DIABLO CANYON POWER PLANT
PROCESS PROTECTION SYSTEM REPLACEMENT
LICENSING EXPERIENCE USING ISG 6
NRC Meeting on Digital I&C
July 8, 2014

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Agenda

- ISG 6
- ISG 6 Pilot Application
- PG&E ISG 6 Lesson Learned

ISG 6

- ISG 6 - Licensing Process for Digital I&C System Modifications
  - Roadmap to success to develop acceptable License Amendment Request (LAR)
  - ISG 6 process will reduce licensing uncertainty and effort for future licensees/vendors
  - Facilitate increased safety to nuclear safety systems

ISG 6 Pilot Application

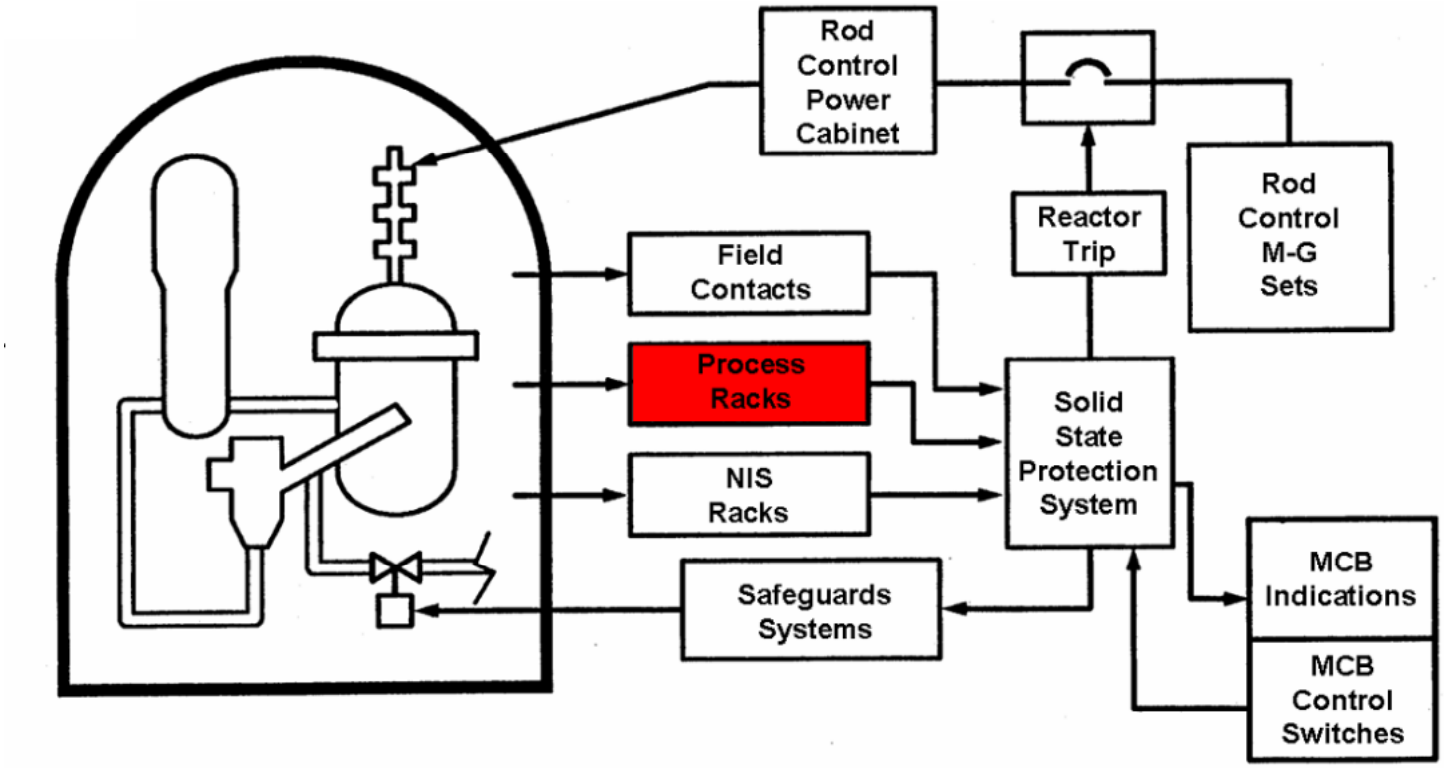
- Diablo Canyon is pilot plant for use of ISG 6
  - PG&E participated in ISG 6 working group
- PG&E submitted pilot application 10/26/11 (ML11307A331)
- Process Protection System replacement
  - Invensys Tricon V10 (PLC based)
  - Westinghouse Advanced Logic System - (ALS) (FPGA based)

