Attachment 2
TVA Letter Dated March 16, 2011
Responses to Licensee Open Items to be Resolved for SER Approval

Westinghouse Electric Company WNA-VR-00283-WBT-NP, Revision 4 "Nuclear Automation IV&V Summary Report for the Post Accident Monitoring System," Dated March 2011 (non-proprietary)

Westinghouse

Westinghouse Non-Proprietary Class 3

Nuclear Automation
Watts Bar Unit 2 NSSS Completion Program I&C Projects

IV&V Summary Report for the Post Accident Monitoring System

WNA-VR-00283-WBT-NP,
Rev. 4

March 2011

APPROVALS

Function	Name and Signature
Authors	Secil Karaaslan* Engineer, Independent Verification & Validation
Reviewer	Nick Sfamenos* Engineer, Independent Verification & Validation
Approver	Murat S. Uzman* Manager, Independent Verification & Validation

*Electronically approved records are authenticated in the electronic document management system.

LIST OF ADDITIONAL REVIEWERS/CONTRIBUTORS

Revision	Name and Title
2	Murat Uzman Manager, Independent Verification & Validation
2, 3, 4	Stephanie Smith Project Manager, Common Q PAMS
3, 4	Jenna L. Tyger Technical Editor, Technical Communications

REVISION HISTORY

RECORD OF CHANGES

Revision	Author	Description	Completed
2	Secil Karaaslan	Added brackets for proprietary information based on WNA-VR-00283-WBT, Rev. 2	Dec. 2010
3	Secil Karaaslan	Updated for Integration Phase	Dec. 2010
4	Secil Karaaslan	Updated to incorporate summary of IV&V activities per new project baseline and release reports. Impacts all phases through Integration. Addressed deficiencies that were identified through self-assessments.	See EDMS

DOCUMENT TRACEABILITY & COMPLIANCE

Created to Support the Following Document(s)	Document Number	Revision
Verification & Validation Process for the Common Q Safety Systems	WNA-PV-00009-GEN	3

OPEN ITEMS

Item	Description	Status
1	Release of Test Summary Report is pending NRC comments. However, it does not impact conclusions of this report. The conclusions are based on lower tier test reports.	OPEN

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ACRONYMS AND TRADEMARKS

Acronyms used in the document are defined in WNA-PS-00016-GEN, "Standard Acronyms and Definitions" (Reference 2), or included below to ensure unambiguous understanding of their use within this document.

Acronym	Definition
CI	Configuration Item
CIT	Channel Integration Test
CM	Configuration Management
CPCE	Custom PC Element
EDMS	Electronic Document Management System
ER	Exception Report
EST	Element Software Test
FAT	Factory Acceptance Test
FPD	Flat Panel Display
FPDS	Flat Panel Display System
IV&V	Independent Verification and Validation
PMST	Processor Module Software Test
QN	Quality Notice
REC	Request for Engineering Change
RSED	Reusable Software Element Document
RTA	Requirements Traceability Assessment
RTM	Requirements Traceability Matrix
SCR	Software Change Request
SDS	System Design Specification
SLC	Software Life Cycle
SPM	Software Program Manual
SRR	Software Release Record
SRS	Software Requirements Specification
SyRS	System Requirement Specification
TC	Type Circuit

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GLOSSARY OF TERMS

Standard terms used in the document are defined in WNA-PS-00016-GEN, "Standard Acronyms and Definitions" (Reference 2), or included below to ensure unambiguous understanding of their use within this document.

Term	Definition
Common Qualified Platform (Common Q)	A safety system instrumentation and control (I&C) platform defined in WCAP-16097-NP-A, "Common Qualified Platform Topical Report" (Reference 3).
Design Objects	Items produced during the design process such as documents, drawings, databases, program code, etc.
WORKM Common Q	Workflow Management System – A Lotus Notes® database used for exception reporting and resolution tracking.

REFERENCES

Following is a list of references used throughout this document.

1. WNA-PV-00009-GEN, Rev. 3, "Verification & Validation Process for the Common Q Safety Systems," Westinghouse Electric Company LLC.

2. WNA-PS-00016-GEN, Rev. 5, "Standard Acronyms and Definitions," Westinghouse Electric Company LLC.

3. WCAP-16097-NP-A, Rev. 0, "Common Qualified Platform Topical Report," Westinghouse Electric Company LLC.

4. NSNP 3.6.1, Rev. 2, "Computer Software Development Process," Westinghouse Electric Company LLC, effective February 8, 2010.

5. NA 4.37, Rev. 1, "Configuration Management," Westinghouse Electric Company LLC, effective April 20, 2009.

6. WCAP-16096-NP-A, Rev. 1A, "Software Program Manual for Common Q Systems," Westinghouse Electric Company LLC.

7. WNA-BR-00299-WBT, Rev. 4, "Post Accident Monitoring System Baseline Report," Release Level 1.1 Rev. 1, Westinghouse Electric Company LLC.

8. WBT-TVA-0070, "Safety Related Digital Logic Cards Circuitry & Related Instrument Racks Restriction," Tennessee Valley Authority, October 9, 2008.

9. WNA-PD-00073-WBT, Rev. 0. "Project Plan Common Q Post Accident Monitoring System," Westinghouse Electric Company LLC.

10. WNS-PQ-00001-WBT, Rev. 0, "Watts Bar Unit 2 NSSS Completion Project Quality Plan," Westinghouse Electric Company LLC.

11. WNA-PQ-00220-WBT, Rev. 1, "Watts Bar Unit 2 NSSS Completion I&C Projects – Project Quality Plan," Westinghouse Electric Company LLC.

12. WNA-PD-00056-WBT, Rev. 1, "Project Plan Watts Bar Unit 2 NSSS Completion I&C Projects," Westinghouse Electric Company LLC.

13. WNA-DS-01617-WBT-P, Rev. 4, "Watts Bar Unit 2 NSSS Completion Program I&C Projects Post Accident Monitoring System – System Requirements Specification," Westinghouse Electric Company LLC.

REFERENCES (Cont.)

14. WNA-DS-01667-WBT-P, Rev 4, "Watts Bar Unit 2 NSSS Completion Program I&C Projects Post Accident Monitoring System – System Design Specification," Westinghouse Electric Company LLC.

15. WNA-SD-00239-WBT-P, Rev. 4, "Software Requirements Specification for the Post Accident Monitoring System," Westinghouse Electric Company LLC.

16. NABU-DP-00014-GEN, Rev. 2, "Design Process for Common Q Safety Systems," Westinghouse Electric Company LLC.

17. WNA-IG-00109-GEN, Rev. 0, "Configuration Management Implementation Guideline," Westinghouse Electric Company LLC.

18. WBT-D-2660, "Revisions to TVA Specifications EDCR-52351 Compliance Matrix," Westinghouse Electric Company LLC, November 17, 2010.

19. Contract Number 65717, "Tennessee Valley Authority Watts Bar Nuclear Plant Unit 2 NSSS Completion Project," Tennessee Valley Authority.

20. WEST-WBT-2008-025, "TVA Contract Work Authorization," Tennessee Valley Authority.

21. WNA-RL-00817-WBT, Rev. 3, "Post Accident Monitoring System Requirements Traceability Release Report," Release Level 1.1.0 Rev. 1, Westinghouse Electric Company LLC.

22. WNA-VR-00279-WBT, Rev. 4, "Watts Bar 2 NSSS Completion Program I&C Projects Requirements Traceability Matrix for the Post-Accident Monitoring System," Westinghouse Electric Company LLC.

23. WNA-VR-00280-WBT, Rev. 2, "Watts Bar 2 NSSS Completion Program I&C Projects Requirements Traceability Matrix for the Reactor Vessel Level Indication System (RVLIS) Custom PC Elements," Westinghouse Electric Company LLC.

24. WNA-PT-00138-WBT-P, Rev. 0, "Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Test Plan," Westinghouse Electric Company LLC.

25. WNA-LI-00058-WBT-P, Rev. 2, "Tennessee Valley Authority (TVA) Watts Bar Unit 2 (WBN2) Post-Accident Monitoring System (PAMS) Licensing Technical Report," Westinghouse Electric Company, LLC.

REFERENCES (Cont.)

26. WNA-CD-00029-GEN, Rev. 1, "Commercial Grade Dedication Report for the ABB Advant PM646A/PM646B Firmware/Base System Software Version 1.3/8, ACC Advanced Version 1.7/1, AC160 PC and DB Element Library Version 1.5/1 for Common Q Applications," Westinghouse Electric Company LLC.

27. WNA-VR-00284-GEN, Rev. 0, "Common Q Generic FPDS IV&V Summary Report," Westinghouse Electric Company, LLC.

28. WNA-SD-00248-WBT, Rev. 2, "Software Design Description for the Post Accident Monitoring System Flat Panel Display," Westinghouse Electric Company, LLC.

29. WNA-SD-00250-WBT, Rev. 3, "Software Design Description for the Post Accident Monitoring System for the AC160 Software," Westinghouse Electric Company, LLC.

30. WNA-RL-00827-WBT, Rev. 3, "Post Accident Monitoring System Software Implementation Release Report," Release Level 1.1.0 Rev. 3, Westinghouse Electric Company LLC.

31. WNA-RL-00816-WBT, Rev. 2, "Post Accident Monitoring System Hardware Implementation Release Report," Release Level 1.1.0 Rev. 2, Westinghouse Electric Company LLC.

32. WNA-SD-00277-WBT, Rev. 3, "Post Accident Monitoring System Flat Panel Display System Screen Design Details," Westinghouse Electric Company LLC.

33. WNA-CR-00010-WBT, Rev. 2, "Watts Bar Unit 2 NSSS Completion I&C Projects User Configurable Setpoints for the Post Accident Monitoring System," Westinghouse Electric Company LLC.

