

Westinghouse Non-Proprietary Class 3

WCAP-17503, WCAP-17504

Pre-submittal Presentation

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Agenda

- ☐ Safety Brief
- ☐ Introductions
- ☐ Overview
- ☐ **WCAP-17503** - Westinghouse Generic Setpoint Control
Program Recommendations
- ☐ **WCAP-17504** - Westinghouse Generic Setpoint
Methodology
- ☐ Summary

Overview

☐ December 2010, TSTF-493 Workshop

- ☐ NRC discussion of Option B requirements
- ☐ Westinghouse presentation of Process Flow Diagram

☐ June 2011, ISA Committee Meetings

- ☐ NRC/Westinghouse discussion of setpoint methodology
- ☐ Identification of desire for generic WCAPs on setpoint methodology and setpoint control program

☐ July 2011, NRC/Westinghouse Meeting

- ☐ Reinforcement of desire for generic WCAPs

Westinghouse Non-Proprietary Class 3

WCAP-17503

Westinghouse Generic Setpoint Control Program Recommendations

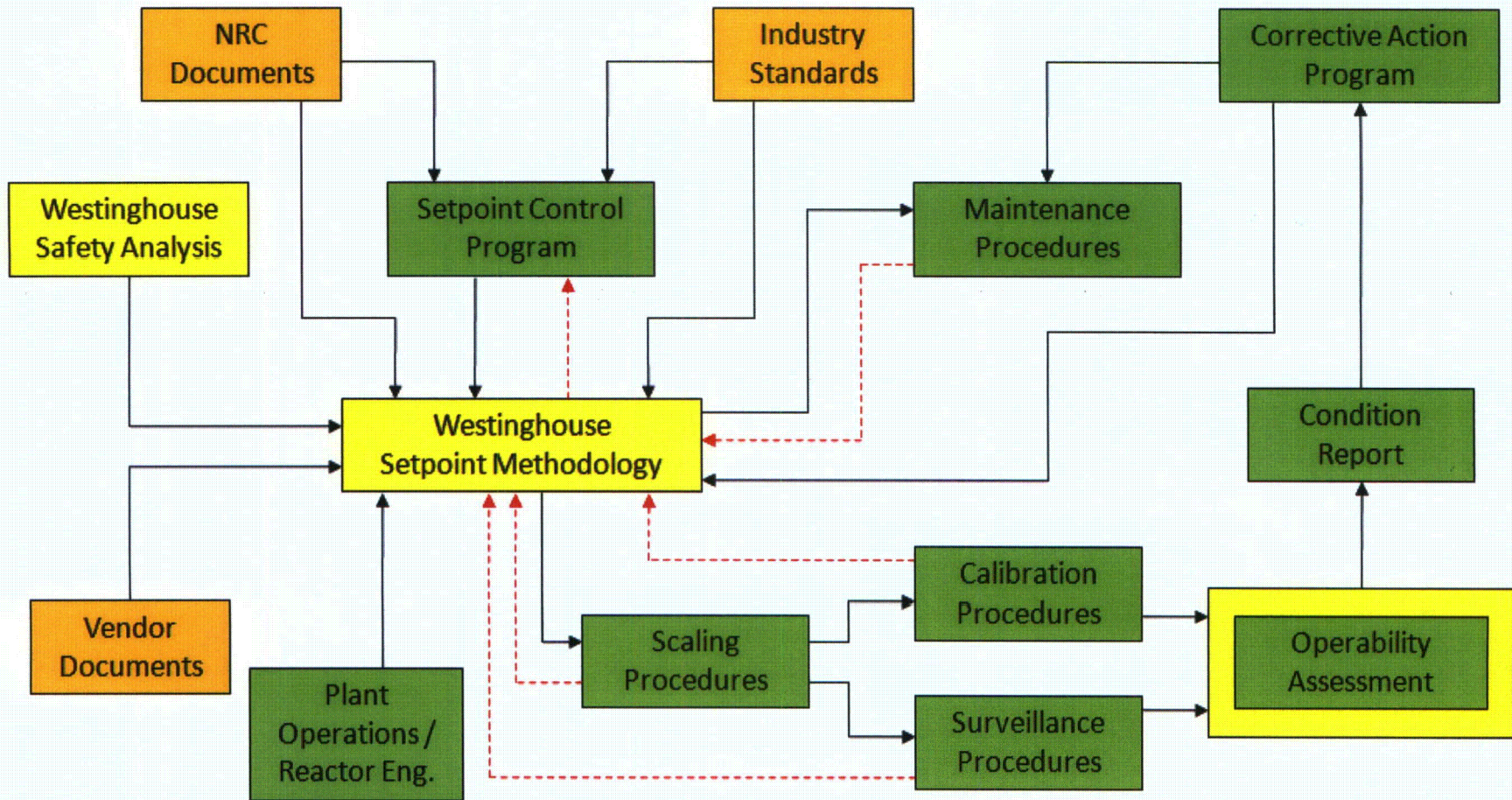
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WCAP-17503 Westinghouse SCP Recommendations

