

# **Proposed Manual Action Rule Impact on Peach Bottom Preliminary Comments**

**Presentation to NRC Staff**

**April 27, 2005**

# Purpose

- The purpose of this presentation is to provide insights on the impact of the proposed Appendix R Manual Action Rulemaking on a specific plant.
- This plant is an older BWR-4/Mark-1 that uses a post-fire shutdown methodology similar to most BWR plants, but is bounding for decay heat and containment response.

# Agenda

- Provide overview of existing PBAPS manual actions
- Provide details on the impact the proposed rule would have on PBAPS

# Overview - Licensing

- Always Been Included in the PBAPS FSSD Analysis
  - July 1983 Meeting and September 1983 Submittal
    - “Associated circuits that have a separation from the fire area less than that required by Section III.G.2 of Appendix R and have a connection to circuits of equipment whose spurious operation could adversely affect the shutdown capability have been adequately resolved by appropriate action pre- or post-fire.
    - “This analysis assumes that any manual capability credited as part of the safe shutdown system for the purposes of this review, will be based on verification that, at a minimum, sufficient numbers of operating shift personnel will be available to fight the fire and perform the necessary operator actions.
    - “The only requirements is that sufficient time must be available to restore the affected safe shutdown system function prior to the occurrence of an unrecoverable plant condition. For this analysis, a time-line/manpower concept is utilized to establish that sufficient time is available for restoration of the safe shutdown system function. The resulting time-line diagram shows the number of personnel involved in performing each safe shutdown function and the time required to perform those functions. The time-line diagram demonstrates that sufficient time and personnel are available to perform the safe shutdown functions.”

# Overview - Licensing

- Fire Protection Program Document (UFSAR) – 1986
  - Per GL 86-10 guidance, gathers all related FP information into a single volume of the UFSAR. Describes FSSD methods including manual actions. Provides listing of manual actions
- 1989 Submittal on MHIF and manual actions
  - Response to URI on MHIF and Manual Actions
- Safety Evaluation Report 1993
  - Approves FPP
- August 1995 Submittal (G.L. 92-08 Response)
  - FSSD re-analysis relies on operator manual actions
- T-Lag Meeting 1997
  - Explained manual actions are used
- T-Lag Order
  - Required completion of actions docketed in 1997 T-Lag meeting.

# Background

- Previously Approved
  - Industry Definition of Current Licensing Basis based on NRC Definition (LIC-100, 10CFR54.3, GL 91-18)
    - Docketed Correspondence
    - Information contained in letters that are referenced in SER's
    - Orders, License Conditions, Bulletin & Generic Letter responses.
      - Appendix R implementation encompassed all of these
    - Resolution of enforcement actions (URI's, Violations, LERs)
      - Typically documented via inspection reports.
  - Not limited to information explicitly stated in a Safety Evaluation Report

# Overview - Risk

- Risk Impact of Manual Actions
  - Required to be addressed in IPEEE (GL 88-20 Supplement 4, NUREG-1407)
  - Addressed in Peach Bottom IPEEE Submittal
  - Evaluated by NRC (NUREG/CR-4550, NUREG-1742, section 3.4.8.1)
  - Re-evaluated in current PBAPS Fire PRA
    - 1 dominant scenario per unit
    - Remaining MA scenarios < 2.8E-7

# Feasibility

- Timelines and staffing requirements
  - Part of original FSSD design basis calculations
  - Certain actions field tested during PBAPS extended shutdown
  - 2002 Manual Action Feasibility Study
    - Comprehensive Review of FSSD Manual Actions
  - NRC inspection team reviewed during 2003 Fire Protection Triennial
    - Found manual actions feasible with no safety concerns



# Types of Actions

- Trip/Open Breakers
- Close Breakers
- Operate Handswitches
  - Restore power to battery chargers
  - Establish Lighting for Alt. SSD Panel
- Operate Valves
  - Manually operate
  - Operate at MCC
- Pull Control Power Fuses
- Insert Plug into Receptacle

***Skill of the craft***

# Feasibility

- PBAPS Manual Actions
  - Most manual actions are similar to tasks operators perform on a frequent basis.
  - “Pre-engineered” to be as simple as possible
  - Most tasks can be accomplished without entering the affected fire area.
    - Operators know plant layout and can often take alternate routes to reach the same location.
  - Many post-fire safe shutdown tasks are similar to tasks performed for both normal and shutdowns addressed by other EOP’s and AOP’s.