34. WNA-TP-02772-WBT, Rev. 0, "Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Cabinet Hardware Test Procedure," Westinghouse Electric Company LLC.

35. WNA-TP-03057-WBT, Rev. 0, "Processor Module Software Test Procedure for the Post Accident Monitoring System," Westinghouse Electric Company LLC.

36. WNA-TP-02955-WBT, Rev. 0, "Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Flat Panel Display Software Test Procedure," Westinghouse Electric Company LLC.

37. WNA-TP-02988-WBT, Rev. 0, "Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Channel Integration Test/Factory Acceptance Test," Westinghouse Electric Company LLC.

38. WNA-DS-01070-GEN, Rev. 5, "Application Restrictions for Generic Common Q Qualification," Westinghouse Electric Company LLC.

REFERENCES (cont.)

39. WNA-RL-00530-GEN, Rev. 0V, "Software Release Record for the STDADD05 AC160 Library," Westinghouse Electric Company LLC.

40. WNA-RL-00646-WBT, Rev. 2, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train A, PAMA," Westinghouse Electric Company LLC.

41. WNA-RL-00648-WBT, Rev. 0, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train B, PAMB," Westinghouse Electric Company LLC.

42. WNA-RL-00743-WBT, Rev. 1, "Software Release Record for Watts Bar Unit 2 PAMS FPDS," Westinghouse Electric Company LLC.

43. WNA-TR-02389-WBT, Rev. 0, "Processor Module Software Test Report for the Post Accident Monitoring System," Westinghouse Electric Company LLC.

44. WNA-VR-00295-WBT, Rev. 1, "Code Review Report for the Post Accident Monitoring System Flat Panel Display," Westinghouse Electric Company LLC.

45. WNA-TR-02383-WBT, Rev. 1, "Post Accident Monitoring System Cabinet Hardware Test Report," Westinghouse Electric Company LLC.

46. NA 10.1.3, Rev. 0, "Inspections," Westinghouse Electric Company LLC, effective May 21, 2010.

47. WNA-TR-02387-WBT, Rev. 1, "Post Accident Monitoring System Flat Panel Display Software Test Report," Westinghouse Electric Company LLC.

48. WNA-TR-02413-WBT, Rev. 1, "Post-Accident Monitoring System Channel Integration Test/Factory Acceptance Test Report," Westinghouse Electric Company LLC.

49. WNA-AR-00196-WBT, Rev. 0, "Regression Analysis for the Post Accident Monitoring System," Westinghouse Electric Company LLC.

50. WBT-D-0088, "Transmittal Westinghouse Comments on TVA Specification EDCR52351," Westinghouse Electric Company LLC, July 10, 2008.

51. WNA-TR-02451-WBT, Rev. 0/DRAFT, "Test Summary Report for the Post Accident Monitoring System," Westinghouse Electric Company LLC.

52. WNA-RL-00646-WBT, Rev. 5, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train A, PAMA," Westinghouse Electric Company LLC.

53. WNA-RL-00648-WBT, Rev. 3, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train B, PAMB," Westinghouse Electric Company LLC.

REFERENCES (cont.)

54. WNA-RL-00743-WBT, Rev. 4, "Software Release Record for Watts Bar Unit 2 PAMS FPDS," Westinghouse Electric Company LLC.

55. WNA-AR-00209-WBT, Rev. 0, "Regression Analysis for the Post Accident Monitoring System," Westinghouse Electric Company LLC.

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SECTION 1
INTRODUCTION

1.1 OBJECTIVE

This report summarizes the independent verification and validation (IV&V) activities and the results of those activities performed during the Watts Bar Unit 2 Post Accident Monitoring System (PAMS) project. It summarizes the results and current status of the IV&V tasks identified by WNA-PV-00009-GEN, "Verification & Validation Process for the Common Q Safety Systems" (Reference 1) as augmented by WNA-PT-00138-WBT-P, "Watts Bar 2 Post Accident Monitoring System Test Plan" (Reference 24). Reference 1 is the interpretation of IV&V activities imposed by the Software Program Manual (SPM) for Common Q Safety Systems (Reference 6) for day-to-day execution.

Updates of this report will occur as the Watts Bar Unit 2 PAMS project progresses through the software life cycle (SLC). The scope section will identify the progressive coverage of the SLC at each revision of this document.

1.2 SCOPE

This revision of the report covers the Concept , System Definition (or requirements), Design and Implementation, and Integration phases of the project as defined by the V&V Process for the Common Q Safety Systems (Reference 1).

The Software Requirements Specification (SRS), in support of the System Requirement Specifications (SyRS) and the System Design Specifications (SDS) bounds the extent of IV&V activities for the System Definition Phase.

The Software Design Descriptions (SDD) released for both AC160 and Flat Panel Display (FPD) platforms are input to the Design Phase activities.

The Implementation Phase inputs are the application software released for unit level verification and validation (Processor Module Software Test for AC160, and code reviews for FPD application). The software is released through Software Release Records.

Module level validation (Element Software Test) of reusable software elements used in the Watts Bar 2 PAMS application software has been undertaken as part of the generic qualification. Results of that qualification effort are also included in the Design and Implementation Phase summaries.

Execution and reporting of the integration level tests are within the scope of the Integration Phase.

Resolution of anomalies resulted in an iteration of definition, design, implementation and integration phase activities. This report also captures the regression performed at each phase.

WNA-BR-00299-WBT, "Post Accident Monitoring System Baseline Report," at release level 1.1 (Reference 7) provides a listing of configuration items (CIs) regarded as predecessors to the IV&V activities for both Concept Phase and System Definition Phase for the Watts Bar Unit 2 PAMS project.

Design and implementation corresponding to the Baseline Report is captured in several Release Reports (References 21, 30 and 31).

Section 2 of this report describes the IV&V tasks performed during each phase within the scope of this revision. Section 3 provides the results of these tasks. Section 4 summarizes the findings of the IV&V review and assessment activities. Section 5 is an assessment of software quality, and Section 6 presents IV&V's recommendation for the Watts Bar Unit 2 PAMS project.

The Lotus Notes® exception reporting and resolution tracking database, WORKM Common Q, contains records of the exception reports (ER) created during the IV&V activities. These ERs contain the details of the IV&V findings summarized in Section 4. Unresolved findings are being carried forward into the next phase of the Watts Bar Unit 2 PAMS project.

1.3 SUMMARY AND CONCLUSIONS

IV&V activities as deemed appropriate for the Concept and Definition Phase of the SLC were performed on configuration items released by the Watts Bar Unit 2 PAMS project Baseline Report (Reference 7). IV&V activities pertaining to Design and Implementation Phases of the SLC were performed on configuration items released through Software and Hardware Implementation Release Reports (References 30 and 31, respectively) and the Requirements Traceability Release Report (Reference 21). The software released to IV&V has been through code inspections, unit, and integration tests as well as regression tests per the Test Plan (Reference 24). The software for the PAMS is classified as Important to Safety as defined in the Common Q Software Program Manual (Reference 6) and the IV&V activities pertaining to this project are commensurate with this classification as defined by the V&V Process for Common Q Safety Systems (Reference 1).

The review of CIs considered to be within the scope of Concept Phase resulted in no findings.

Previous revisions of this report identified documentation and implementation issues that were captured in ERs (see Table 4-2). New documentation and software releases have been through another review cycle and a series of regression testing. Satisfactory resolution of newly identified issues has been recorded in the issue tracking database. There is no outstanding issue that is significant to prevent the Watts Bar Unit 2 PAMS from moving forward with the shipping and installation processes.

A Test Summary Report (WNA-TR-02451-WBT [See Open Item #1]) will be produced by IV&V summarizing the test program and offering conclusions. The conclusions contained in this Phase Summary Report are based on the lower tier test results and reports and will not be invalidated with the introduction of the new Test Summary Report.

The Watts Bar Unit 2 PAMS software has successfully completed the required verification and validation activities for the Design and Implementation Phases of the SLC. The AC160 and FPDS software

applications, released for verification via References 40, 41, and 42, may be transferred to the Production Software Library and issued for use in the delivered Watts Bar Unit 2 PAMS.

The next revision of this IV&V Summary Report will address the Installation Phase of the SLC.

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SECTION 2
DESCRIPTION OF IV&V TASKS PERFORMED

2.1 CONCEPT PHASE

IV&V tasks for the Concept Phase include review of Concept documentation for consistency, incompatibilities, and compliance to regulations.

The following IV&V tasks have been performed for the Watts Bar Unit 2 PAMS project Concept Phase:

1. Evaluated the PAMS project's Baseline Report (Reference 7) for completeness to confirm all necessary concept phase documents were captured as configured items (CI).

2. Reviewed WNA-PD-00073-WBT, "Project Plan Common Q Post Accident Monitoring System" (Reference 9), for compatibility and consistency with the parent project's (Watts Bar Unit 2 NSSS Completion I&C Project) quality and project plans listed below:

   a. WNS-PQ-00001-WBT, "Watts Bar Unit 2 NSSS Completion Project Quality Plan" (Reference 10).

   b. WNA-PQ-00220-WBT, "Watts Bar Unit 2 NSSS Completion I&C Projects – Project Quality Plan" (Reference 11).

   c. WNA-PD-00056-WBT, "Watts Bar Unit 2 NSSS Completion Projects – Project Plan" (Reference 12).

3. Reviewed the PAMS project plan (Reference 9) for compatibility and consistency with established procedures and processes as defined in references below:

   a. Westinghouse Level II Policies & Procedures.

   b. Westinghouse Nuclear Services Policy/Procedure NSNP 3.6.1 "Computer Software Development Process" (Reference 4).

   c. WCAP-16096-NP-A, "Software Program Manual for Common Q Systems" (Reference 6).

   d. NABU-DP-00014-GEN, "Design Process for Common Q Safety Systems" (Reference 16).

   e. WCAP-16097-NP-A, "Common Qualified Platform Topical Report" (Reference 3).

