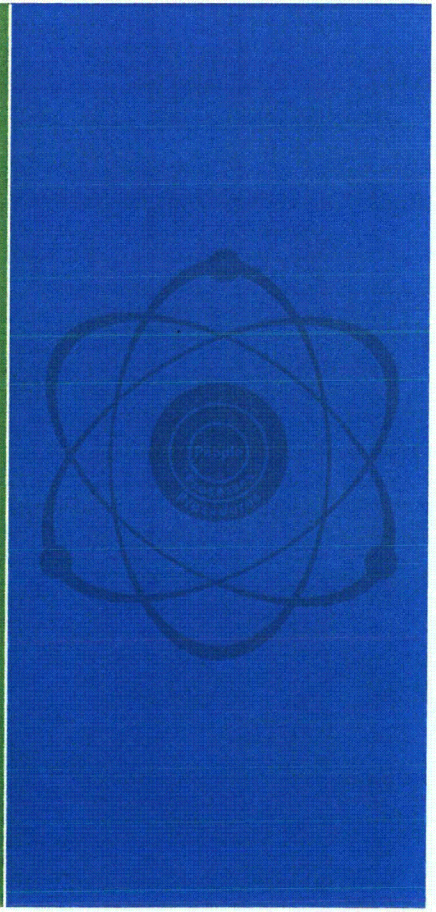
FENOC™

Industry Perspectives on NFPA 805

Paul Harden
Senior Vice President, Fleet Engineering

June 19, 2014



NFPA 805 Historic Experiences

- **Unpredictability of expectations**
- **Cost and schedule challenges**
- **Resource Challenge**
- **Planning Challenges**

Result is $M of added cost, high level of rework, reduced NRC and industry resources, and uncertainty regarding the final outcome

Highlights – What's Going Well?

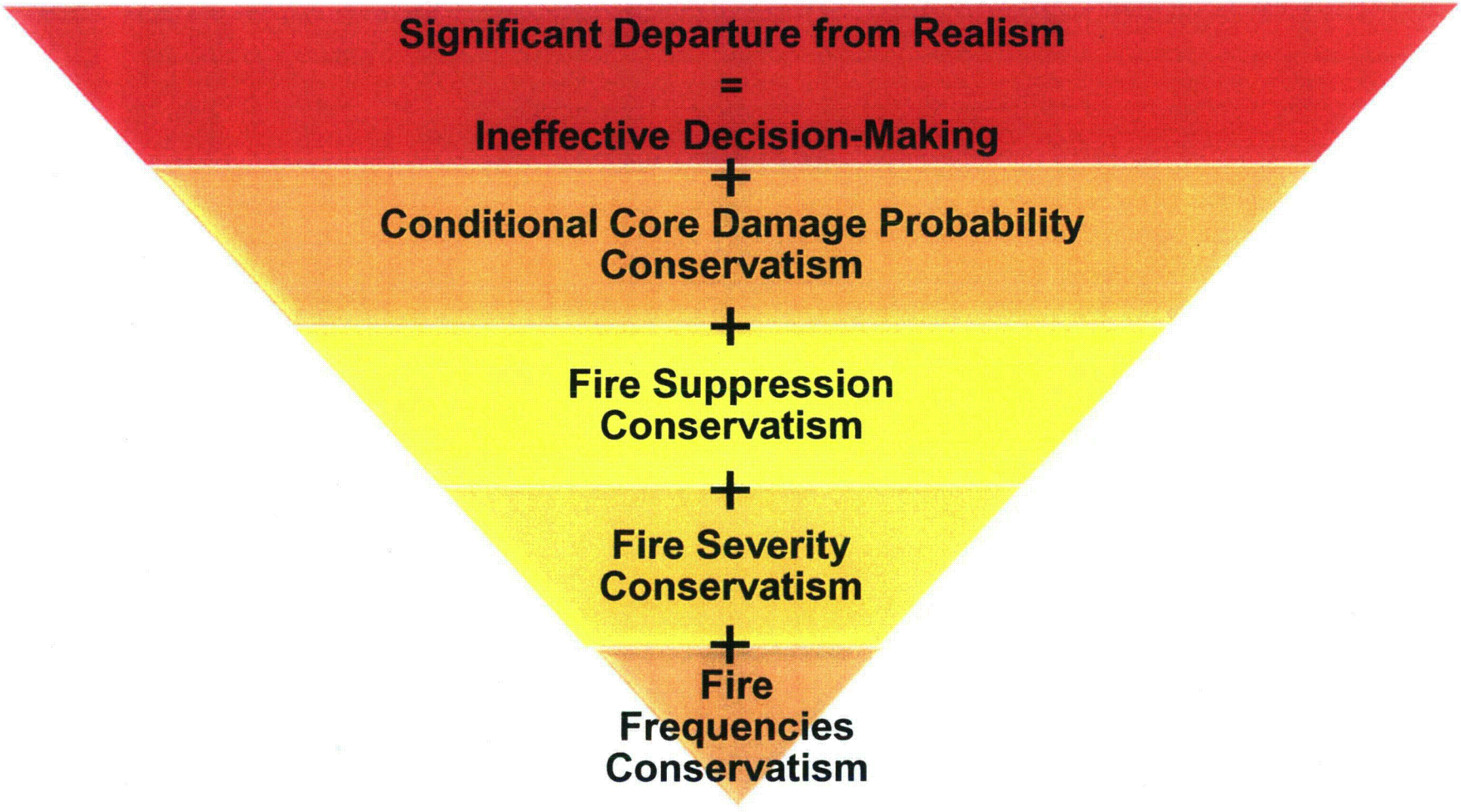
- **Improved understanding within Industry and NRC**
- **Openness to reviewing the process and seeking common ground to make things better**
  - Lessons learned meeting (October 2013)
  - RES and EPRI renewed working relationship
  - Plans for audit schedule changes and better focused RAIs
  - Fire PRA and NFPA 805 FAQ process improvements
- **Leadership engagement**
  - A high level of Leadership Engagement has been required to ensure the process moves forward with consistency

Incremental vs. Transformative Progress is being made

Industry Concerns

- **Fire PRA risks are over-stated – do not comport with OPEX – distorts safety and investment priorities**
- **NFPA 805 brings higher O&M cost compared to Appendix R without perceived commensurate improvement in safety**
- **Cost of LAR, SE development and compliance modifications significantly exceeds NRC and Industry estimates**
  - RAI Volume
  - PRA development resources
  - Modifications driven by conservative Fire PRA results
- **Need for Site Specific vs. Generic RAIs to better focus industry and NRC resources**

Large Conservatism in Fire PRA



Compounding conservatism reduces effectiveness of decision making tool

Current Hard Spots

- **Significant room for improvement of Processes:**
  - Must support timely State of Knowledge improvements
  - Imperative to address as majority of plants have yet to transition
  - Use Operating Experience Process to update models
    - Incorporate realistic data and methods
    - Establishment of freeze point for PRA
  - PRA peer review process must work and be trusted:
    - Majority of RAIs are derived from PRA
      - Refining results, not changing outcomes
      - Deterministic conservatism distorts PRA outcomes
    - Return to basics – use RG 1.200 to demonstrate PRA adequacy
    - Risk Informed Steering Committee Working Group to address

