



# NRR FIRE PROTECTION IMPROVEMENT PLAN

## Background

The Nuclear Regulatory Commission (NRC) has been applying its four outcome goals to the management of its fire protection program: Maintain safety, reduce unnecessary regulatory burden, increase public confidence, and improve efficiency and effectiveness, and has been making significant progress. The challenges stem from (1) the fact that we have prescriptive regulations that are subject to different interpretations and are not always able to be enforced in a clear and consistent way, and (2) the fact that licensees have varying degrees of specificity in their licensing basis and in some cases are substantially different, which can also lead to different interpretations of regulatory intent. In addition, activities to employ risk-informed thinking in the area of fire protection are in development with technical issues, such as fire modeling, as challenges.

The Office of Nuclear Reactor Regulation Fire Protection Improvement Program (NRR FPIP) continues to receive considerable feedback from a number of stakeholders. These include concerns with:

- The progress in resolving circuit analysis issues (Attachment 1)
- Circuit analysis inspection activity (Attachment 1)
- The uniformity in our approach when manual actions are employed to meet 10 CFR Part 50, Appendix R III.G.2 (Attachment 2, Item 1)
- Inspections taking into account the Current Licensing Basis (CLB) at the facility being inspected or give credit for self assessments (Attachment 2, Item 2)
- The treatment of old design issues in the fire protection area and issue management in general (Attachment 2, Item 3)
- The application of Significance Determination Process (SDP) in the fire protection area (Attachment 2, Item 4)
- Relying on fire watches as compensatory measures (Attachment 2, Item 5)
- The application of "Quantitative Fire Hazard Analysis Methods" in the inspection program (Attachment 2, Item 6)
- The NRC position on fire protection equipment included in the scope of License Renewal Application (LRA) reviews (Attachment 2, Item 7)
- A need for adequate guidance for advanced reactors in the fire protection area (Attachment 2, Item 8)
- Risk-informed rulemaking (NFPA 805) (Attachment 2, Item 10)
- Fire protection program pilot for combined operating license (Attachment 2, Item 11)
- Testing of selected fire barrier materials (Attachment 2, Item 12)

All of these concerns pointed to the need for a comprehensive Fire Protection Improvement Plan (FPIP) to manage staff efforts to improve the fire protection regulatory environment (Attachment 2, Item 9). The FPIP is managed by the NRR's Division of Systems Safety and Analysis (DSSA).

## Improvement Plan Objectives

Much progress has been made in a number of fire protection areas, including the issuance of a comprehensive Regulatory Guide (RG), a proposed risk-informed and performance-based rule (Attachment 2, Item 10), issuance of a RIS on risk-informed associated circuit analysis, issuance of NUREG-1805 (for comment) on fire modeling and substantial improvements in inspector training. Emerging challenges facing the fire protection program (FPP) reinforce the need for a clear and comprehensive fire protection improvement plan (FPIP). This NRR FPIP started in October 2002.

The FPIP was developed to consider and take appropriate actions in response to concerns and feedback from stakeholders regarding implementation of the FPP. The FPIP is formulated as a separate document comprising a list of fire protection improvement activities with milestones and schedules identified. The first element of the FPIP is a proposed inspection and resolution plan for the longstanding circuit analysis issue. The Circuit Analysis Resolution Plan (CARP) was updated in October 2002. The FPIP also describes other topics of the improvement plan that are in place or will be developed as resources permit.

The FPIP combines the CARP, fire protection SDP Improvement Program with our rulemaking plans (NFPA 805 Standard), resolution of the issue of using manual action to meet 10 CFR 50, Appendix R, Section III.G.2, guidance development, and training initiatives to produce a comprehensive plan. In order to effectively manage the fire protection program consistent with other agency programs, it will also be necessary to get old design issues into a satisfactory resolution process. Experience has shown that the Task Interface Agreement (TIA) process has not served us well when evaluating performance issues where the licensing basis was not clear, or when evaluating old design issues. The TIA process has been augmented with decision logic that would enable more efficient application of limited resources for emerging fire protection issues that are identified in the Reactor Oversight Process (ROP) to determine if they represent actual performance deficiencies, preferably before they have triggered an inspection finding and a formal risk significance determination (Attachment 2, Item 3).

