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Protecting People and the Environment

NFPA 805 Transition Status

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NFPA 805 Pilot Observation Meeting
US NRC Region II Offices
November 5-8, 2007

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Outline

- NFPA 805 – Who's Transitioning?
- Transition Guidance Documents
- NFPA 805 Transition Pilot Program
  - Pilot Observation Meetings
  - FAQ Program
- Ongoing Activities

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NFPA 805 Transition - Background

- NFPA 805 published in 2001
- 10 CFR 50.48(c) published in 2004
- Letters of Intent for 42 Units at 27 Sites.
- 38 Units are Actively Transitioning
- Pilot LARs due May/June 2008
- First Non-Pilot LARs due in November 2008

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NFPA 805 Transition Guidance Documents

- RG 1.205 – Risk-Informed Fire Protection
  - NEI 04-02 – Implementation Guidance
  - NEI 00-01 – Circuit Analysis
  - NUREG/CR-6850 – Fire PRA Methodology
  - NUREG 1824 & 1805 – Fire Modeling
- ANS Fire PRA Standard
  - ANS standard being combined with ASME PRA combined standards
  - NEI Fire PRA Peer Review Guide

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NFPA 805 Transition Pilot Program

- First 2 plants became Pilots
  - Duke Energy's Oconee
  - Progress Energy's Shearon Harris
- Pilot Observation Meetings
  - Started November 2005
  - Atlanta meeting is 9th
  - 1 more in April 08

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NFPA 805 Transition Pilot Program - continued

- Frequently Asked Question Process
  - Grew out of first Pilot Observation Meetings
  - Provides means to make interim revisions to industry guidance documents
  - Interfaces with NEI NFPA 805 Task Force
  - 15 Public FAQ Meetings with NEI 805 TF

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Protecting People and the Environment

NFPA 805 Transition Pilot Program - continued

- Pilot Plant transition is 2/3 completed
  - NRC staff review of Pilot Fire PRAs scheduled for February and March 2008
  - Pilot LAR submittals scheduled for May/June 2008
  - Pilot SRP Review
  - Considering to Pilot Inspection Procedure

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NFPA 805 Ongoing Activities

- NRC Staff in the process of developing additional guidance to support transition implementation
  - Standard Review Plan Revision
  - Inspection Guidance
- Guidance development scheduled to support review of Pilot LARs and first Triennial inspections

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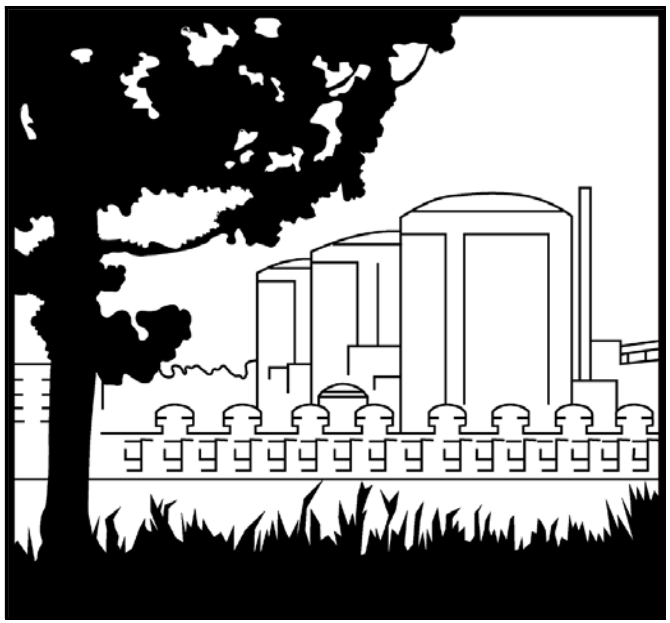
Summary

- 42 units have submitted Letters of Intent to transition to NFPA 805
- Two Pilot Plants are nearing completion of their NFPA 805 transition
- Significant industry and NRC staff resources are being expended on developing adequate guidance for transition
- NRC staff is in the process of considering if additional enforcement discretion is warranted

Oconee NFPA-805 Technical Update



By:
David Goforth
NFPA-805 Technical Manager
November 5, 2007

Overall

- Oconee Unit 3 identified as the pilot unit. ONS 1 & 2 to be submitted as part of the LAR with ONS-3
- Reconstitution
- B-1 Table
- B-2 Table
- B-3 Table
- Radioactive Release
- Non-power Ops
- PRA
- Configuration Control and Documentation
- LAR and UFSAR

Reconstitution

- ONS 2 and 3 completed. SSA strategies mapped out. Working on closing open items.
- ONS-1 cable selection and routing in progress. Fire Area Analysis to follow. Completion in early 2008. Results to be fed into SSA, B-3 table and PRA as completed.
- Modification review from 2002 to present in progress. Modifications are being reviewed for affects on the SSA. Completion by end of year.
- Currently adding PRA and non-power operations components.
- SSA completion expected in February 2008.

B-1 Table

- Updated B-1 Table completed and submitted to send to NRC.
- Duke and NEXUS working to close open items for the next revision. The next revision will be loaded into the Transition Tool Software and re-submitted to the NRC for comment.
- Oconee 86-10's identified and converted into calculation format based on NEI guidance.
- Based on current SSA and PRA, risk important fire areas/zones are being identified for evaluation of traditional fire protection features that need to be credited.

B-2 Table

- Rev 0 complete and send to NRC for comment.
- NFPA-805 Team working to close open items.

B-3 Table

- Updated SSA being used to identify safe shutdown strategies to be documented in the B-3 table.
- ONS-has priority and is being used as the pilot unit for NRC review.
- Performance goals populated based on latest review of the SSA
- NFPA-805 Team working to close open items loaded
- Higher risk fire areas/zones/locations identified for fire suppression/detection capability if credited by the PRA model.

Radioactive Release

- Oconee personnel working on populating the radioactive release table.
- Expect work to complete by end of November 2007

Non-power Operations

- Non-power equipment identified and being loaded into ARTRAK. Cables for non-power equipment are scheduled to be identified and routed.
- FAQ 07-40 submitted to NRC for review. This FAQ approval is a major input to assure proper review of equipment used for non-power operations.
- Non-power Operations expected to complete with the completion of the SSA.

PRA

- ONS-3 model nearing completion
- ONS-2 model in progress
- ONS-1 need for a separate model decision to be made by end of year
- NRC Peer Review scheduled for early March 2008
- PRA ignition source and component selection calculations comments received back from the NRC to be addressed in Nov pilot meeting
- Fire Modeling instructions loaded onto NEI laptop for NRC review
- ONS-3 PRA model data on NEI laptop. Obtaining software from EPRI to load on laptop to run data for NRC review.
- In depth analysis on going for ONS fire areas. Working with SSA team for combined safe shutdown strategy development
- Change Evaluations examples are being used to refine the change evaluation process

Configuration Control and Documentation

- Mapped out all the controlling regulations
- Verifying that each controlling regulation is addressed within the Duke processes
- Development of interim configuration control documents to ensure compliance with NFPA-805 transition activities
- Developing long term controlling documents
- LAR development to start this Fall
- Joint utility team assembled to define UFSAR details
-

LAR and UFSAR

- Joint effort to develop “straw man” LAR for review at the November pilot meeting
  - Lessons being learned
  - Differences between newer and older licenses
- Joint effort to develop “straw man” UFSAR for review at the November pilot meeting
  - How much detail to be added?
  - NEI guidance incorporated

NFPA 805 Implementation
August Pilot Observation Meeting
Harris Transition Status

Jeff Ertman, Transition Project Manager

Tony Maness, Harris Transition Project Manager

November 5, 2007, Atlanta, GA

NGG Nuclear Generation Group

Progress Energy

NFPA 805
Discussion Outline

- PE Goals of this Meeting
- Harris Transition Status
- Overview Meeting Topics

Note: No commitments are made by these presentations.

NFPA 805
PE Goals of Meeting

- Defining and understanding licensing basis under NFPA 805
- Feedback from NRR and Region II on various topics and products

NFPA 805
Harris Status - Current Focus

- Fire PRA completion
- Transition Change Evaluations
- Resolution of Multiple Spurious Operations (MSOs) and Operator Manual Actions (OMAs)
- Fire Safety Analysis (FSA) Completion
- Non-Power Operations Analysis
- Prepare draft LAR, FSAR
- Developing Monitoring Process

NFPA 805
Harris Status - Key Milestones

- Complete ‘Rough in’ FSA – November 2007
  - Initial PRA Quantification complete
  - Draft Transition Program Changes
  - Initial mod scope identified
- Internal Event PRA Limited Peer Review – December 2007
- Fire PRA NRC Staff Review – February 2008
- LAR enter internal review – April 2008
- LAR submittal to NRC – May 31, 2008
- Fire PRA Update and establish NFPA 805 baseline – 2nd QTR 2009
- NFPA 805 Program Implementation – 4th QTR 2009
- NFPA 805 Modifications complete – December 31, 2010

NFPA 805
Harris Status – Fire PRA

- Initial Quantification completed
- Final Quantification in process
  - Complete input open items
    - Review of SSEL ties to basic events
    - Final treatment of oil fires
    - Initial change process resolution strategies
  - MSO, OMA treatment
  - HRA treatment
- High level of activity until and past NRC Staff review

NFPA 805
Harris Status – Modifications

- Implementation
  - On Line and Refueling Outages
- Completed Modifications
  - RF12 - 2004
  - RF13 - 2006
  - RF14 - 2007

NFPA 805
Harris Status – Modifications

- Examples of Completed Modifications:
  - Fire Wrap (3M product -Interam)
  - Fire Rated Cable (Meggitt)
  - Re-analysis of Fire Areas
  - Power Supply
    - Alternate
    - Re-route
  - Dampers
  - Transfer Switch
  - Lighting

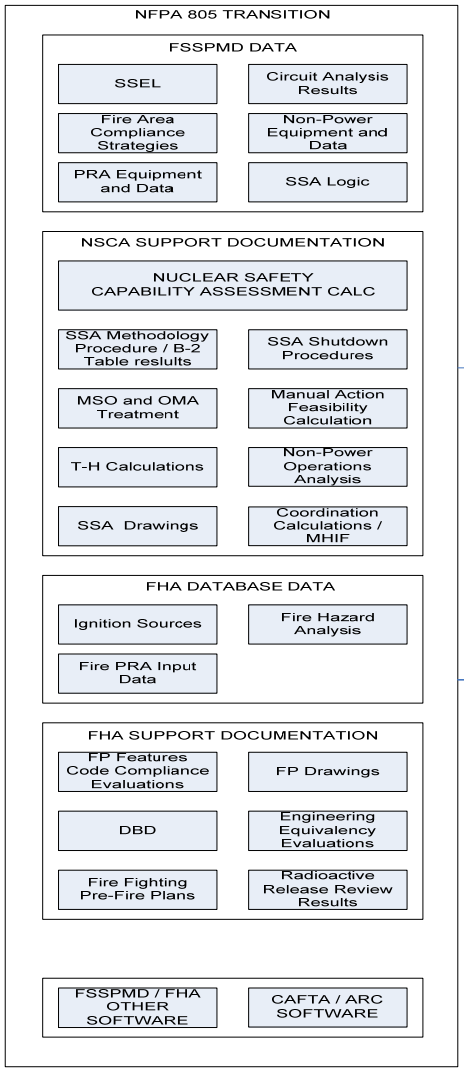
NFPA 805
Harris Status – Modifications

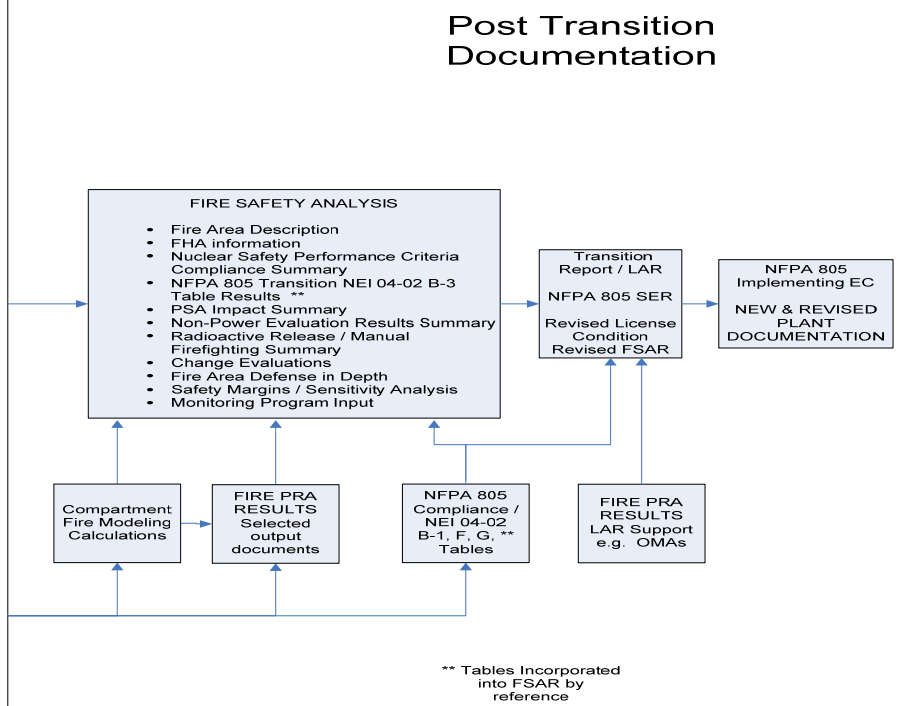
- Modification Scope
  - Initial Fire Area Review – Completed
  - Final scope
- Examples of potential modifications:
  - Cable Reroutes
  - Emergency Lighting
  - Radiant Heat Shield
  - Suppression Systems
  - De-energize components

NFPA 805
Harris Status – Charts

- View Harris Transition Milestones
- View Big Picture

NFPA 805 Topics – PE FSA





NFPA 805
Topics – Others

MSO

OMA

HRA

NPO

LAR / Transition Report

FSAR Outline

Monitoring

Fire scenario Development

Configuration Management

NFPA 805
PE Summary

- Harris Transition is in the final data development and analysis phase
  - Fire PRA
  - FSA
- Need to fix (lock down) the post transition licensing basis during the next 5 months
- This meeting key NRC feedback opportunity

Harris Nuclear Plant (HNP)
NFPA 805 Transition

Fire Safety Analysis (FSA) Update

Harris - Oconee Pilot Observation Meeting
November 5 - 8, 2007
Atlanta, GA

NGG Nuclear Generation Group

Progress Energy

Shirelle Allen, CES/FP

November 5, 2007

Progress Energy FSA Outline

1.0 PURPOSE

2.0 REFERENCES

3.0 BODY OF CALCULATION

- 3.1 Methodology
- 3.2 Classical Fire Protection
- 3.3 Fire Hazards Identification
- 3.4 Nuclear Safety Capability Assessment (NSCA) Compliance Summary
- 3.5 Non-Power Operational Modes Compliance Summary
- 3.6 Radioactive Release Compliance Summary
- 3.7 Probabilistic Risk Assessment – Summary of Results
- 3.8 Risk-Informed, Performance-Based Evaluations
  - 3.8.1 Transition Risk-Informed, Performance-Based Evaluations
  - 3.8.2 Post-Transition Risk-Informed, Performance-Based Evaluations
- 3.9 Defense-in-Depth
- 3.10 Monitoring Program Input
- 3.11 Open Items

4.0 CONCLUSION

5.0 ATTACHMENTS

- 1 - Fire Area 1-A-CSRB – B-3 Table - Nuclear Safety Capability Assessment Summary
- 2 – Fire Area 1-A-CSRB – Scenario Discussions - Change Evaluations

Progress Energy

1.0 Purpose (Page 4)

- Demonstrate achievement of nuclear safety and radioactive release performance criteria of NFPA 805 as required by 10CFR50.48(c)
- For 1-A-CSRB, also documents results of risk-informed, performance based evaluations.

3.1 Methodology (Pages 5-6)

- FSA is Progress Energy's design basis document as described in NFPA 805:2.7.1.2
- Listing of steps performed to develop FSA on a fire area basis

Progress Energy

3.2 Classical Fire Protection (Pages 6-8)

- Fire Response Strategy
- Construction
- Ventilation
- Detection, Automatic Suppression
  - Compliance Basis (Chapter 3 / Chapter 4)
    - FAQ 06-0004 ~ clarify basis for systems being in NFPA 805 program
- Manual Suppression

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3.3 Fire Hazards Identification (Pages 8-9)

- Normally expected fire hazards for the fire area
- Specific classifications/designations
  - i.e. Transient No Storage Locations
- Important ignition sources, based on Fire PRA
  - i.e. Fixed ignition sources in the area for which the calculated risk is equal to or above 1E-8/year for CDF
  - Plan of action utilizing knowledge gained from change evaluation process

3.4 Nuclear Safety Capability Assessment (NSCA) Compliance Summary (Page 9)

- Fire area contents
  - i.e. 1-A-CSRB contains Division 1 and 2 safe shutdown components
- Refers to Attachment 1 ~ NEI 04-02 Table B-3 and Attachment 2 results

3.5 Non-Power Operational Modes Compliance Summary (Page 9)

- High level results of the non-power operations evaluation
- In progress
- Tuesday presentation

3.6 Radioactive Release Compliance Summary (Page 9)

- Results of fire area radioactive release evaluation

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3.7 Probabilistic Risk Assessment – Summary of Results (Pages 9-10)

- 1-A-CSRB preliminary results
- Table 3-1 lists all fixed ignition sources in the area for which the calculated risk is equal to or above 1E-8/year for CDF

3.8 Risk Informed, Performance-Based Evaluations (Pages 10-11)

- Summary of interim results for the fire area
- Reference to Attachment 2 for details associated with change evaluations

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3.9 Defense-in-Depth (DID) (Pages 11-12)

- Extent to which fire protection systems and features are provided
- Traditional way of meeting DID as identified in NFPA805:1.2
- Staff comments concerning broader context for assessing DID elements to be reviewed (NEI 04-02)

3.10 Monitoring Program Input (Page 13)

- Input on what needs to be monitored beyond typical surveillances, etc.
- In progress
- Wednesday presentation

3.11 Open Items (Page 13)

- Summary of open items and proposed modifications required for compliance at the time of NFPA 805 LAR
- Compensatory measures that will be implemented for modification not completed at time of program implementation

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5.0 Attachments (Page 13)

- Attachment 1 – NEI 04-02 Table B-3
- Attachment 2 – Scenario Discussions

Attachment 2 (Pages 1 – 24)

- A2.1 Change Description
  - Grouping of changes identified for evaluation
- A2.2 Inputs/Assumptions
- A2.3 Fire Modeling Methodology

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Attachment 2 Continued

- A2.4 Scenario Descriptions and Model Results
  - Figure 2-1 shows location of all fixed ignition sources (1-A-CSRB is a designated Transient No Storage Location)
  - Figure 2-1 shows routing of all change process targets protected with ERFBS located in the fire area
  - Figure 2-1 shows routing of all change process targets not protected with ERFBS and located within the zone of influence of ignition sources where the calculated risk is equal to or above 1E-8/year for CDF (based on summary shown in Tables 2-1 through 2-3)

Attachment 2 Continued

- A2.4 Scenario Descriptions and Model Results
  - Scenarios below 1E-8 are not addressed in evaluation because any change in risk is below RG1.205 acceptance criteria which bounds the RG1.174 criteria.
- A2.5 Risk Evaluation
  - Assessment of ΔCDF and ΔLERF

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Attachment 2 Continued

- A2.6 Impact of Change on DID
- A2.7 Safety Margin Considerations
- A2.8 Transition Change Evaluation Conclusions

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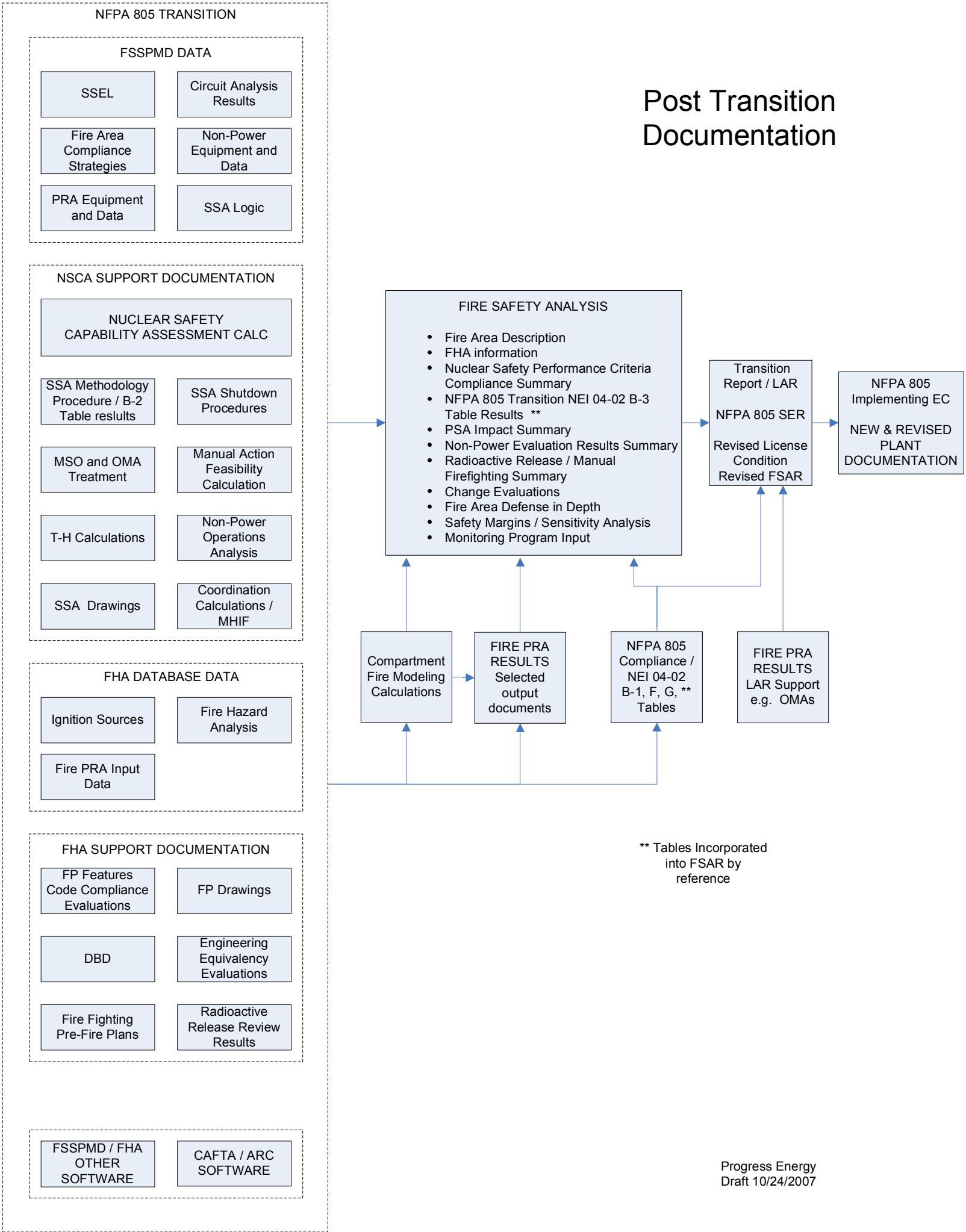
FSA Update

Open Discussion

Progress Energy

Post Transition Documentation



Multiple Spurious Operations Methodology / FAQ 07-0038

Keith Began, Progress Energy

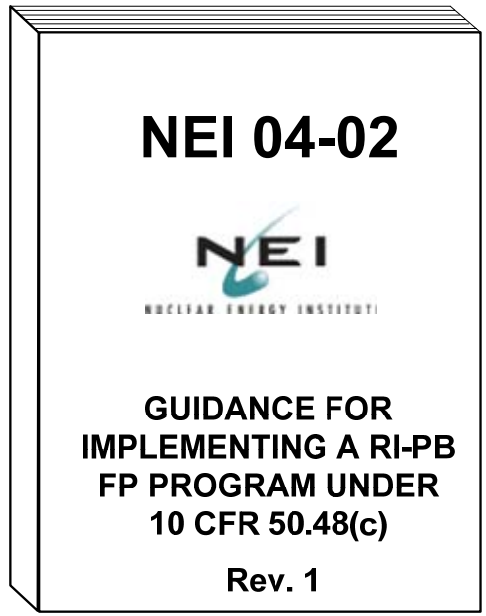
November 6, 2007 Atlanta, GA

FAQ 07-0038 Lessons Learned on MSOs

- Presentation Outline
  - Background on NEI 04-02/RG 1.205, MSO Discussion
  - Purpose of FAQ 07-0038
  - Discussion of proposed process
  - NRC Comments on FAQ 07-0038, Rev. 0

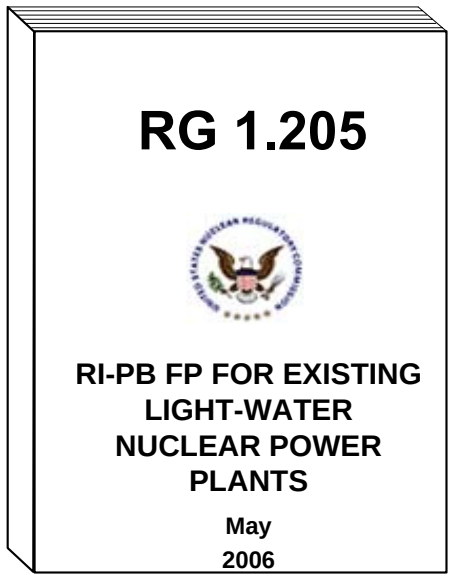
Background on NEI 04-02, MSO Discussion

- NEI 04-02, Rev. 1 (9/05) – Section B.2.1 discusses 'methodology provide by Duke Energy'
- Described as "an acceptable approach for screening out non-risk-significant issues"
- Provided thresholds and proposed actions based on risk thresholds
- Does not provide much detail on process or methods