Future Concerns

- **Executive disillusionment with PRA**
  - Instability and uncertain outcomes
  - Time and resource drain
  - Unnecessary costs
  - Overstated risks results in skepticism about insights
- **Significant concern in industry for how NFPA 805 experience could affect and translate into other future Risk Informed Initiatives:**
  - NFPA 805 pilots were not effective at vetting out significant issues
  - We appear set up for similar experience with Seismic and Flooding PRA

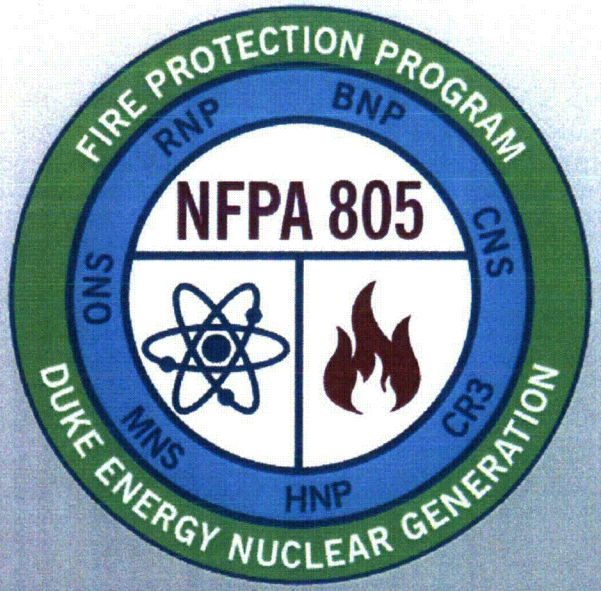
Action is needed now to address hard spots and ensure success of future Risk Informed initiatives

Conclusions

- **Unpredictable process and over-stated risk hinders progress for RI programs and properly targeting safety improvements**
  - Need focus on long-term solutions as well as short-term process changes
  - When allowed to work, existing processes (peer review, use of OE and model updates) address PRA technical adequacy and incorporate state-of-knowledge
- **Risk Informed approaches must be an alternative, not another layer on top of deterministic processes**
- **Need improved alignment within NRC regarding the PRA Policy Statement to increase incentive for industry to expand use of Risk Informed approaches**
- **Continued NRC senior management engagement is key**

Significant progress requires addressing underlying Process and Culture issues

NFPA 805 Implementation



Presented by:
Joelle DeJoseph, PE
June 19, 2014

Duke Energy Nuclear Generation
NFPA 805
Fire Protection Program

Duke Energy Status

- Entire Duke Operating Fleet Adopting 50.48(c) – NFPA 805
- Harris and Oconee were pilot plants for NFPA 805
  - Harris effectively implemented NFPA 805
  - Oconee implementation still in progress
- Brunswick submitted NFPA 805 License Amendment Request (LAR) in September 25, 2012
- Robinson, Catawba, McGuire submitted NFPA 805 LARs in September 2013

Duke Energy Nuclear Generation
NFPA 805
Fire Protection Program

Transition Experience

- Resource intensive LAR preparation and Request for Additional Information (RAI) process
  - Fire PRA is driving factor relative to cost and schedule
- Teaching plant to think differently about fire
  - Enhanced knowledge of fire scenarios and the impact to the plant
  - Recognize significance of fire risk to the overall risk to the plant

Duke Energy Nuclear Generation
NFPA 805
Fire Protection Program

Implementation Experience

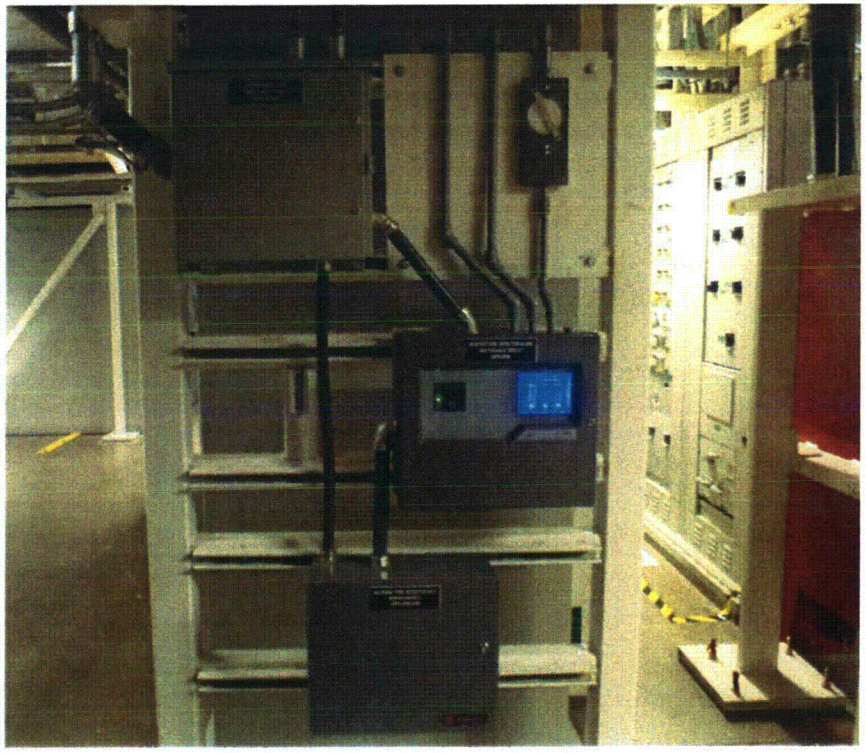
- More comprehensive understanding of the physical plant
  - Documentation of cable routings
  - Realistic fire scenarios versus whole room burn up "insights"
  - Plant response to fires

- At Harris and Oconee, we are managing the specific fire scenarios and its impact to the plant

Duke Energy Nuclear Generation
NFPA 805
Fire Protection Program

Safety Improvements

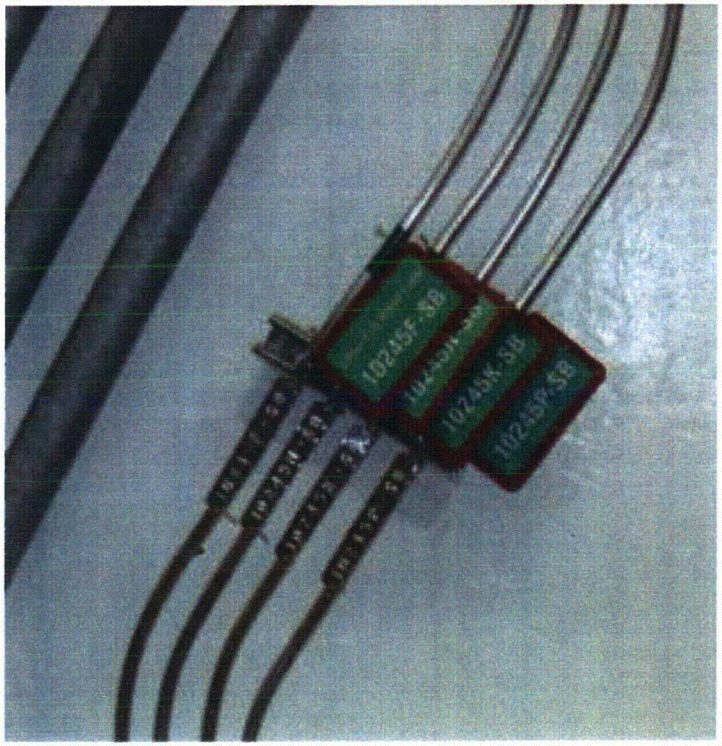
- NFPA 805 Modifications – Incipient Detection



