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NSD-NRC-97-4959

January 30, 1997

Mr. David L. Meyers
Chief, Rules Review and Directive Branch
U.S. Nuclear Regulatory Commision
11545 Rockville Pike
Rockville, MD 20852

ATTENTION: Docketing and Service Branch

Dear Mr. Meyers:

Subject: Draft Chapter 7 of NUREG-0800, "Standard Review Plan for the review of Safety Analysis Reports for Nuclear Power Plants"

The attached comments are submitted by the Westinghouse Electric Corporation ("Westinghouse") in response to the United States Nuclear Regulatory Commision ("NRC") request for public comments on the upddated Chapter 7 of the Standard Review Plan (SRP).

In the Federal Register notice of December 3, 1996 (Volume 61, Number 233) the Nuclear Regulatory Commission announced the availability for public comment of Chapter 7 of NUREG-0800, ''Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (SRP) for review and comments. The updated SRP Chapter 7 incorporates changes in the NRC review criteria in the area of instrumentation and control (I&C) systems, particularly digital computer-based I&C systems of nuclear power plants that have occurred since the last major revision of the SRP in 1981.

Westinghouse appreciates the opportunity to provide these comments. Should you wish to discuss our comments in greater detail, please contact N. J. Liparulo, Manager, Equipment Design and Regulatory Engineering at (412) 374-5169.

Very truly yours,

H. A. Sepp, Manager
Regulatory & Licensing Enginerring

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I&C Guides & Manuals

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The following comments are submitted in response to the Federal Register notice of December 3, 1996 (Volume 61, Number 233) in which the Nuclear Regulatory Commission announced the availability for public comment of Chapter 7 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (SRP) for review and comments. The updated SRP Chapter 7 incorporates changes in the NRC review criteria in the area of instrumentation and control (I&C) systems, particularly digital computer-based I&C systems of nuclear power plants that have occurred since the last major revision of the SRP in 1981.

The technical comments below, are listed in the same order of appearance of the draft SRP Chapter 7 sections, or Branch Technical Position (BTP) to which they apply. Comments on typographical items from all sections are grouped together at the end.

A. Appendix 7.0-A: Review Process for Digital Instrumentation and Control System

1) On page SRP 7.0-A-2 (and page BTP HICB-14-2) the second sentence in the definitions for "Deterministic" and "Deterministic timing" reads: "No system is deterministic under all conditions, and unpredictable delays will be incurred for at least some errors and failures."

   This statement contradicts the first sentence in the definitions which discuses a time response having a "guaranteed maximum and minimum." Computer based instrumentation and control equipment is currently available which has guaranteed maximum and minimum time delays under all conditions. The methods of software design to accomplish this for numerous platforms have been thoroughly described and have implemented for simple systems beginning in the 1970's. Operating system software capable of real time operation, also termed "bounded dispatch latency" is presently available for computer systems of all complexities. Use of "deadman timers" is another method available to assure a predetermined time delay for various error and failures. If a time delay has guaranteed maximum and minimum values, then it cannot be termed "unpredictable," and this statement is incorrect and should be omitted.

2) On page SRP 7.0-A-4, Section C.1 "Summary" (under "C. Review Process") the current wording is "The Staff's review emphasis should be commensurate with the safety significance of the given system or aspect of a system's design under review."

   This sentence indicates that the Staff is willing to relax the acceptance criteria for safety systems of lesser significance. Additional guidance must be provided to the industry so that consistent and logical decisions can be made with respect to the Staff's grading of safety systems. The levels of safety systems should be categorized and the acceptance criteria associated with each category must be identified. IEC 1226 provides guidance on the classification of instrumentation and control systems important to safety for nuclear power plants.

B. Section 7.1 Instrumentation and Controls - Introduction

1) On page SRP 7.1-2, item 7 "Diverse actuation systems" under "I. Areas of Review" should read:

"Diverse Actuation Systems MAY include the Anticipated Transient Without Scram (ATWS) ....." There is no requirement that the ATWS mitigation system be included in the Diverse Actuation System; it may remain a separate system. This choice should remain with the plant designer.

C. Appendix 7.1-B Guidance for Evaluation of Conformance to ANSI/IEEE Std 279

1) On page 7.1-B-1 in the first paragraph, is a sentence that reads: "Although required by NRC regulations only for protection systems, the criteria of ANSI/IEEE Std 279 are applicable to any instrumentation and control (I&C) system." The paragraph then goes on to advise the reviewer to use the "Concepts of ANSI/IEEE Std 279" to review "I&C systems not a part of the protection system, but having a high degree of importance to safety."

