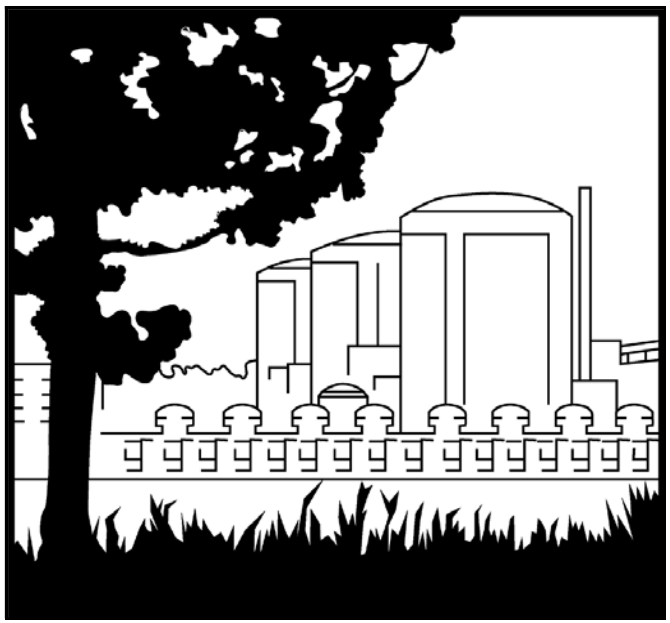
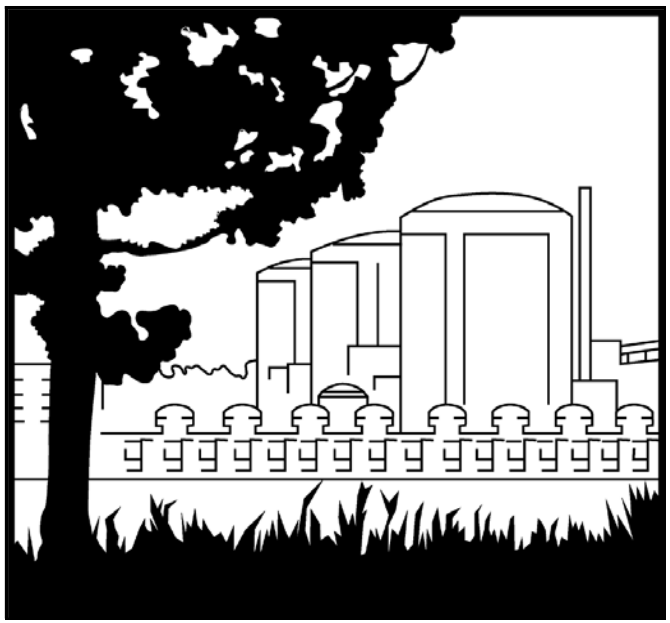
NFPA-805
Technical Update



July 11, 2007

Overall

- Reconstitution
- B-1 Table
- B-2 Table
- B-3 Table
- Radioactive Release
- Non-power Ops
- Configuration Control
- Documentation
- LAR and UFSAR



Oconee
NFPA-805 Project
Chapter 3 Initiative

July 13, 2007

Discussion Outline

- Present Scope Overview of Project Task
- Project Deliverables
- Depict process to document compliance
- Chapter 3 Task 1.1 & 1.2 process
- Future state Fire Protection Program bases document
- Interpretation of interim documentation
- Conclusion

Scope of Project

- Use NFPA-805 Chapter 3 as a roadmap to help define the ONS fire protection classical fire protection program properties.
- Chapter 3 is a combination/enhancement of the qualities that are required to create an effective program as derived through a merger of the GDC-3, 10CFR50.48(a), NUREG 0800, and applicable sections of Appendix R (excluding the subsections pertaining to Safe Shutdown Equipment SSEL).
- Clearly define the “safe today” fire protection features in a database as licensed in the current license bases as defined by SERs and letters to the NRC since ONS has a pre-’79 license and an shutdown protection methodology.
- Evaluate FP features that were evaluated for equivalency with requirements through the past process of 86-10 in a documented control process versus memos to file or left in CAPs.
- Create a draft document to be used in the interim to maintain configuration control.

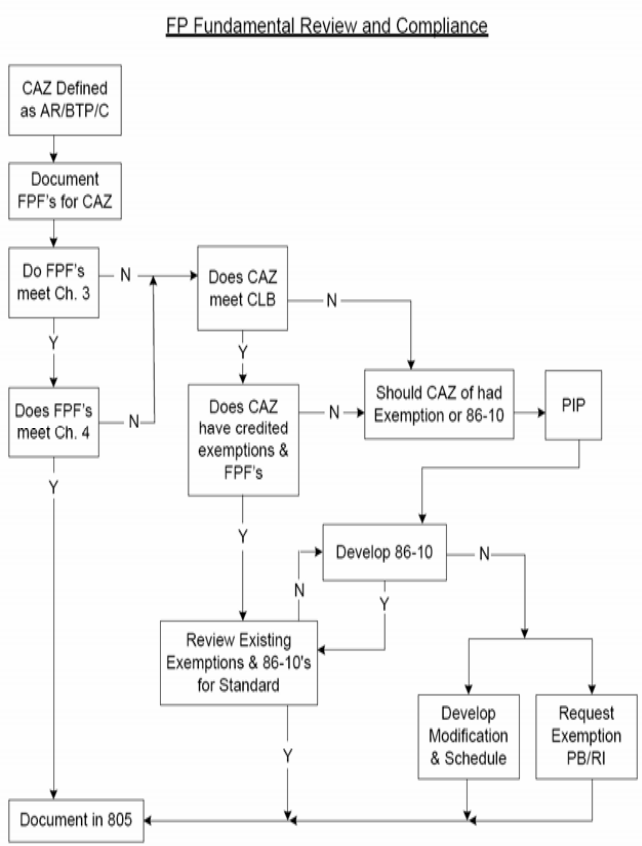
Project Deliverables

- Complete a NEI-04-02 Table B-1 that confirms compliance with each NFPA-805 Chapter 3 line item.
- Deliver a report that includes supporting details and references that document compliance with each line item in Table B-1.
- Perform a walk down of each Fire Zone in the plant to create a current FHA, with additional items of interest.
- Create a list of potential ignition sources per NUREG-6850 defined “bin” list descriptions. Any future fire modeling will still require target to source spatial walk downs.

Determination of Compliance

CAZ: Compartment/Area/Zone

This process was developed to aid the decision process on how to manage elements required by NFPA-805 that may not obviously meet the intent of the requirement.



Project Tasks 1.1 & 1.2

- Task 1.1 - Populate Table B-1 with available and applicable approved licensing information
- Task 1.2 - Physically walk down and verify classical fire protection features and 6850 ignition sources in each fire zone. Relate any fire protection program elements in that zone to prior licensing commitments.

NEI 04-02 Table B-1 Requirements

- Columns to include:
  - NFPA 805 Chapter 3 requirements
  - Compliance Statement
  - Current Licensing Basis Documents

NFPA 805 Chapter 3 Fundamental Fire Protection Program and Design Elements	Mapped to BTP 9.5-1 APCSB 5/1/76 Application Docketed but Construction Permit Not Received as of 7/1/76	Compliance Statement	Current Licensing Basis Document Identification
3.5 Water Supply. 3.5.1 A fire protection water supply of adequate reliability, quantity, and duration shall be provided by one of the two following methods.			
(a) Provide a fire protection water supply of not less than two separate 300,000-gal (1,135,500-L) supplies.	IV.C.2. (d) Two separate reliable water supplies should be provided. If tanks are used, two 100% (minimum of 300,000 gallons each) system capacity tanks should be installed.	The fire water storage system consists of two dedicated fire water storage tanks sized at 350,000 gallons each.	UFSAR Volume 9, Fire Hazards Analysis, Section 9.5-1, page 34. NRC Safety Evaluation Report, page 44-45.

