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## 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.: 444-8530  
SRP Section: 16 - Technical Specifications  
Application Section: 16.3.7, 16.3.3.8, 16.3.3.9, 16.3.3.10  
Date of RAI Issue: 03/16/2016

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### Question No. 16-134

The applicant is requested to revise generic TS 3.3.9, "Control Room Emergency Ventilation Actuation Signal (CREVAS)," as follows (See DCD Figure 7.3-11):

1. Change LCO statement to say, "One CREVAS **instrument division with one radiation monitor** channel, **one Manual Actuation division, and one Actuation Logic division** shall be OPERABLE." Also make conforming changes to the Bases for generic TS 3.3.9.
2. Revise Condition A as follows: "CREVAS **required** Manual Actuation **division, required** Actuation Logic **division**, or **required instrument division with one** ~~or more~~ required ~~channels of~~ radiation monitors **channel** inoperable in MODES 1, 2, 3, and 4." Also make conforming changes to the Bases for generic TS 3.3.9.
3. Revise Required Action A.1 to define acronym 'HVAC' as follows: "Place one control room area **heating, ventilation, and air conditioning (HVAC)** system train in emergency operation mode. | 1 hour"
4. Revise Condition C as follows: "CREVAS **required** Manual Actuation **division, required** Actuation Logic **division**, or **required instrument division with one** ~~or more~~ required ~~channels of~~ radiation monitors **channel** inoperable during CORE ALTERATIONS or movement of irradiated fuel assemblies." Also make conforming changes to the Bases for generic TS 3.3.9.
5. To be consistent with STS 3.3.9B, SR 3.3.9.3, Channel Functional Test on "required CRIS Actuation Logic channel," revise surveillance column Note for generic TS SR 3.3.9.3 as indicated: "Surveillance ~~Requirement~~ of Actuation Logic shall include verification of proper operation of each initiation circuit. In addition, the STS SR 3.3.9.3 Note says "Surveillance of Actuation Logic shall include the verification of the proper

operation of each initiation relay.” Explain the difference between “initiation circuit” and “initiation relay.”

6. To be consistent with suggested edits to LCO 3.3.9, and Conditions A and C, revise SR 3.3.9.3 as indicated: “Perform CHANNEL FUNCTIONAL TEST on required CPIAS Actuation Logic **channel-division**.” Also make conforming changes to the Bases for generic TS 3.3.9.
7. Applicant is requested to revise the Bases for Specification 3.3.9 to be consistent with the requested changes to the Bases for Specification 3.3.8.

### **Response – (Rev. 1)**

APR1400 Technical Specifications, generic TS 3.3.9 and Bases for generic TS 3.3.9 will be revised, as indicated in the attachment associated with this response.

Circuit is a more general term than relay. A circuit can include relay, solid state, and digital logic devices. To accommodate supplier’s diverse technology, the term “circuit” will be used. The “initiation relay” in BASES SR 3.3.9.3 and SR 3.3.9.3 is revised to “initiation circuit”.

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### **ImpaVct 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 original response indicated future incorporation of Technical Specification changes, these proposed changes have already been incorporated into Revision 1 of the Technical Specifications. Therefore, only the applicable changes to Revision 1 of the DCD for this revision are included in the Attachment.

APR1400 Technical Specifications 3.3.9 and Bases section 3.3.9 will be revised, as indicated in the attachment associated with this response.

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

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

3.3 INSTRUMENTATION

3.3.9 Control Room Emergency Ventilation Actuation Signal (CREVAS)

LCO 3.3.9 One CREVAS instrument division with one radiation monitor channel, one Manual Actuation division, and one Actuation Logic division shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4,  
 During CORE ALTERATIONS,  
 During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CREVAS required Manual Actuation division, required Actuation Logic division, or required instrument division with one required radiation monitor channel inoperable in <del>MODES 1, 2, 3, and 4.</del>	A.1 Place one Control Room Area heating, ventilation, and air conditioning (HVAC) System train in emergency operation mode.  <div style="border: 1px solid red; padding: 2px; display: inline-block;">MODE 1, 2, 3, or</div>	1 hour
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3.  <u>AND</u>  B.2 Be in MODE 5.	6 hours  36 hours

**SURVEILLANCE REQUIREMENTS**

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform CHANNEL CHECK on required CREVAS radiation monitor channel.	12 hours
SR 3.3.9.2	Perform CHANNEL FUNCTIONAL TEST on required CREVAS radiation monitor channel in accordance with Setpoint Control Program.	92 days
SR 3.3.9.3	<p>----- NOTE -----</p> <p>Surveillance of Actuation Logic shall include verification of proper operation of each initiation <del>relay</del>.</p> <hr/> <p>Perform CHANNEL FUNCTIONAL TEST on required CREVAS Logic division.</p>	<p><b>circuit</b></p> <p>18 months</p>
SR 3.3.9.4	Perform CHANNEL CALIBRATION on required CREVAS radiation monitor channel in accordance with Setpoint Control Program.	18 months
SR 3.3.9.5	Perform CHANNEL FUNCTIONAL TEST on required CREVAS Manual Actuation division.	18 months
SR 3.3.9.6	Verify that the response time of required CREVAS division is within limits.	18 months

## BASES

## BACKGROUND (continued)

One example of such a change in measurement error is drift of the transmitter during the surveillance interval. If the as-found actuation setting measured by the CHANNEL FUNCTIONAL TEST remains conservative with respect to the as-found tolerance (AFT) band around the previous as-left setting between successive CHANNEL CALIBRATIONS and does not exceed the Allowable Value, the instrument channel is considered OPERABLE, provided the channel is performing normally as expected.