- ❑ Addresses each of the blocks of the Westinghouse SCP Process Flow Diagram initially presented at the December 2010 TSTF-493 Workshop and discussed at the July 2011 NRC/Westinghouse meeting.
- ❑ Identifies Westinghouse recommendations for a plant specific SCP and provides linkage with Westinghouse setpoint methodology assumptions.

WCAP-17503 Westinghouse SCP Recommendations



WCAP-17503 Westinghouse SCP Recommendations

☐ Industry Documents Evaluated

☐ ISA Documents

- 67.04.01-2006 RP67.04.02-2010
- TR67.04.09-2005 51.1-1979 (R1993)
- 67.06.01-2002

☐ IEEE Standards

- 279-1971 338-2006
- 498-1990 603-2009

☐ TSTF-493 Rev. 4



WCAP-17503 Westinghouse SCP Recommendations

☐ NRC Documents Evaluated

☐ RG 1.105 Rev 3

☐ RG 1.97

☐ BTP 7-12 Rev. 5

☐ ISG-08

☐ GL 91-04

☐ RIS 2006 -17



WCAP-17503 Westinghouse SCP Recommendations

☐ Examples of Vendor Documents:

- ☐ Cameron/Barton 764 d/p Transmitter User Manual
- ☐ Ultra/Weed N-E11 & N-E13 Transmitter Spec Sheet
- ☐ Rosemount 1154 H Transmitter Reference Manual
- ☐ Ultra/Weed DTN2010 Transmitter Spec Sheet
- ☐ Fluke 8845A/8846A Multimeter User Manual
- ☐ Keithley 2002 Multimeter User Manual
- ☐ Heise 901A/901B Pressure Indicator Operation Manual

WCAP-17503 Westinghouse SCP Recommendations

- ☐ Examples of Plant Documents to be Addressed:
 - ☐ Scaling Procedures/Calculations
 - ☐ Calibration Procedures
 - ☐ Surveillance Procedures
 - ☐ Corrective Action Program
 - ☐ Maintenance Procedures
 - ☐ Change Control Process
 - ☐ Administrative Controls
- ☐ Plant Safety Analyses

WCAP-17503 Westinghouse SCP Recommendations

☐ Assumptions of Westinghouse Setpoint Methodology With Respect to Instrumentation Testing:

☐ Qualification Testing

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☐ Calibration and Surveillance Testing

WCAP-17503 Westinghouse SCP Recommendations

☐ Westinghouse Calibration and Drift Data Evaluation Process



WCAP-17503 Westinghouse SCP Recommendations

☐ Westinghouse Instrument Operability Criteria

☐ Described in detail in WCAP-17504

- Process Rack
 - $\pm\text{AFT} = \pm\text{ALT} = \pm\text{RCA}$
- Transmitter
 - Within $\pm\text{ALT}$
 - Within $\pm\text{AFT}$
 - Outside $\pm\text{AFT}$



WCAP-17503 Westinghouse SCP Recommendations

- ☐ Outputs of the Westinghouse Setpoint Methodology
 - ☐ Scaling Procedures/Calculations
 - ☐ Calibration & Surveillance Procedures
 - ☐ Maintenance Procedures
 - ☐ Safety Analyses (negative margin correction)

WCAP-17503 Westinghouse SCP Recommendations

☐ Appendix A – BTP 7-12 Acceptance Criteria

- ☐ Addresses each of the items listed in the Acceptance Criteria section of BTP 7-12 Rev. 5

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WCAP-17503 Westinghouse SCP Recommendations

☐ Appendix B – BTP 7-12 Review Procedures

- ☐ Addresses each of the items listed in the Review Procedures section of BTP 7-12 Rev. 5

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WCAP-17503 Westinghouse SCP Recommendations