Duke Energy Nuclear Generation
NFPA 805
Fire Protection Program

Safety Improvements

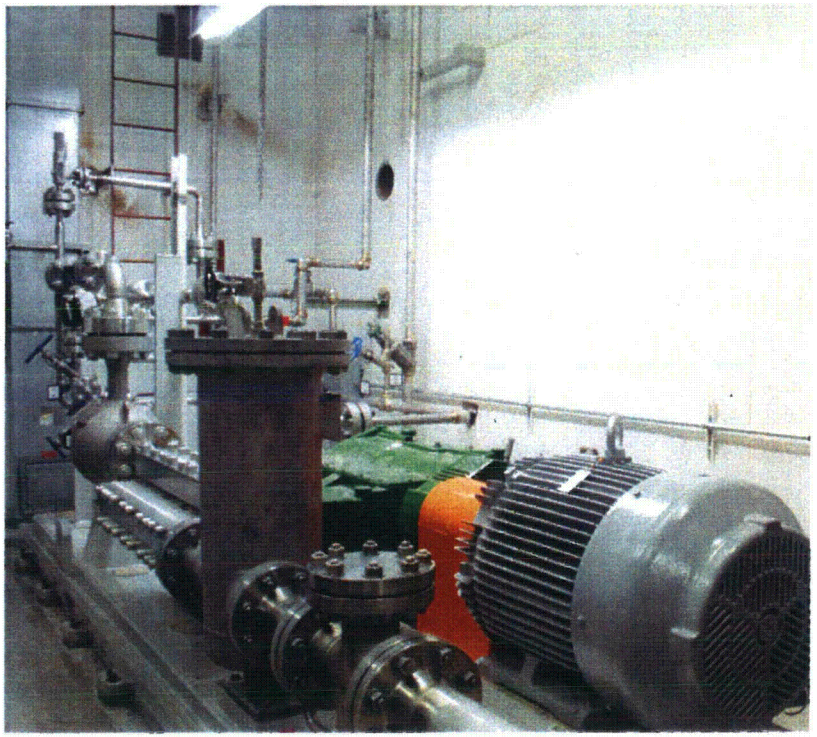
- NFPA 805 Modifications – 3-hour Cable



Duke Energy Nuclear Generation
NFPA 805
Fire Protection Program

Safety Improvements

- NFPA 805 Modifications – Alternate Seal Injection System for Reactor Coolant Pump Seals



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NFPA 805
Fire Protection Program

Safety Improvements

- Addressed Multiple Spurious Operations (MSOs)
  - MSOs were modeled and treated as Variances from Deterministic Requirements (VFDRs)
    - Disposition of most VFDRs using the performance based approach
- Reduction in the number of manual actions required by an operator during a fire event

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NFPA 805
Fire Protection Program

Program Maintenance

- More Informed Maintenance of the Fire Protection Program
  - Fire Protection Program Change Process
  - Transient Combustibles
  - Abnormal Operating Procedures
  - Compensatory Measures
  - NFPA 805 Monitoring

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NFPA 805
Fire Protection Program

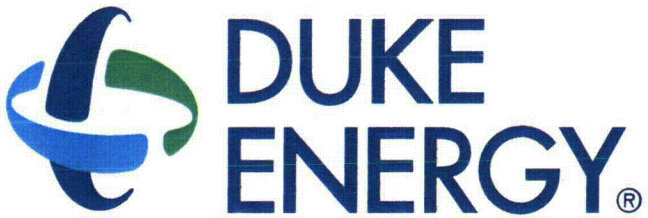
Mutual Fire Protection Insights

- Management of Plant Changes
  - Insights from fire scenarios are used during development of plant modifications
- Transient Combustible Control Program Improvements
  - Control of stand-off distances from plant equipment

Duke Energy Nuclear Generation
NFPA 805
Fire Protection Program

Challenges Moving Forward

- Consistent program implementation throughout the industry
- Understanding that NFPA 805 is risk informed, not risk based
- Continual improvement of the processes
  - NRC Frequently Asked Questions (FAQ) process
  - Memorandum of Understanding (MOU)
  - Industry Benchmarking and Lessons Learned
  - Sharing lessons learned from the NRC inspection process
- Conservatisms in the fire PRA may result in unintended consequences when combined with other PRAs (internal events, seismic, flooding)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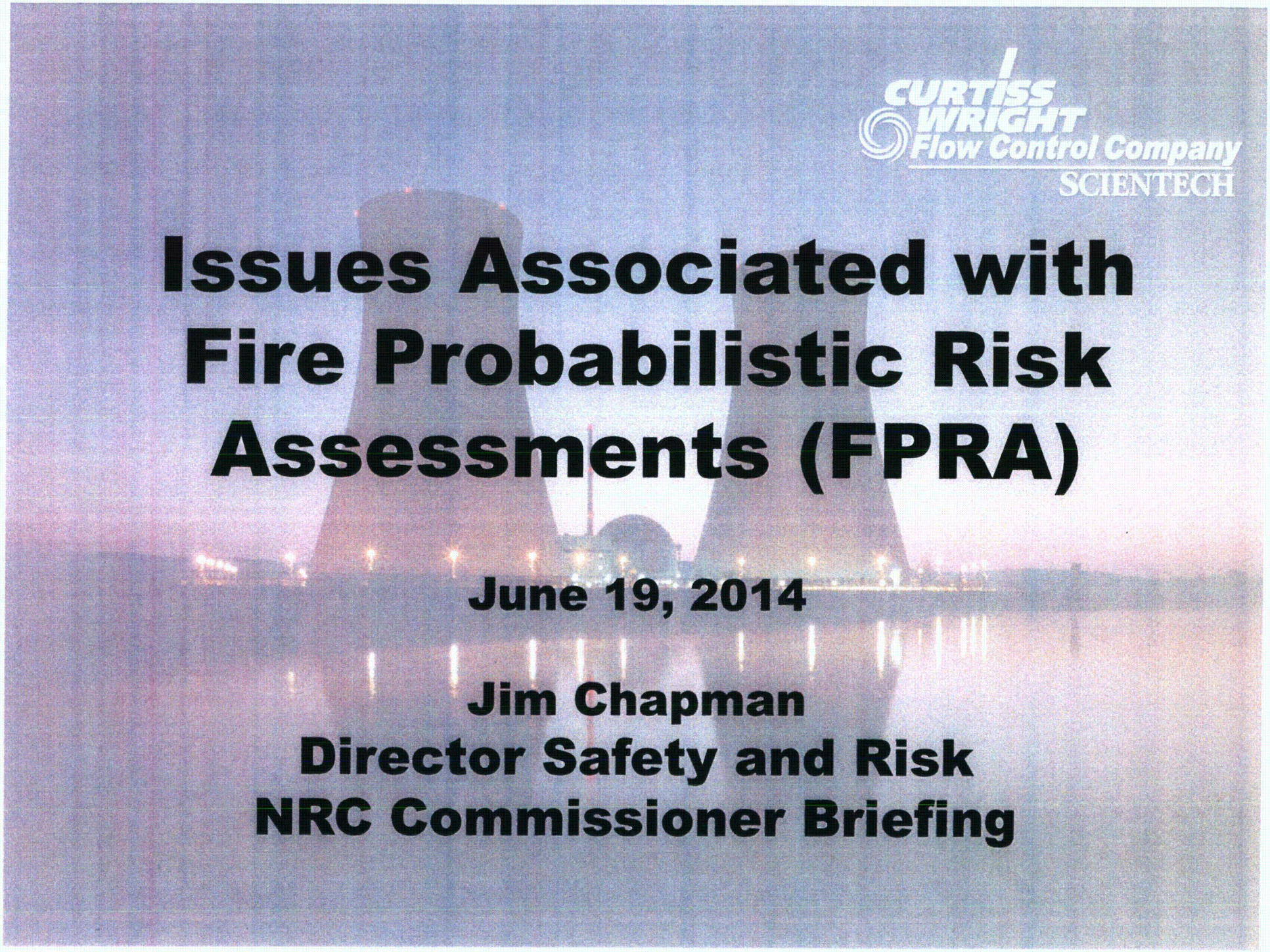


