STAFF RESPONSES TO PUBLIC COMMENTS ON DG-1128

Discussion B

Comment #1 by IEEE/NPEC:

I. In Section B of DG-1128, the discussion of IEEE Std. 497-2002 Annex A (first bullet) states:

> *"Specifically, Clause A.3 states, in part, "Historically, the required accuracy for instrument channels relied upon to monitor containment pressure and hydrogen concentration has been ±10 percent of full span." However, the NRC staff notes that this example may not be applicable to all nuclear power plants. Traditionally, the required accuracy of accident monitoring instrument channels is established based on the assigned function and the plant's safety analysis and licensing basis."*

This wording implies a possible conflict between IEEE Std. 497-2002 and the draft regulatory guide on sources of accuracy requirements. The historical source alluded to in Clause A.3 is ANS Std. 4.5-1980, Sections 6.3.5.2 and 6.3.5.3. ANS Std. 4.5 may or may not be part of a specific plant's licensing basis. To preserve the historical basis of Clause A.3, the working group suggests the following sentence be added after the quoted Clause A.3 passage and before the word "However,"

> *"The historical source for this accuracy value is ANS Std. 4.5-1980, which the IEEE working group carried forward into IEEE Std. 497-2002."*

In addition, the working group suggests at the end of the last sentence after "licensing basis" to add: "which may or may not include ANS Std. 4.5-1980."

Staff Response #1:

The staff does not agree with the comment. Historical accuracy of containment pressure or hydrogen concentration instrumentation is irrelevant to the scope of a standard intended for new nuclear power plants. The staff has stated the appropriate sources for required accuracy for any instrument channel. The example provided by IEEE in informative Annex A could mislead a user of the standard that the stated figure for required accuracy is applicable to all monitors of those types, when it may have been more appropriate to monitoring channels when ANS-4.5 was published in 1980. Furthermore, the commentor requests retaining the historical source of the accuracy value as ANS Std. 4.5-1980, which is an inactive standard. This revision of Regulatory Guide 1.97 is intended for new nuclear power plants and should not endorse references to historical figures that may not apply to current instrumentation. Hence, this comment is not incorporated.

Regulatory Position C.1

Comment #2 by BWROG and IEEE/NPEC and Exelon/AmerGen:

Regulatory position C.1 imposes an unnecessarily restrictive requirement by requiring a plant's entire accident monitoring program to meet the requirements of Revision 4 of the regulatory guide during a voluntary conversion of a current operating reactor to the new criteria. It is agreed that the analysis of variables should cover all variables. However, the design and qualification criteria should recognize the acceptability of the plant's current licensing basis. For example, the electrical separation requirements specified in section 6.3.d of IEEE Std. 497-2002 require use of IEEE 384-1992. Current licensees meet electrical separation requirements per the current licensing basis of the plant but do not meet IEEE 384-1992. There is no benefit in requiring licensees to justify deviations from IEEE 384-1992 and in requiring NRC review of these deviations when voluntarily converting to revision 4 of the accident monitoring regulatory guide. Therefore, it is suggested that regulatory position C.1 be revised to read, "If a current operating reactor licensee voluntarily converts to the criteria in Revision 4 of this guide, the licensee should perform the conversion by evaluating all accident monitoring variables. When alternate

requirements applicable to a design or qualification criteria are provided in the plant's current licensing basis, it is acceptable to apply these requirements to the voluntary conversion."

Staff Response #2:
The staff does not agree with the comment. Licensees who voluntarily perform the conversion to Revision 4 of Regulatory Guide 1.97 should commit to meeting all applicable criteria given in the endorsed standard, and should document how each particular requirement is fulfilled as part of the conversion analysis. Any necessary deviations from the referenced industry codes and standards will be reviewed and approved on a case-by-case basis. This approach is consistent with Branch Technical Position HICB-10 in Chapter 7 of the Standard Review Plan, NUREG-0800. Furthermore, regulatory position #6 provides guidance on the use of codes and standards referenced within IEEE Std. 497-2002, as follows:

> If the NRC's regulations incorporate an industry code or standard referenced in Clause 2 of IEEE Std. 497-2002, licensees and applicants must comply with that code or standard as set forth in the regulations. Similarly, if the NRC staff has endorsed a referenced code or standard in a regulatory guide, that code or standard constitutes an acceptable method for use in meeting the related regulatory requirement as described in the regulatory guide(s). By contrast, if a referenced code or standard has neither been incorporated into the NRC's regulations nor been endorsed in a regulatory guide, licensees and applicants may consider and use the information in the referenced code or standard, if appropriately justified, consistent with current regulatory practice.

Consequently, this comment is not incorporated.

Comment #3 by NEI and NUGEQ:
Regulatory Position C(1)

The draft position specifies that: "If a current operating reactor licensee voluntarily converts to the criteria in Revision 4 of this guide, the licensee should perform the conversion on the plant's entire accident monitoring program to ensure a complete analysis." Such a complete conversion could include unnecessary physical changes, licensing changes, and could have significant cost implications for current operating reactor licensees who decide to convert to the new revision.

NEI/NUGEQ recommends allowing selective use of the revised guidance and IEEE Std. 497-2002 as a basis to justify changes to licensees' existing accident monitoring programs established in accordance with Revision 2 or 3. Such use does not involve complete or partial program "conversion" but would permit licensees to seek changes to their accident monitoring Current Licensing Basis (CLB) using a technical basis based on the Revision 4 guidance.

