WCAP-17503-NP-A
Revision 1

October 2016

Westinghouse Generic Setpoint Control Program Recommendations

WCAP-17503-NP-A
Revision 1

Westinghouse Generic Setpoint Control Program Recommendations

T. P. Williams*
Setpoints and Control Systems

October 2016

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October 14, 2016

Mr. James A. Gresham, Manager
Regulatory Compliance and Plant Licensing
Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

SUBJECT: FINAL SAFETY EVALUATION FOR WESTINGHOUSE ELECTRIC COMPANY TOPICAL REPORTS WCAP-17503-P/WCAP-17503-NP, REVISION 1, "WESTINGHOUSE GENERIC SETPOINT CONTROL PROGRAM RECOMMENDATIONS" AND WCAP-17504-P/WCAP-17504-NP, REVISION 1, "WESTINGHOUSE GENERIC SETPOINT METHODOLOGY" (TAC NO. ME8115)

Dear Mr. Gresham:

By letter dated February 20, 2012 (Agencywide Documents Access and Management System Accession (ADAMS) No. ML12058A448), Westinghouse Electric Company (Westinghouse) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Topical Reports (TRs) WCAP-17503-P, Revision 0, and WCAP-17503-NP, Revision 0, "Westinghouse Generic Setpoint Control Program Recommendations" and WCAP-17504-P, Revision 0, WCAP-17504-NP, Revision 0, "Westinghouse Generic Setpoint Methodology." As a result of the NRC staff requests for additional information, Westinghouse prepared formal revisions to each TR, and submitted Revision 1 to WCAP-17503-P/NP and WCAP-17504-P/NP via letter to the NRC dated March 23, 2016 (ADAMS Accession ML16085A152).

The enclosed final SE addresses the applicability of the WCAP-17503-P/NP, "Westinghouse Generic Setpoint Control Program Recommendations," and WCAP-17504-P/NP, "Westinghouse Generic Setpoint Methodology," TRs.

The NRC staff has found that TR WCAP-17503-P/NP, "Westinghouse Generic Setpoint Control Program Recommendations" and WCAP-17504-P/NP, "Westinghouse Generic Setpoint Methodology," are acceptable for referencing in licensing applications provided that the limitations and conditions stipulated in the Section 4.0 and applicability defined in Sections 1.0 and 5.0 of the enclosed NRC final SE are met along with the proper documentation.

NOTICE: Enclosure 2 transmitted herewith contains proprietary information. When separated from Enclosure 2, this document is decontrolled.

Our acceptance applies only to material provided in the subject TRs. In accordance with the guidance provided on the NRC website, we request that Westinghouse publish accepted proprietary and non-proprietary versions of these TRs within three months of receipt of this letter. The accepted versions shall incorporate this letter and the enclosed final SE after the title page. Also, they must contain historical review information, including NRC requests for additional information (RAIs) and your responses. The accepted versions shall include an "-A" (designating accepted) following the TRs identification symbol.

As an alternative to including the RAIs and RAI responses behind the title page, if changes to the TRs were provided to the NRC staff to support the resolution of RAI responses, and the NRC staff reviewed and approved those changes as described in the RAI responses, there are two ways that the accepted version can capture the RAIs:

1. The RAIs and RAI responses can be included as an Appendix to the accepted version.
2. The RAIs and RAI responses can be captured in the form of a table (inserted after the final SE) which summarizes the changes as shown in the approved version of the TRs. The table should reference the specific RAIs and RAI responses which resulted in any changes, as shown in the accepted version of the TRs.

If future changes to the NRC's regulatory requirements affect the acceptability of this TR, Westinghouse will be expected to revise the TR appropriately or justify its continued applicability for subsequent referencing. Licensees referencing this TR would be expected to justify its continued applicability or evaluate their plant using the revised TR.

Sincerely,

/RA/

Kevin Hsueh, Chief
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 700

Enclosures:
1. Final SE (Non-proprietary version)
2. Final SE (Proprietary version)

Our acceptance applies only to material provided in the subject TRs. In accordance with the guidance provided on the NRC website, we request that Westinghouse publish accepted proprietary and non-proprietary versions of these TRs within three months of receipt of this letter. The accepted versions shall incorporate this letter and the enclosed final SE after the title page. Also, they must contain historical review information, including NRC requests for additional information (RAIs) and your responses. The accepted versions shall include an "-A" (designating accepted) following the TRs identification symbol.

As an alternative to including the RAIs and RAI responses behind the title page, if changes to the TRs were provided to the NRC staff to support the resolution of RAI responses, and the NRC staff reviewed and approved those changes as described in the RAI responses, there are two ways that the accepted version can capture the RAIs:

1. The RAIs and RAI responses can be included as an Appendix to the accepted version.
2. The RAIs and RAI responses can be captured in the form of a table (inserted after the final SE) which summarizes the changes as shown in the approved version of the TRs. The table should reference the specific RAIs and RAI responses which resulted in any changes, as shown in the accepted version of the TRs.

If future changes to the NRC's regulatory requirements affect the acceptability of this TR, Westinghouse will be expected to revise the TR appropriately or justify its continued applicability for subsequent referencing. Licensees referencing this TR would be expected to justify its continued applicability or evaluate their plant using the revised TR.

Sincerely,

/RA/
Kevin Hsueh, Chief
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 700

Enclosures:
1. Final SE (Non-proprietary version)
2. Final SE (Proprietary version)

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OFFICE	NRR/DPR/PLPB	NRR/DPR/PLPB*	NRR/DE/EICB	NRR/DPR/PLPB
NAME	ELenning	DHarrison	MWaters	KHsueh
DATE	9/14/16	9/14/16	/ /16	10/14/16

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U.S. NUCLEAR REGULATORY COMMISSION

FINAL SAFETY EVAULATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR WESTINGHOUSE ELECTRIC COMPANY

TOPICAL REPORTS WCAP-17503-P/WCAP-17503-NP, REVISION 1,

"WESTINGHOUSE GENERIC SETPOINT CONTROL PROGRAM RECOMMENDATIONS,"

AND WCAP-17504-P/WCAP-17504-NP, REVISION 1,

"WESTINGHOUSE GENERIC SETPOINT METHODOLOGY"

PROJECT NO. 700

1.0 INTRODUCTION

By letter dated February 20, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML120580701), Westinghouse Electric Company (Westinghouse) submitted WCAP-17503-P/WCAP-17503-NP, Revision 0, "Westinghouse Generic Setpoint Control Program Recommendations," and WCAP-17504-P/WCAP-17504-NP, Revision 0, "Westinghouse Generic Setpoint Methodology," Topical Reports (TRs) for the U.S. Nuclear Regulatory Commission (NRC) review and approval. The NRC staff performed the acceptance review (ADAMS Accession No. ML121210716) of these documents, and began its detailed evaluation. The NRC staff and Westinghouse representatives met in November 2012 to discuss the level of detail the staff needed to make its "reasonable assurance" determination, and possible ways the NRC staff could receive access to summaries of Westinghouse and licensee evaluations of the raw data used for determining and combining instrument performance uncertainties (ADAMS Accession No. ML12346A132). As a follow-up to this meeting, the NRC staff provided comments to Westinghouse regarding the example Westinghouse calculation summary and the adequacy of detail the NRC staff would need to complete its review of the submitted calculation summaries. During this time, the NRC staff also developed a draft revision (DG-1141, ADAMS Accession No. ML081630179) to Regulatory Guide (RG) 1.105, "Setpoints for Safety-Related Instrumentation," which is one of the key regulatory guidance documents used for evaluating WCAP-17503-P/WCAP-17503-NP and WCAP-17504-P/WCAP-17504-NP.

The NRC staff prepared a set of requests for additional information (RAIs) pertaining to each TR (ADAMS Accession No. ML15033A187). Westinghouse provided RAI responses in LTR-NRC-5-37 dated June 25, 2015 (ADAMS Accession ML15183A246). Further, the NRC staff met with representatives of Westinghouse at the NRC Headquarters on September 16, 2015, to discuss the responses to RAIs. At that time, the NRC staff indicated to the Westinghouse representatives that the responses to the RAIs were adequate to enable completion of staff's evaluation. The NRC staff requested Westinghouse to incorporate clarifications resulting from these RAI responses into the TRs WCAP-17503-P/WCAP-17503-NP and WCAP-17504-P/WCAP-17504-NP as formal revisions to these TRs.

In response to this request, Westinghouse prepared formal revisions to both TRs, and submitted Revision 1 to WCAP-17503-P/WCAP-17503-NP and WCAP-17504-P/WCAP-17504-NP via letter to the NRC dated March 23, 2016 (ADAMS Accession No. ML16085A152), incorporating the resolutions to the NRC staff's RAIs into the text of each TR. This safety evaluation (SE) was prepared as an evaluation of Revision 1 to each of these TRs.

Westinghouse states the WCAP-17504-P/WCAP-17504-NP TR describes the Westinghouse Setpoint Methodology (WSM) and provides the basic uncertainty algorithms for the reactor trip system (RTS) trip functions, engineered safety features actuation system (ESFAS) protection functions, emergency operating procedure (EOP) operator action points, control system functions assumed as initial condition assumptions in the safety analyses, and control board and computer indication of plant parameters utilized by the plant operators to confirm proper operation of the control and protection instrumentation for a Westinghouse Nuclear Steam Supply System (NSSS). Westinghouse states that these algorithms, when supported by appropriate plant procedures and equipment qualification, provide total instrument loop uncertainties, termed Channel Statistical Allowance (CSA), at a 95 percent probability and 95 percent confidence level; in accordance with the guidance provided in NRC RG 1.105, Revision 3.

Westinghouse states the WCAP-17503-P/WCAP-17503-NP TR provides the Setpoint Control Program (SCP) characteristics that are necessary to control setpoint design input and methodology assumptions inherent in the WSM.

2.0 REGULATORY EVALUATION

The NRC staff evaluated the Westinghouse Generic Setpoint Methodology contained in WCAP-17504-P/WCAP-17504-NP TR submittal against the regulatory requirements and guidance listed below to ascertain whether there is reasonable assurance that the systems and components affected by setpoints calculated in conformance with the Westinghouse submittals listed in Section 1.0 will perform their required safety functions when called upon to do so. In addition, the submittals were reviewed to ensure that adequate design and document control measures, taken by licensees and applicants when implementing TR WCAP-17503-P/WCAP-17503-NP, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations," will be in place to assure that appropriate data sources are identified, controlled, and maintained, and that instrument channel performance data will be controlled and evaluated in a manner that setpoints implemented in safety related functions will continue to be correctly selected and maintained.

2.1 Regulatory Requirements

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," establishes the fundamental regulatory requirements. Specifically, Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 provides, in part, that an application for a design certification, combined license, design approval, or manufacturing license, respectively, must include the principal design criteria for a proposed facility. The principal design criteria establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety; that is, structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.

In 10 CFR 50.36, "Technical Specifications," the Commission established its regulatory requirements related to the contents of the technical specifications (TSs). Specifically, 10 CFR 50.36 states that "each applicant for a license authorizing operation of a production or utilization facility shall include in his application proposed technical specifications in accordance with the requirements of this section." Specifically, 10 CFR 50.36(c)(1)(ii)(a) states, "Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. If, during operation, it is determined that the automatic safety system does not function as required, the licensee shall take appropriate action, which may include shutting down the reactor." Additionally, 10 CFR 50.36(c)(3) states, "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions of operation will be met."

The regulation at 10 CFR 50.55a (h) Protection and Safety Systems, incorporates by reference the Institute of Electrical and Electronics Engineers (IEEE) Standard IEEE 279, "Criteria for Protection Systems for Nuclear Power Generating Stations," and the IEEE standard IEEE 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations." Clause 6.8, "Setpoints," of IEEE 603-1991 requires that the allowance for uncertainties between the process analytical limits and the device setpoint be determined using a documented methodology. The IEEE standard makes reference to the Industry Standard Instrument Society of America (ISA) (now referred to as the International Society of Automation--ISA) Standard S67.04-1987.

General Design Criterion (GDC) 13, "Instrumentation and Control," of Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," requires that instrumentation be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, and that controls be provided to maintain these variables and systems within prescribed operating ranges.

GDC 20, "Protection System Functions," of Appendix A to 10 CFR Part 50 requires that the protection system be designed to initiate the operation of appropriate systems to ensure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences.

Appendix B of Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," is applicable, especially the following criteria:

Criterion III, Design Control

> Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in §50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled.

Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components.

Measures shall be established for the identification and control of design interfaces and for coordination among participating design organizations. These measures shall include the establishment of procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces.

The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. The verifying or checking process shall be performed by individuals or groups other than those who performed the original design, but who may be from the same organization.

Where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking processes, it shall include suitable qualifications testing of a prototype unit under the most adverse design conditions. Design control measures shall be applied to items such as the following: reactor physics, stress, thermal, hydraulic, and accident analyses; compatibility of materials; accessibility for in-service inspection, maintenance, and repair; and delineation of acceptance criteria for inspections and tests.

Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design and be approved by the organization that performed the original design unless the applicant designates another responsible organization.

Criterion VI, Document Control

Measures shall be established to control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribe all activities affecting quality. These measures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed. Changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless the applicant designates another responsible organization.

Criterion XI, "Test Control," and Criterion XII, "Control of Measuring and Test Equipment"

Criteria XI and XII provide requirements for tests and test equipment used in maintaining instrument setpoints.

2.2 Regulatory Guides

Regulatory Guide 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3, describes a

method that the NRC staff finds acceptable for use in complying with the NRC's regulations for ensuring that setpoints for safety-related instrumentation are initially within, and will remain within, the TS limits. RG 1.105, Revision 3, endorses Part I of ISA-S67.04-1994, "Setpoints for Nuclear Safety Instrumentation," which is subject to NRC staff clarifications. Regulatory Position 1 of this RG states that Section 4 of ISA-S67.04-1994 specifies the methods, but not the criterion, for combining uncertainties in determining a trip setpoint and its allowable values. The NRC staff position states that the 95/95 tolerance limit is an acceptable criterion for uncertainties. That is, there is a 95 percent probability that the constructed limits contain 95 percent of the population of interest for the surveillance interval selected.

In June 2014, the NRC staff made available for public comment a draft revision to RG 1.105 DG-1141, "Setpoints for Safety-Related Instrumentation," that clarifies the NRC staff positions with regard to the application of the 95/95 criterion. In this draft revision to RG 1.105, in which the current version of the ISA standard ANSI/ISA 67.04.01-2006 is discussed, the NRC staff clarified that instrument performance uncertainty should be estimated using appropriate statistics. The estimate of total loop uncertainty should include all bias terms plus estimates of random uncertainties. The NRC staff position is that the estimate of random uncertainties should be based on population statistics based on the 95/95 criterion. The clarified NRC staff position states that it is generally assumed that random setpoint errors are distributed normally, such that they can be conservatively enveloped by a normal distribution with suitable parameters. When analyzing the expected instrument channel uncertainty performance, to verify the instrument channel will initiate its protective action before the analytical limit is reached, it is important that such distribution be estimated with a sufficiently large tolerance interval to ensure there is at least a 95 percent probability that the distribution of underlying data encompass at least 95 percent of all credible observations. The assumed or enveloping distribution affects the values of the uncertainty parameters and is affected by the amount and quality of the data on which the distribution is based. The draft revision to RG 1.105 also states that the use of statistical estimates or parameters that do not meet the 95/95 criterion should be justified, and the resulting setpoint limits should be shown to be consistent with the staff's intent to achieve assurance that the analytical limit will be protected. Data used in uncertainty analysis should be adjusted as appropriate to adequately represent population statistics. The draft revision to RG 1.105 also states that uncertainty data that cannot be based on a large number of observations should be based on bounding estimate values, accompanied by supporting analyses that demonstrate the bounding estimates to be appropriate. Such analyses should include a description of the reasoning behind the approach taken; a formal mathematical analysis is not required.

The NRC Regulatory Issue Summary (RIS) 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, 'Technical Specifications,' Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels," discusses issues that could occur during testing of limiting safety system setting (LSSS) (ADAMS Accession No. ML051810077). In a letter dated September 7, 2005, from Patrick L. Hiland (NRC) to the Nuclear Energy Institute's (NEI) Setpoint Methods Task Force, "Technical Specification for Addressing Issues Related to Setpoint Allowable Values" (ADAMS Accession No. ML052500004) footnotes are described that should be added to surveillance requirements related to setpoint verification for instrument functions on which a safety limit has been placed. This letter also addresses the information that should be included within TS to ensure operability of the instruments following surveillance tests related to instrument setpoint.

2.3 Supplemental Guidance

The Pressurized Water Reactor (PWR) and Boiling Water Reactor (BWR) Owner's Groups' Technical Specification Task Force (TSTF) TSTF-493, Revision 4, dated January 5, 2010, (ADAMS Accession No. ML100060064) and an errata sheet, "Transmittal of TSTF-493, Revision 4, Errata," dated April 23, 2010 (ADAMS Accession No. ML101160026), clarify the application of setpoint methodology. The NRC approved TSTF-493, Revision 4, on May 11, 2010 (ADAMS Accession No. ML102601920). The TSTF-493 addresses the NRC staff concerns stated in RIS 2006-17. The NRC-approved TSTF was made available in *Federal Register* Notice, "Notice of Availability of the Models for Plant-Specific Adoption of Technical Specifications Task Force Traveler TSTF–493, Revision 4, 'Clarify Application of Setpoint Methodology for LSSS Functions,'" Vol. 75, No. 90/Tuesday, May 11, 2010 (ADAMS Accession No. ML093410581), which documents NRC's position on adoption of TSTF-493, Revision 4. In January of 2013, Office of Nuclear Reactor Regulation staff made available via the *Federal Register*, a Notice of Availability Supplement to NRC-2009-487, "NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program" (ADAMS Accession No. ML12342A157). This Supplemental Guidance for Option B outlined two portions of a license amendment request (LAR) submittal that would be needed by the NRC staff for the evaluation and approval of a proposed SCP. These were 1) a sufficiently detailed Setpoint Calculation Methodology description, and 2) a sufficiently detailed SCP description. The supplemental guidance contained in this document elaborated on the NRC staff's positions as to what constitutes a sufficiently detailed Setpoint Calculation Methodology description and a SCP description.

The NRC Office of New Reactors memorandum dated December 8, 2008 (ADAMS Accession No. ML083380666), contains Final Interim Staff Guidance (ISG), "Notice of Availability of the Final Interim Staff Guidance DC/COL-ISG-08 on Plant Specific Technical Specifications." Current and future COL applicants were directed to resolve all generic TS COL action (or information) items pertaining to 10 CFR 50.36 and 10 CFR 50.36a before COL issuance. This document provided guidance that allows COL applicant to choose how to resolve each such item using one of the proposed three options, listed in the order of preference:

(1) Provide a plant-specific value.
(2) Provide a value that bounds the plant-specific value, but by which the plant may be safely operated (i.e., a useable bounding value), or
(3) Establish a PTS Section 5.5 or 5.6 administrative controls program or report.

Such an administrative controls technical specification as described in option (3) shall require

(a) use of an NRC-reviewed and -approved methodology for determining the plant-specific value,
(b) establishment of an associated document, outside the PTS, in which the relocated plant-specific value shall be recorded and maintained, and
(c) any other information or restrictions the NRC staff deems necessary and appropriate to satisfy 10 CFR 50.36.

2.4 NRC Staff Review Guidance

Chapter 7 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," (SRP) contains a Branch Technical Position (BTP), BTP 7-12, "Guidance on Establishing and Maintaining Instrument Setpoints." This BTP provides guidelines for reviewing the process an applicant/licensee follows to establish and maintain instrument setpoints. These guidelines are based on reviews of applicant/licensee submittals and vendor TR submittals describing setpoint assumptions, terminology, methodology, and on experience gained from NRC inspections of operating plants.

The objectives of the review guidance as stated within BTP 7-12 are as follows:

- To verify that setpoint calculation methods are adequate to assure that protective actions are initiated before the associated plant process parameters exceed their analytical limits.
- To verify that setpoint calculation methods are adequate to assure that control and monitoring setpoints are consistent with their requirements.
- To confirm that the established calibration intervals and methods are consistent with safety analysis assumptions.

The review guidance in BTP 7-12 identifies certain industry standards and NRC generic communications that provide relevant guidance pertaining to setpoint methodology topics. Among these are:

> ISA-S67.04-1994, Part II, "Methodology for the Determination of Setpoints for Nuclear Safety-Related Instrumentation," provides additional guidance, but RG 1.105, Revision 3, does not endorse or address Part II of ISA-S67.04-1994.
>
> IEEE Std. 498-1990, "IEEE Standard Requirements for the Calibration and Control of Measuring and Test Equipment Used in Nuclear Facilities," and American National Standards Institute (ANSI)/National Conference of Standards Laboratories Std. Z540-1-1994, "Calibration Laboratories and Measuring and Test Equipment - General Requirements," provide guidance for the calibration and control of measuring and test equipment used in the maintenance of instrument setpoints.
>
> Generic Letter 91-04, "Guidance on Preparation of a Licensee Amendment Request for Changes in Surveillance Intervals to accommodate a 24-Month Fuel Cycle," provides guidance on issues that should be addressed by the setpoint analysis when calibration intervals are extended from 12 or 18 to 24 months.

The industry standards ISA-S67.04 Part II and IEEE 498-1990 also make reference to applicable portions of the industry standard ANSI/ISA 51.1-1979, "Process Instrumentation Terminology." This standard described the use, performance, operating influences, hardware, and product qualification of the instrumentation and instrument systems used for measurement, control, or both. It provides guidelines for a common vendor and user understanding when referring to terminology describing product specifications, performance, and operating conditions.

3.0 TECHNICAL EVALUATION

3.1 Westinghouse Topical Report WCAP-17504-P/WCAP-17504-NP

The NRC Office of Nuclear Reactor Regulation (NRR) staff performed the evaluation of Westinghouse TR WCAP-17504-P/ WCAP-17504-NP, Revision 1, using the review guidance contained in BTP 7-12, "Guidance on Establishing and Maintaining Instrument Setpoints," of the NRC SRP, NUREG-0800, "Review of Safety Analysis Reports for Nuclear Power Plants." The technical evaluation provided below corresponds to the specific guidance and acceptance criteria contained in BTP 7-12. However, in the sections applicable to the evaluation of Channel Statistical Allowance, supplemental acceptance criteria as described within the NRC staff's proposed Draft RG DG-1141, "Setpoints for Safety-Related Instrumentation," were used by the NRC staff to compare the staff's proposed acceptance criteria against the performance criteria described in the Westinghouse TR. Full compliance with this supplemental guidance is not considered mandatory at this time, since the supplemental criteria described within the Draft RG is considered "Pre-Decisional." The next revision to RG 1.105 is expected to be issued within one year of the date of this SE. For completeness, the NRC staff included an evaluation of the TR against key supplemental criteria contained in this Draft RG, to ensure that the conclusions of this technical evaluation will remain valid in the event that the criteria discussed in the draft guide become part of the next revision to RG 1.105. (Note: Portions of the following technical evaluation are applicable to sections of WCAP-17504-P/WCAP-17504-NP, Revision 1, that have been identified as "Westinghouse Proprietary Class 2" information. These proprietary portions are enclosed in brackets marked as **[ ]**.)

Westinghouse stated that WCAP-17504-P/WCAP-17504-NP, Revision 1, is considered applicable to the following types of plants, when explicitly noted in the plant Updated Final Safety Analysis Report (UFSAR) referencing the equivalent of NUREG-1431, "Standard Technical Specifications Westinghouse Plants," Vol. 2, Rev. 3.0, Sections B 3.3.1, B 3.3.2, B 3.3.3, and B 3.3.5, and References):

- Westinghouse-designed 2, 3, and 4 loop NSSS,
- Westinghouse-designed AP1000® plants,
- Toshiba-designed Advanced Boiling Water Reactors, and
- Combustion Engineering (C-E)-designed NSSS, with the exception of uncertainty calculations identified in the C-E document CEN-356(V)-P-A, "Modified Statistical Combination of Uncertainties," which are associated with the operation of the C-E designed digital monitoring and protection systems, i.e., Core Operating Limit Supervisory System (COLSS) and Core Protection Calculator System (CPCS). (This document was previously reviewed and approved by the staff. (See Letter, dated October 21, 1987, from Mr. E. A. Licitra, USNRC, to Mr. E.E. Van Brunt, Arizona Nuclear Power Project (ADAMS Accession No. 8809090159)).

Westinghouse also stated that it intends for the methodology to be applicable to the following specific types of functions, as follows:

> WCAP-17504-P/WCAP-17504-NP TR provides the basic instrument uncertainty algorithms for the RTS trip functions, ESFAS protection functions, EOP operator action points, control system functions assumed as initial condition assumptions in the safety analyses, and control board and computer indication of plant parameters utilized by the plant operators to confirm proper operation of the control and protection instrumentation. This includes the following:
>
> - RTS functions identified in Table 3.3.1-1 of NUREG-1431 (or equivalent for other NSSS vendor designs),
> - ESFAS functions identified in Table 3.3.2-1 of NUREG-1431 (or equivalent for other NSSS vendor designs),
> - Operator action points associated with instrumentation identified in Table 3.3.3-1 of NUREG-1431 (or equivalent for other NSSS vendor designs),
> - Setpoints associated with LCO 3.3.5," Loss of Power Diesel Generator Start Instrumentation" of NUREG-1431 (or equivalent for other NSSS vendor designs),
> - Instrumentation associated with the-control and indication functions identified in WCAP- 8567-P-A, "Improved Thermal Design Procedure" and
> - Instrumentation associated with the control and indication functions identified in WCAP-11397-P-A, "Revised Thermal Design Procedure."

In this evaluation, the NRR staff evaluates the setpoint analysis methodology and assumptions of WCAP-17504-P/WCAP-17504-NP, Revision 1, for any new safety related setpoints or setpoint changes for the reactor types and functions listed above that will be submitted to NRR as license applications or amendments, to confirm that an acceptable analysis method is being used and that the analysis parameters and assumptions are consistent with the safety analysis, system design basis, TS, plant design, and expected maintenance practices. The following factors were considered in the staff's review:

- Relationships between the safety limit, analytical limit, limiting trip setpoint, the allowable value, the setpoint, the acceptable as-found band, the acceptable as-left band, and the setting tolerance.
- Evaluation as to whether the setpoint TS meet the requirements of 10 CFR 50.36, as enhanced through the criteria within Regulatory Information Summary RIS 2006-17.
- Basis for selection of the trip setpoint.
- Uncertainty terms that are addressed.
- Method used to combine uncertainty terms.
- Justification of statistical combination.
- Relationship between instrument and process measurement units.
- Data used to select the trip setpoint, including the source of the data.
- Assumptions used to select the trip setpoint (e.g., ambient temperature limits for equipment calibration and operation, potential for harsh accident environment).
- Instrument installation details and bias values that could affect the setpoint.

- Correction factors used to determine the setpoint (e.g., pressure compensation to account for elevation difference between the trip measurement point and the sensor physical location).
- Instrument test, calibration or vendor data, as-found and as-left; each instrument should be demonstrated to have random drift by empirical and field data.
- Evaluation results should be reflected appropriately in the uncertainty terms, including the setpoint methodology.

3.1.1 Relationships Among Safety Limit, Analytical Limit, Limiting Trip Setpoint, Allowable Value, Setpoint, Acceptable As-Found Tolerance Band, Acceptable As-Left Tolerance Band, and Setting Tolerance.

In the current version of RG 1.105, Revision 3, issued in December 1999, the NRC staff endorsed the 1994 version of the ISA Standard 67.04, referred to at the time as Part 1 of ISA-S67.04-1994, "Setpoints for Nuclear Safety-Related Instrumentation." This standard defines the requirements for assuring that setpoints for nuclear safety-related instrumentation, are established and maintained within specified limits in nuclear power plants and nuclear reactor facilities. ISA-RP67.04.02-2000 is an industry consensus recommended practice that provides guidance for the implementation of ISA-S67.04.01-2000 (equivalent to Part 1 of ANSI/ISAS67.04, 1994). However, the NRC staff's endorsement of ISA Standard 67.04 in RG 1.105, Revision 3, does not extend to an endorsement of this recommended practice described in ISA RP67.04.02-2000.

The ISA 67.04 Standard contains requirements and the ISA RP67.04.02 Recommended Practice contains guidance for establishing and maintaining nuclear safety-related setpoints in the following areas:

- Methodologies, including sample equations, to calculate total channel uncertainty
- Common assumptions and practices in instrument uncertainty calculations
- Equations for estimating uncertainties for commonly used analog and digital modules
- Methodologies to determine the impact of commonly encountered effects on instrument uncertainty
- Application of instrument channel uncertainty in setpoint determination
- Sources and interpretation of data for uncertainty calculations
- Discussion of the interface between setpoint determination and plant-operating procedures, calibration procedures, and accident analysis, and
- Documentation requirements

The ISA standard provides definitions and describes relationships for the terms referred to in the standard as "Safety Limit," "Analytical Limit," "Trip Setpoint," and "Allowable Value." A figure in the ISA standard depicts the industry consensus relationships among these terms. Allowances for Channel Performance Uncertainty between the Analytical Limit and the Trip Setpoint are described in paragraph 4.3.1 of the ISA Standard. This allowance should account for uncertainties due to instrument calibration activities, normal operating performance, power supply voltage and frequency variations, ambient temperature, humidity, and pressure fluctuations, radiation exposure, analog-to-digital and digital-to-analog conversions, instrument drift under normal operations and normal range of ambient effects, and instrument uncertainties due to design-basis events, such as radiation, seismic, temperature, and pressure effects due to design-basis accident exposure. It should also account for uncertainties due to calculation

(modeling) effects (e.g., determination of primary side power via the use of secondary side power calorimetric), process dynamic effects, and calibration and installation bias effects.

The ISA standard also states that uncertainties to be accounted for between the Trip Setpoint and the "Allowable Value" should account for instrument calibration uncertainties, instrument uncertainties experienced due to normal operational effects, and instrument drift. If the instrument "as-found" condition during surveillance testing is determined to be outside (more non-conservative than) the Allowable Value, the channel is to be evaluated for operability in conformance with the plant TS requirements. The ISA standard identified that uncertainties occurring within the non-conservative direction from the trip setpoint toward the direction of the Analytical Limit are to be calculated and administratively limited. (However, it did not address uncertainties that could occur in the conservative direction. The ramifications of this are described in the next subsection, pertaining to compliance with NRC RIS 2006-17.)

The ISA standard also describes acceptable methods for combining uncertainties. Specifically, the standard states that square-root-sum-of-squares (SRSS) and algebraic methods may be employed. However, alternate methods, including probabilistic or stochastic modeling, or a combination of SRSS and algebraic methods may also be used. In general, random, independent, normally-distributed uncertainty terms are combined using SRSS combination. Dependent terms are generally to be first combined algebraically, and then combined in quadrature (i.e., via SRSS) with other independent terms. Uncertainty terms identified as biases, are generally combined algebraically with other bias terms and then algebraically with the resultant SRSS combination of random uncertainties. The sign (direction) of the bias term may be taken into account such that the resultant of positive and negative biases in the direction of interest may be used. If the sign of the bias term is not known, the absolute value of the bias term must be added to the resultant combination of biases in the direction of interest for which the sign is known.

The NRC staff guidance in RG 1.105 endorses the concepts of the ISA standard described above, but also provides further guidance regarding the acceptance criterion to be used for estimating the individual instrument channel uncertainties and total loop uncertainty when determining setpoints and allowable values. Specifically, the NRC staff position is that when estimating uncertainties, they should be evaluated as "95/95" tolerance intervals. As described in Section 2.2 above, appropriate statistical rigor should be employed such that there is a 95 percent confidence that the constructed limits of the tolerance interval contain 95 percent of the uncertainty population of interest.

Westinghouse WCAP-17504-P/WCAP-17504-NP, Revision 1, describes a generalized algorithm (Eq. 2.1 in the TR) that is used as the basis to determine the overall instrument uncertainty to be applied when determining appropriate setpoints and allowable setpoint margins for a RTS function and for an ESFAS function (i.e., Protection functions.) The WCAP-17504-P/ WCAP-17504-NP, Revision 1, TR also contains detailed descriptions of the uncertainty terms and values for typical RTS/ESFAS, control and indication function uncertainty calculations performed by Westinghouse. Function-specific uncertainty algorithms, noting the appropriate combination of instrument uncertainties to determine the CSA are also described within the TR. The generalized algorithm used for all protection functions includes the terms of the SAL, the Nominal Trip Setpoint (NTS), the Total Allowance (TA) (the difference between the SAL and NTS, in % of span), Margin and Operability criteria, As-Left Tolerance (ALT), and As-Found Tolerance (AFT), for both the sensor/transmitter and process racks. The relationship

of these terms among one another is illustrated in Figure 3-1 of WCAP-17504-P/WCAP-17504-NP, Revision 1, reproduced below.

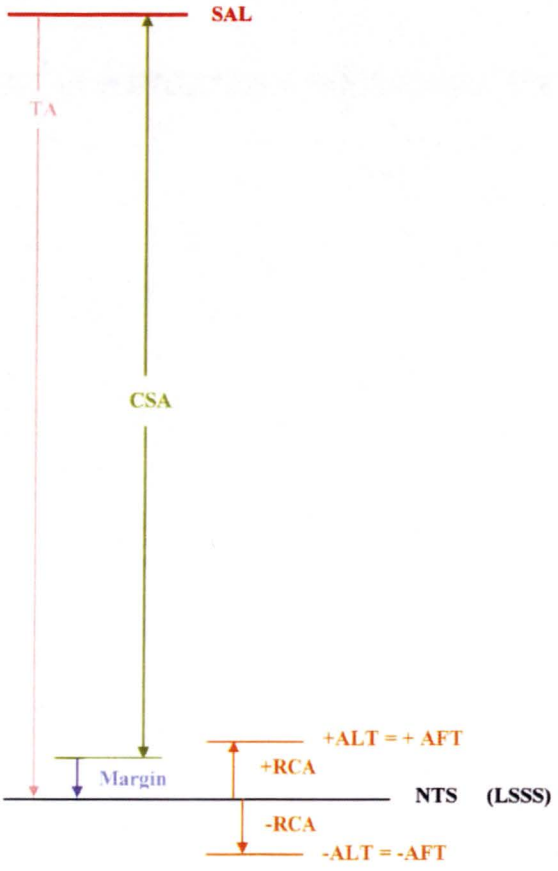

Figure 3-1 Westinghouse Setpoint Parameter Relationship Diagram (Increasing Function)

Note: This figure is intended to provide relative position and not to imply direction.