Issues Associated with Fire Probabilistic Risk Assessments (FPRA)

June 19, 2014

Jim Chapman
Director Safety and Risk
NRC Commissioner Briefing

Presentation Outline

- The Conceptual Challenge
- The Practical Challenges
- The Positive Outcomes
- The Negative Outcomes
- Path Forward
- Conclusions

Note: These are my Personal Views as a Safety Professional

CURTISS WRIGHT Flow Control Company
SCIENTECH

Conceptual Challenge

- **NFPA-805 developed by Experts – Expectation of Straightforward Success; Reality has Proven Otherwise**
- **Methods Not Fully Piloted – "6850" and NFPA-805 Pilots**
- **Almost Half the US Fleet Participating (Resource Intensive and Major Licensing Basis Change)**
- **Fire Risk is Small but not Insignificant**

Practical Challenges

- On Average Important Fire Damage State Frequencies are Overestimated Compared to Operating Experience (OE)
- Thousands of Fire Damage States Needed to Develop Results which on a Relative Basis have an Engineering Basis (I.E. Make Sense)
- Level of Effort Extremely High

Positive Outcomes

- Improved Understanding of Fire Risk and Contributors on a Relative Basis (Scenarios versus Whole Area Damage)
- Improved Communications (Traditional Engineering and PRA Members) Supports Improved Decision Making
- Identification of Beneficial Changes to Reduce Risk and Improve Defense in Depth/Margins
- Identification of Research and Development Needs to Improve Realism/Decision Making

Negative Outcomes

- Cost, Frustration and Reduced Confidence in Risk Informed Applications (Too Complex)
- Unrealistic Characterization of Risk
- Inefficient Use of Resources and Funds?
- Other than Insights from the Fire PRA were Other Deterministic Aspects of NFPA-805 Worth the Effort?

Path Forward

- Develop Lessons Learned and Implement
- Conduct the R&D Appropriate to Achieve Realism and Characterize Uncertainties Objectively
- Key Topic is the Relationship among
  - Fire Frequency
  - Fire Size and Development
  - Detection and Suppression

Conclusions

- I, as Well as Other Senior Industry Members, Firmly Believe FPRA Methods Used in NFPA-805 are Conservative Overall
- Conservatism is Prudent in Decision-making, however:
  - Results should Comport with Operating Experience
  - Realism is Needed to Ensure Proper Safety Focus and Increase Confidence in Decision-making
- Costs Must Be Reduced to Support Improved Use of Risk Insights

CURTISS WRIGHT Flow Control Company
SCIENTECH

References

- Nuclear Energy Institute Letter, Transmittal of NEI Report, "Roadmap for Attaining Realism in Fire PRAs - December 2010", Nuclear Energy Institute, dated December 6, 2010 (ML103430372)
- ACRS Letter, Said Abdel-Khalik, Chairman to The Honorable Gregory B. Jaczko, "CURRENT STATE OF LICENSEE EFFORTS TO TRANSITION TO NATIONALFIRE PROTECTION ASSOCIATION (NFPA) STANDARD 805", dated February 17, 2011 (ML110460631)

Union of Concerned Scientists

Fire When NOT Ready

June 19, 2014

David Lochbaum
Director, Nuclear Safety Project
Union of Concerned Scientists
www.ucsusa.org

Issues

- Glacial pace is slowing down
- Interim risk not negligible
- Broken contract with public

Slow and Slowing

	Harris	Oconee	Browns Ferry	Diablo Canyon
LOI to LAR	3.0	3.2	4.1	7.5
LAR to LA	2.1	2.6	1.2 plus	0.9 plus
Fire to LAR	33.2	33.2	38.0	38.3

LOI to LAR is the number of years between the letter of intent and the license amendment request

LAR to LA is the number of years between the license amendment request and the license amendment (plus indicates ongoing tally)

Fire to LAR is the number of years between the Browns Ferry fire and the license amendment request

Slow and Slowing – 50/50

NFPA 805
Schedule Report

3-18-2013

	3 months	5 months	7 months	14 months	16 months	17 months	19 months	20 months	24 months	
	Acceptance	**Audit**	**RAIs Issued**	**Issue Final RAIs**	**RAIs Resolved**	**Draft SE Done**	**Final SE Done**	**SE to DORL**	**Amendment Issued**	
DC Cook	Sep 2011	Nov 2011	Jan 2012	Sep 2012	Nov 2012	Dec 2012	Feb 2013	Mar 2013	Jun 2013	**10-24-2013**
Duane Arnold	Oct 2011	Dec 2011	Jan 2012	Oct 2012	Dec 2012	Jan 2013	Mar 2013	Apr 2013	Jul 2013	**09-10-2013**
Callaway	Nov 2011	Jan 2012	Mar 2012	Nov 2012	Jan 2013	Feb 2013	Apr 2013	May 2013	Aug 2013	**01-13-2014**
Fort Calhoun	Dec 2011	Mar 2012	Apr 2012	Dec 2012	Feb 2013	Mar 2013	May 2013	Jun 2013	Sep 2013	**LATE**
Waterford	Feb 2012	May 2012	Jul 2012	Feb 2013	Apr 2013	May 2013	Jul 2013	Aug 2013	Nov 2013	**LATE**
Summer	Feb 2012	Jun 2012	Jul 2012	Feb 2013	Apr 2013	May 2013	Jul 2013	Aug 2013	Nov 2013	**LATE**
Cooper	Jul 2012	Oct 2012	Nov 2012	Jul 2013	Sep 2013	Oct 2013	Dec 2013	Jan 2014	Apr 2014	**04-29-2014**
NMP	Aug 2012	Nov 2012	Dec 2012	Aug 2013	Oct 2013	Nov 2013	Jan 2014	Feb 2014	May 2014	**LATE**
Turkey Point	Oct 2012	Dec 2012	Jan 2013	Sep 2013	Nov 2013	Dec 2013	Feb 2014	Mar 2014	Jun 2014	
Prairie Island	Dec 2012	April 2013	May 2013	Dec 2013	Feb 2014	Mar 2014	May 2014	Jun 2014	Sep 2014	
Farley	Dec 2012	Mar 2013	Apr 2013	Dec 2013	Feb 2014	Mar 2014	May 2014	Jun 2014	Sep 2014	
Brunswick	Dec 2012	April 2013	May 2013	Dec 2013	Feb 2014	Mar 2014	May 2014	Jun 2014	Sep 2014	
Palisades	Mar 2013	May 2013	Jul 2013	Feb 2014	Apr 2014	May 2014	Jul 2014	Aug 2014	Nov 2014	
ANO 2	Mar 2013	May 2013	Jul 2013	Feb 2014	Apr 2014	May 2014	Jul 2014	Aug 2014	Nov 2014	

Only half of the amendments scheduled to be issued in the past year were actually issued.