The SPM (Reference 6) also identifies additional tasks for this phase as follows:

1. Identify major constraints of interfacing systems.
2. Identify constraints and limitations of proposed system.
3. Assess allocation of functions to hardware and software items.

Review of the Tennessee Valley Authority (TVA) work authorization (Reference 20) and the Westinghouse's early comments on TVA specifications (Reference 50) concluded that the proposed system is based on generic Common Q PAMS design with certain project-specific changes. The generic Common Q PAMS is defined in Common Qualified Platform Topical Report Appendix 1 (Reference 3). This appendix describes PAMS functions together with constraints and limitations. Therefore, the above identified tasks are not required to be repeated for the Concept Phase of each individual project that utilizes the generic PAMS design. However, the differences from the generic design are captured during the Definition Phase work products and submitted to IV&V. Additionally, IV&V reviews the TVA specification compliance matrix to confirm the proposed system meets the customer requirements. These are captured in this report as part of the Definition Phase tasks.

PAMS is classified as Important to Safety by SPM. Therefore, there is no need to assess criticality of each software item.

2.2 DEFINITION PHASE

The following subsections describe the IV&V tasks performed for the Definition Phase.

2.2.1 Documentation Reviews

Table 2.2-1 lists the Definition Phase documents reviewed for clarity, compatibility, correctness and completeness.

Table 2.2-1. Definition Phase Documentation

Document Number	Document Title	Reference
WNA-DS-01617-WBT-P	Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System – System Requirements Specification	13
WNA-DS-01667-WBT-P	Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System – System Design Specification	14
WNA-SD-00239-WBT-P	Watts Bar 2 NSSS Completion Program I&C Projects Software Requirements Specification for the Post Accident Monitoring System	15

2.2.2 Requirements Traceability Assessment

In order to verify that Watts Bar 2 PAMS requirements were captured completely and correctly, IV&V performed an assessment of the requirements tracing using the Requirements Traceability Matrices (RTM) released by the Requirement Traceability Release Report (Reference 21).

There are two RTMs released for the Project as shown in Table 2.2-2.

Table 2.2-2. Requirement Traceability Matrices

Document Number	Document Title	Reference
WNA-VR-00279-WBT	Watts Bar 2 NSSS Completion Program I&C Projects Requirements Traceability Matrix for the Post Accident Monitoring System	22
WNA-VR-00280-WBT	Watts Bar 2 NSSS Completion Program I&C Projects Requirements Traceability Matrix for the Reactor Vessel Level Indication System (RVLIS) Custom PC Elements	23

The RTM for PAMS (Reference 22), also called the "System RTM", traces the Watts Bar 2 PAMS design aspects not already qualified for use as part of the standard Common Q platform or the Common Q PAMS system. The scope of requirements traceability assessment activity for the System Definition Phase covers tracing from System Requirements Specification down to Software Requirements Specification and back.

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Requirement traceability analysis was performed for System Definition Phase in conjunction with the review of requirements documents identified in Table 2.2-1.

2.2.3 Developing Project Specific Test Plan

A project-specific Test Plan (Reference 24) was developed based on the System Definition Phase documentation. Interpretation of the SPM (Reference 6) requirements for developing a Test Plan is provided in Section 6 of the Verification and Validation Process for Common Q Safety Systems (Reference 1). Accordingly, the detailed test specifications and the test case format and contents are captured within the test procedures rather than within the Test Plan. The test procedures were developed during the Design Phase. For ESTs and PMSTs, generic test procedures are available to define the scope and methodology. They also identify the test environment and test tools.

2.2.4 Configuration Management Assessment

IV&V performed an assessment of the project's baseline report (Reference 7) for completeness, consistency and correctness for the System Definition Phase. Nuclear Automation Policy for Configuration Management NA 4.37 (Reference 5) and the guidelines for creating a project Document Index (WNA-IG-00109-GEN, Reference 17) were used for guidance.

The following activities were performed on the Baseline Report:

1. An evaluation of the Baseline Report to confirm the baseline identifies the source requirement input documents both internal and external, policies and procedures applicable to the project's execution, and the documents generated to capture decomposed system, hardware and software level requirements which are within the scope of Definition Phase of SLC.

2. A consistency check of the Definition Phase requirements documents (Table 2.2-1) with the Watts Bar Unit 2 PAMS source requirement input documents. Table 2.2-3 lists the source input documents.

Table 2.2-3. Watts Bar 2 PAMS Source Requirement Input Documentation

Document Number	Document Title	Reference
Contract Number 65717	Tennessee Valley Authority Watts Bar Nuclear Plant Unit 2 NSSS Completion Project.	19
WBT-D-2660	Revision to TVA Specifications EDCR 52351 Compliance Matrix	18
WEST-WBT-2008-025	TVA Contract Work Authorization	20
WBT-TVA-0070	Safety Related Digital Logic Cards Circuitry & Related Instrument Racks Restriction	8
WCAP-16097-NP-A	Common Qualified Platform Topical Report	3

3. Verification of the configuration items (CIs) listed in the baseline report. All CIs must be approved and archived in the electronic document management system (EDMS). For CIs representing industry codes and standards, EDMS archival was not required since these documents are available through other repositories.

IV&V has taken credit of second-party (peer) review of the source requirement input documents (see Table 2.2-3) as the means for verification. IV&V did not perform further review of these documents during this CM assessment. As defined by the verification and validation process (Reference 1) and WCAP-16096-NP-A, "Software Program Manual for Common Q Systems" (Reference 6), the scope of IV&V activities begins with the functional requirements definition.

2.2.5 Change Control Assessment

IV&V performed an assessment of the change control mechanisms in place for the Watts Bar Unit 2 PAMS project.

Presently, there are two databases used by Nuclear Automation to record and track design changes and issues for the Watts Bar 2 PAMS project. Table 2.2-4 lists the databases and provides a description for each.

Table 2.2-4. Change Control Databases

Database Name	Description
Corrective Action Process (CAP)	Implemented with Lotus Notes and utilized company-wide to report and track issues pertaining to conditions adverse to the safety or quality of items and services.
Exception Reports (ERs) for Common Q Systems	Implemented with Lotus Notes and maintained by Nuclear Automation to record and track issues raised during verification and validation (V&V) of Common Q design objects. The ER database also tracks Common Q software change requests (SCR).

IV&V reviewed each database to impact the issues related to Watts Bar 2 PAMS. The assessment involved the following activities:

1. A status review of CAPs issued against the safety system design processes within Nuclear Automation.

2. A status review of ERs issued against the Watts Bar 2 PAMS project. This assessment was limited to ERs issued by the IV&V team as part of the verification and validation activities against the Watts Bar 2 PAMS project.

In addition to the above mentioned databases which are based on defined workflows and the resolution of issues are tracked to closure, the Watts Bar 2 PAMS project also maintains an internal Open Issue database to keep track of self-identified issues that are documentation or project execution commitments. This Open Issue database was also reviewed by IV&V to confirm the issues are not impacting the successful conclusion of the System Definition Phase. The location and file reviewed is as follows:

Location: \\SINT2010\Groups1\Aut\Comq\PAMS - Watts Bar 2\Open Item Master Database

Filename: WB2 PAMS MASTER Open Items.xls

2.3 DESIGN PHASE

The following IV&V activities were performed during the Design Phase:

2.3.1 Generic Qualification

Generic qualification refers to reuseable software elements as well as the platform and base software used by the Watts Bar 2 PAMS Project. Although the timing of generic qualification is independent of the project-specific verification efforts, generic software and its requirements are expected to be available at the time of the project's Design Phase activities. Therefore, those generic qualification activities and their results are captured in this phase for reporting purposes.

2.3.1.1 Generic AC160 Qualification

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[redacted]

2.3.1.2 Generic Platform Software Qualification

Watts Bar 2 PAMS AC160 application utilize AC160 base system software version at 1.3/8 with its applicable standard libraries. IV&V confirmed the base software has been generically qualified before its use with the PAMS project.

Maintenance and Test Panel (MTP) and Operator's Panel (OM) application software, also called as Flat Panel Display System (FPDS) software, makes use of the generic FPDS software at release level 09-00. IV&V confirmed that the platform software has been generically qualified before use in the PAMS project.

Watts Bar 2 PAMS FPDS software overrides several software files that were part of the Generic FPDS Release 09-00. These differences were introduced into the Watts Bar 2 PAMS FPDS application software to implement fixes to the issues identified in the platform software. The difference analysis and verification and validation of the revised platform software files that are now part of the Watts Bar 2 PAMS FPDS application software have been added to the project's IV&V scope.

2.3.2 Review of Documentation

Table 2.3-1 lists the Design Phase documents produced for the Watts Bar 2 PAMS project.

Table 2.3-1. Design Phase Documentation

Document Number	Document Title	Reference
WNA-SD-00250-WBT	Software Design Description for the Post Accident Monitoring System AC160 Software	29
WNA-SD-00248-WBT	Software Design Description for the Post Accident Monitoring System Flat Panel Display	28
WNA-SD-00277-WBT	Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Flat Panel Display System Screen Design Details	32
WNA-CR-00010-WBT	Watts Bar 2 NSSS Completion Program I&C Projects User Configurable Setpoints for the Post Accident Monitoring System	33

A Preliminary Design Review was performed on the initial releases of the documents in Table 2.3-1. As design progressed and addressed anomalies identified throughout the SLC, new revisions of the design specification documents were released for verification. Critical Design Review was performed on the revisions released for Channel Integration Test/Factory Acceptance Test (CIT/FAT) and on the latest revisions released to close issues identified during those tests.

The Software Design Descriptions have been reviewed for clarity, compatibility, correctness and completeness as part of the preliminary and critical design reviews.

