RUG IV August 2004 Meeting



USNRC/RIV DIVISION OF REACTOR SAFETY

USNRC, REGION IV Participants



- Dwight Chamberlain Director Division of Reactor Safety
- Russ Bywater, Senior Reactor Analyst
- Linda Smith, Chief Plant Engineering Branch
- Rebecca Nease, Team Leader
- Neil O'Keefe, Senior Reactor Inspector
- George Replogle, Senior Reactor Inspector

USNRC, OFFICE OF NUCLEAR REACTOR REGULATION



- Observers
- Suzanne Black, Director Systems Safety and Analysis
- Sunil Weerakkody, Chief Section B, Fire Protection and Special Projects, Plant Systems Branch
- Peter Koltay, Senior Reactor Operations Engineer, Inspection Program Branch

I. LESSONS LEARNED FROM FIRE PROTECTION **INSPECTIONS** COMMON ISSUES Use of manual actions for meeting **III.G.2** III.G.3 (ASD) timing of manual actions Associated Circuits - resolution underway Fixed and transient combustibles Hemyc - resolution underway RCP seals - emerging issue





BEST PRACTICES

- Staff knowledgeable of plant FP Licensing Basis
- Well-written procedures verified and validated, including timing of MAs
- Operations personnel knowledgeable and trained on procedures
- Immediate CAs; post comp measures; enter into CAP
- ID your own issues learn from other triennial inspections



FP INSPECTION PROCESS

- Letter announcing Inspection
- Information-gathering
- Preparation Week
- Onsite Portion (2 weeks)
- Documentation



FP INSPECTION TOPICS

- Capability of FSSD Systems
- Shutdown from Outside the Control Room
- Protection of Safe Shutdown Capabilities
 - Passive Fire Protection



FP INSPECTION TOPICS

- Active Fire Protection
- Protection from Damage from Fire Suppression Activities
- Activities to Recover Fire-Affected Spaces
- Post-Fire Safe Shutdown Analysis



FP INSPECTION TOPICS

- Alternative Shutdown Capability
- Emergency Lighting
- Cold Shutdown Repairs
- Compensatory Measures

II. SIGNIFICANCE DETERMINATION PROCESS



III. FIRE SAFE SHUTDOWN MANUAL ACTIONS



TYPES OF MANUAL ACTIONS TAKEN IN THE CONTROL ROOM TAKEN OUTSIDE THE CONTROL ROOM FOR III.G.2

- Acceptance criteria being developed in conjunction with rulemaking (timing, training, documentation) expert panel
- Similar to Criteria in IP 71111.05, Attachment 2

MANUAL ACTIONS



TYPES OF MANUAL ACTIONS

- CONTROL ROOM EVACUATION (III.G.3)
 - Criteria provided in III.L
 - Feasibility, Training, Timeliness

MANUAL ACTIONS



TYPES OF MANUAL ACTIONS TAKEN AS COMPENSATORY MEASURES

 As permitted by FPP - may need to be revised to permit the use of manual actions as comp measures

MANUAL ACTIONS



TYPES OF MANUAL ACTIONS TAKEN AS COMPENSATORY MEASURES

- Enforcement Discretion
 - IP 71111.05 guidance for assessing the risk of certain manual action findings
 - Criteria in IP 71111.05, Attachment 2

IV. RISK INFORMED POST-FIRE ASSOCIATED CIRCUIT INSPECTION



OPTIONS FOR COMPLIANCE: Appendix R/SRP: deterministic

- compliance
 - One train of cables associated with equipment needed for achieving SSD must be free of fire damage
 - Cables associated with equipment whose spurious operation could adversely affect SSD must be free of fire damage

NFPA 805: risk-informed compliance



- November 2000, NRC suspends associated circuit inspection.
 - Determines the issue is generic
 - Work with stakeholders to solve the issue in a Risk-Informed manner
- NEI Fire Testing.
 - ♦ 18 full-scale fire tests
 - May 2002, EPRI published, "Spurious Actuation of Electrical Cables to Cables Fire: Results of Expert Elicitation."



February 2003, Facilitated Public Workshop. Identify Most Risk Significant Cable **Configurations and Attributes** August 2003, Draft Regulatory Issue Summary (RIS). Technical input for Risk-Informing **Associated Circuit Inspections** Issued for public comment



- September 2003, ACRS Fire Protection Subcommittee
 - Discussed NRR proposed plans for Risk-Informing Associated Circuit Inspections and restarting inspections.

