DIABLO CANYON POWER PLANT LICENSE AMENDMENT REQUEST FOR DIGITAL REPLACEMENT OF PROCESS PROTECTION SYSTEM

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Status of ALS Platform Development Westinghouse)

- All open items from the NRC Acceptance Letter will be addressed in the response to the letter
- Use of tools for producing and testing FPGAs
  - Explanation in the Documentation package that has been submitted
  - Issues identified in audits are being closed
- Schedule for (any) documentation changes will be included in the response to the NRC Acceptance Letter

Status of ALS Platform Development and FAT (Westinghouse)

- First set of documentation - May 2012
- Factory Acceptance Test
  - Test Execution – November 2012
  - Final Documentation – December 2012

Status of Tricon V10 Platform Development and FAT (Invensys)

- Development of DCPP PPS Tricon
  - HDD release in March 2012
  - SDD release in April 2012
  - Application Code release in May 2012
  - Code Verification completed August 2012
- FAT Schedule
  - Dry-Run September 2012
  - Official run December 2012

PG&E Observations on Effectiveness of ISG-06 to Prepare LAR

- ISG 6 - Licensing process for Digital I&C System Reviews
- Allows formal interface with staff on initial digital I&C design and formal staff feedback in meeting minutes
- Diablo Canyon is pilot plant for use of ISG 6
- PG&E held four Phase 0 meetings prior to submittal
  - 2 meetings for diversity, 1 for communications, 1 for LAR
- PG&E submitted pilot application 10/26/11

PG&E Observations on Effectiveness of ISG-06 to Prepare LAR

- Staff feedback on initial design was extremely helpful to finalize design, and to minimize risk that a requirement will not be met for proposed design
- PG&E found ISG 6 to be an excellent roadmap for all requirements and criteria that need to be addressed in LAR

PG&E Global Comments on ISG-06

- ISG 6 is oriented toward complete upgrades to protection systems and does not address when a portion of a protection system or safeguards support system is upgraded
- ISG 6 is oriented toward utilities submitting LARs and is less well suited for vendors submitting platform Topical Reports
- PG&E believes ISG 6 will facilitate increased utility requests for protection system upgrades
  - Increased safety to nuclear safety systems

PG&E Specific Comments on ISG-06

- ISG-06 does not provide specific guidance on the level of detail of information to be provided for Tier 1, Tier 2, and Tier 3 applications
  - Reference to information in vendor topic report, versus summary of vendor topical report information, versus providing all vendor information
  - PG&E requested staff input on level of detail to be provided during the Phase 0 meetings

PG&E Specific Comments on ISG-06

- ISG-06 Section D.1, System Description describes NRC expectations for description of the new system, but does not contain provisions for description of the safety functions that must be performed
  - The DCPP LAR submittal inserted a new Section 4.1, PPS Overview, which described the safety functions performed by the Reactor Trip System and Engineered Safeguards Feature Actuation System. This caused the renumbering of subsequent sections.

PG&E Specific Comments on ISG-06

- There is some overlap in the documentation submitted for the Software Safety Plan (D.4.4.1.9), Vulnerability Assessment (D.12.4.1) and SDOE (D.12.2)
  - Discussions with the vendors were needed to make sure ISG-06 guidance was met

PG&E Specific Comments on ISG-06

- SDS and SDD are equivalent per ISG-06 Enclosure F
  - D.4.4.3.3 (Enclosure B item 1.13) describes the SDS
    - ISG-06 SDS description matches SDD functionality per IEEE-1012-1998
    - SDS is developed from the SRS (Enclosure B Item 1.12; described in D.4.4.3.1)

PG&E Specific Comments on ISG-06

- NUREG/CR-6101 guidance appears more oriented to text-based languages than Function Block Diagrams (FBD)
  - FBD Custom Function Blocks are collection(s) of programming language statements, which are compiled as a unit, verified and validated once, then used repetitively. Analogous to NUREG/CR-6101 Modules or Subroutines.
  - FBD Programs are "…collection(s) of programming language statements, possibly including subroutines, which (are) compiled as a unit …" Analogous to NUREG/CR-6101 Modules.
  - FBD Applications are "…collection(s) of one or more modules, including both application modules and operating system library modules, that (are) capable of independent execution in a computer..." Analogous to NUREG/CR-6101 Load Modules.

PG&E Specific Comments on ISG-06

- FBD show "… exactly how the software requirements will be implemented in software modules and processes…"
  - Could a properly documented FBD Program listing be used in lieu of a SDS/SDD to simplify V&V and NRC Review?

PG&E Specific Comments on ISG-06

- The PG&E ISG-06 Enclosure B Matrix submittal resolves terminology differences for the LAR
- LAR Section 4.5:
  - DCPP SyVVP (4.5.6.1) and SyQAP (4.5.3.1) follow IEEE 1012-1998: SRS and SDD.

PG&E Specific Comments on ISG-06

- LAR Section 4.5.10:
  - Triconex SRS submittal (4.5.10.1)
    - Provides information equivalent to SDS described in ISG-06.
    - SDD will be available for audit
    - V10 Platform documents submitted separately
    - 993754-809 Rev 0 10/27/2011 DCPP Application
  - Westinghouse SDS submittal (4.5.10.2)
    - 6002-0011 Rev 6 ML110600671 Platform
    - 6116-0011 Rev 0 9/12/2011 DCPP Application

PG&E Specific Comments on ISG-06

- Per ISG 6 Phase 1 Software Design Specification (SDS) and the Software Test Plan (STP) are documents from the Design Phase
  - Should SDS/SDD and STP be moved to Phase 2?

PG&E Specific Comments on ISG-06

- The following ISG-06 sections do not appear in the Enclosure B Phase 1 table:
  - D.9.4.2.1 IEEE-603 Clause 5.1, Single Failure
  - D.9.4.2.2 IEEE-603 Clause 5.2, Completion of Protective Action
  - D.9.4.2.3 IEEE-603 Clause 5.3, Quality
  - D.9.4.2.12 IEEE-603 Clause 5.12, Auxiliary Features
  - D.9.4.3.1 IEEE-603 Clause 6.1, Automatic Controls
  - D.10.4.2.8 IEEE 7-4.3.2 Clause 5.8, Information Displays
  - D.10.4.2.11 IEEE 7-4.3.2 Clause 5.11, Identification

PG&E Specific Comments on ISG-06

- ISG-06 Enclosure B Phase 2 Item 2.13, As-Manufactured Logic Diagrams, refers to ISG-06 Section D.9.2 that is System Description (to block diagram level) and is not related to logic diagrams
  - More appropriate reference section may be D.4.4.3.5, System Build Documents, D.9.4.2.2, IEEE 603 Clause 5.2, Completion of Protective Action, and D.9.4.4.3, IEEE 7-4.3.2, Clause 7.3, completion of Protective Action, that discuss logic diagrams