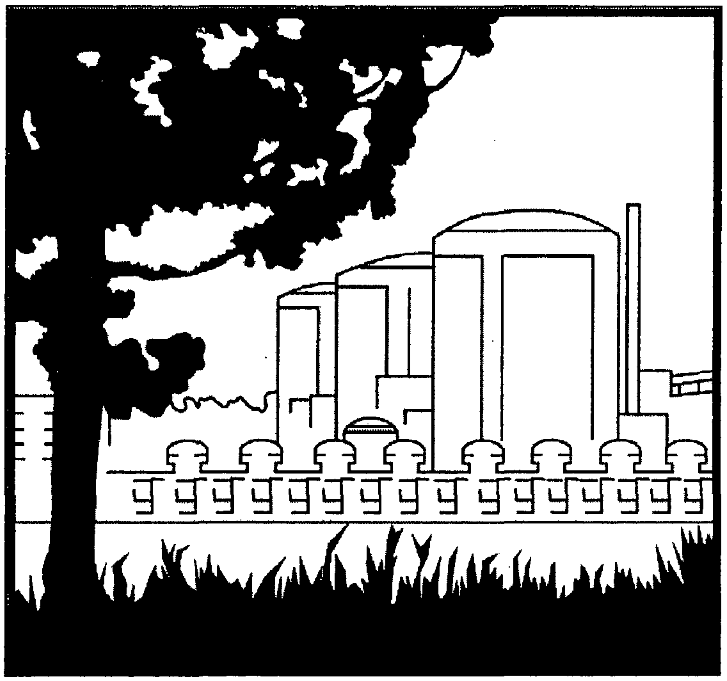
Presentation Handouts
NFPA 805 Transition
Pilot Plant Program

Handout Reference 1

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report



Duke Power NFPA-805 Transition Pilot Observation Project Status

Oconee (ONS)

Harry Barrett

October 17, 2006

Agenda

- Reconstitution Project Status
- NFPA-805 Project Status
- Fire PRA Status
- Duke 3-Site Transition Schedule
- Oconee Transition Schedule
- Near Term Tasks

Reconstitution Project Status

- ONS Units 2 & 3 /Common Reconstitution Analysis is complete
  - Need to review Mods since analysis snapshot
- MNS is approximately 67% complete with expected completion date of April 2007
- CNS is approximately 55% complete with expected completion date of June 2007

NFPA-805 Transition Status

- Fire Protection Program Fundamental Program Elements (Chapter 3)
  - Have completed Fire Hazards Analysis validation walkdowns
    - Data currently under review
    - Ignition Source walkdowns to be discussed later this week
  - Chapter 3 element mapping into the NEI 04-02 Table B-1 is approximately 80% complete

NFPA-805 Transition Status

- Nuclear Safety Performance Criteria Transition (Chapter 4)
  - Have completed mapping Appendix R (NEI 00-01) methodology to NFPA-805
    - Alternate approach referenced in parking lot has been developed
    - Information placed in Table B-1 is abbreviated for better clarity

NFPA-805 Transition Status - continued

- Nuclear Safety Performance Criteria Transition (Chapter 4) - continued
  - Fire Area Assessment in progress for first fire area
    - Working on Table B-3 for Fire Area BH12
  - Continuing to work on Recovery Action Feasibility
  - Pilot of CAFTA EFW Logics completed
- Non-Power Operational Mode Transition
  - Developed Philosophy and Methodology
  - Finalized list of components for additional analysis
  - Performed circuit analysis and cable routing on added components

Fire PRA Status

- Sub-Task 5.1 - Plant Boundary Definition and Partitioning
  - Complete – to be discussed later this week
- Sub-Task 5.2 - Fire Ignition Frequencies
  - In draft form – to be discussed later this week
- Sub-Task 5.3 – Fire PRA Component Selection
  - In draft form – to be discussed later this week
- Sub-Task 5.4 - Fire PRA Cable Selection
  - In Progress – to be discussed later this week
- Sub-Task 5.5 - Qualitative Screening
  - Not going to perform Qualitative Screening (will quantify all Fire Compartments)

Fire PRA Status

- Sub-Task 5.6 - Fire-Induced Risk Model – to be discussed later this week
- Sub-Task 5.7 - Quantitative Screening
- Sub-Task 5.8 - Scoping Fire Modeling
- Sub-Task 5.9 - Detailed Circuit Failure Analysis (combined w/ 5.10)
- Sub-Task 5.10 - Circuit Failure Mode Likelihood Analysis
- Sub-Task 5.11 - Detailed Fire Modeling
- Sub-Task 5.12 - Post-Fire Human Reliability Analysis
- Sub-Task 5.13 - Seismic-Fire Interactions Assessment
- Sub-Task 5.14 - Fire Risk Quantification
- Sub-Task 5.15 - Uncertainty and Sensitivity Analysis
- Sub-Task 5.16 - Fire PRA Documentation

Armored Cable Fire Testing

- We have performed additional fire damage testing to more accurately determine spurious actuation probabilities for our armored cable
  - Testing was performed at Intertek Testing Laboratories (Omega Point Labs) in Texas
  - Test Plan was reviewed and commented on by NRC
  - Testing was observed by NRC
  - Testing Results
    - 120V AC grounded control circuits are very robust – **NO** observed spurious actuations
    - Ungrounded 120V AC and 125V DC control circuits exhibit hot short probabilities in the range of normal thermoset cables
    - Unjacketed Armored Cable is not an effective approach to achieve "no intervening combustibles"