Slow and Slowing - Sideslide

50.48 and App. R went into effect on February 17, 1981.

It took NRC more than 15 years to discover that nearly half the U.S. fleet did not comply with these prescriptive regulations.

Will it take as long or longer to verify NFPA 805 compliance?

Delays Have Risk Implications

"Approximately one-half of the core damage risk at operating reactors results from accident sequences that initiate with fire events."

Jack Grobe, Associate Director for Engineering and Safety Systems, Office of Nuclear Reactor Regulatory, Nuclear Regulatory Commission during July 17, 2008, Commission Briefing on Fire Protection Issues

Delays Have Risk Implications

Fire risk roughly equals risk from ALL OTHER ACCIDENT SEQUENCES combined, and that's if fire regulations are being met. Fire risk increase when reactors do not comply with the safety regulations.

Delays Have Risk Implications

Risk Comparison of ONS Modifications

Modification	Estimated Risk Reduction (delta CDF per year)
Increase SSF Flood Protection	1.5E-4
Total of Currently Planned Modification (sum of values below)	8.1E-5
Tornado	6.8E-6
Internal Events	1.4E-5
HELB	1.0E-5
Fire	5.0E-5

The numerical risk of NOT complying with fire safety regulations.

Delays Have Risk Implications

TVA Nuclear

Modification Breakdown By Type

Protect or Reroute Cables	26 Design Changes/39 Stages
Fusing of Associated Circuits	7 Design Changes/91 Stages
Circuit Protection and Coordination	2 Design Changes/~150 Stages
Interposing Relays for Circuit Isolation	3 Design Changes/18 Stages
Isolation Switches	7 Design Changes/27 Stages
Prevent Spurious Valve Operation	9 Design Changes/28 Stages
Eliminate Unnecessary Circuits/ Functions	8 Design Changes/54 Stages
New Logic Inhibit Switches	4 Design Changes/24 Stages
Fire Protection System Enhancement	5 Design Changes/11 Stages
New High Pressure Injection Pump and backup diesel generator	1 Design Change/3 Stages
Mechanical Isolation	2 Design Changes/12 Stages

Delays Have Risk Implications

TVA Nuclear

Closing

- TVA is strongly committed to reducing fire risk at BFN
- TVA is committed to strategy of parallel plant modification and NFPA 805 application development
  - Modifications are progressing consistent with the schedule captured in the TVA commitment letter of February 17, 2012
- BFN NFPA 805 License Amendment is on track for submittal no later than March 29, 2013

More than 38 years AFTER the Browns Ferry fire – what would a weak commitment to fire safety look like?

Broken Contract

Regulations and operating licenses are three-way contracts between NRC, licensees, and the public.

do

They protect licensees from NRC requiring more stringent, and more costly, measures.

Should also

They protect the public from NRC accepting less than compliance with regulatory requirements.

Broken Contract

10 CFR 50.48 and App. R became effective 02/17/81

NFPA 805 became effective 07/16/04

Browns Ferry and other reactors transitioning to NFPA 805 have never complied with these fire regulations for even a millisecond

NRC is letting the public down.

Broken Contract

Compensatory measures, in place for decades and counting, have not gone through a rulemaking process.

NRC could have pursued rulemaking producing a regulation outlining when compensatory measures are permissible under what conditions.

Relying on compensatory measures year after year constitutes *de facto* rulemaking denying the public its right to contest it.

Nuclear Safety 1.0

Whether risk from fire regulation non-compliance is 5.0E-5, 2.3E-6, or 6.2E-3 per reactor year, the appropriate metric must be 1.0E+0 per reactor year.

There must be a 100 percent chance that reactors comply with NRC's fire safety regulations for nuclear power's risks to be managed properly and responsibly.

July 16, 2014

Four weeks from today is the tenth anniversary of the NFPA 805 regulations becoming effective.

In that decade, a not-so-grand total of six (6) reactors achieved compliance and nearly four dozen others expressed some interest in maybe doing so, too.

Fire safety must be taken seriously.

Acronym List

BFN – Browns Ferry nuclear plant
HELB – high energy line break
LA – license amendment
LAR – license amendment request
LOI – letter of intent
LER – licensee event report
NFPA – National Fire Protection Association
NRC – Nuclear Regulatory Commission
TVA – Tennessee Valley Authority

Backup Slides

Enforcement ~~Discretion~~ Dismissal

Petitioners questioned how NRC inspects a reactor known not to comply with either App. R or NFPA 805.

NRC's answer: "*For Shearon Harris and all other plants that are transitioning to 805, we have a revised inspection procedure. ... In other words, that is no reason to go and reinspect things like operator manual actions where we believe that the licensee is not in compliance.*"

Source: Transcript of NRC Petition Review Board meeting conducted 11/13/2006 (ML063210488)

Shearon Harris Timeline

Date	Event
03/22/75	Browns Ferry fire
02/17/81	50.48 and App. R regulations effective
07/16/04	NFPA 805 regulations effective
06/10/05	Letter of intent for transition to NFPA 805 submitted
05/29/08	License amendment request for NFPA 805 transition submitted
12/17/08	Renewed license issued
06/28/10	License amendment for NFPA 805 transition issued

Shearon Harris Timeline, cont.

Date	Event
03/22/75	Browns Ferry fire
02/17/81	50.48 and App. R regulations effective
07/16/04	NFPA 805 regulations effective
06/10/05	Letter of intent for transition to NFPA 805 submitted
05/29/08	License amendment request for NFPA 805 transition submitted
12/17/08	Renewed license issued
06/28/10	License amendment for NFPA 805 transition issued

Oconee Timeline

Date	Event
03/22/75	Browns Ferry fire
12/08/11	First triennial fire protection inspection post-NFPA 805 identifies one Green finding (non-existent step in response procedure)
12/23/11	NRC grants fee waiver for review costs from NFPA 805 license amendment request
11/04/13	Routine inspection effort identifies one Green finding (non-existent compensatory measure for fire protection impairment)

Oconee Timeline, cont.

Date	Event
03/22/75	Browns Ferry fire
07/31/12	Duke requests completion date for NFPA 805 implementation be extended to 12/31/14
01/15/13	NRC denies extension request because "*the increase in core damage frequency (CDF) resulting from the change requested in the July 2012 application is about four times the greatest acceptable increase in CDF for a facility with a very low total risk and 40 times the greatest acceptable CDF increase for a high total risk plant*"

Oconee Timeline, cont.