Nominal Trip Setpoint vs. Limiting Trip Setpoint

The staff notes that Westinghouse does not employ the concept of a "Limiting Trip Setpoint" (LTSP) that is separate and distinct from a "Nominal Trip Setpoint" in its application of the methodology for RTS or ESFAS trip functions, as described in the ISA 67.04 Standard, and as is frequently employed in other licensee or vendor setpoint methodology programs approved by the NRC. Instead, the WSM ensures that the TA between the SAL and the NTS is inclusive of all CSA errors with a non-negative margin, i.e., ≥0% span. The staff agrees that estimating

individual uncertainty terms on a 95/95 basis or as bounding allowances provides sufficient assurance for protecting the analytical limit; hence, the safety limit will be protected as well.

Analytical Limit

The WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, defines the term SAL to be:

> The parameter value identified in the plant safety analysis or other plant operating limit at which a reactor trip or actuation function is assumed to be initiated. The SAL is typically defined in Chapter 15 of the UFSAR (current operating plants) or Tier 2, Chapter 15, Table 15.0-4a of Reference 14 (AP1000® plant). Actual SAL values are determined, or confirmed, by review of the plant safety analyses. The SAL is the starting point for determination of the acceptability of the CSA, see Figure 3-1.

The NRC staff finds that this definition corresponds to staff's understanding of "Analytical Limit," as defined in the endorsed ISA 67.04 Standard—namely, "the value of a given process variable at which the safety analysis models the initiation of the instrument channel protective action." This is the parameter value considered in modeling and analysis of nuclear plant safety systems for design-basis accidents, transients, and anticipated operational occurrences, such that if the initiation of a protective function occurs at a value more conservative than this limit, the safety analyses conclusions will demonstrate successful prevention or mitigation.

Channel Statistical Allowance

The Channel Statistical Allowance accounts for (includes among all other identified channel performance uncertainties) the uncertainty terms such as bistable calibration accuracy (the WSM refers to this as Rack Calibration Accuracy, RCA), bistable drift (the WSM calls it Rack Drift, RD), and Measurement and Test Equipment Accuracy, RMTE, which are terms that are, in some NRC staff-approved non-Westinghouse setpoint analysis methodologies, applied allowances that are often allocated between the Limiting Trip Setpoint and NTS. The NRC staff finds the Westinghouse-proposed practice to be acceptable, and conservative, in that the equivalent complete set of uncertainty terms are being accounted for between the nominal instrument setting for the channel and the SAL. This allows the WSM term "Nominal Trip Setpoint" to be designated as the "Limiting Trip Setpoint," or "Limiting Safety System Setting" as described in regulations and guidance pertaining to the establishment and maintenance of plant TS. (For more detail on this, see Section 3.1.2 below.)

Setting Tolerance/Calibration Tolerance for Sensors and Rack Equipment

The NRC staff notes that across the civilian nuclear industry there is a range of definitions associated with the use of the term "setting tolerance." In general, the term "setting tolerance" is equivalent to the term "calibration tolerance." This tolerance (sometimes referred to as an "allowance" or "setting allowance") represents the precision to which a module or transmitter is calibrated to (or is allowed to deviate from) values depicted on an ideal instrument channel calibration performance curve/line, and maintained through the application of a formal calibration procedure. This tolerance is applied to instrument channel settings, as in the setting of a bistable trip device, and to the establishment of the expected output signal value for

cardinal points along the span of an analog instrument loop, such as the measured parameter values corresponding to 0 percent, 20 percent, 40 percent, 60 percent, 80 percent, and 100 percent of an instrument channel measurement span.

The WCAP-17504-P/WCAP-17504-NP, Revision 1, describes the term Sensor Calibration Accuracy (SCA) as:

> The two-sided (+/-) calibration tolerance for a sensor or transmitter defined by the ALT in the plant calibration procedures. The SCA is defined at multiple points across the calibration range of the channel, e.g., 0%, 25%, 50%, 75%, and 100% span. [

]

The text and accompanying figures and tables shown on pages 63-64 of ISA Standard 51.1-1979, "Process Instrumentation Terminology," describe the calibration methodology for observing the effects of conformance, hysteresis and linearity of a transmitter while evaluating the conformance of an instrument to an ideal, or desired, calibration curve. The process for determining the applicable tolerance is based on the method for determining hysteresis plus deadband. The standard describes how to utilize a minimum of three passes up, and three passes down to be able to observe the effects of conformance, hysteresis, and linearity. It also describes a method for recording and evaluating the band of data values observed.

Section 4 of the WCAP-17504-P/WCAP-17504-NP, Revision 1, discusses the Westinghouse proprietary methodology for evaluating the data taken during calibration surveillances when using this three pass up and three pass down calibration method. This methodology covers the data analysis techniques required to be applied to arrive at sufficient quality and quantity of data to meet the 95/95 criterion, including the normalization of data, establishment of criteria for meeting the required probability and confidence level, evaluation of the resulting distribution function, evaluation of outliers, identification of the resulting magnitude of drift, and a discussion of the impact of time dependence.

The WCAP-17504-P/WCAP-17504-NP, Revision 1, describes the term RCA as the calibration tolerance reflected in the plant calibration procedures, applied at the NTS for the bistable or trip module, or at multiple points across the calibration range of the channel, (e.g., 0%, 25%, 50%, 75% and 100% span for input modules.) This applied calibration tolerance is not simply the assignment of an assumed tolerance value which follows "rule of thumb" criteria (for example, one that is based on vendor reference accuracy or a fraction/multiple thereof), but rather it is an engineered tolerance based on a particular testing and documentation method that is proprietary to the WSM. The individual modules in a loop are to be calibrated to a particular tolerance and the process loop (as a string) is verified to be calibrated to a specific tolerance

(RCA). Specifically, regarding the magnitude of that tolerance, the WCAP-17504-P/WCAP-17504-NP, Revision 1, states:

> RCA is the two-sided (±) calibration tolerance of the process racks as reflected in the plant calibration procedures. RCA is defined at multiple points across the calibration range of the channel, and specifically at the NTS for the bistable or trip module.
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Although the NRC staff notes that this method requires more calibration process effort than is currently considered normal practice for most plants, if performed properly the method is considered conservative, in that it has the benefit of improving safety through better maintenance of safety related instrument channel calibration settings and trip setpoints, and will enable the plant to experience fewer spurious protection system or ESF system actuations. If the three passes up and down method of calibration is employed, the band of data recorded at each calibration ordinal point should be tighter, while sufficiently accounting for the effects of sensor reference accuracy.

As-Found Tolerance and As-Left Tolerance

Branch Technical Position BTP 7-12, Revision 5, provides a description of the NRC staff understanding of the terms Acceptable AFT Band and Acceptable ALT Band. It enhances the definitions described in ISA Standard 67.04 and RG 1.105, Revision 3, as follows:

Acceptable as-found band: It is the band around the NTS or previous as-left setting of the instrument within which the as-found setpoint is expected to fall. The band accounts for the uncertainties associated with factors such as instrument reference accuracy, measurement and test equipment (MT&E), readability, normal environment effect, and drift of the instrument components that are being tested, and it accounts only for the duration between the tests. The width of the band is established by the Deviation Limit (DL), which may be asymmetrical relative to the reference value (NSP) or a previous as-left) and defines the deviation (from the previous as-left value or NSP) that is expected to occur during the test. It should be noted that the DL must not include the setting tolerance (ST).

As-left tolerance band or acceptable as-left band: It is the band around the NTS (LSP) - or around any value which is more conservative than the LSP - within which the as-left setpoint must fall at the conclusion of a channel test. The band accounts for the ALT, which some licensees define as leeway given to instrument technician or calibration tolerance or setting tolerance. Setting tolerance can be based upon particular uncertainties such as reference accuracy, MT&E, and readability, but the total loop uncertainty analysis must explicitly account for each of these uncertainty terms whether or not the ST incorporates these uncertainties. ST may also be a specified value selected on the basis of engineering judgment or other consideration. However, in that situation, the as-found value must be compared with the previous as-left value.

The NRC staff notes that the purpose of these bands is to provide a benchmark for constraining the safety system setting to within an acceptable band upon initial calibration and subsequently during a periodic surveillance, and establishing a reasonable deviation limit to which the channel performance may reach upon testing during the next calibration surveillance, and still be considered functioning as expected or required. Although the definitions provided in the BTP provide the NRC staff's positions with respect to determining the basis for these bands, the NRC staff position does not represent a requirement, and licensees and applicants may propose alternative ways to address the basis for such setting limits and deviation acceptance criteria.

WCAP-17504-P/WCAP-17504-NP, Revision 1, describes a method for identifying an appropriate AFT and defining an ALT. The magnitude of the AFT for the instrument process rack is defined to be the same as that of the ALT. The WSM defines the ALT to be the appropriate calibration accuracy in the uncertainty calculations for the sensor or associated instrument process rack string.

For process racks, the ALT is a two-sided parameter equal to the RCA (described above) about the NTS (see Figure 3-1). It is also reflected in process rack calibration procedures as the "as left limit," which is applied in both directions about the desired calibration points for racks (e.g., 0 %, 25 %, 50 %, 75 % and 100 % span for process measurement input strings). [

]

Evaluation of the Westinghouse methodology for applying the As-left and AFT bands is discussed in a greater detail in Section 3.1.2 below.

Rack Drift and Sensor Drift

In the WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, for Westinghouse process racks, the appropriate value for both ALT and AFT has been analyzed to be equal to the instrument process RCA, such that AFT= ALT= RCA, (see Figure 3-1 above for how it relates to the NTS). For process racks, the AFT is a two-sided parameter (±) about the NTS. It is also defined as encompassing the expected rack drift (RD), and is reflected in process rack surveillance procedures as the "as found limit," which is applied in both directions (±), initially in the field about the desired calibration point (which establishes RD as an absolute limit of drift parameter), and periodically verified thereafter to be accurate [ ] about the calibration As-Left point (which establishes RD as a relative drift parameter).

[
]

Rack Drift is defined in the WSM as the change in input-output relationship (As Found-As Left) over a period of time at reference conditions, e.g., at constant temperature. Westinghouse notes that: [
] In the WSM, it is necessary to record and trend the As-Found and As-Left conditions of the process racks (RD= (As Found-As Left)), to assure conformance with the uncertainty calculation basic assumptions and to address the supplemental guidance described in the DG-1141 Draft RG 1.105 (Revision 4) to achieve the required 95/95 basis. (As Found-As Left) is defined as [
]

WCAP-17504-P/WCAP-17504-NP, Revision 1, also states that the terms AFT and ALT as applied to process racks, these are two-sided (±) parameter equal to the RCA about the calibration points across the instrument span, including about the NTS. For transmitters, the ALT is defined as the two-sided (±) SCA magnitude about the desired calibration points. The AFT for transmitters is a two-sided parameter (±) about the calibration points (absolute drift), or a two-sided parameter (±) about the calibration recorded [ ] (representing relative drift).

The method for defining/establishing AFT and ALT is acceptable to the NRC staff. The staff notes that in RIS 2006-17, it was found acceptable to define AFT as follows:

> Subsequently, the NRC staff investigated the acceptability of basing operability determinations for as-found instrument values on NSP (Nominal Setpoint) values. The NRC staff review concluded that if specific conditions are met, then the NRC staff would find a NSP-based assessment of as-found values acceptable. Those conditions are: (1) the setting tolerance band is less than or equal to the square root of the sum of the squares of reference accuracy, measurement and test equipment, and readability uncertainties; (2) the setting tolerance is included in the total loop uncertainty, and (3) the pre-defined test acceptance criteria band for the as-found value includes either, the setting

tolerance or the uncertainties associated with the setting tolerance band, but not both of these.

In meetings with Westinghouse held during the course of this TR review, the NRC staff learned that the WSM, described in WCAP-17504-P/WCAP-17504-NP, Revision 1, takes advantage of an extensive Westinghouse knowledge base regarding the operational performance history of the Westinghouse/Hagan, Foxboro, 7100, 7300, and Eagle-21 series of analog and digital process protection system equipment. This equipment is relied upon to perform or contribute to the reactor trip and essential safety features actuation functions. Westinghouse has performed analysis over the years and identified that the performance of this equipment is very stable when operating in environmentally-controlled plant areas, such as that found in control rooms and auxiliary electric equipment rooms of nuclear power plants. For the 7300 series equipment and later version board designs, special features have been incorporated into the design to keep the performance of electronic circuit cards stable and electronic drift to a minimum due to the normal variations of ambient temperature. Also, the uncertainty already included in the temperature effect of this normal ambient temperature fluctuation has been conservatively computed at the 120°F level, when the normal environment is expected to be at most 104°F. In particular, the overall drift performance of the equipment mounted on the racks in such control rooms and auxiliary equipment rooms is well-known, and found to be well bounded within the uncertainty allowance for total rack calibration accuracy. Nevertheless, while Rack Drift is expected to be negligible for this equipment, for the WSM uncertainty model to remain accurate, the WSM requires periodic verification of actual drift experienced over the course of time through the trending and analysis of As-found and As-left calibration performance data.

As existing plant equipment ages and is replaced with newer design equipment, Rack Drift and Sensor Drift for the newer equipment are expected to remain very small, in comparison with other terms such as rack calibration accuracy. In response to one of the NRC staff's RAIs regarding how Westinghouse intends to account for drift of rack components that are replaced with components that have not been used before, Westinghouse stated:

[

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Regarding drift for transmitters or process racks, Westinghouse responded that the magnitude of drift:

[

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The NRC staff finds that WCAP-17504-P/WCAP-17504-NP, Revision 1, adequately describes the important relationships among Safety Limit, Analytical Limit, Limiting Trip Setpoint, Allowable Value, Setpoint, Acceptable AFT Band, Acceptable ALT Band, and Setting Tolerance. Based on the discussion of terms and relationships presented in the WCAP-17504-P/WCAP-17504-NP, Revision 1, and the sample calculations, tables, and figures presented in WCAP-17504-P/WCAP-17504-NP, Revision 1, the NRC staff finds that the Westinghouse setpoint methodology demonstrates that the correct relationships between the SL, AL, NTSP, AFT, and ALT will be ensured, that the basis for the NTS is correct, and that the requirements of GDC 13 and 20 are met.

3.1.2 Evaluation of Compliance with Technical Specifications and RIS 2006-17

NRC RIS 2006-17 described a concern with verification of operability using only the TS "Allowable Value" (AV), or a "one-sided approach," during periodic testing (channel operational test, calibration test). The RIS states:

> As one measure of instrument operability, the NRC staff expects licensees to verify during testing or calibration that the change in the measured trip setpoint (TSP) since the last test or calibration is within predefined limits (double-sided acceptance criteria band) and to take appropriate actions if the change is outside these limits. The acceptance criteria band should be derived from the appropriate licensee/vendor setpoint methodology, including use of generic or plant-specific data. If the as-found TSP exceeds the AV in the plant Technical Specifications, the channel is declared INOPERABLE and the associated action requirements are followed. If the change in the measured TSP exceeds the predefined evaluation limits but the measured TSP is conservative with respect to the AV, and the licensee determines during the surveillance that the instrument channel is functioning as expected and can reset the channel to within the setting tolerance (amount by which as-left setting value is permitted to differ from the nominal setpoint), then the licensee may restore the channel to service and the condition is entered into the licensee's corrective action program for further evaluation. However, if during the surveillance the change in the measured TSP exceeds the predefined evaluation limits and the licensee cannot determine that the instrument channel is functioning as required, then the instrument is declared INOPERABLE and the associated TS actions are followed. It is NRC staff's position that verifying that the as-found TSP is within the acceptance band limits during test or calibration is part of the determination that an instrument is functioning as required.

As described within the WSM presented in WCAP-17504-P/WCAP-17504-NP, Revision 1, Westinghouse does not recommend use of the "Allowable Value" term for making operability decisions regarding instrument channels for plants proposing future changes to plant TSs when employing the use of the WSM as described in WCAP-17504-P/WCAP-17504-NP, Revision 1.

Instead, it is intended that licensees use the evaluation tolerance values "± ALT" and "± AFT" as the correct values on which to base decisions regarding channel operability. In a clarification provided in a response to one of the staff's RAIs on this subject, Westinghouse stated:
With respect to a normally operating instrument channel and an instrument technician driving the As Left condition to a near zero % span calibration error, the expected As Found condition would be within the (NTS ± As Left Tolerance), which the Westinghouse evaluation of plant data demonstrates. Thus, for Westinghouse specified process racks, OPERABLE is defined as:

> As Left condition ≤ (NTS ± As left Tolerance), where the ALT = RCA, and
>
> First Pass As Found condition ≤ (NTS ±As Found Tolerance), where the AFT = ALT (as initially evaluated in the field), and
>
> INOPERABLE process rack instrumentation is defined as a condition where the As Left condition or As Found condition is in excess of the above, i.e.,
>
> As Left condition > (NTS ± As Left Tolerance), where the ALT= RCA, and
>
> First Pass As Found condition > (NTS ± As Found Tolerance), where AFT= ALT

Therefore, the WSM described in the WCAP-17504-P/WCAP-17504-NP, Revision 1, uses double-sided evaluation acceptance criteria bands. Figure 3-1 (above) and the relationships described above illustrate how the operability of the instrument loop is evaluated. Exceeding the AFT in either high or low direction may indicate degraded performance and inability of the instrument channel to meet its intended function. Not being able to reset the setpoint to within the ALT at the conclusion of a channel calibration process also may indicate degraded performance and inability of the instrument channel to meet its intended function.

Based on the requirements of 10 CFR 50.36(c)(1)(ii)(A), the WSM defines the NTS as the LSSS for the RTS and ESFAS functions listed in the plant TSs, e.g., Tables 3.3.1-1 and 3.3.2-1 of NUREG-1431, the Westinghouse Owners Group standardized TSs.

Within TSTF-493 traveler (ADAMS Accession No. ML101160026), affected subsections of NUREG-1431, have been marked to show how a user adopting TSTF-493 Option A or Option B would modify their plant technical specifications to apply the provisions of Option A or Option B as agreed upon with the NRC staff. These markings identify the scope of limiting safety system functions covered by TSTF-493, and the application of the setpoint maintenance and control provisions that would apply. For those Westinghouse NSSS plants whose plant-specific TSs contain both Allowable Value and NTS columns, the NTS identified in the TSs is expected to represent the NTSP for the channel. TSs for plants adopting TSTF-493 Option A would have footnotes added to identify the applicability and use of the As-Found and As-Left values. TSs for plants adopting TSTF-493 Option B would have the Allowable Value and NTS columns removed, and a pointer or note would be placed within the Technical Specifications Administrative Programs section as to where the Licensee SCP information may be found.

The traveler for the NRC-approved TSTF-493 program states:

> In NUREG-1431, the option is given to list only the Allowable Value or to list the Allowable Value and the [Nominal Trip Setpoint (NTSP)]. This second option is referred to as the "multiple columns" format; in this presentation, the [NTSP] is

the LSSS. Those plants that utilize the "multiple column" format are not required to incorporate the NTSP value in the last sentence in Note 2 because any change to the value requires prior NRC review and the values cannot be changed by the licensee under 10 CFR 50.59. For plants that specify the [NTSP] or [LTSP] instead of the Allowable Value, the same restrictions apply and the identification of the [LTSP] or [NTSP] in the last sentence in Note 2 is not required.

The surveillance notes applicable to NUREG-1431 will state:

INSERT 1 (NUREG-1431)

If the as-found channel setpoint is outside its predefined AFT, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

INSERT 2 (NUREG-1431)

The instrument channel setpoint shall be reset to a value that is within the ALT around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and ALTs apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The Nominal Trip Setpoint and the methodologies used to determine the as-found and the ALTs are specified in [insert the facility FSAR reference or the name of any document incorporated into the facility FSAR by reference].

The methodology described in WCAP-17504-P/WCAP-17504-NP, Revision 1, for applying the AFT and ALT terms serves to constrain the adjusted setpoint to within a small deviation from the ideal analyzed setting, and provides an adequate basis for monitoring any deviation of this setpoint from its As-left condition, thus providing a means by which excessive deviation may be identified for corrective action. The NRC staff finds that the methodology and use of the terms for AFT and ALT as described within the WCAP-17504-P/WCAP-17504-NP, Revision 1, addresses the concerns noted in RIS 2006-17, is compatible with the guidance provided in TSTF-493 for Westinghouse plants, and is consistent with the requirements of 10 CFR 50.36.

For licensees electing to implement TSTF-493 Options A or B, Westinghouse states:

Those plants that opt for Option A of TSTF-493 Revision 4 will have one of several parameters listed in the Technical Specifications for RTS/ESFAS functions. These options and the Westinghouse recommendations that address them are noted below.

1. Allowable Value only,
2. Nominal Trip Setpoint only and
3. Nominal Trip Setpoint and Allowable Value.

Westinghouse recommends the Technical Specifications include the NTS only (Item 2--the Nominal Trip Setpoint only) as that places control on the parameter of primary interest, the NTS. As the WSM does not support the Allowable Value concept, for (1) and (3); Westinghouse will provide only the ±ALT and ±AFT values for the calibration points across the instrument span, including the NTS.

Those plants that opt for Option B of TSTF-493 Revision 4 (Reference 18) will relocate the RTS/ESFAS trip setpoints values from the Technical Specifications and utilize a Setpoint Control Program (SCP). The Westinghouse recommendations for an SCP based on the WSM are identified in WCAP-17503-P, Revision 1 (Reference 19). In this instance, the process rack ±ALT and ±AFT values for the calibration points across the instrument span, including the NTS, for each protection function are defined in an administratively controlled document. If the protection function uncertainty calculations are performed by Westinghouse, this document would be a plant-specific WCAP providing a summary of the uncertainty calculations with tables identifying the process rack ±ALT and ±AFT values for the calibration points across the instrument span, including the NTS.

It's the NRC staff understanding of the Westinghouse TSTF-493 Option B statement above that for future applications and license amendments where the applicant or licensee adopts the Westinghouse Setpoint Methodology or both the Westinghouse Setpoint Methodology and the Westinghouse SCP Recommendations for TSTF-493 Option B submittals, licensees may propose to revise their plant-specific TSs to remove references to use of the "Allowable Value" term for the specific functions covered by this methodology and consistent with the scope of LSSS identified in the TSTF-493 Traveler package described above. If it is found that an instrument channel has exceeded the AFT value, the channel is considered inoperable. In addition, those plants adopting TSTF-493 Option B will remove the setpoints from the TSs altogether, and place them into a licensee-controlled document consistent with the TSTF-493 Option B provisions.

The NRC staff understanding is that in the event when during a periodic TS surveillance test channel performance is found to be outside the designated AFT, the following actions are to be taken: 1) declare the channel inoperable due to the surveillance test failure, 2) bring the channel back to within the designated ALT, thereby restoring operability, and 3) perform an engineering evaluation of the channel based on its performance during previous surveillance intervals. If a channel is determined to be inoperable, the licensee will comply with the applicable Actions in the plant TSs, which may require that the channel be placed into Trip or Bypass.

The Westinghouse Setpoint Methodology does not support the concept of "Allowable Value" for TS operability determination. Therefore an "Allowable Value" is not calculated or determined from values used in the Channel Statistical Allowance (CSA) equation. The NRC staff requested Westinghouse to provide clarification regarding how licensees would implement the Westinghouse AFT values if they choose to retain the "Allowable Value" term values currently published in their plant-specific TSs of their current licensing basis. In a closed meeting held on September 16, 2015, at the NRC Headquarters between Westinghouse representatives and NRC staff, the Westinghouse representatives stated that the value corresponding to the AFT term would be used for determining whether the channel was "performing as expected." If the

as-found value for the instrument channel was found during a calibration surveillance to be outside of this AFT, but more conservative than the TS Allowable Value, the surveillance information for that channel would include a notation that the channel was able to be reset to within the ALT, and the channel was to be placed into a corrective action program, for which calibration results would be trended and an evaluation would be made concerning whether instrumentation within the channel should be considered for replacement with new equipment of the same type. If the calibration surveillance information revealed that the Allowable Value was exceeded, the channel would be declared INOPERABLE after evaluation of the data, and corrective action would be taken immediately to restore the channel to Operable status.

3.1.3 Basis for Selection of the Nominal Trip Setpoint

The WSM states that the TA for instrument channel performance uncertainty that must be present between the SAL and the NTS should consist of an evaluation of CSA plus some non-negative Margin. The WSM states that the NTS is the nominal value programmed into digital instrument process racks or the nominal value to which the bistable is set for analog instrument process racks. According to the WCAP-17504-P/WCAP-17504-NP, Revision1, the NTS is based on engineering judgement (to arrive at a Margin ≥0 % span), or at a historical value that has been demonstrated over time to result in adequate operational margin. The methodology described in WCAP-17504-P/WCAP-17504-NP, Revision 1, for estimating the CSA provides significant detail regarding the identification of uncertainties to be estimated, the types of uncertainties (e.g., random, dependent or independent, bias, known sign or unknown sign, etc.), and the method for combining these uncertainties. This methodology is consistent with the philosophy articulated in ISA Standard 67.04, endorsed by the NRC Regulatory Guide 1,105 Revision 3. For any protection function of existing plants, the application of this methodology is to compare the CSA magnitude with the TA to determine the magnitude of the Margin remaining. The WSM results in the total of uncertainties to be included in, and the conservatism of, the CSA algorithm should result in a CSA magnitude that is calculated on a two-sided(±) 95 percent probability with 95 percent confidence level (i.e., 95/95) basis. This guidance is consistent with the guidance contained in the NRC staff's Draft RG D1141.

Use of 95/95 statistical evaluation acceptance criteria is considered by the NRC staff as the generic acceptance criterion for nuclear safety evaluations for determining reasonable assurance. The NRC staff believes that such an acceptance criterion is considered adequate to assure that protective actions are initiated before the associated plant process parameters exceed their analytical limits. Therefore, the NRC staff finds that WCAP-17504-P/WCAP-17504-NP, Revision 1, provides an adequate methodology basis for selecting the NTS that is consistent with the philosophy identified in the NRC guidance and industry standards. This methodology is described in greater detail below in Sections 3.1.4 and 3.1.8.

3.1.4 Uncertainty Terms

WCAP-17504-P/WCAP-17504-NP, Revision 1, provides a specific list of uncertainty terms used in the WSM and provides definitions associated with each of them. These terms have been identified in previous white papers and descriptions of the WSM, or have been identified by licensees employing specific aspects of WSM as described in previously-published Westinghouse white papers, as a portion of their plant-specific setpoint methodologies.

The WSM identifies which terms may be considered to be independent and which terms are considered dependent on one or more of the other terms. The categorization as to whether the term is treated as dependent or independent is based, in part on how the performance of the instrument channel is periodically checked or on how the channel performance is evaluated. For example, WCAP-17504-P/WCAP-17504-NP, Revision 1, states:

> Six parameters are considered to be sensor allowances: Sensor Calibration Accuracy (SCA), Sensor Measurement and Test Equipment Accuracy (SMTE), Sensor Drift (SD), Sensor Temperature Effect (STE), Sensor Pressure Effect (SPE) and Environmental Allowance (EA). Two of these parameters are considered to be independent, two-sided (±), unverified (by plant calibration or drift determination processes), vendor supplied terms (STE and SPE).
>
> STE and SPE are considered to be independent due to the manner in which the instrumentation is checked; i.e., the instrumentation is calibrated and drift is determined under conditions in which pressure and temperature are assumed constant. For example, assume a sensor is placed in some position in the containment during a refueling outage. After placement, an instrument technician calibrates the sensor at ambient pressure and temperature conditions. Sometime later with the plant shutdown, an instrument technician checks for sensor drift using the same technique as was previously used for calibrating the sensor. The conditions under which this drift determination is made are again ambient pressure and temperature. The temperature and pressure should be essentially the same at both measurements. Thus, they should have no significant effect on the drift determination and are, therefore, independent of the drift allowance.

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Several of the uncertainty terms have been defined with specific precautions, limitations, or underlying assumptions associated with the proper estimation of the appropriate value and use of the term within the WSM. For example, the WSM describes specific ways for estimating the magnitude of some of these uncertainty terms. In particular, the WCAP-17504-P/WCAP-17504-NP, Revision 1, states that when identified through a measurement process, the uncertainty term will be quantified with sufficient measurements to enable use of a two-sided, 95/95 statistical approach. When an uncertainty allowance for the term is to be calculated, the methodology for this calculation will incorporate sufficient statistical conservatism for the term to be estimated at 95/95.

Some uncertainty terms can be estimated better than others, because there is an abundance of data demonstrating channel performance, or there is adequate vendor information. For example, in many cases, there is sufficient plant data to enable determination that the term may be treated as a random, independent variable with normal distribution, (or one whose distribution can be proven to be sufficiently normal) and that will support estimates of random uncertainty tolerance intervals, and combined with others using SRSS methods. However, other uncertainty terms cannot be estimated on the basis of adequate data supporting 95/95 tolerance intervals. According to WCAP-17504-P/WCAP-17504-NP, Revision 1, the WSM [

] The NRC staff finds this practice to be acceptable when there is insufficient data to support a rigorous statistical estimate of the uncertainty tolerance interval for such random independent terms at the 95 percent confidence level, and a reasonable engineering justification for the magnitude of the bounding estimate can be made.

Section 7.3 of the 1982 version of ISA Standard 67.04, which was endorsed in a previous version of Regulatory Guide 1.105, stated that:

> A system shall be established to ensure the accuracy and adequacy of the test equipment used to verify setpoints and tolerances of safety-related instrumentation.

In the NRC staff's Information Notice 96-22, "Improper Equipment Settings due to the use of Non-temperature-Compensated Test Equipment," the staff notes that: "measurement and test equipment accuracy directly affects setpoint calculations. Among the factors which affect the accuracy of measuring and test equipment is the temperature at which a calibration is actually performed."

With regard to the terms accounting for Sensor and Rack Measurement and Test Equipment Accuracy (SMTE and RMTE), the NRC staff did not clearly understand from the language in Revision 0 of WCAP-17504-P/WCAP-17504-NP TR whether Westinghouse intended to use the accuracy of the M&TE equipment specifically listed within the licensee calibration procedures combined with the accuracy of the equipment under test (being calibrated), or whether an assumption was being employed that the M&TE uncertainty was considerably smaller than the uncertainty of the equipment being tested, and therefore the contribution of this term was considered to be negligible in comparison to the other terms within the CSA calculation. However, this was clarified by Westinghouse in its responses to the staff's RAIs and in its descriptions of RMTE and SMTE in Revision 1 to the WCAP-17504-P/WCAP-17504-NP TR.

The NRC staff requested Westinghouse to clarify its approach to dealing with M&TE uncertainty for sensors and racks. Specifically, the staff noted that the Westinghouse approach to handling M&TE data in the SCP guidance contained within WCAP 17503-P/ WCAP-17503-NP, Revision 0, submittal seemed at odds with the description of M&TE uncertainty in the WSM TR contained within WCAP 17504-P/WCAP-17504-NP, Revision 0, where it appeared to the NRC staff that the Westinghouse uncertainty expressions assume that the accuracy rating of the reference measuring means for calibrating M&TE is always one-tenth or better than that of the M&TE device being calibrated, and the resulting M&TE uncertainty is always one-tenth or better than that of the sensor or group of rack devices under test. The NRC staff requested

Westinghouse to clarify whether the plant actual or worst-case M&TE uncertainty to be considered in the application of the WSM, or whether the WSM makes an assumption that the M&TE uncertainty is always 1/10 the uncertainty of the equipment being calibrated, and therefore may be ignored because it is much smaller than the device uncertainty. In the responses to NRC RAIs, submitted via letter LTR-NRC-15-37 dated June 25, 2015 (ADAMS Accession No. ML15183A244), Westinghouse stated regarding this request for clarification:

> When uncertainty calculations are performed by Westinghouse, the calibration and surveillance procedure worst case (limiting) M&TE are determined. Thus, the SCA:SMTE and RCA:RMTE limiting ratios are evaluated for each function. If the limiting ratio of SCA:SMTE (or RCA:RMTE) is less than 10:1; Westinghouse includes the magnitude of SMTE (or RMTE) in the uncertainty calculation.

The NRC staff found that this statement provides sufficient clarity for the staff to confirm that it is a requirement of the WSM that actual M&TE uncertainty is to be included in the estimate of RMTE and SMTE unless the ratio of SCA:SMTE or RCS:RMTE is 10-to-one or greater. If there is a 10:1 ratio or greater, the RMTE or SMTE uncertainty may be considered to be negligible when compared to the other uncertainty terms included in the calculation of CSA.

With regard to the question as to whether the WSM ensures that the effects of change in environment from calibration conditions to plant conditions for sensor or rack M&TE equipment, Revision 1 of WCAP-17504-P/WCAP-17504-NP states:

> Westinghouse recommends that RMTE should be as accurate as reasonably achievable. A ratio of RCA:RMTE or RD:RMTE of less than 10:1 must be explicitly included in the uncertainty calculation. Temperature effects on RMTE, as defined by the M&TE vendor, based on the location specific environment should be included when appropriate. This is consistent with NRC Information Notice 96-22 (Reference 31) and is included in the determination of the RCA:RMTE or RD:RMTE ratio. When the magnitude of RMTE meets the requirements of ANSI/ISA-51.1-1979 (R1993) (Reference 12, p.61), i.e., RCA:RMTE or RD:RMTE ≥ 10:1, RMTE may be considered an integral part of RCA or RD. Uncertainties due to M&TE that are 10 times more accurate than the device being calibrated are considered insignificant and need not be included in the uncertainty calculations.