Duke 3-Site Transition Schedule

ONS

MNS

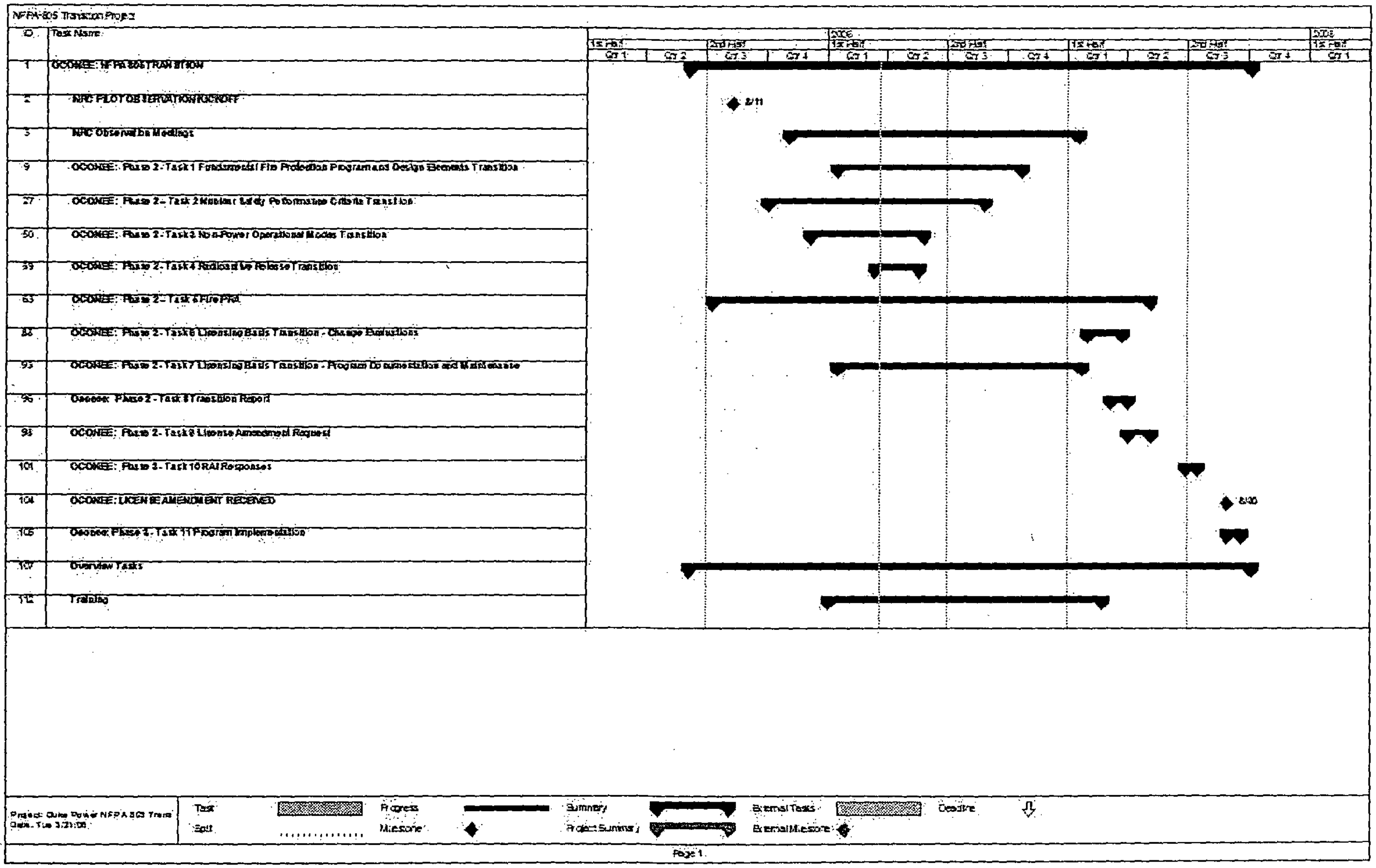
CNS

2005				2006				2007				2008				2009		
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd
		ONS NRC Audit					MNS NRC Audit			CNS NRC Audit								
ONS Unit 0/2		ONS Unit 3 Reconstitution (Jun 05 - Oct 06)																
	ONS Transition to NFPA-805 (Mar 05 – Oct 07)																	
		ONS Fire PRA (Jun 05 - May 07)																
	MNS Reconstitution (Feb 05 - Apr 07)																	
					MNS Transition to NFPA-805 (Apr 06 - Dec 08)													
							MNS Fire PRA (Oct 06 - Mar 08)											
			CNS Reconstitution (Oct 05 - Jun 07)															
										CNS Transition to NFPA-805 (Jul 06 - Sept 09)								
										CNS Fire PRA (Jul 07 - Dec 08)								

MNS and CNS Fire PRA Tasks have been extended by 6 months due to Peer Review

MNS and CNS Transition have been extended 9 months beyond PRA to allow time for addressing major peer review issues and submittal of LAR

Oconee NFPA-805 Transition Schedule



Near Term Tasks (Next Six Months)

- Chapter 4 Transition (Nuclear Safety Performance Criteria)
- Chapter 3 Transition (Fundamental Fire Protection Program Elements)
- Transient Analysis
- Manual Action Feasibility

Handout Reference 2

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report

NFPA 805 Pilot Observations Meeting
Progress Energy Transition Status

October 6, 2006

Jeff Ertman
Dave Miskiewicz

Nuclear Generation Group

Progress Energy

PE NFPA 805 Transition Status Introductions - Oconee 10/14 to 10/19

- Progress Energy Participants this week:
  - Dave Miskiewicz. Fire PRA Lead
  - Andy Spotts, PRA Engineer
  - Bob Rhodes, Harris SSA Program Manager
  - Mike Fletcher, Harris FP Program Manager
  - Jack Curham, Crystal FP Program Manager
  - Ken Heffner, Corp Licensing
  - Bob Rishel, Corp PSA Supervisor
  - Jeff Ertman, Corp FP Supervisor / NFPA 805 Project Manager

PE NFPA 805 Transition Status Discussion Points

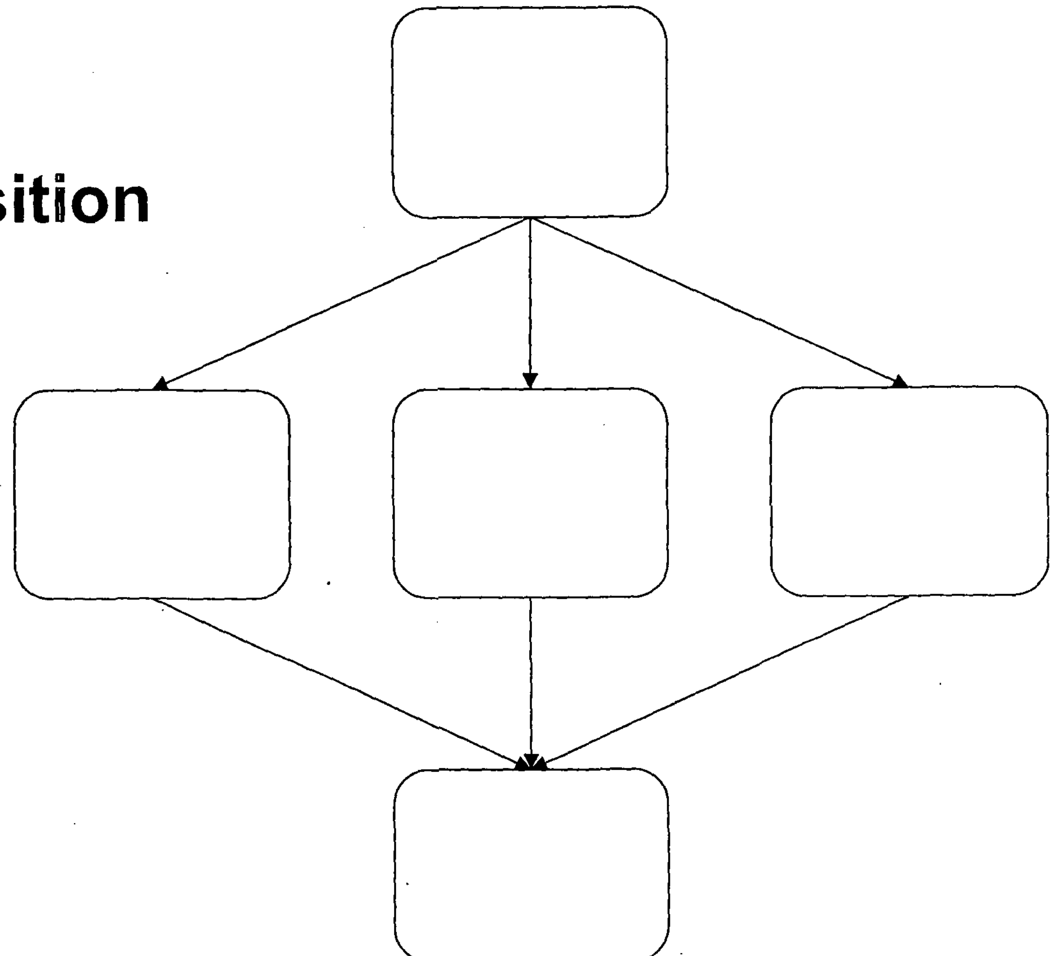
- General project information
- Harris transition plant status
- Summary of outlook upcoming months
- PE Goals of this meeting

