



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 2, 2015

Mr. Edward D. Halpin
Senior Vice President and Chief Nuclear Officer
Pacific Gas and Electric Company
Diablo Canyon Power Plant
P.O. Box 56, Mail Code 104/6
Avila Beach, CA 93424

SUBJECT: DIABLO CANYON POWER PLANT, UNITS 1 AND 2 - REGULATORY AUDIT
REPORT FOR THE JUNE 22-26, 2015 AUDIT AT THE WESTINGHOUSE
FACILITY IN WARRENDALE, PENNSYLVANIA, FOR THE DIGITAL UPDATE
TO THE PROCESS PROTECTION SYSTEM LICENSE AMENDMENT
REQUEST (TAC NOS. ME7522 AND ME7523)

Dear Mr. Halpin:

By letter dated October 26, 2011, as supplemented by letters dated December 20, 2011; and April 2, April 30, June 6, August 2, September 11, November 27 and December 5, 2012; and March 7, March 25, April 30, May 9, May 30, and September 17, 2013; and April 24 and April 30, 2014; and February 2 and June 22, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML113070457, ML113610541, ML12094A072, ML12131A513, ML12170A837, ML12222A094, ML12256A308, ML13004A468, ML12342A149, ML13267A129, ML13093A311, ML13121A089, ML13130A059, ML13154A049, ML13261A354, ML14205A031, ML14121A002, ML15062A386, and ML15173A469, respectively), Pacific Gas and Electric (PG&E, the licensee), requested the U.S. Nuclear Regulatory Commission (NRC) staff's approval of an amendment for the Diablo Canyon Power Plant, Units 1 and 2 (DCPP). The proposed license amendment request would provide a digital replacement of the Process Protection System (PPS) portion of the Reactor Trip System and Engineered Safety Features Actuation System at DCPP.

The NRC Instrumentation & Controls Branch (EICB) conducted a regulatory audit of the at the Westinghouse facility in Warrendale, Pennsylvania during the week of June 22-26, 2015. This audit provided information necessary to complete the NRC staff's evaluation of the proposed Westinghouse portion of the DCPP PPS.

Enclosure 1 to this letter details the results of the audit and portions contain sensitive unclassified non-safeguards information (SUNSI). The proprietary information on pages 6-11 of Enclosure 1 and security-related information on pages 13-15 of Enclosure 1 will be withheld from public disclosure pursuant to Section 2.390 of Title 10 of the *Code of Federal Regulations*. Enclosure 2 to this letter is a public, redacted version of the results of the audit. A list of attendees for Entrance Meeting is provided in Enclosure 3.

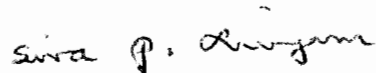
Enclosure 1 transmitted herewith contains SUNSI. When separated from Enclosure 1, this letter is DECONTROLLED.

E. Halpin

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If you have any questions, please contact me at 301-415-1564 or via e-mail at Siva.Lingam@nrc.gov.

Sincerely,



Siva P. Lingam, Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosures:

1. Audit Report (non-public)
2. Audit Report (public)
3. List of Attendees

cc w/o Enclosure 1: Distribution via Listserv

ENCLOSURE 2

REGULATORY AUDIT REPORT

JUNE 22-26, 2015, AUDIT PERFORMED AT WESTINGHOUSE
FACILITY IN WARRENDALE, PENNSYLVANIA

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323



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REPORT OF REGULATORY AUDIT PERFORMED JUNE 22-26-2015, AT
THE WESTINGHOUSE FACILITY IN WARRENDALE, PENNSYLVANIA
IN SUPPORT OF THE DIGITAL PROCESS PROTECTION SYSTEM
PACIFIC GAS AND ELECTRIC COMPANY
DIABLO CANYON POWER PLANT, UNITS 1 AND 2
DOCKET NOS. 50-275 AND 50-323

BACKGROUND

By letter dated October 26, 2011, as supplemented by letters dated December 20, 2011; and April 2, April 30, June 6, August 2, September 11, November 27 and December 5, 2012; and March 7, March 25, April 30, May 9, May 30, and September 17, 2013; and April 24 and April 30, 2014; and February 2 and June 22, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML113070457, ML113610541, ML12094A072, ML12131A513, ML12170A837, ML12222A094, ML12256A308, ML13004A468, ML12342A149, ML13267A129, ML13093A311, ML13121A089, ML13130A059, ML13154A049, ML13261A354, ML14205A031, ML14121A002, ML15062A386, and ML15173A469, respectively), Pacific Gas and Electric (PG&E, the licensee), requested the U.S. Nuclear Regulatory Commission (NRC) staff's approval of an amendment for the Diablo Canyon Power Plant, Units 1 and 2 (DCPP, Diablo Canyon). The proposed license amendment request (LAR) would provide a digital replacement of the Process Protection System (PPS) portion of the Reactor Trip System and Engineered Safety Features Actuation System at DCPP. The LAR requested U.S. Nuclear Regulatory Commission (NRC) review and approval of the proposed design.