Date	Event
03/22/75	Browns Ferry fire
01/31/13	NRC issued apparent violation for missing 12/31/12 deadline
03/11/13	Duke commits to fully implementing NFPA 805 measures by 11/15/16
07/01/13	Confirmatory Order directs all NFPA 805 measures be completed by 11/15/16

Browns Ferry Timeline

Date	Event
03/22/75	Browns Ferry fire
02/17/81	50.48 and App. R regulations effective
03/19/85	Unit 1 enters extended outage
03/19/93	TVA commits to achieving compliance with 50.48 and App. R on Unit 1
07/16/04	NFPA 805 regulations effective
06/02/07	Unit 1 ends 22-year plus outage
03/04/09	Letter of intent for transition to NFPA 805 submitted

Browns Ferry Timeline, cont.

Date	Event
03/22/75	Browns Ferry fire
01/26/12	Fire inside Unit 3's control room
02/17/12	TVA reports 6 modifications completed and 27 pending to reduce fire risk
05/18/12	Confirmatory Order extends NFPA 805 submittal deadline to 03/29/13
05/29/12	LER for combustible materials not in compliance with exclusion zone requirements

Browns Ferry Timeline, cont.

Date	Event
03/22/75	Browns Ferry fire
06/22/12	White finding for "*failure to adequately identify and perform required training for implementation of procedures for combating plant fire events*"
11/08/12	TVA identifies dozens of additional modifications needed to reduce fire risk
03/27/13	License amendment request for NFPA 805 transition submitted

Diablo Canyon Timeline

Date	Event
03/22/75	Browns Ferry fire
02/17/81	50.48 and App. R regulations effective
07/16/04	NFPA 805 regulations effective
12/29/05	Letter of intent for transition to NFPA 805 submitted
10/15/08	Target date for submitting license amendment request extended by one year
06/26/13	License amendment request for NFPA 805 transition submitted

U.S.NRC

United States Nuclear Regulatory Commission

Protecting People and the Environment

Briefing on National Fire Protection Association (NFPA) Standard 805 Fire Protection