PE NFPA 805 Transition Status
General Information - Scope

- Project Scope includes three major work areas:
  - Fire NSA (previously SSA), NFPA 805 Chapter 4
    - Complete SSA/Appendix R Validation and Transition of the analysis to Nuclear Safety Analysis
    - Includes Non Power Operations and Circuit Analysis / Cable Selection of PRA components not analyzed by NSA
  - Fire PRA/PRA
    - Develop Fire PRAs using NUREG 6850 as guidance
    - Assess, revise Internal Events PRA to support NFPA 805 quality requirements
  - Classical FP and Program Transition, Chapter 3
    - Transition to 10CFR50.48(c) / NFPA 805 using NEI 04-02 Guidance
    - Includes Fire Modeling Support and Radioactive Release
    - Includes Change Evaluations

PE NFPA 805 Transition Status General Information - Priorities

- SSA Validation
- NFPA 805 Transition
- Modifications



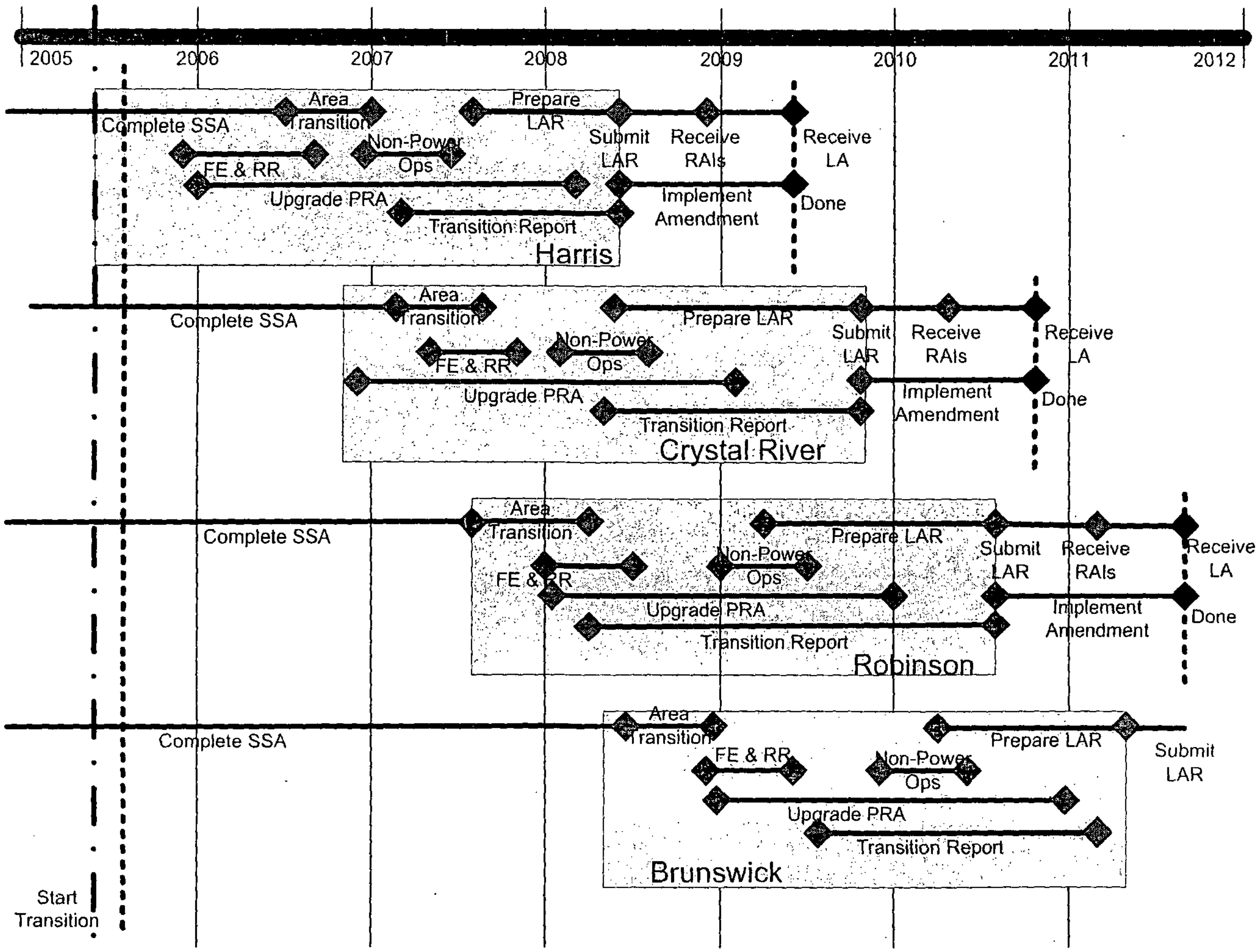
PE NFPA 805 Transition Status
General Information – Project Goals

- Transition to risk informed, performance based licensing basis for an improved safety focus
- Address recent NRC guidance relative to SSA Circuit Analysis and Manual Operator Actions
- Address PE Hemyc applications
- Establish a common Fire Protection Program across fleet – as soon as practical
- Advance Fire Protection and PSA personnel skill and knowledge
- NRC/Industry buy-in on interpretations to guidance during pilot (e.g. use of NEI/NRC FAQ process)