The FPDS Screen Design Details are considered design details and their verification has been left for the Flat Panel Display System Test.

The User Configurable Setpoints for PAMS provide a list of addressable constants and their default values for testing purposes only. This document has not been verified for correctness as the initial values will be modified during plant startup. However, the document has been used to verify the Flat Panel Display System application code databases for variable name, description, range and unit values.

2.3.3 Requirements Traceability Assessment

Requirements Traceability Assessment at the Design Phase includes verification of tracing from Software Design Description statements to the higher level requirements.

2.3.4 Developing Test Procedures

IV&V Test Team utilized the System Definition Phase requirements documents identified in Table 2.2-1 to derive test procedures at each test phase. The test phases include Cabinet Hardware Test (CHT), Processor Module Software Test (PMST), Flat Panel Display System Test (FPDST) and Channel Integration Test (CIT). The CIT is also referred to as Factory Acceptance Test (FAT).

The Element Software Test (EST) for each reusable software element has been developed under generic qualification efforts based on requirements identified in the Reusable Software Element Documents (RSED).

An assessment of test coverage was performed to verify the completeness of the overall test program. As a result of this activity, the RTM was updated with tracing information linking SRS requirements to SDDs and test statements.

2.3.5 Configuration Management Assessment

IV&V performed an assessment of the project's release reports for software (Reference 30), hardware (Reference 31), and requirements traceability matrices (Reference 21) for completeness and consistency with the Project's Baseline Report (Reference 7) as applicable to the Design Phase.

The following activities were performed on the Release Reports:

1. An evaluation of the release reports to confirm they include the documents expected within the scope of Design Phase of SLC.

2. A consistency check of the release levels between the release reports and the baseline report.

3. Verification of the configuration items (CIs) listed in the release reports. All CIs must be approved and archived in the electronic document management system (EDMS).

2.4 IMPLEMENTATION PHASE

The following IV&V activities were performed during the Implementation Phase:

2.4.1 Verification of Software Implementation

IV&V tasks in this phase include code inspections for both AC160 and FPD application software as well as execution of PMST Procedure.

The following table shows software release records that releases the application software for IV&V inspection and test:

Table 2.4-1. Software Release Records for Application Software

Document Number	Document Title	Reference
WNA-RL-00646-WBT	Common Q Software Release Record for Watts Bar Unit 2 PAMS Train A, PAMA	40
WNA-RL-00648-WBT	Common Q Software Release Record for Watts Bar Unit 2 PAMS Train B, PAMB	41
WNA-RL-00743-WBT	Software Release Record for Watts Bar Unit 2 PAMS FPDS	42

This IV&V task includes both test and code inspections (i.e. Greenlining) executed according to the Post Accident Monitoring System Test Plan (Reference 24). The PMST Procedure (Reference 35) identifies what requirements are to be tested vs. the code inspection credited for validation.

The software for both AC160 and FPDS has been released for verification multiple times to address anomalies identified during previous iterations of IV&V review or for self identified issues. Regression analysis is performed to determine the scope of V&V activities necessary to verify the changes. Regression can include code inspection, testing, and documentation reviews. Test cases developed in previous release cycles may also be re-executed to ensure that no unintended changes in functional behavior have occurred as a result of changes made to the current revision under test.

In addition to the Processor Module Software Test Report (Reference 43), a Regression Analysis Report (Reference 49) and a Code Review Report (Reference 44) were generated, and revised over time, to cover complete verification of multiple releases.

2.4.2 Verification of Hardware Implementation

Cabinet Hardware Test Procedure (Reference 34) has been executed to validate the hardware implementation per the Post Accident Monitoring System Test Plan (Reference 24).

2.4.3 Requirements Traceability Assessment

There is no Requirements Traceability Assessment performed during Implementation Phase as the software itself is not an input to the RTM. The tracing of SDDs is a Design Phase activity and the verification of software implementation against the SDD is an IV&V activity that does not impact the RTM. Although PMST procedure has been developed during this phase, the IV&V input for tracing PMST test cases to SDD and SRS has been incorporated into the RTM in its Integration Phase release which also included tracing information from the integration tests.

2.4.4 Configuration Management Assessment

IV&V performed an assessment of the project's release reports for software implementation (Reference 30) for completeness and consistency against the Project's Baseline Report (Reference 7) as applicable to the Implementation Phase.

The following activities were performed on the Release Reports:

1. An evaluation of the release reports to confirm they include the necessary application software releases expected within the scope of Implementation Phase of SLC.

2. Verify the software release records contain all applicable objects, code and documentation, necessary to define the application software and its operating environment.

3. Verification of the configuration items (CIs) listed in the release reports. All CIs must be approved and archived in the electronic document management system (EDMS).

2.5 INTEGRATION PHASE

The following IV&V activities were performed during the Integration Phase:

2.5.1 Cabinet/Channel Integration

The functional tests that verify integration of the released software with the deliverable hardware is the Channel Integration Test (CIT). Prior to execution of CIT, though, a validation of the display software is performed through a Flat Panel Display Software Test (FPDST) in order to ensure that the FPDS complies with all display requirements, thereby reducing the risk of CIT failure due to display issues.

The FPDST is a prerequisite to the CIT, which also fulfills the purpose of FAT. CIT/FAT validates the PAMS system-level requirements on target hardware.

Execution and reporting of the results of these tests are within the scope of the Integration Phase tasks per the Test Plan (Reference 24).

2.5.2 Requirements Traceability Assessment

Requirements Traceability Assessment at the Integration Phase includes tracing test elements to the software and system requirements, and updating the Requirement Traceability Matrix for test coverage.

2.5.3 Configuration Management Assessment

There has been no new baseline release; no changes in the software and hardware implementation since those released during the Implementation Phase. The only design artifact revised was the System RTM, which was issued through a revised requirements traceability matrices release report (Reference 21). This release report was reviewed for correct release level as applicable to the Integration Phase.

2.6 INSTALLATION PHASE

IV&V activities within the scope of Westinghouse for Watts Bar 2 PAMS project includes review of Technical Manual (to be issued).

(Last Page of Section 2)

SECTION 3
SUMMARY OF IV&V TASKS RESULTS

3.1 CONCEPT PHASE

Review of the Watts Bar PAMS project's Baseline Release Report (Reference 7) did not produce any findings.

Furthermore, review of the PAMS project plan (Reference 9) with respect to the projects' higher level quality plans and project plans (References 10, 11, and 12) did not produce any findings.

The PAMS Project Plan (Reference 9) is also compatible and consistent with established procedures and processes, as identified in References 3, 4, 6, and 16.

3.2 DEFINITION PHASE

The following subsections summarize the IV&V tasks results for the scope identified in Section 1.2.

3.2.1 Documentation Reviews

Review of the Watts Bar 2 PAMS definition documents produced findings. The ER database (see Section 4 for the ER numbers) contains records for these findings. The ERs reported in previous revisions of this report (V&V-769, V&V-770, and V&V-868) have resulted in update of requirements documents and the ERs were closed after review of their resolution.

The review of new revisions of System Requirements Specification (Reference 13), the System Design Specification (Reference 14), and the Software Requirements Specification (Reference 15) did not produce any new anomalies.

In addition, IV&V reviewed the Tennessee Valley Authority (TVA) Contract Compliance Matrix and Westinghouse Electric Company's Compliance (Section 12 of the Watts Bar 2 PAMS Licensing Technical Report, Reference 25) as part of the Definition Phase review activities. IV&V credits the demonstrated compliance of Westinghouse System Requirement Specification to TVA contract specifications. TVA had identified several non-compliance issues and Westinghouse responded to those comments with a modified Compliance Matrix that addressed them (Reference 18).

In conclusion, Licensing Technical Report (Reference 25) demonstrates compliance of Westinghouse SyRS to the higher level input requirements supplied by TVA.

3.2.2 Requirements Traceability Assessment

The RTM for PAMS (Reference 22) was reviewed as part of requirements traceability assessment in conjunction with the applicable revisions of SyRS, SDS, and SRS (see Table 2.2-1 for references). Findings were captured in 3 separate exception reports: V&V-800 on Revision 0 of RTM; V&V-870 and V&V-871 on Revision 1 of RTM, and V&V-888 on Rev. 2 of RTM.

The findings are against the deficiencies in the RTM and the inconsistencies in cross-referencing between Appendix A and Appendix B of the RTM. Additionally, the Revision 2 of the RTM has made some minor updates to the requirements text with intention to back-fit these changes into the next revision of SRS. These instances have been acknowledged in Open Issues section of the RTM and carried forward to the project's Master Open Issues database. However, independent of the design team's record keeping, IV&V raised these inconsistencies in requirement text within exception reports to track these to closure. These anomalies have all been confirmed addressed in Rev. 3 and Rev. 4 of the System RTM that reflects updates to the SyRS, SDS, and SRS.

The RVLIS RTM (Reference 23) has been reviewed for complete and correct tracing of individual Reusable Software Element Document (RSED) requirements to the Watts Bar 2 PAMS system and software requirements. Other than very minor non-reportable documentation issue, no comments were generated as a result of this review.

3.2.3 Developing Project Specific Test Plan

Prior to release of Revision 1 of this report, a project-specific Test Plan was generated (Reference 24). The purpose of this Test Plan is to describe the complete test program for the Watts Bar 2 PAMS project.

An evaluation of the Test Plan against the SPM has identified some discrepancies in demonstrating full compliance with the SPM requirements. Some of the information expected in the Test Plan was in fact captured in the Test Procedures which contain test specification and test case details. An assessment of comprehensiveness of the test program was performed by IV&V Test Team and concluded that the test procedures were developed adequately and are complete and comprehensive per the Test Plan. The results of this assessment are to be included in a new Test Summary Report, WNA-TR-02451-WBT.