Method of Compliance

- The following standard Method of Compliance statements are used :
  1. Comply – Oconee clearly complies with the NFPA 805 requirement
  2. Complies by Previous NRC Approval – Oconee does not clearly meet the NFPA 805 requirement but has been approved directly by the NRC (usually by SER)
  3. Complies by Previous Licensee Evaluation - Oconee does not clearly meet the NFPA 805 requirement but the Licensee has/will completed an equivalency evaluation
  4. Submit for NRC Approval - Oconee does not clearly meet the NFPA 805 requirement but has/will submit for NRC review and approval
  5. Further Action Required – open item to be dispositioned
  6. N/A – NFPA 805 requirement does not apply to Oconee

ONS Table B-1 Summary

NFPA 805 Chapter 3 Section	Method of Compliance	Compliance Statement
• **Note: All information below is summarized; for complete details, see the report in Attachment A. Links are provided below. Turn on Web Toolbar.*		
• Section 3.1* General • *This chapter contains the fundamental elements of the fire protection program and specifies the minimum design requirements for fire protection systems and features. These fire protection program elements and minimum design requirements shall not be subject to the performance-based methods permitted elsewhere in this standard. Previously approved alternatives from the fundamental protection program attributes of this chapter by the AHJ take precedence over the requirements contained herein.*		
• Section 3.2 Fire Protection Plan		
3.2.1 Intent *A site-wide fire protection plan shall be established. This plan shall document management policy and program direction and shall define the responsibilities of those individuals responsible for the plan's implementation. This section establishes the criteria for an integrated combination of components, procedures, and personnel to implement all fire protection program activities.*		
3.2.2 Management Policy Direction and Responsibility* *A policy document shall be prepared that defines management authority and responsibilities and establishes the general policy for the site fire protection program.*		

Table B-1 Report

- ***Includes methodology, references and summary table. The sample format is as follows:***

- ***3.2.2.1****
- *The policy document shall designate the senior management position with immediate authority and responsibility for the fire protection program.*
- {Supporting discussion added here. Includes specific discussions pertinent to the Oconee licensing basis}
- Reference(s): {Reference(s) used entered here}

- ***3.2.2.2****
- *The policy document shall designate a position responsible for the daily administration and coordination of the fire protection program and its implementation.*
- {Supporting discussion added here. Includes specific discussions pertinent to the Oconee licensing basis}
- Reference(s): {Reference(s) used entered here}

Table B-1 Enhancements

- Designed with simplification, usefulness, and maintenance in mind
  - Simplification: All references in one location (NEDL), One-line summaries for quick answers, Reading logic
  - Usefulness: Format allows for the Transition Report integration into a new DBD/Licensing document
  - Maintenance: Updating information, Navigation to specific sections, No electronic links to references/ Doc's in doc. control system

Sample Database Output - Ignition Sources

Duke Energy

Oconee Nuclear Station
Fire Ignition Sources

OSS-0254.00-00-4008
Revision 00
Attachment 3.XX2

Unit 0 Turbine Building Fire Area: BOP
Fire Zone: 200 Demo Area
Elevation: 400 Fire Zone Drawing: 003

Ignition Source Description	Ignition Source ID (EDM)	Ignition Source Bin	Bin Count
Transformer	Unknown	23	1
Lighting Panel	0LP123	15	1
Lube Oil Pump Controller	0LP-213	15	1
Lube Oil Pump Motor	PMP-213	21	1

Walkdown Team: ABC/XYZ
Data Entry: ABC
Data Entry Review: XYZ

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NEXUS

Sample Database Output - FP Features

Duke Energy

Oconee Nuclear Station
Fire Protection Features

OSS-0254.00-00-4008
Revision 00
Attachment 3.XX1

Unit 0 Turbine Building Fire Area: BOP
Fire Zone: 200 Demo Area
Elevation: 400 Fire Zone Drawing: 003
Appendix R IIIG Section: 2

Detection:

Detector Number(s)	Detection Type	Coverage (P/C/H)	Committed (Y/N)
UNIT 3 LUBE OIL TANK	Heat	H	N
2101	Smoke	P	N
2102	Smoke	P	N
2103	Smoke	P	N

Suppression System:

Sprinkler System(s)	System Type	Coverage (P/C/H)	Code Calculation	Committed (Y/N)
UNIT 3 LUBE OIL TANK	Deluge	H	Calc-2124	N

Fire Hose Stations:

Station Number(s)	Location	Committed (Y/N)
HS-201	D-45	Y

Fire Extinguishers:

Extinguisher Number(s)	Type	Location	Committed (Y/N)
NA	Ext CO2 20#	D-44	N

Emergency Lights:

Light Number(s)	Type	Location	Committed (Y/N)
EL-202	Sealed	F-44	Y
EL-201	Sealed	D-45	Y

NEXUS

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Sample Database Output - FP Features (cont.)

Duke Energy

Oconee Nuclear Station
Fire Protection Features

OSS-0254.00-00-4008
Revision 00
Attachment 3.XX1

Unit 0 Turbine Building Fire Area: BOP
Fire Zone: 200 Demo Area
Elevation: 400 Fire Zone Drawing: 003
Appendix R IIIG Section: 2

Floor Drainage:

Drainage Type
Drains

Storage Areas:

Storage Type	Storage Location
Designated Storage Area	F-45
Chemical	C-45

Barriers:

Barrier Direction	Partition (Y/N)	Commerial Fire Barrier (Y/N/NA)	Committed Fire Barrier (Y/N/NA)
Below	Y	N	NA
Above	Y	N	NA
West	N	NA	NA
East	Y	Y	Y
South	Y	Y	NA
North	N	NA	NA

Adjacent Fire Zones:

Direction	Adjacent Fire Zone
Above	310
Above	300
North	203
West	201

NEXUS

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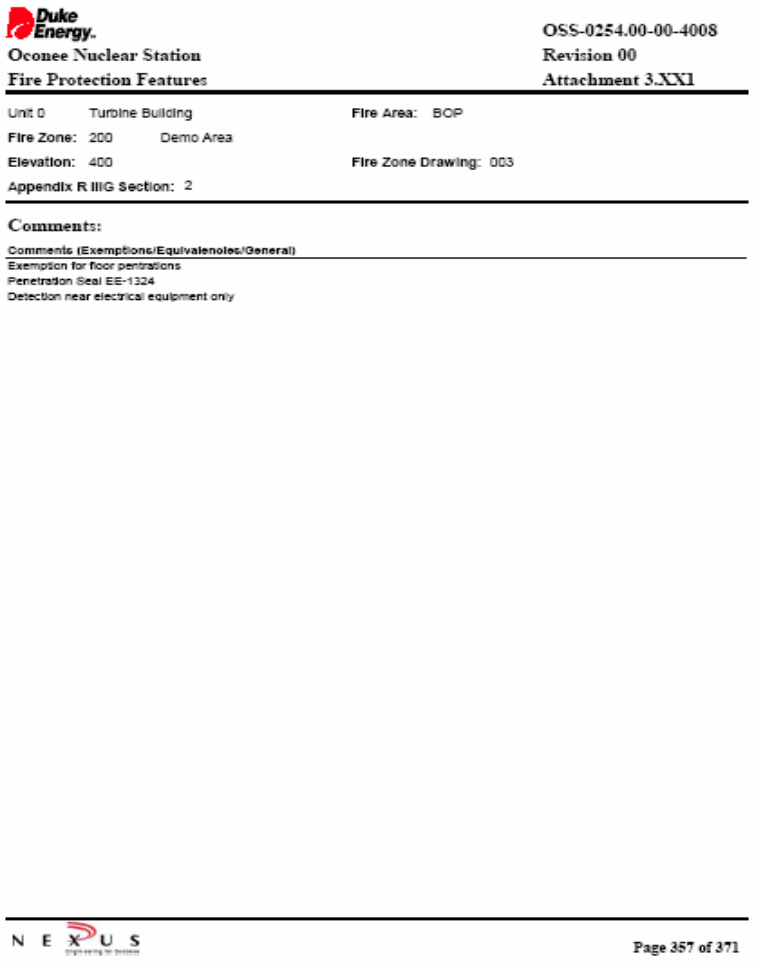
Sample Database Output - FP Features (cont.)



Duke Energy.

