

*NRC & BWROG Meeting  
White Flint, Md.*

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*Use of SRVs & Low Pressure  
Systems for Appendix R  
Post-Fire Safe Shutdown  
April 25, 2000*

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# *Agenda*

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- *Introduction*
- *Discussion of*
  - *Regulation*
  - *System Selection Criteria*
  - *SER History*
- *Summary*

# *Introduction*

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## ■ *BWROG Position:*

- *The use of SRVs and Low Pressure Systems for Post-Fire Safe Shutdown is within the original BWR design basis, is technically acceptable and is a safe means of achieving shutdown.*

# *Introduction*

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## ■ *BWROG Position: [Continued]*

- *SRVs and Low Pressure Systems meets the requirements of Appendix R as a Redundant System.*
- *Appendix R does not limit BWRs to the use of High Pressure Systems in meeting the requirements of Sections III.G.1 and 2.*

# *Introduction*

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- We are ***not*** asking for ***a change***.
- We have always used SRVs & Low Pressure Systems for III.G.1 & 2 Post-Fire Safe Shutdown (Redundant).
- The Position Paper on SRVs & LPS explains our basis.

# *Introduction*

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- *Important Points from BWROG Report  
GE-NE-T43-00002-00-03 Rev. 1*
  - *BWRs used SRVs & LPS for  
Redundant Post-Fire Safe Shutdown*
  - *Previously Accepted by NRC*
  - *Failure to recognize as acceptable  
could presents a significant burden  
to BWRs [\$0.2 to \$20.0 million]*

# *Regulation Discussion*

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- *Redundant vs. Alternative Post-Fire Safe Shutdown*
- *Cold vs. Maintaining Hot Shutdown*
- *Loss of Offsite Power (LOOP) Assumption*
- *Section III.L Requirements*
- *Changes to the Approved Fire Protection Plan*

# *Redundant vs. Alternative Determination*

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- *The Redundant Shutdown Methodology must be able to achieve and maintain cold shutdown using cold shutdown equipment repairs, if necessary.*
- *Cables and equipment for one Redundant Safe Shutdown Path are to be separated by one of the separation techniques described in III.G.2, including requirements for fire detection and suppression, as appropriate.*



# *Redundant vs. Alternative Determination*

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## *■ Alternative Shutdown:*

- is used when separation in accordance with III.G.2 cannot be provided for a Redundant Shutdown Path.*
- must be independent of the area, room or zone under consideration.*
- Fire Detection & Fixed Suppression are required for alternative shutdown, except for NUREG 0800 Plants.*

# *Redundant vs. Alternative Determination*

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- **Alternative Shutdown** is determined based on the inability to satisfy the **separation requirements** of III.G.2 and is not determined based on the **systems selected** to achieve and maintain safe shutdown.
- SRVs + LPS can meet the separation requirements of III.G.2 using raceway fire barriers and suppression and detection, as necessary.

# *Redundant vs. Alternative Determination*

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- *When SRVs + LPS are separated in accordance with the requirements of III.G.2, they assure that the health and safety of the public will be protected.*

**III.G.1** Fire protection features shall be provided for structures, systems, and components important to safe shutdown

One train of systems necessary to achieve and maintain hot shutdown is free of fire damage(\*)

Systems necessary to achieve and maintain cold shutdown can be repaired within 72 hours.

**III.G.2** Ensure that one of the redundant trains is free of fire damage(\*) by one of the following:

Are the cables or equipment located within the same fire area outside of primary containment? (\*\*\*)

Identify and locate the cables and equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown.

Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. (\*\*)

Enclosure of cable and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating (\*\*)

Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating (\*\*)

Ensure that fire detectors and an automatic fire suppression system is installed in the area.

Does the protection of systems whose function is required for hot shutdown satisfy the requirement of III.G.2?

Refer to Appendix D for the requirements of Alternative/Dedicated Shutdown Capability

**III.G.3** Alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the areas, room or zone under consideration, shall be provided.

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(\*) Free of fire damage is achieved when the structure, system or component under consideration is capable of performing its intended function during and after the postulated fire, as needed. It may perform this function automatically, by remote control, or by manual operations.