The current version of the Project Plan (Reference 9) does not include the project-specific Test Plan and will have to be revised. The revision to the Project Plan is captured in the integrated project schedule and will be confirmed in the next revision of this report. This is not a reportable anomaly.

3.2.4 Configuration Management Assessment

IV&V performed an assessment of the project's baseline report (Reference 7) for completeness, consistency and correctness for the current phase of the project, i.e. the Definition Phase.

Evaluation of the Baseline Report confirms that the Configuration Items (CIs) within the baseline report are complete and consistent with what is expected at the Concept and Definition Phase of SLC, except for inclusion of the now-available project specific Test Plan (Reference 24). The Baseline Report identifies the source requirement input documents and applicable plans and procedures for the project's execution. It also contains all the necessary hardware and software level decomposed requirements to allow the project precede with the design phase activities.

The review also confirms consistency of Definition Phase requirements documents (Table 2.2-1) with the Watts Bar Unit 2 PAMS source requirement input documents (Table 2.2-3).

Verified that all CIs within the Baseline Report (Reference 7) are properly archived in EDMS, except for those that are customer documents that are not appropriate to be placed under Westinghouse EDMS. Confirmed that all such external documents are available for project use in the Project's eRoom.

The Baseline Report also includes generic reusable software element documents (RSED) related to the RVLIS functionality that will form basis of the software design. Inclusion of these generic RSEDs in a project specific baseline report was necessary as there were no prior qualification records existed as part of generic Common Q PAMS design including RVLIS. Corresponding verified software release for the RVLS library is included in the Software Implementation Release Report (Reference 30).

3.2.5 Change Control Assessment

IV&V reviewed each database described in Table 2.2-4 to find the issues related to Watts Bar 2 PAMS.

The following CAPS are related to the Watts Bar 2 PAMS:

CAPS 10-240-M002 has been generated after finding that AF100 communication error detection between MTP and the OM was not reliable. The issue was observed during execution of CIT/FAT. The ER CIT-624 has been filed to address the problem for Watts Bar 2 PAMS. The CAPS was initiated to determine and recommend solution to the effected Common Q projects. A resolution for Watts Bar 2 PAMS project has been put in place and the associated ER CIT-624 is now closed.

Issue Report CAPS-10-259-M032 has been written after the U.S. Nuclear Regulatory Commission (NRC) requested an evaluation to be performed to demonstrate compliance of Software Requirement Specification format and contents with the IEEE Std 830. A review of WNA-SD-00239-WBT, Rev. 1, "Watts Bar 2 NSSS Completion Program I&C Projects SRS for the Post Accident Monitoring System" (Reference 15) was performed with respect to how it meets the SRS guidelines in IEEE Standard 830-1998 and Regulatory Guide 1.172. Internal memo CQSA-10-004, Rev. 1, provides the results of this review. The findings in CQSA-10-004 were addressed in a subsequent revision of the Watts Bar 2 PAMS SRS.

CAPS 10-341-M005 has been issued to track an issue with the datafetch application with respect to the redundant bus. The version of datafetch application in the generic FPDS at release level 09-00 introduces AF100 bus communication delays and loss of data when one communication cable is disconnected. The issue was identified during CIT/FAT. The issue was tracked for the Watts Bar 2 PAMS project through ER DT-884. Resolution has been included in the software and regression tested successfully. The ER is closed.

CAPs 11-020-M041 and 11-051-W001 have been issued to capture a discrepancy with the Trend Display. A fix was provided by the platform group and incorporated into the Watts Bar 2 PAMS FPDS application through DT-918. The two CAPS continue to investigate the extent of condition and any safety evaluations on previously delivered software. Tests were devised and run during the regression of the FPDST for Watts Bar 2 PAMS project to address the issue for the project. The ER has been closed after successful validation of the software changes.

In addition to the CAPS database, all IV&V generated anomalies, including those that were identified during the test activities, have been captured in the Lotus Notes WORKM database. A list of these IV&V generated issues can also be found in Section 4.

The Project's self-maintained Master Open Issues database was also reviewed for completeness. All documentation issues captured in the Open Item section of definition phase documents and RTMs were confirmed to have been included in this database.

3.3 DESIGN PHASE

The IV&V activities pertaining to the Design Phase are complete and reported in the following subsections.

3.3.1 Generic Qualification

Watts Bar 2 PAMS system relies on generically qualified platform and software libraries.

3.3.1.1 Generic AC160 Qualification

The following table lists the reusable software element documents of generic CPCE's and Type Circuits that are being used by the Watts Bar 2 PAMS application software. It also lists the verification records that qualified the corresponding software element for use in Common Q applications:

Table 3.3-1. Generic AC160 Qualification

RSED	Type	Name/Option	Test Procedure	Test Report	Verified Software Release Record
WNA-DS-00306-GEN, Rev. 5	CPCE	EUCONVRT/STDADD05	WNA-TP-00479-SSP, Rev. 1/APP	WNA-TR-00338-SSP Rev. 2/APP	WNA-RL-00530-GEN, Rev. 0V
WNA-DS-00288-GEN, Rev. 1/APP	CPCE	SYS_TIME/STDADD05	WNA-TP-00449-GEN, Rev. 0/APP	WNA-TR-00279-GEN Rev. 0	
WNA-DS-00315-GEN, Rev. 2	CPCE	CAL_CRC/STDADD05	WNA-TP-00517-GEN, Rev. 1/APP	WNA-TR-00368-GEN, Rev. 1	
00000-ICE-3238, Rev. 04	CPCE	CET_MON/PAMS01	00000-ICE-35470, Rev. 04	00000-ICE-37744, Rev. 02	WNA-RL-00327-GEN, Rev. 1V
00000-ICE-3238, Rev. 04	CPCE	SM_MON/PAMS01	00000-ICE-35471, Rev. 04	00000-ICE-37745, Rev. 02	
00000-ICE-30140, Rev. 04	CPCE	LATCHINT/PAMS01	00000-ICE-35293, Rev. 01	00000-ICE-37366, Rev. 07	
WNA-DS-01564-GEN, Rev. 2	TC	EXMODERR	WNA-TP-02272-GEN, Rev. 0	WNA-TR-01430-GEN, Rev. 0	WNA-RL-00286-GEN, Rev. 3V
WNA-DS-01715-GEN, Rev. 4	TC	PM_DIAG	WNA-TP-02411-GEN, Rev. 0	WNA-TR-01922-GEN, Rev. 1	WNA-RL-00412-GEN, Rev. 2V
WNA-DS-01505-GEN, Rev. 0	TC	REFLASH	WNA-TP-00658-SSP, Rev. 0/APP	WNA-TR-00526-SSP, Rev. 1/APP	WNA-RL-00249-GEN, Rev. 0V

Table 3.3-1. Generic AC160 Qualification (cont.)

RSED	Type	Name/Option	Test Procedure	Test Report	Verified Software Release Record
WNA-DS-01838-GEN, Rev. 3	CPCE	DENSO4/RVLIS	WNA-TP-02670-GEN, Rev. 0	WNA-TR-02207-GEN, Rev. 1	WNA-RL-00441-GEN_Rev7_Verified, Rev. 0
WNA-DS-01839-GEN, Rev. 4	CPCE	RLDCORR/RVLIS	WNA-TP-02671-GEN, Rev. 0	WNA-TR-02208-GEN, Rev. 1	
WNA-DS-01840-GEN, Rev. 2	CPCE	MAX_S/RVLIS	WNA-TP-02591-GEN, Rev. 0	WNA-TR-01939-GEN, Rev. 0	
WNA-DS-01841-GEN, Rev. 2	CPCE	MIN_S/RVLIS	WNA-TP-02591-GEN, Rev. 0	WNA-TR-02204-GEN, Rev. 0	
WNA-DS-01842-GEN, Rev. 4	CPCE	STLVLCAL/RVLIS	WNA-TP-02672-GEN, Rev. 0	WNA-TR-02209-GEN, Rev. 1	
WNA-DS-01845-GEN, Rev. 6	CPCE	DHCALC/RVLIS	WNA-TP-02673-GEN, Rev. 0	WNA-TR-02210-GEN, Rev. 1	
WNA-DS-01846-GEN, Rev. 2	CPCE	NDH/RVLIS	WNA-TP-02674-GEN, Rev. 0	WNA-TR-02211-GEN, Rev. 1	
WNA-DS-01847-GEN, Rev. 2	CPCE	VOIDFRAC/RVLIS	WNA-TP-02668-GEN, Rev. 0	WNA-TR-02205-GEN, Rev. 2	
WNA-DS-01848-GEN, Rev. 4	CPCE	LVLMNTR/RVLIS	WNA-TP-02675-GEN, Rev. 0	WNA-TR-02212-GEN, Rev. 1	
WNA-DS-01849-GEN, Rev. 2	CPCE	PUMPSTAT/RVLIS	WNA-TP-02676-GEN, Rev. 0	WNA-TR-02213-GEN, Rev. 2	
WNA-DS-01994-GEN, Rev. 0	CPCE	FILTO1/RVLIS	WNA-TP-02669-GEN, Rev. 0	WNA-TR-02206-GEN, Rev. 1	
WNA-DS-02065-GEN, Rev. 2	CPCE	LVLALM/RVLIS	WNA-TP-02667-GEN, Rev. 0	WNA-TR-02214-GEN, Rev. 0	

3.3.1.2 Generic Platform Qualification

AC160 Base Software qualification was performed through Commercial Grade Dedication process. Watts Bar 2 PAMS application will utilize the AC160 base system software version at 1.3/8, ACC Advant version at 1.7/1, and standard AC160 PC and DB Element Library Version at 1.5/1 (Reference 26).

Generic Flat Panel Display System (FPDS) software release 09-00 has been generically verified by IV&V with a resulting summary report (Reference 27). However, the project has identified several issues with the verified software and initiated CAPS process. Accordingly, Watts Bar 2 project incorporated into its application those platform files that were updated to fix the issues for the project.