OSS-0254.00-00-4008
Revision 00
Attachment 3.XX1

Oconee Nuclear Station
Fire Protection Features

Unit 0 Turbine Building Fire Area: BOP
Fire Zone: 200 Demo Area
Elevation: 400 Fire Zone Drawing: 003
Appendix R IIIG Section: 2

Comments:

Comments (Exemptions/Equivalencies/General)
Exemption for floor penetrations
Penetration Seal EE-1324
Detection near electrical equipment only

NEXUS

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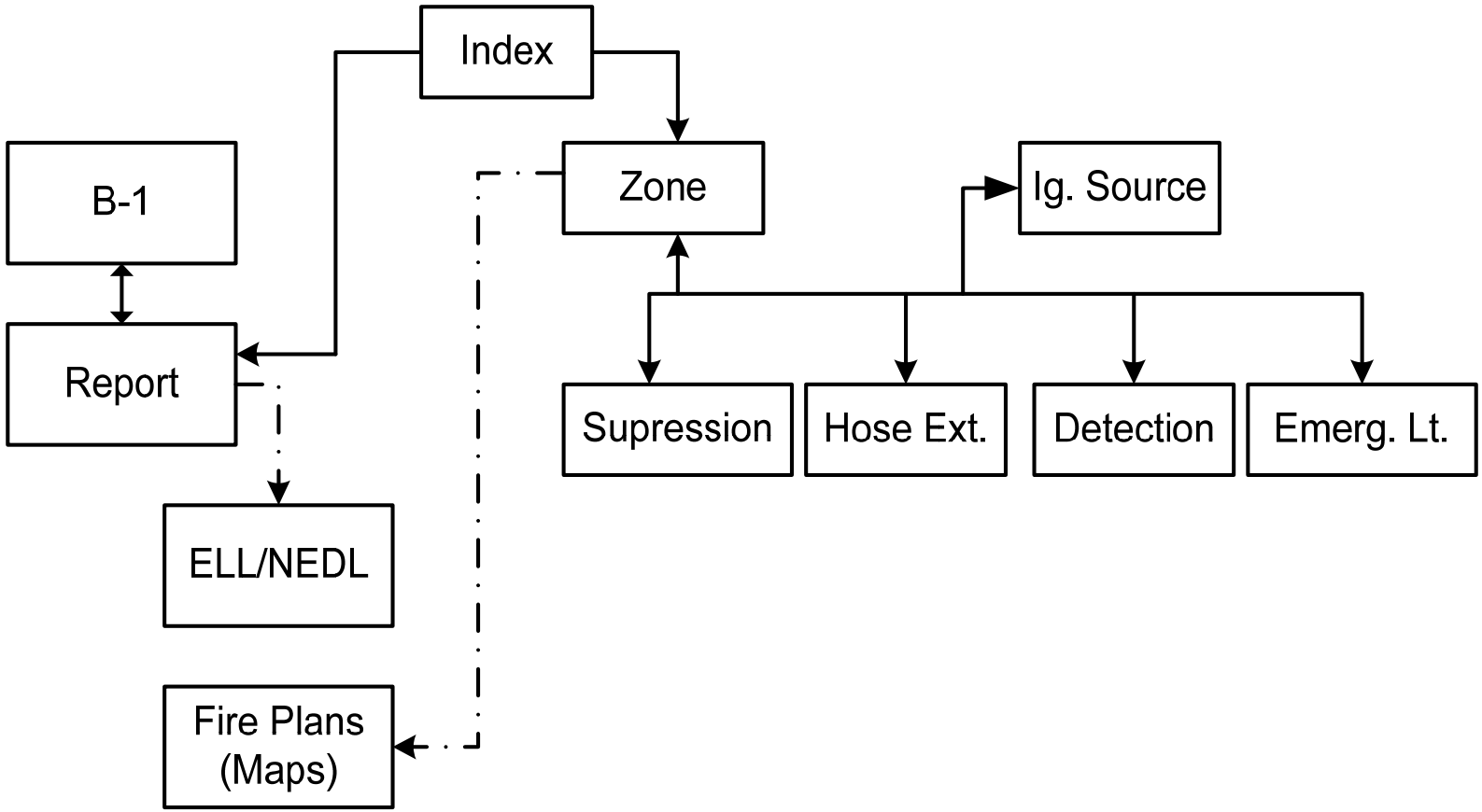
Chapter 3 Interfaces



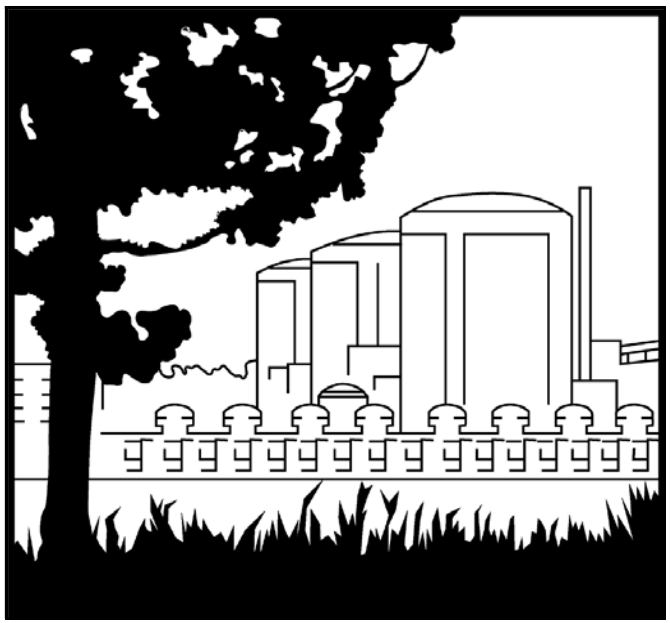
Fire Protection Program Document Development

- Place the information from Task 1.1 and 1.2 in an interim site draft deliverable document to ensure future plant changes take this new information into consideration.
- Expect to modify/enhance this interim document as the NFPA 805 Chapter 4 effort evolves and clarifies the needs for classical fire protection elements/features based on the reconstituted safe shutdown and 6850 analysis outputs.
- Move forward to analyze and validate any fire protection elements deviation or degradation equivalency.

Summary

- Publish an interim site guidance document for to ensure information is maintained current while the Chapter 4 analysis is finalized
- Ensure that a maintainable site fire protection licensing roadmap is produced.
- Ensure future success in audit traceability of compliance.
- Ensure that future configuration control of the data can be achieved.
- Use the deliverable document to support the information required for the license submittal/ transition report.

Oconee NFPA-805
NEI 04-02
B-2 Tables



July 13, 2007
Oconee Nuclear Station
Seneca, SC

NEI 04-02 B-2 Tables

- Background
- Bases
- Project Instruction
- ONS Results
- Summary

Background

- NFPA-805 Nuclear Safety Performance Criteria Transition starts with traditional Appendix R type Safe Shutdown Component and Circuit Analysis
- Assumptions, Criteria and Methodology for performing these analyses have varied over time
- Need for standardized methodology was recognized by Industry and NEI 00-01 was developed
- NRC recognized need for standardized methodology and endorsed NEI 00-01 deterministic methods in Reg. Guide 1.205
- Process fulfills “Safe today, Safe tomorrow”

Bases

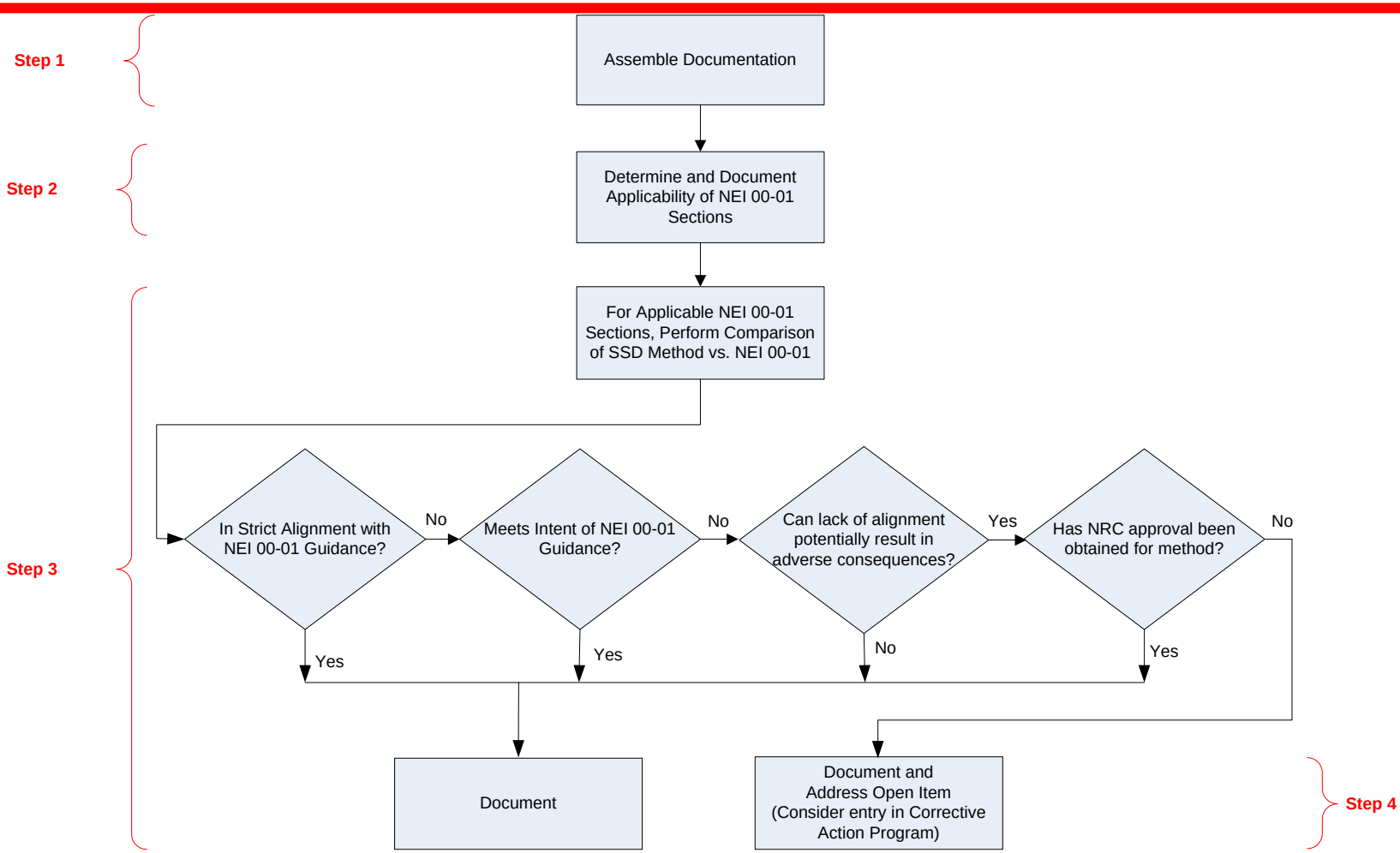
- NEI 00-01 and NEI 04-02 Identify safe shutdown function/performance goals
- In NEI 00-01:
  - Functions are logic tied to Success Paths
  - Success Paths are related to components
  - Components are related to cables
  - Cables are selected based on standardized assumed cable fault combinations
  - Cables are tied to Fire Areas/Zones
  - Analysis of Fire Areas/Zones provides survival information of success paths and/or standardized compliance strategies