In February of 2013, the NRC staff conducted an initial audit of the Westinghouse Electric Company LLC (Westinghouse) Advanced Logic Systems (ALS) system development processes in Scottsdale, Arizona. The February 11-14, 2013, audit report dated October 8, 2013, is publicly available in ADAMS at Accession No. ML13232A263. During that audit, the NRC staff was unable to observe how the design phase outputs are subject to the Verification and Validation (V&V) processes because the V&V activities had not been completed. The staff also identified several open items and noted that a follow-up audit would be necessary to evaluate resolution activities for each of these open items.

REGULATORY AUDIT BASIS

The purpose of this second Westinghouse audit was to determine if the life-cycle processes used during system development resulted in an ALS system for use at DCPD which meets regulatory requirements. This audit provided information necessary to support the NRC staff's evaluation of the Westinghouse / ALS portion of the proposed DCPD PPS. The scope of this audit was defined in the associated audit plan dated May 15, 2015 (ADAMS Accession No. ML15121A310).

AUDIT ACTIVITIES

The NRC audit team, consisting of Richard Stattel, Samir Darbali, and Rossnyev Alvarado from the Instrumentation & Controls Branch (EICB), and Shiattin Makor from NRC Region IV, visited the Westinghouse facility in Warrendale, Pennsylvania, from June 22-26, 2015, to perform this audit. The details of the activities performed during the audit are described below.

1. Entrance Meeting

On June 22, 2015, the audit team summarized the results of the February 2013 audit and discussed follow-up activities to be performed during the week. The team also provided an overview of the audit plan and objectives for the audit. Facility logistics and the detailed audit schedule were discussed. Westinghouse staff provided discussion of the current status of the ALS subsystem. The ALS logic was operating in the prototype system and preparations for performance of the Factory Acceptance Test (FAT) were underway. A list of attendees is provided in Enclosure 3.

2. Requirements Thread Reviews

Several requirement threads were reviewed through the requirements phase during the first audit (documented in the audit report dated October 8, 2013). The team selected the following threads from these previously reviewed threads and performed follow-up reviews through the design and implementation phases of PPS system development.

- Functional Requirements Specification (FRS) 3.2.1.10 and Interface Requirements Specification (IRS) 1.5.8 – time response – This requirement was found traceable to the ALS System Design Specification (SDS) and is tested under test case 09, "SYSTEM RESPONSE TIME TEST," of the FAT.
- FRS 3.2.1.16-5, Detection of an Internal Rack Failure implemented as Digital Output Channel Health function – This requirement was found traceable to the ALS System Design Specification and will be tested under test cases 05, "RCS FLOW INSTRUMENT CHANNEL TEST," and 13, "BOARD REMOVAL TEST," of the FAT.

The NRC staff was able to trace system requirements to specific test cases being performed during the FAT. Available test documentation was also reviewed, and the NRC staff confirmed test coverage within the FAT. The test cases for the FAT were available in the Enterprise Document Management System (EDMS) (within Westinghouse Document 6116-70020).

In addition, the NRC staff traced the following requirements

- IRS 2.3.4 - TxB communication
- IRS 2.3.5 – Test ALS Bus (TAB) communication
- SDS R1609 and R1609.1 - Safety Power Supply Protection Features
- FRS 3.1.5 - Seismic Classification Requirement
- FRS 3.1.6.1 - Line Sense Module EMI/RFI [Electromagnetic Interference/Radio-Frequency Interference] Qualification
- SDS Table D-1 - System Coverage of Serial Link Faults
- SDS Table D-2 ID H1 – RTD [Resistance Temperature Detector] Open Circuit Detection

Using the Requirements Traceability Matrix (RTM), the NRC staff traced these requirements down from the SDS to the ALS Service Unit (ASU) System Design Description, ASU Test Procedure, and test cases in the FAT. The NRC staff reviewed the test cases for the ASU and FAT.