(\*\*) Exemptions, Deviations or GL 86-10 Evaluations with 10CFR50.59 Safety Determinations may be developed as necessary.

(\*\*\*) For simplicity, the mitigation options for inside non-inerted containments have been omitted from this diagram.

# *Achieving Cold Shutdown vs. Maintaining Hot Shutdown*

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- *III.G.1 allows Maintaining Hot Shutdown while Cold Shutdown Repairs are completed.*
- *Maintaining Hot Shutdown is not a more desirable condition than achieving Cold Shutdown.*
- *“...Cold Shutdown is the Ultimate Safe Shutdown Condition...” (Appendix R Statement of Considerations)*

# *LOOP Assumption*

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- *Prior to 1994 Utilities understood that assuming a LOOP was required for Post-Fire Safe Shutdown governed by both III.G.1 & 2 and III.G.3*
- *NRC Clarification in 1994*
  - *Assumption applies to III.G.3 only*
  - *Offsite Power may be credited in III.G.1 & 2 areas unless the fire causes a LOOP*

## *Section III.L Requirements*

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- *Section III.L Performance Goals do not apply to redundant safe shutdown under Section III.G.1 & 2.*
- *Section III.L applies to the alternative safe shutdown option under Section III.G.3 (Court of Appeals decision on Connecticut Light and Power).*

# *Changes to Approved Fire Protection Plan*

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- *All Plants with a Standard License Condition*
  - *Use 50.59 Process*
  - *Changes cannot "...adversely affect the ability to achieve and maintain safe shutdown in the event of a fire."*
- *Changes must consider all Fire Protection Requirements including those related to automatic suppression, fire detection and fire barriers used to protect redundant safe shutdown raceway.*



# *System Selection Criteria*

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- *NRC Generic Letter 81-12 suggested use of ECCS and RCIC Systems for Post-Fire Safe Shutdown. [G.L. 81-12 Section 8.(k) also]*
- *The LOOP Assumption required the use of ECCS, including SRVs and Low Pressure Systems, and RCIC Systems.*
- *ECCS and RCIC Systems are Redundant to each other and we used whatever was least affected by the fire.*

# *System Selection Criteria*

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- *NUREG 0050 states that the the SRVs when coupled with low pressure pumping are redundant alternatives to RCIC and HPCI.*
- *SECY 83-269 states that the use of ADS and LPCI is an approved means of achieving and maintaining safe shutdown conditions.*

# *System Selection Criteria*

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- *NRC Inspection Procedure 64100 states “...For BWRs, the NRC has approved partial short-term core recovery using the automatic depressurization system (ADS) and low-pressure coolant injection system (LPCIS). Note that this option eliminates the need for the hot shutdown maintenance capability of Section III.G.1.a of Appendix R.”*

# *System Selection Criteria*

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- *There is no regulatory requirement that restricts the use of ECCS and RCIC Systems in support of Post-Fire Safe Shutdown under Sections III.G.1 & 2.*
- *Disallowing the use SRVs and LPS in support of Post-Fire Safe Shutdown under Sections III.G.1 & 2 is equivalent to requiring that Post-Fire Safe Shutdown be accomplished using only High Pressure Systems.*

# *System Selection Criteria*

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- *Appendix R, as currently written, does not limit BWRs to the use of only High Pressure Systems.*

# *SER History*

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■ *Foreword*

■ *Review of Specific Licensee Submittals  
and NRC Interactions*

# *Summary*

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- *Parking Lot Items*
- *Actions Items*
- *Schedule for Action Items*

# *Summary*

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## ■ *Using SRVs and LPS for III.G.1 & 2 Post-Fire Safe Shutdown:*

- *Meets the regulation*
- *Is safe*
- *Has been previously accepted*
- *Is consistent with what BWRs have done*



# *Summary*

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- *Failure by NRC to accept the BWROG Position on this issue:*
  - *Will represent a significant burden to BWRs [\$0.2 to \$20.0 million].*
  - *Will require an analysis in accordance with 10CFR50.109.*