
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.: 295-8263
SRP Section: 16 – Technical Specifications
Application Section: 16.3.3
Date of RAI Issue: 11/05/2015

Question No. 16-123

The applicant is requested to revise generic TS 3.3.11, “Accident Monitoring Instrumentation (AMI),” and Bases to conform to RG 1.97, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants,” Revision 4.

1. The applicant is requested to identify all operator manual actions relied upon or otherwise assumed to occur by the DCD Tier 2 Chapter 15 safety analyses, including
 - a Termination of the limiting boron dilution event in Mode 4; and
 - b Termination of auxiliary feedwater flow to a faulted steam generator during secondary side events in Mode 1, 2, or 3, such as
 - A steam generator tube rupture,
 - An unisolatable main feedwater line break,
 - An unisolatable steam generator blowdown line break,
 - An unisolatable main steam line break, and
 - A stuck open main steam safety valve.

Any control room indication of a process parameter or other variable needed by the operator, as directed by the emergency operating procedure or the emergency procedure guidelines for the APR1400, to accomplish a “planned manually-controlled action for which no automatic control is provided,” (IEEE Std 497-2002, Section 4.1; RG 1.97, Rev. 4, Section C) should be identified as a Type A post accident monitoring (PAM) system variable in DCD Tier 2 Section 7.5.1.1, Table 7.5-1, “AMI Variables,” and should be included in generic TS Table 3.3.11-1 as an AMI Function. The NRC staff is

not persuaded of the validity of the statement in DCD Section 7.5.1.1 that “There are no AMI Type A variables in APR1400 design.”

2. The applicant is requested to conform generic TS 3.3.11 and associated Bases to the list of PAM variables or functions described in DCD Tier 2 Section 7.5.1.1, and Table 7.5-1.
3. The applicant is requested to describe the process used to determine the list of AMI variables listed in DCD Tier 2 Table 7.5-1, and what type (B, C, D, or E) each variable is.
4. Please explain what is meant by the column heading “Ambiguity” in last column of Table 7.5-1
5. The Bases for generic TS 3.3.11 often uses the word “channel” in all capital letters by itself. The applicant is requested to make this word all lower case because “CHANNEL” is not a defined term in TS Section 1.1.

Response – (Rev. 1)

1. KHNP’s response to request for additional information (RAI) 294-8302, Question 07.05-6 provides the manual actions for the accident analyses and the basis for the Accident Monitoring Instrumentation (AMI) Type A selection.
2. Table 3.3.11-1 of NUREG-1432, “Standard Technical Specifications-Combustion Engineering Plants,” Rev. 4, provides the following description:

-----REVIEWER’S NOTE-----

Table 3.3.11-1 shall be amended for each unit as necessary to list:

- 1. All Regulatory Guide 1.97, Type A instruments and*
 - 2. All Regulatory Guide 1.97, Category I, non-Type A instruments specified in the unit's Regulatory Guide 1.97, Safety Evaluation Report.*
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Also, Bases section 3.3.11 of NUREG-1432, “Standard Technical Specifications-Combustion Engineering Plants,” Rev. 4, provides the following description:

The PAM instrumentation ensures the OPERABILITY of Regulatory SAFETY Guide 1.97 Type A variables, so that the control room operating staff ANALYSES can:

- *Perform the diagnosis specified in the emergency operating procedures. These variables are restricted to preplanned actions for the primary success path of DBAs and*
- *Take the specified, preplanned, manually controlled actions, for which no automatic control is provided, that are required for safety systems to accomplish their safety functions.*

The PAM instrumentation also ensures OPERABILITY of Category I, non-Type A variables. This ensures the control room operating staff can:

- *Determine whether systems important to safety are performing their intended functions,*
- *Determine the potential for causing a gross breach of the barriers to radioactivity release,*
- *Determine if a gross breach of a barrier has occurred, and*
- *Initiate action necessary to protect the public as well as to obtain an estimate of the magnitude of any impending threat.*

The above Bases indicates AMI Type A, B, C variables.

Therefore, Table 7.5-1 lists all AMI variables. Subsequently, Technical Specification Table 3.3.11-1 and the associated Bases will list the AMI Type A, B, C variables.

Technical Specification Table 3.3.11-1 and the associated Bases will be revised to add the Type A variables as indicated in the attachment to RAI 38-7878, Question 07.05-1.

3. KHNP's response to RAI 294-8302, Question 07.05-6 and RAI 38-7878, Question 07.05-1 provides the process used to determine the list of AMI variables listed in DCD Tier 2 Table 7.5-1 and what type (A, B, C, D or E) each variable is.
4. The column whose heading is titled as "Ambiguity" in Table 7.5-1 identifies the additional variables provided for operators to resolve information ambiguity. Refer to DCD Tier 2, Section 7.5.2.1, a.5 for additional information)
5. "CHANNEL" is revised to "channel" as indicated in the attachment associated with this response.
6. [Technical Specification Table 3.3.11-1 will be revised from 2 to 4 in the number of "REQUIRED MEASUREMENT CHANNELS" related to Function 28. Safety Injection Pump \(SIP\) Direct Vessel Injection \(DVI\) Flow Rate. Refer to the KHNP's response to RAI 38-7878, Question 07.05-1 Rev.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

Technical Specification 3.3.11 and Bases 3.3.11 are revised as indicated in the Attachment to this response.






[The changes that were proposed in the original response to this RAI have been incorporated](#)

into Revision 1 of the DCD; therefore, only the pages containing proposed changes as a result of Revision 1 of this response are included in the Attachment.

Impact on Technical/Topical/Environmental Reports

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

Table 3.3.11-1 (Page 3 of 3)
Accident Monitoring Instrumentation

FUNCTION	REQUIRED MEASUREMENT CHANNELS	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1
23. In-containment refueling water storage tank (IRWST) Level	4 	E
24. IRWST Temperature	4	E
25. Containment Level	2	E
26. Containment Operating Area Radiation (For Fuel Handling Accident)	2	E
27. Spent Fuel Pool Radiation	2	E
28. Safety Injection Pump (SIP) Direct Vessel Injection (DVI) Flow Rate	2 	E
29. Main Steam Atmospheric Steam Dump Valve Position	4 	E
30. Auxiliary Feedwater Flow	4 	E
31. Hydrogen Concentration	2	E
32. Containment Atmosphere Temperature	4	E
33. 4.16 kV Switchgear Voltage	4 	E
34. DC Bus Voltage	2	E
35. Instrument Power Bus Voltage	2	E