A pilot effort to resolve potential generic issues associated with gaseous suppression systems identified in the ROP has been completed. The pilot effort employed augmented decision logic to require a prompt decision on the applicability of the CLB, then move those issues which are not subject to enforcement into a backfit process, rulemaking process, or generic issue process, taking risk implications into consideration. The decision logic provided for the issues to be prioritized so that resource application determinations could be made. In December 2002, the Plant Systems Branch (SPLB) staff provided training to the Division of Licensing and Project Management (DLPM) on using the augmented decision logic. The results of this pilot effort could be shared with the program office to be evaluated for acceptability as an approach for old design issues across the board, not just for fire protection issues. Other issues such as circuit analysis risk uncertain configurations have been transferred to the NRC Office of Nuclear Regulatory Research (RES) for consideration in the Fire Risk Research Plan: Fiscal Years 2003–2006.

The FPIP has four attachments. The first covers the proposed CARP. The second deals with other fire protection topics that have been identified by stake holders. The third lists public meetings that have been held to resolve major fire protection issues. The fourth identifies fire protection emerging issues. These attachments will be revised as necessary to update progress and identify new issues.

**Fire Protection Improvement Plan  
Proposed Circuit Analysis and Resolution Plan (CARP)  
Attachment 1**

**Part 1 - Circuit Analysis Inspection Plan**

Below items support the withdrawal of the circuit analysis Enforcement Guidance Memorandum

| <b>Activity</b>  | <b>Schedule/Status</b>                   |
|--|--|
| Obtain stakeholder perspectives from the Facilitated Workshop.   | February 2003<br>(Complete)              |
| Meet with NEI on the draft inspection plan   | March 2003<br>(Complete)                 |
| Draft Regulatory Information Summary (RIS) on associated circuits and transmit to Reactor Improvements Branch (RORP) | May 2003<br>(Complete)                   |
| Issue the RIS and input to inspection guidance for public comment  | August 2003<br>(Complete)                |
| Receive IIPB and OE agreement on enforcement policy on old open items and on new findings                            | August 2003 (ML 032030584)<br>(Complete) |
| Draft NUREG for public comments  | October 2003                             |
| Issue the final RIS on associated circuits   | October 2003                             |
| Begin training NRC staff on the inspection guidance  | September 2003                           |
| Conduct public workshop on new risk-informed associated circuit inspection   | October 2003                             |
| Withdraw circuit analysis EGM  | October 2003                             |

**Part 2 - Circuit Analysis Resolution Plan (CARP)**

Below items support the resolution of the CARP and new risk-informed RG

| <b>Activity</b>   | <b>Schedule/Status</b>                 |
|---|--|
| Develop and Obtain Management Approval of CARP                            | September - October 2002<br>(Complete) |
| Complete SECY on "fixes" to circuit issues via manual actions             | February 2004                          |
| Complete SECY on enforcement policy on old open items and on new findings | February 2004                          |
| Endorse the final industry guidance in a new risk-informed RG on NFPA 805 | December 2004                          |

**Fire Protection Improvement Plan  
Other Topics  
Attachment 2**

**Item 1 - Manual Actions**

| <b>Activity</b>  | <b>Schedule/Status</b>      |
|--|-----------------------------|
| Draft Regulatory Information Summary (RIS) and forward it to RORP        | February 2003<br>(Complete) |
| Document the appropriateness of symptom-based fire protection procedures | March 2003<br>(Complete)    |
| Prepare a proposed Rulemaking Plan                                       | March 2003<br>(Complete)    |
| Prepare an Interim Enforcement Policy Statement to support rulemaking    | December 2003               |
| Revise RG 1.189 to include manual actions                                | TBD                         |

**Item 2 - Licensing Basis**

| <b>Activity</b>   | <b>Schedule/Status</b>    |
|---|---------------------------|
| Consider a risk-informed approach to establish licensing basis issue priorities                             | April 2003<br>(Complete)  |
| Engage NEI on potential incentives to promote adoption of NFPA 805 (e.g., credit for self-assessments)      | August 2003<br>(Complete) |
| Response to NEI on potential incentives to promote adoption of NFPA 805                                     | August 2003               |
| SECY to receive Commission approval for some incentives to the licensees (e.g., credit for self assessment) | February 2004             |

**Item 3 - Old Design Issues**

| <b>Activity</b>  | <b>Schedule/Status</b>           |
|--|----------------------------------|
| Collect emerging issues being developed in ROP   | Continuous<br>(See Attachment 4) |
| Enhance management controls on the inspector and technical staff interface             | November 2002 (Complete)         |
| Train DLPM on the pilot TIA process with NRC stakeholders                              | December 2002 (Complete)         |
| Establish periodic meeting schedule with NEI to discuss and prioritize emerging issues | January 2003 (Complete)          |

| Activity   | Schedule/Status   |
|--|---|
| Consider a risk-informed approach as a threshold to identify emerging issues | February 2003 (Complete-Issues prioritized in Protocol) |
| Train regions on the pilot TIA process                                       | January 2004  |