3. Time Response Requirements Review

The NRC reviewed the relation between the specified time response requirements for PPS and the safety analysis response time assumptions listed in the DCPD Updated Final Safety Analysis Report (UFSAR) Table 15.1-2. The NRC staff evaluated how the ALS contribution to the PPS system response time is derived and accounted for.

4. Review of Project Risk Mitigation Measures

Westinghouse uses its Risk Assessment Worksheet (RAW) to identify risk, problem and mitigation strategies. This worksheet is maintained and reviewed periodically by the Project Leadership Team. The NRC staff reviewed the RAW updated in June 2015 for the DCPD PPS project. The NRC staff confirmed the RAW identified risks which could possibly be encountered during the project, qualitative analysis, quantitative analysis, and the risk response planning for each item. The RAW is updated at least monthly.

5. Redundancy Checker

The LAR states the redundancy checker compares outputs and critical initial states from the two Cores and will drive the board to a safe state when the outputs do not agree. These types of failures are considered to be detectable failures that could result in loss of ability to perform a required safety function. The NRC performed an audit activity to verify requirements associated with defining these states and was able to confirm implementation within the system design.

The safe states for system functions are defined by the licensee and are included in the system functional requirements specifications. These states are then included in the ALS Non-Volatile Memory (NVM) configuration specifications for each ALS board and virtual channel. The ALS-102 Digital Output Channels, ALS-402 Digital Output Channels, and the ALS-421 Analog Output Channels "Fail As Defined" on a per channel basis upon detection of a diagnostic fault resulting in the loss of capability to drive the associated digital output or analog output. See also NRC request for additional information (RAI) 64 dated March 31, 2014 (ADAMS Accession No. ML14071A181), and the licensee's RAI response dated April 30, 2014).

This audit item is associated with Open Item 110 of the DCPD Open Item List. This Open Item was updated and has been closed due to completion of this audit activity.

6. ALS System Communication / TAB Connection Verification

The NRC staff reviewed the requirements and design of the Test ALS Bus (TAB) communication link and the transmit bus TxB. As mentioned in audit item 2, the NRC staff traced the requirements IRS 2.3.4 and 2.3.5 corresponding to TxB and TAB communication.

Prior to the audit, PG&E submitted its letter dated June 22, 2015, in which PG&E clarified how the TAB communication is enabled. Specifically, this communication is enabled when the TAB data link is physically connected and the TAB Enable digital input (DI) is activated. During the audit, the NRC staff reviewed how this requirement was implemented in the design of the ALS system. Westinghouse designed the system to allow TAB communications only when the TAB enable DI is true. Westinghouse described the design to indicate the TAB is connected and ASU connection to the correct ALS chassis is confirmed (contained in requirement SDS-0310), which was implemented using the logic diagram provided in Appendix B of ALS, System Design Specification (6116-00011). Westinghouse also explained if the TAB Enable DI is in error, the operator would not be able to modify the settings in the ALS NVM and perform calibration of ALS analog Input / Output (I/O). The ALS system will indicate the TAB link is connected by illuminating the Light Emitting Diode (LED) on the ALS-102 board.

During the audit, the NRC staff observed a demonstration of the TAB link connection, including illumination of the LED. The staff also observed that once the TAB was connected information (e.g., serial number) from the ALS chassis was displayed in the ASU. The NRC staff confirmed when the TAB is disconnected, this information in the ASU is no longer available. This configuration information can only be obtained and verified by connecting the TAB. Furthermore, the NRC staff observed this information cannot be accessed through the TxB1 and TxB2 communication links.

The NRC staff and Westinghouse discussed the requirements and design for the TxB communication. The NRC staff observed a demonstration of the FAT test case to verify the requirements for TxB communication described in 6116-00011. This test case is described in 6116-70030, "Diablo Canyon PPS System Test Design Specification." The test case was performed using the system test assembly for FAT, and the test was run successfully.

7. Westinghouse Organization

The Management Plan (6116-00000) defines the project organization for the DCPD PPS project. During the audit, Westinghouse explained the structure organization and roles and responsibilities for the team members. One of the items discussed was the independence of the Independent Verification and Validation (IV&V) group. In the IV&V Plan (6116-00003), Westinghouse noted the IV&V group for DCPD PPS matches the definition of "modified" per the description of Institute of Electrical and Electronics Engineers (IEEE) Std. 1012-1998, "IEEE Standard for Software Verification and Validation." Westinghouse explained the Project Manager (PM) is only tracking the charges made by the IV&V group (for VV activities), as well as the budget. But the PM has no control over the IV&V budget. In this manner, the IV&V group remains independent. During this discussion, the PM explained the support provided by Westinghouse Global Instrumentation and Control Production (GICP) group. Specifically, GICP is responsible for constructing, integrating, testing, and shipping of end-users products in compliance with the terms of the contract.

