

Beaver Valley NFPA 805 Transition



NRC Meeting
August 1, 2012



Beaver Valley NFPA 805 Transition

- **Greg Halnon** **Director Fleet Regulatory Affairs**
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- **Rick Stremple** **PRA Engineer**
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Beaver Valley NFPA 805 Transition

■ Objectives

- Discuss the status of the NFPA 805 Transition Project:
 - Major Project Milestones
 - Challenges
 - Modifications
 - Enforcement Discretion
 - Summary / Discuss Path Forward

Beaver Valley NFPA 805 Project Status

■ Major Project Milestones

- BV1 and BV2 Detailed Fire Modeling is complete
 - BV1 Modeled 22 Fire Areas
 - BV2 Modeled 21 Fire Areas
 - Followed NUREG/CR 6850 Guidance – No Unapproved Analysis Methods used
- Fire PRAs have been Peer Reviewed
 - BV1 Focused Peer Review in January 2011 resolved the previous 2009 Peer Review Findings and Suggestions (F&Os). An additional 6 Findings, 6 Suggestions and an Unreviewed Analysis Method (UAM) were identified. The UAM was for using hot short durations for DC Circuits in FAQ-08-0051 that was not endorsed by the NRC in April 2010. This UAM and F&Os have been resolved by changes to the Fire PRA model, calculation updates, and PRA workbook updates.

Beaver Valley NFPA 805 Project Status

■ Major Project Milestones (cont)

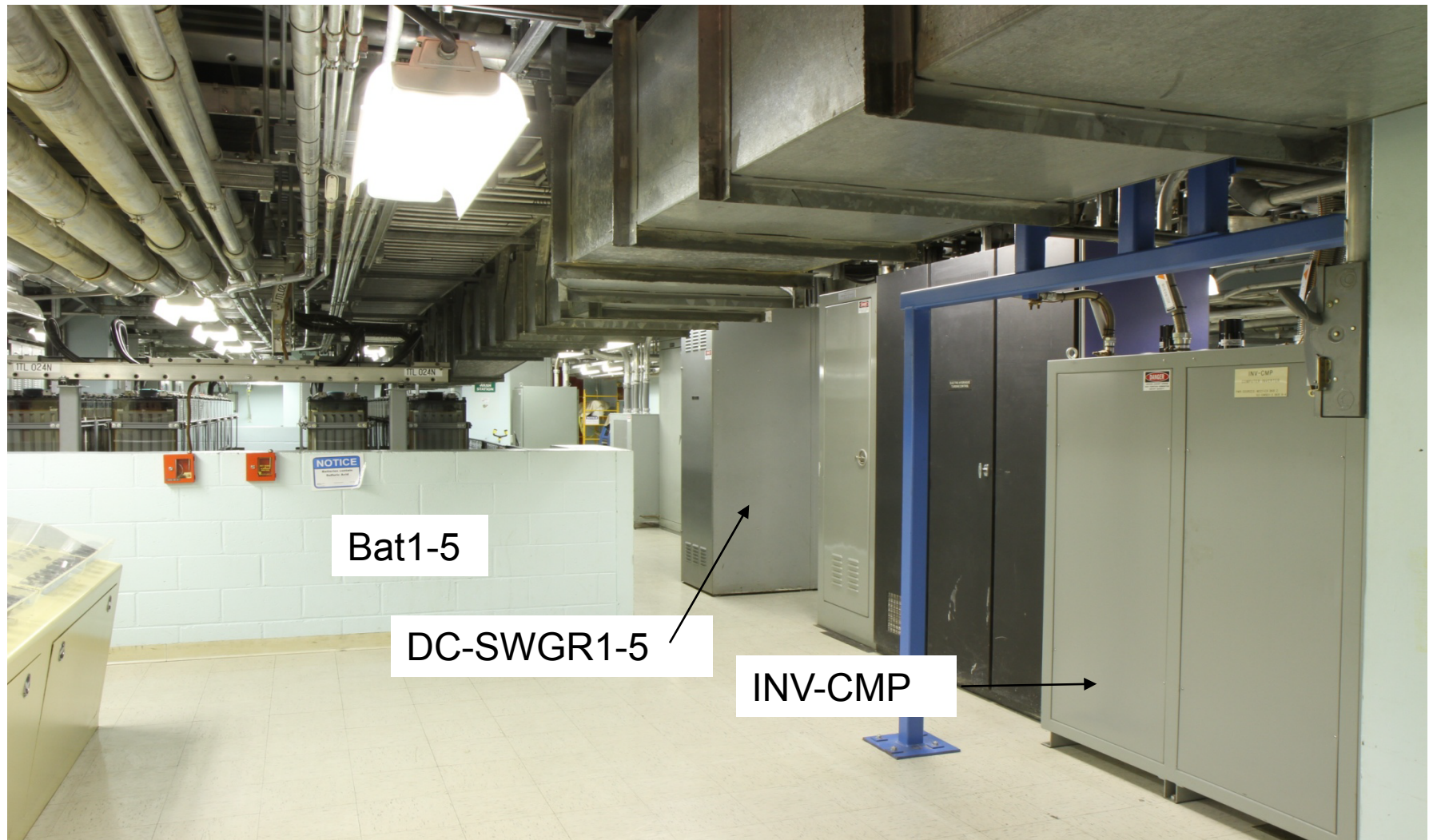
- BV2 Fire PRA Peer Review in February 2012 identified 14 Findings and 15 Suggestions. The HRA Findings were recently completed. The remaining Findings and Suggestions are scheduled to be incorporated by end of August 2012
- Variations From Deterministic Requirements (VFDRs) have been identified for resolution
 - BV1 has approximately 350 VFDRS
 - BV2 has approximately 330 VFDRS
- BV1 Fire Risk Evaluations (FREs) are on-going to support resolution of VFDRs
- BV2 Fire Risk Evaluations will begin when the PRA model has incorporated the remaining F&Os