#### Item 4 - Application of SDP

| Activity   | Schedule/Status         |
|--|-------------------------|
| Support SDP improvement program                            | As needed               |
| Update fire frequency data base                            | October 2002 (Complete) |
| Obtain PRA training for selected fire protection engineers | April 2003 (Complete)   |
| Conduct table top exercises on draft fire protection SDP   | October 2003            |
| Conduct training on revised fire protection SDP            | December 2003           |
| Issue revised fire protection SDP guidance                 | April 2004              |
| Develop fire brigade SDP for ROP use                       | May 2004                |

#### Item 5 - Use of Compensatory Measures (Predecisional)

| Activity  | Schedule/Status |
|---|-----------------|
| Determine the appropriateness of fire watches being used for non-safety compliance issues and prepare white paper | August 2003     |

#### Item 6 - Quantitative Fire Hazards Evaluation

| Activity  | Schedule/Status      |
|---|----------------------|
| Develop quantitative fire hazards analysis tools            | Ongoing (Complete)   |
| Issue Draft NUREG-1805 and spreadsheets for public comments | June 2003 (Complete) |
| Issue Final NUREG-1805                                      | November 2003        |

#### Item 7 - LRA Scoping Fire Protection Equipment

| Activity  | Schedule/Status          |
|---|--------------------------|
| Publish License Renewal Application (LRA) review criteria for scoping fire protection as an ISG | November 2002 (Complete) |
| Refer transferred ISG license renewal issues to RLEP  | January 2003 (Complete)  |

**Item 8 - Advanced Reactors**

| Activity  | Schedule/Status      |
|---|----------------------|
| Revise Standard Review Plan (SRP) Section 9.5.1 Concurrence cycle | July 2003 (Complete) |
| Revise Standard Review Plan (SRP) Section 9.5.1 Final issuance    | December 2003        |

**Item 9 - FPIP Development**

| Activity  | Schedule/Status          |
|---|--------------------------|
| Complete the FPIP and obtain management concurrence | November 2002 (Complete) |
| Meet with stakeholders to discuss FPIP in workshop  | November 2002 (Complete) |

**Item 10 - Risk Informed Rule**

| Activity   | Schedule/Status                      |
|--|--------------------------------------|
| Review and comment on NEI implementation guidance for NFPA 805 rulemaking                    | November 2002 (Complete)             |
| Support NFPA 805 rulemaking  | DSSA as needed                       |
| Issue proposed rule for public comment   | November 2002 (DRIP Lead) (Complete) |
| 75 day comment period on proposed rule ends  | January 2003 (DRIP Lead) (Complete)  |
| NEI Implementation Guidance pilot table top exercise at Farley on the change control process | April 2003 (Complete)                |
| Receive revision D of NEI Implementation Guidance for NFPA 805 rulemaking                    | May 2003 (Complete)                  |
| NEI Implementation Guidance table top exercise at McGuire on transition                      | August 2003 (Complete)               |
| All comments on proposed rule resolved with OGC assistance                                   | September 2003 (DRIP Lead)           |
| DRIP issues draft final rule package for internal NRR review and ADM review                  | September 2003 (DRIP Lead)           |
| DRIP issues final rule package for inter-office concurrence                                  | October 2003 (DRIP Lead)             |
| ACRS and CRGR briefings  | November 2003 (DRIP Lead)            |
| NRR OD concurrence obtained  | November 2003 (DRIP Lead)            |

| <b>Activity</b>   | <b>Schedule/Status</b> |
|---|------------------------|
| Prepare draft RG for public comment to support the rule | June 2004              |
| Establish enforcement policy during transition period   | TBD                    |
| SRM issued after Commission vote                        | TBD (DRIP Lead)        |
| Final Rule published in Federal Register                | TBD (DRIP Lead)        |

**Item 11 - Fire Protection as a Pilot for Programmatic Inspection, Tests, Analyses, and Acceptance Criteria (ITAAC)**

| <b>Activity</b>   | <b>Schedule/Status</b>     |
|---|----------------------------|
| Workshop to discuss with interested stakeholders ITAAC for operational programs | August 2003<br>(DRIP Lead) |

**Item 12 - RES Fire Barrier testing**

| <b>Activity</b>  | <b>Schedule/Status</b>     |
|--|----------------------------|
| Complete fire barrier test plan (Hemyc and MT) and transfer to RES | January 2003<br>(Complete) |