8. ALS Design Process and Documentation

During the first audit, Westinghouse and CS Innovations (CSI) explained the design process and documentation for the ALS system. Due to the closure of CSI, many documents and procedures were replaced or retired. In 6116-0001, "Quality Assurance Plan," Westinghouse provided a mapping of previous procedures and current procedures. In addition, during the audit, Westinghouse described how these procedures were used to develop and design the ALS system. In particular, Westinghouse is using PG&E requirement documents (FRS and IRS) as starting point for its traceability matrix (RTM). Westinghouse created customer deviation/exception request (CD/ER) to identify requirements not applicable to Westinghouse.

The NRC staff reviewed LTR-DCPPS-15-002, "Diablo Canyon PPS Updated Scoping Tables and CD/ER Forms for Submittal to PG&E," dated March 16, 2015, which defines the scope of Westinghouse (scoping table) and CD/ER. This letter includes an attachment, which identifies sections in the FRS/IRS traceable (or not) to Westinghouse requirements. For example, in this table Westinghouse identified IRS 2.7.1.2 is not traceable because it is a duplicate of IRS 2.3.4, 2.3.4.1, and 2.9.6.7.5. The staff also reviewed LTR-DCPPS-15-037, which provided an update to the scoping table and CD/ER. This letter references LTR-DCPPS-15-002 for the specific changes. In its letter PPS-WEC-15-010, dated March 20, 2015, to Westinghouse, PG&E reviewed and approved the modified scoping table and exception requests, the licensee approved the scoping table and CD/ER provided in LTR-DCPPS-15-037.

Westinghouse described the procedures followed for the development of the ALS system. In particular, Westinghouse developed the system life cycle in accordance with NA 3.18, "FPGA-based Project Planning and Execution," and the design and development of ALS-102 in accordance with NA 4.51, "Field Programmable Gate Array (FPGA) Development Procedure."

NA 3.18 replaced the CSI procedure 9000-00310. This procedure defines the structure life cycle for FPGA-based projects. In particular, this procedure defines the schedule and content of each planning document. In addition, this procedure references the work instruction for Human Diversity management for the design of FPGA to ensure diversity requirements and resource allocations are met. During the audit, the NRC staff confirmed the life cycle described in the Management Plan (6116-00000) is equivalent to the process described in NA 3.18.

NA 4.51 defines the development process for FPGA. NA 4.51 replaced the CSI procedure 9000-00313. This procedure is used during the development stage until the FPGA image and the NVM are released for implementation. This procedure describes the roles and responsibilities for the staff involved in the development process. During the audit, the NRC staff confirmed the roles and responsibilities defined in the procedure are consistent with the information described in the Management Plan (6116-00000).

During the audit, the NRC staff confirmed the input to the development process was the system design specification (6116-00011). All subsequent documents, requirements, plans, and tests were developed using Revision 8 of the SDS. During the first audit, Westinghouse explained the different FPGA release versions. Because of the replacement of CSI procedure, Westinghouse modified these release versions to better map the development phases identified in NA 4.51. The FPGA development phases are: Requirements, Design, Implementation, Testing, and Release. FPGA release versions are performed during the requirements, implementation, and test phases.

During the FPGA development, the FPGA team performs FPGA reviews, which are captured in the FPGA Review Checklist (9008-00026). This checklist is included in the Software Release Record (SRR). This checklist contains a section for each FPGA release version in accordance with NA 4.51. [[

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Comments or discrepancies were identified in OnTime tickets. [[

]] The NRC staff observed all comments in this ticket were resolved and the checklist was completed and approved.

At the time of the audit, Westinghouse informed the NRC staff they were resolving items identified [[]]. These items were captured in OnTime tickets. During the audit, the NRC staff reviewed these tickets and observed the proposed resolution for these items. [[

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Regarding NVM release, Westinghouse prepares a release record and a task report for the NVM. The release record summarizes information about the NVM image and description of previous revisions. The task report describes the NVM image, approach for verification and the

verification results. During the audit, the NRC staff saw the draft NVM task report WNA-VT-00282-PGE. In addition, one of the DCCP software engineers demonstrated to the staff the process of programming an ALS board's NVM image binary file through the use of the ALS Spares Programming Station. The software engineer walked the staff through the steps required for programming the NVM of an ALS board. Westinghouse noted the ALS Spares Programming Station cannot be used to rewrite the FPGA.