3.3.2 Review of Documentation

Both AC160 and FPDS Software Design Descriptions (SDD) have been released to and reviewed by IV&V.

For AC160 application software SDD, the review was performed while developing PMST test procedure. Exception reports PMST-168, PMST-169 and PMST-170 were issued to identify mismatches of SDD against SRS requirements. Note that this review was performed on the initial release of the AC160 SDD (WNA-SD-00250-WBT, Rev. 0) which is considered Preliminary Design Review per Software Program Manual (Reference 6).

Since then, new revisions of AC160 application software SDD have been issued. Review of the latest revision of SDD (Reference 29) has been performed in conjunction with the review of latest System RTM which linked SDD statements to the SRS requirements (Reference 22). V&V-888 has been initiated that identifies comments against Rev. 1 of the SDD as well as its tracing to the requirements. An attempt to address this ER with Rev. 2 of the SDD failed and the design team response was rejected by IV&V as incomplete. As a result, another update to the SDD was performed which successfully closed V&V-888.

For FPDS application software SDD (Reference 28), the review was performed as part of code inspections. V&V-872 was issued to capture both SDD issues as well as issues pertaining to released code. This ER is confirmed closed after additional tests requested by IV&V were performed during FPDST regression.

3.3.3 Requirements Traceability Assessment

The System RTM (Reference 22) has been revised for the Design Phase to capture the requirements from the most recent revision of System Definition Phase documents as well as by populating the Design Element column. The requirement traceability assessment performed at this phase include review of added/deleted/modified system and software requirements, verification of their tracing in the revised RTM, and thoroughly reviewing the Design Element column.

V&V-888 has been generated that identifies comments against SDD as well as its tracing to the requirements. This ER is now closed.

a,c

A revision to the RVLIS RTM (Reference 23) has been made at this phase to capture the changes onto the Reactor Vessel Level Monitoring CPCE. No findings were generated per this review.

3.3.4 Developing Test Procedures

IV&V Test Team generated test procedures commensurate with the test program defined in the Post Accident Monitoring System Test Plan (Reference 24).

The following table provides the test procedures developed at this phase based on the Revision 2 of SyRS, SDS, and SRS.

Table 3.3-2. Test Procedures

Test Level	Test Procedure	Title	Ref.
CHT	WNA-TP-02772-WBT	Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Cabinet Hardware Test Procedure	34
EST	Various	Refer to Table 3.3-1 for list of Element Software Test Procedures applicable to Watts Bar 2 PAMS project.	
PMST	WNA-TP-03057-WBT	Watts Bar 2 NSSS Completion Program I&C Projects Processor Module Software Test Procedure for the Post Accident Monitoring System	35
FPDST	WNA-TP-02955-WBT	Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Flat Panel Display Software Test Procedure	36
CIT/FAT	WNA-TP-02988-WBT	Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Channel Integration Test/Factory Acceptance Test	37

A Test Coverage Assessment was also performed during the Design Phase based on requirements presented in the PAMS System RTM (WNA-VR-00279-WBT, Rev. 1). The Appendix A of the System RTM has been used as a worksheet (also called the Test Coverage Assessment Worksheet) to perform the test coverage assessment. A table was added to this worksheet that contains a list of requirements from the System Design Specification (WNA-DS-01667-WBT, Rev. 2) as not all SDS requirements had been traced within the System RTM. This ensured completeness of the test coverage.

Three columns added to the Test Coverage Assessment worksheet: "Test Coverage" column identifies requirements that are needed to be validated in the test phases CHT, FPDST, and/or CIT; while those software requirements to be validated during PMST are identified in the "PMST Test Coverage" column. The "Comments" column provides additional guidance to the test engineer while developing the actual test cases.

An assessment was performed to make sure all testable requirements have been assigned to a test phase for validation. The assessment also included the completeness of each test activity to fully validate the requirements. In certain cases the requirement can only be fully addressed through multiple test phases.

The Test Coverage Assessment Worksheet was archived with Revision 2 of this report in EDMS for audit purposes. The information contained in this worksheet was later used to update the System RTM during the Integration Phase with added granularity from the actual test procedures developed. The test coverage is now captured in the System RTM (Reference 22), and the worksheet used during the Design Phase is obsolesced.

3.3.5 Configuration Management Assessment

IV&V performed an assessment of the project's release reports (References 21, 30, and 31) for completeness, consistency and correctness for the Design Phase of the project.

Evaluation of the release reports confirms that the Configuration Items (CIs) within the release reports are complete and consistent with each other.

Verified that all CIs within the Release Reports are properly archived in EDMS.

3.4 IMPLEMENTATION PHASE

The IV&V activities pertaining to the Implementation Phase are complete and reported in the following subsections.

3.4.1 Verification of Software Implementation

The ESTs were performed on reusable software elements of the generic RVLIS option library. The resulting test reports are listed in Table 3.3-1.

The PMST, both tests and code inspections, has been executed on Revision 1 of AC160 Application Software for Train A. This resulted in exception reports (PMST-171 through PMST-174). Train B code was verified per regression analysis. It was found that the same findings are applicable to Train B. Results were reported in the PMST Report (Reference 43), which also includes the code inspection records.

Since then, a new revision was released for Train A (Reference 40) with accompanying Train B software (Reference 41). A regression analysis was performed on the revised code to validate the changes made to the PAMS application software and requirements documents since the execution of the PMST. The changes were made in response to the ER/SCRs filed against PAMS application software during the Design and Implementation Phases of the SLC. The regression analysis included tracing each change driver identified in the software release record to the code changes. A new difference analysis was performed between the latest revisions of Train A and Train B software. This regression analysis identified how to verify the latest released code: re-test, inspection, or crediting test results of CIT procedures.

The new requirements added to the SRS (Reference 15) were also analyzed. In addition to this revision analysis, Train A and Train B source code files have been analyzed to ensure that no functional differences exist between Train A and Train B.

For most changes, a code analysis sufficed as the means to completely verify the change. Where applicable, a corresponding CIT was referenced as an additional means of verifying the fix.

The regression analysis resulted in ERs (V&V-893 and V&V-894). These two ERs address a lack of justification to minor software changes that have been made to the AC160 application code. ER PMST-171 was written during the implementation phase (PMST). Issues documented with PMST-171

have not been addressed with the revised AC160 application code and required further software and/or documentation change.

There have been two regression analyses performed for AC160 code changes. Regression between software releases Rev. 2 and Rev. 1 (for Train A and its corresponding Train B releases) were reported in WNA-AR-00196-WBT (Reference 49). A regression analysis between Rev. 5 and Rev. 2 was captured in a new regression analysis report, WNA-AR-00209-WBT (Reference 55). These regression analyses reports confirms closure of all past PMST anomalies as well as those self-identified or new anomalies resulting from CIT/FAT.

IV&V performed a code review on Rev. 1 of the FPD application software. The review included both the C code and the databases that contain date compiled from source requirements documents as well as the User Configurable Setpoints document (Reference 33). The effort resulted in exception reports (V&V-872 and FPDS-008).

FPDS code review process was repeated after the new release of PAMS FPD application software (Reference 42). This code review analysis was limited to the changes applied to PAMS FPD application software Revision 3, and how these changes differentiate Revision 3 from Revision 1. Source code modules were reviewed for conformance with the Coding Standards and for adherence to the software Application Restrictions (Reference 38). Configuration data files were also reviewed for consistency and correctness with the SDD. The review of the software modules associated with the PAMS FPD application provides reasonable assurance that the issues found with the Rev. 1 release have been addressed. The Watts Bar 2 PAMS FPDS SDD (Reference 42) was reviewed both to conform to this software release and to comply with the Watts Bar 2 PAMS SRS (Reference 15).

In addition to the anomalies identified by code review process, PAMS FPD application software Rev. 3 addressed additional issues. The Generic Flat Panel Display System (FPDS) platform release 09-00 introduced AF100 communication delays when one of the two redundant AF100 cables is disconnected. As a result, PAMS FPD application software did not utilize the datafetch function that comes with generic release 09-00. Instead, a version of the datafetch function from generic FPD release 08-00 was included in the PAMS FPD application software. All other Common Q FPDS Generic files were kept at 09-00 versions. PAMS FPD application software also overrides cqTrend files that were part of the Generic FPDS Release 09-00 to address issues identified with trend displays. A regression analysis was performed on the affected files. The details regarding the changes made for PAMS FPDS software is captured in the PAMS FPD CRR (Reference 44). Generic FPDS platform release 09-00 has been generically verified by IV&V with a resulting summary report (Reference 27). For all the platform files and features utilized as is from the Generic FPDS Release 09-00, generic verification results are credited.

The IV&V activities also included the review of the RTM (Reference 22) to verify whether FPD code review can be credited to close outstanding open item P092. It was determined that additional tests needed to demonstrate validation of some parts of the requirements that code review cannot be credited alone. These additional tests were tracked through ERs (FPDST-008 and V&V-924). All required additional tests were conducted during FPDST regression and the outstanding ERs were successfully closed.

A code review report was issued to document the results (Reference 44).

3.4.2 Verification of Hardware Implementation

The Cabinet Hardware Test Procedure (Reference 34) was executed and results were reported in the Post Accident Monitoring System Cabinet Hardware Test Report (Reference 45). The CHT procedure and its report were reviewed by IV&V for compliance with the Post Accident Monitoring Test Plan (Reference 24) and for confirmation of test results. There are 2 non-conformances reported: Quality Notice (QN) #60039888 for Train A and QN #60039887which are not direct failure of the CHT tests performed, but identify the results of the prerequisite in-process inspections. The quality control inspection process along with the life cycle of quality notices are governed by the Nuclear Automation Level 3 procedures (Reference 46). These Quality Notices shall be satisfactorily closed and verified during the final inspections before the system is shipped. Nevertheless, an ER (CHT-054) has been issued to increase visibility to these outstanding issues within the Project team.

