Harris Nuclear Plant (HNP)
NFPA 805 Transition

NFPA 805 Monitoring Program

Oconee / Harris NFPA 805 Pilot Observation Meeting

April 14-16, 2008

Charlotte, NC

NGG Nuclear Generation Group

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Progress Energy

NFPA 805 Monitoring Program
Review from Nov. 2007 Pilot Meeting

- Assumptions
  - Assumptions that are not subject to change do not need to be monitored (e.g. ceiling height input maintained by configuration control process)
  - Deterministic monitoring may carry forward as current surveillance processes
  - The level of monitoring of assumptions and performance should be commensurate with associated risk significance
- Considerations
  - Align with existing programs and processes
    - Eliminate/minimize need for new, separate processes
  - Consider the **Human Performance** aspects of our people in the field
  - May use Maintenance Rule-“like” type program
  - One method may not fit all attributes
  - Use Leading Indicators (if determined)

NFPA 805 Monitoring Program

Program Development (Update since Nov. 2007)

- Draft Procedure developed
  - FIR-NGGC-XXXX (provided to NRC)
  - 4-Phase program implementation process
    - Phase 1 - Scoping
    - Phase 2 - Establishing Risk Criteria
    - Phase 3 - Risk Determination
    - Phase 4 - Monitoring Implementation

NFPA 805 Monitoring Program

Program Development (Update since Nov. 2007)

- Phase 1 – Scoping (SSCs, Program Elements, Assumptions)
  - Structures, Systems, and Components (SSCs)
    - Detection and Alarm Systems
    - Fire Suppression Systems
    - Water Supply, Hydrants, and Valves
    - Fire Pumps
    - Stand Pipes, Hose Stations, and Hoses
    - Fire Barriers
    - Portable Fire Extinguishers
    - Equipment supporting recovery actions (Emergency lighting, communications)

NFPA 805 Monitoring Program

Program Development (Update since Nov. 2007)

- Phase 1 – Scoping (SSCs, Program Elements, Assumptions)
  - Program Elements
    - Transient Combustible Control
      - Transient Free Zones
    - Hot Work Control
      - Administrative Controls
    - Fire Watch Programs
      - Program compliance and effectiveness
    - Fire Brigade
      - Qualifications, Drills, Training
      - Response Times

NFPA 805 Monitoring Program

Program Development (Update since Nov. 2007)

- Phase 1 – Scoping (SSCs, Program Elements, Assumptions)
  - Key Assumptions in Engineering Analyses
    - Identify the key assumptions from the risk-informed, performance-based analysis that apply to a fire protection feature.
    - For each applicable feature, identify which characteristics require monitoring to ensure the key assumptions are maintained.
    - For each performance criteria, identify the monitoring that would be needed to ensure the characteristic is maintained.
    - Establish threshold values that would be used to identify when the characteristic is in jeopardy of not being maintained.

Assumptions that are not subject to change do not need to be monitored. The level of monitoring of assumptions should be commensurate with their risk significance.

NFPA 805 Monitoring Program

Program Development (Update since Nov. 2007)

- Phase 2 – Establishing Risk Criteria
  - Risk Significant Criteria
    - Fire PRA is primary tool
  - Performance Criteria
    - Established for items within the NFPA 805 monitoring scope, regardless of their ability to be measured using risk significant criteria
    - The performance criteria used should be availability, reliability, or condition monitoring, as appropriate

NFPA 805 Monitoring Program

Program Development (Update since Nov. 2007)

- Phase 3 – Risk Determination
  - Use Fire PRA, or other processes, to determine the risk significant SSCs/fire protection program elements using the criteria established in Phase 2.