NEI/NUGEQ believes the current draft regulatory position will limit cost-effective, performance-based program improvements and is inconsistent with other NRC policy initiatives (e.g., Alternate Source Term). This regulatory position is also inconsistent with the IEEE objective of revising IEEE Std. 497-2002 to "contain guidance and allow a flexible basis for making changes to such systems in older plants" (IEEE Std. 497-2002 Introduction page iii).

The stated basis for this regulatory position is that partial conversions could result in the "potential for loss of variables or interactions with other variables without a complete analysis in accordance with this guide." NEI/NUGEQ believes this concern can be adequately addressed without requiring complete program and licensing changes to Revision 4. For example, by using the selection criteria in IEEE Std. 497-2002, Clause 5, "Performance criteria" to examine the current variables in their accident monitoring programs, existing plants could establish a performance-based basis for the program variables that would not result in the loss of needed information. This use of the Revision 4 selection criteria should be permitted to justify changes to a few variables without requiring licensees to apply all the other IEEE Std. 497-2002 criteria to all variables, or expecting licensees to implement the significant design and licensing efforts and to expend the associated costs needed to revise the entire accident monitoring program to comply with Revision 4. Similar selective use of other Revision 4 criteria could be used to make performance-

based improvements in existing accident monitoring programs.

NEI/NUGEQ recommends that Regulatory Position C(1) be modified to permit use of Revision 4 information to justify changes to existing programs that are based on Revisions 2 or 3. The existing "conversion" language should be revised or the following added to the regulatory position:

> *"Licensees may use the guidance and criteria in Revision 4 as a basis to justify selective modifications to programs currently complying with Revision 2 or 3. Licensees should ensure that such program modifications do not result in unacceptable variable loss or interactions."*

Staff Response #3:
The staff does not agree with the comment. The comment repeats some of the basis for not recommending partial conversions, as stated in the draft guide. However, there are supplementary concerns related to design control, design review, and inspection that are not stated in the draft guide. Currently, plants have made licensing commitments to use either Revision 2 or 3 of Regulatory Guide 1.97 as a basis for their accident monitoring programs. With total plant conversions, current plants would commit to exclusively use either Revision 2, 3, or 4 of Regulatory Guide 1.97. With partial conversions, current plants would then be committed to combinations of Revisions 2 and 4 or 3 and 4. Consider the outcome of such combinations. In terms of variable types and categories, there could be some variables with both type and category (Revision 2 or 3) and some with type only (Revision 4). Furthermore, the performance, design, qualification, display, and quality assurance criteria are substantially different between the new and previous versions of the guide. The level of complexity that a partial conversion produces could make configuration control, design review, and inspection unmanageable or extremely cumbersome as a minimum. These programmatic reasons, combined with the technical reasons listed in the draft guide, led the staff to recommend that the entire accident monitoring program should be converted.

The staff also believes that the statement "allow a flexible basis for making changes to such systems in older plants" in IEEE Std. 497-2002 was intended to enable licensees of current operating nuclear power plants to utilize the criteria within the standard for digital upgrades to accident monitoring instrumentation. The staff does not believe IEEE Std. 497-2002 was intended to be partially implemented by licensees of current generation plants or for those licensees to make licensing commitments based on its criteria. Therefore, this draft guide does not endorse the practice of partial implementation. The staff acknowledges that some of the IEEE standard criteria for advanced instrumentation and monitoring systems could be useful to current plant licensees desiring to perform plant upgrades and does not want to dissuade a licensee from performing desired or necessary plant improvement projects. However, from a regulatory and licensing commitment standpoint, the staff prefers to have licensees commit to following only one revision of the regulatory guide for their entire accident monitoring program. Therefore, if a current licensee performs non-conversion plant improvements using guidance in IEEE Std. 497-2002, that licensee should retain its current licensing commitments unless a deviation from those commitments is necessary.

Consequently, this comment is not incorporated.

Comment #4 by NEI and NUGEQ:
"Not Intended for Current Operating Plants" language

In Regulatory Position C(1) and in the Regulatory Analysis, page 13, DG-1128 states: "Therefore, Revision 4 is not intended for current operating reactor licensees." Since Regulatory Position C(1) specifically permits use of Revision 4 with certain constraints by existing plants these statements are incorrect and can be confusing. While it may be more appropriate to state that "Revision 4 was primarily intended for future reactor licensees," it would be equally appropriate to delete these statements. NEI (NUGEQ) recommends deletion of these two statements without substitution.

Staff Response #4:
The staff agrees with this comment. IEEE Std. 497-2002 was primarily intended for licensees of new nuclear power plants. Therefore, this comment is incorporated. Refer to the revised regulatory position C.1.

Comment #5 by IEEE/NPEC:
3. Revision 4 of Regulatory Guide 1.97 should provide guidance for current plants that are implementing digital upgrades to existing accident monitoring instrumentation while maintaining their current licensing basis.

The discussion for Regulatory Position C(1) and the last sentence on page 13 include the sentence, "Therefore, Revision 4 is not intended for current operating reactor licensees." This statement along with the discussions about partial conversions in Regulatory Position C(1) and on page 14 could be misinterpreted to imply that current plants should not perform digital upgrades unless they convert the plant's entire accident monitoring program to the variable selection, variable type definitions, and qualification criteria in IEEE Std. 497-2002. In reality, existing accident monitoring instrumentation at current plants can be replaced by digital instrumentation and still remain in compliance with the existing licensing basis (Revision 2 or 3 of Regulatory Guide 1.97). However, Revisions 2 and 3 do not provide guidance concerning the proper use of digital instrumentation.