Project Instruction

Project Instruction

- Project Instruction written for consistency between Pilot plants
- Section/paragraph by section/paragraph comparison with NEI 00-01 guidance for assumptions, criteria and methodology
- Methodology will be rolled into long term FPP maintenance procedures
- Ensures future changes to FPP can be evaluated to same criteria

Project Instruction



ONS Results

- Oconee's Safe Shutdown Analysis was recently re-validated and took advantage of NEI-00-01 guidance
- Good correlation between Oconee assumptions, criteria, and methodology
- Very few Open Items
- Very consistent with Harris

ONS Results

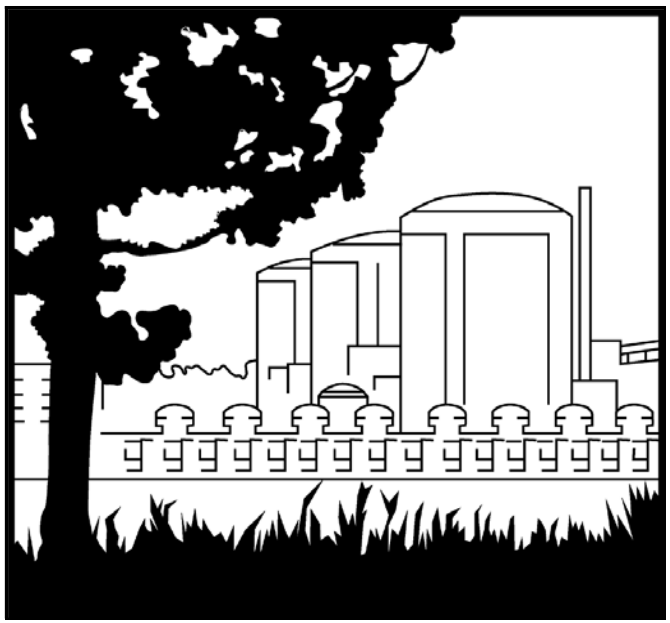
- Open Items:
  - Instrument Tubing not evaluated
  - Manual Actions not evaluated against latest guidance from NRC
  - Duration of circuit faults currently licensed to not occur for first ten minutes of fire event

Summary

Summary

- Recent Safe Shutdown Analysis work helped transition.
- Ten open items around three topical areas
- Consistent with other Pilot plant
- Consistent with NRC endorsed assumptions, criteria and methodology
- FAQ to specify what sections of NEI 00-01 to be evaluated

Oconee NFPA-805
NEI 04-02
B-3 Tables



July 13, 2007
Oconee Nuclear Station
Seneca, SC

NEI 04-02 B-3 Tables

- Background
- Project Instruction
- ONS Results
- Summary

Background

- What the B-3 Tables are:
  - Summary of pre and post transition licensing basis
  - Summary of how performance goals are met
  - Summary of required fire protection systems and features
  - Summary of open items being resolved using RI-PB techniques
  - Summary of Engineering Equivalency Evaluations and Licensing Actions credited
  - Post–transition - Envision the B-3 Tables as the ‘backbone’ of the NFPA 805 2.7.1.2 ‘FP Design Basis Document’

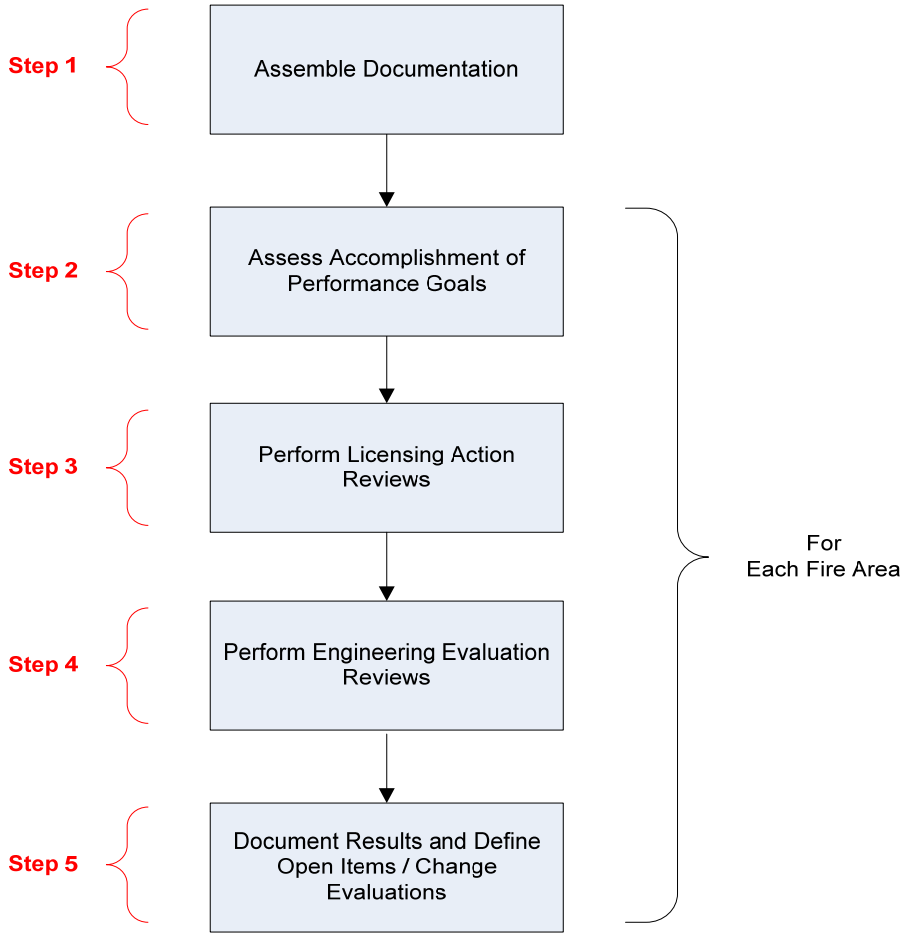
Background

- What the B-3 Tables are not:
  - Replacement for the Details in the Nuclear Safety Capability Assessment
  - Detailed evaluation of the Operator Manual Actions
  - Detailed Change Evaluations
  - Detailed Engineering Equivalency Evaluations and Licensing Actions

Project Instruction

- Project Instruction written for consistency between Pilot plants & other transitioning plants.
- Used to identify process of documenting fire area transition reviews.
- Provides concise steps for utilizing the Transition Tool Database to document current licensing basis
- Provides detail & clarification to document sample information in NEI 04-02 Table B-3 Example