Background on RG 1.205, MSO Discussion

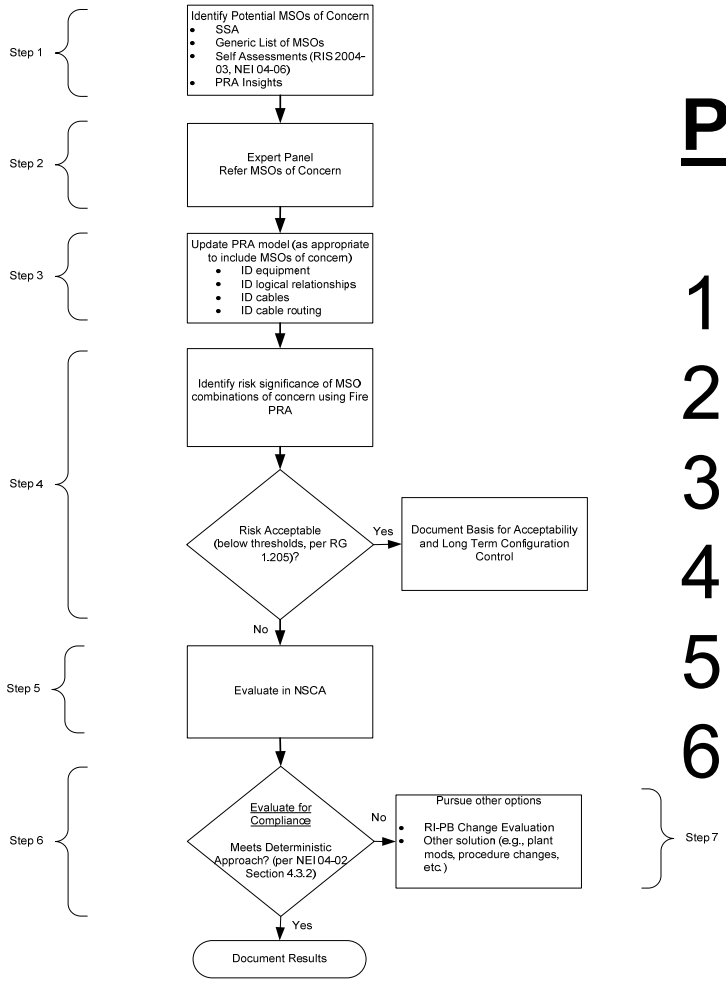
- RG 1.205, Rev. 0 (5/06) – Section C.3.3 – "accepts the NEI thresholds for screening" and for additional action
- Refers to RG 1.205 standard license condition actions for risk increase thresholds
- Allows appropriate credit for recovery actions in application of standard license condition



Purpose of FAQ 07-0038

- Provide updates to NEI 04-02 for lessons learned on scoping MSOs from pilot plant activities, NFPA 805 TF, NRC reviews, & PRA development
- Provide a structured process to allow application of endorsed criteria
- FAQ 07-0038, Rev. 0 submitted to NRC 9/20/07 (ML072740262)
- NRC comments provided on 10/18/07

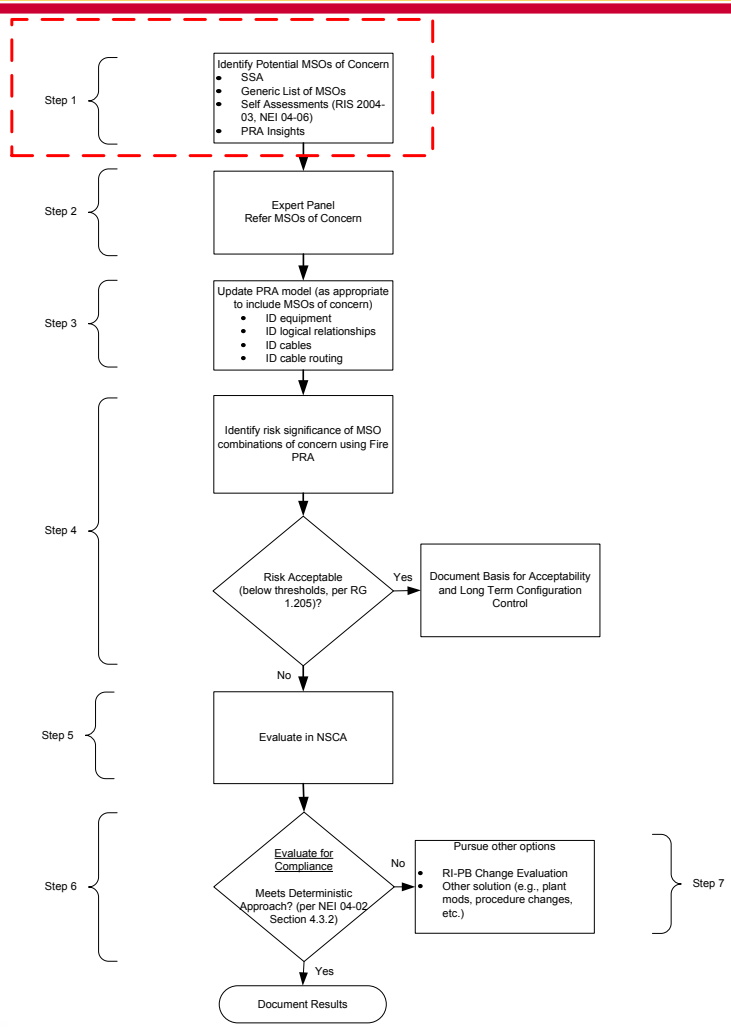
FAQ 07-0038 Proposed Process



Process – 7 Steps

1 - Identify Potential MSOs
2 - Expert Panel
3 - Update FPRA model
4 - ID Risk Significant MSOs
5 - Evaluate in NSCA
6 - Evaluate for Compliance

FAQ 07-0038 Proposed Process Step 1

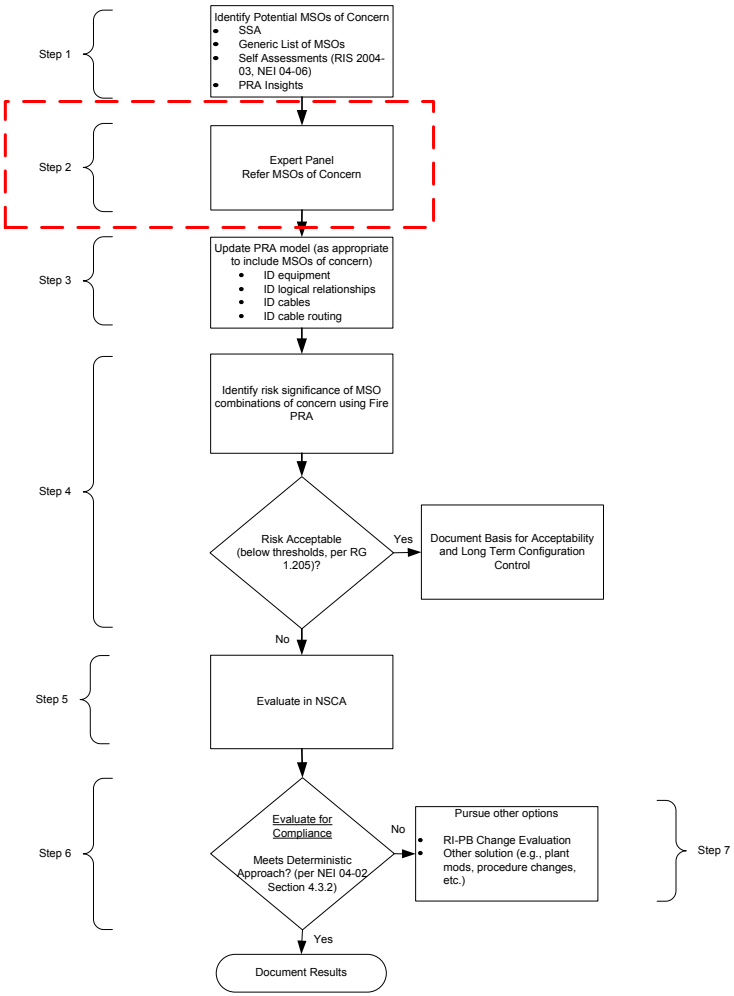


Step 1

Identify Potential MSOs of Concern

- SSA
- Generic List of MSOs
- Self Assessments (RIS 2004-03, NEI 04-06)
- OE (LERs, INPO Reports, etc.)
- PRA Insights

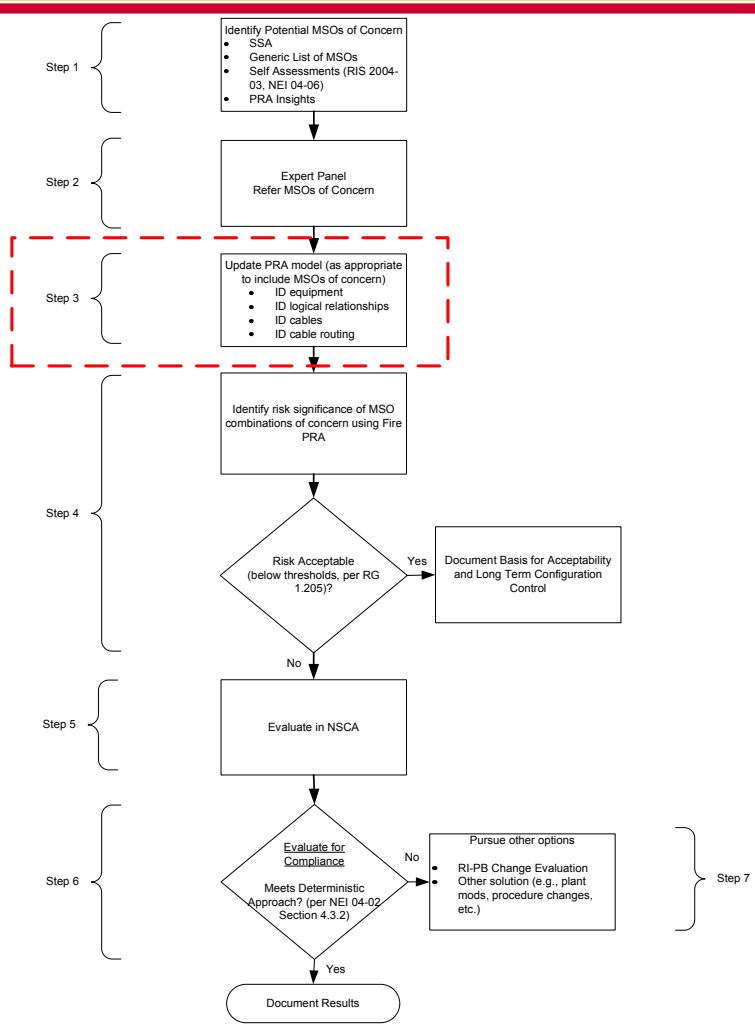
FAQ 07-0038 Proposed Process Step 2



Step 2

Expert Panel
Refer MSOs of Concern

FAQ 07-0038 Proposed Process Step 3

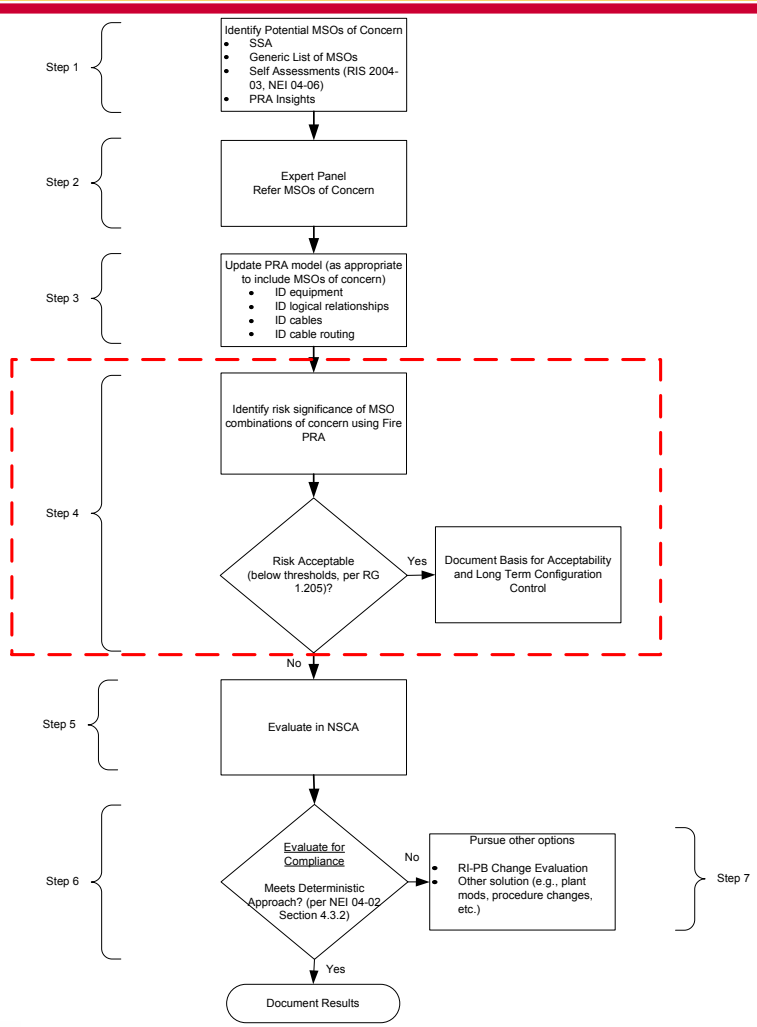


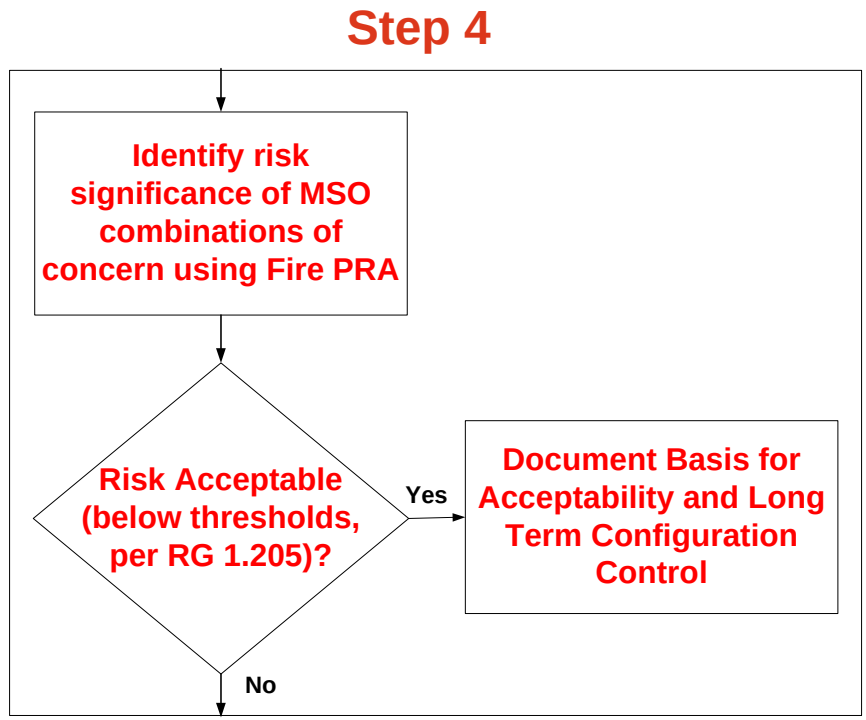
Step 3

Update PRA model (as appropriate to include MSOs of concern)

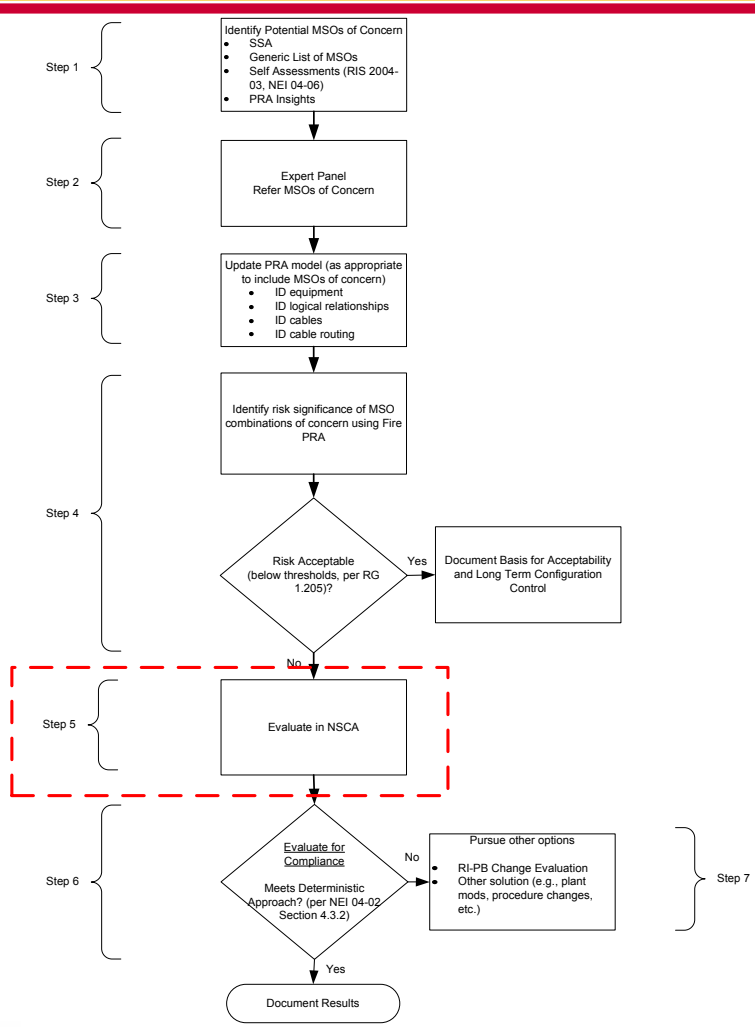
- **ID equipment**
- **ID logical relationships**
- **ID cables**
- **ID cable routing**

FAQ 07-0038 Proposed Process Step 4





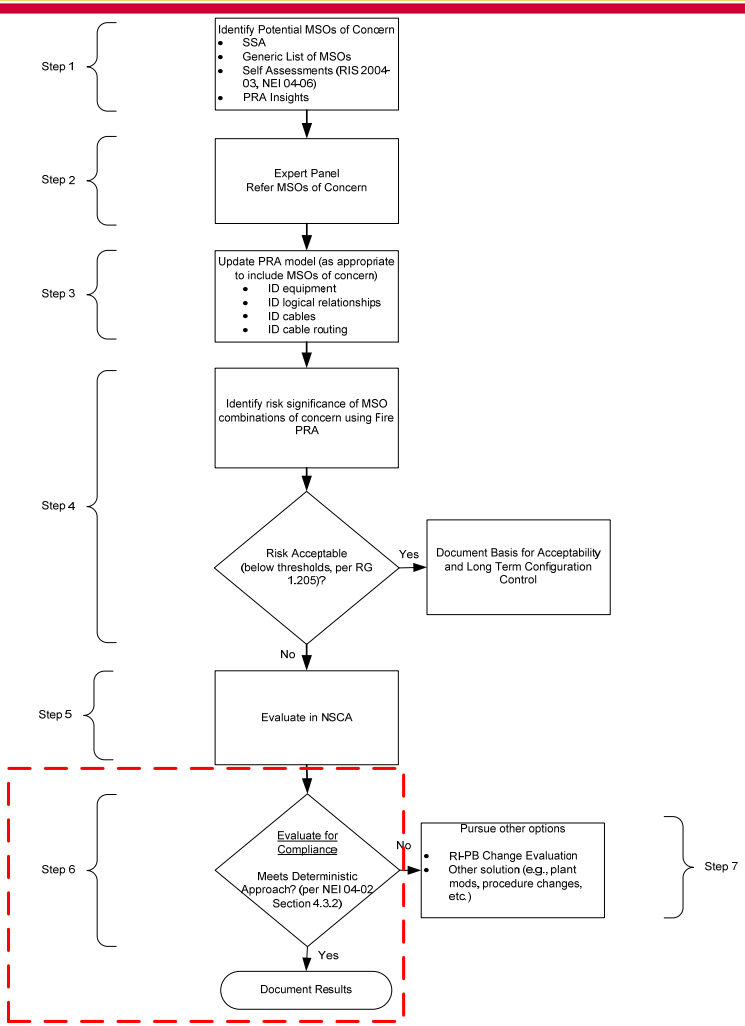
FAQ 07-0038 Proposed Process Step 5

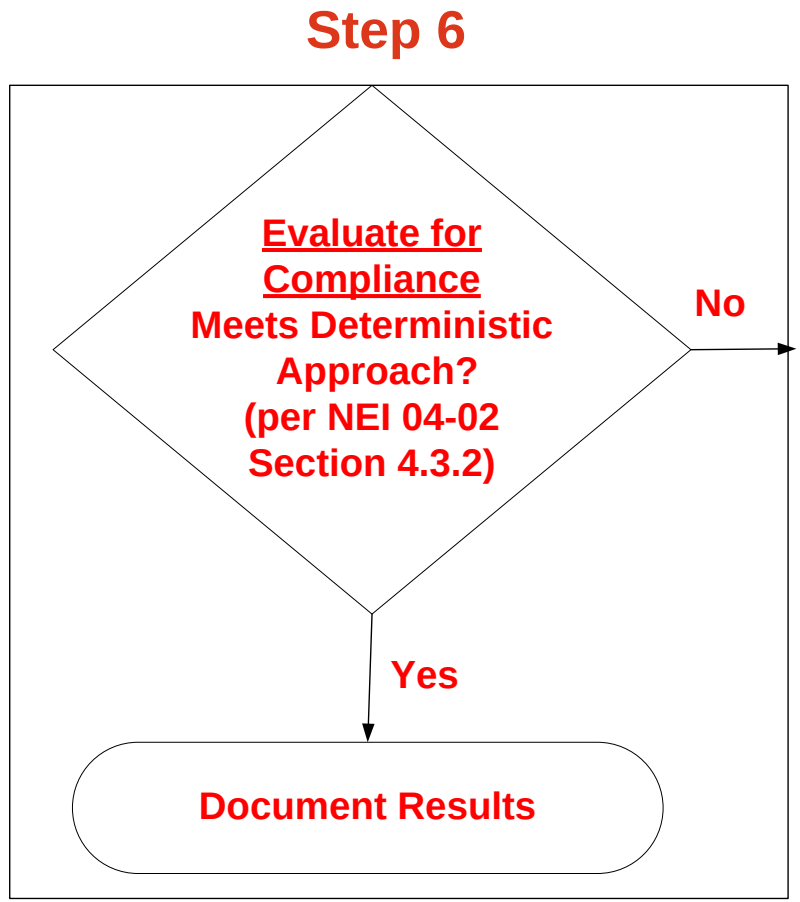


Step 5

Evaluate in NSCA

FAQ 07-0038 Proposed Process Step 6





FAQ 07-0038 Proposed Process Step 6 (cont'd)

Table XX – MSO Risk Assessment Criteria

Ref.	ΔCDF	ΔLERF	Characterization	Action
NEI 04-02 (B.2.1) & RG 1.205 (C.3.3)	< 1E-08/yr (prior to operator response")	< 1E-09/yr (prior to operator response")	Not potentially risk significant Band 1 on Figure YY.	No further consideration required (document results)
NEI 04-02 (B.2.1) & RG 1.205 (C.3.3)	<1E-06/yr (prior to operator response") but ≥_1E-08/yr	<1E-07/yr (prior to operator response") but ≥_1E-09/yr	"Gray Area" Band 2 on Figure YY	Evaluate and include as part of NSCA ("design change or procedure change put in place, if possible, Procedure actions still meet feasibility criteria but are not considered 'required'."
NEI 04-02 (B.2.1)	> 1E-06/yr (prior to operator response")	> 1E-07/yr (prior to operator response")	Potentially risk significant Band 3 on Figure YY	Evaluate and include as part of NSCA

" "Operator response" refers to operator manual action in response to the fire-induced spurious operation(s).

FAQ 07-0038 Proposed Process Step 6 (cont'd)

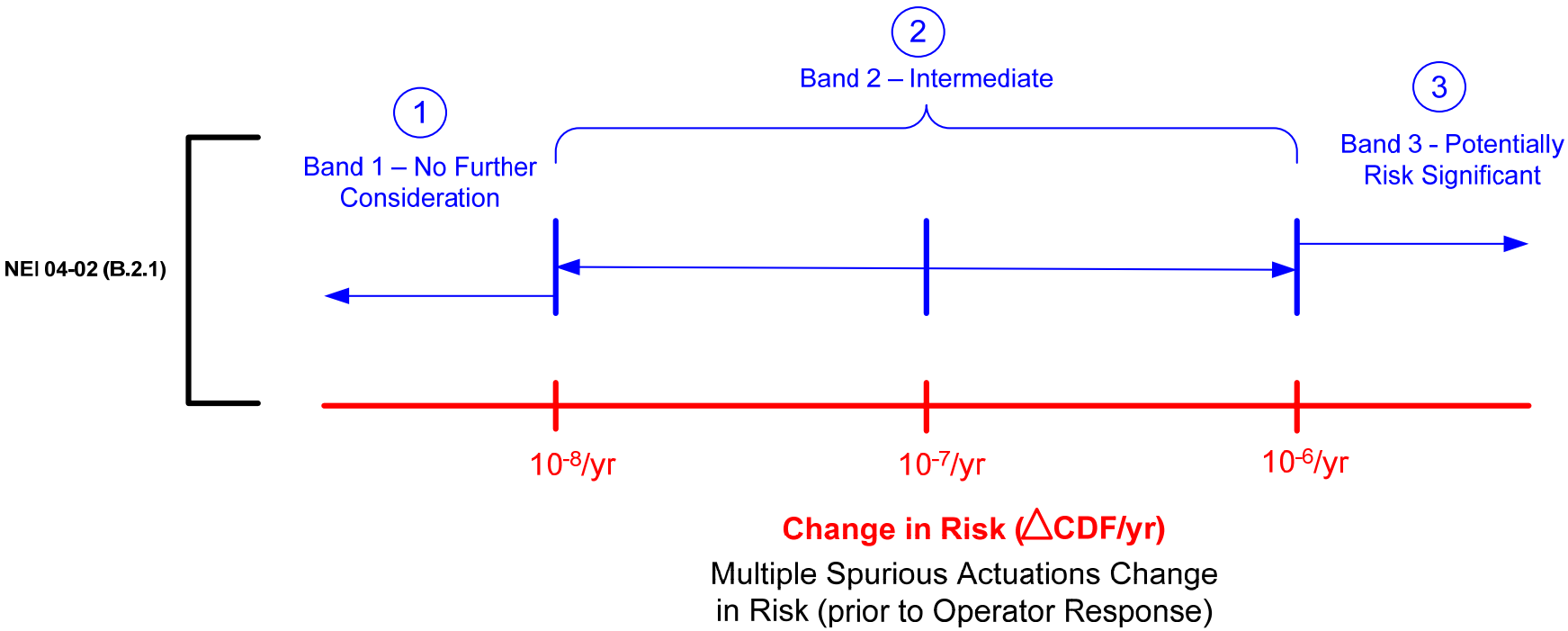


Figure YY – NEI 04-02 Section B.2.1 Change in Risk Criteria due to MSOs (Change in CDF Only Shown)

FAQ 07-0038 Proposed Process Step 6 (cont'd)

Table YY – MSO Risk Assessment Criteria

Ref.	ΔCDF	ΔLERF	Characterization	Action
RG 1.205 (C.3.3 and C.3.1)	<1E-06/yr but ≥_1E-07/yr	<1E-07/yr but ≥_1E-08/yr	Post transition See Figure ZZ	Post-transition – Process in accordance with FP license condition (RG 1.205 – C.3.1) Allows risk increase to consider credit for feasible & reliable recovery actions.