The first sentence of ANSI/IEEE Std 279 reads: "These criteria establish minimum requirements for the safety-related functional performance and reliability of protection systems for stationary, land-based nuclear reactors producing steam for electric power generation." Nothing in section 1 (Scope) of ANSI/IEEE Std 279 states that it applies to I&C systems other than safety-related protection systems. Examples/clarifications should be included in this section for reviewer guidance as to how to apply ANSI/IEEE Std 279 to non-safety related systems.

2) After 10 CFR50.55a(h) is revised from IEEE-279 to IEEE-603, Appendix 7.1-B, "Guidance for Evaluation of Conformance to ANSI/IEEE Std 279" should be eliminated and the SRP be revised to reflect only the use of Appendix 7.1-C, "Guidance for Evaluation of Conformance to IEEE Std 603".

D. Section 7.8 Diverse Instrumentation and Control Systems

On page SRP 7.8-6, the statement "Equipment diversity should be provided to the extent reasonable and practicable to minimize the potential for common-mode failure." This statement is vague and subject to reviewer interpretation. Examples of diversity should be included in this section for reviewer guidance as to how to apply equipment diversity to minimize the potential for common-mode failure.

E. BTP HICB-12 Guidance for Establishing and Maintaining Instrument Setpoints

The following comments constitute our review of BTP HICB-12 DRAFT Rev. 4 - November 1996 which was included as part of the draft Chapter 7 of the SRP. Note that Westinghouse has previously reviewed proposed draft Regulatory Guide DG-1045 (RG 1.105 Rev. 3) "Setpoints for Safety-Related Instrumentation" and supplied comments via Westinghouse letter NSD-NRC-96-4924, 12/19/96, to: Mr. David Meyer (USNRC), from: Mr. N. J. Liparulo (Westinghouse). A comparison of BTP HICB-12 and DG-1045 provides some contrasting potential interpretations.

1) For example, DG-1045 explicitly notes that only the Allowable Value parameter will satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A), see Regulatory Position 3, while BTP HICB-12 notes the acceptability of Section 3 (Definitions) and Figure 1 of ISA-S67.04 Part 1 for definitions and relationships (including limiting safety system setting, LSSS). Figure 1 of ISA-S67.04 Part 1 is based on section 4.3 which notes the following: "The LSSS is derived from the analytical limit in a manner determined by the setpoint calculation methodology. Depending of the methodology, the LSSS may be the allowable value, the trip setpoint, or both. The LSSS is maintained by either the technical specifications or the plant-operating procedures. Figure 1 illustrates the relationships between an analytical limit and an LSSS." The pertinent point being that there is a fundamental and conceptual difference between what the two NRC documents theoretically accept as the definition of an LSSS. While Westinghouse strongly disagrees with the NRC position stated in DG-1045, see comment (7) of our letter, it is suggested that if the Regulatory Position of DG-1045 remains unchanged, then BTP HICB-12 should not find all of the definitions of ISA-S67.04 Part 1 to be acceptable, i.e., the trip setpoint would not be considered a valid definition of an LSSS. This presents a problem as Westinghouse is in complete agreement with the definition of an LSSS as noted in A. 1. Regulatory Basis, of BTP HICB-12 (page 1).

2) Under B. 3. Acceptance Criteria, BTP HICB-12 notes four new criteria;

- The basis for calibration intervals,
- Data supporting instrument drift uncertainties and a discussion of the drift determination methodology,
- Description of control of measurement and test equipment and
- Description of an instrument drift monitoring and trend program.

Westinghouse has no specific disagreements with any of these documentation requirements. However, it should be noted that the second and fourth are only explicitly required in Generic Letter 91-04 and are currently applicable only to surveillance intervals of 24 months. It is suggested that if these documentation requirements are to be applicable for **all** current or future setpoint submittals, that should be noted with an effectivity date and cross-linked to an equivalent requirement in DG-1045. This was noted as comment (1) in our letter on DG-1045. The third item above was also noted in DG-1045 as a shortcoming of ISA-S67.04 Part 1. As comment (5), Westinghouse requested further clarification of this issue. With respect to BTP HICB-12, it is suggested that further guidance in these areas is in order. If this information is **not** required, but desired for ease of review, then that aspect should be

identified. It should be noted that many licensees would state that there are no current requirements to perform explicit drift evaluation studies or maintain drift monitoring and trend programs for surveillance intervals of less than 24 months and therefore may not have such programs in place to gather the needed data. Thus the need for clarity and specificity on the part of the NRC.