January 2004, Draft NUREG-1778

- Knowledge Base Post-Fire Safe-Shutdown Analysis
- Issued for public comments
- March 2004, Issued RIS 2004-03
 - Framework for Risk-Informing Associated Circuit Inspections



April 2004, ACRS Fire Protection Subcommittee

 Discussed NRR final plans for restarting inspections September 2003, ACRS Fire Protection Subcommittee



- Risk = (Fire Frequency) x (Likelihood of fire effects & cable attributes that contribute to failure) x (Likelihood of undesired consequences).
- Fire Frequency established in other programs
- Credible Fire Threat Fire Dynamics Analysis
- Cable Attributes Thermal Failure Mechanism
- Severity of Consequence



GROUPING METHODOLOGY

- Based on NEI cable functionality fire testing
 - Bin 1 the most risk-significant associated circuit configurations
 - Bin 2 believed to be low-risk, but research still in progress
 - Bin 3 low-risk configuration, research complete



BIN 1 - SAFETY SIGNIFICANT CONFIGURATION

- Two "cable" Failures Evaluated per Scenario
 - Intra-cables failure for all cable types Thermoset or Thermoplastic
 - Any number of conductors/combinations are possible within the cable
 - Inter-cable failures possible between Thermoplastic cables



BIN 1 - SAFETY SIGNIFICANT CONFIGURATION

- Capture Majority of Safety Significant Configurations
 - Evaluating 2 cables per scenario will capture vast majority of Risk
 - Sufficient Conservatism to Re-start Inspections
 - RES will be evaluating if more than 2 cables per scenario should be considered



BIN 2 - EXPECTED LOWER RISK

Requires Additional Research to Better Understand & Further Reduce Uncertainties

- Inter-cable shorting of Thermoset cables
 - Thermoset to Thermoplastic
 - Thermoset to Thermoset
- Need to evaluate Three or More Cables for Each Scenario

How many are creditable?



BIN 2 - EXPECTED LOWER RISK

- Requires Additional Research to Better Understand & Further Reduce Uncertainties
 - Effects of Control Power Transformers (CPT)
 - Duration of Hot Shorts
 - How long do they remain energized?



BIN 3 – LOW RISK (RES CONFIRMED)

- Open Circuits
 - Loss of Continuity
- Inter-cable Shorting involving Cables outside Conduits and Armored Cable with those Cables inside
- Multiple High-Impedance Faults on a Common Power Supply



BIN 3 – LOW RISK (RES CONFIRMED)

- Open Circuits
 - Loss of Continuity
- Three-Phase Power Failures Occurring with Proper Polarity
- Reversible DC-Motor Power Cable
 - Requires Proper Combination & Polarity of 5 Circuit Failures



MOST RISK SIGNIFICANT CONSEQUENCES

- Failures that Impede Hot Shutdown within the First Hour of the Event
 - Flow Diversion
 - Loss of Coolant
 - Other Scenarios

V. EXPECTATIONS FOR PROGRAM EXCELLENCE



VI. CORRECTIVE ACTION TIMELINESS



Appendix B and associated Criterion XVI do <u>not</u> apply to the Fire Protection Program at any sites.

However, each fire protection program has a requirement to find and fix problems associated with the fire protection program in a timely manner.



9A.3.4.8 Corrective Action

Measures shall be established to assure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material, and non-conformances, are promptly identified, reported, and corrected.



Generic Letter 91-18, "Information to Licensees Regarding NRC Inspection Manual Section On Resolution of Degraded and Nonconforming Conditions," Revision 1, October 8, 1997,

This document establishes that corrective action should be taken in a timely manner commensurate with safety.



The scope of GL 91-18 is specific but broad. FP Program equipment is covered under "All SSCs relied on in the safety analyses or plant evaluations that are part of the plant's current licensing basis." This goes on to mention fire protection requirements (50.48) specifically.



 <u>Current Licensing Basis</u> - The set of NRC requirements applicable to a specific plant and a licensee's written commitments for assuring compliance with and operation within applicable NRC requirements that are docketed and in effect. The CLB includes the NRC regulations included in 10 CFR Parts ...50... and appendices thereto; orders; license conditions; exemptions, and TS. It also includes commitments made in docketed licensing correspondence such as responses to NRC bulletins, generic letters, and enforcement actions, as well as licensee commitments documented in NRC safety evaluations or licensee event reports.