PE NFPA 805 Transition Status
General Information – Fleet Plan LARs

- HNP LAR May 2008
- CR3 LAR August 2009
- RNP LAR August 2010
- BNP LAR August 2011

PE NFPA 805 Transition Status
General Information – Overview Plan



NGG

Progress Energy

PE NFPA 805 Transition Status
General Information – Project Planning

- *Rolling Wave* project planning method utilized
  - Plan includes all four plants
  - Lessons learned from lead plant will be applied across the fleet on a task basis
  - RAI/SER received prior to LAR for next plant
- Dedicated resources at corporate level
- Committed resources at site level
- Funding at the Fleet Initiative level

PE NFPA 805 Transition Status
Harris Status – October 6, 2006

- Fire NSA (SSA), NFPA 805 Chapter 4
  - Completed initial SSA Validation Fire Area reviews
  - Initiated tasks to select cables of PRA components
- Fire PRA/PRA
  - Fire PRA Ignition Source calculation is complete
  - Fire PRA Component selection is complete
  - Internal Events PRA Gap Closure, In Process
- Classical FP and Program Transition, Chapter 3
  - Chapter 3 initial review in progress
  - HNP MT Fire Test field complete, Hemyc in planning

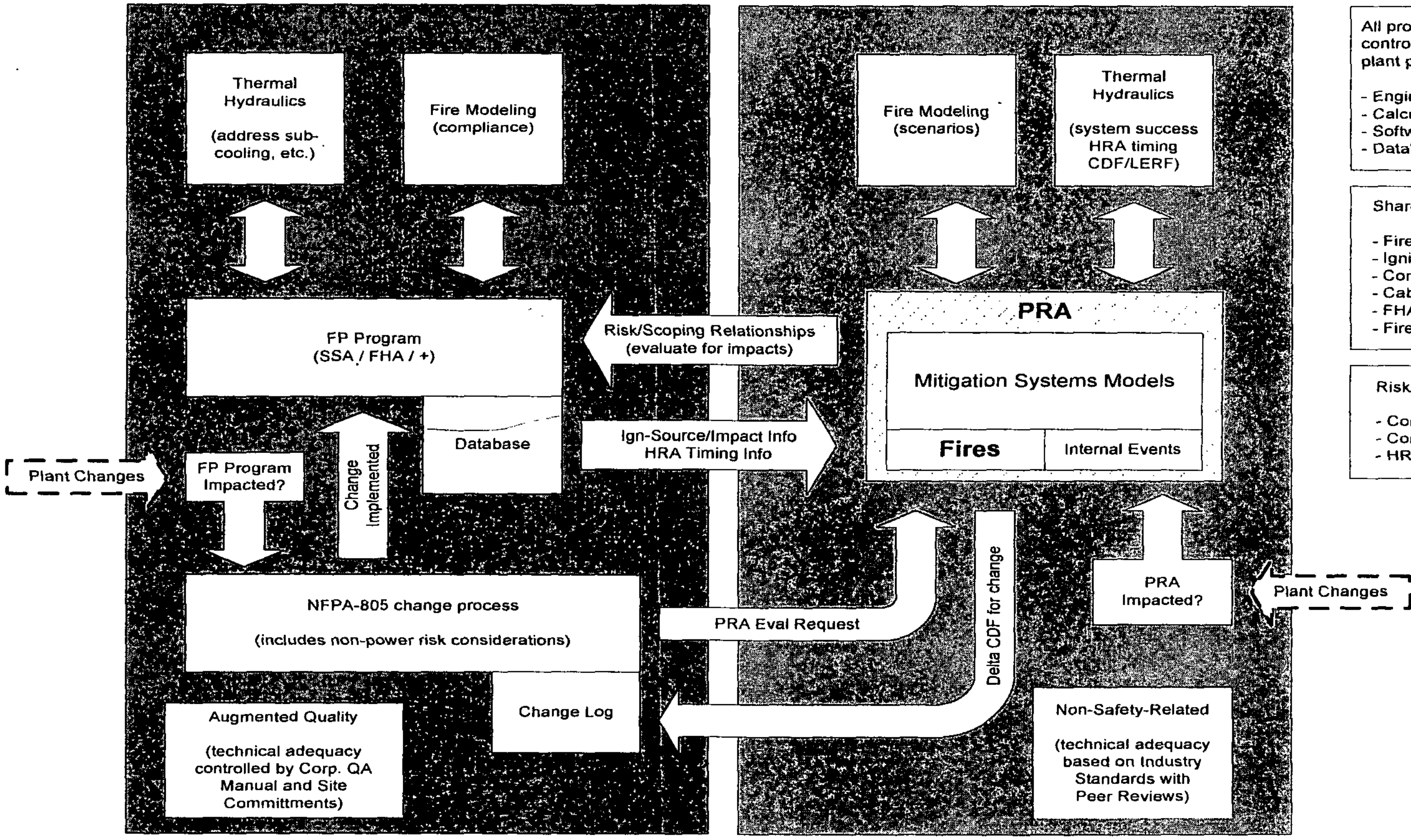
PE NFPA 805 Transition Status
Harris – Highlights Upcoming Tasks

- Fire NSA (SSA), NFPA 805 Chapter 4
  - Detailed NFPA 805 Fire Area review
  - Perform circuit analysis/cable routing for additional PRA related components
  - Review Manual Actions draft NUREG 1852 for impact
  - Review Circuit Analysis GL for impact when issued
  - Start Non-power Operations January 2007
- Fire PRA/PRA
  - Fire Scenario scoping and Detailed Fire Modeling
  - Model updates for Internal Events and Fire Sequences
- Classical FP and Program Transition, Chapter 3
  - Work off open items from Chapter 3 review
  - Review Tech Evaluations (e.g. GL 86-10s)

PE NFPA 805 Transition Status
Our Goals for This Meeting

- Discussion / initial feedback on Fire PRA Results to date
- Parking Lot items
  - Clear Old Parking Lot items - Close to FAQs
  - Resolution schedule for those can't close
  - Identification of new Parking Lot items
- Identify FAQs with near term Pilot impacts
  - Establish schedule with NEI task force/ NRC
- Establish schedule next 12 months
  - NRC Fire PRA Audit schedule
  - Next Pilot Observation meeting (beyond HNP in Nov.)
  - Approximate meeting dates next 12 months

PE NFPA 805 Transition Status
Fire PRA/NFPA 805 Application Interface



All products to be developed and controlled by existing approved plant procedures:

- Engineering Changes
- Calculations
- Software
- Databases

Shared Database Information:

- Fire Compartment Data
- Ignition Source Data
- Component Scoping
- Cable/Circuit Routing
- FHA data
- Fire Scenario Data