☐ Summary

- ☐ WCAP addresses each block of the Westinghouse Setpoint Control Program Process Flow Diagram
- ☐ Provides recommendations for what should be included in a plant specific SCP
- ☐ Is designed to be used in parallel with WCAP-17504, Westinghouse Setpoint Methodology
- ☐ Appendices []^{a,c} addresses each requirement of BTP 7-12 Acceptance Criteria and Review Procedures

Westinghouse Non-Proprietary Class 3

WCAP-17504

Westinghouse Generic Setpoint Methodology

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WCAP-17504 Westinghouse Setpoint Methodology

□ Overview

□ 4 - Main Sections

1. Basic algorithm and term identification
2. Definitions and example calculations
 - Protection function
 - Control function
 - Indication
3. Calibration and drift evaluation process
4. Application of Setpoint Methodology

WCAP-17504 Westinghouse Setpoint Methodology

☐ Basic algorithm is SRSS

☐ Current algorithm in use since 1997

☐ Protection Functions:

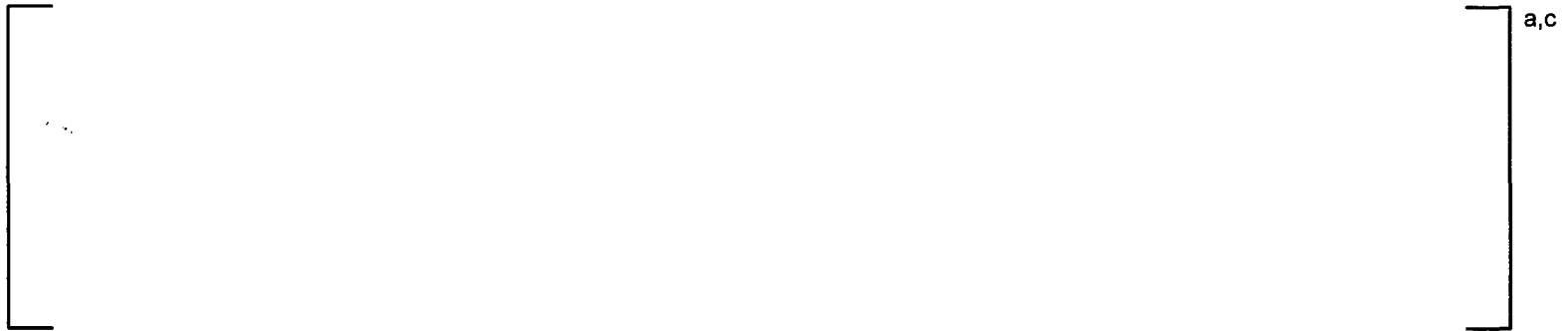
$$CSA_{\text{PROT}} = \left\{ \sqrt{PMA^2 + PEA^2 + SRA^2 + (SMTE + SD)^2 + (SMTE + SCA)^2 + SPE^2 + STE^2 + (RMTE + RD)^2 + (RMTE + RCA)^2 + RTE^2} \right\} + EA + \text{Bias}$$

☐ Control Functions:

$$\left[\begin{array}{c} \text{Control Functions} \end{array} \right]^{a,c}$$

WCAP-17504 Westinghouse Setpoint Methodology

☐ Indication:



WCAP-17504 Westinghouse Setpoint Methodology

☐ Key Points for Uncertainty Algorithm

☐ SMTE is dependent with SCA and SD

☐ RMTE is dependent with RCA and RD

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☐ Bias terms are one direction with a known magnitude

- Typically a result of calibration or drift evaluations or PMA terms

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WCAP-17504 Westinghouse Setpoint Methodology

☐ Statistical Basis

☐ 95/95 Two-sided

- Protection Functions
- Control Functions (ITDP/RTDP, [

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a,c

WCAP-17504 Westinghouse Setpoint Methodology

☐ Environmental Allowance Terms (Transmitters)

☐ Temperature

- Vendor specs note “ \pm ” suggesting that effect can be indicated higher than actual or indicated lower than actual



- Suggests the more appropriate treatment is as a limit of error

☐ Radiation

- Characteristics are very similar to those exhibited for temperature

WCAP-17504 Westinghouse Setpoint Methodology

☐ Environmental Allowance Terms – (Transmitter)

☐ Seismic

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- ☐ Suggests the more appropriate treatment is as a limit of error

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WCAP-17504 Westinghouse Setpoint Methodology

☐ Environmental Allowance Terms (Process Racks)

☐ Temperature

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☐ Radiation

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☐ Seismic

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WCAP-17504 Westinghouse Setpoint Methodology