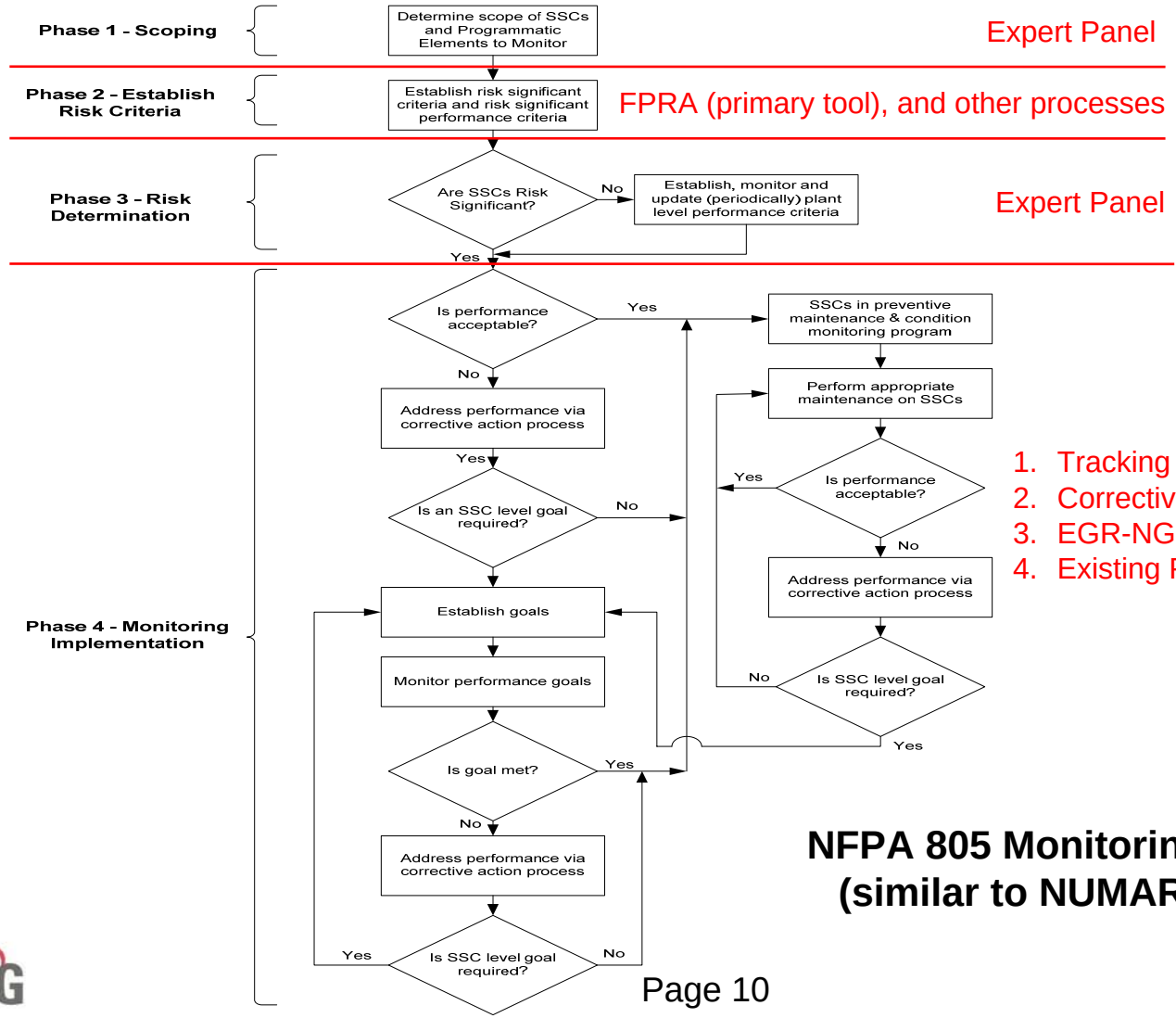
NFPA 805 Monitoring Program

Program Development (Update since Nov. 2007)

- Phase 4 – Monitoring Implementation
  - Tools
    - Tracking database
    - Corrective Action
    - EGR-NGGC-0008, Engineering Programs
    - Existing Procedures
  - Assess performance against established criteria
    - Refinement of performance goals and criteria
    - Analysis of situations where goals are not met, or declining trends
    - Address items appropriately via Corrective Action

NFPA 805 monitoring program scope is not included in the scope of Maintenance Rule. For convenience, the Maintenance Rule monitoring process will be used to facilitate use of existing programs and processes (e.g., use of tools such as tracking databases).