Since current plants would be allowed to voluntarily convert to Revision 4, the sentence, "Therefore, Revision 4 is not intended for current operating reactor licensees." is incorrect and should be removed from both Regulatory Position C(1) and the last paragraph on page 13. Additionally, Revision 4 of Regulatory Guide 1.97 should address the issue of digital upgrades, by defining a digital upgrade and providing guidance as to the appropriate regulatory guides and standards that should be used for a digital upgrade while at the same time maintaining the current variable selection, variable type definitions, and qualification criteria that are part of the plant's current licensing basis. Although this guidance may not be appropriate in a Regulatory Position, it could be included as part of the Regulatory Analysis.

Staff Response #5:
The staff does not agree with this comment. IEEE Std. 497-2002 neither defines the term "digital upgrade" nor provides guidance on how to perform such a digital upgrade. Rather, the standard, as stated in its introduction, establishes design criteria (which could be used) for digital equipment upgrades involving accident monitoring instrument channels. The staff position is that Revision 4 of Regulatory Guide 1.97 is not intended to define the term "digital upgrade" or to provide guidance on how to perform such an upgrade. If licensees choose to perform digital upgrades without converting to Revision 4 of the guide, they should maintain their licensing commitments to Revision 2 or 3. No additional guidance on digital upgrades is necessary or appropriate for this regulatory guide. Consequently, this comment is not incorporated.

Regulatory Position C.2

Comment #6 by Westinghouse:
Additional Editorial Comment

Section C, Position #2 proposes to modify the first sentence in the second paragraph of Clause 6.7 in order to relax the requirement of IEEE Std 497-2002, as it relates to instrumentation calibration during an accident. The proposed modification is as follows:

> *"To the maximum extent possible, considering instrument accessibility, means shall be provided for maintaining instrument calibration during the accident."*

However, the sentence immediately following in the standard states the following:

> *"One or more of the following (actions) may accomplish this:"*

Only one of the four actions listed actually requires access to the instrumentation; therefore, it is not clear that any requirements are, in fact, relaxed.

Staff Response #6:
The staff partially agrees with this comment. Clause 6.7 of IEEE Std. 497-2002 requires maintaining instrument calibration during an accident. The staff reviewed other calibration-related guidance (e.g., Revision 3 of Regulatory Guide 1.118, IEEE Std. 338-1987, IEEE Std. 603-1998, and ANSI/ANS-3.2-1994). However, these standards only include normal operation and plant shutdown as plant operating states during which checking, testing, calibration, and verification can be performed. No mention is made in any of these standards of permitting or requiring these activities during an accident. Furthermore, during an accident, an operator would likely want all operable channels to remain operable and not be taken out of service if only for calibration. However, IEEE Std. 497-1981 required validation of the variable indication by any of the four means (recalibration, etc.). The staff position is that this is a more appropriate concept. Maintaining instrument calibration can only be accomplished by recalibration, whereas validation can be accomplished by other means. The staff has revised the draft guide to recommend validation of the instrument's calibration by any of the four means without relaxation. Thus, this comment is partially incorporated. Refer to regulatory position C.2 in the revised guide.

Comment #7 by NEI and NUGEQ:
Regulatory Position C(2)

NEI/NUGEQ generally agrees with the intent of Regulatory Position C(2), which relaxes the IEEE Std. 497-2002 requirement for instrumentation calibration during an accident. However, we believe that the intent is to provide such means during the required instrument duration (i.e., post-event operating time) and not necessarily for the full accident duration. For example, a particular Type A variable may only be required for 6 hours after certain DBAs. In this case calibration or access may not be necessary since the duration of need (6 hours) is less than the equipment's normal calibration interval. This interpretation is consistent with the objectives of the guidance and recognizes that the required operating time for some variables, particularly Type A variables, may be less than the duration of the accident.

NEI/NUGEQ suggests the following revision to the Regulatory Position C(2) text which modifies IEEE 492 Clause 6.7:

> *"To the maximum extent possible, considering instrument accessibility, means shall be provided for maintaining instrument calibration during the required instrument duration."*

Staff Response #7:
The staff does not agree with this comment. Clause 5.4 of the IEEE standard defines the term "required instrument duration" as the post-event operating time for each variable and is typically a function of the duration the variable is required in the licensing-basis documentation (LBD). The basis for these requirements is ANS-4.5-1980, which the staff endorsed in Revisions 2 and 3 of Regulatory Guide 1.97. The ANS-4.5-1980 criteria for required instrument duration is expressed as the time from the beginning of the event until the time when personnel access is permitted in parts of the plant that require inspection, repair, or replacement. For the purposes of this regulatory guide, the staff interprets the IEEE standard's use of the term "during the accident" to be consistent with the time the variable function is required by the LBD. Refer to the new regulatory position C.8, which is relevant to this comment. This comment is not incorporated.

Comment #8 by IEEE/NPEC:
4. Regulatory Position C(2) modifies the first sentence in the second paragraph of Clause 6.7 in IEEE Std. 497-2002 as follows:

> *"To the maximum extent possible, considering instrument accessibility, means shall be provided for maintaining instrument calibration during the accident."*

The working group concurs with the intent of the NRC in relaxing the standard's requirement. However, the use of the word "maximum" in this context implies use of extreme and even beyond extreme measures to achieve accessibility. The working group suggests replacing "To the maximum extent possible…" with "To the extent practical…".