As part of the development process, Westinghouse performs design reviews in accordance with WEC 3.3.1, "Design Reviews." WEC 3.3.1 defines the system-level design reviews for the system. Westinghouse uses the information resulting from the FPGA reviews as input to the design reviews. The Management Plan identifies an Intermediate Design Review to be performed during the Development Stage of the system, and a Final Design Review to be performed at the completion of the Test Phase. During the audit, the NRC staff reviewed the intermediate design review report (WNA-ER-00210-PGE, Revision 0, dated February 2014). This report includes the reviews performed of the different design documents, the design review action items and the design review checklist. This report identifies the people that participated in the review. In this case, personnel from PG&E, Altran, Westinghouse and CSI participated.

9. Verification and Validation

The NRC staff met with the IV&V group to discuss the status of IV&V activities and observe simulation testing. The IV&V lead explained this group is currently performing verification of the documents resulting from the design phase, performing simulation testing of the FPGAs, reviewing the FPGA task report and NVM task report, and resolving OnTime tickets.

The IV&V [] provided a demonstration of the V&V simulation test, which is described in Westinghouse 6116-10216 and 6002-00018. For this demonstration, the NRC staff selected requirement R1123 from ALS-102 FPGA requirement specification (6116-10201). Using the System Verilog, IV&V used the specific cover group to perform the simulation. After the test was completed, the scoreboard summarized the results of the test, including the percentage of coverage simulation. In this case, the NRC staff observed the test performed achieved a 100 percent coverage of the RTL code. The results from these simulation tests will be included in a test summary report.

In case the simulation does not achieve 100 percent coverage, the scoreboard will identify the lines (in the RTL code) not exercised during simulation. The IV&V will review these lines and determine if the test case needs to be modified. If the analysis identifies that they are unintended functionality or cannot determine if they are required, anomalies will be opened against the lines of code for further consideration by the designer. IV&V will continue with simulation testing until it achieves 100 percent coverage, which is consistent with the metrics defined by Westinghouse IV&V for past platform verification efforts.

10. System V&V associated with "Verification of Diversity"

During the audit, the NRC staff reviewed documents, procedures, and logic to observe how Westinghouse implemented the ALS design diversity described in 6002-00031, "ALS Diversity Analysis."

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11. Staff Training

Westinghouse WEC 2.6, "Training," defines the training requirements for Westinghouse personnel. For the DCPD PPS project, Westinghouse prepared a training needs assessment (TNA) and a TNA plan, which is described in LTR-DCPPS-14-003. The input and bases of this TNA are the training requirements set forth by the ALS platform and the project specific documentation created for DCPD. During the audit, the NRC staff observed this plan identifies all self-study materials (including quality assurance procedures) required for the DCPD PPS

project. The NRC staff also observed examples of training reports for Westinghouse personnel working in the DCPD PPS project, [[]]. The NRC staff noted they completed all training required for DCPD, which was identified in LTR-DCPPS-14-003.

Westinghouse maintains a TNA to the training required for the ALS safety systems and upgrades group, including curricula for system engineer, hardware engineer, software engineer, and test engineer. The NRC staff reviewed LTR-ALS-SSU-14-034, which identifies all quality assurance procedures and Westinghouse procedures required for each individual (by name).

12. Configuration Management

Westinghouse uses its EDMS as the official repository for all of DCPD's approved documents and configuration items (CIs). Each user has a defined access login and level of permission and access for the EDMS.

CSI and Westinghouse used 6116-00050, "Diablo Canyon PPS Configuration Status Accounting (CSA)," to track configuration items for the DCPD PPS project. However, in DCPD PPS Management Plan" (6116-00000), Westinghouse noted the CSA was replaced and superseded by the DI, node "D116." The DI is an Access Database that documents CIs, baselines, and releases related to the DCPD PPS project.

Users need to request access (different levels) and create a login ID. After logged in, a user can view DI hierarchy, select the node for DCPD, and see the documents list.

Section 6.1 of the Management Plan (6116-00000) describes the types of configuration items and levels for the DCPD PPS project. Summaries of the project's CIs can be created from the DI. These summaries for DCPD are provided in 6116-00400, "DCPD PPS Configuration Management Report," and 6116-00401, "Diablo Canyon PPS Configuration Management Baseline Report."