FAQ 07-0038 Proposed Process Step 6 (cont'd)

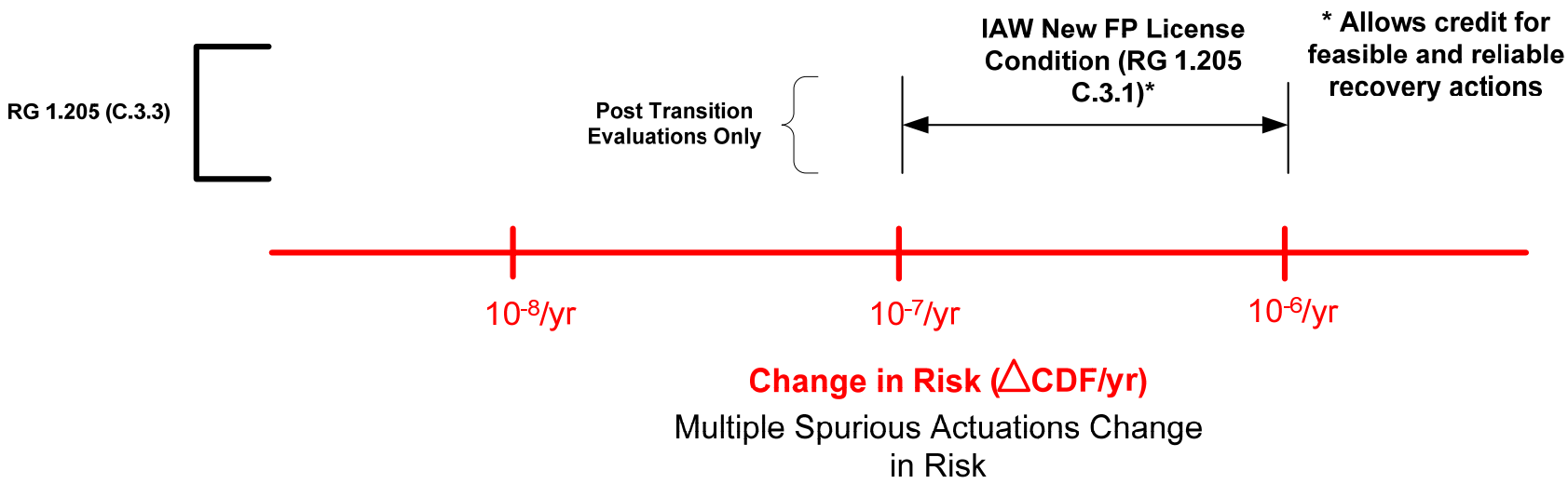
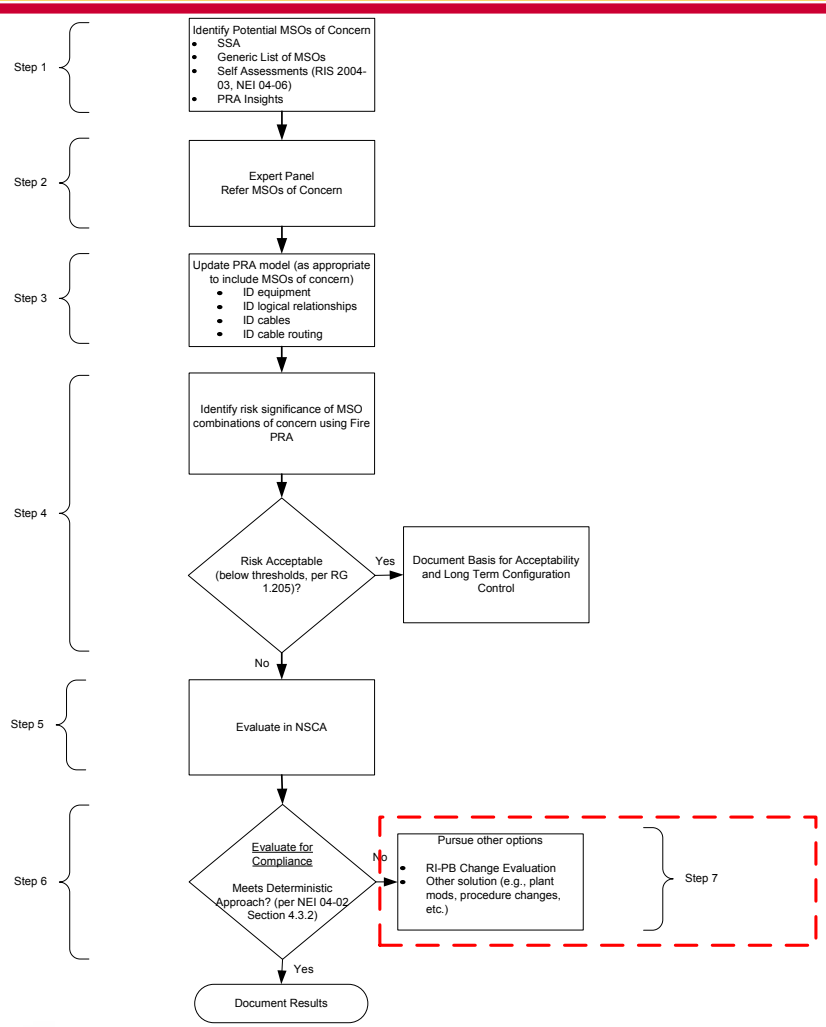


Figure ZZ – RG 1.205 Change in Risk Criteria due to MSOs (Change in CDF Only Shown)

FAQ 07-0038 Proposed Process Step 7



Step 7

Pursue other options

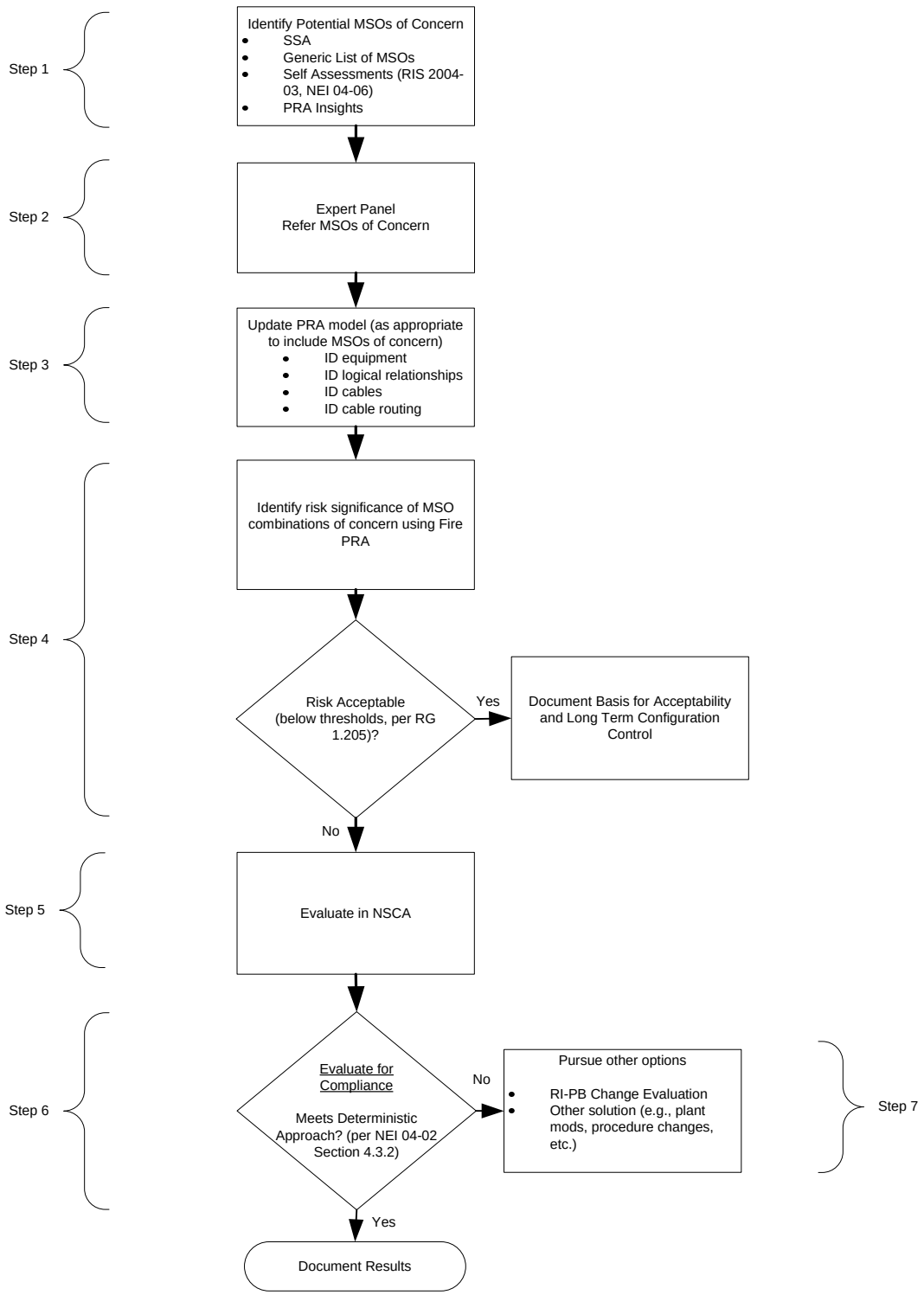
- **Bring condition into compliance w/ deterministic requirements**
- **RI-PB Change Evaluation**
- **Other solution (e.g., plant mods, procedure changes, etc.)**

FAQ 07-0038, Rev. 0 – Key Points

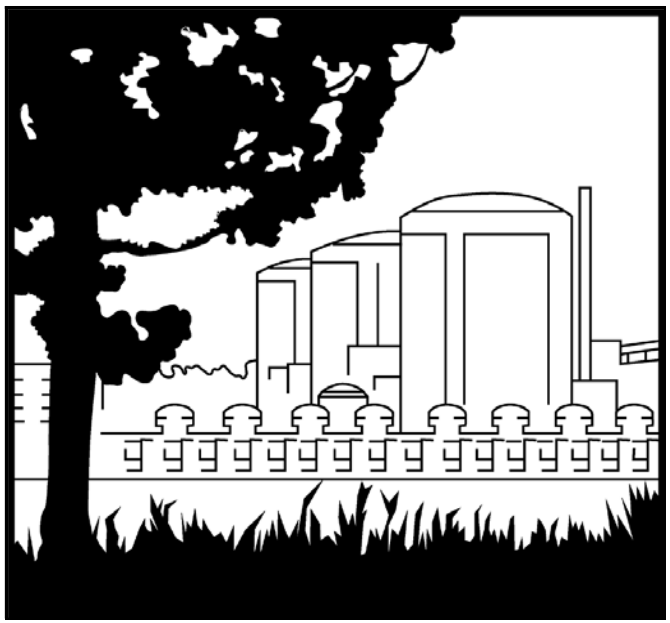
- Risk Assessment / Screening determines if MSO combinations are evaluated in deterministic analysis
- Screening values for ‘Band 2’ have 2 decades of margin to provide sufficient conservatism and account for uncertainty
- If MSO combinations are part of a RI-PB change evaluation, configurations will be assessed for ΔCDF, ΔLERF, Defense-in-Depth and Safety Margin

NRC Comments on FAQ 07-0038, Rev. 0

- Editorial and Clarification Items
- Risk threshold clarification
- DID and Safety Margin Scope
- Documentation and Configuration Control
- Integration of MSOs and Operator Manual Actions


Step 1
Identify Potential MSOs of Concern
SSA
Generic List of MSOs
Self Assessments (RIS 2004-03, NEI 04-06)
PRA Insights
Step 2
Expert Panel
Refer MSOs of Concern
Step 3
Update PRA model (as appropriate to include MSOs of concern)
ID equipment
ID logical relationships
ID cables
ID cable routing
Step 4
Identify risk significance of MSO combinations of concern using Fire PRA
Risk Acceptable (below thresholds, per RG 1.205)?
Yes
Document Basis for Acceptability and Long Term Configuration Control
No
Step 5
Evaluate in NSCA
Step 6
Evaluate for Compliance
Meets Deterministic Approach? (per NEI 04-02 Section 4.3.2)
No
Pursue other options
RI-PB Change Evaluation
Other solution (e.g., plant mods, procedure changes, etc.)
Step 7
Yes
Document Results

Overview of MSO Risk Significance Determination Process



Atlanta NFPA 805 Pilot Meeting
Nov. 5 – 8, 2007

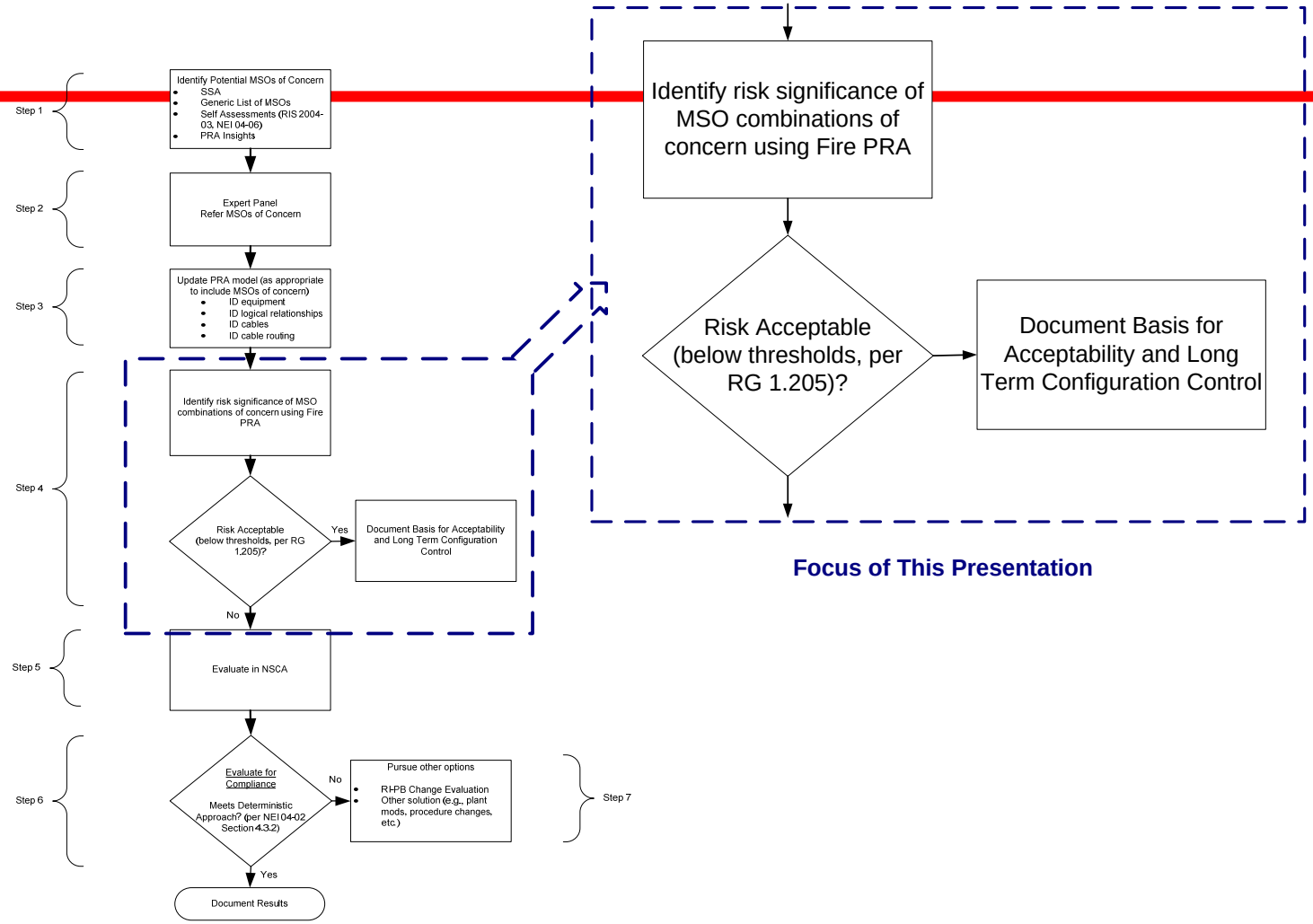
Agenda

- NEI 04-02 Requirements
- Risk Determination Process
- Post-Processing of Fire PRA Results
- Reporting of MSO Risk Insights
- New MSOs after FPRA Completion
- Summary

2

AR1

NEI 04-02 - FAQ 07-0038



Focus of This Presentation

3

Slide 3

AR1 here's a graphic from the faq that you can use if you want

Andy Ratchford, 10/6/2007

NEI 04-02 – FAQ 07-0038

- Identify Potential MSOs of Concern
  - Expert Panel
  - NEI 00-01
  - No inherent limit on number of concurrent SOs
  - Realistic treatment based on PRA fundamentals
- Treat MSOs in Fire PRA
  - NUREG/CR-6850
  - ANSI/ANS-58.23-2007
  - Ensure timing issues are bounded by treatment
  - Potential need for supplemental T-H analyses

4

NEI 04-02 – FAQ 07-0038

- Identify Risk Significant MSOs using Fire PRA
  - Conceptually Straightforward
  - Use of existing PRA quantification tools
  - Supplemental tools/processes needed
- Assess Risk Metrics
  - NEI 04-02 / FAQ 07-0038 provides one approach (endorsed in R.G. 1.205)

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Risk Determination Process

- Assessment based on quantification results (cutsets)
- Identification of events representing a spurious operation (SO)
- ‘Read’ entire cutset file to find unique MSO combinations
- Summation of cutsets for each unique MSO combination
- Compare figure of merit for each MSO combination against NEI 04-02 / FAQ 07-0038 criteria

6

Post-Processing of Fire PRA Results

- Assessment based on quantification results (cutsets)
  - If FRANC is used, individual cutset files must be modified to insert initiator identifier and merged
  - Integrated model should provide results file directly
  - Review BE mapping task – scope of BEs linked to SO events or rely on BE naming convention
  - SO events will not appear in cutset file if set to TRUE – need to set to value
  - Unknown limits in cutset process tools – # of cutsets and # of events in cutset

Post-Processing of Fire PRA Results

- Identification of events representing a spurious operation (SO)
  - Review BE mapping task – SO concerns from SSEL, Expert Panel, etc and scope of BEs
  - BE naming convention – type and failure mode codes
    - FMS0084***MVT*** – MOV 3MS-84 xfers closed (Oconee)
    - F***MV***AF-55***FN*** – MOV 1AF-55 xfers closed (Harris)
  - Not all BEs representing a SO due to a hot short
    - All transfer functions can be included – includes those NOT caused by hot short
    - Will likely result in conservative result – over-predicts risk contribution due to SOs

8

Post-Processing of Fire PRA Results

- 'Read' entire cutset file to find unique MSO combinations
- Summation of cutsets for each unique MSO combination
  - Exploring use of SysImp
  - Could use recovery rule file with substitutions and cutset file post processing for importance measures of substituted events

9

Post-Processing of Fire PRA Results

- Criteria for each MSO Combination - NEI 04-02 / FAQ 07-0038 criteria
  - Used to establish Licensing treatment only
  - All metrics based on risk before Fire Protection Program specific OMA in response to SO is credited

10

New MSOs after FPRA Completion

- New MSOs ***WILL*** be identified
  - Not possible to identify all possible MSOs
  - Using scrutable process to provide high confidence
- Treat new MSOs as ‘open items’ – not SDP

11

New MSOs after FPRA Completion

- Treatment of New MSOs
  - New MSO case must be defined – component combination and damage sequence AND have reasonable likelihood of being important to risk
  - If not on MSO list - Fire PRA Update may be needed
  - If on MSO list - review FPRA model to confirm sequence/event tree are appropriate
  - If sequence/event tree are consistent - already treated – no further action required
  - If sequence/event tree are not consistent - FPRA model update may be needed
  - Additional treatment based on qualitative or quantitative risk results

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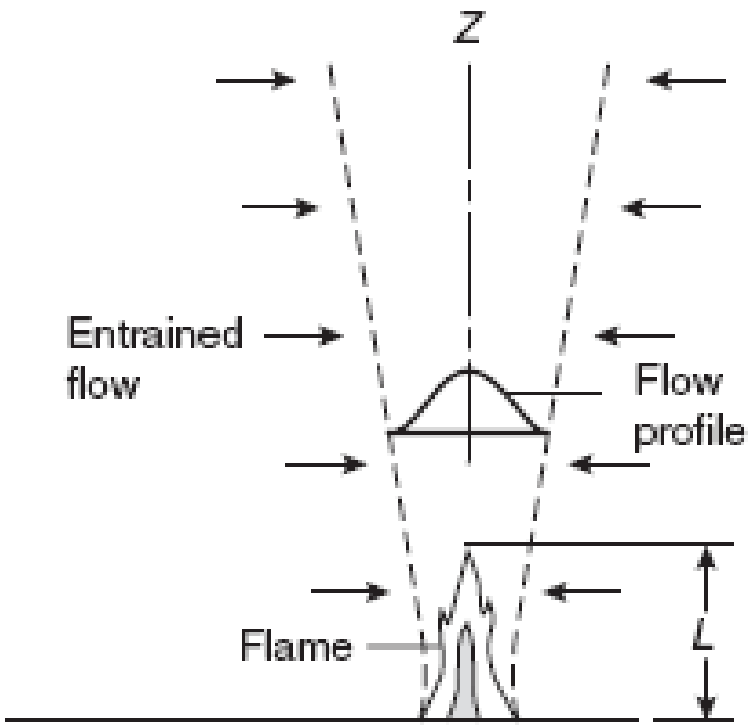
Summary

- Identify Potential MSOs of Concern
- Treat MSOs in Fire PRA
- Evaluate MSOs using Fire PRA
- Assess Risk Metrics
- Establish Licensing Basis for MSO
- Resolve MSO Issue
- MSO treatment update – may require Fire PRA Update

13



Generic Fire Modeling Treatments

November 6, 2007

Overview

- Define the treatments
  - What are they?
  - Why were they developed?
  - What are they used for?
- Describe the basis for each treatment
- Describe the process by which they are applied

Generic Fire Modeling Treatments

- Pre-solved mathematical solutions
  - Simple correlations/zone computer models
  - Conservatively biased/full parameter sensitivity evaluation
  - Range set to accommodate most applications
    - Fully specified limits of applicability for each treatment
- Eight distinct computation areas
  - Fire scenario and fire scenario effects
- Developed to allow efficient determination of zone of influence in the field

Treatment Fuel Packages

- Open electrical cabinets
- Closed electrical cabinets
  - No solutions, but no contact with target
- Transient Class A combustibles
- Combustible liquid spills
  - Confined/unconfined
- Cable trays
- Room heating
  - Target damage and ZOI reduction

Target Sets

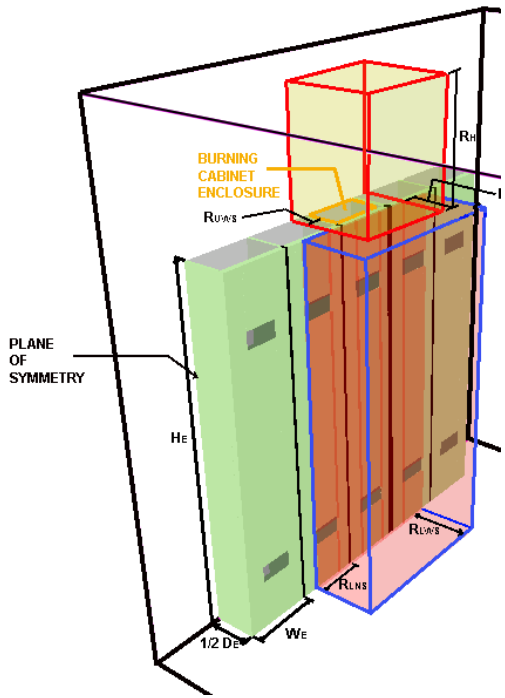
- IEEE-383 qualified or thermoset cables
  - Immersion temperature of 329°C (625°F)
  - Total incident flux of 11.4 kW/m² (1.0 Btu/s-ft²)
- Non-IEEE-383 qualified or thermoplastic cables
  - Immersion temperature of 204°C (400°F)
  - Total incident flux of 5.7 kW/m² (0.5 Btu/s-ft²)
- Class A Combustible materials
  - Immersion temperature of 278°C (532°F)
  - Total incident flux of 9 kW/m² (0.8 Btu/s-ft²)

Fire Sizes

- Does not predict fire sizes – required input
- Transients and cabinet enclosures
  - NUREG 6850 distributions
  - Solutions for all data points
- Spill fires
  - Parameter, range: 50 – 12,000 kW
- Room heating
  - Parameter, range: 50 – 10,000 kW
- Cable trays
  - Parameter, range not yet established

Open Cabinets

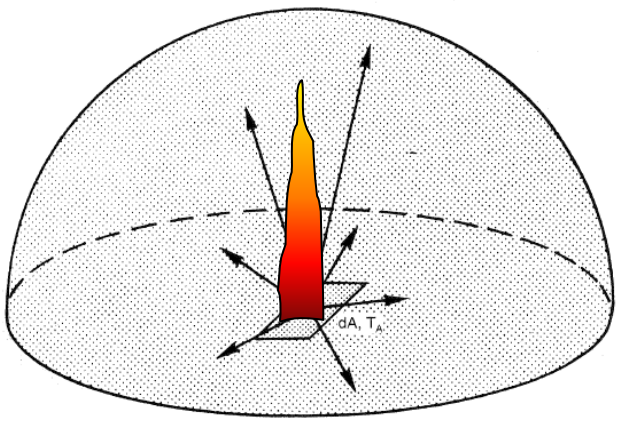
- Defined per NUREG 6850 Appendix G
  - Supported by sensitivity studies
- Generalized burning data scarce
- Treated in a bounding sense:
  - Zone of influence above assumes open top
  - Zone of influence on side assumes open or closed sides



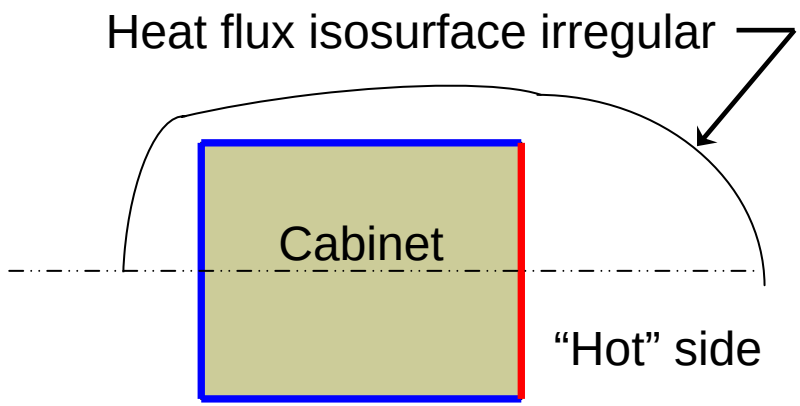
Open Cabinets – Heat Flux Isosurfaces

- Non-symmetric thermal radiation field
  - Point source and open fire near field models not good choices