The NRC staff notes that Revision 1 of WCAP 17504-P/WCAP-17504-NP TR contains a similar statement with regard to the determination of Sensor M&TE (SMTE).

3.1.5 Method used for Combining Uncertainty Terms

The WCAP-17504-P/WCAP-17504-NP, Revision 1, TR defines the generalized equation for combining uncertainty terms for protection system functions (i.e., RTS and ESFAS for the determination of CSA. This generalized form (Equation 2.1 in WCAP-17504-P/WCAP-17504-NP, Revision1) takes into account that sensor and rack measurement and test equipment uncertainties (SMTE and RMTE, respectively) are treated as dependent parameters with their respective drift and calibration accuracy allowances. Environmental Allowances are generally treated a biases and algebraically summed along with other bias terms. By way of reasoning for this, Westinghouse states:

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The NRC staff agrees with this approach for algebraically combining the uncertainties with limited supporting data and unknown sign with the resultant of SRSS uncertainties where it is apparent that the performance is random and bi-directional, and where there is an abundance of data such that significant statistical inferences can be made.

The Westinghouse generalized equation for CSA may be applied to a large majority of plant safety functions. There are a few functions, however, that require a more detailed analysis to address function-specific uncertainties, and therefore, the WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, provides for channel statistical uncertainty algorithms that are function-specific.

3.1.6 Justification of Statistical Combination

See above descriptions of "Uncertainty Terms" and "Method used for Combining Uncertainty Terms." As described above, the WCAP-17504-P/WCAP-17504-NP, Revision 1, provides significant discussion as to whether specific uncertainty terms should be considered as independent or dependent terms, and whether they should be treated as random, bi-directional or bias terms with or without known direction. In general, random independent terms are combined using SRSS methods, random dependent terms are first algebraically added and then combined with other random terms using SRSS methods, and bias terms are algebraically added in a manner consistent with their known signs.

3.1.7 Relationship Between Instrument and Process Measurement Units

While the raw data used for identifying the magnitude of uncertainty terms in the WSM are generally documented in instrument units (e.g., voltage (mV), current (mA), inches of water column, etc.) or process units (e.g., psig, gallons per minute, pounds mass per hour, etc.), the results of the channel performance analysis are provided in terms of percent of span (or, %span.) The Westinghouse Setpoint Methodology is dependent on having accurate scaling equations to translate instrument or process units into %span. The scaling process is outside the scope of the WSM, and has not been evaluated by the staff as part of this safety evaluation.

3.1.8 Data Used to Select the Trip Setpoint

WCAP-17504-P/WCAP-17504-NP, Revision 1, provides detailed discussions regarding the quality of the data used to estimate the uncertainty terms, and any limitations for combining such terms based on the quality. Westinghouse has stated that it intends for the WSM to provide uncertainty tolerance intervals meeting the 95/95 statistical criteria advocated in the NRC staff's DG-1141 released for public comment in 2015. As described above, when there is not sufficient data available for estimating uncertainty tolerance intervals at the 95/95 level,

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] The data used in these calculations are intended to be controlled via the Westinghouse SCP described in WCAP-17503-P/WCAP-17503-NP, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations."

For reactor trip and ESFAS initiation functions, the WSM evaluation of drift is based on a two-sided (±) 95 percent probability at a 95 percent confidence level. A significant volume of as-left and as-found data is collected over a minimum of [ ] to verify the magnitude of drift remains bounded along with reference accuracy and calibration accuracy in the allowance for AFT. To verify the randomness and distribution of the data, the WSM described in the WCAP-17504-P/WCAP-17504-NP, Revision 1, requires a demonstration that the sample distribution is normal or near-normal, which simplifies the ability to demonstrate that the 95/95 criterion is being met. Specifically, the WCAP-17504-P/WCAP-17504-NP, Revision 1, TR states:

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The WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, also describes how data outliers are evaluated and dealt with. Specifically, the WCAP-17504-P/WCAP-17504-NP, Revision 1, states:

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Several paragraphs throughout Revision 0 of WCAP-17504-P/WCAP-17504-NP, used the words "believed to be" when discussing the probability and confidence levels associated with estimates of uncertainty at the 95/95 level, when accounting for uncertainties to be bounded by the Channel Statistical Allowance. The NRC staff requested Westinghouse to provide a clarification or elaboration over what is intended by using the words "believed to be."

In the response to the NRC staffs questions regarding this language, Westinghouse explained that plants using Westinghouse-specified equipment for process racks and for transmitters, and the plant calibration procedures are prepared in a manner that verifies the reference accuracy of sensor/transmitters and process rack instrument channels as described in the WSM, as well as performs calibration and drift evaluation by following the process described within the WSM, and includes SMTE and RMTE uncertainties in the CSA calculation, then the CSA equation will meet the two-sided 95/95 tolerance interval estimate prescribed by RG 1.105.

The term "believed to be," as used in the Revision 0 to WCAP-17504-P/WCAP-17504-NP was used specifically to address equipment not specified by Westinghouse when Revision 0 of the TR was submitted. However, in its response to the NRC staff's RAIs, Westinghouse notes the following:

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If a vendor states that the instrument uncertainties provided in the vendor documentation are two-sided 95/95 values, then Westinghouse does not see the need to perform any additional verification. That responsibility lies with the licensee. Westinghouse believes the trend program evaluating the As-Left and As Found data will confirm any claims with regards to the reference accuracy and drift characteristics. If those two parameters are satisfied, Westinghouse would expect the other parameters to also be acceptable.

The NRC staff notes that if the WSM is to be used in conjunction with any license amendment requests to implement WCAP-17504-P/WCAP-17504-NP, Revision 1, on plants with non-Westinghouse NSSS vendor specified equipment, the NRC staff should verify through an audit of the licensee's data analysis that the licensee has confirmed with the individual equipment vendors that the reference accuracy, drift, and other instrument channel component performance uncertainties have been estimated at the 95/95 two-sided statistical level. If the licensee has not been successful in confirming the vendor data was presented as 95/95 data, then the NRC staff should ensure through a review of evaluations conducted by the licensee (or Westinghouse, on behalf of the licensee) that the available vendor data has been appropriately adjusted so that it is representative of high confidence (i.e., 95/95) information.

3.1.9 Assumptions Used to Select the Trip Setpoint

The WCAP-17504-P/WCAP-17504-NP, Revision 1, TR describes the basis for evaluating the Channel Statistical Allowance used for selecting the NSP in significant detail. This description elaborates on several areas where certain assumptions are made concerning the initial conditions of the plant at the onset of anticipated operational conditions or upset conditions during which the safety function performed by the instrument channel may be needed, and the conditions of the plant environment in the vicinity of the safety related instrument channel equipment when it is needed versus when it is being calibrated. Further, there are several assumptions regarding the appropriate application of several of the uncertainty terms used in the determination of the CSA. In addition, WCAP-17504-P/WCAP-17504-NP, Revision 1, describes programmatic steps to take to continually verify that assumptions made regarding uncertainty characteristics are verified to assure that the methodology is still applicable. Such verification requires data trending and analysis of channel calibration performance data to ensure that data distribution functions assumed by the methodology are still consistent with the methodology. For example, the WCAP-17504-P/WCAP-17504-NP, Revision 1, states:

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In another example, regarding verifying the assumption that the magnitude of drift is still small, the WCAP-17504-P/WCAP-17504-NP, Revision 1, states:

> Recording and trending of the As Found condition of the process racks (RD = (As Found – As Left)) consistent with the process described in Section 4 is necessary to assure conformance with the uncertainty calculation basic assumptions and the DG-1141 Draft Regulatory Guide 1.105 (Revision 4) required 95/95 basis. (As Found – As Left) is defined as [
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The NRC staff finds that use of assumptions within the WSM is reasonable, and that when appropriate, the WSM provides for programmatic verification as to whether the assumptions are still valid.

3.1.10 Instrument Installation Details and Bias Values Affecting Selection of Setpoint

As described above, for the WSM to provide appropriate safety function trip setpoints, it is dependent on having accurate scaling equations and accurate information concerning process and ambient effects on the instrument channel equipment performing the safety functions. Specific details regarding the instrument installation are needed to develop accurate instrument channel scaling equations, and to determine the magnitude of process and ambient effects on channel performance. The scaling process is largely based on plant installation-specific configuration information. Therefore, it is outside the scope of the WSM, and has not been evaluated by the NRC staff as part of this SE. However, for the NRC staff to be able to make its reasonable assurance determination regarding the suitability of a licensee-proposed implementation of new plant TSs based on any new methodology (including the WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1), it is prudent for the NRC staff to perform evaluations of a sample of instrument channel setpoints proposed by licensees and applicants using the new methodology, including an evaluation of the scaling information and equations used for identifying performance effects on the equipment performing the safety functions. For example, scaling equations are needed to translate the range of process variable to be measured from process units into instrument measurement units. Some processes take place at hydraulic pressures and temperatures considerably higher than the ambient temperatures and pressures at which instruments are calibrated. The scaling for an instrument channel may be adjusted to address the predicted effects of operations at elevated static pressure (e.g., instrument span effect and instrument zero offset effect.) Also, the sensing line portion of an instrument channel may be exposed to ambient temperatures that vary significantly from

normal conditions to anticipated operational occurrence conditions. The magnitude of the effects of such ambient temperature changes affecting the density of the sensing fluid, and therefore the uncertainty of the channel performance is dependent on site-specific installation details. The WSM describes how such effects may be accounted for, but the methods for deriving the magnitude of such effects based on plant-specific installation information is considered outside the scope of the WSM.

3.1.11 Correction Factors Applied to Determine Setpoints

The WCAP-17504-P/WCAP-17504-NP, Revision 1, identifies the use of correction factors in the context of scaling equations and when discussing the term Sensor Pressure Effects (SPE). The NRC staff notes that channel performance uncertainty estimates for instrument channels using differential pressure measurement at high (elevated) static head conditions, there is typically a correction needed to account for the change in performance of the differential pressure transmitter from calibration conditions, when it is valved out of service and brought to ambient pressure conditions for calibration, to when it is valve back in service and exposed to the elevated static pressure conditions present in the process being monitored. The WSM accounts for this change in performance through the SPE term. In some setpoint methodologies evaluated by the NRC staff, this term is treated as a bias value, while in others, this term is bounded as a limit of error applied to a random uncertainty with limited data.

The WCAP-17504-P/WCAP-17504-NP, Revision 1, states:

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The NRC staff does not have a stated position as to whether this term should be treated as a bias or as a random uncertainty. However the staff notes that it is not considered to be a term small enough to be ignored, and must be accounted for in determining the total loop uncertainty. The WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, does account for this term.

WCAP-17504-P/WCAP-17504-NP, Revision 1, also describes the use of the WSM for instrument channels where it is beneficial to register the calibration of a particular instrument channel output to a process-related benchmark parameter. Westinghouse refers to this process as "normalization." In contrast to the calibration process, which is performed using equipment adjusted for accuracy against calibration standards to independently determined known values, Normalization is used to establish/register a link between a process parameter and an instrument channel performance range. The WCAP-17504-P/WCAP-17504-NP, Revision 1, states:

A normalization process typically involves an indirect measurement, [

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The NRC staff recognizes that such methods for normalizing the calibrated range of an instrument channel device against a range of values determined from accurate calculation/measurements of a process parameter can be used to ensure protective actions can be made at appropriate process parameter values, provided the data used to perform the registration (normalization) of the instrument channel device was taken from source instrument channel equipment that was calibrated against independently-determined known values, such as those based on calibration standards. It should also be recognized that the uncertainty in the performance of such devices encompasses the contributions from the uncertainties in each of the source instruments used in the calculation, and that an evaluation of the total uncertainty contribution needs to be made and found to be acceptable. However, once this uncertainty is found to be acceptable and accounted for in the setpoints of the normalized device instrument channel, this methodology can be used to establish limiting safety settings.

3.1.12 Instrument Test, Calibration or Vendor Data, and Demonstration of Random Drift

The guidance in BTP 7-12 of NUREG-0800, Chapter 7, states that instrument test, calibration, vendor, and as-found and as-left data should be evaluated using field data and empirical data to demonstrate that each instrument should be demonstrated to have random drift. The NRC staff's evaluation as to how WCAP-17504-P/WCAP-17504-NP, Revision 1, addresses the evaluation of the instrument vendor data, instrument calibration process data, the magnitude of uncertainty introduced by measurement and test equipment used during the calibration process, and the identification of the magnitude of drift" is described in the applicable sections above (see Section 3.1.1 subsection on Rack Drift and Sensor Drift). The WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, uses a proprietary methodology to evaluate rack drift and sensor drift, and uses a periodic verification method to ensure that observed magnitudes of drift remain bounded within the uncertainty allowance for total rack calibration accuracy. The WSM uncertainty model requires periodic verification of actual drift experienced over the course of time through the trending and analysis of As-Found and As-Left calibration performance data. Initial estimates of drift for new installations of instrumentation equipment are based on vendor data, but once enough calibration performance data is gathered, the trending and evaluation process is used to confirm that the original values of rack drift and sensor drift remain bounded within the engineered allowances for as-found and ALTs.

3.1.13 Uncertainty Terms and Setpoint Methodology Reflected in Evaluation Results

The guidance in Branch Technical Position BTP 7-12 of NUREG-0800, Chapter 7, also states that results for the evaluation of instrument test, calibration or vendor data, and as-found and

as-left data should be reflected appropriately in the uncertainty terms, including the setpoint methodology. As described above in Sections 3.1.1, 3.1.4, 3.1.9, and 3.1.11, the WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, provides for periodic evaluation of the instrument channel performance data, and evaluation of the as-found minus as-left data to verify that the as-found and as-left data is reflected appropriately in the magnitude of the uncertainty terms, and is consistent with the WSM.

3.1.14 WCAP-17504-P/WCAP-17504-NP, Revision 1, Technical Evaluation Summary

The NRC staff finds that the WSM provides for a minimum set of assumptions made in the definitions and methods for determining individual uncertainty terms (refer to Section 3 of WCAP-17504-P/WCAP-17504-NP, Revision 1), which the NRC staff finds reasonable and acceptable. The methodology provides for these assumptions to be verified as technically appropriate through the required periodic process of formally evaluating calibration (as-found minus as-left data) as described above. The implementation and periodic verification of the appropriateness of these assumptions will yield conservative uncertainties used in the calculations of the Channel Statistical Allowance while still constraining instrument channel performance deviation from desired nominal calibration values to a within a reasonable maximum as-found and ALT band, which the NRC staff finds reasonable and acceptable.

Following the Calibration and Drift Data Evaluation Process Diagram flow depicted in the Proprietary Figure 4-1 in WCAP-17504-P/WCAP-17504-NP, Revision 1, the pertinent information required to be documented and evaluated for the analysis of sensor calibration accuracy, sensor drift, rack calibration accuracy, rack drift, and resultant drift over the analyzed time interval will yield an evaluation methodology that can be consistently applied to verify that the currently implemented as-left and AFT levels are still reasonable or whether changes are needed. The results of these analyses support verification of the data used in the setpoint the calculation, and are documented in accordance with controlled plant procedures and programs (such as the SCP) with adequate detail so that all bases, equations, and conclusions are fully understood and documented.

The Tables in Section 3 WCAP-17504-P/WCAP-17504-NP, Revision 1, depicting the generalized equations for CSA and example protection and control function uncertainties used to compute CSA includes a list of uncertainties that must be considered for inclusion in the computation of CSA. The surveillance and calibration intervals are determined in part by the plant TSs. Determination of surveillance and calibration intervals takes into account the uncertainty due to instrument drift as described in this report such that there is reasonable assurance that the plant protection system instrumentation is functioning as expected between the surveillance intervals. Plant-specific procedures will include required methods to evaluate the historical performance of the drift for each instrument channel and confirm that the surveillance and calibration intervals do not exceed the assumptions in the Westinghouse methodology and in the plant safety analysis.

As described above in Section 3.1.8, for any license amendment requests to implement WCAP-17504-P/WCAP-17504-NP, Revision 1, on plants with non-Westinghouse NSSS vendor specified equipment, the NRC staff should verify through an audit of the licensee's data analysis whether the licensee has successfully confirmed with the individual equipment vendors that the reference accuracy, drift, and other instrument channel component performance uncertainties have been estimated at the 95/95 two-sided statistical level. If the licensee has not been able to confirm whether the data was presented as 95/95 data, then the NRC staff should review the

evaluations conducted by the licensee (or Westinghouse, on behalf of the licensee) for adjusting the available vendor data so that it is representative of high confidence (i.e., 95/95) information.

For these reasons the NRC staff finds that the WSM conforms to ANSI/ISA-67.04.01-2000 and RG 1.105, Revision 3, with respect to assumptions and data used to determine the uncertainties and select the trip setpoint. Further, the methodology conforms to the NRC staff's positions identified in Draft RG DG-1141, published for comment in June 2015, regarding the estimation of uncertainty tolerance intervals using two-sided (±) statistics at 95 percent probability and 95 percent confidence.

The WSM combines the uncertainty of the instrument loop components to determine the CSA for the functions of the reactor protection system and other important instrument setpoints. All appropriate and applicable uncertainties are considered for each reactor protection system and other important instrument setpoint functions.

The responses to the NRC staff's RAIs (ADAMS Accession No. ML15005A227) have been addressed and incorporated into Revision 1 of WCAP-17503-P/WCAP-17503-NP and WCAP-17504-P/WCAP-17504-NP.

Based on the discussion above, the NRC staff finds that WCAP-17504-P/WCAP-17504-NP, Revision 1, follows the guidance of RG 1.105, Revision 3, RIS 2006-17, ANSI/ISA-S67.04 Part 1-1994, and ANSI/ISA-67.04.01-2006 with regard to setpoint methodology and therefore complies with the NRC regulations for ensuring that setpoints for safety-related instruments are initially within and remain within the TS limits.

3.2 Westinghouse Topical Report WCAP-17503-P/WCAP-17503-NP

To the extent practicable, the NRC staff performed evaluation of Westinghouse TR WCAP-17503-P/WCAP-17503-NP, using the review guidance contained in BTP 7-12, "Guidance on Establishing and Maintaining Instrument Setpoints," of the NRC Standard Review Plan, NUREG-0800, "Review of Safety Analysis Reports for Nuclear Power Plants." However, the NRC staff does not currently have formal staff review guidance specifically prepared for the evaluation of licensee-developed SCPs. To supplement the staff's evaluation of WCAP 17503-P/WCAP-17503-NP, Revision1, the staff considered the content of the PWR and BWR Owner's Groups' TSTF-493, Revision 4, dated January 5, 2010 (ADAMS Accession No. ML100060064) and an errata sheet, "Transmittal of TSTF-493, Revision 4, Errata," dated April 23, 2010 (ADAMS Accession No. ML101160026), which clarifies the application of setpoint methodology. The NRC approved TSTF-493, Revision 4, on May 11, 2010 (ADAMS Accession No. ML102601920).

The NRC-approved TSTF was made available in Federal Register Notice, "Notice of Availability of the Models for Plant-Specific Adoption of Technical Specifications Task Force Traveler TSTF–493, Revision 4, 'Clarify Application of Setpoint Methodology for LSSS Functions,'" Vol. 75, No. 90/Tuesday, May 11, 2010 (ADAMS Accession No. ML093410581), which documents NRC's position on adoption of TSTF-493, Revision 4.

TSTF-493 clarifies the NRC staff's positions regarding TSs for safety-related instrumentation, to ensure compliance with 10 CFR 50.36, "Technical Specifications." It was developed to reduce regulatory uncertainty involving license amendment changes to instrumentation performing limiting safety system setting functions. Licensees of nuclear power plant facilities making

changes to Section 3.3 of the TSs after the issuance of the notice of availability for TSTF-493 are expected to implement the TSTF-493 criteria for TSs trip setpoints and allowable values regarding the implementation of testing requirements to applicable instrument functions. Two strategies were outlined for adopting TSTF-493: Under Option A, Surveillance notes are added to required TS instrumentation functions as delineated by 10 CFR 50.36(c)(1)(ii)(A), and license applications may involve changes to single or multiple setpoint values. License applications can apply surveillance notes without making changes to setpoint values. Under Option B, a SCP is added to Administrative Controls TS. The SCP requires an NRC staff approved setpoint methodology. TS trip setpoints and allowable values within the scope of functions agreed-upon among the BWR and PWR Owners groups and the NRC staff are relocated from TS to a licensee controlled document. The SCP contains equivalent requirements to surveillance notes under Option A.

The SCP establishes the TS requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses. The program provides a means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program ensures that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required.

In response to experience gained by the NRC staff in evaluating a LAR submitted for the implementation of Option B of TSTF-493, the NRC staff recognized that additional guidance was needed so that licensees could prepare LARs for Option B of TSTF-493 which include adequate descriptions of the proposed SCP for the staff to identify how critical elements of the program will be implemented at their facility. In January of 2013, the NRC staff made available via the *Federal Register*, a Notice of Availability Supplement to NRC-2009-487, "NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program" (ADAMS Accession No. ML12342A157). This Supplemental Guidance for Option B outlined two portions of a LAR submittal that would be needed by the staff for its evaluation and approval of a proposed SCP. These were: 1) a sufficiently detailed Setpoint Calculation Methodology description, and 2) a sufficiently detailed SCP description.

The NRC staff's expectations regarding the performance objectives of a SCP include:

- Ensuring configuration management of the design basis information depicting the safety analysis basis, instrument channel engineering design, monitored and controlled process design, instrument hardware performance specifications, instrument scaling, instrument calibration and maintenance methods information, and setpoint and AFT and ALT determination algorithm information/data, to result in the current design basis functional control requirements being continually maintained, and

- Ensuring that instrument channel performance information is continually evaluated to identify trends in deviations from expected performance, and to ensure that the assumptions, inputs, and conclusions for establishing the AFT and ALT are still valid. If needed, this performance data should be used to establish changes in the corrective actions being taken, re-computation of the appropriate tolerance, or replacement of the hardware performing the safety function with better performing hardware.

Further, the staff noted that several key elements of Appendix B to 10 CFR Part 50 apply to the control of setpoint-related information.

Specifically, Appendix B, Criterion III, "Design Control" states:

> Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design and be approved by the organization that performed the original design unless the applicant designates another responsible organization.

Also, Criterion VI, "Document Control" of Appendix B states:

> Measures shall be established to control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribe all activities affecting quality. These measures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed. Changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless the applicant designates another responsible organization.

The section of the supplemental guidance pertaining to the description of the SCP stated that the licensee's Administrative Control TS should point to a controlled licensee document (such as the FSAR, or a Technical Requirements Manual (TRM)), where the complete description of the SCP will be maintained. The description in the licensee's TSTF-493 Option B program submittal should clearly describe how the licensee will ensure that various aspects of instrument channel setpoint control will be continually maintained to address changes that can occur in input data, source documentation, hardware changes, and assumptions. The description of the licensee's SCP should include:

- Setpoints (NTSPs and LTSPs, as appropriate) that are based on analytical limits or other limits derived from current versions of plant safety analyses, or that are demonstrated to be conservative with respect to the current versions. There are occasions when such safety analyses are updated to accomplish related plant activities. A licensee's TSTF 493 Option B SCP should clearly describe how the program ensures that official plant records establishing instrument safety settings reflect the appropriate source and revision of updated safety analyses from which analytical limits are derived.

- Instrument channel total loop uncertainty calculations that take into account the differences in channel performance under operating conditions versus those present under plant testing and maintenance conditions, including the loop configuration used during the performance of calibration and functional test procedures. On occasion, changes are made to plant calibration, functional test, or other periodic test procedures. Licensee's SCPs should ensure that official plant records establishing instrument safety settings reflect the appropriate source and revision of current calibration and functional test procedures. They

should also reflect currently approved maintenance practices and the associated measurement and test equipment for performing such procedures.

- Instrument channel total loop uncertainty calculations that are based on appropriate vendor range, accuracy, and performance data pertinent to the currently-installed instruments. On occasion, installed instruments are found to be inoperable or no longer maintainable. Due to obsolescence, the replacement component may be of a different manufacturer or model number. The safety related instrument settings should be based on current information. Licensee's SCPs should ensure that the official plant records establishing instrument safety settings reflect the appropriate source and revision of manufacturer performance data for the currently-installed equipment.

- Instrument setpoints are based on appropriate and correct scaling information pertinent to the current installation. On occasion, plant configurations change due to equipment replacement or other reasons (Example: Steam generators are upgraded with newer models). The information used to scale the instruments performing safety related functions must be kept current.

- Controlled procedures implementing the calculation methodology for safety related settings. Typically, the maintenance of these procedures is covered under a licensee configuration control process. This may be accomplished by making reference to the existing plant configuration control process and governing procedures and programs.

- The corrective action program steps applied to a finding, during the performance of a calibration or functional test procedure, that address and clearly document why an instrument channel may be performing outside its anticipated "normal performance" AFT band. The corrective actions may include re-evaluating the AFT band through formal engineering analyses, implementing the use of more accurate measurement and test equipment, increasing the required surveillance frequency, or replacing the equipment with new or better performing equipment. In addition to a description of how the licensee implements each of these activities, the SCP must describe how the resulting action will include configuration control for all setpoint calculations, plant configuration documentation, calibration and functional test procedure information, and surveillance frequency control program.

The maintenance of the SCP is a continuous configuration management process that must keep up with changes in the plant licensing basis and physical configuration. The licensee's submittal for approval of a TSTF-493 Option B SCP should conform to the guidance contained in the staff's January of 2013 *Federal Register* Notice of Availability Supplement to NRC-2009-487, "NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program" (ADAMS Accession No. ML12342A157).

3.2.1 Purpose and Scope of WCAP-17503-P/WCAP-17503-NP, Revision 1

Westinghouse states in WCAP-17503-P/WCAP-17503-NP, Revision 1, that the TR provides SCP characteristics Westinghouse believes are necessary to control setpoint design input and methodology assumptions inherent in the WSM. The SCP and WSM specifically address the functions identified in plant TSs, such as described within NUREG-1431, Tables 3.3.1-1, 3.3.2-1, and 3.3.3-1.

The document points out that a plant-specific implementation of the WSM contains either: a) a determination of the NTS for a protection function, given a SAL defined in the plant safety analyses, documented in the plant UFSAR or DCD, or b) a demonstration of the adequacy of an existing NTS for a given SAL. This demonstration is accomplished by accounting for all appropriate instrument uncertainties, both sensor and process racks, process effects (PMA terms) and demonstrating margin between the NTS and the SAL. However, in order to make such determinations, there are inherent assumptions built-in to the setpoint methodology that must be periodically validated to ensure the WSM has developed the appropriate setpoint and allowable tolerance values establishing desired instrument channel performance limits. Westinghouse provided a list of documents and design basis inputs, operational performance data, and plant maintenance and operating activities that contribute to the assurance that the methodology consistently results in appropriate instrument channel setpoint performance. Changes in such documents and performance measurement indicators can occur that need to be evaluated for their potential impact on the output of the WSM. Among these are:

[

]

According to Westinghouse, the purpose of the Westinghouse SCP is to assure the control of critical instrumentation design input parameters such that the plant remains within the design constraints and safety analyses assumptions during all modes of plant operation, both normal and expected transient conditions, and to assure compliance with regulatory requirements and staff expectations. Westinghouse states that the SCP provides a means of continuous evaluation of changes to equipment, procedures and processes that provide design input to the WSM.

The NRC staff finds that these objectives are in line with the staff's expectations regarding the performance objectives of a SCP, as described above.

3.2.1 Role of the Setpoint Control Program in the Control of Inputs

The Westinghouse WCAP-17503-P/ WCAP-17503-NP, Revision 1, identifies the need to evaluate and control the inputs pertaining to the design basis for the setpoints and allowable tolerances associated with the WSM. Among the types of design input information that needs to be evaluated and/or controlled are:

- Industry Standards, such as ISA 67.04.01 and its Recommended Practice ISA 67.04.02
- ISA 51.1-1979
- ISA 67.06
- IEEE Standards IEEE-279-1971, IEEE 338-2006, IEEE-498-1990, IEEE 603-2009
- Industry Documents, such as the TSTF-493 Traveler, Revision 4
- PWROG Emergency Response Guidelines
- USNRC Guidance contained in RG 1.105 Rev 3, Draft RG DG-1141, RG 1.97, Branch Technical Position BTP 7-12 of the SRP NUREG-0800, DC/COL-ISG-08, Generic Letter GL 91-04, RIS 2006-17, Supplemental Guidance to TSTF-493 Option B SCP
- Vendor Product Manuals and Performance Specifications associated with safety related instrument channel hardware used in TS functions covered within the scope of the SCP
- Plant-specific Scaling procedures and calculations, Calibration Procedures, Surveillance Procedures, Corrective Action Program, Maintenance Procedures, plant operations information, Change control processes, plant administrative controls
- Plant Safety Analyses Information
- Instrument environmental qualification testing data
- Plant Calibration and Surveillance Testing Data, and
- [ ]

The NRC staff evaluated description of the inputs to the SCP that need to be controlled contained within the WCAP-17503-P/WCAP-17503-NP, Revision 1, TR, and agrees with the Westinghouse determination that the described inputs comprise the set of inputs that play a key role in assuring appropriate safety related setpoints and allowable performance tolerances are established (calculated), and need to be considered in the process for continual evaluation of the appropriateness of the setpoints. Documents and data under the control of the licensee, particularly the plant-specific calculations, procedures, programs, and operating data need to be considered in any configuration management process to ensure that the latest (current version) information is being incorporated into the development of the safety related setpoints. Plant calibration and surveillance test data needs to be continually evaluated, through a controlled trending and analysis process, and engineering decisions regarding the setpoint, as-found, and ALTs should factor in results of this analysis.

Figures within the WCAP-17503-P/WCAP-17503-NP, Revision 1, TR help to illustrate the relationships of these data sources and the hierarchy of documents that apply to the determination of appropriate setpoints and tolerances.

3.2.2 Role of the Setpoint Control Program in the Evaluation of Test Information

The WCAP-17503-P/WCAP-17503-NP, Revision 1, describes the need to factor into the control of information used for determining instrument channel safety function setpoints and allowable tolerances the use of key test data pertaining to instrumentation performance under anticipated extreme conditions, such as those that would be present under anticipated transients and

design basis accidents. Specifically, WCAP-17503-P/WCAP-17503-NP, Revision 1, identifies the need to control documents containing evidence of device behavior under off-normal ambient environmental conditions, such as ambient temperature, humidity, radiation, aging drift, and seismic performance data gathered from instrument qualification tests. Additionally, Westinghouse identified the need to evaluate and/or confirm instrument performance data gathered during [ ]

The NRC staff agrees with this need for a SCP to ensure control of information providing input to setpoint uncertainty terms used to estimate channel performance under abnormal and design-basis accident conditions.

3.2.3 Role of the Setpoint Control Program in the Evaluation of Performance Data

Westinghouse states in WCAP-17503-P/WCAP-17503-NP, Revision 1, that the assessment of the Calibration Accuracy term is an important input to determining/confirming the ALT value, and that the assessment of Drift is an important input for determining/confirming the correct AFT value. Both of these terms are determined, in part, through proper procedures, data taking, trending, and assessment of periodic channel calibration and surveillance data. Correct analysis of these values serves to confirm the WSM assumptions remain valid. In particular, both of these assessments are needed to help plant operators to establish the operability condition for the instrument channel.

The NRC staff agrees with this need for a SCP to ensure that instrument channel performance data is continually evaluated and the results of this evaluation are needed to ensure appropriate assumptions made within the setpoint methodology remain valid.

The Westinghouse SCP also describes how instrument performance data is to be used in the determination of Channel Operability. The description is consistent with the guidance for determining As-Found and ALT allowances in the WSM in WCAP-17504-P/WCAP-17504-NP, Revision 1. A specific example is provided below:

> If a device is found outside of the AFT, it is identified (via entry into the plant corrective action program) for further evaluation, as this is an indication of drift greater than that assumed in the WSM uncertainty calculation. It may be concluded that the device is not operating within design and must be investigated for repair or replacement. It may be concluded that the surveillance interval is too long and should be decreased. It may be concluded that the drift magnitude is characteristic of the device, found to be consistent with the design, and that the uncertainty calculation should be revised.

This is consistent with the NRC staff's expectations for appropriate objectives for a SCP.

3.2.4 Role of the Setpoint Control Program regarding Outputs of the Setpoint Methodology

The WCAP-17503-P/WCAP-17503-NP, Revision 1, identifies how the output of calculations resulting from application of the WSM is used to ensure proper scaling information is factored into the establishment of appropriate instrument calibration procedures. It also describes how information resulting from the application of properly developed calibration and surveillance procedures is used to ensure that calibration surveillance intervals and allowable as-found and ALTs confirm that the hardware is performing properly. Similarly, following the installation of

new equipment for which there is no performance history to rely upon for the determination of allowances for drift, for example, and is evaluated to determine the magnitude if drift and establish the initial conditions for the next operating/surveillance interval. As-left and As-found data are evaluated to confirm that the device drift magnitude is within limits and that no calibration biases become evident. The As-Found and As-Left data recorded while administering the surveillance form the basis for future re-evaluation of the drift magnitude used in the uncertainty calculations and NTS determination.

The NRC staff agrees that the calculation outputs from the setpoint methodology (i.e., As-Left and AFT allowances and NTS) and the recording and trending of the as-found and as-left performance data in successive periodic instrument channel surveillances play an important role in verifying assumptions made in applying the WSM.