**Fire Protection Improvement Plan**  
**Public Meetings in Fire Protection Major Program Areas 1998-Present**  
**Attachment 3**

| <b>Subject Area</b>     | <b>Date</b>         | <b>Purpose/Comments</b>  |
|-------------------------|---------------------|--|
| <b>Circuit Analysis</b> | July 1, 1998        | Presentation to ACRS on post-fire safe shutdown circuit analysis   |
|                         | July 23, 1998       | NRC workshop for Public and Industry on post-fire safe shutdown circuit analysis (National attendance by public and industry)  |
|                         | December 14, 1998   | Meeting with NEI in fire-induced circuit failure assumptions for various cable configurations  |
|                         | March 25, 1999      | NRC staff/NEI meeting to discuss fire-induced circuit failures   |
|                         | May 3/5, 1999       | NEI Fire Protection Forum, Public Meeting. NRC discusses issue resolution and status. NEI discusses industry activity. RES presents their research on issue. Cleveland, Ohio |
|                         | August 18–19, 1999  | Meeting with BWROG to discuss circuit analysis issues.   |
|                         | October 18–20, 1999 | NEI Fire Protection Forum, Public Meeting. NRC discusses Resolution status<br>NEI presented Assessment Methodology, St. Peterburg, Florida                                   |
|                         | December 20, 1999   | Meeting to discuss status of the NEI post-fire safe shutdown circuit analysis methodology development efforts (NEI 00-01)  |
|                         | April 13, 2000      | NRC staff/NEI meeting to discuss NEI 00-01, Rev. A   |
|                         | May 25, 2000        | Tele-conference with NEI to discuss preliminary staff comment on NEI 00-01 Rev. A  |
|                         | July 21, 2000       | Meeting with NEI to discuss Sandia Report, "Circuit Analysis, Failure Modes and Likelihood Analysis," and relates circuit analysis technical issues                          |
|                         | July 26, 2000       | NRC staff/BWROG/NEI on post-fire safe shutdown circuit analysis  |



| <b>Subject Area</b> | <b>Date</b>         | <b>Purpose/Comments</b>  |
|---------------------|---------------------|--|
|                     | October 3, 2000     | NRC staff/NEI meeting on (Circuit Analysis) fire test protocols  |
|                     | February 4–7, 2001  | NRC staff presentation on fire-induced circuit failure analysis, NEI Fire Protection Information Forum (General Industry in attendance). Also, NEI status presentation on NEI 00-01  |
|                     | August 8, 2001      | NRC staff/NEI meeting to discuss industry progress on circuit analysis resolution activities   |
|                     | October 22–25, 2001 | NEI Fire Protection Information Forum, NRC presents status of fire-protection issues. Public Meeting, Clearwater, Florida  |
|                     | June 4, 2002        | NEI and NRR staff present their view of draft NEI 00-01, Rev. C to ACRS Fire Protection Subcommittee (Public Meeting at HQs)   |
|                     | August 29–30, 2002  | NEI Fire Protection Information Forum. NEI presents the results of pilot use of NEI 00-01 NRC staff present comments on the NEI 00-01 and NRC resolution plan  |
|                     | October 22, 2002    | NEI explained the NEI 00-01, Rev. D to the staff (Public Meeting at HQs)   |
|                     | February 19, 2003   | The NRC hosted an all-day Facilitated Workshop to discuss risk-informing the associated circuit inspection portion of the fire protection triennial inspections. The meeting was facilitated by an OGC representative. The Workshop was attended by representatives from licensees, industry groups (NEI, EPRI), consulting firms, national laboratories (SNL, BNL), RES, Region I and NRR |
|                     | March 20, 2003      | Presentation of the, "Proposed Risk Informed Inspection Guidance for Post-fire Safe-Shutdown Associated Circuit Inspection," at regularly scheduled IIPB/NEI meeting   |
|                     | September 9, 2003   | Presentation to ACRS fire protection subcommittee  |
|                     | October 15–16, 2003 | Risk-informed associated circuits inspection public workshop   |

