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Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants

Comment On: NRC-2017-0237-0001
Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants; Request for Comment on Draft Regulatory Guide

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General Comment

Comments on DG-1335 (Proposed Reg. Guide 1.97 Rev. 5)
Docket ID NRC-2017-0237
Gary Johnson 2018-02-25
Member IEEE Nuclear Power Engineering Committee

See attached file.

Attachments

Comments on DG 1335 Draft RG 1-79 20180225

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Add= Pong Chung (PCC3)
Stephen Burton (SXB3)

Comments on DG-1335 (Proposed Reg. Guide 1.97 Rev. 5)
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Comments on Part B

Last full paragraph in background, *"The plants cannot do so without an equivalent to Type F variables ...."*

- It should be noted that many plants already use existing plant instruments for severe accident management. See EPRI TR-102371, EPRI TR-103412, and section 3.3 of IAEA NP-T-3.16. The incorporation of Type F variables into accident monitoring systems is expected to be an improvement over the use of the methods discussed in the above reports. Those methods are outside of the scope of IEEE Std. 497-2106. Nevertheless, retention of information about monitoring severe accidents using the methods described by EPRI would provide a useful backup to Type F monitoring channels.

Comments on part C – Staff Regulatory Guidance

Clause 1

The position is not unreasonable for licensees converting from RG 1.97 rev. 1, 2, 3 or versions of IEEE Std. 497 prior to 2002. For users of IEEE 497-2002 or RG 1.97 rev. 4 it should only be necessary to review the existing analyses for variable types A to E make what changes are needed to bring the systems into compliance with IEEE 497-2016.

Clause 2

The statement *"The licensee or applicant should first perform a comprehensive analysis of severe accidents to determine the variables to be selected"* is overkill.

Presumably applicants will, and licensees will have already, performed, a comprehensive analysis of severe accidents to support the development of SAMG. More reasonable language would be something along the line of "The licensee and applicant should review plant Severe Accident Management Guidance and the supporting analysis to determine the variables to be selected." But even this seems unnecessary, as similar words are given in IEEE Std. 497-2016 clause 4.6 and in the corresponding row of Table 1.

Clause 3

This clause should be deleted. The wording of this sentence in IEEE Std. 497-2016 is identical to the wording in IEEE Std. 497-2002. This wording was endorsed by rev. 4 of RG 1.97. Thus inserting clause 3 into a rev. 5 would create a conflict between the two versions. It is unreasonable for NRC to have two active documents that completely contradict each other.

Furthermore, implementation of the NRC's proposal may have an effect on plant technical specifications as the tech spec bases for including all Type A variables does not seem to include the variables that the draft Reg. Guide propose as additions. See for example the notes at the bottom of Table 3.3.3-1 in NUREG-1431 Vol. 1, Rev. 3 and the corresponding bases in Volume 2.

Therefore, it would seem that a revision of the standard tech specs would also be required. Otherwise, licensees adopting the new guide would be faced with the need to apply for changes to the post accident monitoring instrumentation tech specs.

Clause 4

"These variables shall have extended ranges, sufficient range to cover, with appropriate margin, the predicted limits of the variables and address a source term that considers a fuel damage. "

- The term *"a fuel damage"* is rather unconventional English.

"The range of instrumentation used to implement EOPs [emergency operating procedures] should cover, with appropriate margin, the predicted full range of the variables with the consideration of analytical uncertainties and environment measurement errors under design-basis accident conditions."

- In this statement it would be more clear to make reference to the variable types. It is suggested to change the statement to "Type A and B variables should cover, with appropriate margin..."

Clause 6

Delete. Clause 5.6 in IEEE Std. 497-2016 takes care of this point.

Clause 7

"Design of Type A, Type B, and Type C instrumentation shall address common cause failures, as described in IEEE Std. 379-2016..."

- Change IEEE Std. 379-2016 to IEEE Std. 379-2014. There is no 2016 version.

"The licensee or applicant should verify the acceptability of endorsed IEEE or International Electrotechnical Commission (IEC) standards identified in Clause 6.2 of IEEE Std. 497-2016;"

- The intent of this clause is unclear. Is the position indicating that endorsed IEEE standards are not acceptable? Perhaps this paragraph is simply trying to say that the versions of 379 and 7-4.3.2 to be used are the ones

corresponding to their current Reg. Guides and the version of 603 to be used is as explained in 10 CFR 50.55a(h). But this idea is also stated in the bulleted paragraph on the use of secondary references. Perhaps this first clause in the sentence should be deleted.

"*...alternately, applicants should consider NUREG-0800, Chapter 7, Branch Technical Position 7-19 ....*

- Delete from "alternately" to the end of this paragraph. The intent of BTP 7-19 as it is applied to displays and controls is to respond to point 4 of the NRC's Four Point Position, "A set of displays and controls located in the main control room shall be provided for ... monitoring the parameters that support the safety functions. The displays and controls shall be independent and diverse from the safety computer system ...." Such an analysis is important to the DinD&D strategy for the protection system but it does not respond to the intent of 6.2 of IEEE Std. 497-2016, as that clause is dealing with potential common cause failure within the accident monitoring system.
- One might point out the BTP recommendation separate from IEEE Std. 497-2017 clause 6.2, but the intent of such as statement must be clear, and it should specifically reference the guidance of BTP 7-19, section 3.10 and NUREG/CR-6303 guideline 13. In my opinion, it is sufficient that the recommendation remains only in BTP 7-19 as the analysis is directed at the protection system, not the accident monitoring system.
- Perhaps the staffs' intent was to recommend applying BTP 7-19 to the accident monitoring functions as if they were a protection system. This would be a rather awkward application of the BTP. The guidance of NUREG/CR-6303 did not envision such an application and the acceptance criteria in BTP 7-19 are entirely inappropriate for accident monitoring systems. It was not by accident that NUREG-6303 was titled "Method for Performing Diversity and Defense-in-Depth Analysis of **Reactor Protection Systems**."
- Applying the full weight of NUREG/CR 6303 would unnecessarily encourage the use of a complex methodology for assessing CCF of accident monitoring functions. Accident monitoring functions perform no logic (except perhaps to trigger an alarm), are not highly interconnected between channels, and under accident conditions keep doing exactly the same thing that they were doing before the accident. In short, accident monitoring instrumentation is much less complex than protection systems and, because they perform continuous rather than demand functions, operating experience has more relevance. Thus the assessment of potential CCF within accident monitoring functions should be far simpler than what is laid out in BTB 7-19. SECY-93-087 Item II.Q acknowledged that there might be multiple acceptable methods for evaluating defense in depth.