Risk/Scoping Examples:

- Compartment Risk Ranking
- Component Importances
- HRA Importances

Industry Standards and Related Guidance:

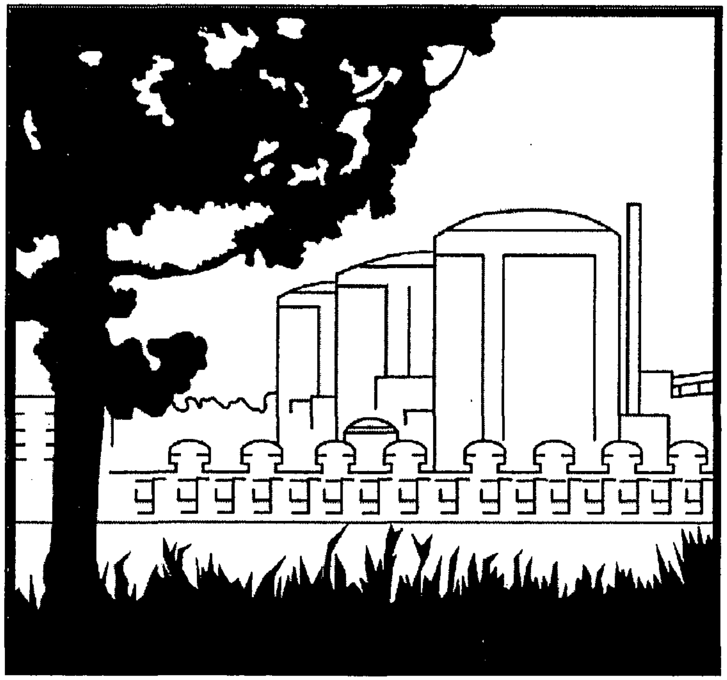
- ASME RA-Sb-2005
- ANS 58.23
- NUREG/CR-6850
- NEI 04-02

Fire PRA / Fire Protection Program Interface

Handout Reference 3

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report

Duke Energy



Task 1
Duke Power
FPRA Pilot Meeting
Oconee (ONS)

October 16, 2006

NUREG/CR-6850

TASK 1

Plant Boundary Definition & Partitioning

Duke Energy

FPRA Boundary Definition

- The area within the plant protected area fence is the starting point for the Fire PRA boundary definition
- Within the plant protected area, selected locations were excluded:
  - If a fire would not cause a plant trip or require shutdown
  - If the structure is not directly connected with the primary plant power block structures
  - If the structure contained no PRA components

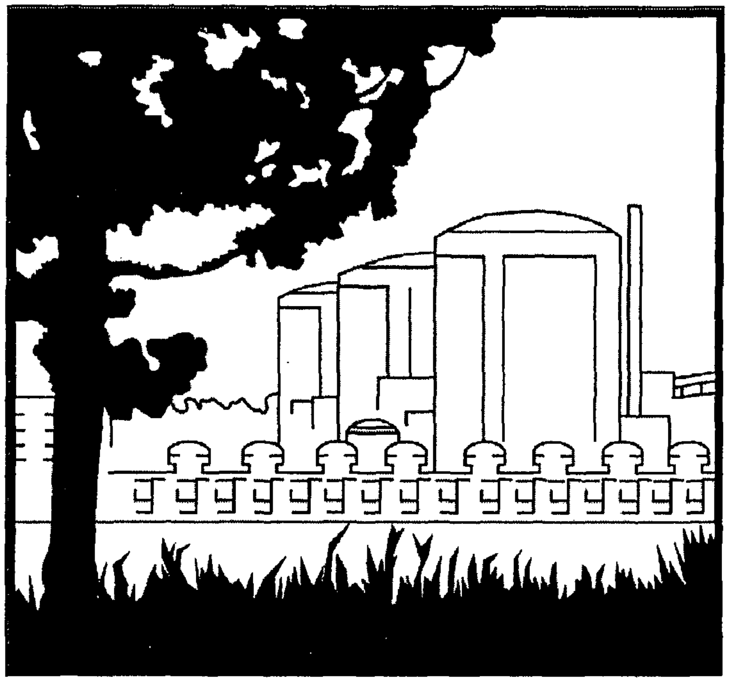
Plant Partitioning

- Started with IPEEE compartment list
  - Most compartments correspond to single FZ
  - TB comprised of 3 compartments (TB01, TB02, & TB03)
- Refined compartment list
  - ESV Building (contained PRA components)
  - Keowee Dam (emergency power)
  - Intake Structure (include with Yard FC)
- Multi-compartment analysis considerations
  - Maintenance Support Building
    - Shares boundary with NE end of TB
  - Service Building
    - Shares boundary with North end of TB

Handout Reference 4

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report

Duke Energy



Task 6
Duke Power
FPRA Pilot Meeting

Oconee (ONS)

October 16, 2006

NUREG/CR-6850

TASK 6

FIRE IGNITION FREQUENCIES

Duke Energy[SM]

Fixed Ignition Source Counting

- Initial walkdown lacked detailed criteria
  - Benchmarking meeting
  - Potential outlier with respect to HEAF
- Verification walkdown performed to refined criteria
- Latest results still being reconciled

Duke Energy

Counting Criteria

- HEAF (Bin 16)
  - If less than 1000 V, count entire load center or switchgear as one HEAF
  - If greater than 1000 V, count each vertical segment of the load center or switchgear as one HEAF
  - Bus Duct – no longer based on linear feet
- MCC's as HEAF (include or not include)
  - Breakers in MCCs are typically molded case and not the type that hang up and cause problems
  - MCC's are not high energy – too far removed from the switchyard energy

Counting Criteria

- Electrical Cabinets (Bin 15)
  - Considered pro-rating based on size (similar to vertical stack counting for an MCC, Load Center, or Switchgear)
  - Since 6850 is not explicit; all cabinets counted the same
  - Exclude cabinets less than 1’x1’x1’ and less than 440 V
- Main Control Board (Bin 4) – Back Panels
  - Count as Bin 4 - panels have control functions similar to Bin 4 consoles
  - Count as Bin 15 - cabinet function is not really part of the 6850 counting criteria for Bin 15

ISDS Workbook

- Imported walkdown Information
  - Reviewed for consistency
  - Additional refinement likely
- Transient Fire Frequency
  - Influence Factors determined
  - Weighting factors for “Cutting and Welding” bins applied to “Cable Fires Caused by Welding and Cutting” bins (5, 11, 31)
  - Oconee utilizes armored cables; no Bin 12 (self igniting cable fires)
- Bayesian update
  - Reviewed site data for potentially challenging fires
  - Only 1 event met criteria
  - Performed Bayesian update for Bin 21
- Compartment frequencies determined