# Specific Concerns

- Time Margin for Manual Actions
  - Current Design basis actions are based on assumed “all-encompassing” fire at  $T=0$ 
    - Creates perception issue
    - Sequencing & timing taken on inflated importance
  - For realistic fire scenarios
    - Most manual actions are not required
    - Sequence & timing less important
    - Operators will have advance warning of fire conditions since  $T$  never really equals 0

# Specific Concerns

- Dose
  - NUREG-0737 – GDC-19 dose limits are applicable to emergency actions, not 10CFR20.
  - 10CFR20 sets occupational limits, annual accounting & bookkeeping.
    - Accounting and bookkeeping can't be managed in emergency situation, creates a distraction
    - Not reasonable to maintain “dose balance” in reserve for post-fire actions, nor is it currently required for other non-fire post-accident conditions.

# *Typical Generic Actions*

- *Appendix R assumptions (ex., GL 86-10 guidance) non-mechanistically force us to assume many initiators.*
- *These same initiators already have generic manual actions as part of their response, regardless of the cause.*
- *Due to the design of Rx protection systems, no amount of fire barriers/encapsulation can completely prevent these initiators from occurring in a fire.*

# *Typical Generic Actions*

- *Chapter 15 Accidents & Transients typically allow manual actions, 10 minutes after event initiation.*
  - *Only exception is that actions to protect Tech Spec Safety Limits for Chapter 15 Accidents & Transients must be automatic (GL 91-18)*
- *Common (BWR/PWR)*
  - *LOOP – Verify DG operation, including local observation and adjustment*
  - *LOOP or 4kv transfer – Verify transfer, re-set power supplies & chargers, verify system alignments*
  - *LO Inst Air – Reposition critical valves by hand or manually align backup supply to critical valves*
  - *Any Event – Manage unit dependencies to support the “accident” unit (plant specific)*

# *Typical Generic Actions*

- *BWR*
  - *Transient – Inhibit ADS*
  - *SORV – Remove fuses*
  - *LOFW – Maximize CRD flow (manual valve)*
  - *Cont Isolation – Re-open instrument valves. Restore instrument nitrogen to valves in containment.*
- *PWR*
  - *LO RCP Seal Cooling – manually restore cooling and/or trip RCPs*
  - *LOFW – manually initiate turbine-driven EFW*
  - *ES Actuation – Reset actuation, return systems to standby*
  - *Depressurization/Cooldown – Periodically Block ESAS*

# Impact of Proposed Rule

- Detection and Automatic Suppression In Fire Area Requiring the Manual Action
  - Existing Detection and Suppression provided to meet specific hazards (BTP 9.5-1) and regulatory requirements (App. R).
  - Existing exemptions in some areas for lack of detection (III.F) or lack of suppression (III.G.2.b, III.G.2.c) based on hazards analysis.
    - Will these exemptions still be valid? Revision req'd?



# Impact of Proposed Rule

- Most fire areas are large with multiple zones and rooms.
  - Suppression often limited to an zone/room with a specific hazard and is not area wide.
  - Further subdivision of fire areas into smaller areas would require additional FSSD analysis and upgrade of barriers.

# Impact of Proposed Rule

- Primary impact was lack of full area automatic suppression systems.
- Exemption Requests to address these areas could be submitted.
  - 13 out of 47 fire areas affected
  - 168 rooms/zones affected within these 13 fire areas.

# Impact of Proposed Rule

- Exemption Justification
  - Low combustible loading in most zones
    - Typical combustibles in the areas are not prone to fast spreading fires.
  - Spatial and physical separation between rooms/zones within fire area
    - Typically, damage to a specific part of the fire area results in the need for manual actions.
    - Existing barriers while not credited for App. R will slow fire growth and limit exposure.