Heat flux isosurface on hemisphere



(Far-field approach)
Point-Source Model



Plan view of electrical cabinet

Open Cabinets – Calculation Method Above Top

- Unconfined source fire
- Near field radiation model for horizontal separation
  - Horizontal separation
  - Shokri and Beyler Method – validation basis provided in SFPE Engineering Guide
  - Rectangular ZOI bounds irregular heat flux isosurfaces
- Correlated peak plume heat fluxes/centerline temperature – vertical separation
  - Vertical separation
  - Validation basis: NUREG 1824 as a minimum
- Iteration parameters
  - Shape of fire
  - Unit heat release rate – 3,000 kW/m^2 maximum
- Sensitivity parameters
  - Method (near field/far field models)
  - Model constants

Open Cabinets – Calculation Method Below Top

- Assume peak sustained heat flux measured in corner enclosure fires (120 kW/m²)
  - SFPE Handbook
  - Apply heat fluxes to one cabinet side (long/short)
- Compute steady-state flux on external surface (about 108 kW/m²)
- Compute radiation view factor and resulting zone of influence
- If side open, add flame extension offset of 0.2 × cabinet height to zone of influence
  - Based on enclosure tests

Open Cabinets – Results

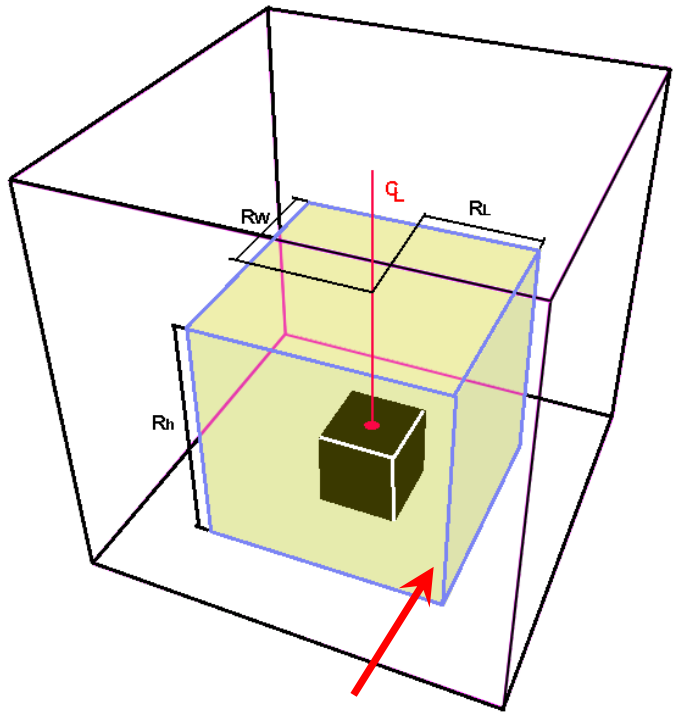
- Tabulated and graphical data
  - 24 tables and 24 2-D graphs
- Parameters:
  - Heat release rate distribution profile (4)
  - Dimensions of electrical cabinet (3)
  - Elevation of fuel package (above or below top)
  - Target type
    - Qualified/unqualified cable
    - Class A combustible

Closed Cabinets

- Defined per NUREG 6850 Appendix G
- Assumed to not propagate fire
- Outer surfaces assumed hot
  - Target must not be in contact with cabinet

Transient Class A Combustibles

- Rectangular ZOI about center
  - Reduces parameters
  - Bounds irregular geometries
- Includes fuel packages other than:
  - Cable trays
  - Cabinet enclosures
  - Combustible liquids
- Full parameter sensitivity assessment



Maximally conservative at apexes

Transient Class A Combustibles

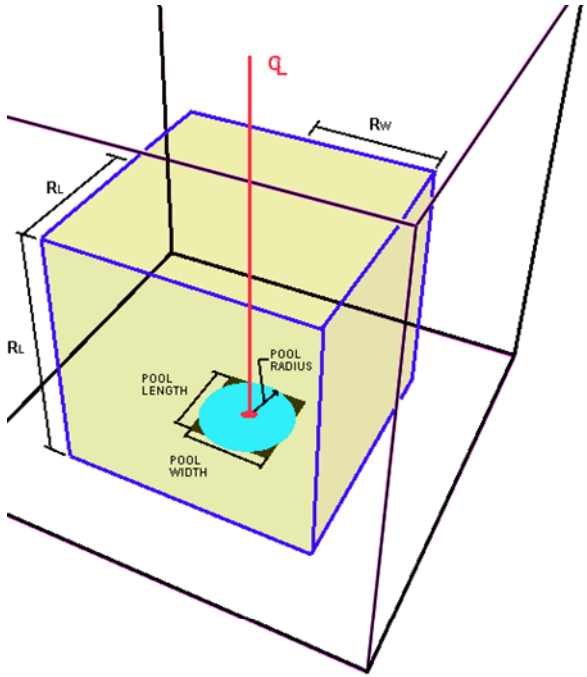
- Examined flux and temperature correlations
  - Far field/near field
  - Measurements
- Adopted approach is the same as that used for targets located above open cabinets
- Heat release rate per unit area adjusted to produce most severe fire exposure
  - Range 200 – 1,000 kW/m^2

Transient Class A Combustibles – Results

- Tabulated and graphical data
  - 2 tables and 2 2-D graphs
    - Horizontal/Vertical ZOI dimensions
- Parameters:
  - Fire size
  - Target type
    - Qualified/unqualified cable
    - Class A combustible

Combustible Liquid Spill Fires

- Rectangular ZOI about center
- Two spill types
  - Confined (deep)
  - Unconfined (shallow)
- Spill types distinguished by the burning rate
- ZOI computed in same manner as Class A combustibles



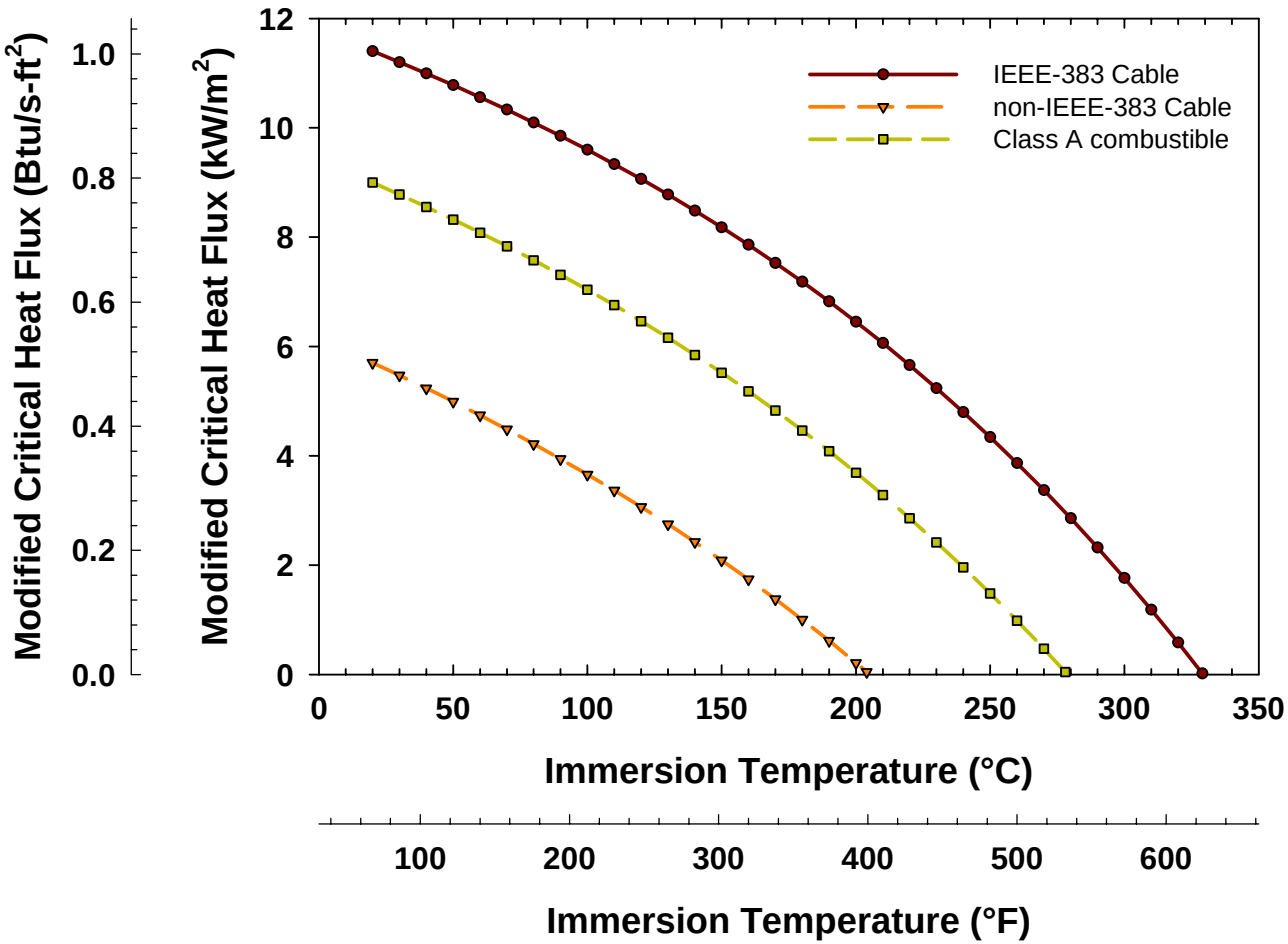
Combustible Liquid Spill Fires – Results

- Tabulated and graphical data
  - 4 tables and 6 2-D graphs
    - Horizontal/Vertical ZOI dimensions
- Parameters:
  - Spill type (2)
  - Unit heat release rate (3)
    - 1,000 – 3,000 kW/m^2
  - Spill volume *or* spill area
    - Surrogate for heat release rate: 50 – 12,000 kW

Room Temperature Estimates

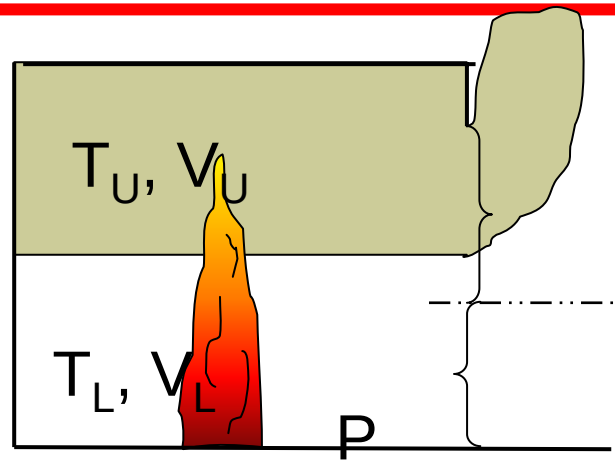
- Two computations:
  - Indirect target damage
    - No local heat flux: time to reach critical target temperature
  - Reduction in critical heat flux (and ZOI)
- Critical heat flux for target damage is lower in presence of a hot gas layer
  - Assumed to be zero at critical damage temperature
  - Assumed to be relative to “normal” ambient
    - 20°C
    - Based on test environment not facility environment

Room Temperature Estimates – Modified Critical Flux



Room Temperature Estimates – Approach

- CFAST
  - V&V basis in NUREG 1824
  - Long pedigree
  - Flexible parameters
    - Fire position (corner, open, wall)
    - Fire height
    - Number and type of openings
    - Boundary materials
    - Fuels
    - Forced ventilation

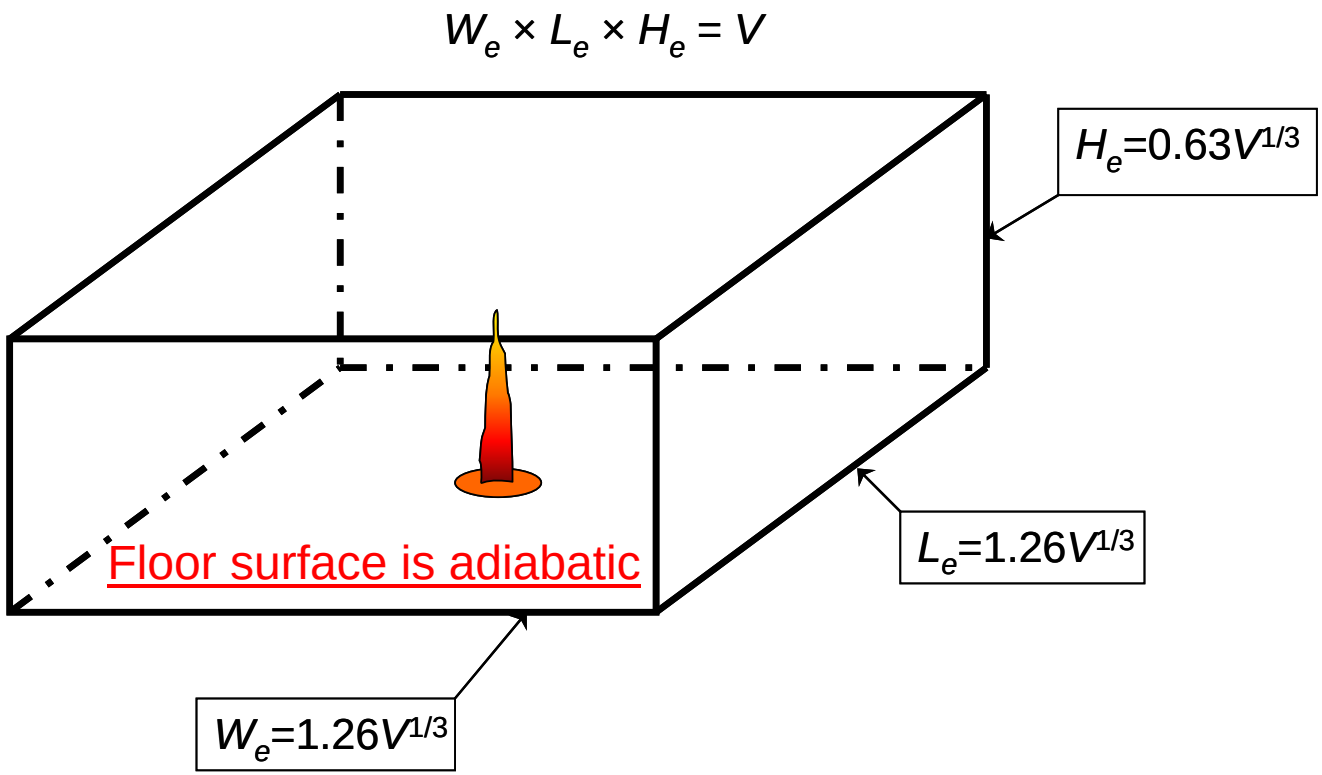


Zone Model Concept

Room Temperature Estimates – Approach

- 1,000+ CFAST simulations used to identify conservative vent orientations, fuel compositions, room shape
- 2,400+ CFAST simulations used to compute time to reach critical temperatures
- Comparisons to MQH method (NUREG 1805) show close agreement once fire environment is fully developed and model used within limits
  - CFAST has flexibility of additional parameters

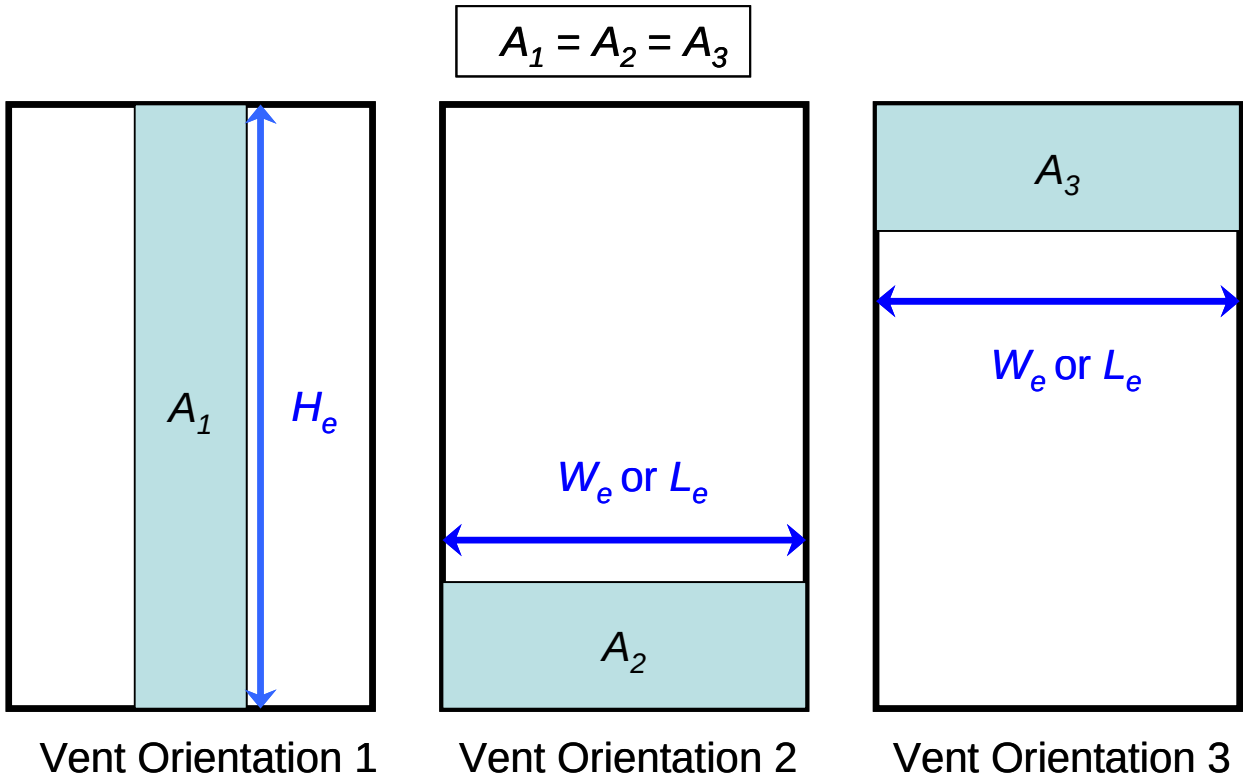
Room Temperature Estimates – Limiting Enclosure



Room Temperature Estimates – Results

- Time to reach a hazardous condition
  - 36 primary tables
  - 27 supplemental tables
- Parameters
  - Opening fraction
    - 9 (0.001 – 10 percent)
  - Room volume
    - 10 (10 – 10,000 m^3)
  - Fire size
    - 9 (50 – 10,000 kW)
  - Vent configurations (3)

Room Temperature Estimates – Limiting Openings



Any one of these three may be limiting; tables based on the single limiting opening

Field Use of Generic Treatments

- 3-page field note form with procedure
- Cross-indexes NUREG 6850 Ignition Source Bins with eight generic treatment cases
- Selects ZOI using a bounding treatment heat release rate bin for the field notes
- Defines limits of applicability
- Provides an option for more refined ZOI
  - Consult tables and graphs in generic treatment report
- Detailed analysis may be required:
  - Exceed limits of applicability or higher resolution result is needed

Field Use of Generic Treatments - Example

- Assume NUREG 6850, Chapter 6, Ignition Source Bin 3
  - Containment (PWR) – transients and hotwork
- Mapped to Generic Treatments Case A (transient combustibles)

6850 ignition source Bin No. vs. Scoping Fire Modeling Cases, below	Bin 1 - Case E Bin 2 - Oil: Case D and B; Elect, for JB: Case G, if required by Case D Bin 3 - Case A Bin 4 - Case G Bin 5 - LATER Bins 6 & 7 - Case A	Bin 8 - Oil: Case D and B; Elect: Case G Bin 9 - Same as Bin 2 Bin 10 - Case G Bin 11 & 12 - LATER Bin 13 - Case A Bin 14 - Case C Bin 15 - Case G

Field Use of Generic Treatments - Example

- Generic Treatment Case A ZOI dimensions
  - Provides 75th percentile
  - Vertical (V) and horizontal (H) directions

		383 Cable	Non-383 Cable	Class A combustibles
A - Transient Combustibles	Based on 75th percentile heat release rate from NUREG 6850 (HRR Bin 4)	5.6-V / 3.6-H	7.6-V / 5.2-H	6.2-V / 4.1-H

- The ZOI about a transient where 383 cables are targets is:
  - 5.6 ft vertically above the *base* of the transient
  - 3.6 ft horizontally from the *center* of the transient
  - A 7.2 ft by 7.2 ft by 5.6 ft rectangular parallelepiped *centered on* the fuel package

Operator Manual Actions

Jeff Ertman, Progress Energy

November 6, 2007 Atlanta, GA

Introduction

- Operator manual actions
- Determining scope of change evaluation
- Assessing the risk of recovery actions

Pertinent FAQs

- 06-0012 Clarify Manual Action Transition in Appendix B *[In Progress, Addressing NRC Concerns with Bin G in Rev. 4 of FAQ 06-0004]*
- 06-0011 Clarify III.G.3 Compliance Transition *[Tentatively Approved]*
- FAQ 07-0030 Risk of Recovery Actions *[Under Development*]

Key Points - Operator Manual Actions

- All credited operator manual actions to be transitioned to NFPA 805 recovery actions must be feasible.
- Reliability of actions credited in Fire PRA will be addressed in the PRA
- Only ‘unallowed’ operator manual actions will be part of the transition change evaluation.
- The risk of recovery actions relied upon post-transition will be evaluated.

Determining Scope of Change Evaluation

- Recent meetings / documents help to clarify ‘allowable’ actions (public meetings, RIS 2006-10)
- FAQ 06-0012 written to summarize and clarify scope of operator manual action / recovery action change evaluations (Duke presentation to provide examples – Brandi Weaver)

Risk of Recovery Actions

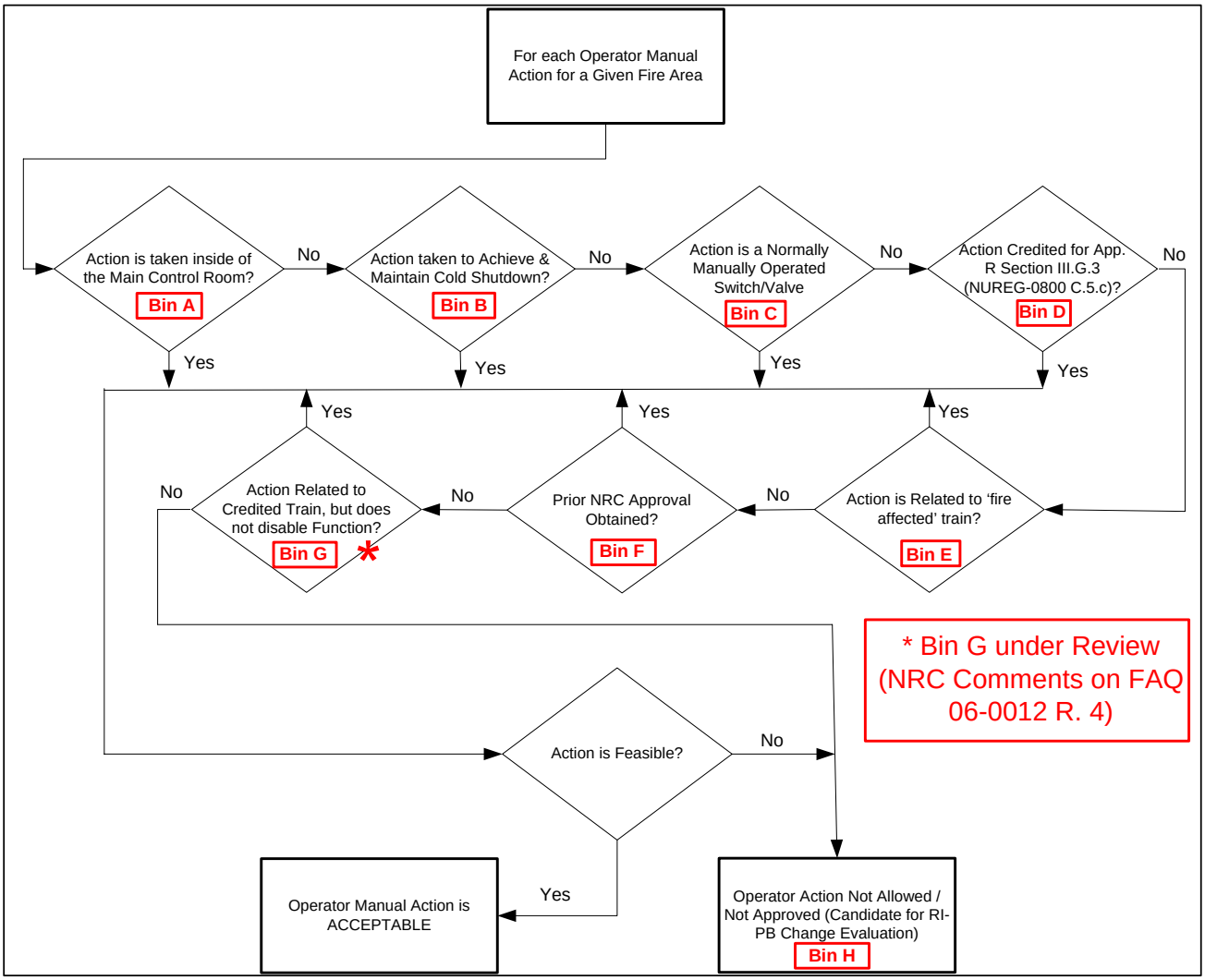
- NFPA 805, Section 4.2.4 Performance-Based Approach:
  - "……. When the use of recovery actions has resulted in the use of this approach, the additional risk presented by their use shall be evaluated...."
- The risk of recovery actions needs to be evaluated. However, this 'risk' may / may not be part of the transition change evaluation.

Risk of Recovery Actions (cont'd)

- 'Evaluation of risk' can be performed in a number of ways:
  - Qualitative or simplified assessment.
  - Bounding risk assessment based on 'role' of affected component in Fire PRA (e.g., cold shutdown action)
  - Detailed assessment using PRA methods
- Overall 'Evaluation of risk' will a combination of the above.