The baseline report (6116-000401) documents the design basis for the DCPD PPS project to be used for the development of both hardware and software that will be delivered to PG&E. [[

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The configuration management release report (CMRR) (6116-00400) documents the CIs at the time the report is created. During the audit, the NRC staff reviewed the CIs used as the basis for the Test Phase of the project per 6116-00000, "DCPPS Management Plan". This report also identified where the CIs can be found (for this project in the EDMS folder for DCPD).

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Westinghouse uses the Request for Engineering Change (REC) Process for configuration control and to manage changes to baselines and CIs. The REC process is defined in NA 4.28, "Request for Engineering Change." During the audit, the NRC staff observed how this process

is being used. [[

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RECs are maintained and posted in a SharePoint called ENOVIA. This site requires login access. During the audit, the NRC staff observed an REC associated with Revision 8 of the system design specification (6116-00011). The REC showed the initiator, proposed change (change history), when it was submitted to the CCB for approval, and its current status (in this case, complete). REC will reference any applicable OnTime tickets, Corrective Actions, and Deviation Notice that may impact the released CIs.

For changes to engineering drawings, Westinghouse uses its Engineering Change Order. During the audit, the NRC staff reviewed Engineering Change Order ECO-15-00400, which documented changes requested to a board drawing.

The PM explained access to update CI information is granted to authorized users. To update/modify these documents, they should be first posted in EDMS. [[

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For the project files required to be on the Westinghouse Isolated Development Infrastructure (IDI) (including FPGA files), Westinghouse created a repository in the Concurrent Version System (CVS), which is a configuration management tool.

The NRC staff interviewed the IDI Software Librarian, who provided a demonstration of the process for creating the NVM software release compact discs (CDs) as part of manufacturing requests. [[

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13. Configuration Verification

The NRC staff conducted an audit activity to observe how the Maintenance Workstation/ASU can be used to verify that correct logic implementation is installed into the DCPD system Core Logic boards. The NRC staff determined this verification activity can be performed with the system operable. The NRC staff also determined that accessing the board's NVM requires connecting the TAB.

The NRC staff reviewed the Configuration Status Accounting document 6116-00050, however, Westinghouse informed the audit team this document was being replaced by an ALS configuration report (as described in item 12 of this report) and ALS board configuration drawings to serve as the control documents for managing system configuration. ALS board configuration information including board revision level, non-volatile RAM [random access memory] revision level, and board part numbers are contained in the ALS board configuration drawings and can be compared to the installed board information displayed on the ALS maintenance workstation. The NRC staff drafted the following recommended inspection item as a means of confirming correct system configuration upon plant installation of the ALS system (to be included in the safety evaluation).

Inspection Item - Perform a comparison of the required ALS subsystem configuration data to the installed logic configuration including ALS board part numbers, NVM part numbers, and associated revision levels of the delivered plant PPS equipment. The intended system logic is recorded in DCPD PPS ALS Board Configuration Drawings 5116-10201, 5116-30201, 5116-31101, 5116-32101, 5116-40201, 5116-40202, 5116-42101, 5116-42102.

This audit item is associated with Open Item 109 of the DCPD Open Item List. This Open Item was updated and will be closed due to completion of this audit activity.

14. Non-Conformance and Problem Resolution

Westinghouse uses the OnTime defect tracking tool to record and track anomalies and non-conformances. The NRC staff reviewed several OnTime tickets. The NRC staff observed each ticket includes a brief summary of the issue, severity, priority, date, proposed resolution and workflow status. The NRC staff selected modifications proposed in several OnTime tickets to trace them until the resolution was implemented, approval was granted and the ticket was closed.

Westinghouse explained how it uses the Corrective Action, Prevention, and Learning (CAPAL) to record and track issues until their resolution. During the audit, the NRC staff reviewed several CAPALs, including resolutions for those issues identified.

15. Indication of Channel Bypass Status

This audit item is associated with Open Item 111 of the DCPD Open Item List. The NRC performed a thread review of requirement R4082 of the FPGA Requirements Specification 6116-10201. This requirement was superseded; however, the NRC staff evaluated how the initiating functional requirement is being satisfied in the completed system design.

16. Secure Development Environment

This audit activity focused on verifying conformance of the development environment established for the DCPD system to the requirements of Regulatory Guide 1.152, Revision 3,

"Criteria for Use of Computers in Safety Systems of Nuclear Power Plants," July 2011 (ADAMS Accession No. ML102870022). The NRC staff previously observed the secure development environment (SDE) implemented by Westinghouse and CSI at the Scottsdale, Arizona facility during the February 2013 audit. During the present audit, the staff focused on reviewing how SDE activities have been addressed by Westinghouse since moving the DCPD development environment from Scottsdale, Arizona to Warrendale, Pennsylvania.