Staff Response #8:
The staff agrees with the comment and considered incorporating it. However, this regulatory position has been changed as a result of resolving public comments from Westinghouse (see Comment #6). Refer to the revised regulatory position C.2, which modifies the requirement from "maintain instrument calibration" to "validate instrument calibration." As a result, there is no longer a need to relax the requirement, and this comment is not incorporated.

Regulatory Position C.3

Comment #9 by BWROG:
Suggest deleting the term extended range from IEEE Std. 497-2002 Section 4.3 in lieu of the proposed wording in C.3. Section 5.1 of IEEE Std. 497-2002 addresses the range for Type C variables, which includes requirements imposed by the plant License Basis Documents (LBD) that would include extended range considerations. Alternatively, we suggest revising to …shall consider a damaged core and be capable of surviving….

Staff Response #9:
The staff agrees with the comment. The proposed detailed requirements for expanded ranges for Type C variables will reference Clause 5.1 of the IEEE standard, which addresses accident monitoring instrument ranges. This comment is incorporated. Refer to the regulatory position C.3 in the revised regulatory guide.

Comment #10 by NEI and NUGEQ:
Regulatory Position C(3)

The guide should clarify that the accident source terms defined by both TID-14844 and Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," meet the intent of "a source term that shall consider a damaged core capable of surviving the accident environment."

Existing plant CLBs use source terms based on TID-14844 or the AST to comply with the guidance contained in NUREG-0660, "NRC Action Plan Developed as a Result of the TMI-2 Accident," and NUREG-0737, "Clarification of TMI Action Plan Requirements," with respect to accident monitoring instrumentation and other post-accident considerations. Accordingly, these source terms represent a damaged core capable of surviving the accident environment.

NEI/NUGEQ suggests the following be added to the discussion portion of Position C(3):

> *"Regarding damaged core source terms, existing plants may use the guidance contained in TID-14844 or the AST as described in Regulatory Guide 1.183, 'Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors'."*

Staff Response #10:
The staff does not agree with the comment. The purpose of the regulatory guide is to present the criteria for accident monitoring instrumentation. The means for meeting the source term criteria, as required by NUREG-0660 and -0737, are plant-specific. Each licensee should describe its method for meeting these criteria in its accident monitoring analysis documentation. Consequently, this comment is not incorporated.

Regulatory Position C.4

Comment #11 by BWROG:
We believe the statement contained in IEEE Std 497-2002 Clause 4.1 and Clause 1.3 concerning contingency actions not being within the scope of the Standard should be retained. Removal of this statement will not capture that plant emergency operating procedures (EOPs) for BWR Owners include contingency actions which go beyond the plant's licensing basis. BWR Owner Emergency Procedure Guidelines which are the basis for plant EOPs are symptom based and have incorporated strategies based on existing plant systems and accommodate use of any available instrument indications regardless of safety classification or inclusion in the plants licensing basis. The NRC agrees that such contingency actions would be the basis for elimination of certain instruments but the inclusion of the statements as provided by the IEEE Std. will avoid interpretation issues with respect to EOPs.

Staff Response #11:
The staff does not agree with the comment. The basis for including contingency actions is to ensure that licensees consider all actions (contingency or otherwise) when developing their lists of accident monitoring variables. It is appropriate and conservative for licensees to begin the analysis of monitoring variables with a broader scope of potential variables. This approach would also negate any issues related to differences in EPGs, EOPs, etc. by recommending that licensees also consider contingency actions that are within the licensing basis (see Comment #14 and the related Staff Response). This approach may result in the inclusion of some variables that licensees would otherwise unnecessarily or unacceptably ignore due to the IEEE standard's restriction regarding all contingency actions. Contingency or otherwise, the actions that become Type A variables should meet the remaining criteria in Clause 4.1 of the standard. The staff also recognizes that IEEE Std. 497-2002 is intended to address those instruments needed to mitigate design-basis accidents within the licensing basis. Hence, this guide is also intended to address those instruments associated with design-basis

accidents. The method that a licensee chooses to address actions and equipment needed to combat beyond-plant-licensing-basis accidents may vary by plant or NSSS design and is not within the scope of this guide. Consequently, this comment is not incorporated.

Comment #12 by Westinghouse:

Background

IEEE Std 497-2002, Clause 1.3 describes the application of the standard. The last sentence in this section states the following:

> *"This standard also does not apply to instrumentation used to support contingency actions in emergency operating procedures or to instrumentation required to support plant shutdown from outside the control room."*

Clause 4.1 provides guidance for the selection of Type A variables. The "contingency actions" exclusion also appears in the last paragraph of this section as follows:

> *"Type A variables provide information essential for the direct accomplishment of specific safety related functions that require manual action. These variables are a subset of those necessary to implement the plant specific emergency~procedure guidelines (EPGs) or the plant specific emergency operating procedures (EOPs) or the plant abnormal operating procedures (AOPs). Type A variables do not include those variables that are associated with contingency actions that may also be identified in written procedures."*

Regulatory Position #4 in the draft regulatory guide deletes the final sentence of Clause 4.1, and replaces the last sentence of Clause 1.3 with the following:

> *"This standard also does not apply to instrumentation required to support plant shutdown from outside the control room."*

The argument stated in the draft regulatory guide for making the change is "Revision 3 provided a prescriptive list of variables to monitor, whereas this revision provides a non-prescriptive, performance-based approach to variable selection. Thus, in this performance-based guide, the staff cannot endorse the carte blanche exclusion of contingency actions from the selection criteria (especially those associated with plant-specific operating procedures or guidelines)."

