
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

Question No. 16-135

The applicant is requested to revise generic TS 3.3.10, "Fuel Handling Area Emergency Ventilation Actuation Signal (FHEVAS)," as follows (See DCD Figure 7.3-9):

1. Change LCO statement to say, "One FHEVAS **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 3.3.10.
2. Revise Condition A as follows: "**Required Manual Actuation division, required Actuation Logic division, Manual Actuation, or required instrument division with required** radiation ~~monitors channels~~ **monitor channel** inoperable." Also make conforming changes to the Bases for generic TS 3.3.10.
3. For consistency with STS 3.3.10B, revise Required Action A.1 to define acronym 'HVAC' as follows: "Place one **OPERABLE** fuel handling area **heating, ventilation, and air conditioning (HVAC)** system train in emergency operation mode. | Immediately" Also make conforming changes to the Bases for generic TS 3.3.10.
4. Generic TS SR 3.3.10.1 says, "Perform CHANNEL CHECK on required FHEVAS radiation monitor channel." If only one channel is required, how is this surveillance accomplished?
5. STS 3.3.10B, SR 3.3.10.3 surveillance column Note, says "Testing of Actuation Logic shall include the actuation of each initiation relay and verification of the proper operation of each ignition relay." Generic TS SR 3.3.10.3 surveillance column Note says "Testing of Actuation Logic shall include actuation of each initiation circuit and verification of proper operation of each initiation circuit." Explain difference between "initiation relay" and "initiation circuit." Also, revise generic TS SR 3.3.10.3 as indicated: "Perform

CHANNEL FUNCTIONAL TEST on required FHEVAS **Actuation** Logic **channel division**.

6. Revise generic TS SR 3.3.10.4 as indicated: "Perform CHANNEL FUNCTIONAL TEST on required FHEVAS Manual Actuation **channel division**."
7. Revise generic TS SR 3.3.10.6 as indicated: Verify that the response time of required FHEVAS **channel division** is within limits.
8. Applicant is requested to revise the Bases for Specification 3.3.10 to be consistent with the requested changes to the Bases for Specification 3.3.8.

Response – (Rev.1)

4. Generic TS SR 3.3.10.1 says, "Perform CHANNEL CHECK on required FHEVAS radiation monitor channel." If only one channel is required, how is this surveillance accomplished?

A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on the other channel.

When a test is performed, one channel is bypassed at the maintenance test panel and a test signal can be manually inserted into the engineered safety features actuation system (ESFAS) actuation circuit at the radiation monitoring system cabinet. The output exists only when the input is higher than the set point. During the test, the other channel will remain in service to perform the required ESFAS initiation.

Surveillance of one radioactivity particulate monitor channel is performed by using a radioactive check source. The radioactive check source is generally built into the detector assembly and can be remotely activated by the operator. The radioactive check source is primarily used to check whether a particular radiation monitoring channel loop is live or functioning as described in the response to the RAI 368-8470, Question 14.03.08-14 subquestion 4.a. When a check source is exposed to the detector on demand, if upscale measurement is indicated, the channel is assessed with channel live status by pass/fail criteria. The criteria are qualitative assessment, by observation, of channel behavior during operation.

Circuit is a more general term than relay. A circuit can include relays, solid state, and digital logic devices. To accommodate supplier's diverse technology, the term "circuit" will be used. The "initiation relay" in BASES SR 3.3.10.3 and SR 3.3.10.3 is revised to "initiation circuit".

The APR1400 Technical Specifications, section 3.3.10 and Bases section 3.3.10 will be revised.

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 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 section 3.3.10 and the Bases section 3.3.10 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.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.10.1	Perform CHANNEL CHECK on required FHEVAS radiation monitor channel.	12 hours
SR 3.3.10.2	Perform CHANNEL FUNCTIONAL TEST on required FHEVAS radiation monitor channel in accordance with Setpoint Control Program.	92 days
SR 3.3.10.3	<p style="text-align: center;">----- Circuit NOTE -----</p> <p>Testing of Actuation Logic shall include actuation of each initiation relay and verification of proper operation of each initiation relay.</p> <p style="text-align: center;">----- Circuit -----</p> <p>Perform CHANNEL FUNCTIONAL TEST on required FHEVAS Actuation Logic division.</p>	18 months
SR 3.3.10.4	Perform CHANNEL FUNCTIONAL TEST on required FHEVAS Manual Actuation division.	18 months
SR 3.3.10.5	Perform CHANNEL CALIBRATION on required FHEVAS radiation monitor channel in accordance with Setpoint Control Program.	18 months
SR 3.3.10.6	Verify that the response time of required FHEVAS 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 Safety Limits are 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 FHEVAS is required to isolate the Normal Fuel Handling Area Heating, Ventilation, and Air Conditioning (HVAC) System and automatically initiate the recirculation and filtration systems in the event of the fuel handling accident in the fuel handling area, as described in Reference 2. The FHEVAS helps ensure acceptable consequences for the dropping of a spent fuel bundle breaching up to 60 fuel pins.

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

Manual Actuation

LCO

LCO 3.3.10 requires one FHEVAS division to be OPERABLE. The required division consists of one instrument division with one radiation monitor channel, one ~~Actuation Logic~~ division; and one ~~Manual~~ Actuation division. The specific Allowable Values for the actuation (trip) setpoints of the FHEVAS are listed in the SCP required documentation.

Logic

Only the Allowable Values are specified for each actuation Function in the SRs. 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.

Each specified Allowable Value is more conservative than the analytical limit assumed in the transient and accident analyses in order to account for instrument uncertainties appropriate to the actuation Function.

These uncertainties are defined in the Nuclear Regulatory Commission (NRC) approved setpoint methodology specified by the SCP, Specification 5.5.19.

BASES

**SURVEILLANCE
REQUIREMENTS**SR 3.3.10.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Add following page

Agreement criteria are determined by the plant staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it could be an indication that the transmitter or the signal processing equipment has drifted outside its limit.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Since the probability of two random failures in redundant channels in any 12 hour period is low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK checks channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.10.2

A CHANNEL FUNCTIONAL TEST is performed on the required fuel handling area radiation monitor 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 Frequency is a rare event.

If only one radioactivity particulate monitor channel is required, surveillance of one radioactivity particulate monitor channel is performed by using of radioactive check source. The radioactive check source is generally built into the detector assembly and can be remotely activated by the operator. The radioactive check source is primarily used to check whether a particular radiation monitoring channel loop is live or functioning. When check source is exposed to detector on demand, if upscale measurement is indicated, the channel is assessed with channel live status by pass/fail criteria. The criteria are qualitative assessment, by observation, of channel behavior during operation.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.10.3

Circuits

Circuit

Proper operation of the individual initiation relays is verified by actuating 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. The Frequency of 18 months is based on plant operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of an Actuation Logic division of a given Function during any 18 month Frequency is a rare event.

FHEVAS Actuation

A Note to the SR indicates that this Surveillance includes verification of operation for each initiation relay.

SR 3.3.10.4

Circuit

Every 18 months, a CHANNEL FUNCTIONAL TEST is performed on the required FHEVAS Manual Actuation division.

This Surveillance verifies that the actuation push buttons are capable of providing manual actuation of the fuel handling area emergency ventilation Function.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage. Operating experience has shown these components usually pass the Surveillance when performed at a Frequency of once every 18 months.

SR 3.3.10.5

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.

CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains OPERABLE between successive tests. 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.

The Frequency is based upon the assumption of an 18 month calibration interval for the determination of the magnitude of equipment drift in the setpoint analyses.