ISG 6 Pilot Application

- Both vendors obtained NRC approval of platform topical reports (TR) during Pilot Application review
  - Invensys Tricon V10, April, 2012 (ML1209008902)
  - Westinghouse ALS, September 9, 2013 (ML13210A309)
  - Approved vendor TRs allow use of ISG 6 Tier 1 for systems with approved TR (fast-track)
  - Significantly simplifies future licensee LARs, NRC review, and safety evaluation

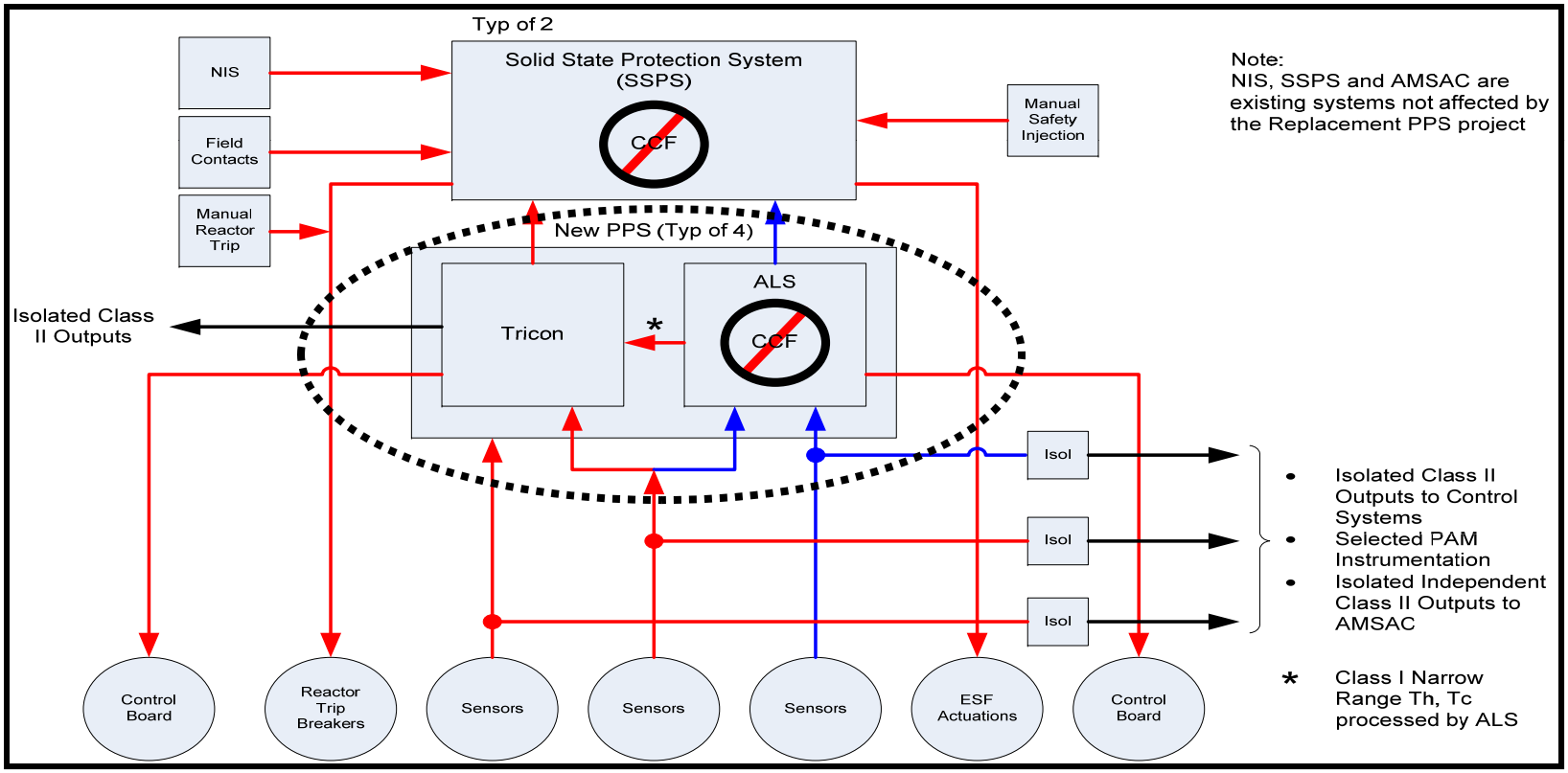
ISG 6 Pilot Application

- Project Scope



ISG 6 Pilot Application

- Process Protection System Replacement Architecture



ISG 6 Pilot Application

Current Status

- Completed ACRS reviews in February and March
- Completing final ISG 6 milestones
- NRC support of application has been excellent
  - Resources
  - Use of sharepoint site for documentation
  - Efficient resolution of open items
  - Identifying lessons learned from Oconee project
  - ACRS presentations/meetings

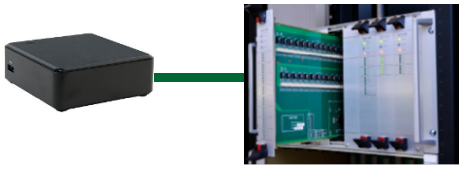
ISG 6 Pilot Application

Outstanding Milestones

- Invensys Tricon
  - Factory Acceptance Test (FAT) in progress, first of four protection sets tested acceptable
  - Expect to submit FAT results to NRC in October
- Westinghouse ALS
  - Final detailed design in progress
  - FAT expected spring 2015
  - Submit FAT results summer 2015
- PG&E to respond to final set of RAIs

ISG-06 Lessons Learned

- Most significant NRC issue, testing and software requirements on proposed common maintenance workstation for both Tricon and ALS subsystems
- PG&E changed design to use separate maintenance computer for each subsystem in each division
  - Simplifies factory acceptance testing requirements and eliminates potential software interaction issues