3.2.5 WCAP-17503-P/WCAP-17503-NP, Revision 1, Technical Evaluation Summary

As described above, SCP establishes the TS requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses. The SCP provides means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program ensures that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required.

The NRC staff finds that the Westinghouse Generic SCP recommendations described in WCAP-17503-P/WCAP-17503-NP, Revision 1, are consistent with its expectations for compliance with TSTF-493 Option B, as outlined in its supplemental guidance, and provide a reasonable analysis of the activities a licensee would need to include within a proposed SCP for establishing and maintaining safety related setpoints using the WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1. The NRC staff also finds that considerations have been made within these recommendations to identify the means by which key assumptions embedded within the WSM are continually validated through an instrument channel performance evaluation process, and that the evaluation process considers the need for engineering analyses supporting a change in the performance acceptance limits, if appropriate. Licensees adopting the Westinghouse recommendations within their plant-specific SCPs will be able to provide assurance that critical instrumentation design input parameters will remain controlled such that the plant remains within the design constraints and safety analyses assumptions during all modes of plant operation. The Westinghouse SCP recommendations ensure continuous evaluation of changes to equipment, procedures, and processes that provide design input to the WSM.

It is the NRC staff's expectation that licensees or applicants, planning to adopt the Westinghouse Generic Setpoint Methodology and Generic SCP recommendations as a way for adopting TSTF-493 Option B, will submit: 1) a Setpoint Calculation Methodology description, and 2) a sufficiently detailed SCP description, as outlined above and in the supplemental guidance for TSTF-493 Option B described in the NRC Notice of Availability Supplement to NRC-2009-487, "NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program," (ADAMS Accession No. ML12342A157). If a licensee maintains an overall corporate, fleet-wide, or plant-specific setpoint methodology, licensees or applicants must describe how the elements of the Westinghouse Generic Setpoint Methodology have been incorporated into their formal setpoint methodology and/or setpoint

calculation procedures, but do not need to repeat in detail the WSM algorithms and terms used, unless there are any differences from those outlined in WCAP-17504-P/WCAP-17504-NP, Revision 1. Licensees and applicants must identify whether the term "Allowable Value" is to be retained as the limiting threshold for determination of OPERABLE versus INOPERABLE instrument channels, or whether such determination will be made using the Westinghouse-specified "As-Found Tolerance" (AFT) value. However, within their submittals for a LAR to implement a SCP under TSTF-493 Option B, licensees or applicants must provide a detailed description regarding how each element of the Westinghouse Generic SCP will be addressed in the licensee's SCP. The licensee or applicant must identify the plant-specific policy, process, and procedure documents that will be used to implement the proposed SCP for their facility, and make these documents available for the NRC staff evaluation and/or audit. The NRC staff will evaluate proposed Option B programs using its SRP, BTPs, regulatory guidance, and other NRC staff review guidance consistent with the licensing basis of the facility, and the WSM and SCP recommendations to make a determination of reasonable assurance that the licensee proposed plant-specific SCP, as documented in the LAR, ensures adequate protection of the health and safety of workers and the public, and adequately protects the environment.

Once a proposed plant-specific SCP is approved for use by the NRC staff, licensees would be permitted to relocate the AVs and NTSPs of instrument channels performing certain LSSS safety functions from the TS Section 3.0 tables to the FSAR or TRM (TRM) via license amendment. Following relocation, subsequent changes to the nominal TS setpoint (NTSP), AFT, ALT and AV (if appropriate) would be controlled in accordance with the requirements of 10 CFR 50.59. Provided that all elements of the NRC staff's positions regarding the establishment and maintenance of safety related instrument channel settings as described in the NRC regulations and guidance, and as identified within the Westinghouse WCAP-17503-P/WCAP-17503-NP, Revision 1, are adequately described in the licensee's 10 CFR 50.90 submittal and supporting documentation describing its proposed SCP, the NRC staff would find such SCPs to be adequate to ensure that proposed changes to safety related instrument channel settings will continue to meet the NRC regulations and NRC staff's guidance, and thus provide reasonable assurance that the licensee's program will continue to protect the health and safety of the public, and the environment.

4.0 CONDITIONS/LIMITATIONS

NRC Staff Evaluation of WCAP-17504-P/WCAP-17504-NP, Revision 1, "Westinghouse Generic Setpoint Methodology"

The NRC staff finds WCAP 17504-P/WCAP-17504-NP, Revision 1, acceptable for referencing by licensees in their descriptions of the setpoint methodology applied for the establishment of Limiting Safety System Settings in accordance with the requirements in 10 CFR 50.36, and the guidance provided in RG1.105 Revision 3 and Draft RG DG-1141, subject to the following condition:

As described above in Section 3.1.8, for any LARs to implement WCAP-17504-P/WCAP-17504-NP, Revision 1, for plants with non-Westinghouse NSSS vendor specified equipment, the licensee should state whether it has confirmed with the individual equipment vendors that the reference accuracy, drift, and other instrument channel component performance uncertainties have been estimated at the 95/95 two-sided statistical level. If the licensee has not been able to confirm whether the data was presented as 95/95 data, then the

staff shall audit the licensee's data analysis to verify the licensee (or Westinghouse, on behalf of the licensee) has appropriately adjusted the available raw vendor data so that it is representative of high confidence (i.e., 95/95) tolerance interval information.

NRC Staff Evaluation of WCAP 17503-P/WCAP-17503-NP, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations"

The NRC staff finds that the recommendations contained within WCAP-17503-P/WCAP-17503-NP, Revision 1, are acceptable for use in referencing within LARs to adopt TSTF-493 Option B, subject to the following conditions and limitations:

Provided that all elements of the NRC staff's positions regarding the establishment and maintenance of safety related instrument channel settings as described in the NRC regulations and guidance, and as identified within the Westinghouse WCAP-17503-P/WCAP-17503-NP, Revision 1, are adequately described in the licensee's 10 CFR 50.90 submittal and supporting documentation describing its proposed SCP, the NRC staff would find such SCPs to be adequate to ensure that proposed changes to safety related instrument channel settings will continue to meet the NRC regulations and NRC staff's guidance and thus provide reasonable assurance that the licensee's program will continue to protect the health and safety of the public and the environment.

However, licensees must provide in their LARs adequate descriptions of their commitments to the approved TSTF-493 Option B traveler, NRC model LAR/model SE, and the NRC supplemental guidance as described in the Notice of Availability Supplement to NRC-2009-487, "NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program" (ADAMS Accession No. ML12342A157). This supplemental guidance for Option B outlined two portions of a LAR submittal that would be needed by the NRC staff for its evaluation and approval of a proposed SCP. These were: 1) a sufficiently detailed Setpoint Calculation Methodology description, and 2) a sufficiently detailed SCP description. The supplemental guidance contained in this document elaborated on the staff's positions as to what constitutes a sufficiently detailed Setpoint Calculation Methodology description and a SCP description.

5.0 CONCLUSIONS

The NRC staff has reviewed Westinghouse TR WCAP 17504-P/WCAP-17504-NP, Revision 1, "Westinghouse Generic Setpoint Methodology," and found that (1) the setpoint calculation methods described therein are adequate to assure that protective actions are initiated before the associated plant process parameters exceed their analytical limits, (2) the setpoint calculation methods are adequate to assure that control and monitoring setpoints are consistent with their requirements, and (3) the established calibration intervals and methods are consistent with safety analysis assumptions.

The NRC staff has also reviewed Westinghouse TR WCAP-17503-P/WCAP-17503-NP, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations," and found that: (1) the TR identifies and recommends the appropriate set of design documents, performance data, specifications, scaling and setpoint calculations, and performance monitoring data analysis needed to ensure configuration control of instrument channel setpoints determined using the WSM described in WCAP-17504-P/WCAP-17504-NP, Revision 1, and (2) instrument channel performance information will be continually evaluated to identify trends in

deviations from expected performance, to ensure that the assumptions, inputs, and conclusions for establishing the As-Found and ALTs are still valid. A licensee developing a SCP using all the recommendations provided within the Westinghouse SCP will evaluate the instrument channel performance data to establish whether changes in surveillance process are needed, appropriate as-found or ALTs need to be re-computed, or surveillance intervals need to be adjusted.

Therefore, the NRC staff concludes, subject to the conditions outlined in Sections 3.1.14 and 3.2.5 above, the following:

a) The proposed Westinghouse Generic Setpoint Methodology described in WCAP-17504-P/WCAP-17504-NP, Revision 1, is an acceptable methodology for satisfying the requirements of 10 CFR Part 50, Appendix A, GDC 13 and 20, of 10 CFR Part 50, 10 CFR 50.36(c)(1)(ii)(A), 10 CFR 50.36 (c)(3), and of 10 CFR 50.55a(h), which requires compliance with IEEE Std. 603-1991.

   The WCAP-17504-P/WCAP-17504-NP, Revision 1, meets the criteria in 10 CFR 50 Appendix A GDC 13, because the methodology enables the safety related instrument channels to perform safety actions while remaining functionally capable of monitoring variables and systems over their anticipated ranges for normal operation, anticipated operational occurrences, and accident conditions since it establishes setpoints that are conservative with respect to the SALs and accounts for the instrument channel performance uncertainties present under such conditions. WCAP-17504-P/ WCAP-17504-NP, Revision 1, also meets the criteria in 10 CFR 50 Appendix A GDC 20: the proposed Westinghouse Generic Setpoint Methodology ensures that setpoints for safety related instrument channels will initiate the operation of appropriate systems at values conservative to SALs that were determined to ensure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences.

   Further, the methodology described in WCAP-17504-P/WCAP-17504-NP, Revision 1, satisfies the requirements within 10 CFR Part 50, 10 CFR 50.36(c)(1)(ii)(A) and 10 CFR 50.36 (c)(3) because for safety related instrument channels whose setpoints are determined using this methodology, the setting derived using this methodology accounts for all anticipated uncertainties such that the protective action will correct the abnormal situation before a safety limit is exceeded. Also, the proposed Westinghouse Generic Setpoint Methodology provides for the establishment of AFT values that are used to identify whether automatic protective instrument channels are functioning as required. During periodic surveillances of the performance of these instrument channels, if it is determined that the protection channel setting deviates outside this AFT, such deviation will be apparent to the licensee such that he can take appropriate corrective or remedial action, which may include shutting down the reactor. Also, the methodology within the WCAP-17504-P/WCAP-17504-NP, Revision 1, allows licensees to meet the requirements of 10 CFR 50.36(c)(3) because such surveillances adopting the AFT values determined by the methodology assure that the necessary quality of the instrument channel is maintained, and that facility operation will remain within safety limits, and that the limiting conditions of operation will be met.

   Finally, the methodology described in WCAP 17504-P/WCAP-17504-NP, Revision 1, enables licensees to satisfy the requirements within 10 CFR Part 50 50.55a (h), "Protection and Safety Systems," because the methodology requires that the allowance for uncertainties

between the process analytical limits and the device setpoint is documented in controlled plant calculations.

b) The proposed WCAP-17503-P/WCAP-17503-NP, Revision 1, is an acceptable set of recommendations for licensees to follow when developing and implementing a SCP to maintain setpoints determined through an approved Westinghouse setpoint methodology. This set of recommendations satisfies the requirements of 10 CFR 50.36(c)(1)(ii)(A) and 10 CFR 50.36(c)(3), as well as Appendix B, Criterion III, Criterion VI, and Criterion XI of 10 CFR Part 50.

10 CFR 50.36

The recommendations described in WCAP 17503-P/WCAP-17503-NP, Revision 1, will assist licensees in satisfying the requirements within 10 CFR Part 50, 10 CFR 50.36(c)(1)(ii)(A) and 10 CFR 50.36 (c)(3) because information used for deriving the settings, and allowable tolerances using Westinghouse Generic Setpoint Methodology in WCAP-17504-P/WCAP-17504-NP, Revision 1, will be controlled to account for any pertinent changes in safety analyses, instrument channel hardware, or performance, in a way that any changes in the anticipated uncertainties will be factored into the controlled setpoint and the protective action will continue to correct the abnormal situation before a safety limit is exceeded. In addition, the methodology described in the WCAP-17503-P/WCAP-17503-NP, Revision 1, allows licensees to meet the requirements of 10 CFR 50.36(c)(3) because the continual analysis of performance data collected during periodic surveillances, while adopting the AFT values as acceptance criteria, will assure that the necessary quality of the instrument channel is maintained, facility operation will remain within safety limits, and limiting conditions of operation will be met.

10 CFR Part 50, Appendix B, Criterion III

The recommendations described in WCAP-17503-P/WCAP-17504-NP, Revision 1, will assist licensees in satisfying the requirements within 10 CFR Part 50, Appendix B, Criterion III, "Design Control." Recommendations are included to ensure that measures are established to assure that applicable regulatory requirements and the design basis, as defined in Section 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. The recommended measures include provisions to assure that appropriate quality standards are specified and included in design documents, while ensuring that the deviations from such standards are controlled.

10 CFR Part 50, Appendix B, Criterion VI

The recommendations described in WCAP-17503-P/WCAP-17503-NP, Revision 1, will assist licensees in satisfying the requirements within 10 CFR Part 50, Appendix B, Criterion VI, "Document Control." The recommendations state that licensees need to control the issuance and changes to documents, procedures, and drawings prescribing activities affecting quality.

10 CFR Part 50, Appendix B, Criterion XI and XII

Finally, the recommendations described in WCAP 17503-P/WCAP-17503-NP, Revision 1, will assist licensees in satisfying the requirements within 10 CFR Part 50, Appendix B, Criterion XI,

"Test Control," and Criterion XII, "Control of Measuring and Test Equipment," since the SCP provides appropriate recommendations requiring the maintenance of quality applicable to tests and test equipment used in maintaining instrument setpoints.

6.0 REFERENCES

1. ANSI/ISA 51.1-1979, (reaffirmed 1993), "Process Instrumentation Terminology."

2. Draft Regulatory Guide DG-1141, "Setpoints For Safety-related Instrumentation," released for public comments (ADAMS Accession No. ML081630179)

3. Federal Register Notice, "Transmittal of Final Interim Staff Guidance - Notice Of Availability of the Final Interim Staff Guidance DC/COL-ISG-08 on the Necessary Content of Plant-Specific Technical Specifications for a Combined License," December 8, 2009 (ADAMS No. ML083380666).

4. Federal Register Notice, "Notice of Availability of the Models for Plant-Specific Adoption of Technical Specifications Task Force Traveler TSTF–493, Revision 4, 'Clarify Application of Setpoint Methodology for LSSS Functions,'" Vol. 75, No. 90 / Tuesday, May 11, 2010 (ADAMS Accession No. ML093410581)

5. Industry Standard ANSI/ISA-S67.04-1994, "Setpoints for Nuclear Safety Related Instrumentation."

6. Industry Recommended Practice, ISA-S67.04-1994, Part II, "Methodology for the Determination of Setpoints for Nuclear Safety Related Instrumentation."

7. Industry Standard IEEE Std 498-1990, "IEEE Standard Requirements for the Calibration and Control of Measuring and Test Equipment Used in Nuclear Facilities."

8. ISA-RP67.04.02-2000 "Methodology for the Determination of Setpoints for Nuclear Safety Related Instrumentation."

9. Letter from J. A. Gresham (W) to U.S. Nuclear Regulatory Commission, "Submittal of WCAP-17503-P, Revision 0 and WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations,' and WCAP-17504-P, Revision 0 and WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology,' (Proprietary/Non-Proprietary)," LTR-NRC-12-14, February 20, 2012 (ADAMS Accession No. ML12058A448)

10. Letter from J. A. Gresham (W) to U.S. Nuclear Regulatory Commission, "Submittal of WCAP-17503-P, Revision 1 and WCAP-17503-NP, Revision 1, 'Westinghouse Generic Setpoint Control Program Recommendations,' and WCAP-17504-P, Revision 1 and WCAP-17504-NP, Revision 1, 'Westinghouse Generic Setpoint Methodology,' (Proprietary/Non-Proprietary)," LTR-NRC-16-9, March 23, 2016 (ADAMS Accession No. ML16085A152)

11. Letter, E. Lenning (NRC) to J. A. Gresham (Westinghouse), "Request For Additional Information Re: Westinghouse Electric Company Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, "Westinghouse Generic Setpoint Control Program Recommendations," and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology,' (TAC NO. ME8115)," April 15, 2015 (ADAMS Accession No. ML15033A187).

12. Letter from J. A. Gresham (W) to U.S. Nuclear Regulatory Commission, "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504 P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115), (Proprietary/Non-Proprietary)," LTR-NRC-15-37, June 25, 2015 (ADAMS Accession No. ML15183A246).

13. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition," U.S. NRC, March 2007 (ADAMS Accession No. ML070660036)

14. NRC Generic Letter 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle," April 2, 1991.

15. NRC Regulatory Guide 1.105, Revision 3, "Instrument Setpoints for Safety Systems," December 1999

16. NRC Regulatory Issue Summary (RIS) 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, 'Technical Specifications,' Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels."

17. "Notice of Availability Supplement to NRC-2009-0487 NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program," Revision 4, Option B, December 14, 2012 (ADAMS Accession No. ML12342A157)

18. TSTF Owners Group Transmittal of TSTF-493 Rev 4 Letter from TSTF to Michael Lesar (NRC), "Technical Specification Task Force (TSTF) Response to November 10, 2009 Federal Register Notice, 'Notice of Opportunity for Public Comment on the Proposed Model Safety

19. Evaluation for Plant-Specific Adoption of Technical Specification Task Force Traveler-493, Revision 4, Clarify Application of Setpoint Methodology for LSSS Functions'," January 5, 2010 (ADAMS Accession No. ML100060064)

20. TSTF Owners Group Transmittal of TSTF-493, Revision 4, "Errata," April 23, 2010 (ADAMS Accession No. ML101160026)

Attachment: Resolution of Comments on Draft Safety Evaluation

Contributors: David Rahn, Subinoy Mazumdar, NRR/DE/EICB
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Date: October 14, 2016

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LTR-NRC-16-9

March 23, 2016

Subject: Submittal of WCAP-17503-P, Revision 1 and WCAP-17503-NP, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations," and WCAP-17504-P, Revision 1 and WCAP-17504-NP, Revision 1, "Westinghouse Generic Setpoint Methodology," (Proprietary/Non-Proprietary)

Enclosed are the proprietary and non-proprietary versions of WCAP-17503-P, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations," dated March 2016, and WCAP-17504-P, Revision 1, "Westinghouse Generic Setpoint Methodology," dated March 2016, submitted for review and approval under the NRC's licensing topical report program for referencing in licensing actions.

Also enclosed are:

1. An Application for Withholding Proprietary Information from Public Disclosure, AW-16-4385 (Non-Proprietary) with Proprietary Information Notice and Copyright Notice
2. An Affidavit (Non-Proprietary).

This submittal contains proprietary information of Westinghouse Electric Company LLC. In conformance with the requirements of 10 CFR Section 2.390, as amended, of the Commission's regulations, we are enclosing with this submittal an Application for Withholding Proprietary Information from Public Disclosure and an Affidavit. The Affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

Correspondence with respect to the proprietary aspects of the Application for Withholding or the Westinghouse Affidavit should reference AW-16-4385 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 3 Suite 310, Cranberry Township, Pennsylvania 16066.

James A. Gresham, Manager
Regulatory Compliance

Enclosures

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AW-16-4385

March 23, 2016

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: WCAP-17503-P, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations," and WCAP-17504-P, Revision 1, "Westinghouse Generic Setpoint Methodology," (Proprietary)

Reference: Letter from James A. Gresham to Document Control Desk, LTR-NRC-16-9, dated March 23, 2016.

The Application for Withholding Proprietary Information from Public Disclosure is submitted by Westinghouse Electric Company LLC (Westinghouse), pursuant to the provisions of paragraph (b)(1) of Section 2.390 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit AW-16-4385 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The Affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the proprietary aspects of this Application for Withholding or the accompanying Affidavit should reference AW-16-4385 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 3 Suite 310, Cranberry Township, Pennsylvania 16066.

James A. Gresham, Manager
Regulatory Compliance

AW-16-4385
March 23, 2016

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

I, James A. Gresham, am authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

James A. Gresham, Manager
Regulatory Compliance

(1) I am Manager, Regulatory Compliance, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitute Westinghouse policy and provide the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(iii) There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iv) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, is to be received in confidence by the Commission.

(v) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(vi) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in WCAP-17503-P, Revision 1, "Westinghouse Generic Setpoint Control Program Recommendations," dated March 2016, and WCAP-17504-P, Revision 1, "Westinghouse Generic Setpoint Methodology," dated March 2016, for submittal to the Commission, being transmitted by Westinghouse Letter, LTR-NRC-16-9, and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with Westinghouse's request for NRC approval of WCAP-17503-P and WCAP-17504-P, and may be used only for that purpose.

(a) This information is part of that which will enable Westinghouse to obtain NRC approval of WCAP-17503, Revision 1, "Westinghouse Generic Setpoint Control

Program Recommendations," and WCAP-17504, Revision 1, "Westinghouse Generic Setpoint Methodology."

Provide a base setpoint control program for customers to reference on an individual plant basis.

Provide a generic setpoint methodology document for customers to reference as part of a plant specific setpoint control program.

(b) Further, this information has substantial commercial value as follows:

(i) Westinghouse plans to sell the use of similar information to its customers for the purpose of providing reference documents for generating plant specific setpoint control program submittals.

(ii) Westinghouse can sell support and defense of the use of the setpoint control program and generic setpoint methodology reference documents.

(iii) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluation justifications and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and non-proprietary versions of a document, furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the Affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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1 INTRODUCTION

Westinghouse Nuclear Steam Supply Systems (NSSS) and Advanced Plants (**AP1000**®[1] plant) utilize a large number of instruments for protection, control, Post-Accident Monitoring System (PAMS), indication (computer and control board), alarm and Balance Of Plant (BOP) functions. NSSS and **AP1000** protection and PAMS functions are typically listed in the plant Technical Specifications e.g., NUREG-1431 Tables 3.3.1-1, 3.3.2-1, and 3.3.3-1 (Reference 23). Chapter 7 of the NSSS Updated Final Safety Analysis Report (UFSAR) and **AP1000** Design Control Document (DCD) define typical channel functional requirements, including the channel instrument uncertainty. The channel instrument uncertainty is based upon a calculation that models defined characteristics for the function (process errors, sensor, process rack, plant computer, indication and alarm), scaling of the channel, calibration, surveillance and maintenance of the instrumentation. Two U. S. Nuclear Regulatory Commission (NRC) documents identify the acceptability of the use of an approved Setpoint Control Program (SCP):

- Final Interim Staff Guidance - 8 (ISG-08) (Reference 1) – Option 3, for Advanced Plants, and
- Technical Specification Task Force (TSTF) Traveler TSTF-493, Revision 4 (TSTF-493) (Reference 2) – Option B, for current NSSS plants.

The information contained on the following pages provides the SCP characteristics Westinghouse believes are necessary to control setpoint design input and methodology assumptions inherent in the Westinghouse Setpoint Methodology (WSM).

The WSM has been defined in the past in a plant specific WCAP for current NSSS plants and WCAP-16361-P (Reference 3) for the **AP1000** plant. WCAP-17504-P Revision 1 (Reference 20) is the generic Westinghouse document that describes the current WSM that addresses DG-1141, Draft Regulatory Guide (RG) 1.105 Revision 4 (Reference 32) requirements and is directly linked to the SCP requirements. Typically, a current plant specific document contains four sections:

1. a description of the basic uncertainty algorithm,
2. uncertainty term definitions,
3. tables providing function specific uncertainty calculations, and
4. a short description of the application of the methodology.

The primary purpose of a typical plant specific WSM (limited to protection functions) is to; 1) determine the Nominal Trip Setpoint (NTS) for a protection function, given a Safety Analysis Limit (SAL) defined in the plant safety analyses, documented in the plant UFSAR or DCD, or 2) demonstrate the adequacy of an existing NTS for a given SAL. This is accomplished by accounting for all appropriate instrument uncertainties, both sensor and process racks, process effects (PMA terms) and demonstrating margin

[1] **AP1000** is a trademark or registered trademark of Westinghouse Electric Company LLC, its affiliates and/or subsidiaries in the United States of America and may be registered in other countries throughout the world. All rights reserved. Unauthorized use is strictly prohibited. Other names may be trademarks of their respective owners.

between the NTS and the SAL in percent instrument span. However, the WSM is only part of the process. Inherent assumptions of the WSM are:

[a,c

]

Proceeding through this process provides assurance, at the appropriate probability and confidence level (95/95 for protection [ ]^{a,c} that a function will perform as designed within the modeling of the safety analyses.

The SCP noted in ISG-08 (Reference 1) is designed to meet the NRC guidance provided by BTP 7-12, Revision 5 (Reference 4), DG-1141, Draft RG 1.105 Revision 4 (Reference 32) and NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program (Reference 30). The means by which the acceptance criteria of BTP 7-12 are satisfied through the Westinghouse SCP recommendations are identified in Appendix A. The means by which the information noted in BTP 7-12 review procedures are satisfied are identified in Appendix B. The means by which the information noted in Reference 30 are satisfied through the Westinghouse SCP recommendations are identified in LTR-NRC-15-37, "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP,

Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115)" (Reference 31), specifically, the Westinghouse response to NRC RAI question 2 on WCAP-17503 Revision 0. The WSM, in plant specific form, has been reviewed by the NRC many times, the latest being a review of WCAP-16361-P (Reference 3). The NRC's safety evaluation of this WCAP is dated August 20, 2007 (Reference 6). The basic methodology utilized in WCAP-16361-P (Reference 3) and WCAP-17504-P Revision 1 (Reference 20) is consistent with that noted in ANSI/ISA-67.04.01-2006 (R2011) (Reference 7). Information contained in the International Society of Automation (ISA) recommended practice, the latest version of the document being ISA-RP67.04.02-2010 (Reference 8), was also considered in the development and evolution of the WSM.

As previously noted, the SCP and WSM specifically address the functions identified in plant Technical Specifications, e.g., NUREG-1431 Tables 3.3.1-1, 3.3.2-1 and 3.3.3-1 (Reference 23). [

]^{a,c} Uncertainty calculations and the subsequent NTS determination for functions of a lesser significance utilize a graded approach of [ ]^{a,c} similar to that described in ISA-TR67.04.01-2005 (Reference 9), i.e., 95/95, [ ]^{a,c} Following the steps outlined in this SCP for the maintenance of setpoint design input control ensures that the plant remains within the design analyses through the life of the plant.

A process flow diagram is provided below for ease in visualization of the SCP.

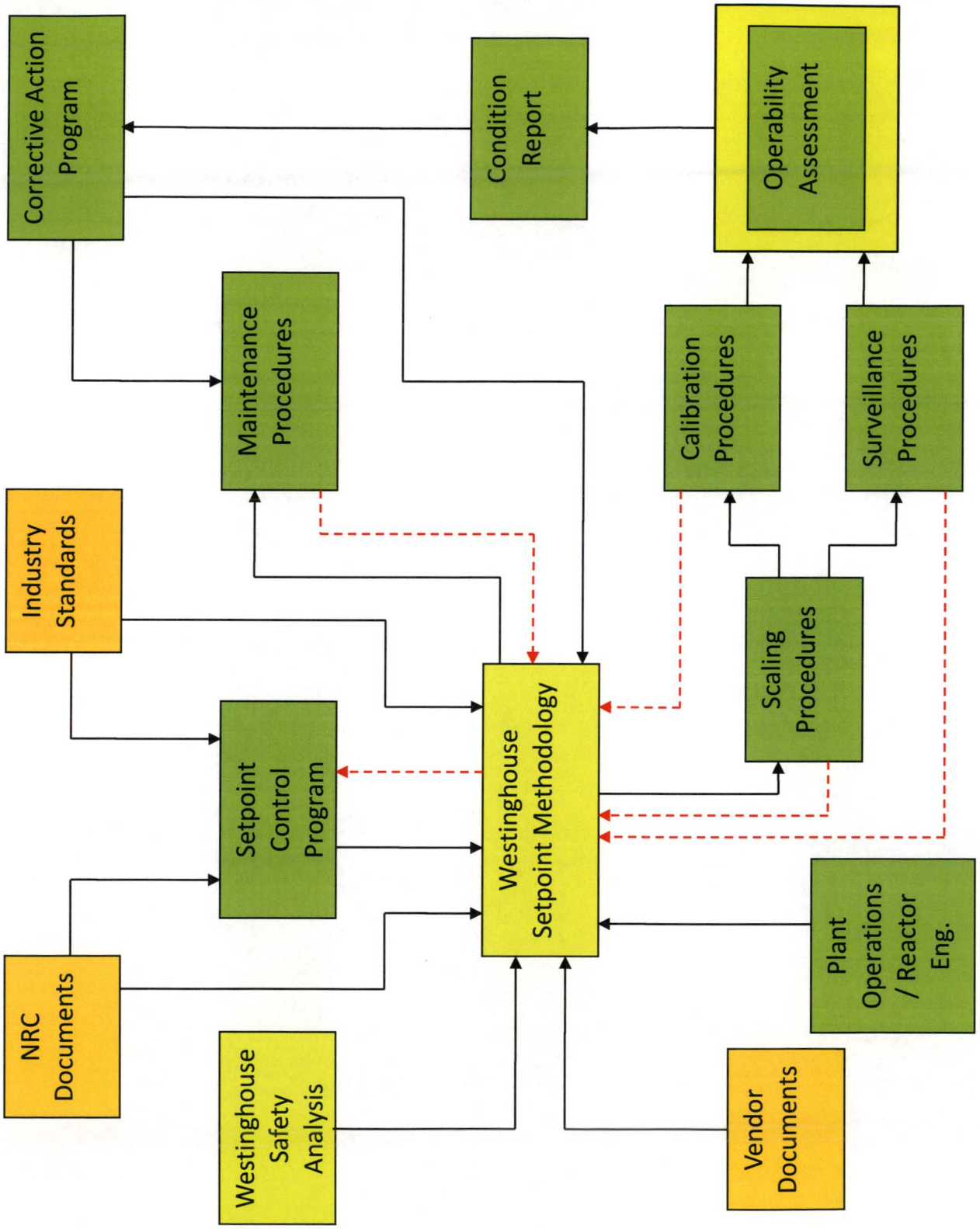


Figure 1-1 Westinghouse Setpoint Control Program Process Flow Diagram

2 PROGRAM GOALS AND OBJECTIVE

The Westinghouse SCP assures the control of critical instrumentation design input parameters, such that the plant remains within the design constraints and safety analyses assumptions during all modes of plant operation, both normal and expected transient conditions, e.g., Steam Generator and Pressurizer Level functions, and within the initial condition assumptions for abnormal events and accident conditions throughout the life of the plant. To achieve these goals, the NTS values are determined, considering process effects and instrument uncertainties, such that relevant safety features can be either automatically initiated or an operator may take appropriate action. This program is also implemented to assure compliance with applicable regulatory requirements and expectations.

To assure appropriate Instrumentation and Control (I&C) equipment operability within the assumptions of the WSM, the SCP will:

[ ] a,c

Thus, the SCP provides a means of continuous evaluation of changes to equipment, procedures and processes that provide design input to the WSM.

This document describes the scope of the SCP and provides insight to the hierarchy of the various components of the SCP.

3 SCOPE

This document defines the SCP components needed and notes the requirements of each major activity. Detailed descriptions of the various plant processes and plant administrative controls are not provided as these will be provided on a plant specific basis. However, key points and functions are identified to provide an understanding of the purpose of each component of the SCP. Further definition of each of the plant processes will be provided via the generation of reports or procedures or implementation plans that are produced on a plant specific basis. The sections that follow note the major SCP elements and subsequent descriptions for the Westinghouse SCP. Where appropriate; calibration, surveillance and operability acceptance criteria are identified.

[ ] a,c

The SCP addresses credible plant operations that are important for the safety of the plant as well as accident conditions required to be considered as a part of the nuclear power plant design. This includes:

[ ] a,c

The SCP covers the utilization of the WSM, the determination of the instrument channel uncertainty, the calculation of the 10 CFR 50.36 Limiting Safety System Setting (LSSS), NTS for the WSM, [

] a,c

The SCP starts with the functional requirements, initially defined by Westinghouse, or required by the NRC or industry, [ ]a,c

[

]^{a,c} It then continues through the utilization of the WSM to determine the NTS and operability criteria for each function. The scaling program is executed to provide the correct calibration and display of a signal on qualified I&C equipment. Finally, it defines the process of maintaining the setpoints by the surveillance and maintenance of setpoints and instrumentation.

Issues that can affect the instrument uncertainty calculation for one or more protection functions or control functions, and thus, should cause uncertainty re-evaluation within the SCP are changes in any of the following:

[

a,c

]

[ ] a,c

Specific details of the SCP, WSM, NTS determination, the scaling program, or the surveillance or maintenance procedures of setpoints and instruments are not provided in this document. These details are described in the appropriate documents, under administrative controls, that result from the SCP, such as the WSM topical report, e.g., Reference 20, instrument uncertainty calculation notes; calibration, surveillance and maintenance procedures, and plant CAP description.

4 WESTINGHOUSE SETPOINT METHODOLOGY DEFINITIONS

The WSM is explained in the generic report, Reference 20, or a plant specific topical report, e.g., Reference 3 for the **AP1000** plant. Inherent in any discussion of an SCP are setpoint methodology terms. To assure a common understanding for this discussion, the necessary terms are defined below in alphabetical order, excerpted from WCAP-17504 Revision 1 (Reference 20).

- **As Found** – The condition in which a transmitter, instrument process rack module, or process instrument loop is found after a period of operation.