Beaver Valley NFPA 805 Project Status

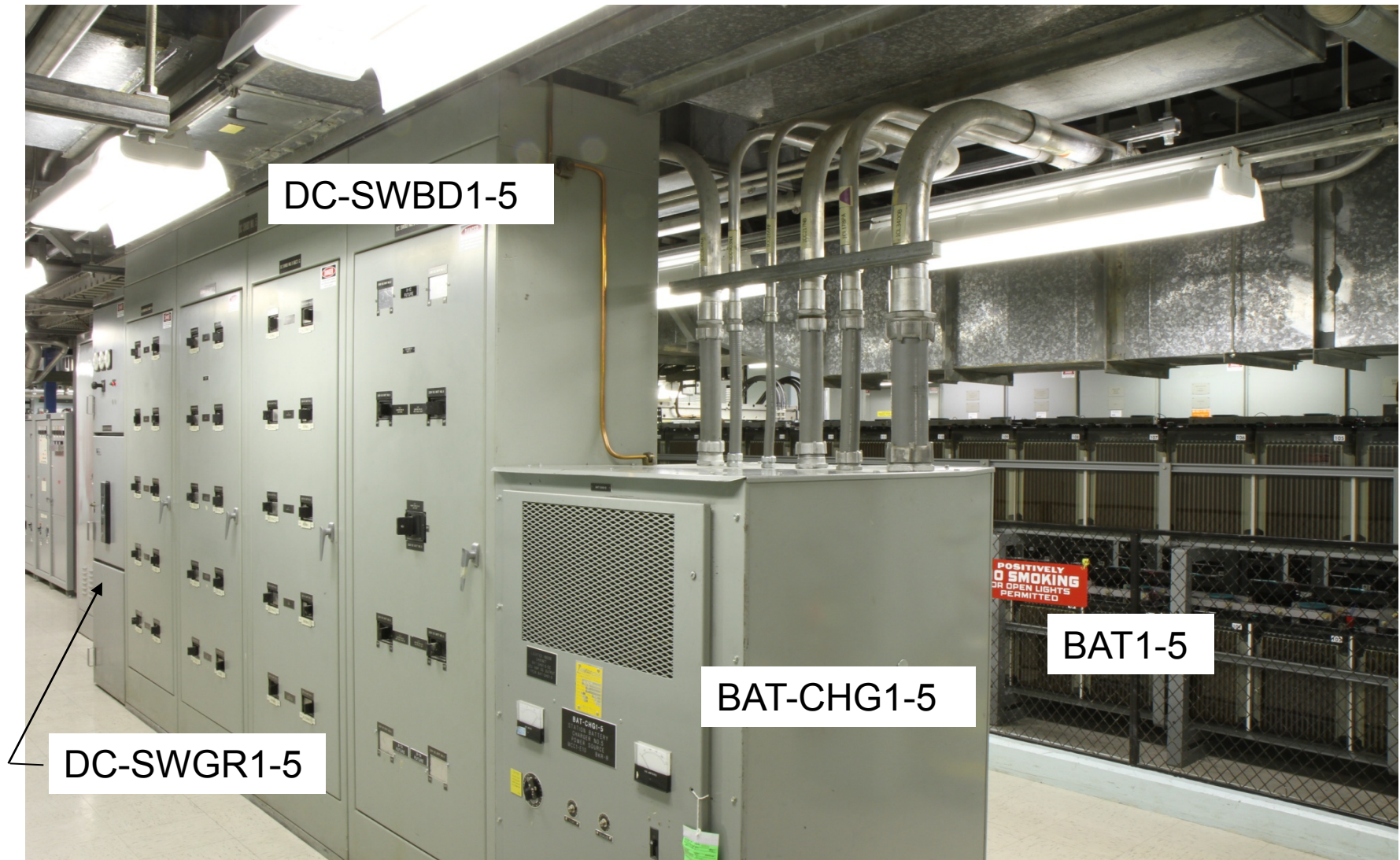
■ Project Challenges

- During the FRE process it was discovered that the BV1 control room abandonment area of the FPRA model requires additional risk reductions to meet the RG 1.174 CDF limit
- Currently performing engineering feasibility studies on fire ignition sources in the BV1 Process Rack Area that are impacting risks (See next slide for pictures):
 - Installing Radiant Energy or Plume Impingement Shields over these fire ignition sources
 - Relocate these fire ignition sources to another plant area and provide enclosures within the new location area
- Update the BV1 Fire Model to reflect the chosen modification and complete the fire risk evaluations and determine the Risk of Recovery Actions
- The BV2 control room abandonment area of the FPRA is not an issue due to the Alternate Shutdown Panel design

Bat1-5 in BV1 Process Rack Area



DC-SWBD1-5 in BV1 Process Rack Area



Beaver Valley NFPA 805 Project Status

■ Project Challenges (cont)

- BV1 Solid State Protection System portion of the PRA model was updated to provide needed resolution of VFDRs and incorporate lessons learned from the BV2 Fire PRA model development