Risk of Recovery Actions (cont'd)

- 'Evaluation of risk':
  - Certain components with credited deterministic actions may not be important to fire risk.
  - Fire scenario development may show that no damage to circuits (that are the reason for the action) occurs.
  - The PRA may show that operator manual actions currently credited may have a higher risk based on more realistic treatment
  - Additional discussion of the PRA processes to be provided by Progress Energy (David Miskiewicz)


For each Operator Manual Action for a Given Fire Area
Action is taken inside of the Main Control Room?
Bin A
No
Action taken to Achieve & Maintain Cold Shutdown?
Bin B
No
Action is a Normally Manually Operated Switch/Valve
Bin C
No
Action Credited for App. R Section III.G.3 (NUREG-0800 C.5.c)?
Bin D
No
Yes
Yes
Yes
Yes
Action is Related to 'fire affected' train?
Bin E
No
Yes
Prior NRC Approval Obtained?
Bin F
No
Yes
Action Related to Credited Train, but does not disable Function?
Bin G
*
No
Yes
Action is Feasible?
No
Yes
Operator Manual Action is ACCEPTABLE
Operator Action Not Allowed / Not Approved (Candidate for RI-PB Change Evaluation)
Bin H
* Bin G under Review (NRC Comments on FAQ 06-0012 R. 4)

PRA Processing of Fire Scenario Operator Actions

David Miskiewicz

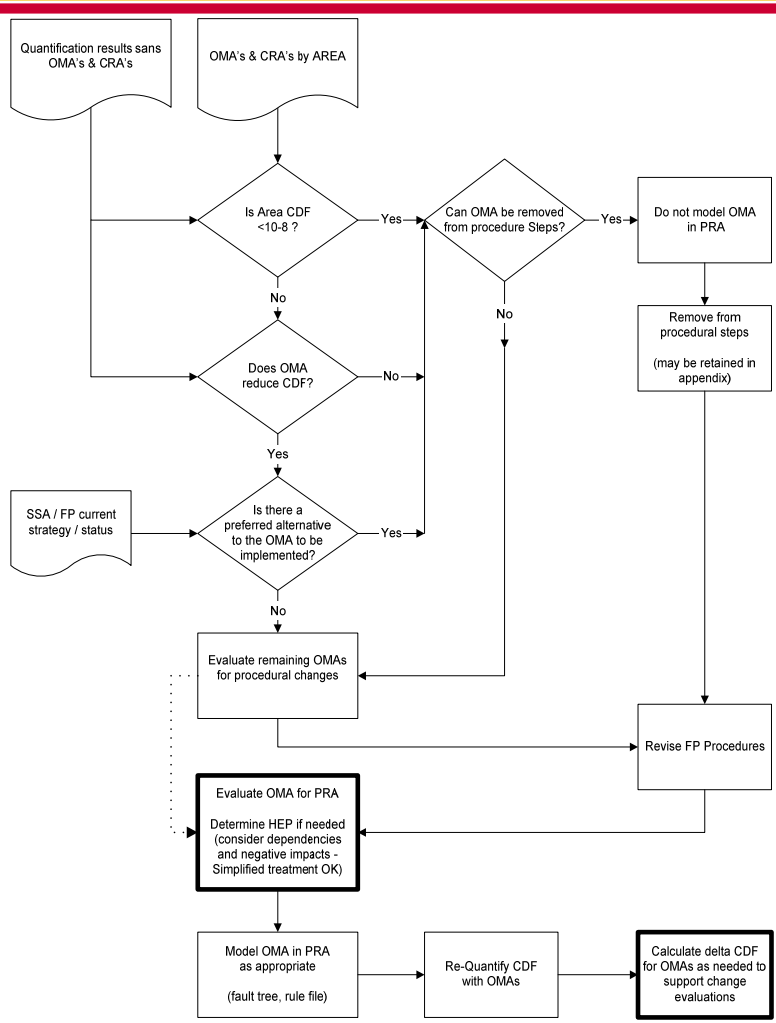
Operator Actions Types

- Operator Manual Actions (OMAs)
  - Typically involve local operation of components due to loss of power/air or, to prevent/correct fire induced spurious operations
- Control Room Actions (CRAs)
  - Generally redundant to existing alarm response or emergency/abnormal operating procedures
  - May include some actions to pre-emp spurious actuations
- PRA Internal Events Actions (IEAs)
  - Can be in MCR or local
  - HEPs do not addess fire scenario impacts

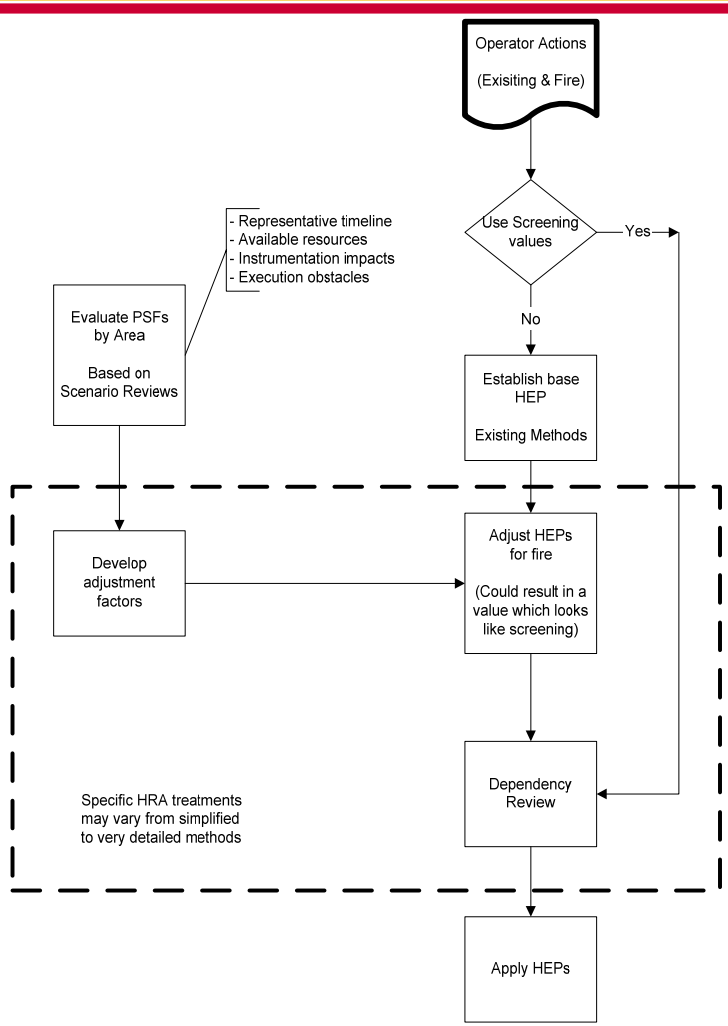
Operator Actions Review

- All operator actions will be reviewed for risk impact
  - Evaluate the action for removing from procedure steps, and adding to appendix
  - If retained evaluate adverse impacts such as disabling equipment or dependencies
- Procedures revisions likely
- The HEPs will be determined consistent with existing internal events actions

PRA Processing of Fire Program Identified Actions (OMAs, CRAs)



HRA Processing For Fire PRA



NUREG/CR-6850

- Provides a Screening HRA methodology
- Provides Performance Shaping Factors (PSF) to consider
- References existing HRA methods with adjustment for fire for more detailed analysis

Performance Shaping Factors

- Evaluate PSFs based on Fire locations
  - Timeline
    - greater than or less than 1hour
  - Resources
    - Staffing, Procedures, Training, Experience
  - Instrumentation Impacts
    - Missing or wrong cues
  - Execution Obstacles
    - Environment, Accessibility, Equipment

HEP Adjustment
MCR

- Given the cues are present
  - No adjustment applied if any of the following:
    - The action is before the fire distractions are manifested
    - The action is expected, simple, and without conflict
    - The action is after plant responses to the fire has stabilized (60 minutes)

HEP Adjustment
MCR

- MCR Adjustments
  - Reduced staffing
    - Stress, confusion
  - Environment
    - Smoke, temperature, lighting
  - Instrumentation
    - Failed cues, no redundancy
    - Failed cues, alternate cues available
    - Wrong cues

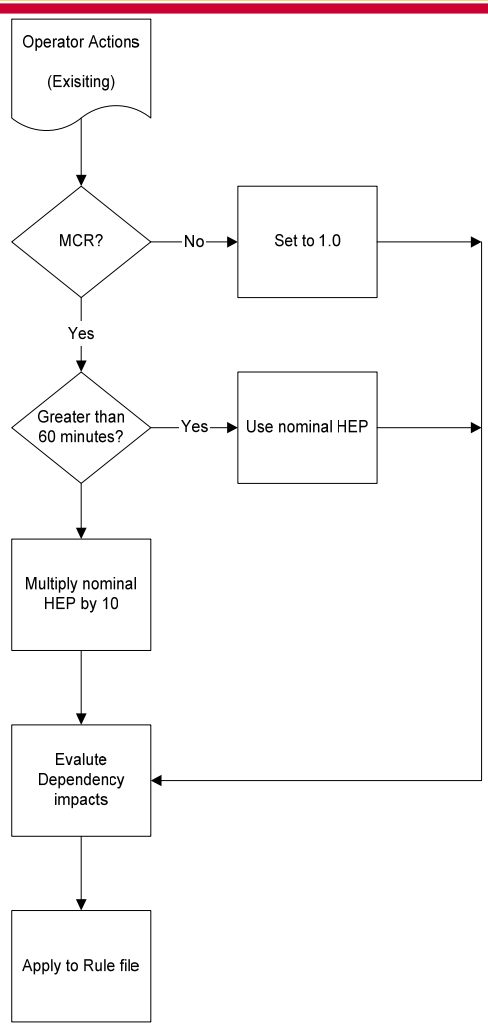
HEP Adjustment
Local (OMA or Internal Events)

- No adjustment necessary if PSFs are not impacted
  - The fire is suppressed locally by fire watch or does not propagate beyond the ignition source, and
  - The MCR is not impacted, and
  - Local environmental effects are minor

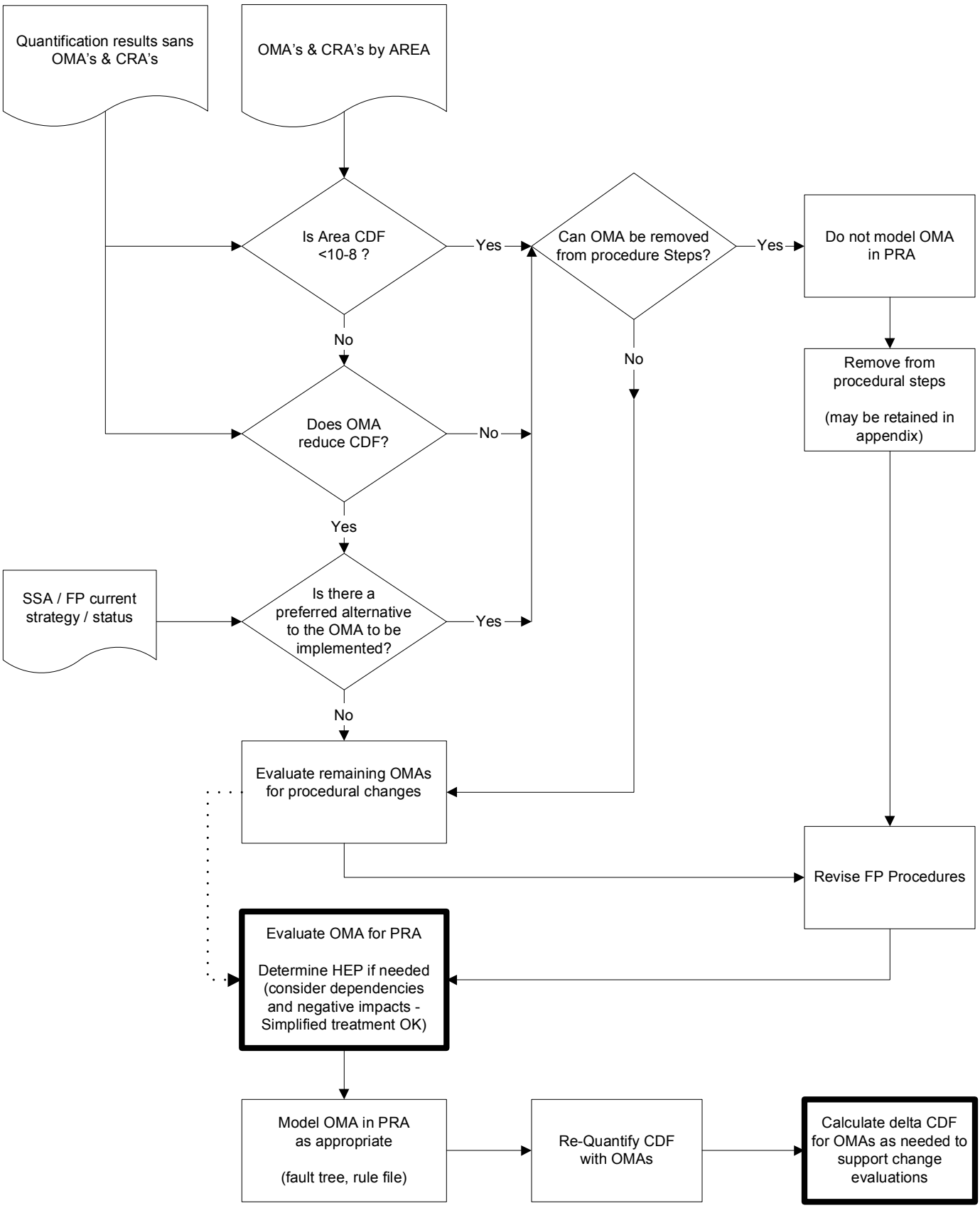
HEP Adjustment
Local Actions

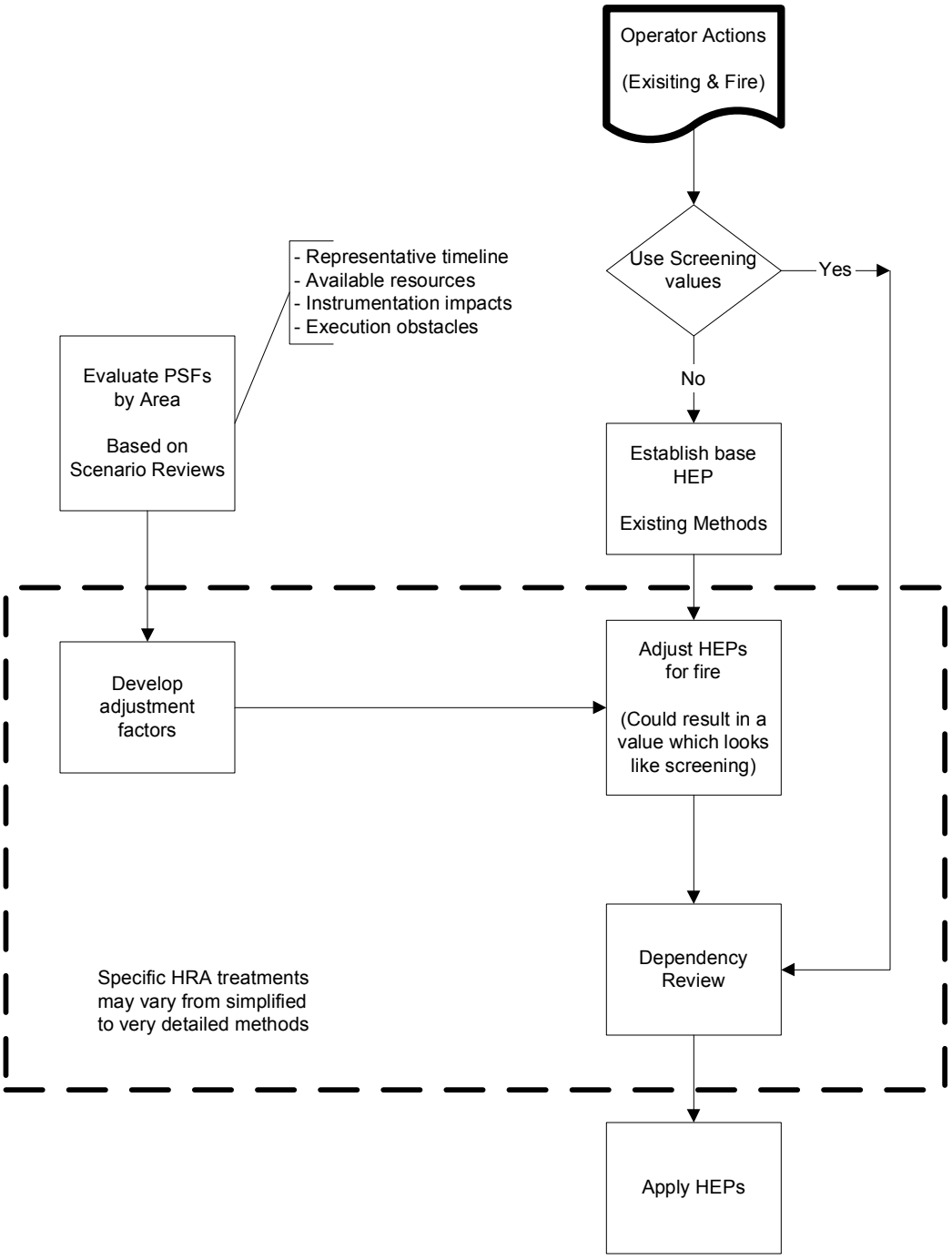
- Local Action Adjustments
  - Timing and number of actions
  - Resources and Training
  - Accessibility
    - Addresses ingress, egress, and within location
      - Environmental conditions
        - Smoke, temperature, lighting
      - Fire fighting activity
  - Equipment
    - Personal protective equipment
    - Tools needed to perform action

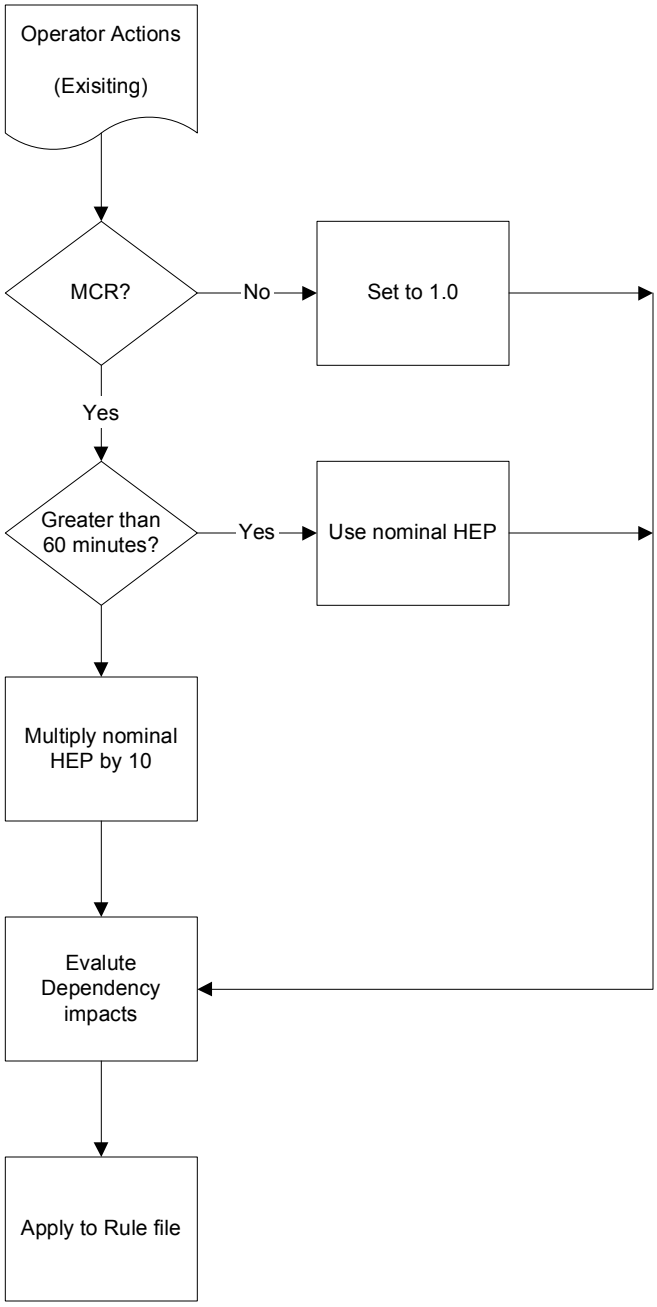
PE Simplified HRA Treatment



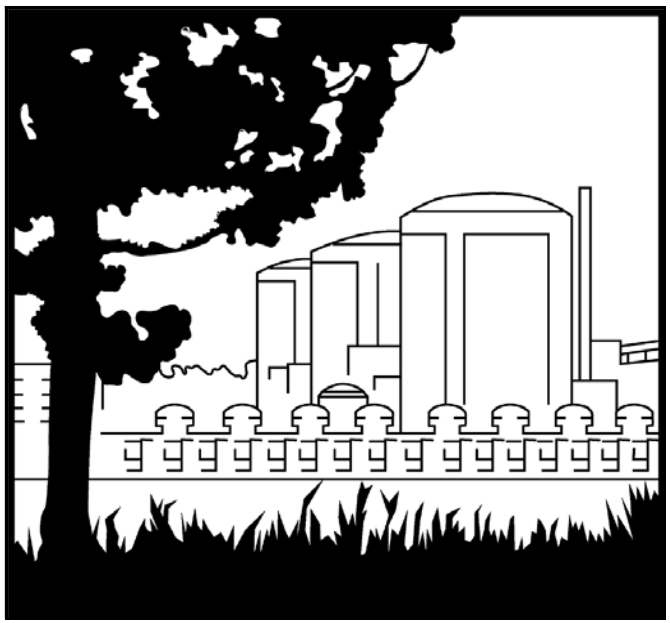
OMA/PSA Reconciliation




Operator Actions
(Exisiting & Fire)
Use Screening values
Yes
No
- Representative timeline
- Available resources
- Instrumentation impacts
- Execution obstacles
Evaluate PSFs by Area
Based on Scenario Reviews
Establish base HEP
Existing Methods
Develop adjustment factors
Adjust HEPs for fire
(Could result in a value which looks like screening)
Dependency Review
Specific HRA treatments may vary from simplified to very detailed methods
Apply HEPs


Operator Actions
(Exisiting)
MCR?
No
Set to 1.0
Yes
Greater than
60 minutes?
Yes
Use nominal HEP
Multiply nominal
HEP by 10
Evalute
Dependency
impacts
Apply to Rule file

Oconee Non-Power Operations



By:
David Goforth
NFPA-805 Technical Manager
November 6, 2007

Shutdown Risk Management

- The likelihood of an adverse event is best reduced by maintaining a balance between prevention and mitigation strategies. Shutdown Risk is minimized by implementing a program that contains the following elements outlined in NUMARC 91-06 and Generic Letter 88-17.
  1. Preserving Shutdown Key Safety functions through Defense in Depth
  2. Effective Risk Management
  3. Awareness and planning of High Risk Evolutions
  4. Appropriate involvement of organizations and disciplines in schedule development and review
  5. Effective communication of plant status
  6. Effective control of outage activities

FAQ 07-40

The strategy for additional controls/protection of equipment during non-power operations will be based on configurations or Plant Operating States (POS) during the outage where the risk is intrinsically high. The point of the strategy will be to evaluate and manage the risks of a fire, but not necessarily when the plant is more susceptible to an event causing the loss of a key safety function (KSF). Rather, the strategy should address configurations during which there is a high risk associated with the loss of a KSF. This takes into account the consequences of the loss of a KSF, not just the increased likelihood of the loss of a KSF. During periods of low risk normal risk management controls, processes and procedures will be utilized.

Significant POS

Many studies have been performed to characterize the risk associated with non-power states. Using Core Damage Frequency (CDF) as a risk metric, it is accepted that most outage configurations or POS are of relatively low risk and that only a few configurations or POS represent a risk near or greater than at-power operations.

PWR POS Disposition

POS / Configuration	Disposition	Discussion
POS 1 with SG Heat Removal Available	Screened	In this POS, if SGs are available in addition to RHR, significant redundancy and diversity exists for heat removal. Just having inventory in the SGs can provide substantial passive heat removal, providing additional time to recover other heat removal methods. Inventory control is not generally challenged during this POS.
POS 1 with SG Heat Removal Unavailable [Consider limiting to configurations where time to core damage is less than 2 hours and/or RCS level is being changed]	Perform actions per NEI 04-02, Section 4.3.3	Without SG Heat Removal capability, heat removal is limited to RHR and potentially bleed and feed. RCS pressurization on loss of heat removal could render RHR unavailable due to high pressure. Activities in this POS often involve changing RCS level. During RCS level changes, the likelihood of loss of inventory control is higher, challenging the inventory control safety function.

PWR POS Disposition

POS / Configuration	Disposition	Discussion
POS 2 *This POS represents the shutdown condition when (1) the vessel head is removed and reactor pressure vessel water level is less than the minimum level required for movement of irradiated fuel assemblies within the reactor pressure vessel as defined by Technical Specifications OR (2) a sufficient RCS vent path exists for decay heat removal.*	Perform actions per NEI 04-02, Section 4.3.3	This is the generally the highest risk configuration/POS for a PWR. Due to low inventory, times to core uncovery and damage are low, on the order 2 hours or less.

PWR POS Disposition

POS / Configuration	Disposition	Discussion
POS 3 *This POS represents the shutdown condition when the reactor pressure vessel water level is equal or greater than the minimum level required for movement of irradiated fuel assemblies within the reactor pressure vessel as define by Technical Specifications. This POS occurs during Mode 5.*	Evaluate potential RCS drain paths that could be affected by fire	During this POS, substantial inventory exists to cope with an extended loss of active heat removal. Times to core damage are often on the order of 16 or more hours. However, fire induced RCS draindown events can reduce margins substantially.

Methodology

- To transition to the NFPA 805 Licensing Basis, the licensee must demonstrate that the nuclear safety performance criteria are met for the required POSs. To accomplish this objective the following tasks should be performed.
  - Review existing plant outage processes (outage management and outage risk assessments) to determine equipment relied upon to provide Key Safety Functions (KSF) including support functions during the required POSs. Each outage evolution identifies the diverse methods of achieving the KSF.
  - Compare the equipment credited for achieving these KSFs against the equipment credited for nuclear safety. Note the position/function for the component.
  - For those components not already credited (or credited in a different way e.g., on versus off, open versus closed, etc.) analyze the circuits in accordance with the nuclear safety methodology.
  - Identify locations where 1) fires may cause damage to the equipment (and cabling) credited above, or 2) recovery actions credited for the KSF are performed (for those KSFs that are achieved solely by recovery action, i.e., alignment of gravity feed).

