital bus to be powered by the inverter with output voltage and frequency within tolerances, and power input to the inverter from a 125 VDC station battery.

APPLICABILITY The inverters are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

- Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients.
- Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

Inverter requirements for MODES 5 and 6 are covered in the Bases for LCO 3.8.8, "Inverters – Shutdown."

ACTIONS

A.1

add

This LCO is modified by a Note that allows one inverter to be disconnected from a battery for ≤ 24 hours, if the vital bus is powered from a Class 1E regulating transformer during the period and all other inverters are OPERABLE. This allows an equalizing charge to be placed on one battery. If the inverter were not disconnected, the resulting voltage condition might damage the inverter. These provisions minimize the loss of equipment that would occur in the event of a loss of offsite power. The 24-hour time period for the allowance minimizes the time during which a loss of offsite power could result in the loss of equipment energized from the affected AC vital bus while taking into consideration the time required to perform an equalizing charge on the battery bank.

The intent of this Note is to limit the number of inverters that may be disconnected. Only the inverter associated with the single battery undergoing an equalizing charge may be disconnected. All other inverters must be aligned to their associated batteries.