- BV1 LER 2011-001-00, “Use of Liquid Tight Conduits Installed in Fire Barrier Penetrations Results in Unanalyzed Configurations”
- Since RISKMAN PRA software is used at Beaver Valley, additional fleet / vendor PRA resources are not readily available to work parallel PRA paths

Beaver Valley NFPA 805 Project Status

■ Project Challenges (cont)

- Generic MSO scenarios from NEI 00-01, Guidance for Post Fire Safe Shutdown Circuit Analysis, Rev. 3, have been incorporated into the BV1 and BV2 Fire PRA models
- Risk of Recovery Actions has been identified for non control room abandonment areas during the BV1 FRE process. Investigating incorporating these Recovery Actions into the EOPs as an attachment to gain the following benefits:
 - Eliminate a human error trap on transitioning from EOPs to the fire safe shutdown procedures
 - Streamline the existing procedures

Beaver Valley Completed NFPA 805 Modifications

- **Relocation and Addition of BV1 Smoke Detectors in:**
 - Process Rack Fire Area
 - Emergency Switchgear Train A Fire Area
 - Emergency Switchgear Train B Fire Area
 - Normal Switchgear Fire Area
- **Installation of a Strainer in the BV1 River Water Supply to the Auxiliary Feedwater Pumps to Provide Long Term Decay Heat Removal**