Setpoint Parameter Relationship Diagram (Increasing Function)

SAL = Safety Analysis Limit

TA = Total Allowance

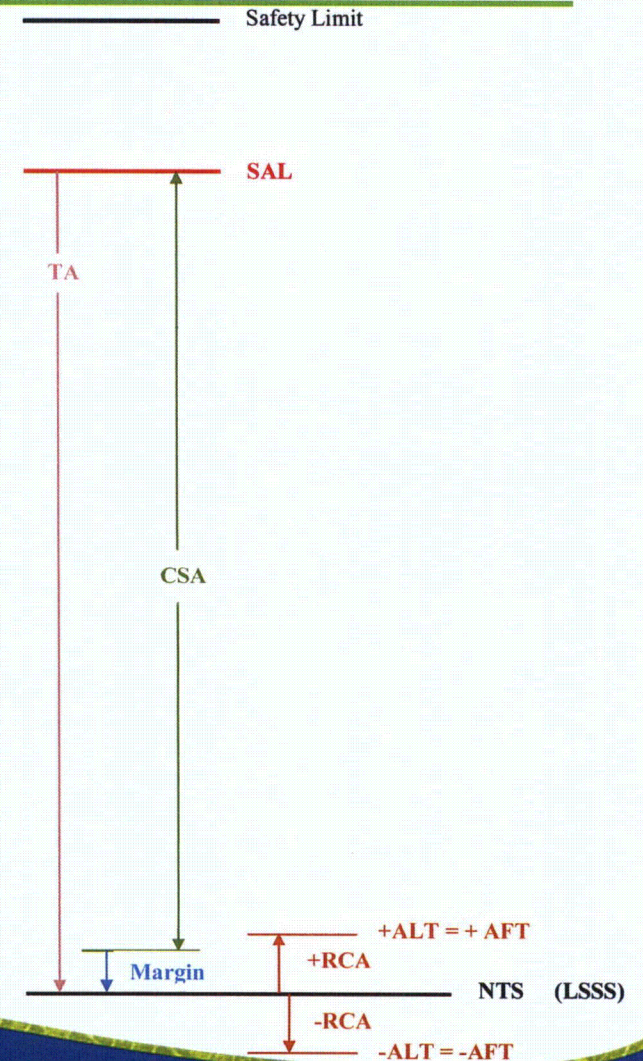
CSA = Channel Statistical Allowance

NTS = Nominal Trip Setpoint

RCA = Rack Calibration Allowance

ALT = As Left Tolerance

AFT = As Found Tolerance



WCAP-17504 Westinghouse Setpoint Methodology

□ AFT



Westinghouse

WCAP-17504 Westinghouse Setpoint Methodology

□ ALT.



WCAP-17504 Westinghouse Setpoint Methodology

☐ Example Tables Contain:

- ☐ Breakdown of instrument uncertainties
- ☐ CSA calculation
- ☐ SAL, NTS (Protection) [a,c
- ☐ TA calculation
- ☐ Margin
- ☐ Transmitter ALT, AFT limits
- ☐ Process Rack ALT, AFT limits
- ☐ Example Scaling information for Transmitter, Process Racks, Controller, Indication (as applicable)

WCAP-17504 Westinghouse Setpoint Methodology

☐ Westinghouse Calibration and Drift Evaluation Process

☐ Input Data



WCAP-17504 Westinghouse Setpoint Methodology

☐ Data Validity

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☐ Probability/Confidence Level

☐ 95/95

☐ RTS/ESFAS

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WCAP-17504 Westinghouse Setpoint Methodology

- ☐ Basic approach (deterministic) of calculating drift magnitude is based on GL 91-04
 - ☐ WCAP-13870 Rev. 1 – Indian Point 2 – 24 Month Fuel Cycle
 - ☐ WCAP-14646 Rev. 1 – Diablo Canyon – 24 Month Fuel Cycle
 - ☐ WCAP-15001 Rev. 0 – Indian Point 3 – 24 Month Fuel Cycle
- ☐ Same method as used to justify Indian Point 2 one time surveillance extension of 37 months
- ☐ NRC Approved
 - ☐ Indian Point 2 - 24 Month fuel cycles
 - ☐ Indian Point 3 - 24 Month fuel cycles
 - ☐ Indian Point 2 – One time 37 Month surveillance extension

WCAP-17504 Westinghouse Setpoint Methodology

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WCAP-17504 Westinghouse Setpoint Methodology