- **As Found Tolerance** (AFT) – The As Found limit identified in the plant surveillance procedures. This defines a significant operability criterion for the instrument process rack and the transmitter. It is a sufficient condition to satisfy an operability assessment for an instrument process rack. The AFT for the instrument process rack is the same as (equals) the As Left Tolerance (ALT) or instrument process rack calibration accuracy (RCA) defined in the uncertainty calculations, i.e., AFT = ALT = RCA. For process racks, the AFT is a two-sided parameter (±) about the NTS. It is also defined as RD and is reflected in process rack surveillance procedures as the "as found limit," which is applied in both directions, initially in the field about the desired calibration point (which establishes RD as an absolute drift parameter), and [ ]^{a,c} about the calibration As Left point (which establishes RD as a relative drift parameter).

[ ] a,c

- **As Left** – The condition in which a transmitter, instrument process rack module, or process instrument loop is left after calibration or trip setpoint verification. This condition is typically better than the calibration accuracy for the piece of equipment.

- **As Left Tolerance** (ALT) – The As Left limit identified in the plant calibration procedures. This defines the initial operability criterion for the instrument process rack or the transmitter. It is a necessary condition to satisfy an operability assessment for an instrument process rack or transmitter. The ALT is defined as the appropriate calibration accuracy in the uncertainty calculations for the sensor or associated instrument process rack string and is initially based on the vendor's Reference Accuracy (RA). For process racks, the ALT is a two-sided parameter (±) equal to the RCA about the NTS. It is also reflected in process rack calibration procedures as the "as left limit," which is applied in both directions about the desired calibration points, e.g., 0 %, 25 %, 50 %, 75 % and 100 % span.

[ ] a,c

- **Channel** – The sensing and process equipment, i.e., transmitter to bistable (analog process racks) or transmitter to trip output (digital process racks), for one input to the voting logic of a protection function. Westinghouse designs protection functions with voting logic made up of multiple channels, e.g., 2 out of 4 Steam Generator Level - Low-Low channels for one steam generator must have their bistables in the tripped condition for a Reactor Trip to be initiated. For control functions, a channel is the sensing and process equipment through the controller module. For indication functions, a channel is the sensing and process equipment through the indicator (control board or Plant Process Computer).

- **Channel Statistical Allowance** (CSA) – The combination of the various channel uncertainties via Square-Root-Sum-of-the-Squares (SRSS), statistical, or algebraic techniques. It includes instrument (both sensor and process rack) uncertainties and non-instrument related effects. This parameter is compared with the Total Allowance (TA) for determination of instrument channel margin. For a protection function, the uncertainties included in, and the conservatism of, the CSA algorithm results in a CSA magnitude that is calculated on a two-sided (±) 95 % probability / 95 % confidence level (95/95) basis.

- **Environmental Allowance** (EA) - The change in a process signal (transmitter or process rack output) due to adverse environmental conditions from a limiting design basis accident condition or seismic event. Typically this value is determined from a conservative set of enveloping conditions and may represent the following:

    - Temperature effects on a transmitter
    - Radiation effects on a transmitter
    - Seismic effects on a transmitter
    - Temperature effects on a level transmitter reference leg
    - Temperature effects on signal cable, splice, terminal block or connector insulation
    - Seismic effects on process racks.

a,c

[ ]

- **Margin** – The calculated difference (in % instrument span) between the TA and the CSA.

  Margin = TA – CSA

  Margin is defined to be a non-negative number, i.e., Margin ≥ 0 % span.

- **Nominal Trip Setpoint** (NTS) – The trip setpoint defined in the WSM and reflected in the plant procedures. This value is the nominal value programmed into the digital instrument process racks or the nominal value to which the bistable is set (as accurately as reasonably achievable) for analog instrument process racks. The NTS is based on engineering judgement (to arrive at a Margin ≥ 0 % span), or a historical value, that has been demonstrated over time to result in adequate operational margin. Based on the requirements of 10 CFR 50.36(c)(1)(ii)(A), Westinghouse defines the NTS as the LSSS for the RTS and ESFAS functions listed in the plant Technical Specifications, e.g., Tables 3.3.1-1 and 3.3.2.-1 of, NUREG-1431 (Reference 23) or the **AP1000** plant (Reference 10).

- **Rack Calibration Accuracy** (RCA) – The two-sided (±) calibration tolerance of the process racks as reflected by the ALT in the plant calibration procedures. The RCA is defined at multiple points across the calibration range of the channel, e.g., 0 %, 25 %, 50 %, 75 % and 100 % span for input modules, and specifically at the NTS for the bistable or trip module. [

  ]^{a,c}

  It is assumed that the individual modules in a loop are calibrated to a particular tolerance and that the process loop (as a string) is verified to be calibrated to a specific tolerance (RCA). [

  ]^{a,c}

- **Rack Drift** (RD) – The change in input-output relationship (As Found – As Left) over a period of time at reference conditions, e.g., at constant temperature. [

  ]^{a,c}

  Recording and trending of the As Found condition of the process racks (RD = (As Found - As Left)) consistent with the process described in Section 4 of WCAP-17504 Revision 1 (Reference 20) is necessary to assure conformance with the WSM basic assumptions and the DG-1141 Draft RG 1.105 (Revision 4) required 95/95 basis. (As Found – As Left) is defined as [ ]^{a,c}

- **Reference Accuracy** – "accuracy rating" as defined in ISA-51.1-1979 (R1993) (Reference 11, page 12), specifically as applied to Note 2 and Note 3 for a sensor/transmitter or an instrument process loop string (channel). The magnitude is typically defined in a manufacturer's specification data sheet. Inherent in this definition is the verification of the following under a set of reference conditions; Conformity (Reference 11, page 16), i.e., Linearity (Reference 11, page 39), Hysteresis (Reference 11, page 36) and Repeatability (Reference 11, page 49). The determination of the components of Reference Accuracy require the performance of three passes up and three passes down across the instrument span to gather sufficient data (Reference 11, page 64, Table 3). This parameter is explicitly verified for each sensor/transmitter or channel at least [ ]^{a,c} as part of the TSTF-493 trending program.

- **Safety Analysis Limit** (SAL) – The parameter value identified in the plant safety analyses or other plant operating limit at which a reactor trip or actuation function is assumed to be initiated. The SAL is typically defined in Chapter 15 of the UFSAR (current operating plants) or Tier 2, Chapter 15, Table 15.0-4a of the **AP1000** plant (Reference 10). Actual SAL values are determined, or confirmed, by review of the plant safety analyses.

- **Sensor Calibration Accuracy** (SCA) – The two-sided (±) calibration tolerance for a sensor or transmitter as defined by the ALT in the plant calibration procedures. The SCA is defined at multiple points across the calibration range of the channel, e.g., 0 %, 25 %, 50 %, 75 % and 100 % span. [

]^{a,c}

- **Sensor Drift** (SD) – The change in input-output relationship (As Found – As Left) over a period of time at reference calibration conditions, e.g., at constant temperature. Recording and trending of the As Found condition of the sensor or transmitter (SD = (As Found – As Left)) consistent with the process described in Section 4 of WCAP-17504 Revision 1 (Reference 20) is necessary to assure conformance with the uncertainty calculation basic assumptions and the DG-1141 Draft RG 1.105 (Revision 4) required 95/95 basis. (As Found – As Left) is defined as [

]^{a,c}

- **Square-Root-Sum-of-the-Squares** (SRSS) –

$$\varepsilon = \sqrt{(a)^2 + (b)^2 + (c)^2}$$

As approved for use in setpoint calculations by ANSI/ISA-67.04.01-2006 (R2011)(Reference 7).

- **Total Allowance** (TA) – The absolute value of the difference (in % instrument span) between the SAL and the NTS.

$$TA = |SAL - NTS|$$

- **Trend** – The evaluation of [ ]^{a,c} consistent with the process described in Section 4 of WCAP-17504 Revision 1 (Reference 20) on a periodic basis [ ]^{a,c} utilizing As Left (gathered utilizing three passes up and three passes down across the instrument span) and As Found [ ]^{a,c} plant data for SCA, SD, RCA and RD for each control, protection and indication function to verify that the statistically based assumptions of the uncertainty calculations and the DG-1141 Draft RG 1.105 (Revision 4) required 95/95 basis are satisfied.

5 INPUTS TO THE WESTINGHOUSE SETPOINT METHODOLOGY AND THE WESTINGHOUSE SETPOINT CONTROL PROGRAM

The primary inputs to the WSM, and thus the SCP, are the instrumentation Functional Requirements documents for the protection system, control system and indication for the primary side, secondary side and safety-related equipment. These documents are the combined efforts of instrumentation engineers (sensor and process rack), analysts (cognizant of the safety analyses and transient analyses) and operations engineers. Reviews and evaluations of industry, NRC and vendor documentation are performed in conjunction with performance of engineering calculations to determine the control and protection system responses. Noted below are various documents that have bearing or influence on the determination or maintenance of protection system, control system or indication systems and their setpoints.

5.1 INDUSTRY DOCUMENTS

Noted below are industry documents Westinghouse has considered in the WSM or SCP, depending on the transmitters installed. It should not be construed that consideration implies unqualified endorsement. Westinghouse reviews the applicability of the vendor information to the uncertainty calculations and uses the information as appropriate.

5.1.1 ANSI/ISA-67.04.01-2006 (R2011)

(Reference 7)

In general, Westinghouse endorses this standard.

- Specifically, the WSM utilizes the SRSS and algebraic combination techniques noted in Section 4.5.

- The WSM does not utilize the Limiting Trip Setpoint (LTSP) concept noted in Sections 4.3 and 4.4. Instead, the WSM utilizes the Nominal Trip Setpoint (NTSP in the standard, NTS in Westinghouse nomenclature) as the basis for setpoint determination.

5.1.2 ISA-RP67.04.02-2010

(Reference 8)

Westinghouse utilizes the recommended practice (RP) as a general guide only.

- As with Reference 7, the WSM does not utilize the LTSP concept described in this document. Instead, the WSM utilizes the NTS as the basis for setpoint determination.

- The WSM does not utilize the periodic test acceptance criteria (PTAC) magnitude identified in Section 8.1 of the RP. Evaluation of drift data for process racks for multiple plants and rack models, both analog and digital, has concluded that the more appropriate magnitude is the AFT as

defined by; AFT = ALT = RCA. The WSM has also adopted a more conservative ALT definition than the RP, as defined by; ALT = RCA.

- [

]^{a,c}

5.1.3 ISA-TR67.04.09-2005

(Reference 9)

Westinghouse endorses the concept of a Graded Approach. With respect to WSM uncertainty calculations, the following are utilized:

1. Two-sided 95/95 calculations for all RTS/ESFAS protection functions identified in the Technical Specifications, e.g., Tables 3.3.1-1 and 3.3.2-1 of NUREG-1431 (Reference 23) and the **AP1000** plant (Reference 10), [

]^{a,c}

2. [

]^{a,c}

3. [ ]^{a,c}

5.1.4 ISA 51.1-1979 (R1993)

(Reference 11)

The WSM utilizes this standard for definition of instrumentation parameter terms.

5.1.5 ISA 67.06.01-2002

(Reference 12)

Westinghouse considers this standard, recognizing that specific methods between the annexes and the WSM may differ. Westinghouse suggests Annex G, Online Monitoring, requires additional development prior to utilization to justify increased surveillance intervals for transmitters.

5.1.6 IEEE-279-1971

(Reference 28)

Westinghouse protection systems are designed to be in conformance with this standard. The WSM identifies the levels at which protective action is required, i.e., the NTS.

5.1.7 IEEE-338-2006

(Reference 13)

Westinghouse protection systems are designed to be in conformance with this standard. The identified testing requirements are considered in the WSM, e.g., functional tests, channel calibration tests and test methods.

5.1.8 IEEE-498-1990

(Reference 29)

Westinghouse agrees with the requirements of this standard. Specifically, Westinghouse concurs with the requirement that the accuracy of the working standard should be four times better than the accuracy of the Measurement and Test Equipment (M&TE) (Figure 1 of the standard). [

]^{a,c}

5.1.9 IEEE-603-2009

(Reference 14)

Westinghouse protection systems are designed to be in conformance with this standard. The protection system process racks are designed to allow periodic testing and calibration of channels via the introduction of known inputs. The WSM reflects the most common periodic testing methods utilized in the plant. The WSM documents the methodology that provides the basis for the TA and identifies the basis for the utilized SAL.

5.1.10 Technical Specifications Task Force Traveler TSTF-493, Revision 4

(Reference 2)

The proposed Westinghouse generic SCP is in conformance with TSTF-493, Revision 4, Option B. Based on the WSM, the SCP does not utilize the concepts of LTSP and Allowable Value (AV), but rather defines an operable channel based on the AFT and ALT about the NTS. The NTS, AFT and ALT are defined, and controlled, for each protection function process rack channel as part of the SCP. The AFT and ALT for transmitters are also defined, and controlled, for each protection function as part of the SCP.

5.1.11 Emergency Response Guidelines

The Emergency Response Guidelines (ERGs) specify operator action points where specific operations are performed to stabilize the plant and limit the consequences of an event. These action points may be determined utilizing the WSM and accounting for the environmental and process conditions that exist at that time. The determination, control and maintenance of these operator action points would be contained within the SCP.

5.2 NRC DOCUMENTS

Noted below are NRC documents Westinghouse has considered in the WSM or SCP.

5.2.1 RG 1.105 Revision 3

(Reference 5)

The WSM is in general compliance with the requirements of this RG. However, Westinghouse does take exception to the definition of the LSSS as the Allowable Value. As noted previously, the WSM defines the NTS as the LSSS. The NRC Staff concerns identified in the "Discussion" section of the RG are addressed in the following manner:

1. Limited drift data evaluated – Reference 20 notes the number of calibration/drift intervals utilized in the Westinghouse calibration/drift evaluation process.

2. Drift data accounts for all data points – [

   ]^{a,c}

3. Large number of data points for limited number of channels – Reference 20 provides support for the claim that the Westinghouse calibration/drift evaluation process is appropriate. [

   ]^{a,c}

4. Flawed outlier analysis – Reference 20 provides the Westinghouse outlier evaluation process, [

   ]^{a,c}

5. Time dependency found to be negligible – [

   ]^{a,c} Rather, Reference 20 provides the process Westinghouse follows to establish the absence/presence of a significant time dependent drift characteristic and follows this process for plant specific drift evaluations.

6. Assumption of Normal distribution – Reference 20 identifies the process Westinghouse follows with regards to normality. [

]^{a,c}

7. Drift evaluations utilize incomplete data sets – [

]^{a,c}

8. Drift projections do not include appropriate projection penalties – Reference 20 describes the Westinghouse drift evaluation process, [

]^{a,c}

9. Process or installation variables not addressed – [

]^{a,c}

10. Assumptions for instrumentation or process effects not verified or surveillance performed – [ ]^{a,c}

11. Pooling of generic drift data with plant specific data – [

]^{a,c}

12. All applicable data not utilized – see (7) above.

5.2.2 Draft RG DG-1141, Proposed RG 1.105 Revision 4 (ML081630179)

(Reference 32)

The WSM, as defined in WCAP-17504-P Revision 1 (Reference 20), is in general compliance with the requirements of this proposed Regulatory Guide revision.

5.2.3 RG 1.97

(Reference 24)

The WSM is appropriate and applicable for instrumentation uncertainty determination for monitoring instrumentation required by RG 1.97, whichever revision is the licensing basis for the plant.

5.2.4 BTP 7-12 Revision 5

(Reference 4)

BTP 7-12 Revision 5 provides guidance on the establishment and maintenance of setpoints. The means by which the acceptance criteria of BTP 7-12 are satisfied by the Westinghouse SCP are provided in this document and are identified in Appendix A.

5.2.5 ISG-08

(Reference 1)

With respect to the **AP1000** plant, ISG-08 requires one of three options be met for information contained in the plant technical specifications prior to issuance of the Combined Operating License (COL):

1) Provide a plant specific value.

2) Provide a value that bounds the plant-specific value, but by which the plant may be safely operated (i.e., a usable bounding value).

3) Establish a PTS Section 5.5 or 5.6 administrative controls program or report.

Such an administrative controls technical specification as described in option (3) shall require (a) use of an NRC reviewed and approved methodology for determining the plant-specific value, (b) establishment of an associated document, outside the PTS, in which the relocated plant-specific value shall be recorded and maintained, and (c) any other information or restrictions the NRC staff deems necessary and appropriate to satisfy 10 CFR 50.36. For example, some COL applicants have proposed an administrative controls technical specification for a set point control program to satisfy 10 CFR 50.36(c)(1)(ii)(A) in lieu of specifying explicit values for the limiting safety system settings in the PTS.

Options (2) and (3) should allow an applicant to provide the necessary information without relying on information that is impractical to obtain before the time of COL issuance (i.e., information such as design detail, equipment selection, as-built system configuration, and system test results). Option (2) may be the most time-efficient approach to provide to the NRC staff for review.

As transmitter and process rack uncertainties had not been determined at a level sufficient to satisfy Option 1 and Option 2 was determined to be a burden to the plant, Option 3 was selected. This was reflected in Chapter 16, Specification 5.5.14 of Reference 10. A plant referencing this document (WCAP-17503-P Revision 1) that provides separate plant specific documents providing details of the plant specific SCP for NRC review, meets this requirement.

5.2.6 GL 91-04

(Reference 15)

The Westinghouse calibration and drift data evaluation process has been reviewed and found acceptable by the NRC for several 24 month surveillance cycle extensions. Reference 20 is the most definitive documentation of the Westinghouse calibration and drift evaluation process. The Westinghouse SCP requirements for evaluation of As Left and As Found data are consistent with the requirements of GL 91-04.

5.2.7 RIS 2006-17

(Reference 21)

With respect to this document, the parameters; LTSP and AV have no equivalent in the WSM and are not utilized. Operability of the process racks and the transmitters are as defined in Section 5.6.3.

The LSSS is defined as the NTS in the WSM. With respect to the NRC guidance provided on test acceptance criteria about the NTS, Westinghouse utilizes the process rack reference accuracy (defined as RCA) only in the determination of the ALT and AFT, i.e., AFT = ALT = RCA for process racks.

5.2.8 Notice of Availability Supplement to NRC-2009-487, "NRC Staff Guidance for License Amendment Requests to Implement a TSTF-493 Option B Setpoint Control Program"

(Reference 30)

The means by which the information noted in Reference 30 are satisfied through the Westinghouse SCP recommendations are identified in LTR-NRC-15-37, "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115)" (Reference 31), specifically, the Westinghouse response to NRC RAI question 2 on WCAP-17503 Revision 0, see Appendix C.

5.3 VENDOR DOCUMENTS – TYPICAL

Noted below are typical industry equipment vendor documents Westinghouse considers in the WSM or SCP, depending on the transmitters installed. It should not be construed that consideration implies unqualified endorsement. Westinghouse reviews the applicability of the vendor information to the uncertainty calculations and uses the information as appropriate.

- Cameron/Barton®(2) Model 764 Differential Pressure Transmitter User Manual (Reference 16).

[2] Barton® is a registered trademark of Cameron International Corporation ("Cameron")

- Ultra/Weed Product Specifications Series N-E11 and N-E13 Electronic Pressure Transmitters (Reference 17).
- Rosemount 1154 Series H Alphaline®(3) Nuclear Pressure Transmitter (Reference 18).
- Ultra/Weed Product Specifications Model DTN2010 Pressure Transmitters (Reference 19).
- Fluke 8845A/8846A®(4) Digital Multimeter User's Manual (Reference 25).
- Keithley Model 2002®(5) Multimeter User's Manual (Reference 26).
- Heise®(6) 901A/901B Digital Pressure Indicator Installation and Operation Manual (Reference 27).

5.4 PLANT DOCUMENTS

5.4.1 Scaling Procedures/Calculations

The WSM receives input from the scaling procedures or calculations. Examples of scaling corrections are:

[ ] a,c

The As Left (calibration) and As Found (drift determination) limits are typically provided in the calibration and surveillance procedures but calculated via scaling calculations. The values from these procedures are input to the uncertainty calculations for an operating plant and thus the magnitudes can have an effect in the determination or acceptability evaluation of the NTS.

Therefore, the plant scaling calculations and procedures should not be modified without an evaluation of the potential effects on the associated function uncertainty calculation. The SCP shall assure that a formal hierarchy of review is established via the plant scaling procedures to confirm the potential

[3] Alphaline, Rosemount and the Rosemount logotype are registered trademarks of Rosemount Inc.

[4] Fluke is a registered trademark of the Fluke Corporation

[5] All Keithley product names are trademarks or registered trademarks of Keithley Instruments, Inc.

[6] Heise is a registered trademark of Dresser, Inc., Dresser Measurement

effects are addressed. The procedures necessary to achieve this hierarchy are contained in the plant SCP. [

]^{a,c}

5.4.2 **Calibration Procedures**

The WSM assumes that the plant calibration procedures confirm device operability via [

]^{a,c}

The WSM assumes that the more complex instrument process racks are string calibrated, or string verified if individual module calibration is performed. The WSM assumes the calibration is performed at multiple points across the instrument span. An instrument string or sensor that cannot be calibrated to within the ALT is declared inoperable and repair or replacement action is initiated. The assumptions of the WSM are confirmed as part of the uncertainty determination process. The SCA and RCA characteristics of the WSM are confirmed on a periodic basis via the trend program evaluation process of the ALT recorded values.

Operating plant Calibration procedures typically identify M&TE by make and model or equivalent accuracy that must be used in the performance of the procedure. The WSM reflects the accuracy of operating plant worst case M&TE or makes recommendations with regards to new plant M&TE, e.g., Digital Multimeter (DMM), digital pressure gauge, decade resistance box, for a given Calibration procedure. The SCP shall assure that a formal hierarchy of review is established via the plant Calibration procedures to address changes to M&TE used in the plant. The procedures necessary to achieve this hierarchy are contained in the plant SCP. [

]^{a,c}

[ ] a,c

5.4.3 Surveillance Procedures

The WSM assumes that the plant Surveillance procedures confirm device operability via verification that the instrument channel or sensor maintains operation within the AFT on a periodic basis. The WSM assumes that the As Found condition of the more complex instrument channels is determined on a string basis. The WSM assumes the surveillance is performed at multiple points across the instrument span. The assumptions of the WSM are confirmed as part of the uncertainty determination process. The SD and RD characteristics of the WSM are confirmed on a periodic basis [ ]^{a,c} via the trend program evaluation process of the recorded AFT and ALT values (AFT – ALT).

An instrument channel that is found:

1. Within the ALT = AFT = RCA is considered OPERABLE,

2. Outside the ALT = AFT = RCA and can be recalibrated to within the ALT is considered OPERABLE, but Suspect and should be observed closely via trending, for indications of additional drift outside tolerance. Such drift should result in the generation of a Condition Report and frequent drift should result in repair or replacement. Multiple instrument channels for a given function drifting in this manner should result in an evaluation of the drift characteristics of the RD term of the WSM.

3. Outside the ALT = AFT = RCA and cannot be recalibrated to within the ALT is considered INOPERABLE. A Condition Report should be generated and the instrument channel should be repaired or the failed component replaced to return the instrument channel to an OPERABLE condition.

A sensor that is found:

1. Within the ALT is considered OPERABLE,

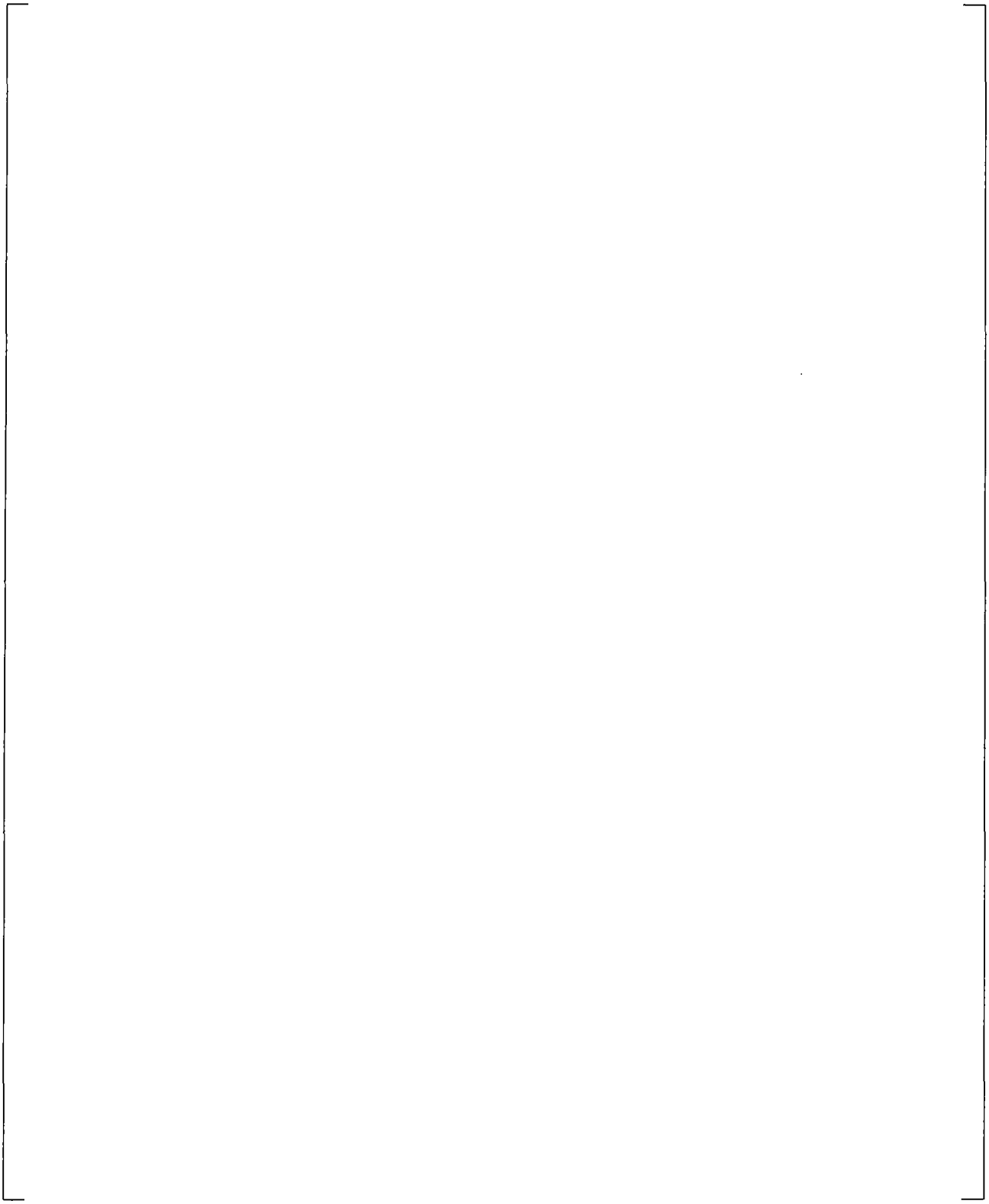
2. Within the AFT, but outside the ALT, is considered OPERABLE and must be recalibrated to within the ALT,

3. Outside the AFT, but can be recalibrated to within the ALT, is considered OPERABLE, but Suspect and should be observed closely, via trending, for indications of additional drift outside tolerance. Such drift should result in generation of a Condition Report and frequent drift should result in repair or replacement. Multiple sensors for a given function drifting in this manner should result in an evaluation of the drift characteristics of the SD term of the WSM.

4. A sensor that cannot be recalibrated to within the ALT, regardless of the As Found condition, is considered INOPERABLE. A Condition Report should be generated and the device should be repaired or replaced to return the sensor to an OPERABLE condition.

Operating plant surveillance procedures typically identify M&TE by make and model or equivalent accuracy that must be used in the performance of the procedure. The WSM reflects the accuracy of operating plant worst case M&TE or makes recommendations with regards to new plant M&TE, e.g., DMM, digital pressure gauge, decade resistance box, for a given Surveillance procedure. It should be recognized that there are multiple means to identify the M&TE or the accuracy of M&TE that must be used in the performance of calibration or surveillance. The most straight forward approach is to explicitly identify in a Calibration or Surveillance procedure the minimum accuracy required, e.g., X psig, Y millivolts, Z Ohms. Another approach is to specify a specific device, e.g., Fluke 8842A on the 20 VDC range, Keithley 2000 on the 1 VDC range. In many cases when the latter approach is used the phrase "or equivalent," is also specified, to allow the use of an equal or more accurate device if the specified device is not available. The "or equivalent" M&TE may be used once equivalency (or better) has been established and documented. In the event that a transmitter or process rack is changed to a different model or vendor, the M&TE requirements may change. At which point, a thorough review of the M&TE requirements is in order. The SCP shall assure that a formal hierarchy of review is established via the plant Surveillance procedures to address changes to M&TE used in the plant. The procedures necessary to achieve this hierarchy are contained in the plant SCP. [

]^{a,c}



a,c

Figure 5-1 Plant Procedure Hierarchy Example Diagram

5.4.4 Corrective Action Program

The generation of a Condition Report should result in entering the Correction Action Program (CAP). The inability to satisfy the ALT or AFT for a given function should be trended within the CAP for feedback to the Maintenance Procedures and to the WSM. The inability to satisfy the ALT and AFT for a given function should result in evaluation of the adequacy of the RD and SD term characteristics and the subsequent effects on the uncertainty calculation, i.e., NTS and SAL.

5.4.5 Maintenance Procedures

The maintenance procedures provide input to the WSM via the performance of the sensor/transmitters and process racks. Confirmation that the hardware performs as designed and modeled in the uncertainty calculations, would result in no changes to the NTS or surveillance/calibration process. If it is found that abnormally high maintenance is necessary to keep equipment within specification, this could call into question the appropriateness of the various equipment uncertainty terms. The uncertainty term magnitudes are based on equipment design specifications and the inability to meet these magnitudes could call into question other uncertainty assumptions and equipment operability. Thus, feedback from the instrumentation maintenance program on these assumptions and how the equipment is operating is required. If new or different equipment, e.g., transmitter, process rack modules, M&TE, is installed or utilized, or significantly revised Calibration or Surveillance procedures are utilized, it is then necessary to evaluate the effects of such changes on the uncertainty calculation assumptions and results, and potentially the adequacy of the NTS, ALT and AFT values. Such changes should also be evaluated to determine potential effects on scaling procedures/calculations.

The opposite would be the fact that little or no recalibration is required to meet ALT/AFT values. This could suggest that the ALT/AFT values are not representative of expected equipment performance by being too large in magnitude. A 95/95 parameter is expected to be challenged on an occasional basis. If an AFT is never challenged, that is indicative of using a conservatively high magnitude in the uncertainty calculation but a non-conservatively high magnitude for a performance based operability criterion.

5.4.6 Plant Operations/Reactor Engineering

The WSM receives input, or feedback, from Plant Operations through the confirmation of acceptable AFT values. Indirectly this occurs through the channel check process performed by the Operators. If a channel deviates from its associated channels frequently, without equipment failure, this could be an indication that the AFT is not representative of the equipment performance, i.e., is too large in magnitude. Reactor Engineering would confirm that the allowed Incore/Excore ΔI mismatch magnitude is sufficient. This is influenced by the surveillance interval, i.e., the expected shift in ΔI as a function of core burnup.

5.4.7 Change Control Process

In order to maintain the uncertainty calculations of the WSM current during plant operation, the Change Control Process must determine and evaluate the effects of changes to: instrumentation

(transmitters, process racks, M&TE, control system design/approach), plant operating parameters (Thot, Tcold, flow rates, pressures), plant design (tap relocation, replacement steam generators, flow measurement methods, steam generator or vessel internals), operating philosophy (surveillance intervals, surveillance methods, calibration methods) and analyses (SAL, NTS, thermal design methodology). This evaluation process must require formal review of potential effects of plant changes and processes on the assumptions and values of the WSM. The SCP shall provide the formalization and linkage of the Change Control Process to the WSM calculations.

5.4.8 Administrative Controls

To assure interlocking of the various plant procedures and processes, an Administrative Controls program, with appropriate oversight and auditing must be present. This would typically be performed via a Quality program.

5.5 PLANT SAFETY ANALYSES

SALs are initially gathered from Chapter 15 of the plant UFSAR or DCD, e.g., Reference 10, and confirmed with the holder of the Analysis of Record (AOR). (In some older plants, the SALs are defined in Chapter 14.) [

]^{a,c} This information is utilized by the WSM in the form of SAL values [

]^{a,c}

5.6 INSTRUMENTATION TESTING

5.6.1 Instrumentation Qualification Testing

Design aspects of transmitter, process rack or other equipment, e.g., solid state relays, behavior are confirmed for Design Basis Event (DBE) conditions via qualification testing. This type of testing is typically limited in the number of devices tested and scope. [

]^{a,c} The results of the qualification testing are utilized in the WSM. The SCP shall provide the controls necessary to assure that replacement equipment meets or exceeds the same criteria. The areas covered in Westinghouse design basis qualification testing are:

1. Environmental

   a. Temperature – [

   ]^{a,c} This testing includes a bounding temperature for the maximum temperature expected for a high energy line break, typically a large steam line break.

   b. Radiation – the device design accuracy is confirmed for radiation exposure [

   ]^{a,c}

c. Submergence/high humidity – device survivability is confirmed for those transmitters that are required to operate in a high humidity environment and potential submergence.

2. Drift – [ ]^{a,c}

3. Seismic – survivability and design maximum error during bounding seismic acceleration testing is confirmed. [ ]^{a,c}

Items 1.a, 1.b, and 3 result in the definition of Environmental Allowance (EA) terms in the WSM. Item 2 results in the definition of [ ]^{a,c}

5.6.2 [ ]^{a,c}

[ ]^{a,c}

5.6.3 Calibration and Surveillance Testing

1. As Left Condition - Calibration Accuracy - Reference Accuracy verification – On a periodic basis the transmitter or process rack channel is calibrated. This calibration should verify the device accuracy, [ ]^{a,c} and establish the As Left condition at multiple calibration points within the instrument calibration span, e.g., 0 %, 25 %, 50 %, 75 % and 100 % span, for multiple passes (three up/three down) for the next surveillance interval. When combined with previous As Left values, the trend characteristics of the reference accuracy of that device and function can be determined. Such trend data for an instrument channel (transmitter or process racks) [ ]^{a,c}

[

]^{a,c} of the calibration process and thus, confirm the WSM uncertainty calculation assumption. The ability to calibrate is the first step in establishing the operability condition of the device or instrument channel.