Beaver Valley Ongoing NFPA 805 Modifications

- **BV1 and BV2 Exterior Fire Door Replacements**
- **Install the Westinghouse Shutdown Seals in the BV1 and BV2 Reactor Coolant Pumps during the following outages:**
 - 2R16 (September 2012) start implementation
 - 1R22 (September 2013) start implementation
- **Installation of a Strainer in the BV2 Service Water Supply to the Auxiliary Feedwater Pumps to Provide Long Term Decay Heat Removal**
- **Install an Incipient Fire Detection System for the BV1 and BV2 Process Rack Areas**

Beaver Valley Potential Future NFPA 805 Modifications

- **Modify Over Current Trip Protection scheme for BV1 and BV2 4KV Emergency Busses to address potential simultaneous faults on power and control cables**
- **Add BV1 Relay/Modify BV2 Relay for existing Turbine/Generator Main Output Breakers to address Spurious Re-closure or Failure to Trip on Turbine Trip**
- **Addition of isolation valves in the BV1 and BV2 CO2 systems to reduce out of service time and provide positive clearance points**
- **Addition of an auto suppression system for the BV2 DF Switchgear to resolve the embedded cable adverse condition**

Beaver Valley Potential Future NFPA 805 Mods (cont)

- **Modify control circuits for over 100 BV1 MOVs to prevent certain hot shorts from bypassing the torque and limit switch protection thus preventing damage to the valve for subsequent manual operation**
- **Modify the BV1 diesel generator circuit to prevent non-synchronous paralleling of EDG with on-site and off-site sources through spurious breaker operations**
- **Addition of BV2 PORV isolation switches outside Containment to address MSO scenarios**
- **Resolve BV1 Penetration Seals configuration identified by LER 2011-001-00**
- **BV1 Equipment and Cable relocations in the Emergency Switchgear Train A Fire Area**

Beaver Valley Potential Future NFPA 805 Mods (cont)

- **Change Normal System Alignments for several valves to preclude spurious operation.**
- **Fire Barrier Wrap for BV2 Cables:**
 - 2CX950RA and 2CX950RB for A Diesel Generator fans & dampers
 - 2RCS8NX001 for PZR Pressure in required fire areas
- **Modify BV1 1VS-F-90 exhaust damper control circuit for diesel-driven instrument air compressor to prevent failure on loss of power**

Beaver Valley Enforcement Discretion Status

Description	Safety Significance	Compensatory Measures
Failure to include appropriate criteria for restoring cooling to Reactor Coolant Pump seals in post fire safe shutdown procedures	Very Low	Procedures Revised
NRC non-cited violation for failure to evaluate the volume control tank outlet valves spuriously closing and damaging the single charging pump credited for alternative shutdown	Very Low	Fire Watch Tours / Procedures Revised
NRC non-cited violation for failure to evaluate the effects of a spurious safety injection signal during alternative shutdown	Very Low	Fire Watch Tours / Procedures Revised

Beaver Valley Enforcement Discretion Status (cont)

Description	Safety Significance	Compensatory Measures
NRC non-cited violation in that the procedure for shutting down the plant in response to a serious fire in the service building did not provide adequate guidance to the operators to verify that all reactor coolant pumps (RCPs) were tripped and remain tripped prior to isolating the RCP seal injection and thermal barrier cooling	Very Low	Fire Watch Tours / Procedures Revised
Use of Liquid Tight Flexible Conduits Installed in Fire Barrier Penetrations Results in Unanalyzed Configurations (Pending)	Low to moderate by BV PRA	Fire Watch Tours, no hot work in the vicinity of any affected penetrations, and no transient combustibles

Beaver Valley NFPA 805 Summary

- **Existing enforcement discretion items are of low to moderate risk and compensatory measures are in place**
- **Beaver Valley is committed to a strategy of parallel plant modifications and NFPA 805 license application development**
 - Have identified additional modifications based on fire risk PRA
- **Continue high level of FENOC personnel involvement in the project**
- **Current commitment for NFPA 805 LAR submittal is September 30, 2012**
- **Beaver Valley projected schedule for submittal of a complete high-quality NFPA 805 License Amendment Submittal**
 - 4th Quarter CY 2013

Beaver Valley NFPA 805 Project Status

■ Questions and Answers