Project Instruction



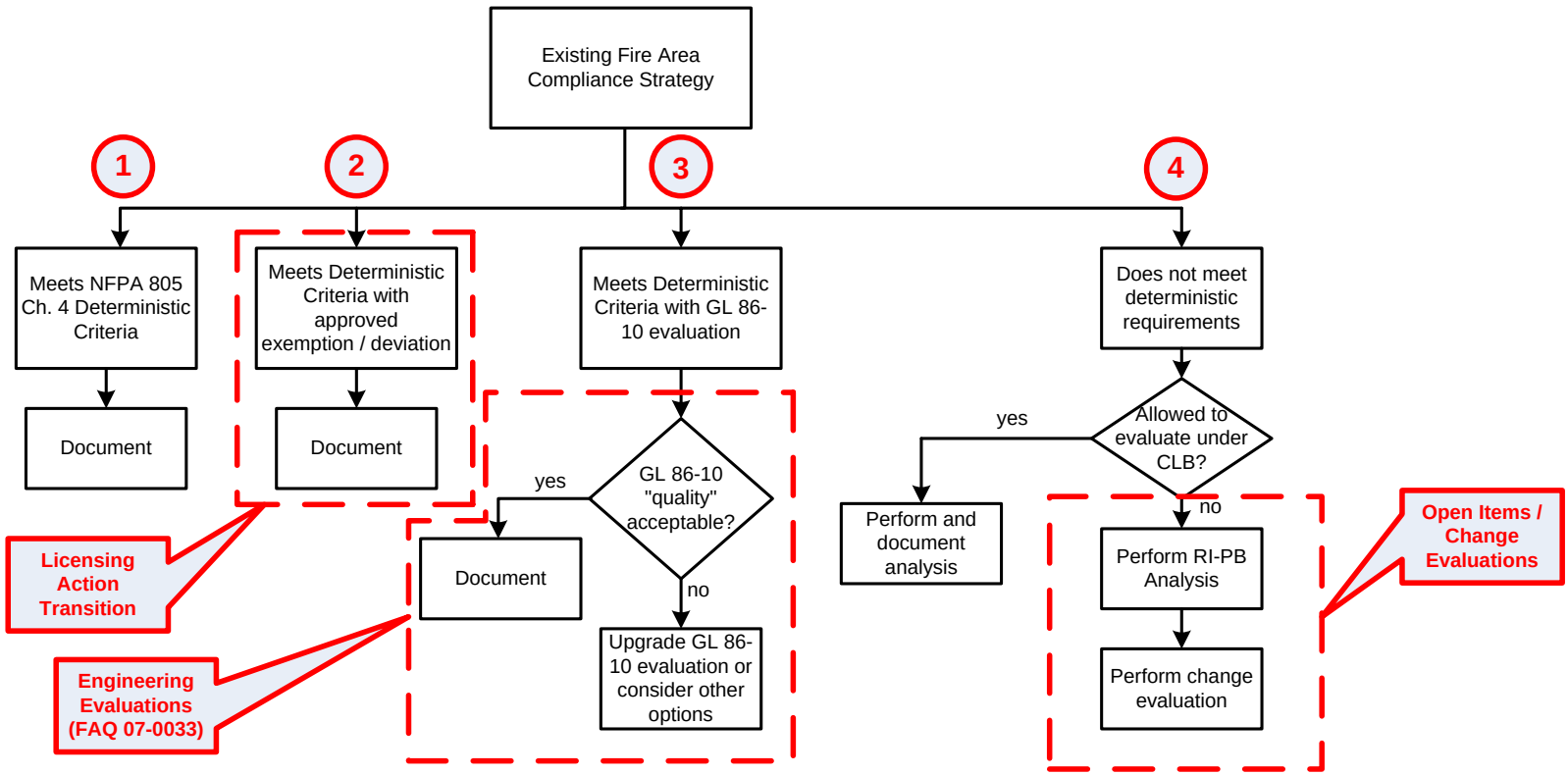
Project Instruction

Summary of Transition Review Steps:

- Step 1 - Assemble Documentation
- Step 2 - Assess Accomplishment of Performance Goals
- Step 3 - Perform Fire Area Licensing Action Reviews
- Step 4 - Perform Engineering Evaluation Reviews
- Step 5 - Document Results and Define Open Items / Change Evaluations

Project Instruction

Note: Process is performed for each compliance strategy (i.e., there can be multiple approaches for each fire area)



Project Instructions

NEI 04-02 Figure 4-3

- **Determine how compliance strategies:**
  - Align with the NFPA 805 Ch. 4 deterministic methods
  - Align with the NFPA 805 Ch. 4 deterministic methods with approved exemptions or deviations from Appendix R
  - Align with the NFPA 805 Ch. 4 deterministic methods with correctly implemented supporting engineering evaluations
  - Do not align with the NFPA 805 Ch. 4 methods and either can or cannot be evaluated under the current licensing basis (CLB). Items outside the CLB would be evaluated using RI-PB methods.

Project Instructions

- **Step 2 – Assess Accomplishment of Performance Goals**
  - Document the fulfillment of the NFPA 805 performance goals for the selected fire area, listing the ‘Method of Accomplishment’ in summary level form for the fire area
    - Pre-transition and Post-transition regulatory basis
    - Required fire protections features and systems
    - Reference documents
    - Open items.

Project Instructions

- **Step 3 – Fire Area Licensing Action Reviews**
  - Provide a ‘Licensing Action Description’
  - Document Reference Documents associated with the licensing action
  - Document the Basis for Acceptability of this licensing action (information to be included in the plant’s monitoring program - these statements should be easily translatable into plant monitoring procedures)
  - Statement that the bases for acceptability remain valid. If additional information is needed for confirmation (e.g., plant walkdowns), document this need as an open item in the transition database.

Project Instructions

- **Step 4 – Engineering Evaluation Reviews**
  - Document the purpose of the evaluation (e.g., acceptability of non-rated penetration)
  - Document the Basis for Acceptability of this engineering evaluation (information to be included in the plant's monitoring program - these statements should be easily translatable into plant monitoring procedures)
  - Document the review of the evaluation against the criteria of FAQ 07-0033.
  - Document any open items associated with the Engineering Evaluation.

Project Instructions

- **Step 5 – Document Results and Define Open Items / Change Evaluations**
  - Summary level information applicable to the fire area that is outside of the content in other database fields can be documented in the Fire Area Comments field.
  - All open items should be reviewed and binned, by fire area (and topic), if appropriate, in order to gain an overall understanding of the magnitude and complexity of the individual issues, as well as their aggregate impact.
  - The output of step 5 will be input to the Change Evaluation task.

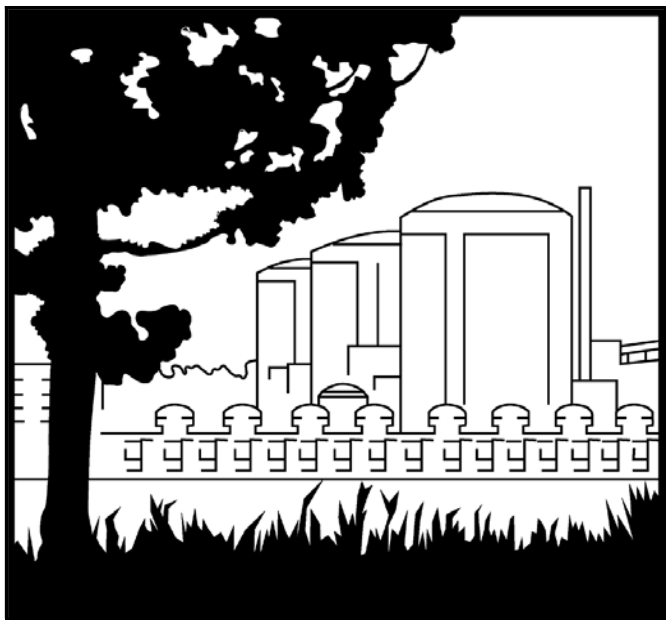
ONS Preliminary Results

- Open Items:
  - Modify Project Instruction
    - More specific instruction for documenting performance goals
    - More specific instruction for documenting open items
  - Modify TTool
    - Open item reporting capabilities
    - Specific Fire Protection System and Feature Screen

Summary

- Recent Safe Shutdown Analysis work helped transition.
- Consistent with other Pilot plant
- Awaiting feedback from the NRC as to scope and content of the B-3 Tables to determine the need for a FAQ