Handout Reference 5

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report

NFPA 805 Transition

Harris Nuclear Plant (HNP) Ignition Frequency Calculation

Andrew Spotts
10/17/06

NGG Nuclear Generation Group

Progress Energy

Methodology:

NUREG/CR-6850

EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities

Volume 2: Detailed Methodology

HNP Ignition Source Calc provides official documentation for:

- TASK 1 - PLANT BOUNDARY DEFINITION AND PARTITIONING
- TASK 4 - QUALITATIVE SCREENING
- TASK 6 - FIRE IGNITION FREQUENCIES

TASK 1
PLANT BOUNDARY DEFINITION AND PARTITIONING

- Selection of Global Plant Analysis Boundary
  - HNP Global Boundary is the plant's Protected Area

- Plant Partitioning
  - 51 Fire Compartments
    - 38 » identical to Fire Areas
    - 10 » are identical to Fire Zones – Large Fire Areas divided up into smaller analysis areas.
    - 3 » Outside areas where vital equipment is located

TASK 4
QUALITATIVE SCREEING

- Several buildings within the Global Boundary screened from further analysis qualitatively.
  - No PSA or Safe Shutdown equipment (or circuits)
  - Fire in building will not lead to:
    - Automatic plant trip
    - Manual plant trip (per procedure, policy, or practices)
    - Controlled shutdown per tech specs
    - Fire will not spread to another area and cause any of the above three things
  - Examples:
    - Security Building
    - Paint Shop
    - Bulk Warehouse

TASK 6
FIRE IGNITION FREQUNCY

- Unused bins

- Fixed ignition sources
  - Walkdown documentation
  - Fixed source counts

- Transient frequencies
  - Weighting Factors
  - Cable Loading
  - Cable Run & Junction Boxes

Unused Bins

- Bin 20 – Offgas/H2 Recombiner
  - BWR component (HNP is PWR)
- Bin 23A – Transformer (oil filled)
  - 6 oil filled transformers at HNP, all in qualitatively screened or out of scope areas. No oil filled transformers found during compartment walkdowns.
- Bin 30 – Boiler
  - Only boiler at HNP is in building that was qualitatively screened.

Frequencies from unused bins omitted from analysis

Transient Frequencies

- Weighting Factors (maintenance, occupancy, storage)
  - Engineering judgment used to determine factors
    - Input solicited from PRA & plant Fire Protection Program personnel
- Bin 3, 7, 25, 37 – Transient fires
  - All three weighting factors used
- Bin 6, 24, 36 – Transient fires from cutting & welding
  - Only maintenance factor used
- Bin 5, 11, 31 – Cable Fires from cutting & welding
  - Cable loading data from HNP combustible load calculations
  - Maintenance factor combined with cable loading factor
- Bins 12 - Cable Run & Bin 18 - Junction Box
  - Combustible load calculations used to determine ratio of cable in each compartment relative to all plant cable
  - Assumed the number of junction boxes is proportional to the ratio of cable in each compartment

Fixed Ignition Sources

- Every Compartment was walked down twice (including Containment). Once to identify ignition sources, and once for validation of initial walkdown.

- Each ignition source recorded on the walkdown sheets and a photo of each source was taken.

- Once the walkdowns were complete all the sources were added up and the fire frequency per component (per bin type) was calculated.

- Walkdown sheets and validation sheets are included in the Ignition Frequency Calculation in an attachment.

Electrical Cabinets

- There is a wide variety in what was counted for Bin 15 – Electrical Cabinets
  - Some very small, low voltage panel/cabinets with fewer than 4 switches were not counted (not considerer a significant fire source).
  - Free standing electrical cabinets counted by number of vertical sections
  - Counted each cabinet as '1' regardless of size. Size varies from small wall mounted panels to large 'walk-in' size cabinets.

High Energy Arc Fault (HEAF)

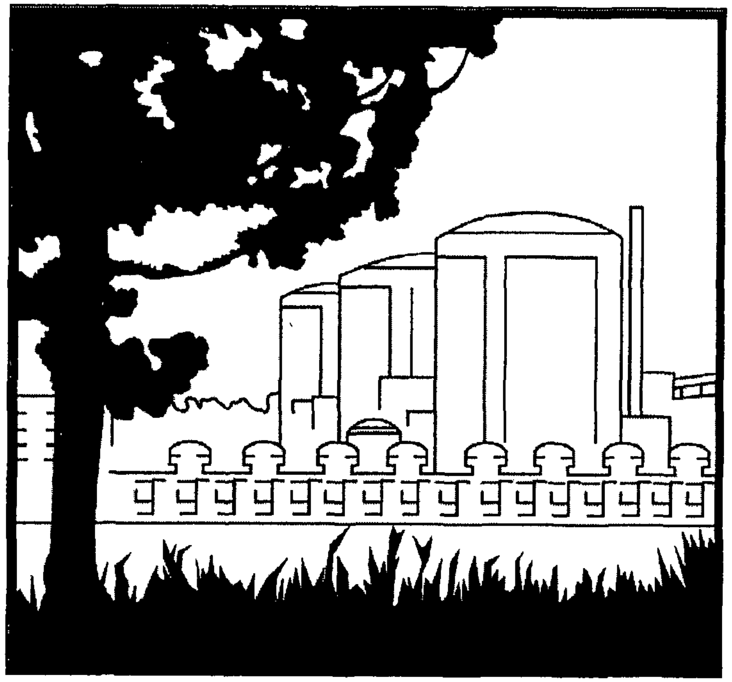
- 480V to 6.9kV switchgears & load centers counted for HEAF.
  - Example: A 4.16kV load center with three vertical sections and a transformer counts:
    - 3 Electrical Cabinets
    - 3 HEAF
    - 1 Transformer (dry)

Results

Table 6.1 Total Compartment Ignition Frequencies and Rankings			
Rank	Compartment	Total Freq	Description
1	1-G	8.48E-02	Turbine Generator Building
2	5-W-BAL	3.30E-02	Waste Processing Building
3	1-D-DGB	1.22E-02	Diesel Generator 1B
4	1-D-DGA	1.22E-02	Diesel Generator 1A
5	1-C	1.06E-02	Containment Building, All Levels
6	1-A-BAL-A	9.70E-03	Reactor Auxiliary Building Elevations 236, and 261 ft
7	1-A-BAL-B	7.63E-03	Reactor Auxiliary Building El 261 and 286 ft
8	12-A-CRC1	6.87E-03	Control Room Complex
9	5-F-BAL	6.01E-03	Fuel Handling Building, Balance of Areas
10	12-A-CR	5.56E-03	Control Room, Reactor Auxiliary Building (RAB)
11	1-A-SWGRB	5.23E-03	Switchgear Room B
12	1-A-SWGRA	5.15E-03	Switchgear Room A
13	12-A-BAL	3.45E-03	Reactor Auxiliary Building Units 1 and 2 Balance
14	1-A-BAL-J	2.73E-03	Reactor Auxiliary Building - HVAC room
15	1-A-BAL-C	2.72E-03	Reactor Auxiliary Building Elevation 286 ft