# Impact of Proposed Rule

- Unintended Consequences
  - New suppression systems will create hazards to some equipment.
  - Flooding design basis impacted
  - “Gridlock” future changes to FP program
    - Significantly limit what changes could be made under Standard FP Licensing Condition w/o prior NRC approval (contrary to Commission policies on burden reduction for requirements marginal to safety, GL 86-10, GL 88-12).

# Impact of Proposed Rule

- \$67 Million - Cost Estimate for sprinklers
  - Excludes Turbine deck, Refuel floor, Feedwater heater rooms, Stair towers
  - Additional factors to consider (not in \$ est.)
    - Dose - Significant dose during installation and future testing.
    - Drainage – Many areas do not have floor drains (or the drains covered for Rad/Environmental reasons).
    - Plant Equipment – Impact of sprinkler flow and pipe breaks would have to be addressed.
    - Impact on capacity of existing fire protection water supply system.

# Impact of Proposed Rule

- Fire Area Example
  - Turbine Building (Fire Area 50)
    - Large fire area encompassing both U2 & U3 areas.
    - 143,000 ft<sup>2</sup> already provided with automatic sprinkler protection.
      - Lube oil rooms, moisture separators, condenser pits, common areas, 13kV Switchgear areas, feed pump rooms, railroad bay and hatch area.

# Impact of Proposed Rule

- Turbine Building (Fire Area 50)
  - 87,000 ft<sup>2</sup> not proposed to have automatic suppression (exemption required)
    - Pipe tunnels, ventilation equipment area, feedwater heater rooms, turbine deck (turbine bearings and underskirt area have sprinklers)
    - Cost for sprinklers if required would exceed \$26 million
  - 57,000 ft<sup>2</sup> could need sprinkler protection under proposed rule (exemption would be submitted)
    - Areas do not present FSSD hazards
    - Areas not required to have suppression under prior NRC rules or guidelines.
    - Cost for sprinkler installation would exceed \$17 million

# Impact of Proposed Rule

- RadWaste Building (Fire Area 2)
  - Large multistory building between two reactor buildings, common fire area
    - Suppression systems in HPCI pump rooms and in old baling and drumming room
    - 45,000 ft<sup>2</sup> would need sprinkler protection under the proposed rule
      - Projected cost would exceed \$13 million
    - Secondary Containment breaches involved



# Impact of Proposed Rule

- Radwaste Building (Fire Area 2)
  - Exemption Request would be submitted
    - Low combustible loading throughout building (except where suppression is provided)
    - Building is well compartmentalized primarily for radiation considerations
    - Many high dose rooms

# Impact of Proposed Rule

- Training
  - Increase in training requirements in FSSD procedures will impact the training organization.
    - Training cycle already full.
    - FSSD procedures are covered on two year cycle but not in detail required by the proposed rule.
    - Training is already performed, however proposed rule will result in 94 unique training events per operator.
      - Result will be less training time to spend on other more risk significant events.
      - Train on the same action, for multiple fire areas?

# Impact of Proposed Rule

- Procedures
  - Written using a template
    - Supplement the EOPs
    - Format provides consistent and easy to understand guidance for the operator.
  - Human factors reviews.
    - Operator feedback
    - 1 procedure per fire area per unit
    - Each action is in a separate “tear-out”

# Summary

- Improvement in Safety Does Not Support Proposed Rule Given the Cost of Compliance
  - Cost of additional automatic suppression systems could exceed \$70 million at PBAPS
  - Training burden may impact plant safety since less time will be available for other even more risk relevant training.
  - Ignores 25 years of precedent on manual actions at PBAPS
  - Significant burden developing exemptions
  - PBAPS Triennial inspection found all actions feasible

# Conclusion

- “The results from NRC fire protection inspections to date indicate that there is insufficient evidence that the generic use of these manual actions poses a safety concern.” – Reg Analysis 12/2004