2. As Found Condition – Drift – On a periodic basis the transmitter's or process rack channel's As Found condition should be determined at multiple calibration points within the instrument calibration span, e.g., 0 %, 25 %, 50 %, 75 % and 100 % span. The recording of the [ ]^{a,c} in the increasing and decreasing span directions across the instrument span, when compared to the [ ]^{a,c} at the same points determines the instrument drift. When combined with previous drift data for that device or instrument channel, the trend characteristics of drift for that device or instrument channel can be determined. The device characteristics establish the performance of that single device or channel. [

]^{a,c} the WSM uncertainty calculation assumption of drift for the transmitter and/or process racks is confirmed. The magnitude of drift for a device is the second indication of the operability condition of the device or instrument channel.

5.7 CALIBRATION AND DRIFT DATA EVALUATION

The WSM (Reference 20) assumes that the SCA, RCA, SD and RD terms can be described as two-sided, random probability distribution functions. In the simplistic sense, the SRSS presumes that the distribution functions can be described as Normal. [

]^{a,c} However, changes in hardware (transmitters, process racks, M&TE), surveillance intervals or procedures can invalidate previous uncertainty calculation assumptions, depending on the degree of conservatism of said assumptions. Therefore, to maintain the 95/95 calculation basis of the individual uncertainty terms, as required by DG-1141 (Reference 32), periodic evaluation of transmitter and process rack calibration (recorded As Left condition) and drift (recorded As Found condition - recorded As Left condition) data is required. It is suggested that the evaluation for a function should take place any time the hardware or surveillance interval is changed [ ]^{a,c}

Reference 20 describes the Westinghouse data evaluation process in detail. In the simplistic sense, it should be noted that the process includes the following:

[ ] a,c

5.8 INSTRUMENT OPERABILITY CRITERIA

Instrument operability is determined based on several criteria. On a continuous basis, channel checks, i.e., comparison of redundant channels, are performed by the plant process computer. The SCP shall determine and document the appropriate channel check acceptance criteria. These acceptance criteria should be representative of normal operation and expected differences between like channels. [

]^{a,c}

On a longer term basis (refueling), instrument performance is determined by the surveillance procedure, i.e., the gathering of [ ]^{a,c} As Found data for multiple points across the instrument span. If during the surveillance process, a device is found outside of the ALT, the device is recalibrated utilizing the appropriate calibration procedure. The ability to calibrate a device is a major indication of the expected performance of the instrument and once a device can be recalibrated to within the ALT it is again considered operable.

If a device is found outside of the AFT, it is identified (via entry into the plant CAP) for further evaluation, as this is an indication of drift greater than that assumed in the WSM uncertainty calculation. It may be concluded that the device is not operating within design and must be investigated for repair or replacement. It may be concluded that the surveillance interval is too long and should be decreased. It may be concluded that the drift magnitude is characteristic of the device, found to be consistent with design, and that the uncertainty calculation should be revised.

The SCP shall assure that a formal hierarchy of review is established via plant maintenance procedures to address instrument operability assessment – Surveillance procedure review, initialization of a condition report to note operation outside of design, entry into a CAP for repair or replacement as necessary. The procedures necessary to achieve this hierarchy are to be contained in the plant SCP.

5.8.1 Procedures for Detecting Instrument Abnormal Conditions

The WSM instrument uncertainty calculations account for protection function actuation and post event indication when the transmitter experiences harsh environment conditions within the instrumentation qualification envelope. [

]^{a,c}

5.8.2 Instrument Process Rack

The WSM assumes that an instrument process rack string begins each surveillance interval within the two-sided tolerances of the RCA (ALT) term in order to satisfy the requirements of the calibration process. This is the first definition of an operable instrument channel. While the response time of the process rack is not explicitly measured as part of the calibration process, it is expected that the instrument technician performs a qualitative evaluation, i.e., the channel is not slow in responding. This is a second order definition of operability. In order to satisfy the randomness requirement, minimize the possibility of introducing an uncertainty bias over time [

]^{a,c} and withstand the application of tolerance factors in a statistical trend evaluation; it is suggested that whenever an instrument channel is adjusted, the instrument technician should drive the calibration error to zero, i.e., minimize the calibration error. When a "leave alone zone" concept is incorporated into the calibration process, it is incumbent upon the plant staff to verify through the calibration trend evaluation process that a calibration bias is not introduced. An instrument channel must be left within the ALT at each calibration point as part of the three up/three down multi-pass calibration process. Westinghouse [

]^{a,c} therefore, it should be found within the ALT; thus, the Westinghouse definition for operability of the process racks: AFT = ALT = RCA. If an instrument process rack string is found outside of the AFT, the instrument string must be recalibrated and left within the ALT.

5.8.3 Sensor/Transmitter

The WSM assumes that a sensor or transmitter begins each surveillance interval within the two-sided tolerances of the SCA term in order to satisfy the requirements of the calibration process. This is the first definition of an operable transmitter. The second definition of an operable sensor or transmitter is that at the end of the surveillance interval (fuel cycle), the device should be found within its AFT, i.e., for relative drift determinations, [

]^{a,c}; for absolute drift determinations, [ ]^{a,c} While the response time of the transmitter is not explicitly measured as part of the calibration process, it is expected that the instrument technician performs a qualitative evaluation, i.e., the device is not slow in responding. This is a second order definition of operability. In order to satisfy the randomness requirement, minimize the possibility of introducing an uncertainty bias over time [

]^{a,c} and withstand the application of tolerance factors in a statistical trend evaluation; it is suggested that whenever a transmitter is adjusted, the instrument technician should drive the calibration error to zero, i.e., minimize the calibration error. When a "leave alone zone" concept is incorporated into the calibration process, it is incumbent upon the plant staff to verify through the calibration trend evaluation process that a calibration bias is not introduced. A sensor or transmitter must be left within the ALT at each calibration point as part of the three up/three down multi-pass calibration process. If a sensor or transmitter is found outside of the ALT, it must be recalibrated and left within the ALT.

6 OUTPUTS OF THE WESTINGHOUSE SETPOINT METHODOLOGY

6.1 SCALING PROCEDURES/CALCULATIONS

The WSM works in the unit of % span. Utilization of % span, instead of the engineering unit (psia, psig, % RTP, etc.), results in fewer errors in the determination of the instrument uncertainty. However, this is not acceptable for the instrument technician to use in the field. The channel must be scaled into a unit that can be read in the field, milliamp (mA), or voltage (V) if measured across a dropping resistor, for transmitters, and voltage for process rack modules (signal condition, bistables and analog to digital (A/D) converters). In addition, it is in the scaling process that [

]^{a,c} Thus, the WSM provides input to the plant instrumentation Scaling procedures or calculations. [

]^{a,c}

6.2 CALIBRATION AND SURVEILLANCE PROCEDURES

The surveillance program, which includes the recalibration of the channels, will assess operability of the equipment, transmitter or process rack modules. As a result, instrumentation that is out of calibration or determined inoperable will be identified, recalibrated, repaired or replaced. When an instrument is replaced with a different make or model, criteria must be developed to define the acceptability of the new instrumentation. These criteria may include recalculation of the setpoint to re-establish margin (analysis or operational margin as required). If necessary, the plant Technical Specifications, licensing and or design basis documentation must be appropriately revised.

Calibration and surveillance of the transmitters and process racks is performed on a periodic basis, as required by the plant Technical Specifications. Transmitters and process rack modules are checked on a continuous basis via the plant process computer and periodically by the Operators via the control board indication, i.e., comparisons between channels (channel checks). Transmitters are checked utilizing known inputs on a refueling basis (nominal 18 months, maximum 22.5 months or nominal 24 months, maximum 30 months) to determine the As Found condition. Process rack modules are checked utilizing known inputs on a more frequent basis, as short as monthly, as long as semi-annually. The Surveillance procedures confirm that the hardware is performing as designed and if not found within the ALT, are recalibrated utilizing the appropriate Calibration procedure. These checks and calibrations provide the data necessary to determine the drift magnitudes and establish the initial condition for the next operating or surveillance interval. Device As Left and As Found data are recorded and managed. The data are utilized to confirm device operation within design and the assumptions of the uncertainty calculations.

The As Left data are evaluated to confirm that calibration biases are not introduced through the calibration process.

As Left and As Found data are evaluated to confirm that the device drift magnitude is within limits and that no biases become evident. The As Left and As Found data form the basis for future re-evaluation of the calibration and drift magnitudes utilized in the uncertainty calculations and NTS determination. The WSM provides as an output, the definition of the design ALT/AFT, through the SCA and SD term magnitudes for the sensor/transmitter and the RCA and RD term magnitudes for the process racks. These magnitudes are reflected as two-sided calibration accuracies (As Left tolerances) at the calibration points in the transmitter and process rack Calibration procedures; and as two-sided As Found tolerances at the calibration points in the transmitter and process rack Surveillance procedures.

M&TE utilized to perform the instrument calibration and surveillance should be as accurate as reasonably achievable. Utilization of currently available, high accuracy DMM and digital pressure gauges, examples of which are provided in Section 5.3, results in easily accomplished accuracy ratios of 10:1 (SCA:M&TE, RCA:M&TE). This minimizes the effect of M&TE on the As Left and As Found condition of the instrumentation. Surprisingly, older DMMs (0.05 % span for a Fluke 8600A) can achieve better accuracies than more modern DMMs (0.09 % span for a Fluke 8050A and 0.08 % span for a Fluke 45) on a worst case basis, i.e., 5 VDC reading on a 1 – 5 VDC instrument span. However, this suggests that while the desired 10:1 ratio is not satisfied with some DMMs, a 5:1 ratio is satisfied. The effects of a 5:1 ratio M&TE are still acceptable as the DMM uncertainty is a specification and may not represent the actual uncertainty with careful calibration and use under controlled conditions.

[ ] a,c

It should be understood that if the ratio of SCA:M&TE or RCA:M&TE is less than 10:1, it must be explicitly modeled in the WSM and this requirement reflected in the plant SCP. It should also be recognized that since As Found data is typically taken at the same time as As Left data, the M&TE for the As Found is the same as for the As Left and is reflected in the uncertainty calculations based on the SCA:M&TE or RCA:M&TE ratios.

[ ] a,c

[ ] a,c

6.3 MAINTENANCE PROCEDURES

The plant SCP shall identify that the instrument maintenance program provides directions to repair instrumentation to within design specifications. The maintenance program shall track and assess ALT/AFT data to determine the performance of the instrument throughout the life of the device. Replacement instrumentation shall be confirmed to meet or exceed the design specifications of the instrument uncertainty calculations. If the replacement instrumentation does not meet the design specifications of the instrument uncertainty calculations; the instrument uncertainty calculations shall be re-evaluated and revised as necessary. If the replacement instrumentation exceeds the design specifications of the instrument uncertainty calculations, the ALT/AFT shall be evaluated for revision to reflect the appropriate criteria. If the ALT/AFT criteria are revised, appropriate changes must be reflected in all affected downstream calculations and documentation, e.g., Scaling procedures/calculations, Calibration procedures, Surveillance procedures, etc.

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APPENDIX A: NRC BTP 7-12 ACCEPTANCE CRITERIA

1. Facility setpoint list identifying safety setpoints and non-safety setpoints for functions providing protective functions important to safety or that are relevant to compliance with technical specification limiting conditions for operation.

[ ] a,c

2. Identification of safety setpoints that are not safety-limit-related LSSS and the basis for this determination.

[ ]a,c

3. Identification of setpoints that trigger procedural actions that are important to safety.

[ ]a,c

4. Description of the setpoint methodology and procedures used in determining setpoints, including information sources, scope, assumptions, interface reviews, and statistical methods.

[

]a,c

5. Terminology used to describe limits, allowances, and tolerances, and environmental or other effects used to support setpoint calculations.

[

]a,c

6. Technical specifications and basis for LSSSs.

[

]a,c

7. Basis for acceptable as-found band and acceptable as-left band and determination of the instrument operability based on acceptable as-found band and acceptable as-left band.

[

]a,c

8. Basis for calibration intervals.

[

]^{a,c}

9. Basis for assumptions regarding instrument uncertainties and discussion of the method used to determine uncertainty values.

[

]^{a,c}

10. Description of the provisions for control of measuring and test equipment used for calibration of the instrument.

[

]^{a,c}

11. Description of the program and methodology used to monitor and manage instrument uncertainties, including drift.

[

]^{a,c}

12. Description of the functional and performance criteria for the initiation and execution of the safety functions at the setpoints.

[

]^{a,c}

13. Instrument specifications, including range, accuracy, repeatability, hysteresis, dynamic response, environmental qualification, calibration reference, and calibration intervals for each instrument type.

[

]^{a,c}

14. Instrument loop diagrams showing all hardware elements of the instrument loop(s).

[

]^{a,c}

15. *Instrument and tubing layout drawings and installation details showing locations and elevations of instruments and tubing relative to a reference datum, as well as the points where the instrument interfaces with the monitored process.*

[

]^{a,c}

16. *For digital instrumentation, the configuration database for the instrumentation functions, and identification of digital elements (hardware and software) where error could be introduced into the measurement – for example, errors that could result from analog-to-digital or digital-to analog conversion or from numerical methods used in the software (e.g., curve fitting).*

[ ]^{a,c}

17. *The description of assumptions in accordance with ISA-S67.04, should include the environmental allowances (temperature, pressure, humidity, radiation, vibration, seismic, and electrical) for the instruments.*

[

]^{a,c}

APPENDIX B: NRC BTP 7-12 REVIEW PROCEDURES

1. Relationships between the safety limit, analytical limit, limiting trip setpoint, the allowable value, the setpoint, the acceptable as-found band, the acceptable as-left band, and the setting tolerance.

[ ]a,c

2. The reviewer should assure that the setpoint technical specifications meet the requirements of 10 CFR 50.36. Additional information related to setpoint technical specifications is provided in RIS 2006-17.

[ ]a,c

3. Basis for selection of the trip setpoint.

[ ]a,c

4. Uncertainty terms that are addressed.

[ ]a,c

5. Method used to combine uncertainty terms.

[ ]a,c

6. Justification of statistical combination.

[ ]a,c

7. Relationship between instrument and process measurements units.

[ ]a,c

8. Data used to select the trip setpoint, including the source of the data.

[

]^{a,c}

9. Assumptions used to select the trip setpoint (e.g., ambient temperature limits for equipment calibration and operation, potential for harsh accident environment).

[

]^{a,c}

10. Instrument installation details and bias values that could affect the setpoint.

[

]^{a,c}

11. Correction factors used to determine the setpoint (e.g., pressure compensation to account for elevation difference between the trip measurement point and the sensor physical location).

[

]^{a,c}

12. Instrument test, calibration or vendor data, as-found and as-left; each instrument should be demonstrated to have random drift by empirical and field data. Evaluation results should be reflected appropriately in the uncertainty terms, including the setpoint methodology.

[

]^{a,c}

APPENDIX C: LTR-NRC-15-37

Submittal of: "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TACNo. ME8115)" (Proprietary/Non-Proprietary).

(Limited to NP-Attachment A)

Westinghouse

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LTR-NRC-15-37

June 25, 2015

Subject: Submittal of "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115)" (Proprietary/Non-Proprietary).

Enclosed are the proprietary and non-proprietary versions of "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115)"

Also enclosed are:

1. An Application for Withholding Proprietary Information from Public Disclosure, AW-15-4172 (Non-Proprietary), with Proprietary Information Notice and Copyright Notice
2. An Affidavit (Non-Proprietary).

This submittal contains proprietary information of Westinghouse Electric Company LLC. In conformance with the requirements of 10 CFR Section 2.390, as amended, of the Commission's regulations, we are enclosing with this submittal an Application for Withholding Proprietary Information from Public Disclosure and an Affidavit. The Affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

Correspondence with respect to the proprietary aspects of the Application for Withholding or the Westinghouse Affidavit should reference AW-15-4172 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 3 Suite 310, Cranberry Township, Pennsylvania 16066.

James A. Gresham, Manager
Regulatory Compliance

Enclosures

LTR-NRC-15-37
Page 2 of 2

bcc: James A. Gresham
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AW-15-4172

June 25, 2015

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-NRC-15-37 P-Attachment, "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115)" (Proprietary)

Reference: Letter from James A. Gresham to Document Control Desk, LTR-NRC-15-37, dated June 25, 2015

The Application for Withholding Proprietary Information from Public Disclosure is submitted by Westinghouse Electric Company LLC (Westinghouse), pursuant to the provisions of paragraph (b)(1) of Section 2.390 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary information for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10 CFR Section 2.390, Affidavit AW-15-4172 accompanies this Application for Withholding Proprietary Information from Public Disclosure, setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the proprietary aspects of the Application for Withholding or the accompanying Affidavit should reference AW-15-4172 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, 1000 Westinghouse Drive, Building 3 Suite 310, Cranberry Township, Pennsylvania 16066.

James A. Gresham, Manager
Regulatory Compliance

AW-15-4172
June 25, 2015

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

I, Henry A. Sepp, am authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of my knowledge, information, and belief.

Henry A. Sepp, Director
CRE-Systems and Components Engineering

(1) I am Director, CRE-Systems and Components Engineering, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitute Westinghouse policy and provide the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

(iii) There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(vi) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(v) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(vi) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-NRC-15-37 P-Attachment, "Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115)" (Proprietary), for submittal to the Commission, being transmitted by Westinghouse letter, LTR-NRC-15-37, and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the NRC review and approval of WCAP-17503-P/WCAP-17503-NP, Revision 0 and WCAP-17504-P/WCAP-17504-NP, Revision 0 and may be used only for that purpose.

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(a) This information is part of that which will enable Westinghouse to:

(i) Secure NRC approval of WCAP-17503-P/WCAP-17503-NP, Revision 0 and WCAP-17504-P/WCAP-17504-NP, Revision 0.

(b) Further this information has substantial commercial value as follows:

(i) Westinghouse plans to sell the use of similar information to its customers for the purpose of performance of control and protection function instrument uncertainty calculations using a methodology that has received NRC prior approval.

(ii) Westinghouse plans to sell the use of similar information to its customers for the purpose of assisting in the organization and securing NRC approval of a plant-specific Setpoint Control Program.

(iii) Westinghouse can sell support and defense of industry guidelines and acceptance criteria for plant-specific applications.

(iv) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar uncertainty calculations and consultation services, including licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

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In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and non-proprietary versions of documents furnished to the NRC in connection with requests for generic review and approval of WCAP-17503-P/WCAP-17503-NP, Revision 0 and WCAP-17504-P/WCAP-17504-NP, Revision 0.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(iii)(f) of the Affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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LTR-NRC-15-37 NP-Attachment

Westinghouse Responses to U.S. Nuclear Regulatory Commission Request for Additional Information for the Topical Reports (TRs) WCAP-17503-P/WCAP-17503-NP, Revision 0, 'Westinghouse Generic Setpoint Control Program Recommendations' and WCAP-17504-P/WCAP-17504-NP, Revision 0, 'Westinghouse Generic Setpoint Methodology' (TAC No. ME8115) (Non-Proprietary)

June 2015

Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

Westinghouse Responses to NRC RAIs on WCAP-17503-P

1. Intent of WCAP 17503-P, Revision 0, and WCAP-17503-NP, Revision 0, Topical Report

The title of the TR is "Westinghouse Generic Setpoint Control Program Recommendations." From this title, the staff anticipated that the purpose of this document is to provide licensees who intend to use the Westinghouse Setpoint Methodology for determination of CSA, nominal trip setpoint, as-found tolerance, and ALT values (etc.) as described within Westinghouse WCAP-17504-P/WCAP-17504-NP, Revision 0, with guidance for ensuring that inputs and information needed for determination of these values are properly identified, controlled, interpreted, and used or applied. Further, it appears to the NRC staff that WCAP-17503-P/ WCAP-17503-NP, Revision 0, is intended to provide guidance for ensuring that outputs from these calculations are appropriately fed back to applicable maintenance, surveillance, and calibration procedures and other plant documents so appropriate plant corrective action program actions can take place, leading to proper update of the affected setpoint calculations when needed. However, the NRC staff notes that while the document provides detailed information identifying the inputs and outputs to be controlled, there is little or no guidance describing how or why such information needs to be controlled. The Program Goals and Objective section states: "the setpoint control program (SCP) provides a means of continuous evaluation of changes to equipment, procedures and processes that provide design input to the Westinghouse Setpoint Methodology. This document describes the scope of the SCP and provides insight to the hierarchy of the various components of the SCP."

However, the NRC staff notes there is little or no guidance for implementing programmatic controls to assure the Westinghouse Setpoint Methodology will be appropriately, routinely, and consistently applied. There are statements within the Scope section as follows:

> "Detailed descriptions of the various plant processes and plant administrative controls are not provided as these will be provided on a plant specific basis. However, key points and functions are identified to provide an understanding of the purpose of each component of the SCP. Further definition of each of the plant processes will be provided via the generation of reports or procedures or implementation plans that are produced on a plant specific basis."

The staff views the title of this report to be a bit misleading, in that the document does not provide actual recommendations to licensees for implementing a program/process for setpoint information control, but only describes the inputs, outputs, and relationships that need to be controlled, if one were to implement a setpoint control program incorporating the Westinghouse Setpoint Methodology. A more appropriate title might be "Westinghouse Setpoint Methodology Data Considerations for Inclusion within a Licensee-Developed Setpoint Control Program."

Please describe the actual intent, scope, and limitations of this document.

Westinghouse Response:

In the above, Westinghouse has determined that three significant points were identified. They will be addressed in sequence below.

First paragraph excerpt: "However, the NRC staff notes that while the document provides detailed information identifying the inputs and outputs to be controlled, there is little or no guidance describing how or why such information needs to be controlled."

With respect to guidance on how to control information; each plant has its own system for generation and control of procedures. With neither regulatory authority nor contractual oversight, Westinghouse must work with a utility on a plant specific basis with the system in place at their plant to meet the guidance of WCAP-17503-P. Westinghouse proposes to do exactly that. When a utility contracts with Westinghouse for setpoint calculations, Westinghouse requests and reviews the appropriate information, i.e., procedures, vendor documents, safety analyses, etc., recognizing up front that the calculation is a "snapshot in time" that may not reflect (or bound) the effects of changes made in the future to those same procedures, vendor documents (hardware) or safety analyses. Thus, when discussing a Setpoint Control Program (SCP) in the generic sense, Westinghouse must limit the discussion to identification of the characteristics and sensitive parameters of the Westinghouse Setpoint Methodology (WSM) and to recommend control of those procedures, vendor documents and safety analyses. Recognizing this, Westinghouse will address these limitations by ensuring that the plant specific SCP reflects the additional control expected by the NRC. Therefore, for utilities that contract with Westinghouse for work on and assistance with an SCP, the NRC can expect the following:

[ ] a,c

[ ] a,c

The above addresses the "how." As to the "why," it is suggested that any input parameter that is utilized in a protection function uncertainty calculation should be controlled. While the uncertainty magnitude may be small, in many cases the magnitude is controlled by the process, e.g., calibration (As Left), drift determination (As Found), M&TE (actual hardware utilized and its calibration and maintenance). Therefore, it is appropriate to control all input parameters to an uncertainty calculation, per the guidance of this WCAP.

Second paragraph excerpt: "However, the NRC staff notes there is little or no guidance for implementing programmatic controls to assure the Westinghouse Setpoint Methodology will be appropriately, routinely, and consistently applied."

As noted above, with neither regulatory authority nor contractual oversight, Westinghouse has limited the scope of WCAP-17503 to identification of the WSM sensitivities and programmatic guidance. Once contracted, it is Westinghouse's preferred approach to work with the utility's plant specific existing programs and procedures to provide the appropriate controls. It is believed that WCAP-17503, in conjunction with WCAP-17504, does provide the information necessary to define where Westinghouse will be looking for the presence or establishment of the appropriate procedures and controls. In many cases, it is expected that a review of existing procedures and programs will result in low to moderate level changes to provide the controls necessary.

Third paragraph excerpt: "The NRC staff views the title of this report to be a bit misleading, in that the document does not provide actual recommendations to licensees for implementing a program/process for setpoint information control, but only describes the inputs, outputs, and relationships that need to be controlled, if one were to implement a setpoint control program incorporating the Westinghouse Setpoint Methodology. A more appropriate title might be "Westinghouse Setpoint Methodology Data Considerations for Inclusion within a Licensee-Developed Setpoint Control Program."

If after further discussion with the NRC staff it is determined appropriate, Westinghouse will change the document title of the approved version of WCAP-17503, and where required in the approved version WCAP-17504, which references WCAP-17503.

2. **Current Version of Staff Guidance for Technical Specification Task Force (TSTF) Traveler TSTF-493 Option B.**

The NRC staff notes the "Introduction" section and Section 5.1.10 of WCAP-17503-P/WCAP-17503-NP, Revision 0, makes reference to the TSTF-493, Revision 4, (TSTF-493) - Option B, for current NSSS plants. This Option, if voluntarily exercised, would enable licensees to revise their plant-specific TSs by relocating allowable values and nominal trip setpoints from TS Section 3.3, "Instrumentation," to the plant's Final Safety Analysis Report (FSAR) reference or to a document incorporated into the facility FSAR by reference and by adding Administrative Control TS 5.5.[ ], "Setpoint Control Program (SCP)." The TSs SCP program would require assessment of channel performance during testing to verify that instrument channel settings are consistent with values established by the NRC-approved setpoint methodology/ies for each plant. The TS SCP would also apply new surveillance test evaluation criteria to certain instrument functions, consistent with Attachment A of NRC-approved TSTF-493, Revision 4. The availability of this TSs voluntary improvement was announced in the Federal Register.

Subsequent to the initial issuance of the Federal Register Notice of Availability, the NRC staff developed additional guidance and provided clarification regarding its expectations for licensee submittals describing the licensee's intent to develop a SCP under TSTF-493 Option B. This additional guidance was provided in draft form to the BWR/PWR Owner's Group TSTF for comments in January 2013. The NRC staff's understanding is that Westinghouse may have received a copy of this draft additional guidance for its comments and use. If not, please let the NRC staff know and the staff will ensure that a copy is forwarded to you.

If you have had an opportunity to review and comment on the staff's draft additional guidance, please provide your evaluation comparing the guidance contained in WCAP-17503-P/ WCAP-17503-NP, Revision 0, with the staff's additional guidance transmitted to the TSTF.

Westinghouse Response:

Westinghouse has given the draft guidance document considerable thought since it was made available to the BWR/PWR Owner's Group Technical Specification Task Force. In general, Westinghouse is in agreement with the information believed to be appropriate for NRC review of an SCP submittal. Westinghouse has identified where and how this information may be contained, i.e., in Westinghouse generic WCAPs, Westinghouse plant specific WCAPs and/or plant supplied documents and procedures in the attached commented draft guidance document, noted as "Appendix A." While the basic document is open literature to the public, Westinghouse considers the highlighting and comments of a highly commercial nature and thus has marked the attached as Westinghouse Proprietary information.

3. **Interaction with other Technical Specification Initiatives—TSTF-425**

TS Initiative 5b, "Relocation of Most Surveillance Requirement Frequency Requirements from Technical Specifications to a Licensee-Controlled Program" resulted in the development of TSTF-425, which, if adopted, permits most surveillance requirement frequencies to be determined by the licensee through a process defined in an administrative TSs program (approved July 2009). If a licensee were to adopt this program, it would be permitted to follow the guidance of NEI 04-10, which requires performance monitoring of structures, systems & components whose surveillance frequency has been revised as part of a feedback process to assure the change in test frequency has not resulted in degradation of equipment performance and operational safety. The surveillance frequency/interval is an input to the determination of the amount of uncertainty in instrument channel performance due to drift. Uncertainty due to drift, is to be accounted for in both the total loop uncertainty calculations and the determination of appropriate as-found tolerance.

Please describe any additional guidance or recommendations to ensure that technical specification improvement programs and initiatives (such as the surveillance frequency control program described above) adopted by licensees will be closely coordinated as inputs (potentially subject to occasional changes) to the instrument setpoint and surveillance requirements portion of a licensee's SCP.

Westinghouse Response:

The SCP guidelines proposed in this document define a defense in depth approach. For example, Page 6 of WCAP-17503 provides a reasonable list of items that could result in a change to an input to an uncertainty calculation that could have an effect on a control or protection function setpoint. That list should be incorporated into the plant's Change Control Program. Then programs like TSTF-425, would be included as a potential initiator of a setpoint change, e.g., [

]^{a,c}. While TSTF-425 may not provide guidance on what evaluations must be performed, WCAP-17504 does, [

]^{a,c}. Thus, the tools would be in place to evaluate the effects of changes prior to implementation, e.g., [

]^{a,c}. The same can be said for changes [

]^{a,c}

[ ] a,c

4. Consideration of Vendor Documents

Section 5.3 of WCAP-17503-P/WCAP-17503-NP, Revision 0, describes the applicability of vendor documents to the Westinghouse Setpoint Methodology, and provides a list of example vendor documents to be considered in the application of the Setpoint Methodology. The statement is made: "There are aspects of various documents that Westinghouse does not consider appropriate for the WSM and thus does not comply with or utilize in the Westinghouse methodology or calculations." Please elaborate on this statement; i.e., describe the aspects or types of information described in the example vendor documents that are not considered appropriate for use with the Westinghouse Setpoint Methodology.

Westinghouse Response:

Westinghouse will revise the statement in WCAP-17503 to provide clarification. Westinghouse, in conjunction with the utility, reviews the applicability of the vendor documentation to the plant when performing uncertainty calculations. Westinghouse and the utility then agree on the use of the vendor information as design input to the uncertainty calculations. The vendor information should then be controlled by the plant SCP. There may be instances where the vendor specifications are not applicable as written. For example, the specifications may have been prepared for the larger I&C industry, not specifically for use in the nuclear industry. Therefore, the specifications may not address all the necessary information for the uncertainty calculations, and other sources of information may be required, e.g., supplemental vendor test information, or industry operating history. Also, after sufficient plant surveillance data has been introduced into the trending program and device drift has been determined, it would be appropriate to use the plant drift value in lieu of vendor specifications.

Westinghouse proposes to reword this section in the approved version of WCAP-17503 as follows:

Noted below are typical industry equipment vendor documents Westinghouse considers in the WSM or SCP depending on the transmitters installed. It should not be construed that consideration implies unqualified endorsement. Westinghouse reviews the applicability of the vendor information to the uncertainty calculations and uses the information as appropriate.

5. Consideration of Worst-Case M&TE

Section 5.4.3 of WCAP-17503-P/ WCAP-17503-NP, Revision 0, describes the relationship of the use of plant surveillance procedures as input to the application of the Westinghouse Setpoint Methodology. Section 5.4.3 states: "Operating plant surveillance procedures typically identify M&TE by make and model or equivalent accuracy that must be used in the performance of the procedure. The WSM reflects the accuracy of operating plant worst case M&TE or makes recommendations with regards to new plant M&TE, e.g., DMM, digital pressure gauge, decade resistance box, for a given surveillance procedure. The SCP shall assure that a formal hierarchy of review is established via the plant surveillance procedures to address changes to M&TE used in the plant."

a) Please clarify, using examples, what is meant by assurance of a "formal hierarchy of review".

Westinghouse Response:

There are multiple means to identify the M&TE or the accuracy of M&TE that must be used in the performance of calibration or surveillance. The most straight forward approach is to explicitly identify in a calibration or surveillance procedure the minimum accuracy required, e.g., X psig, Y millivolts, Z Ohms. Another approach is to specify a specific device, e.g., Fluke 8842A on the 20 VDC range, Keithley 2000 on the 1 VDC range. In many cases when the latter approach is used the phrase "or equivalent," is also specified, to allow the use of an equal or more accurate device if the specified device is not available. The "or equivalent" M&TE may be used once equivalency (or better) has been established and documented. In the event that a transmitter or process rack is changed to a different vendor, the M&TE requirements may change. At which point, a thorough review of the M&TE requirements is in order. [

]^{a,c}

[ ] a,c

Page 8 of 11

b) This approach to handling M&TE data seems at odds with the description of M&TE uncertainty in the Westinghouse Setpoint Methodology TR, where it appears to the staff that the Westinghouse uncertainty expressions assume that the accuracy rating of the reference measuring means for calibrating (M&TE) is always one-tenth or better than that of the M&TE device being calibrated, and the resulting M&TE uncertainty is always one-tenth or better than that of the sensor or group of rack devices under test. Is the plant actual or worst-case M&TE uncertainty to be considered in the application of the Westinghouse Setpoint Methodology, or not?

Westinghouse Response:

Please see the Westinghouse responses to NRC RAI 3 on WCAP-17504-P. When uncertainty calculations are performed by Westinghouse, the calibration and surveillance procedure worst case (limiting) M&TE are determined. Thus, the SCA:SMTE and RCA:RMTE limiting ratios are evaluated for each function. If the limiting ratio of SCA:SMTE (or RCA:RMTE) is less than 10:1; Westinghouse includes the magnitude of SMTE (or RMTE) in the uncertainty calculation.

c) Section 6.2 of WCAP-17503-P/ WCAP-17503-NP, Revision 0, describes the effects of a 5:1 ratio of calibrated device to M&TE uncertainty is acceptable. However, no guidance is provided describing the conditions under which the uncertainty of M&TE needs to be specifically accounted for in the calculations of nominal trip setpoint or As-Found and As-Left Tolerances, as opposed to the conditions when one can assume the uncertainty is negligible and not to be specifically accounted for.