Methodology
(Continued)

- Identify fire areas where a single fire may damage all the credited paths for a KSF. This may include fire modeling to determine if a postulated fire (MEFS – LFS) would be expected to damage required equipment.
- For those areas consider combinations of the following options to reduce fire risk depending upon the significance of the potential damage:
  - Prohibition or limitation of hot work in fire areas during periods of increased vulnerability
  - Verification of operable detection and /or suppression in the vulnerable areas.
  - Prohibition or limitation of combustible materials in fire areas during periods of increased vulnerability
  - Provision of additional fire patrols at periodic intervals or other appropriate compensatory measures (such as surveillance cameras) during increased vulnerability
  - Use of recovery actions to mitigate potential losses of key safety functions.
  - Identification and monitoring insitu ignition sources for “fire precursors” (e.g., equipment temperatures).

Methodology
(Continued)

- NUMARC 91-06 discusses the development of outage plans and schedules. A key element of that process is to ensure the KSFs perform as needed during the various outage evolutions. The results of the fire area analysis of those components relied upon to maintain defense in depth should be factored into the plant's existing outage planning process.

ONS POS's

RCS Status	DHR Trains	LPSW Pumps	SFC Trains	Emerg Sump Recirc	HPI Trains	BWST Gravity Flowpath	BWST Level and Concentation	RB Cooling	Offsite power Sources	Emergency Power Sources	MFBs
Loops Filled	2 OP	TS 3.7.7	N/A	TS 3.5.3	1 AV	N/A	TS 3.5.4	TS 3.6.5	TS 3.8	TS 3.8	TS 3.8
Loops Filled w/ 30# Bubble in PZR	2 OP	U-1&2: 3 OP U-3: 2 OP	1 AV	N/A	1 AV	N/A	> 42' > 2222 PPM	1 AV	1 OP	1 OP	2 ENERGIZED
Loops Dropped, FTC NOT Flooded	2 OP	U-1&2: 3 OP U-3: 2 OP	1 AV	N/A	1 AV	2 AV	> 42' > 2222 PPM	1 AV	1 OP	1 OP	2 ENERGIZED
Reduced Inventory	2 OP	U-1&2: 3 OP U-3: 2 OP	1 AV	N/A	1 AV	2 AV	> 43' > 2250 PPM	1 AV	1 OP	2 OP	2 ENERGIZED
FTC Flooded	2 OP	U-1&2: 3 OP U-3: 1 OP	1 AV	N/A	N/A	N/A	N/A	N/A	1 OP	1 OP	2 ENERGIZED
Defueled	N/A	U-1&2: 2 OP U-3: N/A	2 AV	N/A	N/A	N/A	N/A	N/A	1 OP	1 OP	2 ENERGIZED

Loops Filled

(Draft Example)

- S/G's available
- 2 trains of DHR available
- 1 train of HPI required
- Diverse, redundant power supplies available
- Conclusion:
  - Low risk
  - Large thermal margin
  - KSF's protected by adequate Defense in Depth
  - No further analysis for pinch points required

Loops Filled with 30# Bubble in PZR

(Draft Example)

- S/G's available
- 2 trains of DHR available
- 1 train of HPI required
- Diverse, redundant power supplies available
- Conclusion:
  - Low risk
  - Large thermal margin
  - KSF's protected by adequate Defense in Depth
  - No further analysis for pinch points required

Loops Dropped, FTC NOT Flooded

(Sample Example)

- S/G's NOT available
- 2 trains of DHR available
- 1 train of HPI required
- No large vent path established, gravity flow NOT available
- Diverse, redundant power supplies available
- Conclusion:
  - High risk
  - Low thermal margin
  - Protection of DHR required
  - Implement methodology for non-power ops analysis to ensure credited Defense in Depth is not challenged by a fire

Reduced Inventory

(Sample Example)

- S/G's NOT available
- 2 trains of DHR available
- 1 train of HPI required
- No large vent path established until Rx Head lifted or S/G manway removed, gravity flow NOT available
- Diverse, redundant power supplies available
- Conclusion:
  - High risk
  - Low thermal margin
  - Protection of DHR required
  - Implement methodology for non-power ops analysis to ensure credited Defense in Depth is not challenged by a fire

Conclusion

Questions?

Non-Power Operations Update

Harris - Oconee Pilot Observation Meeting
November 5 - 8, 2007
Atlanta, GA

NGG Nuclear Generation Group

Progress Energy

Bob Rhodes

November 6, 2007

Non-Power Operational Mode Review Previous Pilot Meeting Discussions

- Described Project Procedure FPIP-0126.
- Defined High Risk Evolution and Plant Operational States (POS) to be considered.
- Identified Key Safety Functions of interest.
- Status of equipment selection and additional circuit analyses.
- Results of a trial run for Fire Area with known “pinch points”.

Non-Power Operational Mode Review Current Status

- SSA Database (FSSPMD) modified and updated to be used in performing NPO reviews.
- An initial review of all Fire Areas completed.
- Draft of NPO Analysis (calculation) prepared.
- Second round of reviews to be performed.

Non-Power Operational Mode Review FSSPMD

- NPO component information added to database.
  - Additional components not required for SSA.
  - Components with different functional state than for a post fire safe shutdown.
  - Components can negatively impact more than one KSF path (for example)
    - 1CS-165 and 1CS-166 (VCT outlets): CSIP_A, CSIP_B, and CSIP_C.
    - NSW Pumps A and B: ESW_A and ESW_B.
- NPO Separation Report made available.
  - Report similar to SSA Compliance Report.
  - Report by Fire Area.
  - Separated by Key Safety Function.

Non-Power Operational Mode Review FSSPMD (cont.)

- NPO Separation Report format (see example)
  - Breaks by KSF Path.
  - Provide required condition/position information for each component.
  - Lists required and associated circuit cables that are routed through the Fire Area.
  - Identifies if a fire induced fault of that cable can result in spurious operation.
  - Field (to be added in next revision) to document any NPO compliance strategy for that component if necessary.

Non-Power Operational Mode Review Fire Areas Reviewed

- Fire Area reviews were performed utilizing:
  - Guidance provided in project procedure FPIP-0126, “NPO Modes Transition Review”
  - Draft version of FAQ #07-0040, “Non-Power Operations Clarifications”
- NPO Separation Report prepared and reviewed to identify KSFs and KSF paths that may be impacted in each Fire Area.

Non-Power Operational Mode Review Fire Area Reviews (cont.)

- Reports reviewed along with SSA to identify systems, components, and compliance strategies credited for that Fire Area.
- Analyzed components affected for each KSF to determine if it would be available to support the KSF.
- Identified KSF paths with “pinch points”.
- Matrix of KSF paths affected by Fire Area prepared (see example).
- KSF Summary Report (see example)

Non-Power Operational Mode Review Draft Analysis

- Results of preliminary review documented in a NPO Modes Review calculation.
  - Methodology used and procedures reviewed described.
  - Plant Operational States considered are identified.
  - Findings and possible “pinch points” identified.
  - Recommendations for resolving findings and “pinch points” provided.

Non-Power Operational Mode Review Second Round

- Additional NPO components identified during review, and some that can be deleted.
- KSF associations to be re-aligned.
- Update NPO calculation.

Non-Power Operational Mode Review Finding and Resolution - Example #1

Finding: The RHR suction valves from the RCS have been identified in a number of Fire Areas as subject to spurious closure in the event of a fire. Should this occur during Shutdown Cooling on the operating train, pump damage and loss of that train could occur.

Recommendation: Discuss with Operations and PSA, and propose that power to these valves be removed after that they are placed in the desired position for Shutdown Cooling.

Non-Power Operational Mode Review Finding and Resolution - Example #2

Finding: NSW pumps are included in the NPO model in support of decay heat removal KSF paths ESW A and B. However, the need to credit the NSW pumps as being available is not addressed in the current outage risk management procedure (OMP-003) when checking the availability of KSFs. In one Fire Area, it is possible that the supplies to both ESW pumps may be lost, and if the NSW pumps were not available, ESW DHR may not be available.

Recommendation: Update the OMP to require the suction paths to the ESW pumps be shifted from the Auxiliary to the Main reservoir if the NSW pumps will be out of service.

Non-Power Operational Mode Review Finding and Resolution - Example #3

Finding: The RWST and the Containment Sumps are suction sources for the Containment Spray Pumps. The Containment sump isolation valves, which are normally closed, and the RWST are aligned to the pumps suction header. Spurious opening of the sump isolation valves could result in the contents of the RWST draining to the Containment sump.

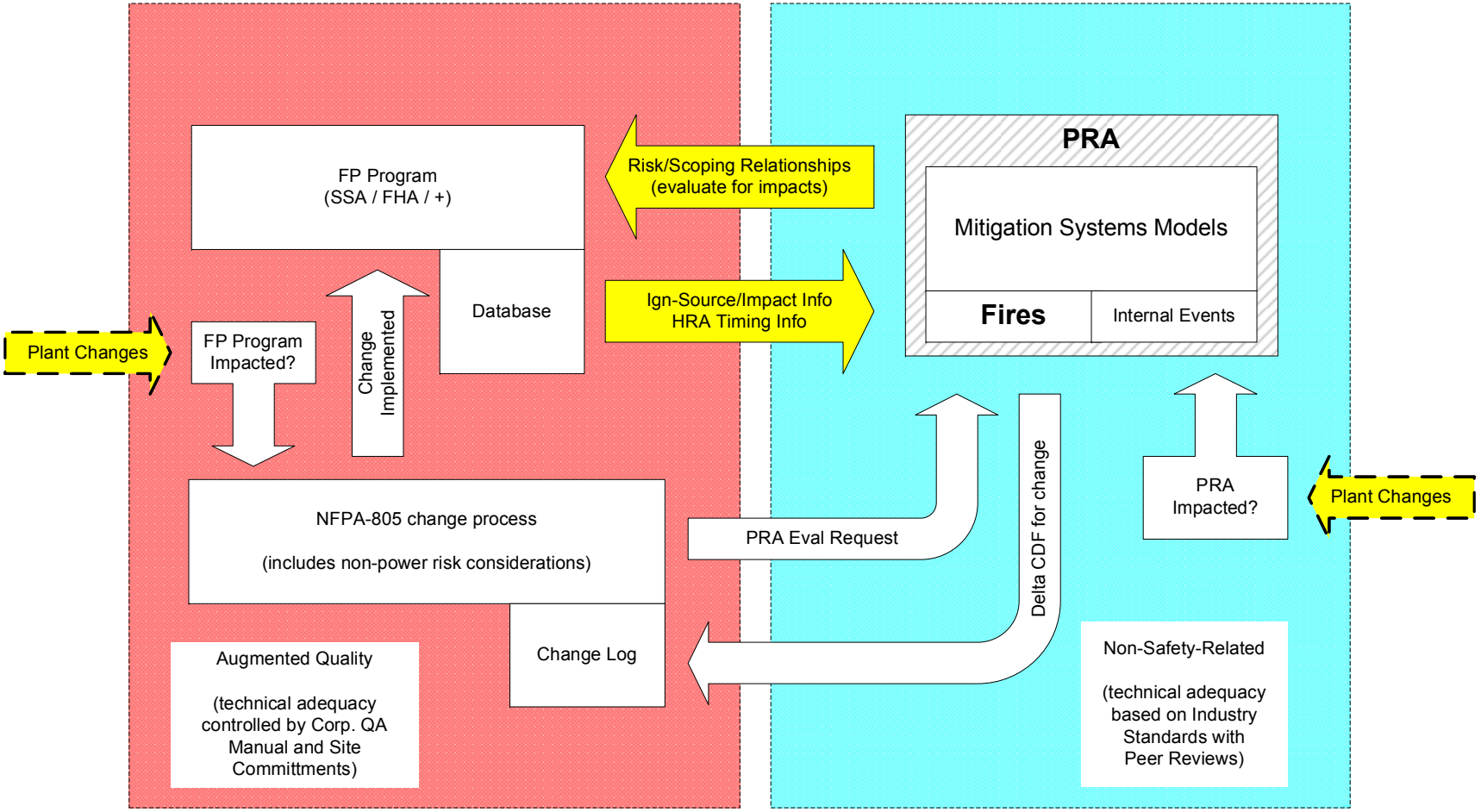
Recommendation: Add a step to the shutdown and cooldown procedure (GP-7) to remove power from these valves at the same time power is removed from the RHR Containment sump suction valves.

Non-Power Operational Mode Review Defining Compliance to NFPA 805

Identify Pinch points

Provide Defense in Points

Maintain analysis



Fire PRA / Fire Protection
Program Interface

LAR – Transition Report Content

Topic	Requirement / Guidance	LAR Reference	Trans. Rpt. Ref.
Revised and Revoked License Condition change	10 CFR 50.48(c)(3)(i), 10 CFR 50.90, RG 1.205 (C.3.1), NEI 04-02 (4.6.1)	LAR text, Attachment A	5.1
Revoked and Revised License Conditions	10 CFR 50.90, 10 CFR 50.48(c)(3)(i), RG 1.205 (C.3.1), NEI 04-02 (4.6.1)	LAR text, Attachment B	5.1
Revoked and Revised Tech Specs and Bases	10 CFR 50.90, 10 CFR 50.48(c)(3)(i), NEI 04-02 (4.6.1)	LAR text, Attachment C	5.1
Revoked and Revised Orders and Exemptions	10 CFR 50.90, 10 CFR 50.48(c)(3)(i), NEI 04-02 (4.6.1)	LAR text , Attachment D	5.1
RI-PB (NFPA 805 Ch. 3)	10 CFR 50.48(c)(2), RG 1.205 (C.2.2, C.3.2.3), NEI 04-02 (2.3, 2.4)	LAR text, Attachment E	5.1, 4.1.2
Use of RI-PB Alternative Methods for NFPA 805	10 CFR 50.48(c)(4), RG 1.205 (C.2.2, C.3.2.3), NEI 04-02 (2.4, 4.6.1)	LAR text, Attachment F	5.1
FP Program Changes	RG 1.205 (C.2.2, C.3.2), NEI 04-02 (4.4)	LAR text, Attachment G	4.5
Changes to the UFSAR	10 CFR 50.71(e), NEI 04-02 (4.6.1)	LAR text, Attachment H	5.2
Modifications	NEI 04-02 (4.6.1)	LAR text, Attachment I	4.5.3
Clarification of prior NRC Approvals	NEI 04-02 (2.3, B.2), RG 1.205 (C.2.2),	LAR text, Attachment J	5.1
Existing Engineering Equivalency Evaluations	RG 1.205 (C.2.3)	LAR text, Attachment K	4.1.2
Multiple Spurious Operations Methodology	RG 1.205 (C.3.3), NEI 04-02 (B.2)	LAR text Attachment L	4.2, Appendix G
Operator Manual Action Transition to Recovery Actions	RG 1.205 (C.2.2), NEI 04-02 (B.2)	LAR text, Attachment M	4.2, Appendix H
No Significant Hazards Consideration Finding	10 CFR 50.91, NEI 04-02 (4.6.1)	LAR text, Attachment N	5.1
Categorical Exclusion Finding	10 CFR 51.22(b)	LAR text, Attachment O	5.1
Frequently Asked Questions	RIS 2007-19	LAR text, Attachment P	3.4, Appendix I
Fire PRA Peer Review High Level Findings	RG 1.205 (C.4.3)	LAR text, Attachment Q	4.5.1
Transition Schedule	NEI 04-02 (4.6.1)	LAR text, Attachment R	5
Fundamental FP Program Elements and Minimum Design Requirements Transition	RG 1.205 (C.3.2.3), NEI 04-02 (4.3.1, B.1)		4.1, Appendix A
Nuclear Safety Performance Criteria Transition	NEI 04-02 (4.3.2, B.2)		4.2, Appendices B and C
Non-Power Operational Modes Transition	NEI 04-02 (4.3.3, F)		4.3, Appendix D
Radioactive Release Transition	NEI 04-02 (4.3.4, G)		4.4, Appendix E
Power Block Definition	NFPA 805, FAQ 06-0019		

NFPA 805 NRC Pilot Observation Meeting Final Safety Analysis Report (FSAR) Content

Mike Fletcher, Progress Energy, HNP
David Goforth, Duke Power
November 7, 2007
Atlanta, Georgia

Overview (Purpose & Content)

- Purpose
  - Discuss conceptual application of NFPA 805 and future FSAR
- Current Guidance
- NFPA 805
- Objectives
- 805 Relationships
- Level of Detail

Current Guidance

- Current FSAR Contents
  - Reg. Guide 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*
    - 9.5.1 Fire Protection
      - 9.5.1.1 Design Bases
      - 9.5.1.2 Systems Description
      - 9.5.1.3 Safety Evaluation (Fire Hazards Analysis)
      - 9.5.1.4 Inspection and Testing Requirements
      - 9.5.1.5 Personnel Qualifications and Training

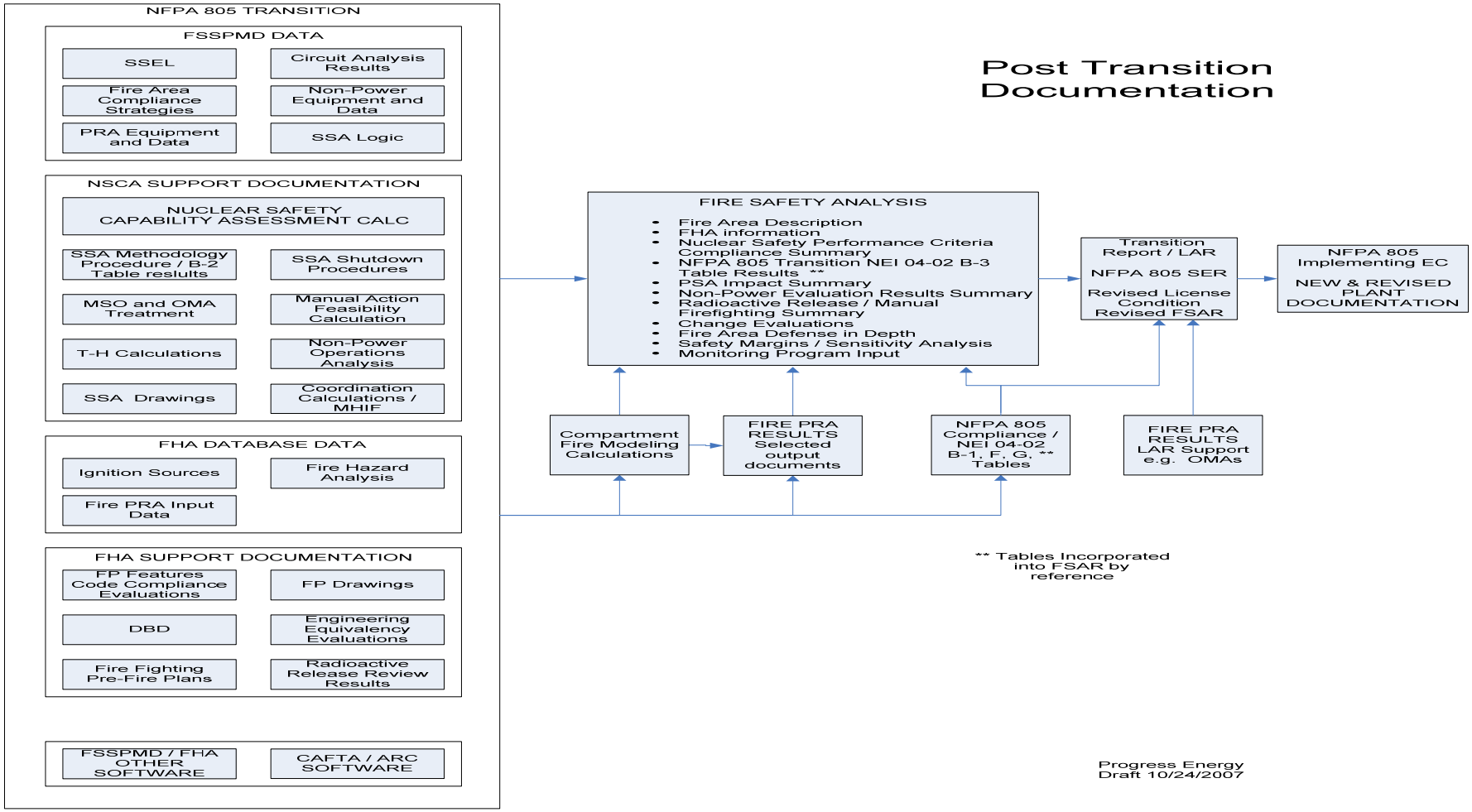
NFPA 805

- The LAR /Transition Report would contain:
  - A discussion of the changes to Updated Final Safety Analysis Report (UFSAR) necessitated by the license amendment, and
  - A statement that the changes will be made in accordance with 10 CFR 50.71(e).

Objectives

- Establishes a clear new licensing basis going forward
- Supersedes CLB and previous exemptions and SERs.
- Anticipation of an explicit and concise treatment of Fire Protection
- Incorporation by reference of appropriate 805 transition Tables and Calculations in required sections
- Summary information provided in the LAR

805 Relationships



Level of Detail

- 9.5.1 Fire Protection
  9.5.1.1- 9.5.1.5 as outlined in Reg. Guide 1.70

Level of Detail

- 9.5.1.1 Design Bases Summary
  - NFPA 805
  - Fire Safety Analysis (FSA)
  - Upper Tier Design Documents (DBD, etc.)
  - Define Codes of Record utilized

Level of Detail

- 9.5.1.2 System Descriptions
  - NEI 04-02 B-1 Tables, by Reference
  - NFPA 805 required detection and suppression systems
  - Identification of NFPA 805 required passive separation
  - Identification of “Power Block” structures

Level of Detail

- 9.5.1.3 Safety Evaluation (Fire Hazards Analysis)
  - High level description of approach and point to Fire Safety Analysis (FSA) sections as needed

Level of Detail

- 9.5.1.4 Inspections & Testing Requirements
  - NEI 04-02 B-1 Tables, Incorporated by Reference
  - Incorporate by reference surveillance guidance documents
  - Monitoring

Level of Detail

- 9.5.1.5 Personnel Qualifications & Training
  - NEI 04-02 B-1 & G-1 Tables, Incorporated by Reference
  - Upper Tier Documents noted in B-1 Tables
    - Program Management documentation
    - Fire Brigade Program

FSAR Content

Questions ?

Harris Nuclear Plant (HNP)
NFPA 805 Transition

NFPA 805 Monitoring Program

Keith Began, CES/FP

November 5 - 8, 2007

Atlanta, GA

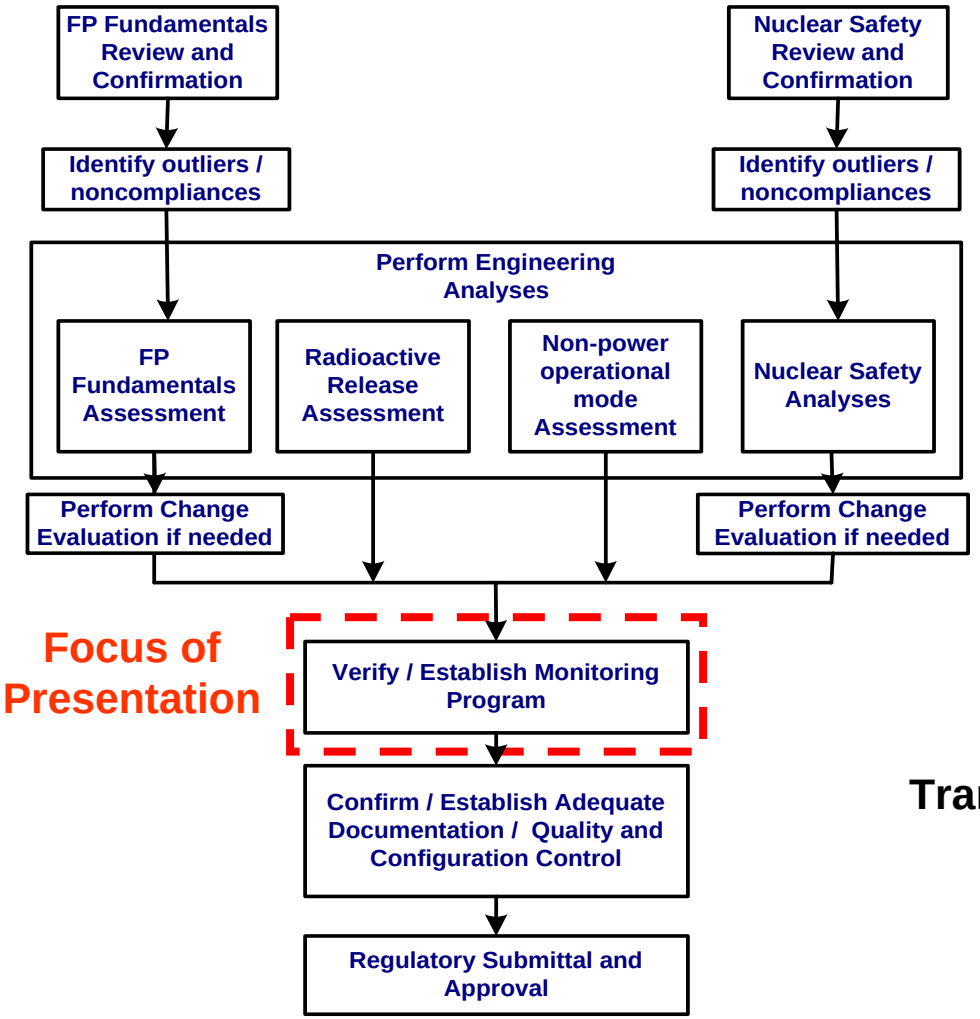
NGG Nuclear Generation Group

Progress Energy

NFPA 805 Monitoring Program Overview

- Purpose
  - Initiate discussion on NFPA 805 Monitoring Program Requirements
- Discussion Topics:
  - Requirements
  - Attributes
  - Considerations
  - Examples
  - Existing Processes
  - Implementation Activities
  - Summary

NFPA 805 Monitoring Program Overview



NEI 04-02 – Figure 4-1
Transition Process (simplified)

NFPA 805 Monitoring Program Requirements

- NFPA 805, Section 2.2.10 states:

  "A monitoring program shall be established to assess the performance of the fire protection program in meeting the performance criteria established in this standard."

- NFPA 805, Section 2.6 states:

  "A monitoring program shall be established to ensure that the availability and reliability of the fire protection systems and features are maintained and to assess the performance of the fire protection program in meeting the performance criteria. Monitoring shall ensure that the assumptions in the engineering analysis remain valid."