Oconee NFPA-805 Non-Power Operation Transition



July 13, 2007
Oconee Nuclear Station
Seneca, SC

Non-Power Operation Transition

- Background
- Bases
- Project Instruction
- ONS Results
- Summary

Background

- NFPA 805 requires the evaluation of the effects of a fire
  - “During any operational mode and plant configuration”
- Concept introduced in NUREG 1449
- Building on NUMARC 93-01 and 91-06

NEI 04-02 Methodology

- Detailed methodology provided in NEI 04-02, Appendix F:
  - Review existing plant outage processes to determine equipment relied upon to provide Key Safety Functions
  - Compare list of SSCs required to maintain KSFs with those analyzed for Safe Shutdown at Power
  - For those SSCs not already credited, perform circuit/cable/routing analysis to determine where these SSCs can be impacted by fire

NEI 04-02 Methodology

- Detailed methodology provided in NEI 04-02, Appendix F continued:
  - Identify locations where fire may impact shutdown safety
    - Pinch Points where fire damage may prevent achieving KSFs
    - Recovery actions credited for KSFs are performed
  - Identify fire areas where a single fire may damage all the credited paths for a KSF.
    - May include fire modeling

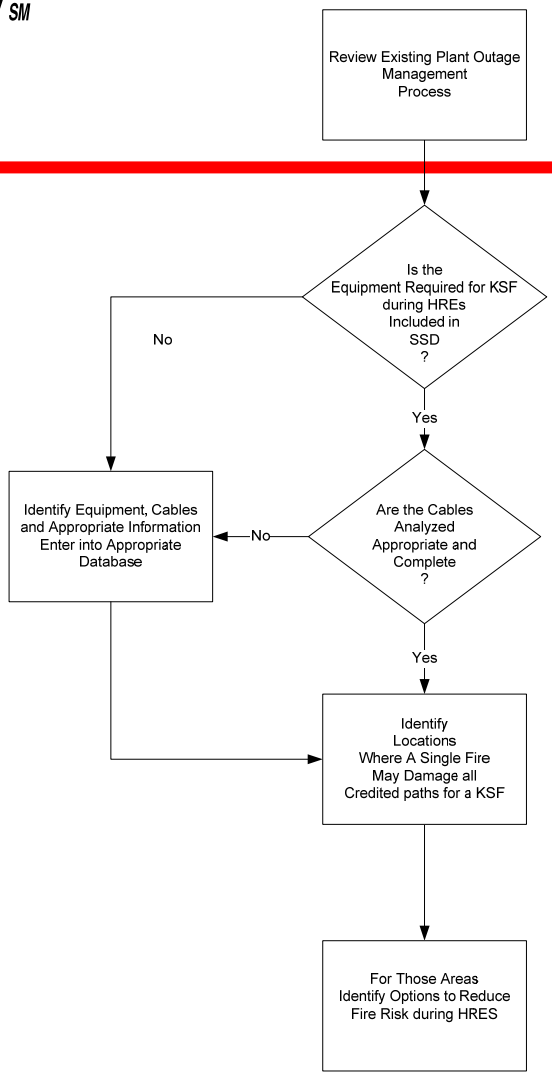
NEI 04-02 Methodology

- Focus on managing fire risk Qualitatively during High Risk Evolutions (HREs)
  - NEI 91-06 defines High Risk Evolutions as follows:
    - Outage activities, plant configurations or conditions during shutdown where the plant is more susceptible to an event causing the loss of a key safety function

Project Instruction

- Project Instruction written for consistency between Pilot plants
- Section/paragraph by section/paragraph comparison with NEI 00-01 guidance for assumptions, criteria and methodology
- Methodology will be rolled into long term FPP maintenance procedures
- Ensures future changes to FPP can be evaluated to same criteria

Project Instruction



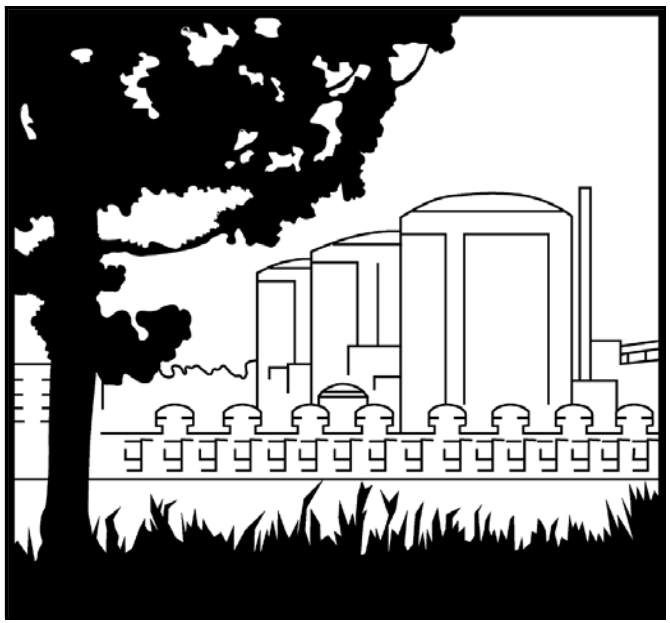
- Prohibition or limitation of hot work in fire areas during periods of increased vulnerability
- Verification of operable detection and /or suppression in the vulnerable areas.
- Prohibition or limitation of combustible materials in fire areas during periods of increased vulnerability
- Provision of 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).

ONS Results

- Identified an additional 24 components per site – no new power supplies
- Completed circuit identification for new components
- Identified routing for new circuits
- Remaining to be done
  - Incorporate non-power components and circuits into database
  - Completion of Pinch Point analysis
  - Modification of Shutdown Risk Management Directive

ONS Concepts

- For this effort the “high risk evolution” to be defined in terms of:
  - Fuel in the reactor, AND
  - Thermal margin OR
  - Reduced inventory condition
  - Pinch Point Areas are similar to those for power operations



Duke Power
FPRA Pilot Meeting
Oconee (ONS)

July 11, 2007

NUREG/CR-6850

TASK 1

Plant Boundary Definition & Partitioning

FPRA Boundary Definition

- Task 1 combined with Task 6 – same calc
- Within the global analysis boundary, selected structures were excluded:
  - If a fire would not cause a plant trip or require shutdown
    - No affect on offsite power sources (including overhead cables)
  - If the structure was not directly connected with the primary plant power block structures
  - If the structure contained no PRA components

Multi-compartment analysis

- Open Communication Between Fire Zones
  - Expand evaluation of “screened” compartments to address the potential for fire spread from one compartment to another
- Compartment Interaction
  - Identified targets within the zone of influence of the ignition source (modify predetermined set of “failures” where necessary)
- Structure Interaction
  - Evaluated shared boundaries

NUREG/CR-6850

TASK 2

COMPONENT SELECTION

Component Selection

- Component & cable location information controlled in ARTRAK
  - Safe Shutdown Equipment List (SSEL)
  - Risk Significant PRA equipment
- Component Selection Calculation
  - Calculation completed for review
  - Update expected

Task 2 Elements

- FPRA Component List
  - PRA
  - SSEL (with cables)
  - MSO (Expert Panel)
  - ISLOCA – updated screening criteria for fire
  - Containment Isolation – updated criteria
  - Instrumentation
- Disposition of PRA basic events
- Disposition of Safe Shutdown Equipment List (SSEL)

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 & added to model
  - No “new” components identified

Instrumentation

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

NUREG/CR-6850

TASK 3

CABLE SELECTION

ARTRAK Database

- Appendix R Reconstitution
  - Unit 2 & 3 cable selection completed; ARTRAK updates still need to be reflected in FRANC
  - Unit 1 cables are being traced; data expected by end of 2007
  - Components/cables selected to address flow diversion paths
- Cables for selected PRA credited equipment (not on SSEL) will be selected and added to database

NUREG/CR-6850

TASK 5

FIRE-INDUCED RISK MODEL

Model Limitations

- Preliminary quantification results based on Unit 3 model
  - Parallel effort on-going to meeting RG 1.200
  - Scheduled completion is the end of this year
- Need for unit specific PRA models identified
  - Power supply differences
  - Beginning development of application specific Unit 2 model
  - Unit 1 cables are being traced; qualitative assessment will dictate whether Unit 1 fault tree is required or not

New Sequences

- Fire-induced SBO with spurious PORV opening
- High point vents spuriously open
- Vessel head vents spuriously open
- HPI NPSH is lost due to uncooled letdown
- Impact on letdown of a spurious ES signal along with the BWST valves
- Pressurizer heaters spuriously operate (on and off)
- Spurious operation of EFW flow control valves (open) cause SG overcooling
- Boron dilution of letdown via bleed holdup tank (demin water) and pump