Westinghouse Response:

With respect to determination of the CSA, which evaluates the acceptability of the NTS, as noted above, the M&TE should be explicitly addressed when the SCA:SMTE or RCA:RMTE ratio is less than 10:1. With respect to As Left and As Found tolerances (ALT and AFT), Westinghouse does not recommend the inclusion of M&TE errors in their determination. Using the Westinghouse Setpoint Methodology defined in WCAP-17504-P:

- Transmitters
  - ALT = SCA – vendor defined reference accuracy
  - AFT = SD – initially vendor defined drift magnitude
- Process Racks
  - ALT = RCA – vendor defined reference accuracy
  - AFT = ALT = RCA – vendor defined reference accuracy

It is a Westinghouse position that neither SMTE nor RMTE should be included in the definition of ALT or AFT.

With respect to the acceptability of a 5:1 Calibration Accuracy:M&TE ratio noted in the section, it was intended to identify that strict adherence to a 10:1 ratio is not required. However, as noted above, any ratio less than 10:1 must be explicitly addressed in the uncertainty calculation and the equation: $CSA \leq |SAL - NTS|$ must be satisfied, i.e., Margin ≥ 0.0 % span.

6. **Documentation of the Source of Data Derived from Plant Safety Analyses**

Section 5.5 of WCAP-17503-P/ WCAP-17503-NP, Revision 0, describes the use of safety analysis data as input to the Westinghouse Setpoint Methodology, however there is no guidance provided to licensees to document and control the source of the data derived from plant safety analyses. Please describe the guidance that will be provided to licensees on the need for coordination of setpoint calculation input data with any changes made to plant safety analyses as a result of updated safety analysis modeling or plant configuration changes (e.g., as a result of the installation of new design steam generators.)

Westinghouse Response:

Section 5.5 identifies that the plant Safety Analyses contained in Chapter 15 of the UFSAR are a source of input for the control and protection function uncertainty calculations, specifically, the Safety Analysis Limit (SAL) [ ]^{a,c}. This information is reviewed by the holder of the Analysis of Record (AOR) for each reload and major plant modification. Section 3 of WCAP-17503, page 6, provides a detailed listing, with examples, of equipment modifications, plant changes, procedure changes, and items to which the Westinghouse Setpoint Methodology has demonstrated sensitivity. However, a more comprehensive listing is contained in the Section 3 tables in the Westinghouse provided plant specific uncertainty calculation (WSM) WCAP that is a necessary part of any Setpoint Control Program for a Westinghouse NSSS. The most comprehensive evaluation of Westinghouse Setpoint Methodology parameter to transient or modification sensitivity would be performed by Westinghouse. Westinghouse includes in the plant specific Westinghouse Setpoint Control Program WCAP statements providing equivalent guidance. Regulatory requirements already exist for control of the AOR on the holder of the safety analyses. However, to ensure appropriate treatment and coordination, Westinghouse will provide guidance identifying an explicit requirement within the plant procedures for review of the effects on the setpoint uncertainty calculations of changes in any of the following:

[ ]^{a,c}

[ ] a,c

7. Drift Evaluation

Section 5.2.1 of WCAP-17503-P/ WCAP-17503-NP, Revision 0, describes compliance of the Westinghouse Setpoint Methodology with Regulatory Guide 1.105, Rev. 3. In its description of the evaluation of drift data, Reference 22 is noted. The staff could not locate this reference in its ADAMS repository. Please furnish an ADAMS Accession number for this report, if one is known, or provide an additional copy of this report for use in evaluating WCAP-17503-P/WCAP-17503-NP, Revision 0, and WCAP-17504-P/ WCAP-17504-NP, Revision 0.

Westinghouse Response:

A copy of the referenced letter, LTR-NRC-07-14, noted as "Appendix B," and its attachment, noted as "Appendix C," are attached.

Westinghouse Responses to NRC RAIs on WCAP-17503-P

Appendix A

Notice of Availability Supplement to NRC–2009–0487
NRC Staff Guidance for License Amendment Requests to Implement a
TSTF-493 Option B Setpoint Control Program

Introduction

In accordance with the U.S. Nuclear Regulatory Commission (NRC) staff's May 11, 2010 Notice of Availability of the TSTF-493 Instrument Setpoint Control Program guidance (75 FR 26294, available at www.regulations.gov, ID: NRC-2009-0487) licensees may elect to submit a license amendment request for NRC staff evaluation which contains a description of their proposed Setpoint Control Program that meets Option B of TSTF-493, Revision 4 "Clarify Application of Setpoint Methodology For LSSS Functions." Using TSTF-493 Option B, licensees may relocate the Allowable Values (AVs) and Nominal Trip Setpoints (NTSPs) of instrument channels implementing certain limiting safety system setting (LSSS) safety functions from Technical Specifications Section 3.3, "Instrumentation," to the Final Safety Analysis Report (FSAR) or another document (e.g. Technical Requirements Manual) incorporated into the facility FSAR by reference, and add an Administrative Control Technical Specification into Section 5 of the Technical Specifications, entitled "Setpoint Control Program."

The Setpoint Control Program establishes the technical specification requirements for ensuring that setpoints for automatic protective devices are initially within and remain within the assumptions of the applicable safety analyses. The program provides a means for processing changes to instrumentation setpoints, and identifies setpoint methodologies to ensure instrumentation will function as required. The program ensures that testing of automatic protective devices related to variables having significant safety functions as delineated by 10 CFR 50.36(c)(1)(ii)(A) verifies that instrumentation will function as required. Specifically, the Setpoint Control Program establishes the following programmatic requirements:

a. The program lists the Functions in the following specifications to which it applies (Note: The following is a typical list of functions for a BWR-6 reactor design, as identified in a letter from the TSTF Owners Group to the NRC dated April 23, 2010, (ML101160026) containing a marked version of the BWR-6 Standardized Technical Specifications. Other marked Standardized Technical Specifications in that letter have different affected Functions, as appropriate):

   1. LCO 3.3.1.1, "Reactor Protection System (RPS) Instrumentation;"
   2. LCO 3.3.1.2, "Source Range Monitor (SRM) Instrumentation;"
   3. LCO 3.3.2.1, "Control Rod Block Instrumentation;"
   4. LCO 3.3.2.2, "Feedwater and Main Turbine High Water Level Trip Instrumentation;"
   5. LCO 3.3.4.1, "End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation;"
   6. LCO 3.3.4.2, "Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation;"
   7. LCO 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation;"
   8. LCO 3.3.5.2, "Reactor Core Isolation Cooling (RCIC) System Instrumentation;"

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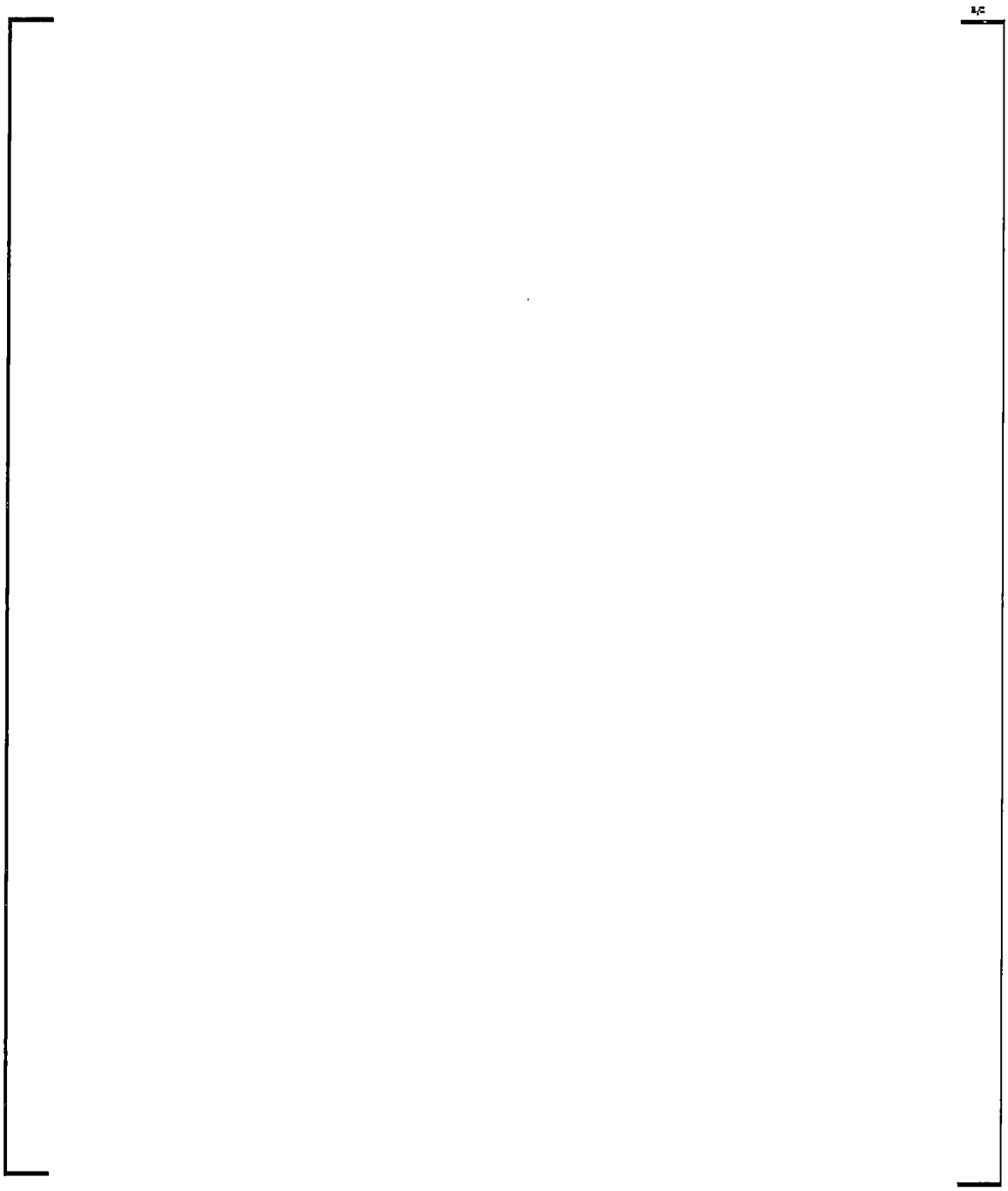

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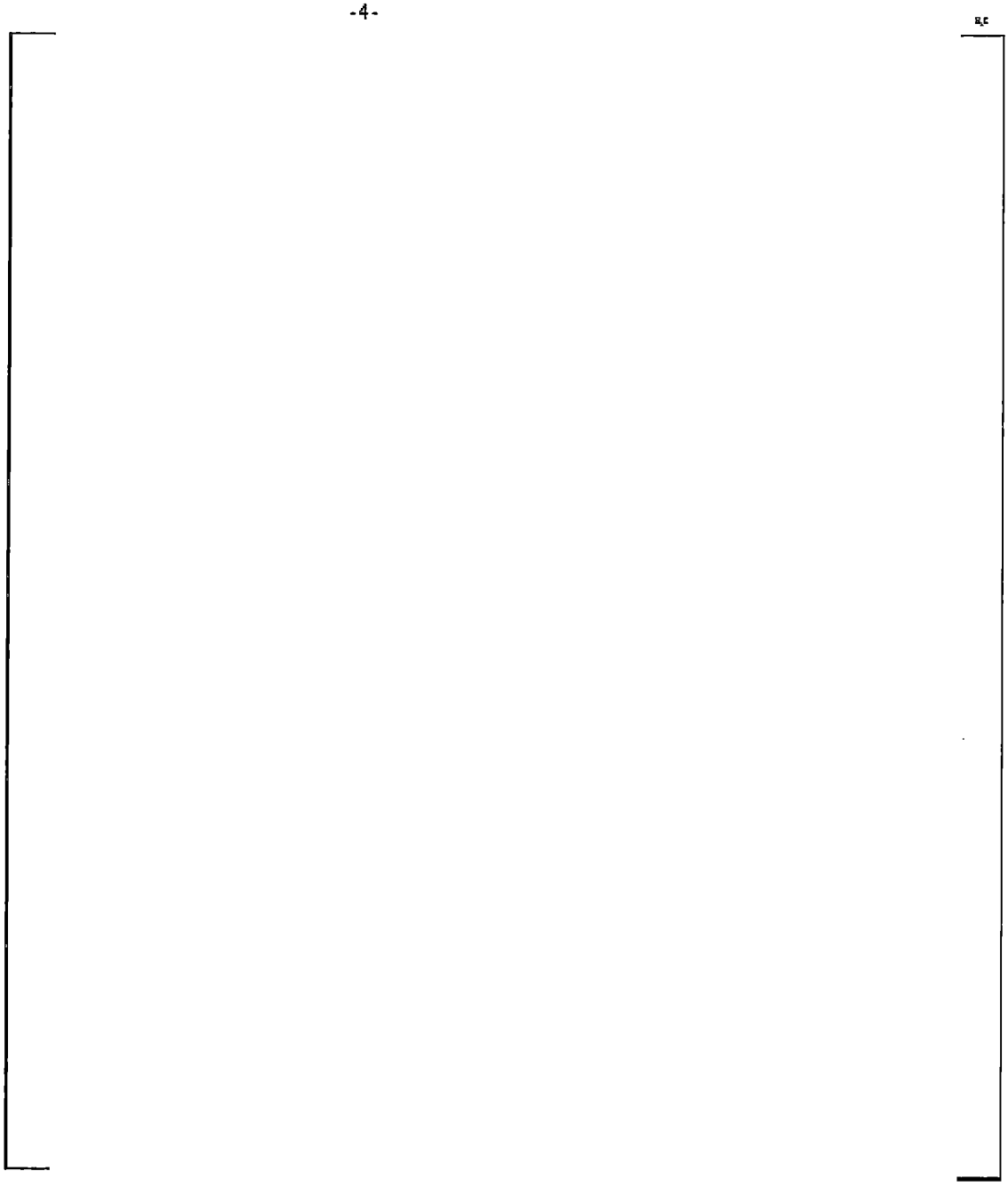

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Detailed Guidance for the Content of License Amendment Request Submittals for TSTF-493 Option B Setpoint Control Programs

To be considered for NRC review, the licensee's 10CFR50.90 submittal proposing a TSTF-493 Option B Setpoint control program must contain detailed descriptions of two processes:

1. Detailed Setpoint Methodology Description, and
2. Detailed Setpoint Control Program Description

These process descriptions are discussed below.

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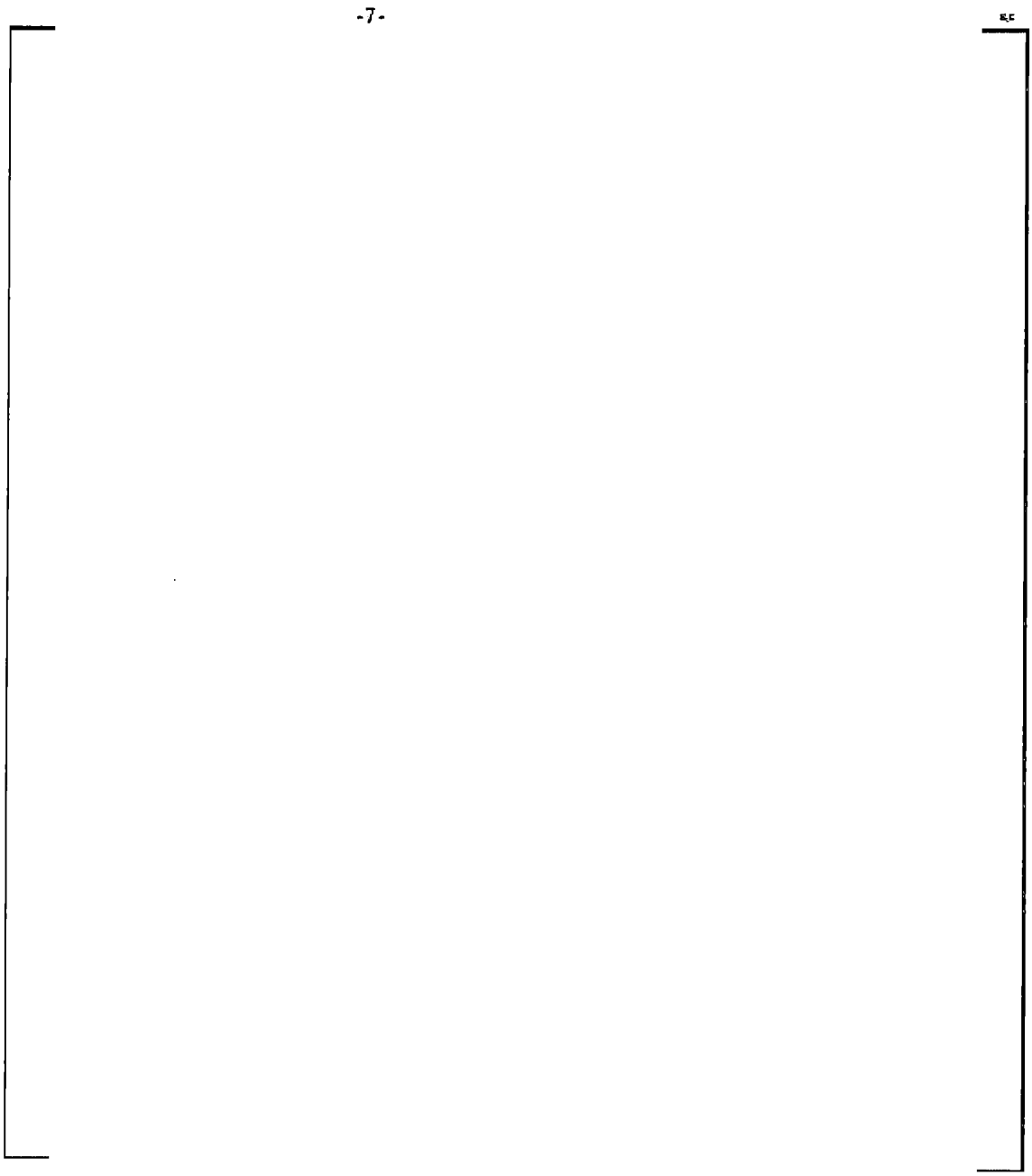

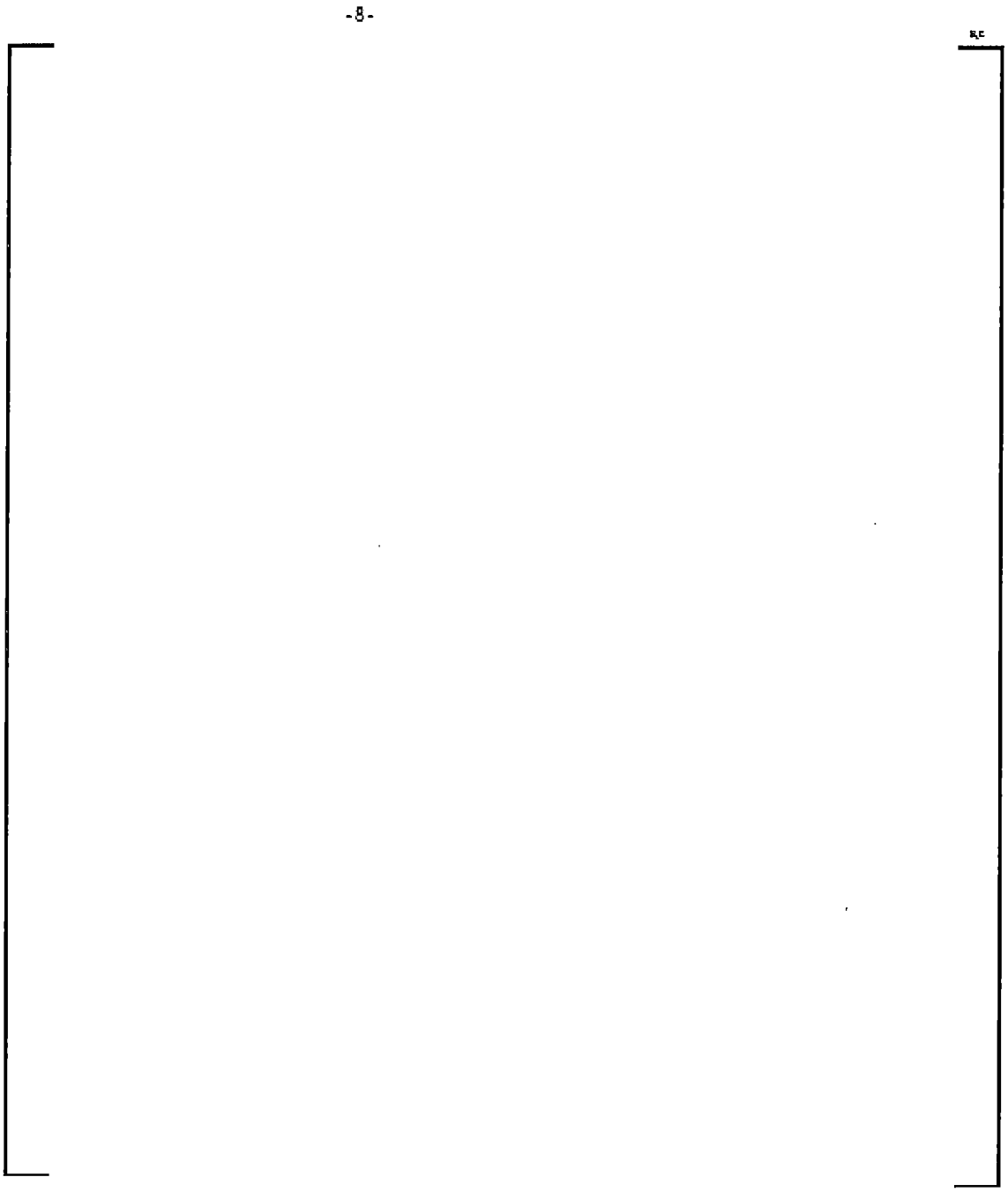

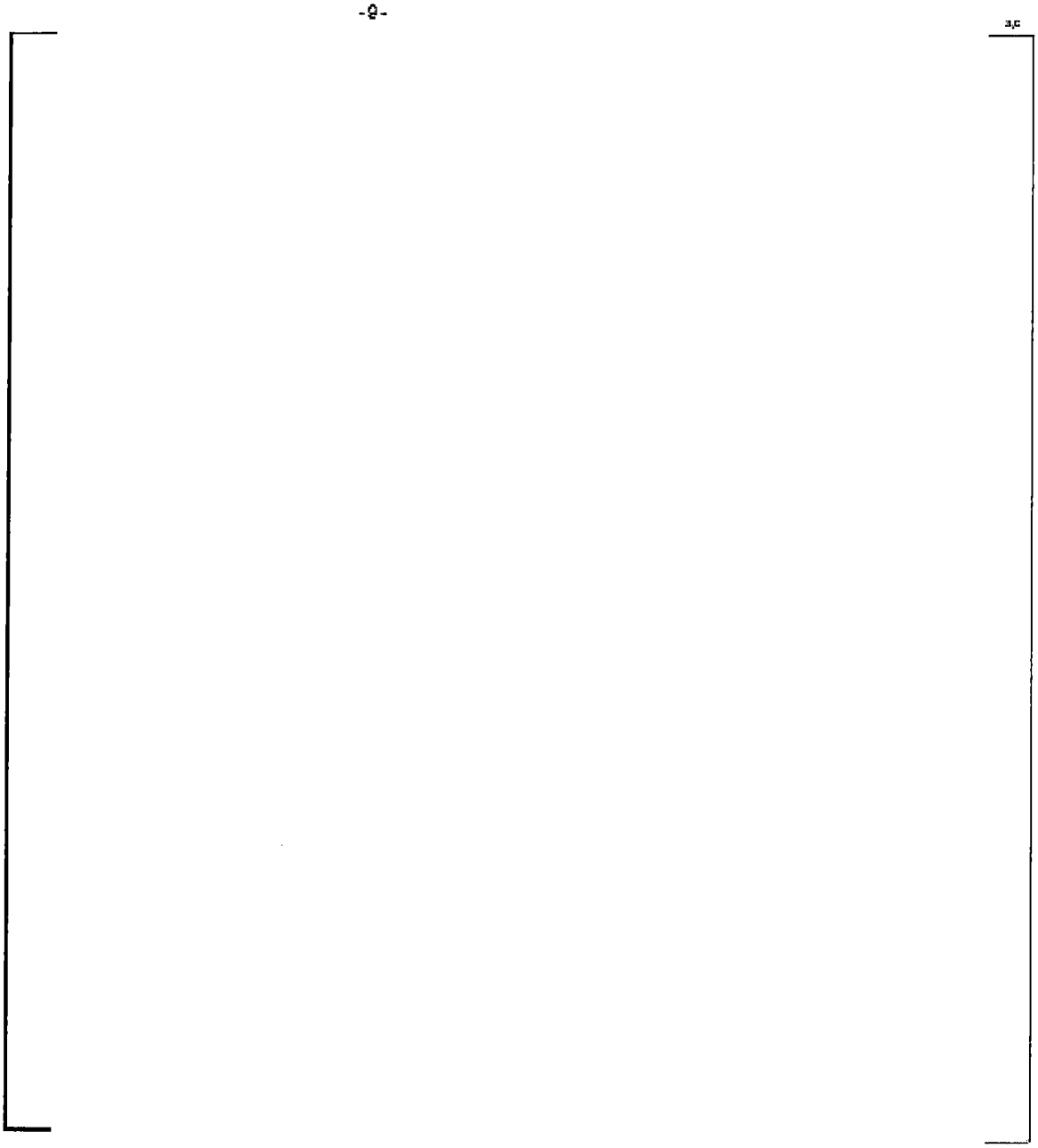

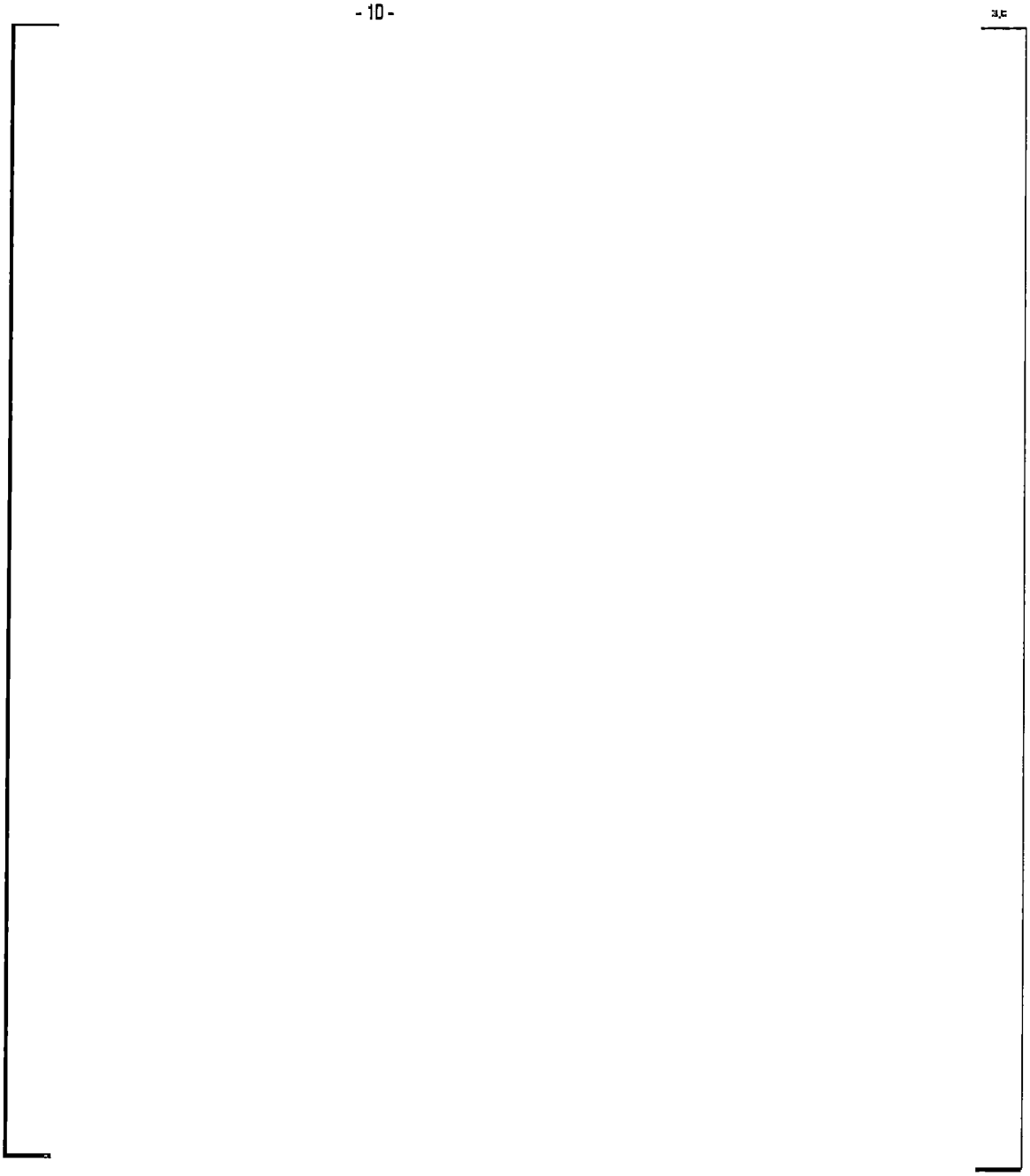
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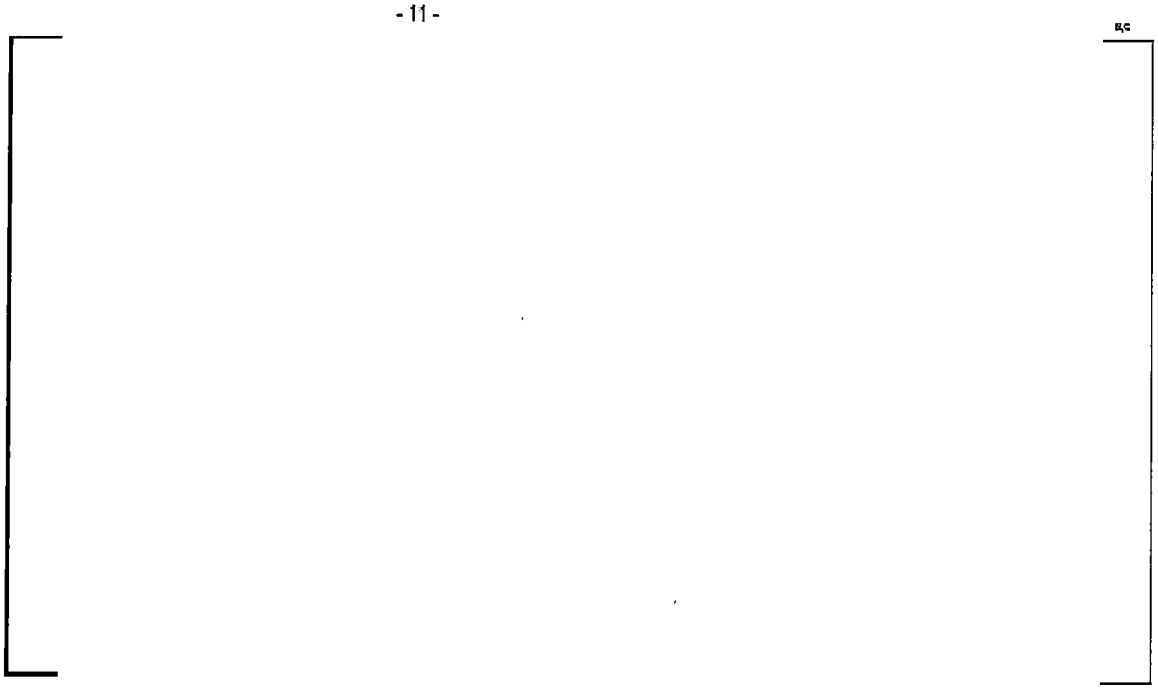

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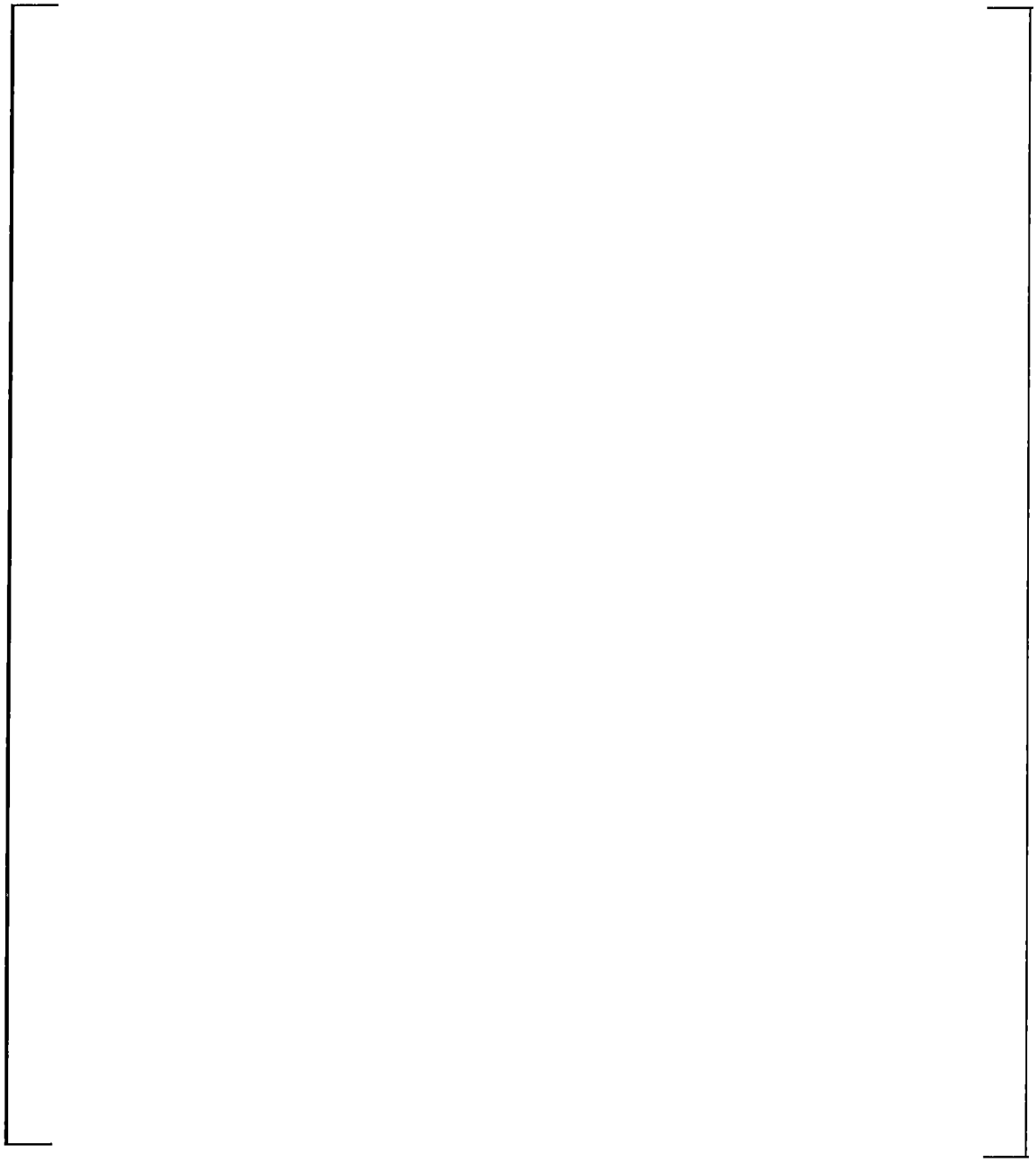