The SDE activities at the Warrendale, Pennsylvania facility focus on controlling and monitoring access to the DCPD development environment, and preventing the inclusion of errors or unused functionality in the DCPD products and design documentation.

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The NRC staff reviewed several Westinghouse documents used to establish and maintain the DCPD SDE. NA 5.10, "NA Cyber Security Program," Revision 0 (formerly NA 5.9, "CS Innovations Cyber Security Plan," Revision 1), addresses the SDE in which standard and project-specific software development will occur, including development and production activities, and the DTE. This program references physical and cyber security guidelines for controlling the IDI and the DTE, as well as training expectations for Westinghouse employees and contractors.

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During the 2013 audit of Westinghouse / ALS, the NRC staff was given a demonstration of how the IV&V process is used to detect and prevent the use of unintended code and unintended functions. Code coverage as well as a simulation tool are implemented by the IV&V team to identify code that is not executed or not traceable to a requirement. These methods allow the IV&V to detect which lines of code were not executed by a test. The staff reviewed several OnTime tickets related to the identification and correction of unused or incorrect code in the DCPD PPS project.

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17. Inspection Items

The NRC staff discussed recommended inspection items that will be included in the safety evaluation. Several changes and clarifications were made to the proposed list. This list will be shared with the licensee and further discussions will be addressed in the open items table.

18. ALS Equipment Environmental Qualification Discussion

The NRC staff conducted a meeting to discuss the open items associated with ALS equipment environmental qualification to gain information regarding these issues via audit review activities. The following audit actions were performed as a result:

- a. The Line Sense Module (LSM) EQ [Environmental Quality] Summary Report (EQ-QR-120PGE) provides a summary of EMI/RFI test results derived from the detailed test report EQLR-319. As a confirmatory audit activity, the NRC staff reviewed Section 7.2.5 of this report, which describes the test results for Radiated Susceptibility Tests performed on the ALS LSM.

These tests were conducted in accordance with International Electrotechnical Commission (IEC) Std. 61000-4-3, "Testing and Measurement Techniques – Radiated, Radio-Frequency, Electromagnetic Field Immunity Test," and satisfied all requirements of that standard. The equipment under test was operated in normal operating mode. The test data was reviewed and found to be consistent with the overall reported results. No equipment anomalies or deviations were observed during the tests and all acceptance test criteria were met. Temperature and humidity parameters were monitored during the test and remained consistent with operating conditions.

- b. During these discussions, the NRC staff was made aware of an experimental equipment temperature rise test performed by the licensee to determine if the temperature requirements of the system could be met in advance of equipment installation into plant cabinets. A report for this test was reviewed. Though this was an informal test and was not intended to satisfy the licensee's obligation to measure temperature when the equipment is installed in the plant, the NRC staff considers it to be useful and will include an assessment of the test results as part of the PPS safety evaluation.
- c. The document titled "Seismic Study PPS Replacement IS-022C-Study" was provided to the NRC staff for review. This document contains a study of the seismic response for the PPS replacements cabinets with the ALS and Tricon equipment installed and how the response compares to the in-equipment response spectra (IERS). There were some exceedances of the IERS for some components at some frequencies which means more detailed analyses and/or cabinet structural changes will be needed. Follow-up activities are identified in Open Item 101 and resolution of this item will be tracked via the open items table.

19. Exit Meeting

During the exit meeting on June 26, 2015, the NRC staff provided a summary of observations made during the audit. The audit team identified several documents for which newer versions

reviewed during the audit will need to be submitted in support of the LAR. New Open Items (OIs) resulting from audit activities were discussed and the NRC staff will add these OIs to the current OI list to support the next scheduled project conference call.

CONCLUSIONS

The NRC staff addressed each of the planned audit activities outlined in the audit plan. Several requirements threads were selected and evaluated for compliance with the DCPD PPS specific specification documents. Interviews were conducted with Westinghouse personnel from the IV&V, Design Engineering, and Configuration Management groups.