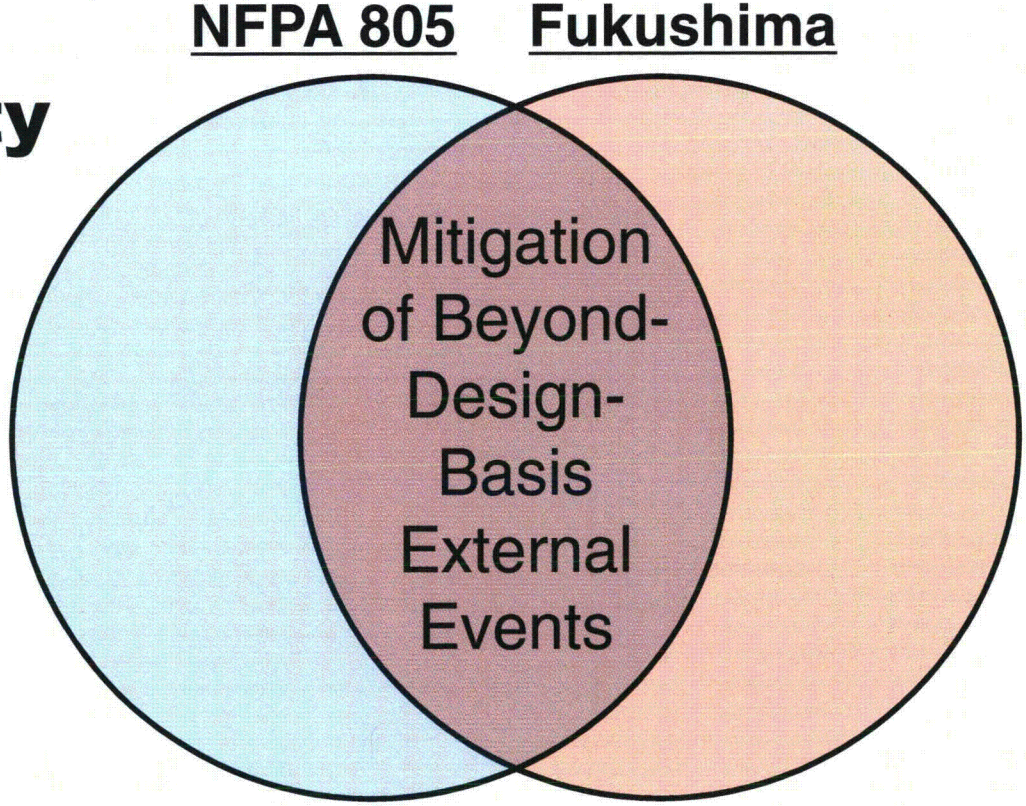
Mark Satorius

Executive Director for Operations, OEDO

June 19, 2014

NFPA 805 Improves Safety

- **Improved Safety**
- **Progress**
- **Challenges**

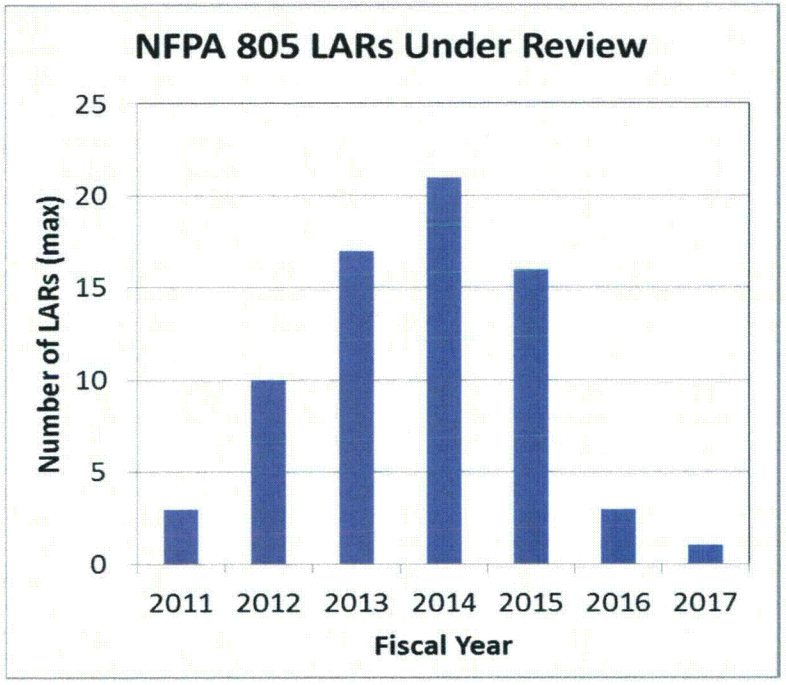


Presenters

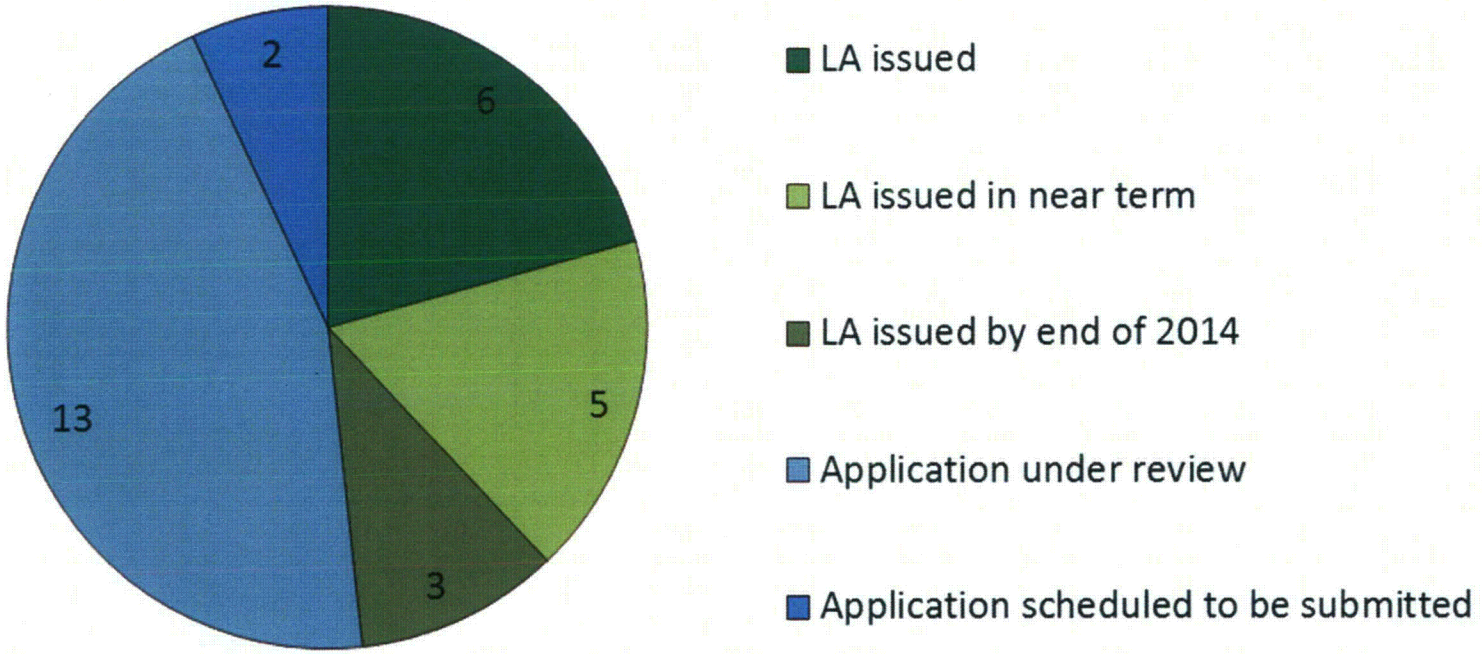
- **Joseph Giitter, Director, Division of Risk Assessment (DRA), NRR**
- **Alex Klein, Branch Chief, Fire Protection Branch, DRA, NRR**
- **Hossein Hamzehee, Branch Chief, Probabilistic Risk Assessment (PRA) Licensing Branch, DRA, NRR**

We are Focused on the Success of the NFPA 805 Program

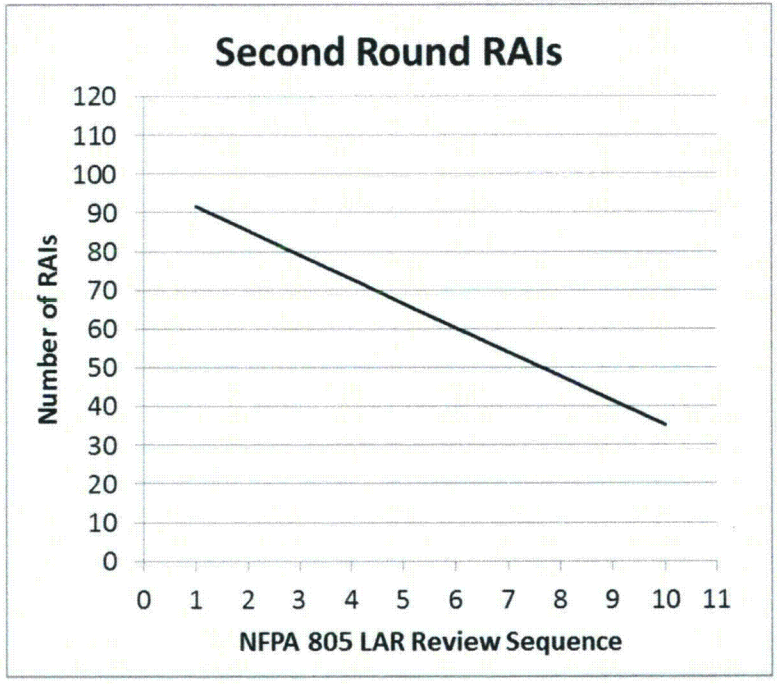
- Safety Improvements
- Challenges
  - Resources
  - New Methods
- Efficiency
- Communications

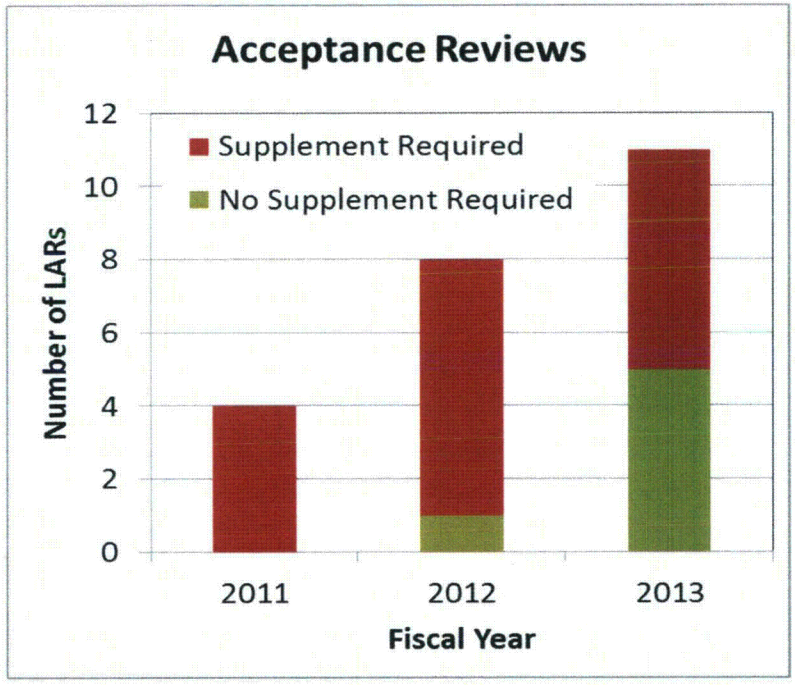


Nearly Half of the NFPA 805 Reviews Will Be Completed By the End of 2014



NFPA 805 LAR Quality Has Improved





Transition to NFPA 805 is a Positive Step Forward

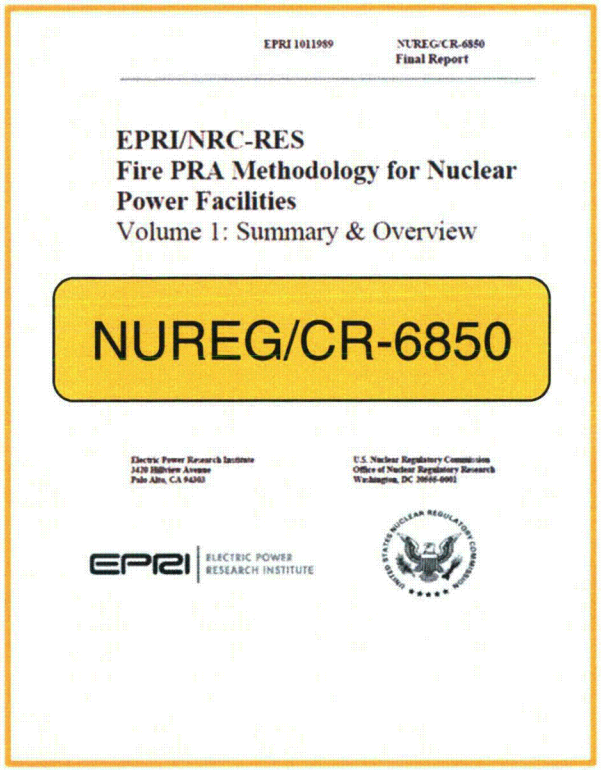
- Safety improvements
- Licensee knowledge
- Licensee ownership