NFPA 805 Monitoring Program
Process Flowchart



1. Tracking database
2. Corrective Action
3. EGR-NGGC-0008
4. Existing Procedures

NFPA 805 Monitoring Process (similar to NUMARC 93-01)

NFPA 805 Monitoring Program
Monitoring Scope
Example (final determination from Expert Panel)

System / Topic	EPRI 1006756?	Risk Measurement?	Proposed Type of Monitoring	Comments
Detection and Alarm Systems	Yes	Yes (NSP) NUREG/CR-6850 Section 11.5.1.8, App. P	High safety significant fire detection systems - Monitoring using system level unavailability/unreliability performance criteria Low safety significant fire detection systems - Condition Monitoring using program similar to existing surveillance/testing process. Address performance issues via system health reporting process.	Use fire area/zone risk (detection in areas/zone contributing 90% of fire risk) as the high safety significant systems. EPRI 1006756 provides guidance on determining failures/functional failures and calculation of failure probabilities.
Fire Suppression Systems	Yes	Yes (NSP) NUREG/CR-6850 Section 11.5.1.8, App. P	High safety significant fire suppression systems - Monitoring using system level unavailability/unreliability performance criteria Low safety significant fire suppression systems - Condition Monitoring. Condition Monitoring using program similar to existing surveillance/testing process. Address performance issues via system health reporting process.	Use fire area/zone risk (fixed suppression in areas/zone contributing 90% of fire risk) as the high safety significant systems. EPRI 1006756 provides guidance on determining failures/functional failures and calculation of failure probabilities.
Water Supply, Hydrants, and Valves Water Storage and Suction Supply Underground Fire Main Hydrants Fire System Valves	Yes	Indirectly (part of NSP) NUREG/CR-6850 Section 11.5.1.8, App. P	Condition monitoring	Establishing unavailability and unreliability criteria for this manual suppression equipment (hydrants) is not considered a practical means of monitoring.

NFPA 805 Monitoring Program
Monitoring Scope
Example (final determination from Expert Panel)

System / Topic	EPRI 1006756?	Risk Measurement?	Proposed Type of Monitoring	Comments
Fire Pumps	Yes	Indirectly (part of NSP) NUREG/CR-6850 Section 11.5.1.8, App. P	May already be part of maintenance rule.	
Stand Pipes, Hose Stations, and Hoses	Yes	Indirectly (part of NSP) NUREG/CR-6850 Section 11.5.1.8, App. P	Condition monitoring	Establishing unavailability and unreliability criteria for this manual suppression equipment is not considered a practical means of monitoring.
Fire Barriers Walls, Floors, and Ceilings Fire Doors Fire Dampers Penetration Seals Electric Raceway Fire Barrier Systems (Fire Wraps) Structural Steel Fire Proofing Radiant Energy Shields	Yes	Partial (part of Multi-Compartment Analysis) NUREG/CR-6850 Section 11.5	Condition monitoring	Use multi-compartment analysis of Fire PRA to determine inter-area/zone barrier importance. Fire wraps credited in areas/zone contributing 90% of fire risk or fire wrap whose failure could increase fire risk to be in the top 90% of areas/zones would be considered high safety significant systems.
Portable Fire Extinguishers	Yes	Indirectly (part of NSP) NUREG/CR-6850 Section 11.5.1.8, App. P	Condition monitoring	Establishing unavailability and unreliability criteria for this manual suppression equipment is not considered a practical means of monitoring.
Fire Brigade	No	Fire Brigade Response NUREG/CR-6850 Section 11	Program Effectiveness Monitoring	FP Programmatic activity that will be monitored by FP program procedures, self assessments (EGR-NGGC-0008, CAP-NGGC-0201), system heath reports, etc.

NFPA 805 Monitoring Program

Monitoring Scope

Example (final determination from Expert Panel)

System / Topic	EPRI 1006756?	Risk Measurement?	Proposed Type of Monitoring	Comments
Transient Combustible Control	No	Potential. CDF of transient scenarios	Program Effectiveness Monitoring	FP Programmatic activity that will be monitored by FP program procedures, self assessments (EGR-NGGC-0008, CAP-NGGC-0201), system heath reports, etc.
Hot Work		Hot work-induced transient fires are part of the fire PRA.	Program Effectiveness Monitoring	FP Programmatic activity that will be monitored by FP program procedures, self assessments, system heath reports, etc.
Nuclear Safety Equipment (systems and equipment needed for reactor safety, modeled in the FPRA)	No	Will be addressed as part of maintenance rule. No specific post-transition NFPA 805 monitoring is planned	Maintenance rule as appropriate	
Equipment supporting recovery actions (Emergency lighting, communications)	No	Not explicitly modeled	Condition Monitoring	Emergency lighting should already be part of maintenance rule. Communications equipment should be part of routine surveillance program.
Fire Watch	No	Not explicitly modeled	Program Effectiveness Monitoring	FP Programmatic activity that will be monitored by FP program procedures, self assessments (EGR-NGGC-0008, CAP-NGGC-0201), system heath reports, etc.