NFPA 805 Monitoring Program Attributes

- Availability (NUMARC 93-01)
  - The time that a SSC is capable of performing its intended function as a fraction of the total time that the intended function may be demanded. The numerical complement of unavailability.
- Reliability (NUMARC 93-01)
  - A measure of the expectation (assuming that the SSC is available) that the SSC will perform its function upon demand at any future instant in time.
- Performance
  - Operating parameters / assumptions of an SSC described and quantified in engineering terms
- 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

NFPA 805 Monitoring Program 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 Examples

- Programs (Effectiveness & Performance)
  - Transient Combustible Control
    - Transient Free Zones
  - Hot Work Control
    - Admin. Controls
  - Fire Watch
    - Program compliance and effectiveness
  - Fire Brigade
    - Qualifications, Drills, Training
    - Response Times

NFPA 805 Monitoring Program Examples

- Design and Analyses (Assumptions, Effectiveness & Performance)
  - Configuration Management
    - EGR-NGGC-0003, Design Review Requirements
    - EGR-NGGC-0005, Engineering Change
    - EGR-NGGC-0007, Maintenance of Design Documents
    - EGR-NGGC-0012, Equipment Data Base
    - EGR-NGGC-0017, Preparation and Control of Design Analyses and Calculations
  - Health Reports (backlogs, etc.)
    - Program
    - System

NFPA 805 Monitoring Program Examples

- Systems and Features (Availability & Reliability)
  - Suppression Systems
  - Detection Systems
  - Fire Pump, Fire Main and Water Supplies
  - Passive Barrier Systems

NFPA 805 Monitoring Program
Existing Processes

- Maintenance Rule 10CFR50.65 (ADM-NGGC-0101)
  - Example of an existing availability and reliability program
- Periodic Self-Assessments (EGR-NGGC-0008, CAP-NGGC-0201)
  - Example of method to monitor overall effectiveness/performance
- Corrective Action (CAP-NGGC-0200)
  - Actions necessary to limit or mitigate degradation, or return the system / feature to established levels
  - Ongoing evaluation to determine if enhanced program monitoring is necessary
- New, or variations of existing, processes may be identified

NFPA 805 Monitoring Program Implementation Activities

- Implementation Activities
  - Review Current Performance Data
  - Define final assumptions and monitoring needs, 2nd quarter 2008
  - Develop monitoring program details
    - Implementation is a “Work in Progress”
  - Final implementation following SER

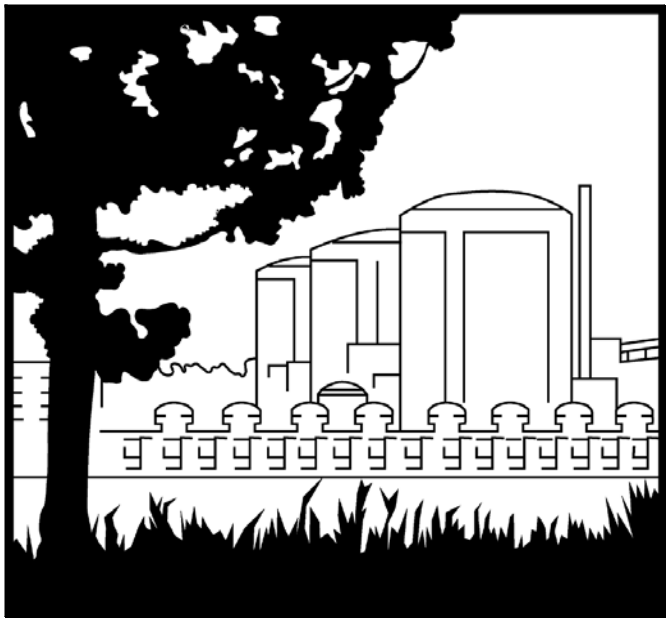
NFPA 805 Monitoring Program Summary

- Align with existing programs and processes
  - Eliminate/minimize need for new, separate processes
- Consider the **Human Performance** aspects of our people in the field
- One method may not fit all attributes
- Use Leading Indicators (if determined)

NFPA 805 Monitoring Program

Open Discussion

Configuration Control



November 7, 2007

Atlanta, GA

Duke Presenter

Ron Oates (ARS)

Duke Energy

NFPA-805 Transition Team

Outline

- Purpose - Begin Early Dialog on Post-NFPA 805 Transition Configuration Control
- NFPA 805 Requirements & Guidance
- What is New?
- What is Important?
- Monitoring
- New Challenges
- Change Process is More Complex
- Configuration Control during Transition

NFPA-805 Requirements & Guidance

- NFPA-805 - Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition
- NEI 04-02 - Guidance For Implementing A Risk Informed, Performance Based Fire Protection Program Under 10 CFR 50.48(c)
- NUREG-6850 – Fire PRA Methodology for Nuclear Power Facilities
- Reg Guide 1.205 - Risk-Informed Performance-Based Fire Protection For Existing Light Water Nuclear Power Plants
- Reg Guide 1.174 - An Approach For Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant Specific Changes To The Licensing Basis
- Regulatory Guide 1.189 - Fire Protection For Nuclear Power Plants

What is New?

- MSOs
- OMAs
- PRA
- Fire Modeling
- Transitioned EEEEs
- Non-Power Operations
- Other

What is Important?

- Examples:
  - MSOs (reference Progress Flow Chart)
    Bases for MSOs screened out – Risk Acceptable (below thresholds, per RG 1.205)
    If Bases change, MSO could screen back in and would need to be included in the SSA.
  - OMAs
    Feasibility Remains Valid
  - PRA
    Periodic Changes that May Affect Inputs to the “Red Box”

- Fire Modeling (reference Duke presentation)
  Zone of Influence (ZOI) Calculations
  Changes in bounding conditions of simplified FM Treatments
  Ambient Conditions of Rooms

- EEEEs
  Monitoring plant configurations that may be relied upon in evaluation (i.e., no intervening combustibles, combustible loading in area, etc. is maintained).
  Heat release rate may be important new parameter

- Non-Power Operations
  Control of “Pinch Points” for Defense in Depth

Monitoring

- Previous presentation by Progress Energy
- A monitoring program shall be established to ensure that the availability and reliability of the fire protection systems and features are maintained and to assess the performance of the fire protection program in meeting the performance criteria. Monitoring shall ensure that the assumptions in the engineering analysis remain valid.

New Challenges

- Balance between Analysis Approaches and Long-Term Configuration Control
  Screening techniques in fire modeling for PRA
  Many versus few Unique Fire Models
- Temporary Plant Conditions
  (accounting for anticipated conditions)
- Configuration Control during Non-Power Operations
- Configuration Control During Transition Period

Change Process is More Complex

- Plant Change Process
  - Simplified “check list” may not be enough
  - Detailed “check list” may be too much
- New “tools” (databases, etc.) can help
- Integrate Various “Elements” of Fire Protection Program
- Enhanced Training will be Required

Questions

- Questions?

AGENDA

NFPA 805 Pilot Observation Visit
Public Meeting

November 8, 2007

US NRC Region II
Sam Nunn Atlanta Federal Center
Room 24T20
61 Forsyth Street, SW
Atlanta, GA 30303-3415

0830 Welcome from Region II Management

0835 Status of NFPA 805 Transition Pilot Program

0840 Multiple Spurious Operation Risk-Informed Methodology

0900 HRAs & Manual Operator Action Reconciliation Process

0920 Fire Scenario Development - Zone of Influence/Fire Origin Placement

0940 Break

0950 Treatment of Non-Power Operations

1000 License Amendment Request Template & FSAR Content Outline

1015 Existing Engineering Equivalency Evaluations

1035 Monitoring/Configuration Management

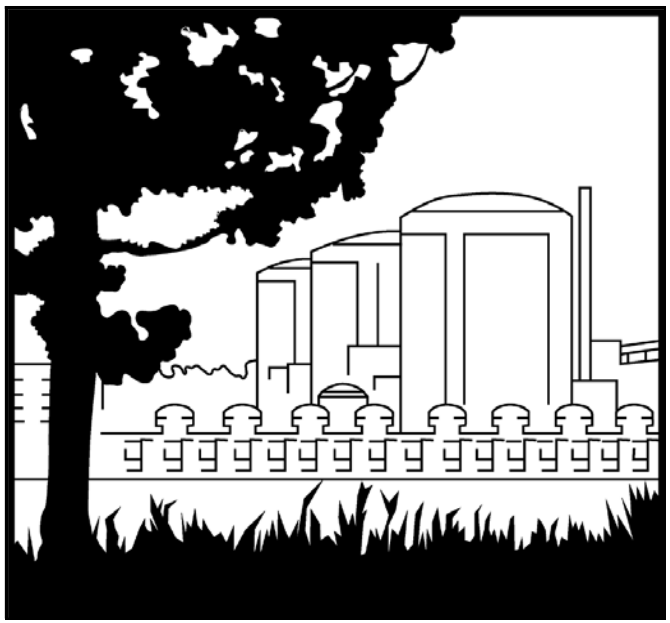
1055 Review of Outstanding and New Parking Lot Issues

1115 Questions

1130 Adjourn

ENCLOSURE

Oconee NFPA-805 Technical Update



By:
David Goforth
NFPA-805 Technical Manager
November 5, 2007

Overall

- Oconee Unit 3 identified as the pilot unit. ONS 1 & 2 to be submitted as part of the LAR with ONS-3
- Reconstitution
- B-1 Table
- B-2 Table
- B-3 Table
- Radioactive Release
- Non-power Ops
- PRA
- Configuration Control and Documentation
- LAR and UFSAR

NFPA 805 Implementation
August Pilot Observation Meeting
Harris Transition Status

Jeff Ertman, Transition Project Manager

Public Meeting

November 8, 2007, Atlanta, GA

Note: No commitments are made by Progress Energy presentations.

NGG Nuclear Generation Group

Progress Energy

NFPA 805
Harris Status - Current Focus

- Fire PRA completion
- Transition Change Evaluations
- Resolution of Multiple Spurious Operations (MSOs) and Operator Manual Actions (OMAs)
- Fire Safety Analysis (FSA) Completion
- Non-Power Operations Analysis
- Prepare draft LAR, FSAR
- Developing Monitoring Process Detials

NFPA 805
Harris Status - Key Milestones

- Complete ‘Rough in’ FSA – November 2007
  - Initial PRA Quantification complete
  - Draft Transition Program Changes
  - Initial mod scope identified
- Internal Event PRA Limited Peer Review – December 2007
- Fire PRA NRC Staff Review – February 2008
- LAR enter internal review – April 2008
- LAR submittal to NRC – May 31, 2008
- Fire PRA Update – 2nd QTR 2009
- NFPA 805 Program Implementation – 3rd or 4th QTR 2009
- NFPA 805 Modifications complete – December 31, 2010

NFPA 805
PE Summary

- Harris Transition is in the final data development and analysis phase
  - Fire PRA
  - FSA
- Need to lock down the post transition licensing basis during the next 5 months
- This meeting key NRC feedback opportunity

Questions

Multiple Spurious Operations Methodology / Frequently Asked Question (FAQ) 07-0038

Keith Began, CES/FP
November 8, 2007
Atlanta, GA

NGG Nuclear Generation Group

Progress Energy

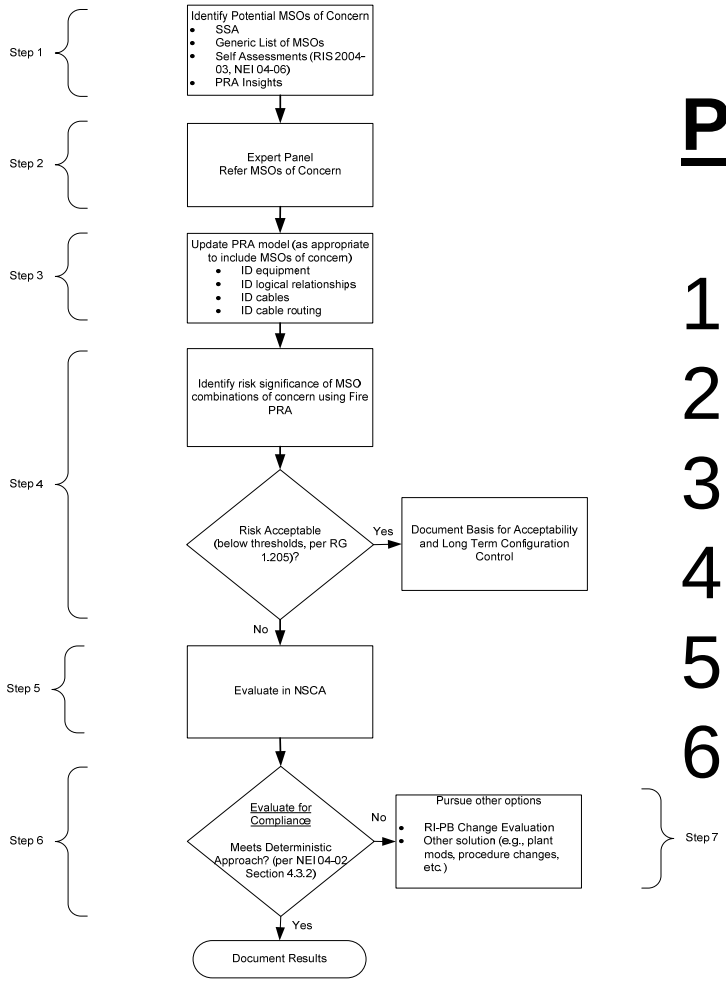
FAQ 07-0038 Lessons Learned on Multiple Spurious Operations (MSOs)

- Presentation Outline
  - Purpose of FAQ 07-0038
  - Discussion of proposed process
  - NRC Comments on FAQ 07-0038, Rev. 0

Purpose of FAQ 07-0038

- Provide updates to NEI 04-02 for lessons learned on scoping MSOs from pilot plant activities, NFPA 805 TF, NRC reviews, & PRA development
- Provide a structured process to allow application of endorsed criteria
- FAQ 07-0038, Rev. 0 submitted to NRC 9/20/07 (ML072740262)
- NRC comments provided on 10/18/07

FAQ 07-0038 Proposed Process



Process – 7 Steps

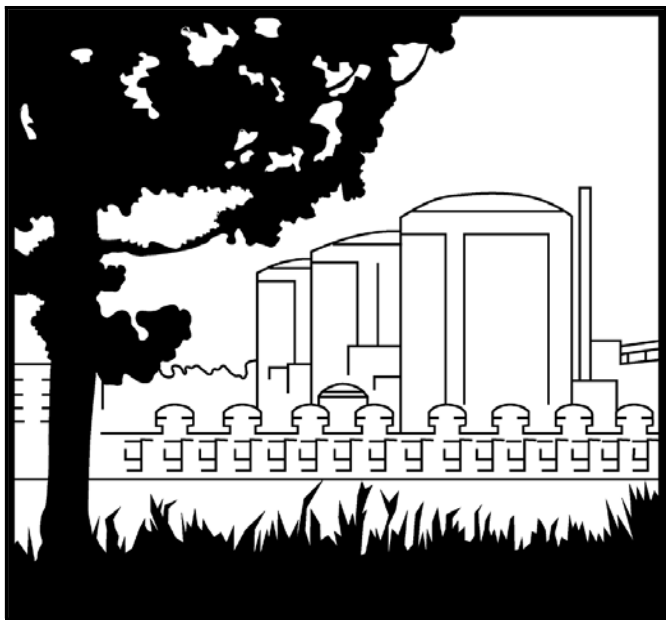
1 - Identify Potential MSOs
2 - Expert Panel
3 - Update FPRA model
4 - ID Risk Significant MSOs
5 - Evaluate in NSCA
6 - Evaluate for Compliance

NRC Comments on FAQ 07-0038, Rev. 0

- Editorial and Clarification Items
- Risk threshold clarification
- DID and Safety Margin Scope
- Documentation and Configuration Control
- Integration of MSOs and Operator Manual Actions

Questions

Overview of MSO Risk Significance Determination Process



Atlanta NFPA 805 Pilot Meeting
Nov. 5 – 8, 2007

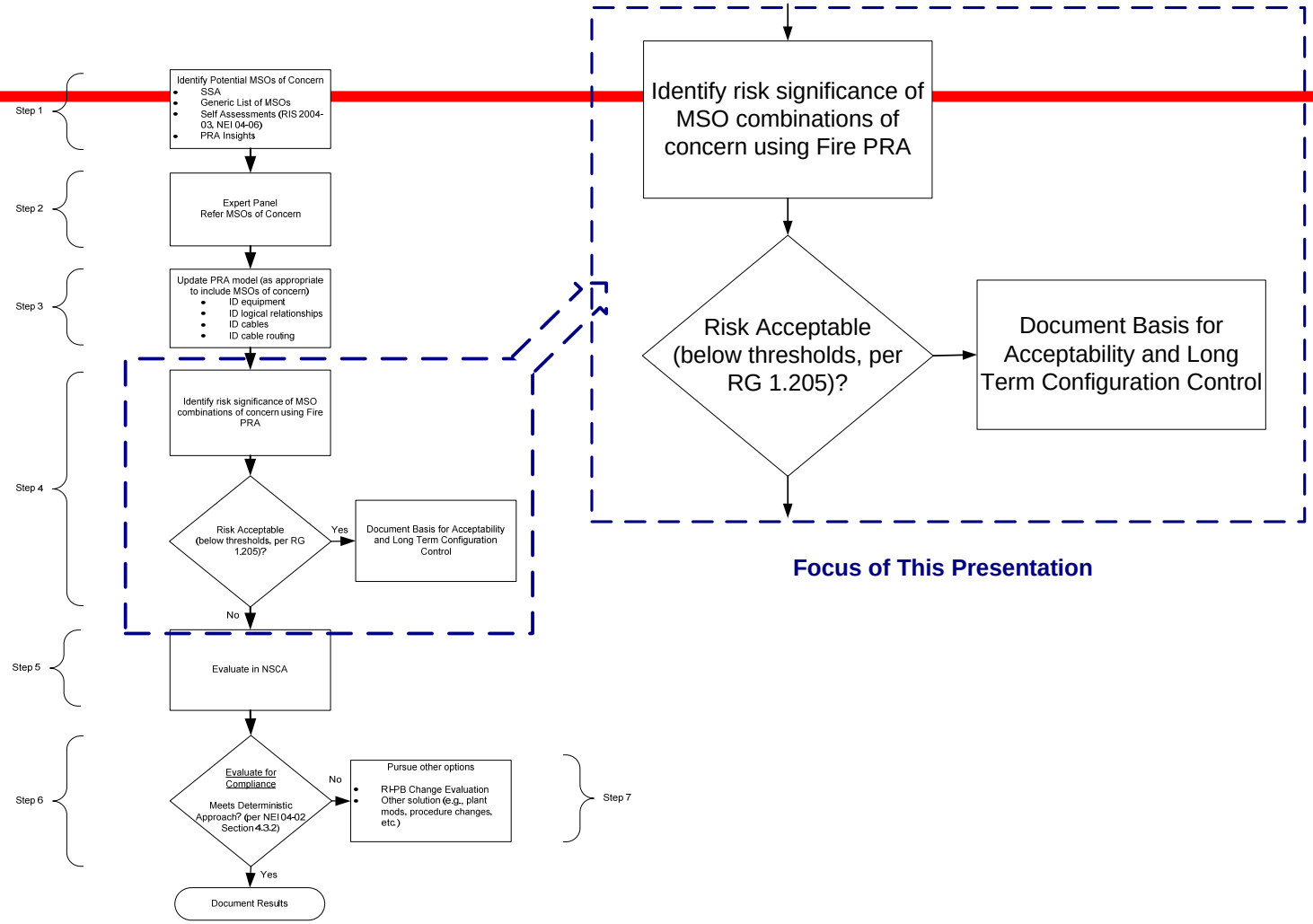
Agenda

- NEI 04-02 Requirements
- Risk Determination Process
- Post-Processing of Fire PRA Results
- Reporting of MSO Risk Insights
- New MSOs after FPRA Completion
- Summary

2

AR1

NEI 04-02 - FAQ 07-0038



Focus of This Presentation

3

Slide 3

AR1 here's a graphic from the faq that you can use if you want

Andy Ratchford, 10/6/2007

Risk Determination Process

- Assessment based on quantification results (cutsets)
- Identification of events representing a spurious operation (SO)
- ‘Read’ entire cutset file to find unique MSO combinations
- Summation of cutsets for each unique MSO combination
- Compare figure of merit for each MSO combination against NEI 04-02 / FAQ 07-0038 criteria

4

Summary

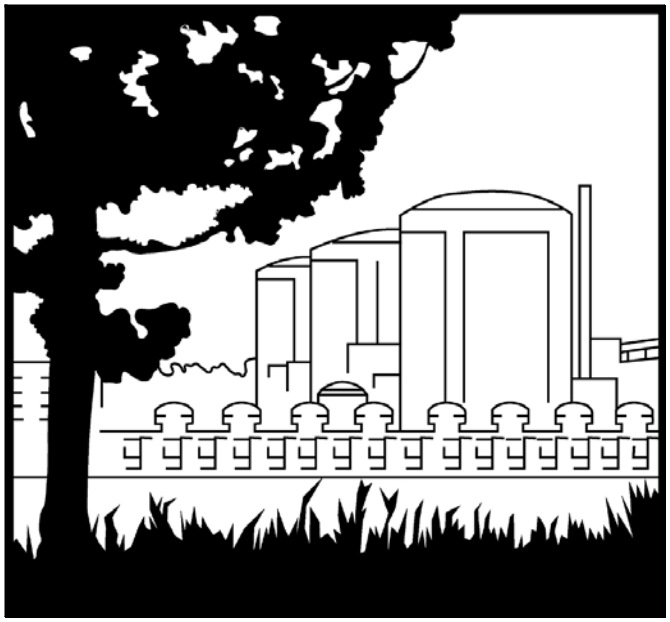
- Identify Potential MSOs of Concern
- Treat MSOs in Fire PRA
- Evaluate MSOs using Fire PRA
- Assess Risk Metrics
- Establish Licensing Basis for MSO
- Resolve MSO Issue
- MSO treatment update – may require Fire PRA Update

5

Operator Manual Action Reconciliation:

With a Focus on Determining the Scope of Change Evaluations

November 6, 2007



Overview

- Purpose of Operator Manual Action (OMA) Reconciliation
- OMA Change Evaluation Scope
- Oconee FAQ 06-0012 Binning Examples

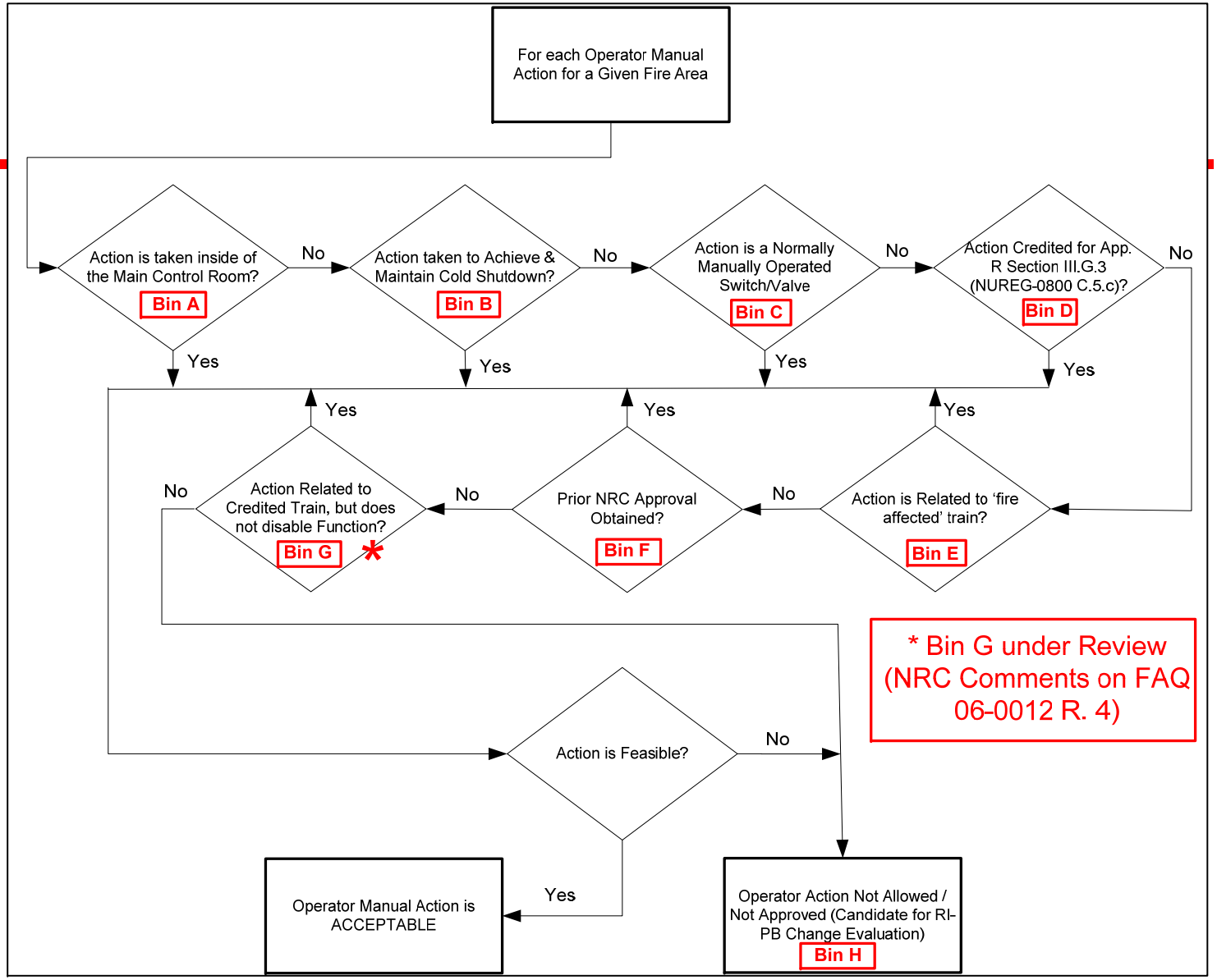
Purpose of OMA Reconciliation

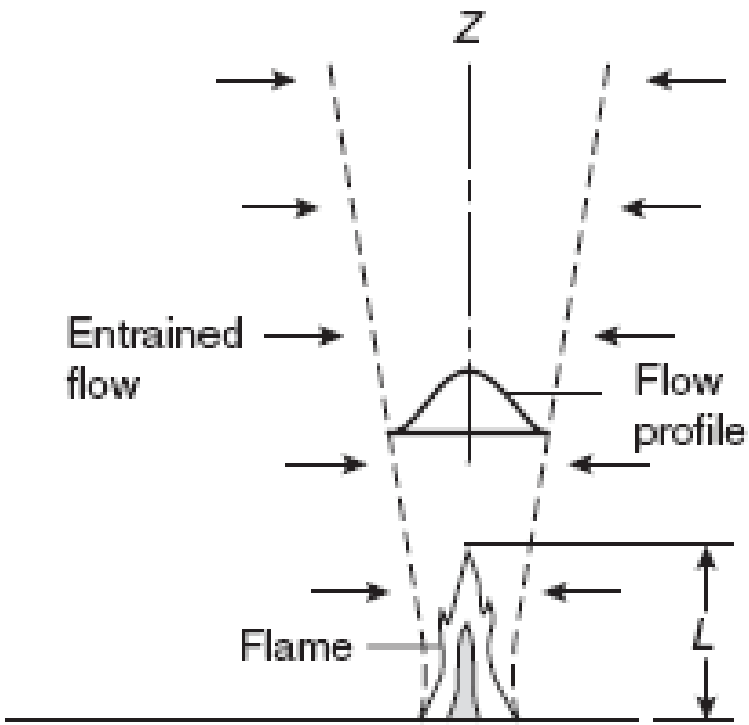
- NFPA 805, Section 4.2.4, in reference to the use of OMAs for the performance based approach states “additional risk presented by their use shall be evaluated.”
- Process can contribute to safety by eliminating unnecessary OMAs
- **Presentation Focus: Determine which compliance strategy OMAs are allowed and those that require change evaluation**

OMA Change Evaluation Scope

- OMAs that are either not allowed under the current regulatory framework or for which there is no previous NRC approval are not compliant with current regulations.
- NEI 04-02 FAQ 06-0012 clarifies which operator manual actions that will require change evaluations during the transition to NFPA 805.