Statement of Concern

The concern with the proposed revision to IEEE Std 497-2002 is that all references to contingency actions are deleted from the criteria. Whereas, the standard excluded the consideration of all contingency actions, the proposed revision to the Type A selection criteria in the draft regulatory guide does not provide any limitation to the contingency actions that must be considered except in the explanatory paragraph included in the regulatory guide.

Proposed Alternative Solution

Instead of simply deleting all references to contingency actions in IEEE Std 497-2002 as suggested in the draft regulatory guide, a portion of the explanatory paragraph included in the draft regulatory guide should be included. For example, the last paragraph of Clause 1.3 could be replaced with the following:

> *"This standard also applies to accident monitoring instrumentation necessary for the operator to execute contingency actions that are considered part of the plant specific emergency procedure guidelines (EPGs) or plant specific emergency operating procedures (EOPs). This standard does not apply to accident monitoring instrumentation that is intended solely for historical recording or solely for maintenance purposes. This standard also does not apply to instrumentation required to support plant shutdown from outside the control room."*

Justification

If all references to "contingency actions" are deleted from the standard, the user could infer that all contingency actions should be addressed when applying the performance-based guide. Whereas the draft regulatory guide did include an explanatory paragraph, the standard should also include an explanation of the scope of contingency actions that should be addressed. By restricting the contingency actions to those contingency procedures that are associated with the EPGs or plant EOPs, guidance is provided to the user of the standard as to the scope the contingency actions must be considered.

For example, with the absence of any guidance concerning contingency actions, the user could imply that contingency actions associated with severe accidents must be addressed when applying the standard. But based upon the explanatory paragraph in the draft regulatory guide, that certainly is not the intent of the proposed Position #4 changes. Another example could be the plant emergency response level procedures. Again, the intent is not to include these plant procedures since they are not considered part of the plant EOPs.

Staff Response #12:

The staff does not agree with the comment. The basis for including contingency actions is to ensure that licensees consider all actions (contingency or otherwise) when developing their lists of accident monitoring variables. It is appropriate and conservative for licensees to begin the analysis of monitoring variables with a broader scope of potential variables. This approach would also negate any issues related to differences in EPGs, EOPs, etc. by recommending that licensees also consider contingency actions that are within the licensing basis (see Comment #14 and the related Staff Response). This approach may result in the inclusion of some variables that licensees would otherwise unnecessarily or unacceptably ignore due to the IEEE standard's restriction regarding all contingency actions. Contingency or otherwise, the actions that become Type A variables should meet the remaining criteria in Clause 4.1 of the standard. The staff also recognizes that IEEE Std. 497-2002 is intended to address those instruments needed to mitigate design-basis accidents within the licensing basis. Hence, this guide is also intended to address those instruments associated with design-basis accidents. The method that a licensee chooses to address actions and equipment needed to combat beyond-plant-licensing-basis accidents may vary by plant or NSSS design and is not within the scope of this guide. The actions considered for Type A variables should not be restricted to EOPs and EPGs as the commentor requests, since the appropriate criteria are given in Clause 4.1 of the standard. Consequently, this comment is not incorporated.

Comment #13 by NEI and NUGEQ:

Regulatory Position C(4)

NEI/NUGEQ disagrees with this regulatory position which effectively includes instrumentation associated with certain "contingency actions" within the scope of the accident monitoring instrument program, in particular as Type A variables. This position is inconsistent with IEEE-492 and Regulatory Guide 1.97 Revisions 2 and 3 which all exclude such instrumentation associated with contingency actions from the scope of the accident monitoring instrumentation program. The NRC proposes a process whereby such contingency action instruments would initially be included in the list of instruments. The licensee would then be required to justify excluding them. The only NRC guidance regarding the exclusion process is an example; "if the contingency action takes place beyond the plant's licensing basis."

NEI/NUGEQ believes this regulatory position is unnecessary and confusing. In particular, it has the potential of diluting the significance of the Type A variables, which are appropriately required based on the plant accident analysis and design basis, by including other less important contingency action variables. IEEE Std. 497-2002 defines contingency actions as "alternative actions taken to address unexpected responses of the plant or conditions beyond its licensing basis (for example, actions taken for multiple equipment failures)."

In Regulatory Position C(4), the NRC example suggests that contingency action variables can be excluded "if the contingency action takes place beyond the plant's licensing basis." This position appears to involve circular logic since, by definition, contingency actions are beyond the plant's licensing basis, and, therefore, can be excluded. Alternatively, the NRC may interpret the IEEE contingency action definition to include "alternative actions taken to address unexpected responses of the plant" that are within the design basis. NEI/NUGEQ believes that such actions and associated variables are already addressed under Type D variables and it is inappropriate to categorize such variables as Type A. Clause 4.4 states that such Type D variables indicate the performance of safety systems, auxiliary supporting features, and other systems necessary to achieve and maintain safe shutdown and are based, in part, on the contents of plant EPGs, EOPs, and AOPs. It is reasonable to expect such procedures to include variables associated with important actions taken to address unexpected plant responses.