3) Under B.3. Acceptance Criteria, it is noted that the description of assumptions required by ISA-S67.04 should include environmental allowances, specifically electromagnetic interference (EMI). This topic was discussed as part of the S67.04 committee review. Westinghouse responded to a 1993, S67.04 committee survey request noting that as part of the Westinghouse design/verification and installation process, sensitivity to EMI/RFI is determined. However, such sensitivity is considered a fault as opposed to an error that should be accounted for in the determination of a setpoint. Efforts are then made to reduce the sensitivity, e.g., shielding or administrative control to prevent radio transmissions in the vicinity such that the effects are negligible. Therefore, while some electronic modules demonstrate some sensitivity to these effects, it is not considered appropriate to include them in an uncertainty calculation. Rather, it is believed to be more appropriate to minimize them or exclude them by various control mechanisms. Consistent with the above, Westinghouse would then note that the listing of EMI in BTP HICB-12 would not be appropriate.

4) Under "Statistical Guidelines for Instrument Uncertainty," it is noted that, "the NRC staff typically uses 95/95 tolerance limits as an acceptable criterion." There is considerable confusion within the industry as to what minimum probability/confidence level the NRC requires for instrument uncertainty calculations. Inconclusive wording, like that noted above, does not provide the clarity and explicitness the industry needs. It is suggested that the NRC staff determine what minimum probability/confidence levels for reactor trip and engineered safety features actuation trip setpoints are required and then clearly identify them. This is equivalent to our comment (6) on DG-1045.

5) Under "Guidelines for Graded Approach" it is noted that the grading technique "should consider all known applicable uncertainties regardless of setpoint application." Then there is a discussion of a graded approach with four categories;

Group A - 95/95 (All uncertainty terms including drift)
Group B - 95/95 (95/75 for drift uncertainty terms)
Group C - 95/95 (75/75 for drift uncertainty terms)
Group D - Engineering Judgement.

Westinghouse concurs with the NRC position that all known applicable uncertainties should be considered for an uncertainty calculation. It is difficult to justify ignoring an effect under the guise of less rigor. With respect to the groupings, Westinghouse has the following comments:

- Concur with Group A.
- Disagree with Group B in that the overall probability/confidence level of 95/95 can not be met with a drift of 95/75 without some increase in the probability/confidence level in one or more other parameters in the calculation. This does not make physical sense and thus must be

construed as an error. However, to allow only a decrease in confidence level on one parameter is not a significant change. If this is truly the position of the staff, it is suggested that this category be combined with Group A. Westinghouse believes that a Group B calculation could be performed at an overall 75/75 level (all parameters) and still provide adequate margin to perform the required function.

- Same comment as with Group B on the overall probability/confidence level. It is suggested that a Group C calculation could be performed based on Engineering Judgement, this should be the equivalent of 50/50 or better if plant specific drift and calibration data are scanned.
- Based on the above, Westinghouse would suggest that there is no need for a Category D. Any functions that fit this category could be moved to Group C.

The above comments are consistent with our comment (3) on DG-1045.

6) Under 4. Review Procedures, the last factor noted for as found and as left data is "each instrument should be demonstrated to have random drift by empirical and field data." Westinghouse believes this statement is incomplete, i.e., what does the applicant do if the data is not completely random? Westinghouse has performed many drift evaluations on process rack channels and sensor transmitters as part of 24 month surveillance extensions and other work. In some cases, the data evaluation clearly notes a significant non-zero mean indicative of a one-direction bias, with a two-direction random component about it. Thus, it would not be appropriate to treat the sum of the two components as a single random term. It would be more appropriate to treat the mean as a bias and the random component as a separate term. Therefore, it is suggested that the text on as found and as left data be modified to require the evaluation of as found and as left data with the results appropriately reflected in the uncertainty algorithm.

7) Under Statistical Guidelines for Instrument Uncertainty, page 4 and Guidelines for Graded Approach, page 5 are discussions of the probability and confidence level "for the surveillance interval selected." It should be noted that Westinghouse drift evaluations have not demonstrated significant time dependence. Therefore, the probability and confidence level for instrument drift is not dependent on the surveillance interval length. In addition, any statistical evaluation of other instrument parameters, e.g., calibration or temperature effects, would not be dependent on the surveillance interval. It is therefore suggested that discussions of probability and confidence level should not to be linked to surveillance intervals.