Enforcement Discretion Policy Supports NFPA 805 Transition

- Policy
  - Issued in 2004
  - Provides enforcement discretion for certain fire protection non-compliances
- NFPA 805 Confirmatory Orders
  - Establishes a legally binding commitment to submit an NFPA 805 application

Technical Challenges Related to Fire PRA

- New methods are used in LARs and evaluated during review process
- Impact
  - Review Schedule
  - Consistency
  - Resource Challenges
  - Stability of Review Process



Joint Fire PRA Method Development Efforts Have Been Successful

- New methods and guidance have been developed by NRC and Industry
  - Fire testing by NRC/RES (e.g., Electrical Cabinet Heat Release Rate testing, Incipient Detection System Testing)
  - Joint Fire PRA research efforts by NRC/RES and EPRI
- FAQ process is used to provide interim guidance on various Fire PRA technical issues

Significant Progress Made to Date

- Fire PRA technical issues are being resolved
- A number of fire tests have been completed by NRC/RES
- "Freeze Point" concept for Fire PRA application is feasible
- A number of licensees have committed to installing RCP shutdown seals to enhance safety

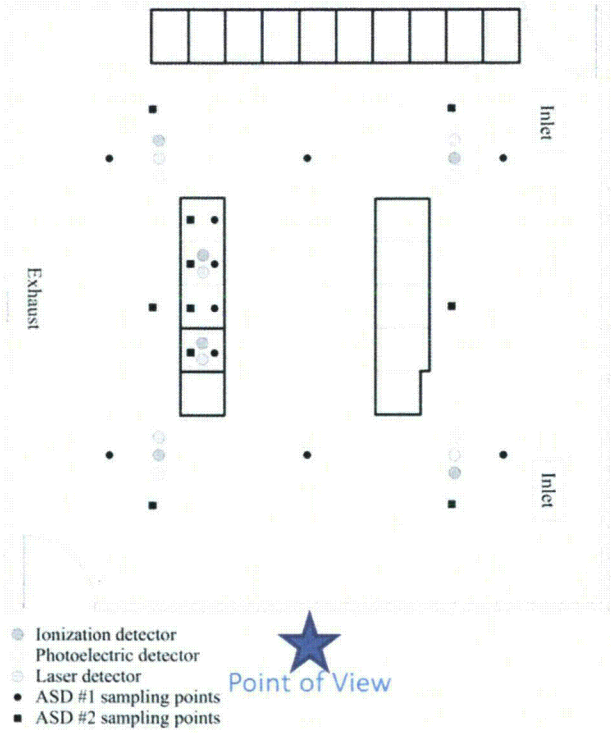
NRC Formed Risk-Informed Steering Committee

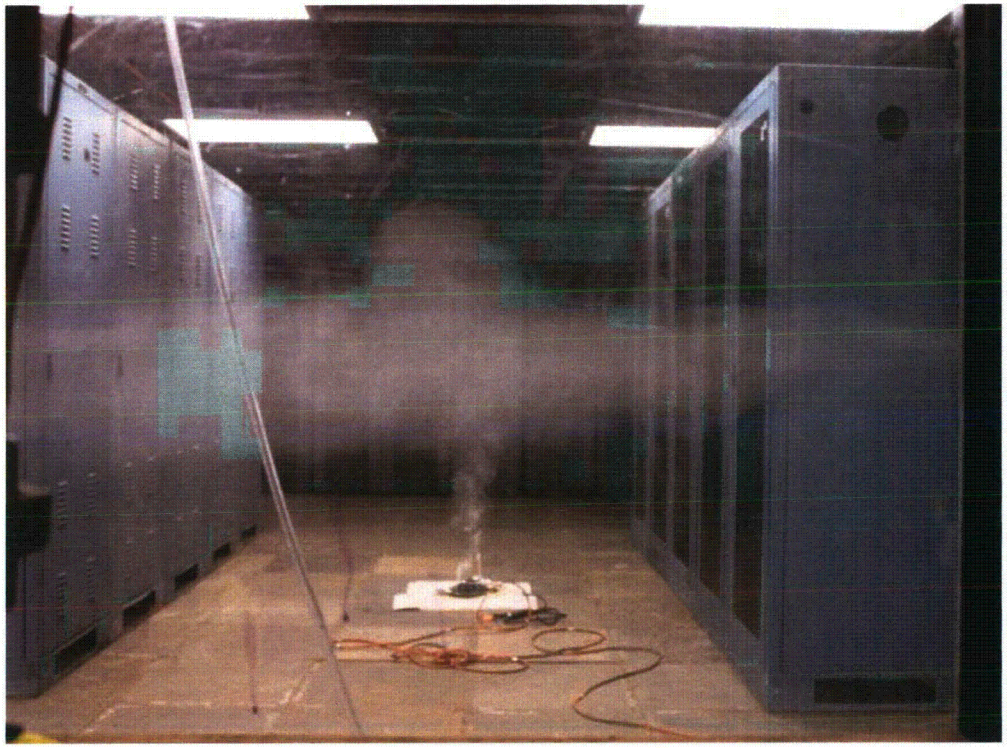
- The Risk-Informed Steering Committee (RISC) was just formed in early 2014
- RISC is chaired by the NRR Office Director and other members include Deputy Directors from various NRC offices
- RISC provides strategic direction to the staff to advance the use of risk-informed decision making

Incipient Fire Detection Systems

- **Installation of Incipient Fire Detection Systems (IFDS) can result in safety enhancement.**
- **Credit for IFDS is currently allowed in Fire PRA consistent with existing guidelines and operating experience.**
- **Results of IFDS testing will be used to provide more realistic credit in Fire PRA.**

Incipient Fire Detection System





Summary

- Focus on safety
- Continuous process improvement
- Continued focus on communications
- Paving the path for future risk-informed applications

Acronyms

ASD	**Aspirating Smoke Detector**
DRA	**Division of Risk Assessment**
EPRI	**Electric Power Research Institute**
FAQ	**Frequently Asked Questions**
IFDS	**Incipient Fire Detection System**
LA	**License Amendment**
LAR	**License Amendment Request**
NFPA	**National Fire Protection Association**
NRC	**U.S. Nuclear Regulatory Commission**
NRR	**Office of Nuclear Reactor Regulation**
OEDO	**Office of the Executive Director for Operations**
PRA	**Probabilistic Risk Assessment**
RAI	**Request for Additional Information**
RCP	**Reactor Coolant Pump**
RES	**Office of Nuclear Regulatory Research**
RISC	**Risk-Informed Steering Committee**