Other Model Changes

- Add more structure to capture Appendix R functions not previously modeled
- Added ‘AND’ gate to address normal and emergency power paths
- Spurious RCP operation (multiple places)
- Add power supplies that support operation of the switchyard PCBs
- Model details relative to CC to the letdown heat exchangers
- Model other valves capable of isolating letdown including power, interlocks and signals

Operator Actions

- Inside Control Room Actions
  - Screening HEPs for fires outside the Control Room
  - No HRA revisions identified to date
  - Refinements likely
- Outside Control Room Actions
  - Identify locations including pathways
  - Credit by exclusion
  - Confirm operator can get to areas where OA is credited
  - Screening HEP adjustment may be needed
- No credit taken for post-fire shutdown actions not modeled in PRA
- Inputs to Task 12

Operator Action Issues

- Assess Instrumentation Impact on HRA
  - NUREG/CR-6850 approach linked instrument to OA
    - OA with diverse instrumentation not linked
    - Instruments relied on but not cited in HRA
  - Revised approach pending (ANS FPRA Standard)
    - What's the impact on HRA due to failure of one of many?
    - Verify diversity remains for all fire scenarios

NUREG/CR-6850

TASKS 7 - 12

SCENARIO DEVELOPMENT

Scenario Development

Combines elements associated with:

- Quantitative Screening (Task 7)
- Scoping Fire Modeling (Task 8)
- Detailed Circuit Failure Analysis (Task 9)
- Circuit Failure Mode Likelihood Analysis (Task 10)
- Detailed Fire Modeling (Task 11)
- Post-Fire Human Reliability Analysis (Task 12)

Scenario Development

- Quantitative Screening (Task 7)
  - No compartments were screened
  - Confirm compartment interaction on adjacent zones
- Initial scenarios are built around ignition sources with the potential for damaging nearby targets
- Not all fixed ignition sources become scenarios
- Calculate scenario frequency
- Conditional trip probability not yet credited

Fire Modeling (Tasks 8 & 11)

- Zone of Influence
  - Damage distances for generic configurations determined
  - Supplemented with values from 6850
- Credit for Suppression
  - May be warranted - later
  - Transients due to Welding & Cutting
    - Prompt suppression can be credited for hot work fire scenarios
    - Applied factor to account for the associated procedural non-compliance (for failure to protect the target)

Circuit Analysis (Task 9)

- Case by case basis
- Limited applications thus far
  - Normal versus emergency power
  - Reallocate cables associated with alternate power sources to separate tags
- Need for additional circuit analysis likely as top contributors undergo further evaluation

Altered Events

- Circuit Failure Mode Likelihood Analysis (Task 10)
  - Limited applications thus far
  - Applied 0.3 to selected MOV transfer functions
    - Conservative for armored cable based on NUREG/CR-6850
    - Subject to change pending finalization of Duke testing

Documentation

Fire Scenario Report – Table of Contents

NFPA 805

CHANGE EVALUATIONS

Change Evaluations – NFPA 805

2.4.4* Plant Change Evaluation.

A plant change evaluation shall be performed to ensure that a change to a previously approved fire protection program element is acceptable. The evaluation process shall consist of an integrated assessment of the acceptability of risk, defense-in-depth, & safety margins.

Change Evaluations – NEI 04-02

Change Evaluation Process

4 Subtasks (NEI 04-02 Section 5.3, Appendix J)

- Defining the Change
- Preliminary Risk Screening
- Risk Evaluation
- Acceptance Criteria

Change Evaluation Process – Defining the Change

- Process begins by defining the change or altered condition to be examined & the baseline configuration
- Baseline (compliant) - Plant condition or configuration that is consistent with the CLB (pre-transition licensing basis)
- The changed or altered condition or configuration, either ‘as found’ or proposed by a plant change, that is not consistent with the Licensing Basis
- The ‘changes’ associated with NFPA 805 transition are those non-compliances with the CLB that are not expected to be brought into compliance prior or during the transition process

Change Evaluation Process – Preliminary Risk Review

- Once the definition of the change is established & groupings/organizations are established, a preliminary risk review is performed to identify & resolve minor changes to the fire protection program.

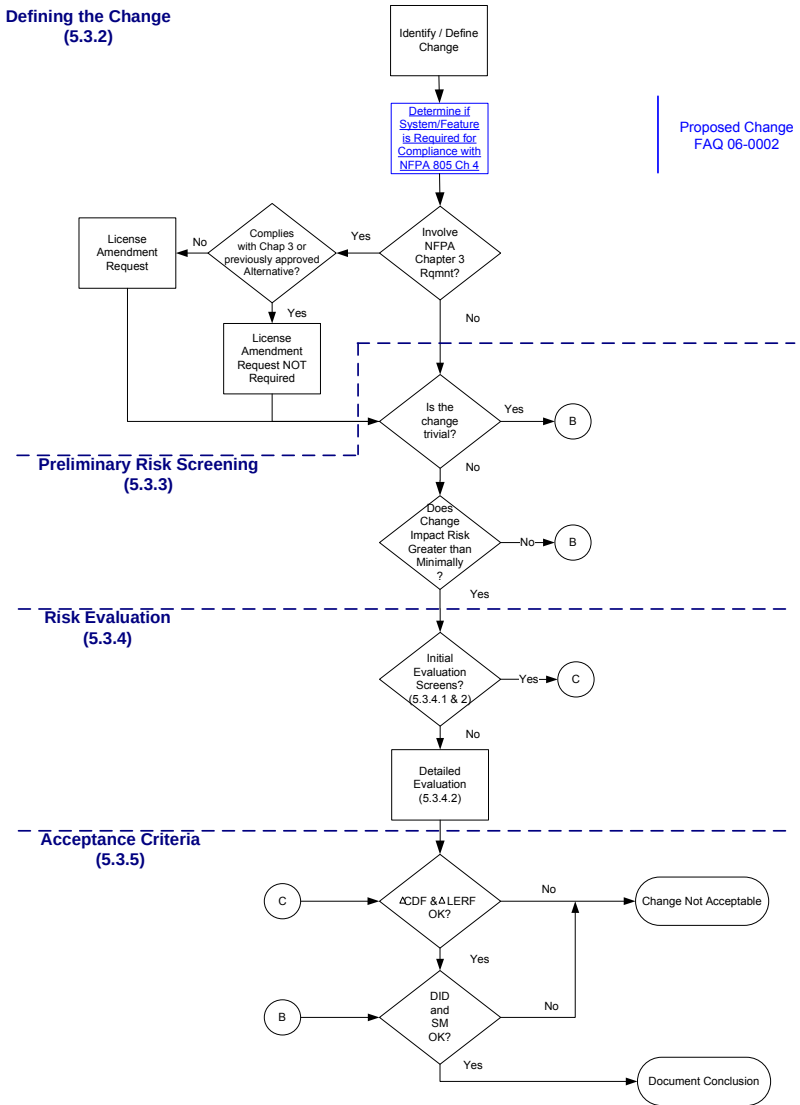
Change Evaluation Process – Risk Evaluation

- Changes are assessed using risk-informed, performance-based techniques
- Techniques include, but not limited to fire modeling & PRA
- The risk evaluation may be in the form of a limiting or bounding fire modeling/fire risk analysis or a detailed integrated analysis

Change Evaluation Process – Acceptability Determination

- The risk evaluation shall be measured quantitatively for acceptability using the ΔCDF & ΔLERF criteria
- Acceptance criteria are in Regulatory Guide 1.174, as clarified in Section 5.3.5 of NEI 04-02 & RG 1.205
- An evaluation of defense-in-depth & safety margin shall also be performed