3.4.3 Requirements Traceability Assessment

No RTM was issued to cover the implementation phase details. The tracing of PMST test statements has been incorporated into RTM together with the remaining Integration Phase tests. See Section 3.5.2 for activities performed during the Integration Phase requirements traceability assessment.

3.4.4 Configuration Management Assessment

IV&V performed an assessment of the project's release reports (References 21, 30, and 31) for completeness, consistency and correctness for the Implementation Phase of the project.

Evaluation of the release reports confirms that the Configuration Items (CIs) within the release reports are complete and consistent with each other with one exception. Although the PAMS application software use more than one option library, only the RVLIS library's verified software release record (SRR) is listed in the release reports.

Verified that all CIs within the Release Reports are properly archived in EDMS.

3.5 INTEGRATION PHASE

Subsequent sections of this report provide a summary of the IV&V tasks performed during the Integration Phase of the software life cycle.

The following table identifies the reports produced throughout the Watts Bar Unit 2 PAMS test program and the respective software revisions subject to those tests, reviews and analyses.

Table 3.5-1. Mapping of IV&V Reports to Software Releases

AC160 Train A WNA-RL-00646-WBT		Rev. 0	Rev.1	Rev.2	Rev.3	Rev.4	Rev.5
AC160 Train B WNA-RL-00648-WBT		N/A	N/A	Rev.0	Rev.1	Rev.2	Rev.3
FPDS WNA-RL-00743-WBT		N/A	Rev.0	Rev.1	Rev.2	Rev.3	Rev.4
Unit Level	AC160	WNA-TR-02389-WBT, Rev. 0		WNA-AR-00196-WBT, Rev. 0	WNA-AR-00209-WBT, Rev. 0		
	FPDS		WNA-VR-00295-WBT, Rev. 0		WNA-VR-00295-WBT, Rev. 1		
Channel Level	CIT/FAT			WNA-TR-02413-WBT, Rev. 0	WNA-TR-02413-WBT, Rev. 1		N/A
	FPDST			WNA-TR-02387-WBT, Rev. 1	WNA-TR-02387-WBT, Rev. 1		

3.5.1 Cabinet/Channel Integration

Per the Post Accident Monitoring System Test Plan (Reference 24), the Cabinet/Channel Integration Tests consist of the FPDST and the CIT. CIT also fulfills the contractual requirement of the FAT; therefore, CIT, FAT, or CIT/FAT will be used interchangeably.

3.5.1.1 Execution and Reporting of Flat Panel Display Software Test

The Flat Panel Display Software Test (FPDST) of the Watts Bar Unit 2 PAMS has been performed on version 00.02/02 of AC160 Application Software released by WNA-RL-00646-WBT, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train A, PAMA" (Reference 40) for Train A; WNA-RL-00648-WBT, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train B, PAMB" (Reference 41) for Train B; and FPD Application Software released by WNA-RL-00743-WBT, "Software Released Record for Watts Bar Unit 2 PAMS FPDS" (Reference 42). The FPDS testing of the Watts Bar Unit 2 OM and MTP subsystems began 11/9/2010 and continued until 11/11/2010. Test results were captured in WNA-TR-02387-WBT, "Post Accident Monitoring Flat Panel Display Software Test Report" in its original release. Executing the FPDST Procedure has resulted in ERs (DT-841, DT843 through DT-854, and DT-856).

Following FPDST, issues with the Trend Display and FPD Heartbeat status have been identified. This resulted in a fix to the FPD application software which was tracked via DT-918 and DT-959, respectively. Further, additional testing was requested by IV&V to validate certain requirements (identified as Open

Item P092 in System RTM) that cannot be addressed via code inspection alone. These were captured in ERs FPDS-008 and V&V-924, and added to the scope of FPDST Regression.

A regression test was performed to validate changes to the software and close out outstanding ERs. The test was conducted on modified software released through new revisions to SRRs WNA-RL-00646-WBT (Reference 52), WNA-RL-00648-WBT (Reference 53) and WNA-RL-00743-WBT (Reference 42).

Upon successful execution of these regression tests, a revision to the FPDS Test Report was issued (Reference 47).

3.5.1.2 Execution and Reporting of Channel Integration Test

The CIT/FAT of the Watts Bar Unit 2 PAMS has been executed on version 00.02/02 of AC160 Application Software released by WNA-RL-00646-WBT, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train A, PAMA" (Reference 40) for Train A and WNA-RL-00648-WBT, "Common Q Software Release Record for Watts Bar Unit 2 PAMS Train B, PAMB" (Reference 41) for Train B between 11/15/2010 and 11/19/2010. Test results were captured in Revision 0 of WNA-TR-02413-WBT, "Post-Accident Monitoring System Channel Integration/Factory Acceptance Test Report". The tests performed on each train were nearly identical with minor changes which are due to differences in addressable constants between the two trains.

A total of eight ERs (CIT-621 through CIT-628) were generated to document problems identified during testing. Most of the issues discovered during testing were minor software and procedural problems. The resolution of anomalies resulted in revised software which went through a regression analysis and testing. Upon successful execution of these regression tests, a revision to the CIT/FAT Report was issued (Reference 48).

3.5.2 Requirements Traceability Assessment

IV&V has provided input to the System RTM (Reference 22) during the Integration Phase to add tracing to the test statements as defined in WNA-TP-03057-WBT, "Watts Bar 2 NSSS Completion Program I&C Projects Processor Module Software Test Procedure for the Post Accident Monitoring System" (Reference 35); WNA-TP-02955-WBT, "Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Flat Panel Display Software Test Procedure" (Reference 36); WNA-TP-02772-WBT, "Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Cabinet Hardware Test Procedure" (Reference 34); and WNA-TR-02413-WBT, "Watts Bar 2 NSSS Completion Program I&C Projects Post Accident Monitoring System Channel Integration Test/Factory Acceptance Test Report" (Reference 48).

The requirement traceability assessment performed at this phase includes review of RTM test coverage against the most recent revision of System Definition Phase documents (Table 2.2.-1). Some requirements are determined to be verified through inspection on the final release of the software as they are related to the configuration of the operating environment.

3.5.3 Configuration Management Assessment

A new baseline report (Reference 7), software implementation release report (Reference 30) and requirement traceability release report (Reference 21) were issued that capture the new requirements, design and implementation changes performed since the initial run of CIT/FAT.

IV&V performed an assessment of the changes in the contents of these release reports for completeness, consistency, and correctness for the Integration Phase of the project, as well as to confirm closure of outstanding anomalies.

After the issuance of Software Implementation Release Record (Reference 30) an issue was identified and required a software modification (DT-959). The software modification resulted in SRRs that went to the FPDST as well as AC160 and FPD code regression analyses. There was no impact on the Baseline documents due to addressing this issue. Nevertheless, the configuration management release record for software implementation needs updated to capture the latest released software implementation. This does not invalidate the verification results as all the code, release records (SRRs), and associated documentation (SDDs) were under configuration management.

3.6 INSTALLATION PHASE

Subsequent revisions to this report will provide a summary of the IV&V tasks results for the installation SLC phase.

(Last Page of Section 3)

SECTION 4
SUMMARY OF IV&V FINDINGS AND RESOLUTION

This section provides a listing of IV&V exception reports generated for the Watts Bar 2 PAMS project and their current status.

Multiple IV&V findings may be reported within a single exception report if that facilitates the assignment and resolution of the findings easier, such as one ER per each document. IV&V classified and listed each finding in the ER. Classification of findings is as described in Table 4-1.

Table 4-1. Classifications of Findings

Classification	Description
ANO	The finding is an anomaly and satisfactory resolution is required for IV&V's acceptance.
RAI	The finding requires additional information for clarity and/or IV&V's understanding. Depending on the information provided, the finding is either removed or turned into an anomaly.
COM	The finding is a comment or suggestion for improvement of the documentation and does not impact IV&V acceptance if not resolved.

Table 4-2 lists the ERs and their metrics for the project specific findings:

Table 4-2. Exception Reports Issued Against Watts Bar 2 PAMS Project

ER	Subject	ANO	COM	RAI	ER Workflow Status	Open/Closed
V&V-769	SRS, Rev 1	11			Resolution Complete	Closed
V&V-770	SDS, Rev 1	14			Resolution Complete	Closed
V&V-800	RTM, Rev 0	2			Resolution Complete	Closed
PMST-168	SDD, Rev. 0	1			Resolution Complete	Closed
PMST-169	SDD, Rev. 0	1			Resolution Complete	Closed
PMST-170	SDD, Rev. 0	1			Resolution Complete	Closed
PMST-171	RTD Quality	1			Resolution Complete	Closed
PMST-172	DSP Quality	1			Resolution Complete	Closed
PMST-173	Average RJT	1			Resolution Complete	Closed
PMST-174	RCS Press.	1			Resolution Complete	Closed
V&V-868	SRS	23		5	Resolution Complete	Closed
V&V-870	RTM, Rev. 1	8			Resolution Complete	Closed

Table 4-2. Exception Reports Issued Against Watts Bar 2 PAMS Project (cont.)