The industry NEI/NUGEQ recommends deletion of Regulatory Position C(4) in order to minimize confusion, maintain appropriate consistency with Revisions 2 and 3 with regard to contingency actions, and prevent dilution of the Type A variable list.

Staff Response #13:

The staff does not agree with the comment. The regulatory position does not change the requirements for Type A variables as defined in Clause 4.1 and, thus, does not dilute their significance. The inclusion of contingency actions as Type A variables may increase the scope of what is to be considered for Type A variables. This regulatory position recommends that licensees consider all actions, contingency or otherwise, when developing their lists of accident monitoring variables. This does not imply that any contingency action must be a Type A variable. Licensees should, however, consider each contingency action that is within the licensing basis (see Comment #14 and the related Staff Response) during the development of the list of accident monitoring variables. The important point is that all actions, contingency or otherwise, must meet the remaining criteria in Clause 4.1 to become a Type A variable. Furthermore, contingency actions may or may not be beyond the plant's design basis and may vary by plant or NSSS design (see Staff Response #14). Hence, the staff does not endorse qualifying all contingency actions to be beyond all plants' design bases. This modification of the criteria encourages licensees to document such considerations and determinations, thereby producing more thorough reviews of the plants' LBDs when developing the lists of accident monitoring variables. Consequently, this comment is not incorporated.

Comment #14 by IEEE/NPEC:

5. IEEE Std. 497-2002 provides guidance for the selection of Type A variables in Section 4.1. The last paragraph in the section states the following:

> *"Type A variables provide information essential for the direct accomplishment of specific safety-related functions that require manual action. These variables are a subset of those necessary to implement the plant-specific emergency procedure guidelines (EPGs) or the plant-specific emergency operating procedures (EOPs) or the plant abnormal operating procedures (AOPs). Type A variables do not include those variables that are associated with contingency actions that may also be identified in written procedures."*

In Regulatory Position C(4), the draft regulatory guide deletes the final sentence of this paragraph and replaces it with the following in Section 1.3:

> *"This standard also does not apply to instrumentation required to support plant shutdown from outside the control room."*

The concern is with the elimination of the sentence in IEEE Std.497-2002 excluding contingency actions. DG-1128 states the basis for this regulatory position. During the variable selection process instruments associated with all actions, including contingencies, should be considered and then associated instruments eliminated from consideration if the contingency action takes place beyond the plant's licensing basis. IEEE Std. 497-2002 excluded contingencies because actions credited in the licensing basis would be primary actions in plant operating procedures or guidelines, not contingencies. Furthermore, Rev. 3 of Regulatory Guide 1.97 excluded contingency actions from consideration for Type A variables, yet did not have a prescriptive list of Type A variables (only for other types of variables).

It is suggested that either (1) the exclusion of contingency actions be removed from the regulatory positions to make Reg. Guide 1.97 Rev. 4 consistent with IEEE Std. 497-2002 in this regard or (2) a statement be added in Regulatory Position C(4) such as "Contingency actions that are part of the plant's licensing basis shall be considered in selecting Type A variables" as a modification to Clause 4.1 of IEEE Std. 497-2002.

Staff Response #14:

The staff agrees with the comment. This regulatory position is intended to ensure that licensees consider all actions, contingency or otherwise, within their licensing basis during the selection of Type A variables. IEEE Std. 497-2002 defines contingency actions as "alternative actions taken to address unexpected responses of the plant or conditions beyond its licensing basis (for example, actions taken for multiple equipment failures)." However, the use of the term "contingency action" may be applied differently between plants, licensees, and NSSS suppliers. For example, Westinghouse EPGs define emergency contingency action guidelines as those which "supplement both the entry guidelines and subguidelines by providing guidance for low probability or unique event scenarios." By contrast, General Electric EPGs state that "contingencies form extensions to the top-level guidelines, providing more detailed instructions for controlling individual parameters under more degraded conditions." Further, Combustion Engineering EPGs state that "contingency actions are included for use when primary success paths have not been successful." As a result of the varying definitions and uses of the term, it is necessary to recommend considering such actions while applying the criteria in Clause 4.1 of the standard. The staff also recognizes that IEEE Std. 497-2002 is intended to address those instruments needed to mitigate design-basis accidents within the licensing basis. Hence, this guide is also intended to address those instruments associated with design-basis accidents. The method that a licensee chooses to address actions and equipment needed to combat beyond-plant-licensing-basis accidents may vary by plant or NSSS design and is not within the scope of this guide. Refer to regulatory position C.4 in the revised guide. Regarding the exclusion of contingency actions in Revision 3 of Regulatory Guide 1.97, neither the guide nor its endorsed standard define "contingency actions," and this may have led to the varying uses described above. The staff also recognizes that Type A variables are not based on a prescriptive list as was provided for Types B through E. However, when using a performance-based approach to the selection of variables, it is important that licensees begin the selection process with a broad range of potential variables and then narrow down the list based on the selection criteria in Clause 4 of the standard. Hence, this comment is incorporated.

Regulatory Position C.6

Comment #15 by BWROG:
We agree with the NRC's statement concerning need for NRC approval but request that the section on Codes and Standards (Clause 2, "References" in IEEE Std 497-2002) be modified to allow use of current plant licensing basis Codes and Standards.