Change Evaluation Process



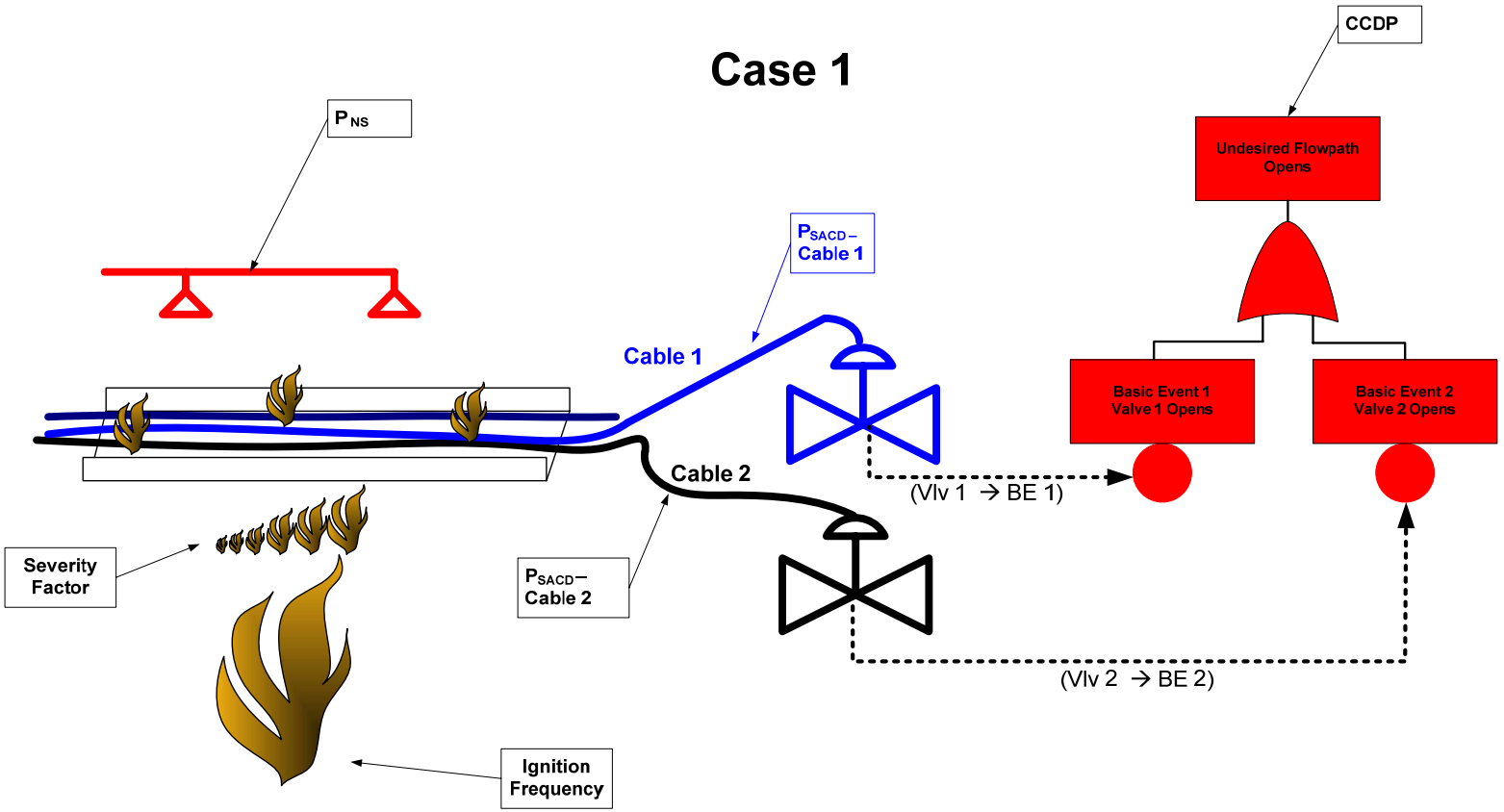
Risk Evaluation

- Evaluation of feature versus function
- Is feature explicitly modeled or implicitly credited?
  - Barrier protects circuits that were previously or are now assumed to fail
  - Impact due to suppression added / removed / modified
- Is function explicitly modeled?
  - Confirm function treatment or non-treatment in model is appropriate
  - Assume function recovers equipment otherwise assumed to fail unless action specifically modeled

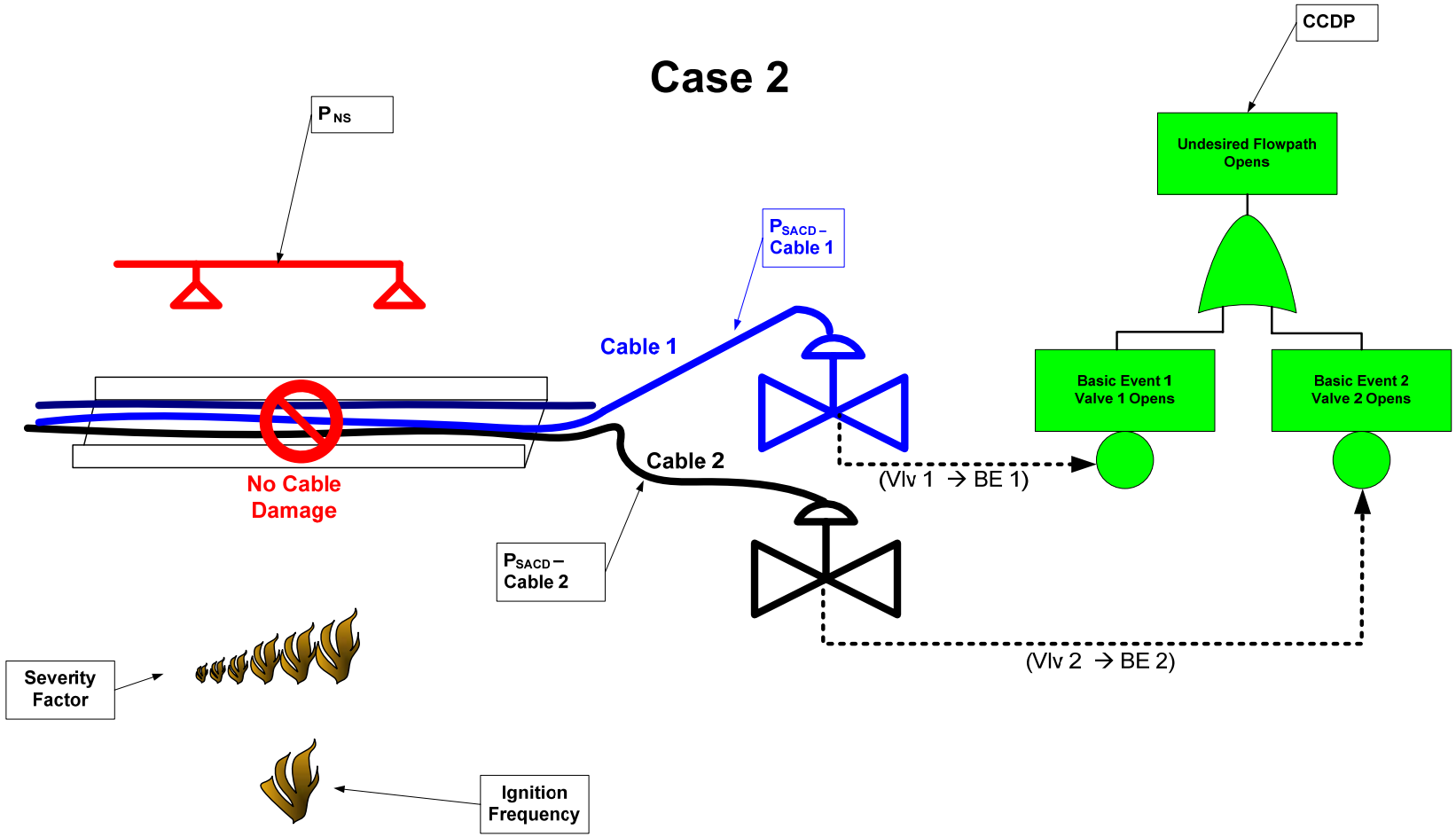
FP Feature Evaluation

- Identify impacted circuits and scenarios
- Calculate change in risk:
  - Case 1 (non-compliant): Sum associated scenarios for in-situ configuration
  - Case 2 (compliant): Sum associated scenarios reflecting deterministically compliant configuration
  - Calculate the delta between the CDF for Case 1 and the CDF for Case 2

Example with Cable Damage



Example with No Cable Damage



Manual Actions

- Identify impacted circuits and scenarios
- If function recovered is in FPRA model
  - Case 1 (non-compliant): Sum associated scenarios with function failed
  - Case 2 (compliant): Sum associated scenarios with function not failed
  - Model change may be required to calculate change due to loss of power
- If function recovered is not in FPRA model
  - Function is not risk significant (previously confirmed)

OCONEE FPRA

What next?

Unit 3 Refinements

- Revisit Dominant Risk Contributors
  - More Circuit Analysis
- Location Factors
  - Multipliers increase damage distances
  - Located within 2’ of a wall or a corner
- Hot Gas Layer
  - Generally not an Oconee issue
  - A few areas will be revisited

Units 1 & 2

- Unit 2
  - Beginning development of application specific model
  - Power supply differences identified
  - FRANC model should progress quickly
- Unit 1
  - Cables are now being traced
  - Qualitative assessment will dictate extent to which Unit 1 FPRA development is required