Handout Reference 6

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report



Task 2
Duke Power
FPRA Pilot Meeting

Oconee (ONS)

October 16, 2006

NUREG/CR-6850

TASK 2

COMPONENT SELECTION

Task 2 Elements

- FPRA Component List
  - PRA
  - SSEL (with cables)
  - MSO
  - ISLOCA
  - Containment Isolation
  - Instrumentation
- Disposition of PRA basic events
- Disposition of Safe Shutdown Equipment List (SSEL)

Scope of FPRA Component List

Components:

- Whose fire-induced failure will cause an initiating event (e.g., ADVs and PORVs)
- That support mitigating functions credited in the PRA (e.g., pumps, MOVs)
- Whose spurious actuation could cause an adverse effect on mitigating functions credited in the PRA (e.g., normally closed MOVs that could open & cause flow diversion)
- That support operator actions credited in the PRA or whose spurious actuation or failure could likely induce undesirable operator action (instrumentation)

Duke Energy

Dispositioning of PRA Basic Events

Disposition	Action or Result
Y1	Link Basic Event to SSE or Appendix R equipment
Y2	Link Basic Event to other equipment (assemble cable data)
Y3	Fail equipment in every Fire Area or set BE probability to 1.0
N1	Not affected by fire – basic event may be ignored
N2	Addressed by another basic event – may be ignored
N3	All other justifications for not mapping a basic event

Link

Ignore

Duke Energy

N1 – Not Affected by Fire

- Start by identifying basic events involving component failures that are not impacted by a fire
  - Passive components
  - Components with no cables
- Basic events involving maintenance unavailability or misalignment (pre-initiators)
- Initiating events
- Common cause failures

N3 – Unrelated to Fire Mitigation

- Start with BE database from internal events PRA
- Remove unrelated event tree sequence logic
  - ATWS
  - SGTR, Large LOCA
  - Tornado, Flood
- Use purge utility to remove basic events from the database that no longer appear in the fault tree to reduce disposition effort
- For identifying basic events that are <u>only</u> associated with non-fire related sequences; not for quantification

Y1 – Link BE to SSE

- Remaining basic events involve active functions applicable to fire events
- Looked for matches on SSEL (ARTRAK Component List)
  - Functional failure modeled by the BE must be consistent with ARTRAK cable selection
  - Used Appendix R Safe Shutdown Logics to compare with PRA functions

Y3 – Ensure Failure of BE

- Cable location unknown
- Requires link to a component or variable that is assumed to be located in <u>every</u> compartment
- Credit by exclusion still an option
- Preliminary Y3 systems
  - Instrument and Station Air
  - Emergency Siphon Vacuum
  - High Pressure Service Water
  - Reactor Building Cooling
  - Recirculating Cooling Water

N2 – Addressed by Another BE

N2 may be used:

Provided	Example
▪ The BE is in the same PRA logic sequence as another linked BE and ▪ The components associated with each BE are related by common cables	A circuit breaker for an MOV ▪ The MOV has been linked to one or more basic events ▪ The routing information for the complete set of cables for that MOV is known ▪ No additional PRA logic sequences are involved

Duke Energy

Y2 – Link BE to Other Equipment

- Requires assembly of cable routing information
- Components not credited for Appendix R safe shutdown
  - HPI Instrumentation (modeled in PRA)
    - Suction xfer to the BWST on low LDST level
  - CS-46 & 56, HP-16, and CS-3A & 3B
    - Boron Dilution of Letdown Flow
    - MSO Scenario (new sequence)
  - RB Purge Inlet/Outlet
    - Containment Isolation Review

SSEL

- Not all entries have cables or known cable routing information (manual valves, relief valves; Unit 1 cables not traced)
- PRA function must be consistent with SSEL function from a cable selection perspective
- Configuration control – incorporation of “additional” (Y2) components in Appendix R database
- Certain SSEL functions not modeled in PRA
  - Control Room HVAC
  - Ventilation for SSF DG, switchgear, and pump rooms
- Everything on SSEL is linked or dispositioned; some PRA model changes were required

Duke Energy

Multiple Spurious

- New Sequences
  - Unique fire-induced sequences not treated in the PRA model
  - NEI 00-01 & NEI 04-06
  - Expert Panel
- Not many "new" components
  - Most already in ARTRAK
- Screened Initiating Events
  - New sequences identified
  - No "new" components identified

ISLOCA Screening Criteria

- Already in the PRA model vs. previously screened
- Flow restrictions would restrict any leak to a rate below the capacity of normal charging
- No paths leading outside containment (closed loop)
- Path contains more than three normally closed valves (including check valves) in series

Containment Isolation Screening

- **Low Probability** - Pathways containing three or more closed valves in series, or requiring reverse flow through 2 or more check valves
- **Closed Loop inside RB** - Pathways from systems that form a closed loop inside the Reactor Building
- **Water Solid** - Water solid penetrations are torturous paths and are insignificant with respect to consequence
- **High Awareness** - Pathways whose isolation status was deemed highly visible, such as the steam generator drains and equipment hatch
- **Low Consequences** - Releases from lines less than or equal to 0.5 inch in diameter are insignificant

Instrumentation

- Treatment of instrumentation and diagnostic equipment
- Applicable SSEL entries linked to in-Control Room operator actions
- Simulator review planned
  - Confirm equipment that provides cues to operators for credited actions
  - Identify equipment that could lead to fire-induced operator errors of commission

Handout Reference 7

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report

NFPA 805 Transition

Harris Nuclear Plant (HNP) Fire PRA Components Selection

David Miskiewicz
10/18/06

NGG Nuclear Generation Group

Progress Energy

Methodology:

NUREG/CR-6850

EPRI/NRC-RES Fire PRA Methodology
for Nuclear Power Facilities
Volume 2: Detailed Methodology

HNP Component Selection provides documentation for:

- TASK 2 – Fire PRA Components Selection
  - Inputs to Task 3 – Fire Cable Selection
  - Inputs to Task 5 – Fire-Induced Model

TASK 2
FIRE PRA COMPONENTS SELECTION

- Existing Information
- Multiple Spurious Operation (MSO)
- Dispositioning Safe Shutdown Equipment
- Dispositioning PRA Equipment
- Identifying New PRA Sequences
- Identifying Cable Routing Priorities
- Treatment of Operator Actions