FAQ 06-0012 Background





Generic Fire Modeling Treatments

November 6, 2007

Overview

- Define the treatments
  - What are they?
  - Why were they developed?
  - What are they used for?
- Describe the basis for each treatment
- Describe the process by which they are applied

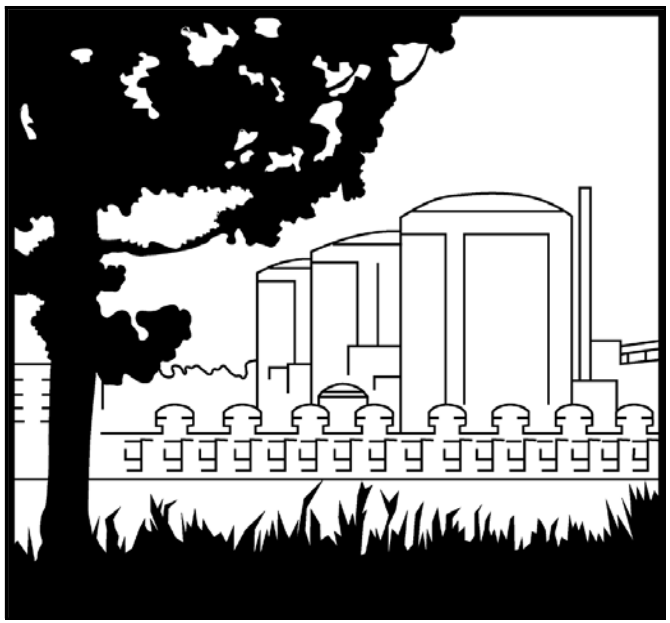
Generic Fire Modeling Treatments

- Pre-solved mathematical solutions
  - Simple correlations/zone computer models
  - Conservatively biased/full parameter sensitivity evaluation
  - Range set to accommodate most applications
    - Fully specified limits of applicability for each treatment
- Eight distinct computation areas
  - Fire scenario and fire scenario effects
- Developed to allow efficient determination of zone of influence in the field

Field Use of Generic Treatments

- 3-page field note form with procedure
- Cross-indexes NUREG 6850 Ignition Source Bins with eight generic treatment cases
- Selects ZOI using a bounding treatment heat release rate bin for the field notes
- Defines limits of applicability
- Provides an option for more refined ZOI
  - Consult tables and graphs in generic treatment report
- Detailed analysis may be required:
  - Exceed limits of applicability or higher resolution result is needed

Oconee Non-Power Operations



By:
David Goforth
NFPA-805 Technical Manager
November 6, 2007

Shutdown Risk Management

- The likelihood of an adverse event is best reduced by maintaining a balance between prevention and mitigation strategies. Shutdown Risk is minimized by implementing a program that contains the following elements outlined in NUMARC 91-06 and Generic Letter 88-17.
  1. Preserving Shutdown Key Safety functions through Defense in Depth
  2. Effective Risk Management
  3. Awareness and planning of High Risk Evolutions
  4. Appropriate involvement of organizations and disciplines in schedule development and review
  5. Effective communication of plant status
  6. Effective control of outage activities

FAQ 07-40

The strategy for additional controls/protection of equipment during non-power operations will be based on configurations or Plant Operating States (POS) during the outage where the risk is intrinsically high. The point of the strategy will be to evaluate and manage the risks of a fire, but not necessarily when the plant is more susceptible to an event causing the loss of a key safety function (KSF). Rather, the strategy should address configurations during which there is a high risk associated with the loss of a KSF. This takes into account the consequences of the loss of a KSF, not just the increased likelihood of the loss of a KSF. During periods of low risk normal risk management controls, processes and procedures will be utilized.

Non-Power Operations Update
NFPA 805 Pilot Observation Meeting

Bob Rhodes, Harris Plant

Public Meeting

November 8, 2007, Atlanta, GA

NGG Nuclear Generation Group

Progress Energy

Non-Power Operational Mode Review Previous Pilot Meeting Discussions

- Described Project Procedure FPIP-0126.
- Defined High Risk Evolution and Plant Operational States (POS) to be considered.
- Identified Key Safety Functions of interest.
- Status of equipment selection and additional circuit analyses.
- Results of a trial run for Fire Area with known “pinch points”.

Non-Power Operational Mode Review Current Status

- SSA Database modified and updated to be used in performing NPO reviews.
- An initial review (first round) of all Fire Areas completed.
- Draft of NPO Analysis prepared.
- Second round of reviews to be performed.

Non-Power Operational Mode Review FSSPMD

- NPO component information added to database.
  - Additional components not required for SSA.
  - Components with different functional state than for a post fire safe shutdown.
  - Components can negatively impact more than one KSF path
- NPO Separation Report made available.
  - Report similar to SSA Compliance Report.
  - Report by Fire Area.
  - Separated by Key Safety Function (KSF).

Non-Power Operational Mode Review Fire Areas Reviewed

- Fire Area reviews were performed utilizing:
  - Guidance provided in project procedure FPIP-0126, “NPO Modes Transition Review”
  - Draft version of FAQ #07-0040, “Non-Power Operations Clarifications”
- NPO Separation Report prepared and reviewed to identify KSFs and KSF paths that may be impacted in each Fire Area.

Non-Power Operational Mode Review Fire Area Reviews (cont.)

- Reports reviewed along with SSA to identify systems, components, and compliance strategies credited for that Fire Area.
- Analyzed components affected for each KSF to determine if it would be available to support the KSF.
- Identified KSF paths with “pinch points”.
- Matrix of KSF paths affected by Fire Area prepared.
- KSF Summary Report

Non-Power Operational Mode Review Draft Analysis

- Results of preliminary review documented in a NPO Modes Review calculation.
  - Methodology used and procedures reviewed described.
  - Plant Operational States considered are identified.
  - Findings and possible “pinch points” identified.
  - Recommendations for resolving findings and “pinch points” provided.

Non-Power Operational Mode Review Second Round

- Additional NPO components identified during review, and some that can be deleted.
- KSF associations to be re-aligned.
- Update NPO calculation.

Non-Power Operational Mode Review Defining Compliance to NFPA 805

Identify Pinch points

Provide Defense in Points

Maintain analysis

Harris Nuclear Plant
NFPA 805 Transition
License Amendment Request / Transition Report

Jeff Ertman, Progress Energy
David Goforth, Duke Energy
November 8, 2007 Atlanta, GA

HNP LAR / Transition Report

- Overview of Requirements/Guidance
- Outline of LAR / Transition Report (Focus on LAR)
- Itemized discussion of Draft LAR content

HNP LAR / Transition Report Requirements/Guidance

- 10 CFR 50.48(c)(3)(i)
- 10 CF R 50.48(c)(2)(vii)
- 10 CFR 50.48(c)(4)
- 10 CFR 50.90
- Reg. Guide 1.205 (C.2.2, C.3.1)
- NEI 04-02 (4.6, Appendix H)

License Amendment Request Template Background

- Used NEI 04-02 App. H as template
- Updated NEI 04-02 App. H template to reflect additional guidance in RG 1.205
  - FP License Condition
  - Reporting Requirements
- Updated NEI 04-02 App. H template to reflect Pilot Plant activities, FAQs, etc.

License Amendment Request
Major Sections

- FP License Condition
- Other License Condition
- Technical Specifications
- Orders & Exemptions
- Use of RI-PB Methods for NFPA 805 Ch. 3 Compliance
- Use of RI-PB Alternatives (non-NFPA 805 methods)
- FP Program Changes and Risk Impact
- USAR Changes
- Modifications

License Amendment Request Major Sections (cont'd)

- Clarification of Prior NRC Approvals
- EEEEs
- Circuit Analysis Methodology (MSO Resolution)
- OMA transition to Recovery Actions
- Power Block Definition
- Role of the FAQs
- FPRA Review High Level Findings and Resolutions
- Transition Schedule

Transition Report Template Background

- Used NEI 04-02 App. H as template
- Updated NEI 04-02 App. H template to reflect additional guidance in RG 1.205
- Updated NEI 04-02 App. H template to reflect Pilot Plant activities, FAQs, etc.
- Proposed to be provide the ‘next level of detail’ to supplement the LAR

Transition Report Outline

- 1 - Introduction
- 2 - Overview of Existing FPP
- 3 - Transition Process
- 4 -Demonstrations of Compliance with NFPA 805 Requirements
- 5 -Post-transition FP Licensing Basis
- Appendices

Transition Report Outline (cont'd)

- Appendices
  - A – NEI 04-02 Table B-1
  - B – NEI 04-02 Table B-2
  - C – NEI 04-02 Table B-3
  - D – NEI 04-02 Table F-1
  - E – NEI 04-02 Table G-1
  - F – MSO – Resolution Methodology
  - G – OMA – Transition
  - H – FAQs – Summary Table
  - I – Power Block Definition

Transition Report / LAR Challenges / Decisions

- What level of detail to include in the LAR and Transition Report?
- Will the Transition Report be an attachment, enclosure, submittal, etc.?
- What information will be duplicated in both the LAR and Transition Report?
- What information from the LAR and Transition Report will become ‘living documents’ (e.g., FSA, UFSAR, etc.)?

NFPA 805 NRC Pilot Observation Meeting Final Safety Analysis Report (FSAR) Content

Mike Fletcher, Progress Energy, HNP
David Goforth, Duke Power
November 7, 2007
Atlanta, Georgia

Current Guidance

- Current FSAR Contents
  - Reg. Guide 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*
    - 9.5.1 Fire Protection
      - 9.5.1.1 Design Bases
      - 9.5.1.2 Systems Description
      - 9.5.1.3 Safety Evaluation (Fire Hazards Analysis)
      - 9.5.1.4 Inspection and Testing Requirements
      - 9.5.1.5 Personnel Qualifications and Training

NFPA 805

- The LAR /Transition Report should contain:
  - A discussion of the changes to Updated Final Safety Analysis Report (UFSAR) necessitated by the license amendment, and
  - A statement that the changes will be made in accordance with 10 CFR 50.71(e).

New FSAR Objectives

- Establish a concise new licensing basis for FP Program.
- Supersedes CLB and previous exemptions and SERs.
- Incorporation by reference of appropriate 805 transition Tables and Calculations in required sections

Level of Detail

- 9.5.1.1 Design Bases Summary
  - NFPA 805
  - Fire Safety Analysis (FSA)
  - Upper Tier Design Documents (DBD, etc.)
  - Define Codes of Record utilized

Level of Detail

- 9.5.1.2 System Descriptions
  - NEI 04-02 B-1 Tables, by Reference
  - NFPA 805 required detection and suppression systems
  - Identification of NFPA 805 required passive separation
  - Identification of “Power Block” structures

Level of Detail

- 9.5.1.3 Safety Evaluation (Fire Hazards Analysis)
  - High level description of approach and point to Fire Safety Analysis (FSA) sections as needed

Level of Detail

- 9.5.1.4 Inspections & Testing Requirements
  - NEI 04-02 B-1 Tables, Incorporated by Reference
  - Incorporate by reference surveillance guidance documents
  - Monitoring

Level of Detail

- 9.5.1.5 Personnel Qualifications & Training
  - NEI 04-02 B-1 & G-1 Tables, Incorporated by Reference
  - Upper Tier Documents noted in B-1 Tables
    - Program Management documentation
    - Fire Brigade Program

FSAR Content

Questions ?

NFPA 805 Transition HNP Pilot Transition Of Existing Engineering Equivalency Evaluations

November 6, 2007

Mike Fletcher, HNP

NGG Nuclear Generation Group

Progress Energy

Purpose

Describe the transition process for Existing Engineering Equivalency Evaluations (EEEE's)

- Guidance
- Scope
- Adequacy Review Process
- Documentation
- HNP Results / Examples

Guidance

- NEI 04-02 (Reference 2.4) Section 4.1.1 states in part:

"The extent to which the pre-transitional fire protection licensing basis can be incorporated into the new NFPA 805 licensing basis is determined by the extent to which the fire protection CLB can be shown to comply with the requirements in NFPA 805. However, exceptions are permitted for the following licensee specific deviations from NFPA 805 requirements:

  - *Existing Engineering Equivalency Evaluations [NFPA 805 Figure 2.2]. Note the licensee will review these equivalency evaluations during the transition process to ensure the quality level and the basis for acceptability is still valid."*

Guidance (Cont)

- Proposed FAQ 07-0033
- EEEE's performed per the appropriate application of current deterministic guidelines (Generic Letter 86-10) and evaluated under 50.59 and/or the Standard License Condition can be transitioned.
- EEEE's are not considered previously approved by the NRC.

Scope – Summarized in LAR

- Not in Scope - EEEE's which document "rated " or "compliant" conditions.
- In Scope-EEEE's which use performance based evaluations.

Adequacy Review Process

- Process documented in FPIP-0125.
- Review performed by independent FPE.
- EEEE's that don't meet adequacy review…
  - Can be reworked to meet acceptance criteria.
  - Can be included in transition as a "change".

Adequacy Review Process (Cont)

- Acceptance Criteria- NEI 02-03, Appendix A & FAQ 07-033 (Proposed)
  - The engineering evaluation should not be based solely on quantitative risk evaluations.
  - The engineering evaluation should reflect the current plant configuration or bound changing plant conditions.

Adequacy Review Process (Cont)

- The engineering evaluation should be an appropriate use of the engineering evaluation process.
- The engineering evaluation has been evaluated against the criteria in the pre-transition standard fire protection license condition, 10 CFR 50.59, or plant specific process used to determine the impact of the change/condition on the ability to achieve and maintain post-fire safe shutdown.

HNP Results

- 34 EEEE's identified for adequacy review
- All identified EEEE's performed since 1999.
- 21 identified as adequate during first pass.
- 8 have minor items which need clean up, typo's, minor clarifications.
- 5 still under review.

Questions

Harris Nuclear Plant (HNP)
NFPA 805 Transition

NFPA 805 Monitoring Program

Keith Began, CES/FP

November 8, 2007

Atlanta, GA

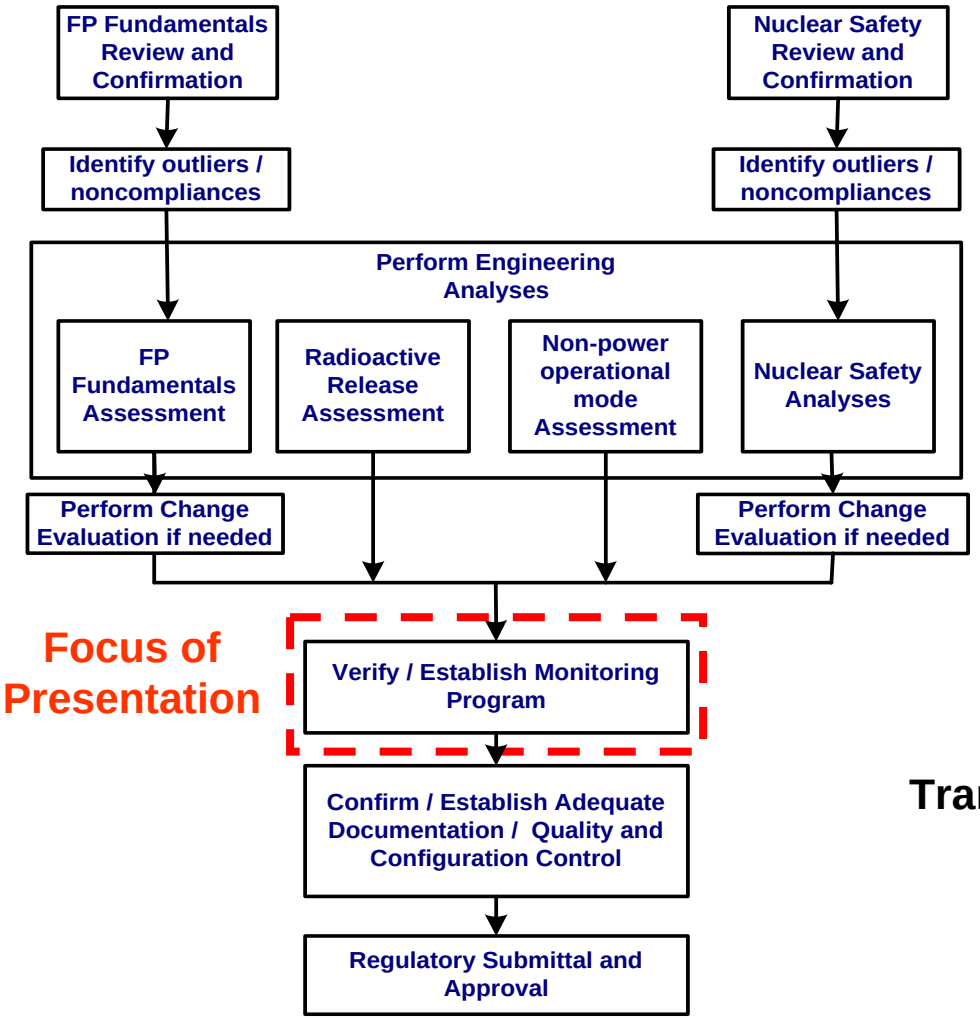
NGG Nuclear Generation Group

Progress Energy

NFPA 805 Monitoring Program Overview

- Purpose
  - Initiate discussion on NFPA 805 Monitoring Program Requirements
- Discussion Topics:
  - Requirements
  - Considerations

NFPA 805 Monitoring Program Overview



NEI 04-02 – Figure 4-1
Transition Process (simplified)

NFPA 805 Monitoring Program Requirements

- NFPA 805, Section 2.2.10 states:

  "A monitoring program shall be established to assess the performance of the fire protection program in meeting the performance criteria established in this standard."

- NFPA 805, Section 2.6 states:

  "A monitoring program shall be established to ensure that the availability and reliability of the fire protection systems and features are maintained and to assess the performance of the fire protection program in meeting the performance criteria. Monitoring shall ensure that the assumptions in the engineering analysis remain valid."

NFPA 805 Monitoring Program 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

Questions

NFPA 805 Transition Observation Meeting Atlanta, GA – November 5 – 8, 2007 – Updated Parking Lot							
No.	**Topic**	**Assigned To**	**Action**	**Schedule**	**Action Taken**	**Meeting Discussion**	**FAQ Action**
1	How will Reactor Oversight Process deal with multiple spurious operations? Low significance vs. high significance. Philosophical approach for RI-PB treatment of multiple spurious operations is in NEI 04-02. 'Endorsement' of process will be accomplished via Reg. Guide.	Duke / Progress	ROP (new) / NEI 04-02 Methodology for Expert Panel Update Markup to P. Lain 3/28/06 flowchart Review of MC 0612	Feb. 2008 (Ertman)	NRC (Paul Lain) presented flowchart for "unevaluated Multiple Spurious operations" on 03/27/06. It included a screening process that included CAP and comp. measure inclusion, and documentation of the issue as a potential URI based upon risk significance.	Concerns and questions were raised about the process and the burden associated with URIs. Look at minor violation questions for MC 0612 – to see if 'potential multiple spurious operation findings' are adequately addressed. 1E-08 threshold for screening. Is it an appropriate value to use and consistent with the ROP? (NEI 04-02, NUREG-6850. RG 1.205) Pilot plants to provide comments on NRC flowchart and potential changes to NEI 04-02. Pilot Plants to provide Update by Feb. 2008 Provide feedback to NRC on this process for April 2008 Pilot Meeting	Potential
44	Consider establishing a NEI site for U.S. Nuclear Regulatory Commission (NRC) review of pilot material	NEI	NEI to determine logistics and capability.	August 2007 NEI TF meeting		Consideration is being given to setting up a location at NEI to allow NRC staff and contractors to review pilot-plant material. This will enhance the review of required material while allowing the plants' proprietary, security, and business sensitive information maintained under appropriate controls. Staff recommended process used previously for Reg Guide 1.200. NRC requested more than a single laptop for the reviews of detailed material (i.e., PRA info) at the 8/8/07 Pilot meeting.	

NFPA 805 Transition Observation Meeting Atlanta, GA – November 5 – 8, 2007 – Updated Parking Lot							
No.	**Topic**	**Assigned To**	**Action**	**Schedule**	**Action Taken**	**Meeting Discussion**	**FAQ Action**
49	NUREG/CR 6850 Kerite FR is 237°C not 372°C	NRC	NRC Provide information to public domain July 2007) and eventually provide errata sheet.	Sept. 2007 (Fletcher)		NUREG/CR 6850 Table H 3 and H 4 incorrectly lists the Kerite failure temperatures as being between 372°C -382°C with a Recommended Failure Threshold of 372°C. The recommended Failure Threshold for Kerite should be 237°C. The tables need to be reviewed and an errata/revision issued for the NUREG/CR. 8/8/07 update – EPRI (Bijan N. reviewing the topic based on discussions with NRC Research staff) 11/07/07 update – ERATA sheet for NUREG 6850 distributed in Palo Alto Training	**[CLOSED]**
52	Potential coordination issues between License Renewal Application (LRA) and NFPA 805 transitions (License Amendment Request [LAR])	Progress	Progress Energy point of contact K. Heffner. Developing a detailed plan and schedule.	August 2007 (Heffner)		The Harris Nuclear Plant (HNP) will be submitting a LRA that will be reviewed between 10/08 – 06/09. The current schedule for the NFPA 805 LAR is for submittal in 06/08 with review through 12/08. An LRA locks down a license (i.e., an LAR would not be considered prior to approval of a submitted LRA. This scheduling conflict has not been resolved for HNP.	**[CLOSED]**

NFPA 805 Transition Observation Meeting Atlanta, GA – November 5 – 8, 2007 – Updated Parking Lot							
No.	**Topic**	**Assigned To**	**Action**	**Schedule**	**Action Taken**	**Meeting Discussion**	**FAQ Action**
61	HRA in general Questions arose of HEP screening values in NUREG/CR-6850.	Duke / NEI	DUKE/ERIN to organize PRA Task Force Call on methods being used HEP screening values.	8/23/07		**Update at 8/8/07 Pilot Mtg [spilt item 61 into two PL Items 61 and 62]** **11/07/07 Update – Harris and Duke PRA team to develop single combined approach to address HRA issue (due to NRC 12//03/07). Meeting tentatively scheduled for 12/06/07 at NEI.**	
62	How are the "new" instrumentation requirements in the new proposed revision to the ANS Fire PRA standard going to be addressed in a fire PRA used for NFPA 805 transition?	Duke / NEI		8/23/07 update		**Update at 8/8/07 Pilot Mtg [spilt item 61 into two PL Items 61 and 62]** New 'requirements' for instrumentation related to operator actions in the PRA are being introduced in the ANS FPRA standard. These 'requirements' exceed those in NUREG/CR-6850. Questions were raised on the manner in which this new information will be implemented in an NFPA 805 Fire PRA. **11/07/07 Update – Harris and Duke PRA team to include this issue in the 12/03/07 submittal. Meeting tentatively scheduled for 12/06/07 at NEI**	
63	NRC to review ability to revise RG 1.205 to address FAQs in spring 2007 to support Pilot Plant LAR reviews.	NRC / Lain		8/23/07 Pilot Mtg. (update)		Concerns were raised over RG 1.205 revision and ability to revise it in 2007. A tie to RG 1.200 was discussed as part of a reason that RG 1.205 may not be able to be revised.	
	Items started at Pilot Meeting (Atlanta, GA, November 2007)						
65	NRC questioned the location of the transient packages on the floor versus a treatment such as that in SDP (2 ft above the floor). The Fire PRA should have a basis for where the transient package is placed vertically.	Pilot Plants	Verify / document basis for vertical placement of transient fire (ZOI).	30 days			
66	The NRC questioned to 'placement' of transient combustible sources based on likelihood of the location (how hard is it to get to the location) being used rather than the 'pinch point' location that has the highest consequences.	Pilot Plants	Verify / document basis horizontal placement of transient fire (ZOI) in a location other than the 'pinch point(s)'.	30 days			

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No.	**Topic**	**Assigned To**	**Action**	**Schedule**	**Action Taken**	**Meeting Discussion**	**FAQ Action**
67	The NRC had some questions on interpretation of the FSA (B-3 tables) that were discussed and resolved with Progress Energy staff. In particular, there were questions on whether SG pressure control was specifically addressed in the B-3 table and the integrated impact on RCS inventory control. The use of valve numbers without descriptions may have led to the potential concern.	Progress Energy NRC	Progress Energy will ensure this is addressed within the B-3 tables. NRC to provide comments on B-3 table (FAQ 07-0039)				
68	The NRC questioned the desire to see documented MSO combinations on a fire area/scenario basis. The challenges associated with presenting this information were discussed and deferred to future presentations.	Pilots	Pilots to provide example of level of detail on submittal.	January Pilot Meeting			
69	The NRC questioned potential fire-induced RPS failures and potential consideration in the Fire PRA (IN 2007-07). Non-pilot plant issue.	Fire PRA Task Force	Fire PRA Task Force to ensure treatment is adequate in NUREG/CR 6850.	120 days			
70	NRC agreed to review the Generic Fire Modeling Treatment calculation in more detail (at the NEI offices).	NRC	NRC review generic treatment including fire placement guidance				
71	NRC requested that a parking lot item be created for the NRC to review the FSAR (level of detail, format, etc.) information in order to get an FAQ in place. Feedback necessary prior to January Pilot Meeting.	NRC	NRC review FSAR slides and provide feedback.	30 days			

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No.	**Topic**	**Assigned To**	**Action**	**Schedule**	**Action Taken**	**Meeting Discussion**	**FAQ Action**
72	FAQ to be submitted by NRC to clarify confusing/incorrect guidance in NUREG/CR 6850 on cabinets and propagation based on venting	NRC	NRC submit FAQ.	Dec FAQ Meeting			
73	Pilot plants to submit Ignition Source Characterization project instruction as part of pilot plant deliverables, etc.	Pilots	HNP/Duke submit ignition source processes to NRC.	30 days			
74	Verify that NUREG/CR 6850 and ANS Standard allows Bayesian update of fire frequency in both directions	NRC	NRC to review documents and provide results of review	30 days			