NFPA 805 Monitoring Program

Performance Monitoring Group (PMG)

Example (final determination from Expert Panel)

F-BARR FIRE BARRIERS - PSEUDO SYSTEM

System

☐ Within the Scope of 10CFR50.65 Program: FIRE PROTECTION Unit: 1

Description: This is the Pseudo system to monitor fire barriers for NFPA-805. The Fire Barrier system includes those fire features or elements identified by the assumptions of the Fire risk analysis. SSCs monitored under the Fire Barriers system include walls, floors, ceilings, fire doors, fire dampers, penetration seals, fire wraps, structural steel fire proofing, and radiant energy shielding **NOTE - the scope of this system is currently undefined. The example monitoring listed within this performance monitoring group are for demonstration only.

Performance Monitoring Group **Fire Barriers - Doors in Risk Significant areas / zones**

Significance:

Basis: Included in this performance monitoring group are the doors that were determined to be risk significant based on the multi-compartment analysis of the Fire PRA. **NOTE - the scope of this system is currently undefined. The example monitoring listed within this performance monitoring group are for demonstration only.

Monitoring	Goal	Interval Start Date	Criteria Type	Basis	Definition
CONDITION Condition Monitoring - Hours to repair	N	0	0 LIMIT	Monitoring used is based on a review of plant operating experience, industry operating experience, engineering assumptions and expert panel recommendations. Fire doors in risk significant areas/zones should be repaired within xx hours in order to maintain the fire barrier function of protecting SSCs important to Nuclear Safety *NOTE- Criteria and monitoring intervals have been intentionally left at zero because the monitoring scope and engineering assumptions have yet to be defined. This PMG is for demonstration only.	The prevalent failure modes affecting the function of the door is the failure of the door to seal or latch. Events included are any loss of door operability that requires timely corrective maintenance. To monitor for this PMG, door unavailability will be tracked in the Out of Service log. Any Fire Door corrective maintenance that that exceeds the limit of xx hours to repair wil exceed the criteria of this PMG. ARs will be initiated to track exceeded criteria in the corrective action program.

Enter Value

Monitoring Type (choices are):
- Unavailability
- Reliability
- Condition
- Plant Level

Used for MR. Not used for NFPA 805 Monitoring

(Sum, Count, Hours, Limit, Inspection)

NFPA 805 Monitoring Program

Performance Monitoring Group (PMG)

Example (final determination from Expert Panel)

F-SUPR FIRE SUPRESSION - PSUEDO SYSTEM

System

☐ Within the Scope of 10CFR50.65 Program: FIRE PROTECTION Unit: 1

Description: Pseudo system for monitoring the fire safety significant and non significant fire supression systems for NFPA 805 **NOTE - the scope of this system is currently undefined. The example monitoring listed within this performance monitoring group are for demonstration only.

Performance Monitoring Group **Fire Supression - Risk Significant Areas/Zone**

Significance:

Basis: This performance Monitoring group monitors fire supression SSCs located in fire Areas/zones considered risk significant. **NOTE - the scope of this system is currently undefined. The example monitoring listed within this performance monitoring group are for demonstration only.

Monitoring	Goal	Interval Start Date	Criteria Type	Basis	Definition
UNAVAILABILITY Fire Supression System Unavailability	N	0	0 HOURS	Monitoring used is based on a review of plant operating experience, industry operating experience, engineering assumptions and expert panel recommendations. Condition Monitoring is provided for Fire Suppression SSCs through routine surveillances performance under FPP-0013. Unavailability monitoring of Fire Suppression systems, assumed as input to the FPRA non-suppression probability function (i.e. 3%), is provided through trending of high fire significant FP SSCs out of service time to ensure the assumption is met. Condition monitoring frequency remains as previously established under the surveillance program outlined in FPP-0013, and unavailability will be provided as equipment hours out of service time per year from data collected following issuance of the SER. *NOTE- Criteria and monitoring intervals have been intentionally left at zero because the monitoring scope and engineering assumptions have yet to be defined. This PMG is for demonstration only.	

NFPA 805 Monitoring Program

Questions / Discussion