ISG-06 Lessons Learned

- PG&E issued single Functional Requirements Specification for project (covered both platforms)
  - Resulted in unnecessary difficulty for vendor design, vendor documentation, and NRC review
  - Contributed to vendors not meeting all applicable requirements, requiring redesign
  - Extended vendor schedules
  - Complicated NRC review and resulted in vendor audit issues

ISG-06 Lessons Learned

- PG&E did not incorporate I&C maintenance personnel expectations to support troubleshooting and maintenance into initial Functional Requirements Specifications
  - Required revision to Functional Requirements Specification
  - Caused vendors to have to redesign to meet new functional requirements

ISG-06 Lessons Learned

- Vendors did not fully understand meaning of some functional requirements
  - Nuclear requirements and terminology are unique
  - Some vendor design personnel did not have prior nuclear project experience (most PLC and FPGA business is non-nuclear)
  - Clarifying questions on requirements from vendors occurred late in detailed design, required some redesign
  - Utilities need to proactively ensure vendor design and IV&V personnel have correct understanding of all requirements

ISG-06 Lessons Learned

- Vendors underestimated effort for detailed design
  - First-of-Its-Kind large scope application of each vendor platform to US nuclear plant protection system
  - Nuclear requirements and processes are more complex
  - Vendor document revisions required to address ISG 6 requirements

Closing Comments

- ISG 6 process will reduce licensing uncertainty and effort for future Digital I&C applications