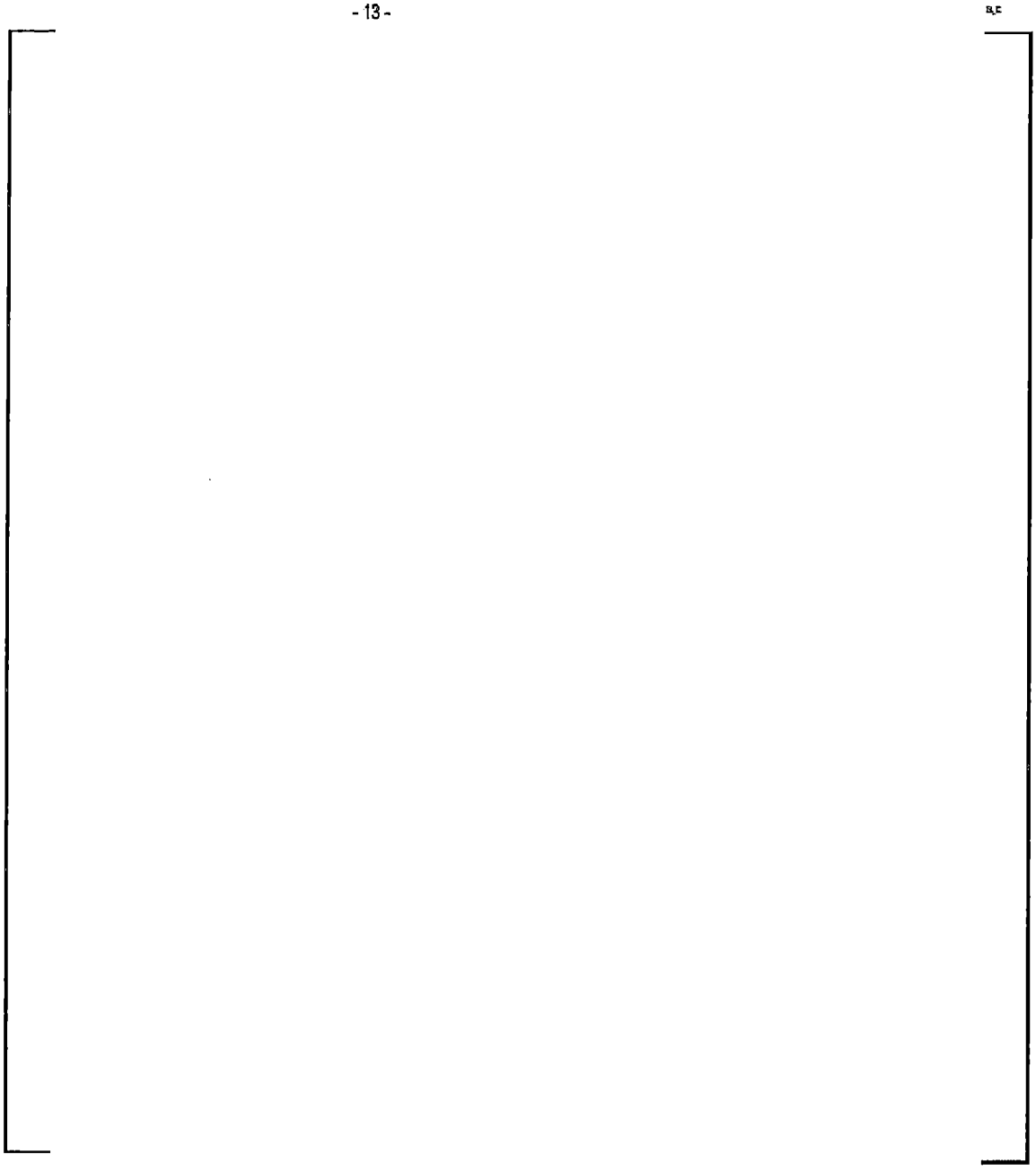

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Westinghouse Responses to NRC RAIs on WCAP-17503-P

Appendix B

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Our ref: LTR-NRC-07-14

March 15, 2007

Subject: Westinghouse Presentation to the NRC, "Westinghouse Transmitter and Process Rack Surveillance Extension Program" (Proprietary)

Enclosed is a copy of presentation slides, "Westinghouse Transmitter and Process Rack Surveillance Extension Program," for a discussion with the NRC to be held March 22, 2007.

Also enclosed is:

1. One (1) copy of the Application for Withholding, AW-07-2253 (non-proprietary) with Proprietary Information Notice.
2. One (1) copy of Affidavit (Non-Proprietary).

This submittal contains proprietary information of Westinghouse Electric Company LLC. In conformance with the requirements of 10 CFR Section 2.390, as amended, of the Commission's regulations, we are enclosing with this submittal an Application for Withholding from Public Disclosure and an affidavit. The affidavit sets forth the basis on which the information identified as proprietary may be withheld from public disclosure by the Commission.

Correspondence with respect to this affidavit or Application for Withholding should reference AW-07-2253 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

B. F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Enclosures

cc: Jon Thompson (NRC O-7E1A)

bcc: J. A. Gresham, 1L
R. Bastien (Nivelles, Belgium) 1L, 1A
C. B. Brinkman (Rockville) 1L, 1A
RCPL Administrative Aide (ECE 4-7) 1L w/affidavit

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Our ref: AW-07-2253

March 15, 2007

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: "Westinghouse Transmitter and Process Rack Surveillance Extension Program" (Proprietary)

Reference: Letter from B. F. Maurer to Document Control Desk, LTR-NRC-07-14, dated March 15, 2007

The Application for Withholding is submitted by Westinghouse Electric Company LLC (Westinghouse), pursuant to the provisions of Paragraph (b) (1) of Section 2.390 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10 CFR Section 2.390, Affidavit AW-07-2253 accompanies this Application for Withholding, setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to this Application for Withholding or the accompanying affidavit should reference AW-07-2253 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours.

B. F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

cc: Jon Thompson (NRC O-7E1A)

Enclosures

AW-07-2253

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

B. F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing

Sworn to and subscribed before me
this 15th day of March, 2007

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Sharon L. Markle, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Jan. 29, 2011
Member, Pennsylvania Association of Notaries

(1) I am Acting Manager, Regulatory Compliance and Plant Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse "Application for Withholding" accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in, "Westinghouse Transmitter and Process Rack Surveillance Extension Program" (Proprietary) for a meeting to be held on March 22, 2007, for submittal to the Commission, being transmitted by Westinghouse letter LTR-NRC-07-14 and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with methods utilized to determine the magnitude and characteristics of transmitter and process rack drift such that surveillance intervals may be extended.

This information is part of that which will enable Westinghouse to:

(a) Determine and justify extended transmitter surveillance intervals.

(b) Determine and justify extended process rack surveillance intervals.

(c) Determine and justify different instrument uncertainty calculation methodologies.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of the information to its customers for the purpose of transmitter and process rack surveillance extension.

(b) Westinghouse can sell support and defense of transmitter and process rack surveillance extension.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar surveillance extension and instrument uncertainty calculation methodologies and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

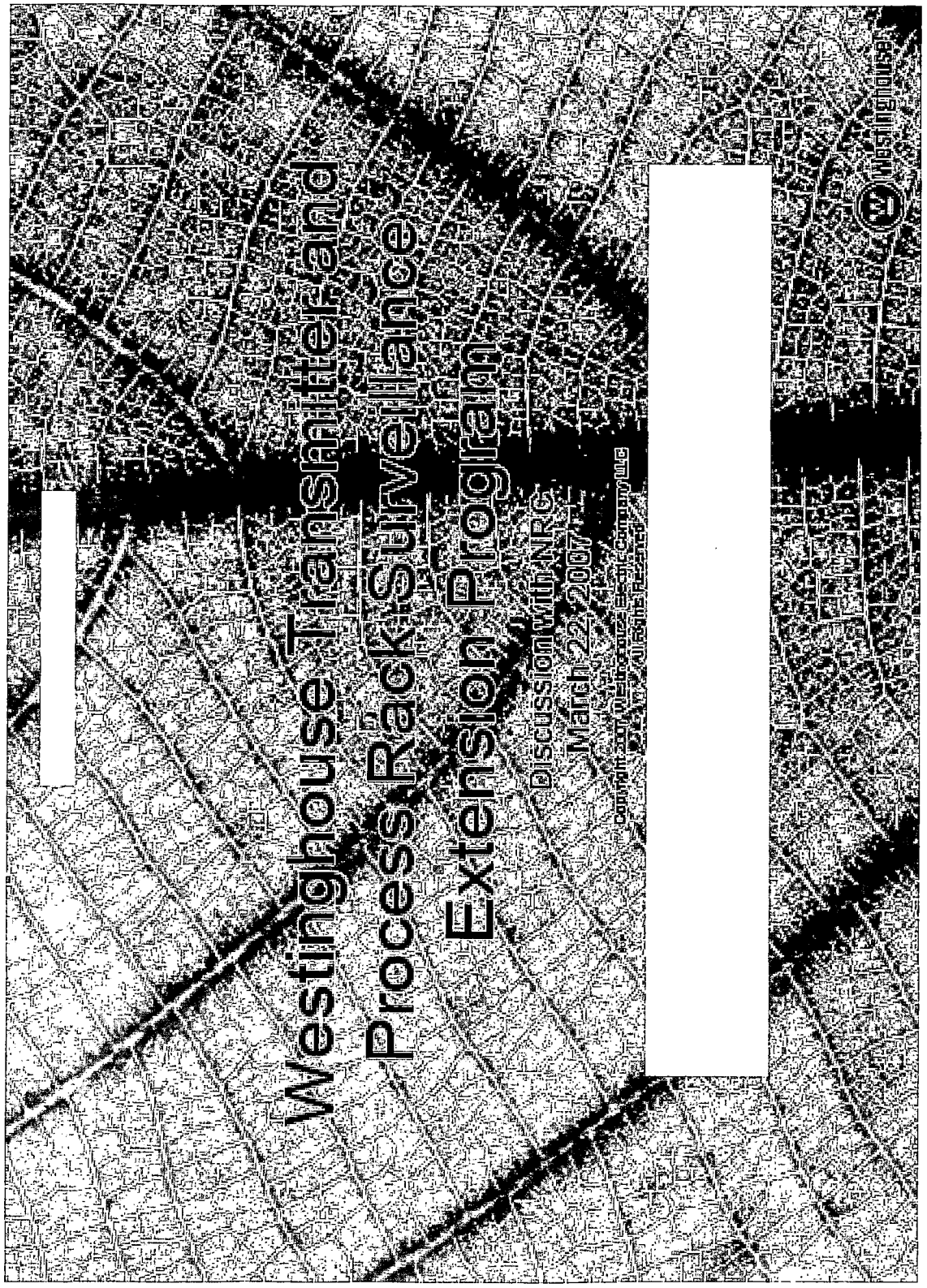
In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

COPYRIGHT NOTICE

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.390 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection notwithstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, DC and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

Westinghouse Responses to NRC RAIs on WCAP-17503-P

Appendix C


Westinghouse Transmittal and
Process Rack Surveillance
Extension Program
Discussion with NRC
March 22, 2007
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Objectives

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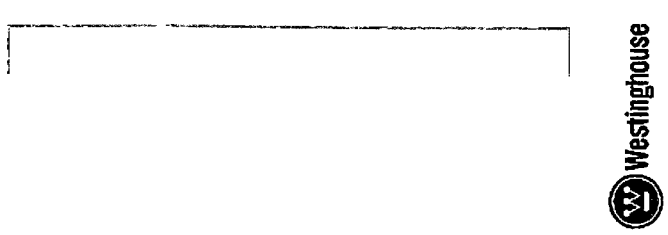

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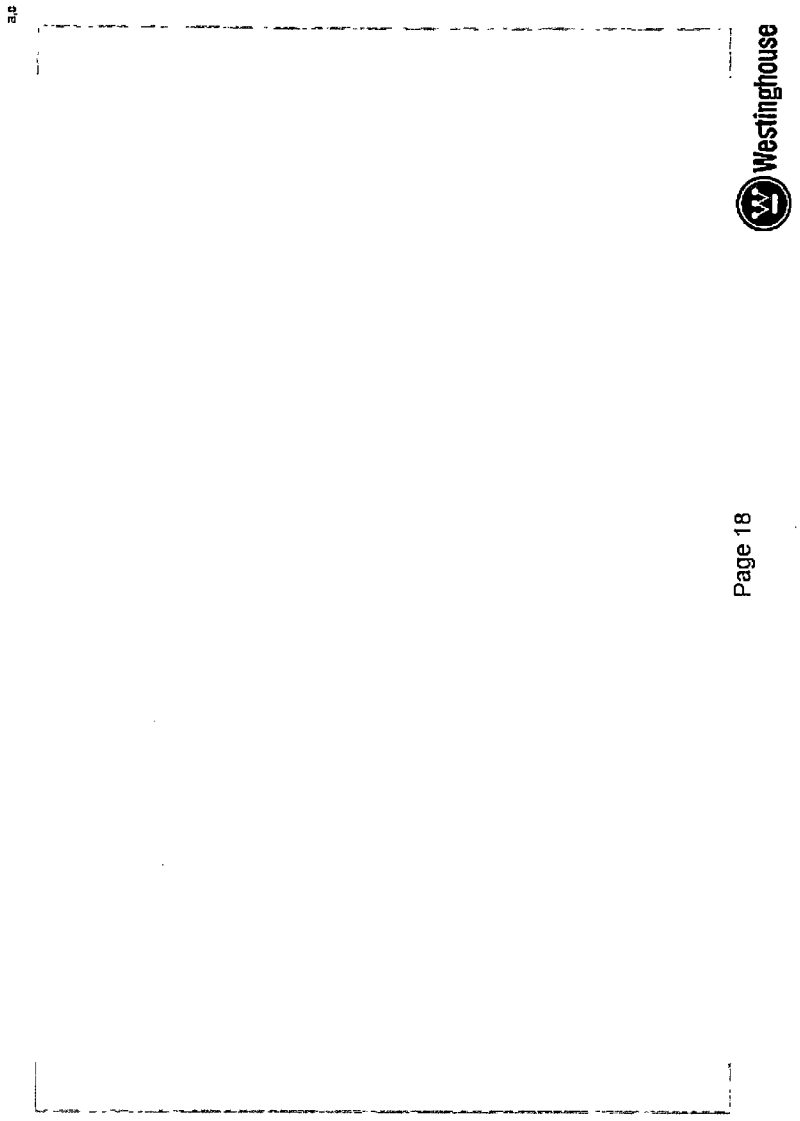
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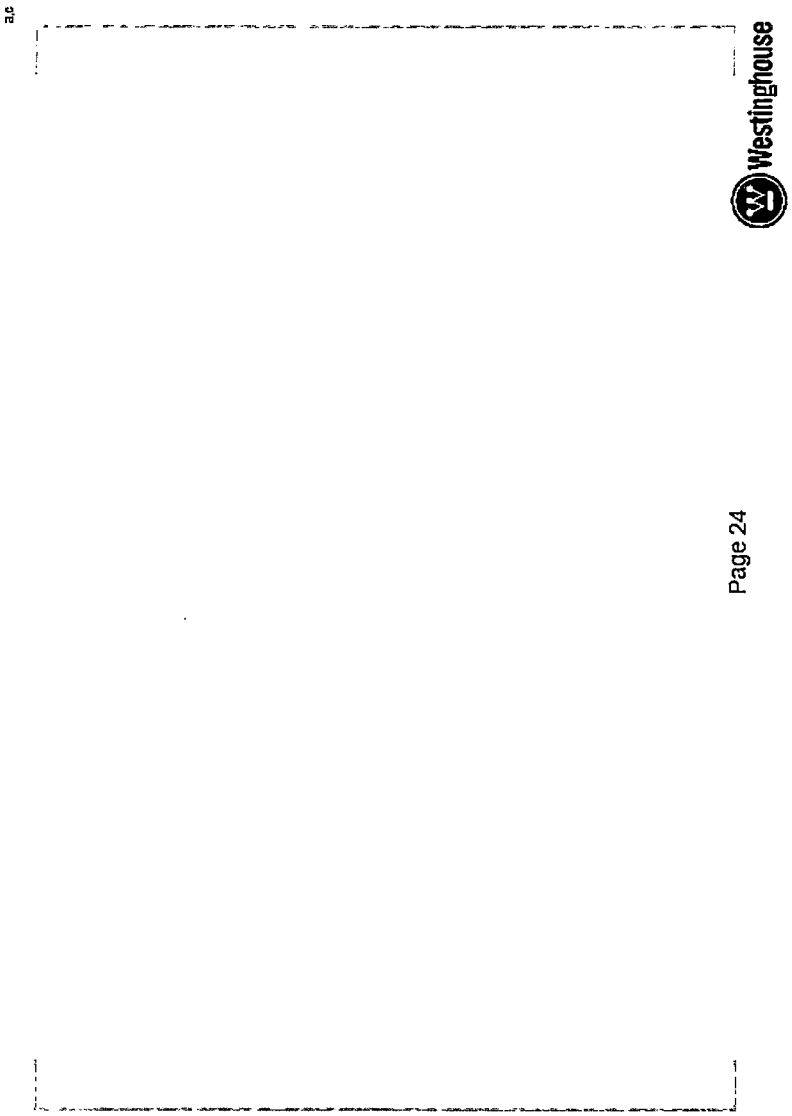
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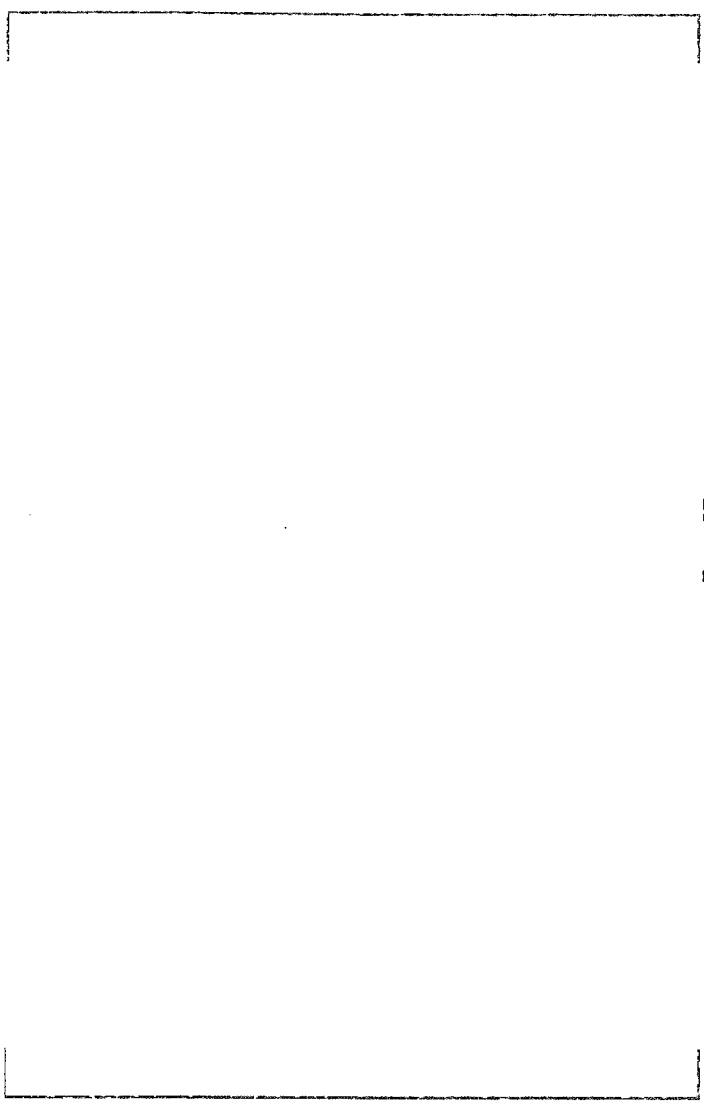

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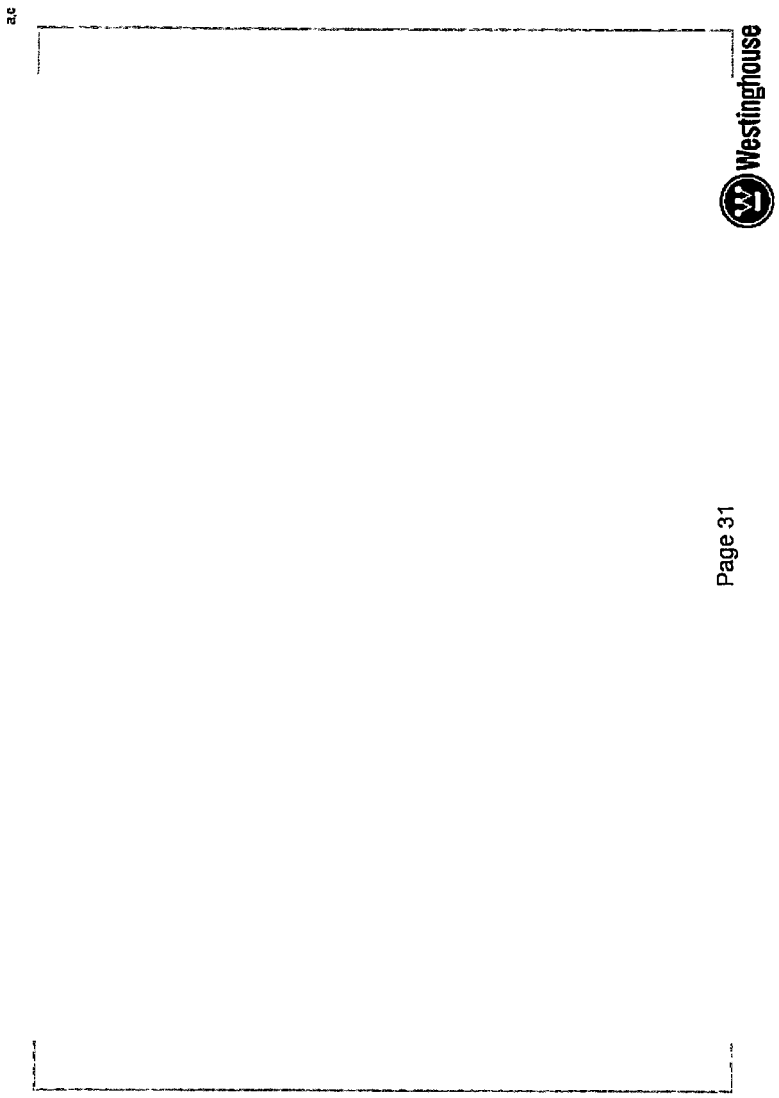
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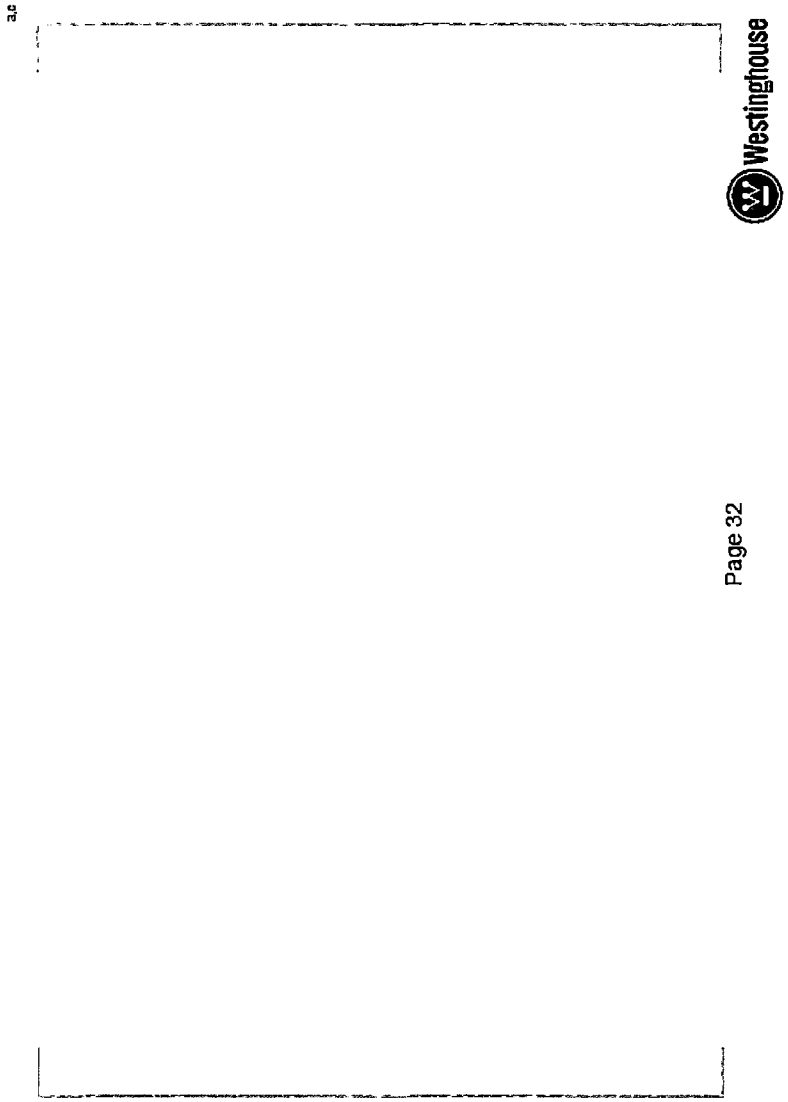
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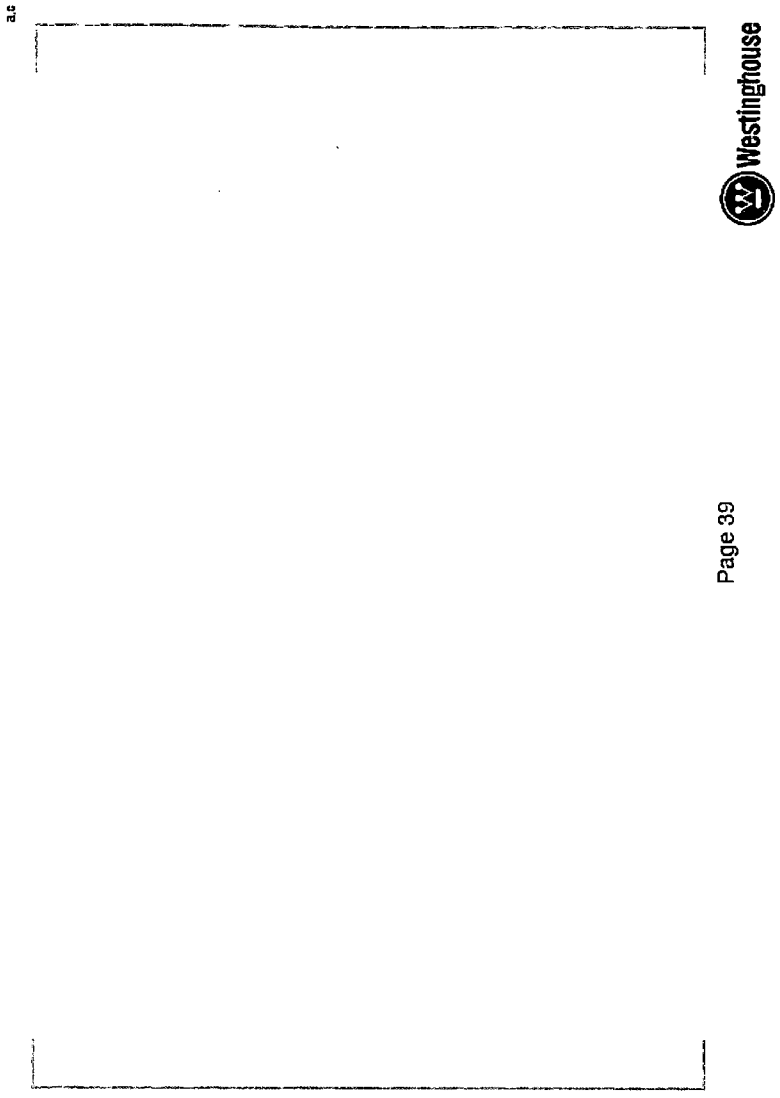
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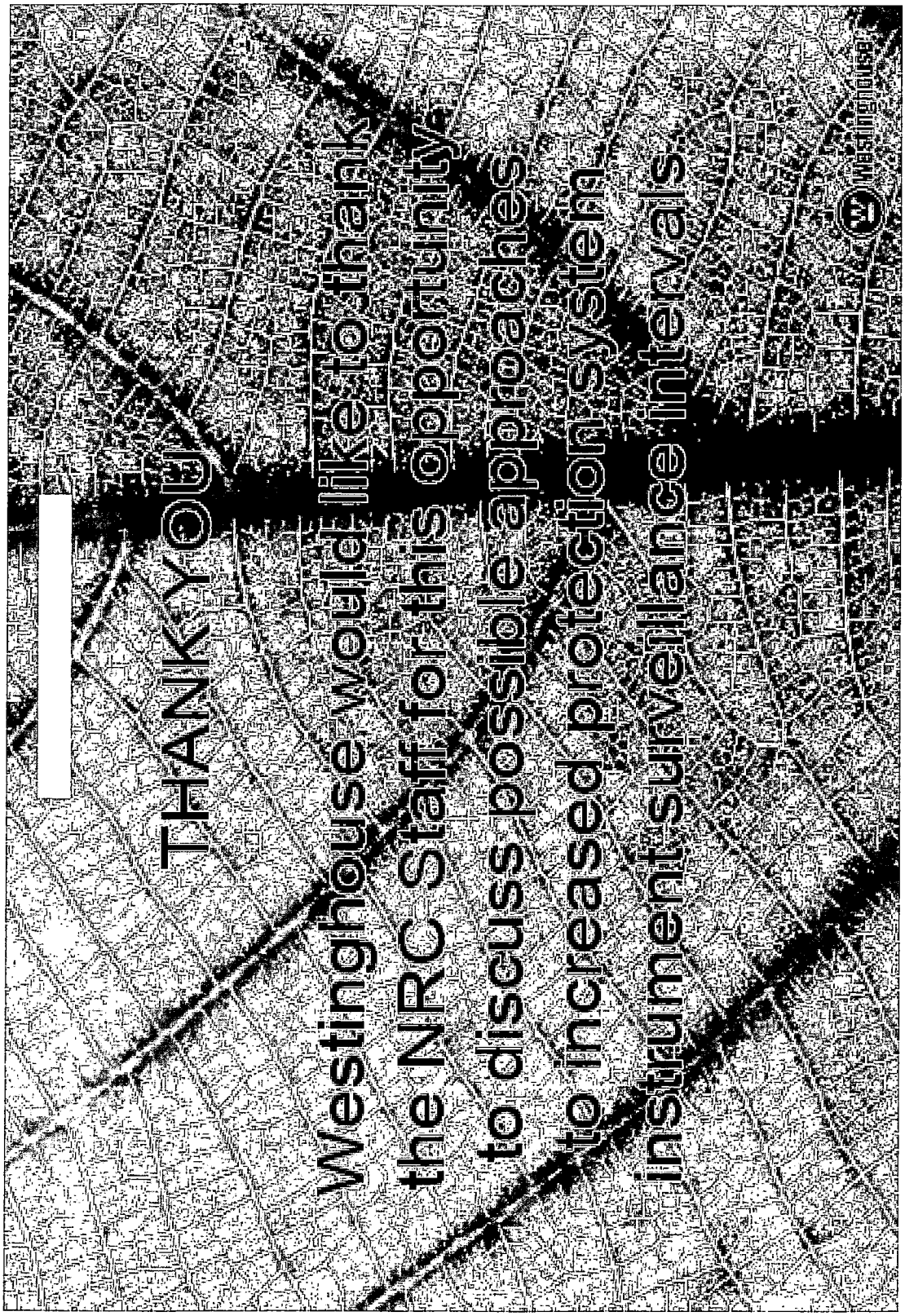
THANK YOU
Westinghouse would like to thank
the NRC staff for this opportunity
to discuss possible approaches
to increased protection system
instrument surveillance intervals