F. BTP HICB-13: Guidance for Cross-Calibration of Protection System Resistance Temperature Detectors

1) The primary Westinghouse comment deals with the BTP recommendation that a reference RTD be installed at each refueling outage for cross-correlation with the existing RTDs. It has been Westinghouse experience, based on evaluation of cross calibration test data involving partial RTD changeouts for a variety of utilities, that protection system RTDs do not exhibit systematic drift. This experience is supported by NUREG/CR-5560, which states on page 144 that RTD drift is random and that cross calibration is viable without the use of reference

RTDs. Therefore, based on the absence of systematic drift, Westinghouse does not recommend the installation of reference RTDs.

2) In addition to not recommending the installation of reference RTDs, Westinghouse has the following concern associated with this practice. The purpose of cross calibration testing is to verify installed RTD accuracy and to identify any "installation effects" (RTD characteristic shifts) due to handling, installation, etc. If a single reference RTD is installed, it is susceptible to such installation effects. Thus, if there is disagreement between a reference RTD and the average of the existing RTDs, it is difficult to identify which measurement is more accurate. In this situation it would be risky to recalibrate or trend drift for the existing RTDs against a single questionable reference measurement. In fact, based on the belief that RTD drift is random, Westinghouse would tend to recommend recalibration of the new RTD to the average of the numerous existing RTDs, on the premise that the new RTD is exhibiting an installation effect. In order to address this concern over the reliance on a single reference RTD, several reference RTDs (perhaps one per loop) would need to be installed to provide a greater number of reference measurements, which would allow a more refined evaluation of potential installation effects. However, this alternate approach is considered to represent an undue expense and burden to utilities, especially considering that systematic RTD drift has not been proven to exist.

3) An additional comment relates to the Chapter 7 Standard Review Plan Table 7-1, "Acceptance Criteria and Guidelines for Instrumentation and Control Systems Important to Safety." On page 6 of the Table, Item 1, under BTP HICB-13, "Replacement of Reactor Coolant RTD Bypass Manifold Temperature Instruments," a note states that the BTP is applicable only to Westinghouse PWR designs. It should be noted that cross calibration testing and issues related to the installation of reference RTDs are generic in nature and apply to both Westinghouse and non-Westinghouse designs, and are independent of whether bypass manifolds are used.

4) A final minor comment is the BTP reference to verification of RTD response time through cross calibration testing. Response time is typically verified through LCSR (loop current step response) testing, which is independent of the cross calibration test.

G. Typographical Errors:

Section 7.1. Instrumentation and Controls - Introduction

page 7.1-5 Item b, change "pre-existing softwarepProducts (PESP)" to "pre-existing software products (PESP)".

Table 7-1. Acceptance Criteria and Guidelines for Instrumentation and Control Systems Important to Safety

page SRP T7.1-1 Paragraph 3, change "are imposed by 10 CFR 34(f)" to "are imposed by 10 CFR 50.34(f)".

page SRP T7.1-2 In footnote, change "are used as guidnance" to "are used as guidance".

page SRP T7.1-6 Table 7-1, "Acceptance Criteria and Guidelines for Instrumentation and Control Systems Important to Safety." On page 6, Item l, this table refers to BTP HICB-13, as "Replacement of Reactor Coolant RTD Bypass Manifold Temperature Instruments," rather than "Guidance for Cross-Calibration of Protection System Resistance Temperature Detectors".

Appendix 7.1-A Acceptance Criteria and Guidelines for Instrumentation and Control Systems Important to Safety

page SRP 7.1-A-2 Item c, change "bypassed and operable status" to "bypassed and inoperable status".

Appendix 7.1-C Guidance for Evaluation of Conformance to IEEE Std 603

page 7.1-C-14 Regulatory Guide 1.153, change date from 1985 to 1996. Also check the entire SRP for consistency.

Section 7.5 Information Systems Important to Safety

page SRP7.5-6	Under item 2, change "As a minimum BISI sould be provided" to "as a minimum BISI should be provided".
page SRP7.5-7	Redundancy: change "redundant systems should be equivallent to" to "redundant systems should be equivalent to".
page SRP7.5-8	Paragraph #5, change "for which no automatic sontrol is provided" to "for which no automatic control is provided"