<u>Degraded Condition</u> - A condition of an SSC in which there has been a loss of quality or functional capability



- <u>Nonconforming Condition</u> A condition of an SSC in which there is failure to meet requirements or licensee commitments. Some examples of nonconforming conditions include the following:
 - There is a failure to conform to one or more applicable codes or standards specified in the FSAR.
 - As-built, or as-modified equipment, does not meet FSAR descriptions.
 - Operating experience or engineering reviews demonstrate a design inadequacy.
 - Documentation required by NRC requirements such as 10 CFR 50.49 is not available or deficient.

CA TIMELINESS



- The design and operation of a nuclear plant is to be consistent with the current licensing basis. Whenever degraded or nonconforming conditions of SSCs subject to Appendix B [FP Program] are identified, Appendix B [FP Program] requires prompt corrective action to correct or resolve the condition.
- The licensee must establish a time frame for completion of corrective action.
- The timeliness of this corrective action should be commensurate with the safety significance of the issue.

CA TIMELINESS



In determining whether the licensee is making reasonable efforts to complete corrective action promptly, NRC will consider whether corrective action was taken at the first opportunity, as determined by safety significance (effects on operability, significance of degradation) and by what is necessary to implement corrective action. Factors that might be included are the amount of time required for design, review, approval, or procurement of the repair/ modification; availability of specialized equipment to perform the repair; or the need to be in hot or cold shutdown to implement the actions.

CA TIMELINESS



- The NRC expects time frames longer than the next refueling outage to be explicitly justified by the licensee as part of the deficiency tracking documentation.
- If the licensee does not resolve the degraded or nonconforming condition at the first available opportunity or does not appropriately justify a longer completion schedule, the staff would conclude that corrective action has not been timely and would consider taking enforcement action

REASONABLE ASSURANCE OF SAFETY



- For SSCs that are not expressly subject to TS and that are determined to be inoperable, the licensee should assess the reasonable assurance of safety. If the assessment is successful, then the facility may continue to operate while prompt corrective action is taken. Items to be considered for such an assessment include the following:
 - Availability of redundant or backup equipment
 - Compensatory measures including limited administrative controls
 - Safety function and events protected against
 - Conservatism and margins, and
 - Probability of needing the safety function.

COMPENSATORY MEASURES



- In its evaluation of the impact of a degraded or nonconforming condition on plant operation and on operability of SSCs, a licensee may decide to implement a compensatory measure as an interim step to restore operability or to otherwise enhance the capability of SSCs until the final corrective action is complete.
- Reliance on a compensatory measure for operability should be an important consideration in establishing the "reasonable time frame" to complete the corrective action process.



- NRC would normally expect that conditions that require interim compensatory measures to demonstrate operability would be resolved more promptly than conditions that are not dependent on compensatory measures to show operability because such reliance suggests a greater degree of degradation.
- Similarly, if an operability determination is based upon operator action, NRC would expect the nonconforming condition to be resolved expeditiously

ENFORCEMENT



If the licensee, without good cause, does not correct the nonconformance at the first available opportunity, the staff concludes that the licensee has failed to take prompt corrective action and, thus, is in violation of 10 CFR 50 Appendix B, Criterion XVI [FP Program].

ENFORCEMENT



When the NRC concludes that corrective action to implement the final resolution of the degraded or nonconforming condition is not prompt, or the operability determination is not valid, enforcement action will be taken.

ENFORCEMENT



Implementation of complete corrective action within a reasonable time frame does not mitigate the potential for taking enforcement action for the root causes that initially created the degraded or nonconforming condition or for violations of other regulatory requirements.

GL 91-18 DOES NOT DISCUSS



- Timeliness W.R.T. waiting for rulemaking...
- Timeliness W.R.T. enforcement discretion...

Assessing risk or remaining capability when removing equipment with FSSD functions from service...

VII. FIRE PROTECTION FUTURE



DECISION - NFPA 805 or APP R/SRP

- Declaration Date Likely Extended to 2005
- NFPA 805 Broader Endorsement of NEI 00-001
- NFPA 805 Broader Enforcement Discretion
- NFPA 805 Circuit Issues can be resolved with no NRC involvement

FIRE PROTECTION FUTURE



SCHEDULE OF UPCOMING EVENTS

- Associated circuits workshop in Sept
 8 & 9
- NUREG 1778 issued final Fall/Winter 2004

 Associated circuit inspections restart January 2005

Manual Actions Rule

FIRE PROTECTION FUTURE



FUTURE NRC INSPECTION FREQUENCY

 Triennial

 SELF ASSESSMENTS

 No current plans to replace NRC inspection

Can be used to self-identify problems

 Obtain discretion for long-standing weaknesses