Staff Response #15:
The staff does not agree with this comment. This regulatory position is consistent with other regulatory guides regarding the use of referenced codes and standards. Furthermore, licensees who voluntarily perform the conversion to Revision 4 of Regulatory Guide 1.97 should commit to meet all applicable criteria given in the endorsed standard, and should document how each particular requirement is fulfilled as part of the conversion analysis. Any necessary deviations from the referenced industry codes and standards will be reviewed and approved on a case-by-case basis. This approach is consistent with Branch Technical Position HICB-10 in Chapter 7 of the Standard Review Plan, NUREG-0800. Hence, this comment is not incorporated.

Requested Additional Changes/Positions

Comment #16 by BWROG:
IEEE Std. 497-2002 Clause 5.4(c) should be modified to remove "shall be at least 100 days" and replaced with "shall be the duration for which the measured variable is required by the plant's LBD". In NRC's letter dated February 20, 2004, from José Calvo, in response to the Nuclear Utility Group on Equipment Qualification letter dated October 22, 2003, it is noted that the post-accident operating time varies depending on when a plant was licensed and, thus, should not be established as 100 days for Type C variables which monitor fission product barriers.

Staff Response #16:
The staff agrees with this comment. Historically, no current licensees have requested deviations from this requirement, as the requirement also exists in ANSI/ANS-4.5-1980, which the staff endorsed in Revisions 2 and 3 of Regulatory Guide 1.97. Nonetheless, the staff agrees that plants' LBDs should dictate the required operating time for the instrument channel. Consequently, this comment is incorporated. Refer to regulatory position #7 in the revised guide.

Comment #17 by TVA:
Delete the applicability of IEEE-497 in Section B of the draft Revision 4 RG 1.97. This imposes excessive requirements on equipment defined as Type B and Type C variables in the RG. The conflict is introduced by reference to IEEE 7-4.3.2 given by IEEE-497. In addition, the extra requirements conflict with Branch Technical Position No. HICB-19 referenced in the same DG section. Only variable Type A equipment should apply to the requirement to demonstrate defense-in-depth against common-mode software failure. Specifically, HICB-19 focus is addressing software common-mode software failures with respect to safety-related protective functions (i.e., the RPS and ESFAS), and should not be applied beyond Post-Accident Monitoring Type A instrumentation needed for manual protective actions.

Staff Response #17:
The staff does not agree with the comment. The staff interprets the comment as requesting modification of Clause 6.2 to *not* include Type B or C variables. The commentor's argument is that Branch Technical Position HICB-19 is limited to safety-related protective functions (e.g., RPS and ESFAS). However, Clause 6.2 of the IEEE standard requires *either* defense-in-depth *or* diversity. Therefore, the requirements in IEEE Std. 497-2002 regarding common-cause failure are not as restrictive as those presented in IEEE Std. 7-4.3.2-1993 and HICB-19. The draft regulatory guide presented HICB-19 only as a reference for additional information regarding common-cause failure, and did not address HICB-19 in a regulatory position against the criteria of IEEE Std. 497-2002. Nonetheless, HICB-19 adds guidance that "Manual displays and controls provided for compliance with the fourth point of the NRC position on D-in-D&D should be sufficient to both monitor the plant states and to actuate systems required by the control room operators to place the nuclear plant in a hot-shutdown condition. In addition, the displays and controls should monitor and control the following critical safety functions: reactivity level, core heat removal, reactor coolant inventory, containment isolation, and containment integrity." As a result, the staff agrees with IEEE Std. 497-2002 that variable types A, B, and C should have common-cause failure issues addressed in accordance with Clause 6.2. Consequently, this comment is not incorporated.

Comment #18 by NEI and NUGEQ:
Proposed New Regulatory Position

NEI/NUGEQ suggests the following new regulatory position:

> *"The provisions of IEEE Std. 497-2002 Clauses 7.1, 7.2, 7.3, and 7.4 regarding environmental and seismic qualification shall be interpreted to mean that environmental and seismic qualification of accident monitoring variables shall be in accordance with a plant's current licensing basis (CLB); the information in IEEE 323-1983 and IEEE 344-1987 (if not part of the CLB) may be considered if appropriately justified and consistent with current regulatory practice."*

The environmental and seismic qualification discussions in IEEE Std. 497-2002 Clauses 7.1, 7.2, 7.3, and 7.4 should be amended in a regulatory position to specify that environmental and seismic qualification shall be in accordance with a plant's current licensing basis (CLB) and not IEEE 323-1983 and IEEE 344-1987 although these standard versions may be used as guidance.

Regarding environmental qualification, Clauses 7.1, 7.2, 7.3, and 7.4 currently state, in part, that Types A, B, C, and D variables shall be environmentally qualified for the particular accident's postulated environment at the installed location "in accordance with IEEE Std 323-1983". This may be appropriate for plants that have committed to the 1983 version of IEEE 323. However, the environmental qualification licensing basis for existing plants is 10 CFR 50.49, as clarified by plant specific commitments and other NRC guidance documents, such as Regulatory Guide 1.89 Rev. 1, the DOR Guidelines, and NUREG-0588. For these operating plants IEEE 323-1983 is not typically identified as part of the CLB (termed LBD in IEEE Std. 497-2002). It is also noteworthy that IEEE 323-1983 has not been endorsed by a Regulatory Guide and has been superseded by IEEE 323-2003. Although some future plants may identify IEEE 323-1983 as part of the plant's CLB, it is more likely that such plants will reference IEEE 323-2003. Similar considerations apply to a plant's seismic CLB and IEEE 344-1987.