Existing Information

- PRA Data
  - IPEEE
  - Internal Events PRA
  - Basic Event to Component Mapping used for EOOS/A4 monitoring
- Safe Shutdown Data
  - Safe Shutdown Equipment List (SSEL)
  - MSO Investigations

MSO Investigation

- An Expert Panel Methodology was used to identify MSO of concern
  - SSA (1), OPS (2), Contractor (2)
  - Reviewed Flow Drawings
  - Identified potential component pairs (180)
  - Reviewed Fire Areas
  - Dispositioned

Dispositioning SSEL

- Compared to PRA Equipment List
  - Tag IDs and failure modes (OK)
- Dispositioned remaining tags
  - Many were in PRA with alternate IDs (OK)
    - Add tag cross reference
  - Some were in PRA but with different failure modes
    - Evaluate for adding to PRA (AD) or not (NA)
  - Some were totally new tags
    - Evaluate for adding to PRA (AD) or not (NA)

NGG

Progress Energy

Dispositioning PRA Equipment List

- Compared to SSEL
  - Tag IDs and failure modes (Y)
- Screened Passive Mechanical Components (P)
- Added Instruments relied upon for Operator Actions (A)
- Dispositioned remaining tags
  - Some were already in SSEL with alternate IDs (Y)
    - Create tag cross reference
  - Some were in SSEL but with different failure modes
    - Evaluate for Cable routing (A,U,L)
  - Some were totally new tags
    - Evaluate for Cable Routing (A,U,L)

Identifying New PRA Sequences

- New Sequences were identified based on:
  - The new PRA components or failure modes from SSEL
  - Comparison of SSA and PRA system functions and end-states
  - Reviewing previously screened initiators

Identifying Cable Routing Priorities

- Low Priority Components include
  - Components which only support pipe break scenarios (such as SGTR)
  - Components which support systems with low likelihood of providing mitigation benefit (such as condensate)
  - Components with RAW < 2
- Spurious Events are higher priority even if low RAW

Treatment of Operator Actions

- Operator Actions will be addressed as part of later tasks
  - Errors of commission due to spurious alarms or failed instrumentation
  - Existing Operator actions which are blocked by fires
  - New operator (control room / manual) actions and dependencies based on fire procedures
    - Could add more components to PRA

Deliverables

- Report (still draft)
- Database
- List of SSEL tags for PRA modeling consideration (Input to Task 5)
- List of PRA components for Cable Routing consideration (Input to Task 3)

Handout Reference 8

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report

NFPA 805 Transition

Harris Nuclear Plant (HNP) Internal Events PRA Update

David Miskiewicz
10/18/06

NGG Nuclear Generation Group

Progress Energy

PSA Standards

- ASME PSA Standard (Addendum B)
  - RG 1.200
- A self assessment was performed
- A formal peer review may be performed

Internal Events Updates

- Pre-Initiator HFEs
- Plant Specific Data
- Documentation Issues
  - Phenomenology Impacts (OG)
  - Key assumptions and sources of uncertainty

Handout Reference 9

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report

NFPA 805 Transition

Harris Nuclear Plant (HNP) Next PRA Tasks

David Miskiewicz
10/18/06

NGG Nuclear Generation Group

Progress Energy

Task 3

- Cable Selection
  - Fire / Electrical support
- Integral with Tasks 9 and 10
- Raceway database

Task 5

- Fire Induced PRA Modeling
  - SSEL Components
  - New sequences
  - Location Mapping

Task 8

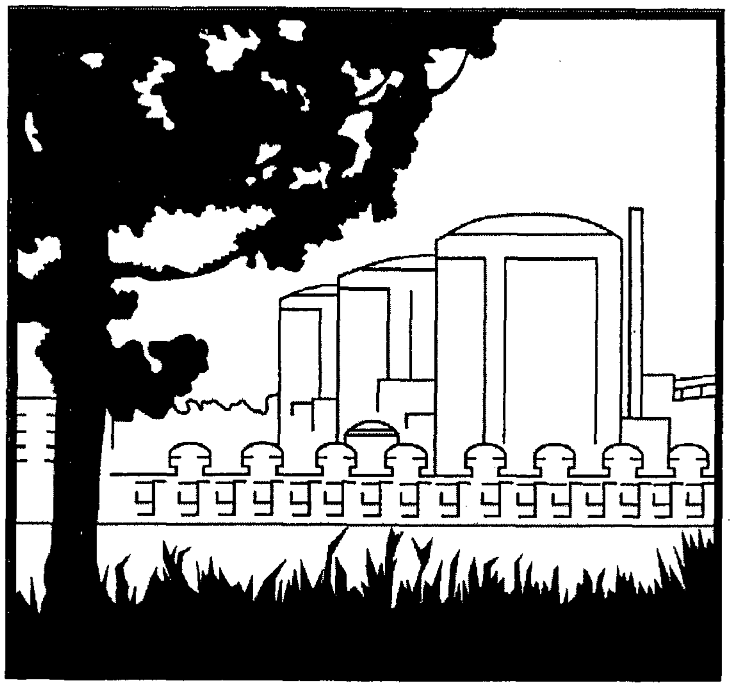
- Scoping Fire PRA
  - Identify Targets by Ignition Source
  - Use lookup values for ZOI
  - Bounding HGL Analyses

- Screen if no targets

- Otherwise Develop Scenarios

Handout Reference 10

NFPA 805 Pilot Plant Observation Visit
October 16 – 19, 2006
Enclosure 3 Trip Report



Looking Ahead
Duke Power
FPRA Pilot Meeting

Oconee (ONS)

October 18, 2006

NUREG/CR-6850

TASK 5

FIRE-INDUCED RISK MODEL

New Sequences

- Fire-induced SBO with spurious PORV opening
- High point vents (RC-155 thru RC-158) spuriously open leading to a small LOCA
- Vessel head vents (RC-159/160) spuriously open leading to a small LOCA
- HPI NPSH is lost due to uncooled letdown
- Impact on letdown of a spurious ES signal along with the BWST valves failing all HPI sources
- Pressurizer heaters spuriously operate (on and off)
- Spurious operation of EFW flow control valves (open), FDW-315 and 316, cause SG overcooling
- Boron dilution of letdown via bleed holdup tank and pumps
- Model fire impact on pressurizer instrumentation
- Include RCP failure to trip in RCP seal LOCA sequence

Duke Energy[SM]

Other Model Changes

- Add more structure to the CCW model so that failures due to fire can be propagated more accurately
- Add power supplies that support operation of the switchyard PCBs
- Model CC to the letdown heat exchangers
- Model other valves capable of isolating letdown including HP-1, -2, -6, and -7 including power, interlocks and signals
- Rename initiators to begin with special character (e.g., "%") to support FRANC operation