ER	Subject	ANO	COM	RAI	ER Workflow Status	Open/Closed
V&V-871	RTM, Rev. 1	11	22		Resolution Complete	Closed
V&V-872	FPDS code	33	6		Resolution Complete	Closed
V&V-888	RTM, Rev. 2	5	8		Resolution Complete	Closed
FPDS-008	FPDS DB		82		Resolution Complete	Closed
CIT-620	FPDS DB	1			Resolution Complete	Closed
CIT-621	AC160 thermocouple	1			Resolution Complete	Closed
CIT-622	AC160 RTD	1			Resolution Complete	Closed
CIT-623	CET_MON	2			Resolution Complete	Closed
CIT-624	AC160 FOM	1			Resolution Complete	Closed
CIT-625	TMARCET	1			Resolution Complete	Closed
CIT-626	SMM Test	1			Resolution Complete	Closed
CIT-627	Cabnt Temp	1			Resolution Complete	Closed
CIT-628	RVLIS Calc	1			Resolution Complete	Closed
DT-841	FPDS Printing	1			Resolution Complete	Closed
DT-843	FPD Res	1			Resolution Complete	Closed
DT-844	FPDS Screen	1			Resolution Complete	Closed
DT-845	FPDS RJT	1			Resolution Complete	Closed
DT-846	FPDS Time	1			Resolution Complete	Closed
DT-847	SRS	1			Resolution Complete	Closed
DT-848	FPDS Display	1			Resolution Complete	Closed
DT-849	FPDS Display	1			Resolution Complete	Closed
DT-850	Annun Test	1			Resolution Complete	Closed
DT-851	FPDST Procedure	1			Resolution Complete	Closed
DT-852	RCS P Res.	1			Resolution Complete	Closed
DT-853	FPD Rounding	1			Resolution Complete	Closed
DT-854	SMM	1			Resolution Complete	Closed
DT-856	FPDS RCP	1			Resolution Complete	Closed
V&V-893	AC160	1			Resolution Complete	Closed
V&V-894	AC160	1			Resolution Complete	Closed
V&V-924	FPDS	1			Resolution Complete	Closed

Table 4-2. Exception Reports Issued Against Watts Bar 2 PAMS Project (cont.)

ER	Subject	ANO	COM	RAI	ER Workflow Status	Open/Closed
DT-882	AC160	1			Resolution Complete	Closed
DT-884	Datafetch	1			Resolution Complete	Closed
DT-889	FPDS SDD	1			Resolution Complete	Closed
DT-890	AC160 SDD	1			Resolution Complete	Closed
DT-902	WDT	1			Resolution Complete	Closed
DT-918	Trends	1			Resolution Complete	Closed
DT-775	SRS	1			Resolution Complete	Closed
DT-620	MIN_S	1			Resolution Complete	Closed
DT-959	FPD Heartbeat monitoring	1			Resolution Complete	Closed

Table 4-3 lists the ERs issued against the generic qualification of Custom PC Elements or Type Circuits used within the Watts Bar 2 PAMS project.

Table 4-3. Exception Reports Issued Against Generic Software

ER	Subject	ANO	COM	RAI	ER Status	Open/Closed
V&V-703	MAX_S	2			Resolution Complete	Closed
V&V-707	SRR RVLIS Library	1			Resolution Complete	Closed
V&V-711	LVLMNTR	1			Resolution Complete	Closed
V&V-739	NDH	1			Resolution Complete	Closed
V&V-740	SRR RVLIS Library	2			Resolution Complete	Closed
V&V-742	LVLALM	2			Resolution Complete	Closed
V&V-745	DENSO4	1			Resolution Complete	Closed
V&V-746	RLDCORR	3			Resolution Complete	Closed
V&V-747	PUMPSTAT	2			Resolution Complete	Closed
V&V-749	FILTO1	2			Resolution Complete	Closed
V&V-751	PUMPSTAT	1			Resolution Complete	Closed
V&V-750	DENSO4	1			Resolution Complete	Closed
V&V-752	NDH	1			Resolution Complete	Closed
V&V-757	RLDCORR	1	1		Resolution Complete	Closed

Table 4-3. Exception Reports Issued Against Generic Software (cont.)

ER	Subject	ANO	COM	RAI	ER Status	Open/Closed
V&V-758	DENSO4	1			Resolution Complete	Closed
V&V-760	STLVLCAL	1			Resolution Complete	Closed
V&V-762	DHCALC	1			Resolution Complete	Closed
V&V-039	SYS_TIME	1			Resolution Complete	Closed
V&V-755	SYS_TIME	1			Resolution Complete	Closed
V&V-779	STLVLCAL	3			Resolution Complete	Closed
V&V-781	DHCALC	1			Resolution Complete	Closed
V&V-785	PMDIAG	13	6		Resolution Complete	Closed
V&V-792	DHCALC	1			Resolution Complete	Closed
V&V-794	VOIDFRAC	1			Resolution Complete	Closed

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SECTION 5
IV&V ASSESSMENT OF SOFTWARE QUALITY

The Watts Bar 2 Post Accident Monitoring System project has

- Maintained project plans (Reference 9, Reference 24)
- Established a design baseline (Reference 7)
- Released design artifacts through release reports (References 21, 30, and 31)
- Managed design changes

The Design Team will maintain the System RTM (Reference 22) for the Watts Bar 2 PAMS project. There are still two open issues with the System RTM both of which can be closed crediting regression test activities. IV&V will continue to assess the completeness and correctness of the requirements throughout the project.

IV&V has filled and archived checklists at the end of each phase, except for the Concept Phase. Below is the list of checklists generated so far. The source of the checklists is the Verification and Validation Process for the Common Q Safety Systems (Reference 1):

Definition Phase Checklists:

- WNA-DS-01617-WBT_rev2_Checklist
- WNA-DS-01667-WBT_rev2_Checklist
- WNA-SD-00329-WBT_rev2_Checklist

Design Phase Checklists:

- WNA-SD-00248-WBT_R1_Checklist (FPD)
- WNA-SD-00250-WBT_R1_CheckList (AC160)

Implementation Phase Checklists:

- FPDS Code Review Report (Reference 44) contains a checklist for each module
- The EST Reports for CPCE's (Table 3.3-1) contain a code review checklist
- WNA-RL-00743-WBT_R1_Checklist (FPD)
- WNA-RL-00646-WBT_R3_CheckList (AC160)

Integration Phase Checklists:

- WNA-TR-02389-WBT_R0_CheckList.pdf (PMST)
- WNA-TR-02387-WBT_R0_CheckList (FPDST)
- WNA-TR-02413-WBT_R0_CheckList (CIT)
- CPCE checklists are captured within the EST Reports

No new checklists have been prepared for the regression activities as all the activities pertaining to the modifications have been captured within the ERs.

All of these project activities have been conducted in accordance with established Westinghouse Electric Company policies, procedures, and processes. All Watts Bar 2 PAMS design objects covered in this report have undergone second-party (peer) and IV&V review.

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SECTION 6
IV&V RECOMMENDATIONS

The Watts Bar 2 Post Accident Monitoring System project demonstrated sufficient evidence for IV&V to conclude completion of the Integration Phase with successful regression of FPDST and CIT/FAT. The software release that went through regression will be transferred into the Production software library that is maintained by IV&V. A Verified Software Release Record will also be issued by IV&V back to the Project. The Verified SRR is considered the code certificate and can be used as one of the inputs to generate Certificate of Conformance prior to delivering the software for installation and use at Watts Bar Unit 2.

As identified in Section 3.5.3, a new revision of the Software Implementation Release Report, WNA-RL-00827-WBT, is needed needs prior to issue the Certificate of Conformance.

The remaining activities include official release of Test Summary Report, which does not impact the conclusions of this report, confirmatory review of RTM update which should close out the minor open items, and continuing with the limited scope of Installation Phase activities.

(Last Page of Document)

Attachment 3
TVA Letter Dated March 16, 2011
Responses to Licensee Open Items to be Resolved for SER Approval

Westinghouse Electric Company CWA-11-3121, Application for Withholding Proprietary Information from Public Disclosure, WNA-VR-00283-WBT-P, Revision 4 "Nuclear Automation IV&V Summary Report for the Post Accident Monitoring System" (Proprietary)," Dated March 3, 2011

Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: WBT-D-2978

CAW-11-3121

March 3, 2011

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: WNA-VR-00283-WBT-P, Rev. 4, "IV&V Summary Report for the Post Accident Monitoring System" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-11-3121 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.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Tennessee Valley Authority.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-11-3121, and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance

Enclosures

CAW-11-3121

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared J. A. Gresham, 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:

J. A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 3rd day of March 2011

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Cynthia Olesky, Notary Public
Manor Boro, Westmoreland County
My Commission Expires July 16, 2014
Member, Pennsylvania Association of Notaries

(1) I am Manager, Regulatory Compliance, 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 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 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 WNA-VR-00283-WBT-P, Rev. 4, "IV&V Summary Report for the Post Accident Monitoring System" (Proprietary), dated March 2011, for submittal to the Commission, being transmitted by Tennessee Valley Authority letter 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 Post Accident Monitoring System and may be used only for that purpose.

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

(a) Continue to provide independent verification and validation data to its customers.

(b) Remain competitive in the marketplace.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for purpose of verification and validation of technical data related to Westinghouse-supplied systems and/or equipment.

(b) Westinghouse can sell support and defense of design and licensing.

(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 technical reports 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

Tennessee Valley Authority

Letter for Transmittal to the NRC

The following paragraphs should be included in your letter to the NRC:

Enclosed are:

1. __ copies of WNA-VR-00283-WBT-P, Rev. 4, "IV&V Summary Report for the Post Accident Monitoring System" (Proprietary)

2. __ copies of WNA-VR-00283-WBT-NP, Rev. 4, "IV&V Summary Report for the Post Accident Monitoring System" (Non-Proprietary)

Also enclosed is the Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-11-3121, accompanying Affidavit, Proprietary Information Notice, and Copyright Notice.

As Item 1 contains information proprietary to Westinghouse Electric Company LLC, it is supported by an affidavit signed by Westinghouse, the owner of the information. The affidavit 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 Section 2.390 of the Commission's regulations.

Accordingly, it is respectfully requested that the 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 copyright or proprietary aspects of the items listed above or the supporting Westinghouse affidavit should reference CAW-11-3121 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.