Staff Response #18:
The staff does not agree with the comment. Licensees who voluntarily perform the conversion to Revision 4 of Regulatory Guide 1.97 should commit to meet all applicable criteria given in the endorsed standard, and should document how each particular requirement is fulfilled as part of the conversion analysis. Any necessary deviations from the referenced industry codes and standards will be reviewed and approved on a case-by-case basis. This approach is consistent with Branch Technical Position HICB-10 in Chapter 7 of the Standard Review Plan, NUREG-0800. Furthermore, regulatory position #6 provides guidance on the use of codes and standards referenced within IEEE Std. 497-2002, as follows:

> If the NRC's regulations incorporate an industry code or standard referenced in Clause 2 of IEEE Std. 497-2002, licensees and applicants must comply with that code or standard as set forth in the regulations. Similarly, if the NRC staff has endorsed a referenced code or standard in a regulatory guide, that code or standard constitutes an acceptable method for use in meeting the related regulatory requirement as described in the regulatory guide(s). By contrast, if a referenced code or standard has neither been incorporated into the NRC's regulations nor been endorsed in a regulatory guide, licensees and applicants may consider and use the information in the referenced code or standard, if appropriately justified, consistent with current regulatory practice.

Consequently, this comment is not incorporated.

Comment #19 by NEI:
Proposed New Regulatory Position

NEI suggests the following new regulatory position:

Replace the current contents of Clause 5.4(c) with the following: "The qualification duration for Type C variable instrument channels shall be the duration for which the measured variable is required by the plant's LBD."

NEI agrees with IEEE Std. 497-2002 Clause 5.4 that the operating time of each variable shall be defined and addressed in the qualification program. Further, NEI agrees that these times shall be based on a plant's CLB (referred to as the LBD by IEEE Std. 497-2002). However, we disagree with the standard's guidance in Clause 5.4 c) regarding a minimum 100 day operating time for Type C variables, particularly when this time conflicts with a plant's CLB. While 100 days may (or may not) be appropriate and consistent with the design basis for future plants, a significant number of existing plants have established shorter environmental qualification program operating times (e.g., 30 days) for Type C variables. For any existing plants seeking to use Revision 4 as the basis for their accident monitoring instrumentation, their CLB should be preserved.

Staff Response #19:
The staff partially agrees with this comment. Historically, no current licensees have requested deviations from this requirement, as the requirement also exists in ANSI/ANS-4.5-1980, which the staff endorsed in Revisions 2 and 3 of Regulatory Guide 1.97. Nonetheless, the staff agrees that plants' LBDs should dictate the required operating time for the instrument channel. Consequently, this comment is partially incorporated, and the regulatory position is changed to provide a choice of 100 days or as determined by the plant's LBD for Type C operating times. Refer to regulatory position C.7 in the revised regulatory guide.

Comment #20 by NUGEQ (similar to Comment #19 by NEI):
6. New Regulatory Position C(5)

The NUGEQ agrees with IEEE 497 Clause 5.4 that the operating time of each variable shall be defined and addressed in the qualification program. Further, the NUGEQ agrees that these times shall be based on a plant's CLB (referred to as the LBD by IEEE 497). However, the NUGEQ disagrees with the

standard's guidance in Clause 5.4 c) regarding a minimum 100 day operating time for Type C variables, particularly when this time conflicts with a plant's CLB. Although 100 days may be appropriate and consistent with the design basis for future plants, a significant number of existing plants have established shorter environmental qualification program operating times (e.g., 30 days) for Type C variables. For any existing plants seeking to use Revision 4 as the basis for their accident monitoring instrumentation, their CLB should be preserved. The NUGEQ has also been unable to identify a technical basis for the 100 days duration and believes that other CLB durations, including 30 days, are equally justifiable.

Finally, The NUGEQ believes there is an inconsistency in Clause 5.4 c) regarding Type C variables. Currently, the clause specifies a 100 day operating time for variables monitoring the fuel cladding, reactor coolant system pressure boundary, and containment pressure boundary fission product barriers and then states that the duration for "other" Type C variables is that required by the plant's CLB. However, because Clause 4.3 "Type C variables" defines Type C variables as only those monitoring the fuel cladding, reactor coolant system pressure boundary, and containment pressure boundary fission product barriers there cannot be any "other" Type C variables.

All these NUGEQ concerns can be resolved by applying the guidance in the last sentence in Clause 5.4(c) to all Type C variables. Simply stated the qualification duration for all Type C variable instrument channels should be the duration for which the measured variable is required by the plant's LBD.

Suggested New Regulatory Position C(6)

NUGEQ suggests the following new regulatory position:

Replace the current contents of Clause 5.4(c) with the following: "The qualification duration for Type C variable instrument channels shall be the duration for which the measured variable is required by the plant's LBD."

Staff Response #20:

The staff partially agrees with this comment. Historically, no current licensees have requested deviations from this requirement, as the requirement also exists in ANSI/ANS-4.5-1980, which the staff endorsed in Revisions 2 and 3 of Regulatory Guide 1.97. Nonetheless, the staff agrees that plants' LBDs should dictate the required operating time for the instrument channel. Consequently, this comment is partially incorporated, and the regulatory position is changed to provide a choice of 100 days or as determined by the plant's LBD for Type C operating times. Refer to regulatory position C.7 in the revised regulatory guide.