Setpoints in accordance with the Allowable Value will ensure that the MCR dose is not violated during anticipated operational occurrences (AOOs) and the consequences of design basis accidents will be acceptable, providing the plant is operated from within the LCOs at the onset of the AOO or accident and the equipment functions as designed.

APPLICABLE  
SAFETY  
ANALYSES

The CREVAS, in conjunction with the Control Room Area Heating, Ventilation, and Air Conditioning (HVAC) System maintains the MCR atmosphere within conditions suitable for prolonged occupancy throughout the duration of any one of the accidents discussed in Reference 1. The radiation exposure of MCR personnel, through the duration of any one of the postulated accidents discussed in "Transient and Accident Analysis," FSAR, Chapter 15 (Ref. 1), does not exceed the limits set by 10 CFR Part 50, Appendix A, GDC 19 (Ref. 2).

The CREVAS satisfies the requirements of Criterion 3 of 10 CFR 50.36(c)(2)(ii).

Manual Actuation

## LCO

LCO 3.3.9 requires one CREVAS division to be OPERABLE. The required division consists of one instrument division with one ~~area~~ radiation monitor channels, one ~~Actuation Logic~~ division; and one ~~Manual Actuation~~ division. The specific Allowable Values for the actuation (trip) setpoints of the CREVAS are listed in the SCP required documentation.

Logic

Operation with an actuation setpoint less conservative than the NTSP, but within its allowable value, is acceptable provided that the difference between the actual trip setting and the allowable value is equal to or greater than the drift allowance assumed for each actuation in the calculated NTSP, which is derived from the analytical limit in the transient and accident analyses.

## BASES

## ACTIONS

A CREVAS division is inoperable when it does not satisfy the OPERABILITY criteria for the division's function. The most common cause of process instrument channel inoperability is outright failure or drift of the sensor, transmitter, or analog signal processing equipment sufficient to exceed the tolerance allowed by NRC approved setpoint methodology specified in the SCP, Specification 5.5.19. Typically, the drift is not large and would result in a delay of actuation rather than a total loss of function. This determination is generally made during the performance of a CHANNEL FUNCTIONAL TEST when the process instrument is set up for adjustment to bring it within specification.

If the as-found actuation setting is not within the Allowable Value, the division is inoperable and the appropriate Conditions must be entered.

A.1, B.1, B.2, C.1, C.2.1, C.2.2, and C.2.3

Conditions A, B, and C are applicable to manual and automatic actuation of the Control Room Area HVAC System by CREVAS. Condition A applies to the failure of the CREVAS required Manual Actuation division, required Actuation Logic division, or required instrument division with one required radiation monitor channel inoperable in ~~MODES 1, 2, 3, and 4~~. Entry into this Condition requires action to either restore the failed division(s) or manually perform the CREVAS safety function (Required Action A.1).

MODE 1, 2, 3, or

The Completion Time of 1 hour is sufficient to complete the Required Actions and accounts for the fact that CREVAS supplements MCR isolation by other Functions (e.g., SIAS) in MODES 1, 2, 3, and 4. If the channel cannot be restored to OPERABLE status, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours (Required Action B.1) and to MODE 5 within 36 hours (Required Action B.2). The Completion Times of 6 hours and 36 hours for reaching MODES 3 and 5 from MODE 1 are reasonable, based on operating experience and normal cooldown rates, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant safety systems.

Condition C applies to the failure of CREVAS required Manual Actuation division, required Actuation Logic division, or required instrument division with one required radiation monitor channel inoperable during CORE ALTERATIONS or movement of irradiated fuel assemblies. The Required Actions are immediately taken to place one OPERABLE Control Room Area HVAC System train in the emergency radiation protection mode, or to suspend CORE ALTERATIONS, positive reactivity additions, and movement of irradiated fuel assemblies.

BASES

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.9.2

A CHANNEL FUNCTIONAL TEST is performed on the required MCR radiation monitoring channel to ensure the entire channel will perform its intended function.

The SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology.

The Frequency of 92 days is based on plant operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 92 day interval is a rare event.

SR 3.3.9.3

circuits

circuit

Proper operation of the individual initiation relays is verified by de-energizing these relays during the CHANNEL FUNCTIONAL TEST of the required Actuation Logic division every 18 months. This will actuate the Function, operating all associated equipment. Proper operation of the equipment actuated by each division is thus verified.

CREVAS Actuation

The Frequency of 18 months is based on plant operating experience with regard to channel OPERABILITY, which demonstrates that failure of an Actuation Logic division of a given Function in any 18 month interval is a rare event.

A Note to the SR

Note indicates this Surveillance includes verification of operation for each initiation relay.

circuit

SR 3.3.9.4

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. The SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the setpoint methodology. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains OPERABLE between successive surveillances.

~~The SCP has controls which require verification that the instrument channel functions as required by verifying the as-left and as-found setting are consistent with those established by the NRC approved setpoint methodology.~~