Audit Observations:

- PG&E issue: details of the Keyboard-Video-Mouse (KVM) switch were removed from the LAR. The NRC will create a recommended inspection item to verify proper use of the KVM switch.
- PG&E's letter dated June 22, 2015, identifies several modifications to section 4.8, compliance to Interim Staff Guidance ISG-04 in the LAR. These changes are inconsistent with the information provided in WEC 6116-00054, DCPD PPS ISG04 Matrix. The NRC staff will capture this in the safety evaluation stating that the LAR supersedes the Westinghouse document, since design changes were not implemented. This issue is also captured in the new OI list below.
- Revisions of documents used during the audit were different than those available to the NRC staff (either at the SharePoint site or submitted on the docket). These documents are listed below and have been added to the Open Item 145 required submittal list.
 - Configuration Management Report 6116-00400
 - Configuration Management Baseline Report 6116-00401
 - ALS System Design Specification 6116-00011
 - Diablo Canyon PPS System Design Specification 6116-70030
 - PG&E Interface Requirements Specification
 - PG&E Functional Requirements Specification
 - PG&E Controller Transfer Functions Design Input Specification

The following new OIs were initiated during this audit:

150. **Westinghouse and PG&E** - PG&E letter dated June 22, 2015 identifies several modifications to section 4.8, compliance to ISG-04, in the LAR. These changes are inconsistent with the information provided in WEC 6116-00054, DCPD PPS ISG04 Matrix. The NRC staff plans to capture this in the safety evaluation report

and note that the LAR supersedes the Westinghouse document, since design changes were not implemented.

151. **PG&E** - The PG&E "Quality Assurance Plan for the Diablo Canyon Process Protection System Replacement" states that PG&E will perform management and oversight activities during the work performed by Invensys and Westinghouse/ALS, as well as evaluate deviations or anomalies during software development, approved corrective actions, and coordinate the disposition of discrepancies in the course of V&V. PG&E to state how these activities will be documented and where and when this information will be available.
152. **PG&E** - The PG&E "DCPP Project Procedure, System Verification and Validation Plan (SyVVP) for the PPS Replacement Project" defines activities for PG&E to perform, such as preparing the final system V&V report for DCPP PPS. PG&E to Please indicate how these activities will be documented and where and when this information will be available.
153. **PG&E** - The FRS, Transfer Function Specification and IRS include requirements that are the responsibility of PG&E. PG&E will prepare a traceability matrix to show how these requirements were fulfilled.
154. **Westinghouse** - The staff was informed that IV&V will review the WSA-CSS-14-01 IDI assessment results to confirm there is no impact to the DCPP PPS project. Westinghouse to provide a summary of the results of the IV&V review of the WSA-CSS-14-01 IDI assessment, and whether or not there is an impact to the DCPP PPS project.

Principal Contributors: Richard Stattel, NRR/DE/EICB
Rossnyev Alvarado, NRR/DE/EICB
Samir Darbali, NRR/DE/EICB

Date: September 2, 2015

ENCLOSURE 3

LIST OF ATTENDEES AT ENTRANCE MEETING FOR REGULATORY AUDIT REPORT

JUNE 22-26, 2015, AUDIT PERFORMED AT WESTINGHOUSE
FACILITY IN WARRENDALE, PENNSYLVANIA

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323

LIST OF ATTENDEES AT ENTRANCE MEETING FOR REGULATORY AUDIT REPORT

JUNE 22-26, 2015, AUDIT PERFORMED AT WESTINGHOUSE
FACILITY IN WARRENDALE, PENNSYLVANIA

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DIABLO CANYON POWER PLANT, UNITS 1 AND 2

DOCKET NOS. 50-275 AND 50-323

NRC	PG&E	WESTINGHOUSE
R. Alvarado	K. Schrader	J. Beck
S. Darbali		A. Breneman
S. Makor		A. Chandrasekhara
R. Stattel		S. Karaaslan
J. Thorp		M. Maher
		W. Odess-Gillett
		S. Packard
		M. Pfeiffer
		M. Shaffer
		D. Sklarsky
		M. Stofko
		T. Tuite
		T. Tweedlt

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E. Halpin

- 2 -

If you have any questions, please contact me at 301-415-1564 or via e-mail at Siva.Lingam@nrc.gov.

Sincerely,

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-275 and 50-323

Enclosures:

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2. Audit Report (public)
3. List of Attendees

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NAME	BSingal (S. Lingam for)	SLingam	JBurkhardt
DATE	8/17/15	8/17/15	8/13/15
OFFICE	NRR/DE/EICB/BC(A)	NRR/DORL/LPL4-1/BC	NRR/DORL/LPL4-1/PM
NAME	DRahn*	MMarkley	SLingam
DATE	8/3/15	9/2/15	9/2/15

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