WCAP-17504 Westinghouse Setpoint Methodology

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WCAP-17504 Westinghouse Setpoint Methodology

a,c



Westinghouse

WCAP-17504 Westinghouse Setpoint Methodology

☐ Drift Determination

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WCAP-17504 Westinghouse Setpoint Methodology

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Westinghouse

WCAP-17504 Westinghouse Setpoint Methodology

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WCAP-17504 Westinghouse Setpoint Methodology

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WCAP-17504 Westinghouse Setpoint Methodology

**Westinghouse Calibration
and Drift Data Evaluation
Process Diagram**

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Westinghouse

WCAP-17504 Westinghouse Setpoint Methodology

□ Application of Westinghouse Setpoint Methodology

□ 7- Basic Assumptions

1. Instrument techs drive RCA towards 0 error
2. RCA $\left[\begin{array}{c} \text{ } \end{array} \right]_{a,c}$
3. RD $\left[\begin{array}{c} \text{ } \end{array} \right]_{a,c}$
4. Process racks are verified/functionally tested as a string or loop
5. Instrument techs drive SCA towards 0 error
6. SCA $\left[\begin{array}{c} \text{ } \end{array} \right]_{a,c}$
7. SD $\left[\begin{array}{c} \text{ } \end{array} \right]_{a,c}$

* surveillance interval (currently a nominal 18 or 24 months)

WCAP-17504 Westinghouse Setpoint Methodology

☐ Trend Evaluations look at the following



☐ Ability to calibrate is first indication of operability

☐ Drift magnitude is second indication of operability

☐ [] a,c

WCAP-17504 Westinghouse Setpoint Methodology

☐ Summary

☐ Basic algorithm is an SRSS

☐ 95/95 two-sided for protection functions, $\left[\begin{array}{c} \\ \end{array} \right]_{a,c}$

☐ Process Racks: $\pm\text{AFT} = \pm\text{ALT} = \pm\text{RCA}$

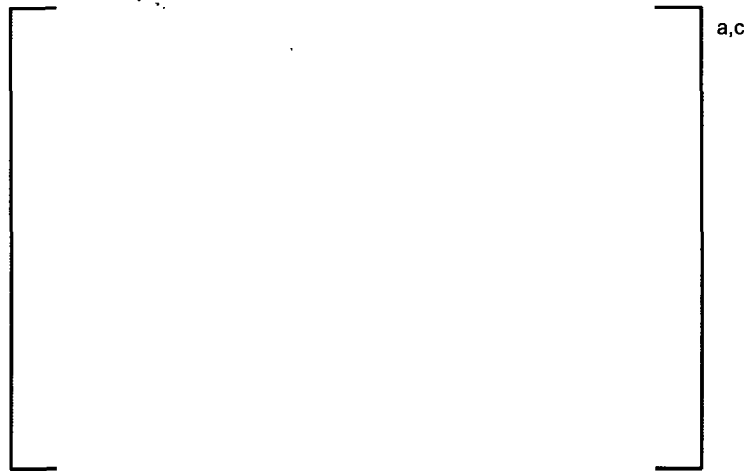
- AFT and ALT are performance based

☐ Transmitters: $\pm\text{AFT} = \pm\text{SD}$, $\pm\text{ALT} = \pm\text{SCA}$

- AFT and ALT are performance based

WCAP-17504 Westinghouse Setpoint Methodology

☐ Calibration and Drift evaluation processes [



☐ Trending/evaluation process [

]_{a,c} (currently a nominal 18 or 24 months)

WCAP-17504 Westinghouse Setpoint Methodology

☐ Appendix A – BTP 7-12 Acceptance Criteria

- ☐ Addresses each of the items listed in the Acceptance Criteria section of BTP 7-12 Rev. 5

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WCAP-17504 Westinghouse Setpoint Methodology

☐ Appendix B – BTP 7-12 Review Procedures

- ☐ Addresses each of the items listed in the Review Procedures section of BTP 7-12 Rev. 5

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SUMMARY

- ☐ Generated two WCAPs to address TSTF-493 Option B
 - ☐ WCAP-17503 Westinghouse Generic Setpoint Control Program Recommendations
 - ☐ WCAP-17504 Westinghouse Generic Setpoint Methodology
- ☐ WCAP-17503 used in conjunction with WCAP-17504
- ☐ WCAP-17504 can stand alone

SUMMARY

☐ Each WCAP addresses BTP 7-12 Rev 5

☐ Acceptance Criteria section in Appendix A

☐ Review Procedures section in Appendix B

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