| <b>Subject Area</b>        | <b>Date</b>       | <b>Purpose/Comments</b>   |
|----------------------------|-------------------|---|
| <b>NFPA 805 Rulemaking</b> | January 16, 2002  | Continue discussion of the NEI implementing guidance for NFPA 805   |
|                            | February 12, 2002 | Continue discussion of the NEI implementing guidance NFPA 805   |
|                            | February 26, 2002 | Continue discussion of NEI implementing guidance for NFPA 805   |
|                            | April 23, 2002    | Continue discussions of issues raised in the NEI letter of April 9, 2002 concerning fire protection rulemaking language to adopt NFPA 805   |
|                            | August 1, 2002    | Continue the discussion of NEI implementing guidance for NFPA 805   |
| <b>Manual Actions</b>      | June 20, 2002     | Follow-up discussion of May 16, 2002-letter on the use of manual actions to achieve a safe shutdown, to satisfy the requirement of Section III.G.2 of Appendix R to 10CFR50   |
|                            | August 21, 2002   | SPLB met with Executive Team (ET) and received direction to proceed with rulemaking   |
|                            | August 29, 2002   | SPLB presented description of, "Feasible Manual Actions," to public at NEI Fire Protection Information Forum in Seattle, Washington   |
|                            | November 6, 2002  | SPLB presented description of "feasible manual actions," to public at Licensing Workshop at Washington Terrace Hotel, DC  |
| <b>Fire Protection SDP</b> | May 23, 2002      | Public meeting to discuss fire protection SDP revision  |
|                            | July 9, 2002      | Public meeting to discuss fire protection SDP revision  |
|                            | August 14, 2002   | Working Group meeting to discuss Phase 2 fire protection SDP methodology  |
|                            | September 4, 2002 | The NRC staff and NEI discussed separate Phase 1 screening alternatives. Eleven issues for improving Phase 2 were discussed and task leaders were assigned action plans for short and long term fixes to be presented at a workshop in November |

| <b>Subject Area</b>                            | <b>Date</b>        | <b>Purpose/Comments</b>  |
|--|--------------------|--|
|  | September 14, 2002 | An update of all overall SDP revision effort was presented at the Fire Protection Inspector Workshop in Region III. Three issues (i.e., fire scenario development, and fire barriers) were discussed with inspectors to mine resolution alternatives |
|  | November 2002      | Public workshop to discuss new fire protection SDP methodology   |
|  | April 14, 2003     | Public workshop to discuss draft fire protection SDP methodology   |
| <b>Fire Protection Improvement Plan (FPIP)</b> | November 5, 2002   | The SPLB Branch Chief briefs NRR Associate Director on the FPIP  |
|  | November 6, 2002   | The FPIP is presented at the NEI licensing forum at the Washington Terrace   |
|  | November 20, 2002  | The NRR Office Director is briefed on the FPIP by the SPLB Branch Chief  |
|  | January 15, 2003   | NRC staff and NEI representatives held a public meeting to discuss FPIP updates and the management of emerging issues  |
|  | March 18, 2003     | NRC staff and NEI representatives held a public meeting to continue the discussion on FP emerging issues   |
|  | April 18, 2003     | NRC staff and NEI representatives held a public meeting to continue the discussion on fire protection issue management   |

**Fire Protection Improvement Plan  
Fire Protection Emerging Issues  
Attachment 4**

| <b>Emerging Issue</b>  | <b>Status</b>   |
|--|---|
| Incentives for adopting NFPA 805 (ADAMS ML030370027)   | Staff/NEI March 2003 agenda item  |
| Interim inspection guidance for manual actions (ADAMS ML030370027)   | Staff/NEI March 2003 agenda item  |
| Scoping for license renewal is a CLB issue under Part 50. Reference item 7, Attachment 2 (ADAMS ML030370027)                         | Staff/NEI April 2003 agenda item  |
| Seek Region feedback on NEI concerns with inspectors in the areas of safe- shutdowns and the regulatory process. (ADAMS ML030370027) | Staff/NEI March 2003 agenda item  |
| Clarify the process and documentation necessary to provide fire-protection issue closure (ADAMS ML030370027)                         | Staff/NEI April 2003 agenda item  |
| Heat collector sprinkler heads (ADAMS ML023030065)   | SPLB representatives attended a public meeting at the Brunswick site in February 2003                                   |
| Evaluate results of first round of triennial inspections (ADAMS ML030370027)   | Staff/NEI April 2003 agenda item  |
| Epoxy floor coating flame spread   | Staff/NEI August 2003 agenda item   |
| Alternate shutdown timing issues   | Staff/NEI August 2003 agenda item   |
| Fire protection safety evaluations in CLB  | Action item identified at National Regional Utility Group (RUG) meeting 2003. Staff/NEI August 2003 meeting agenda item |
| NRC fire protection regional public workshops  | Action item identified at National Regional Utility Group (RUG) meeting 2003. Staff/NEI August 2003 meeting agenda item |
| Fort Calhoun CLB   | Action item identified at National Regional Utility Group (RUG) meeting 2003. Staff/NEI August 2003 meeting agenda item |
| Gaseous fire suppression system lockouts   | Staff/NEI August 2003 agenda item   |