

August 7, 2002

MEMORANDUM TO: Michael R. Johnson, Chief  
Probabilistic Safety Assessment Branch  
Division of Systems Safety and Analysis  
Office of Nuclear Reactor Regulation

FROM: See-Meng Wong/**RAI**  
Licensing Section  
Probabilistic Safety Assessment Branch  
Division of Systems Safety and Analysis  
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY MINUTES OF JULY 09, 2002 PUBLIC MEETING TO  
DISCUSS THE IMPROVEMENT INITIATIVE FOR FIRE PROTECTION  
SIGNIFICANCE DETERMINATION PROCESS (SDP) METHODOLOGY

Attached is the summary minutes of the July 09, 2002 public meeting between NRC staff and external stakeholders which summarizes the discussions on the current status of the fire protection SDP, and provides the NRC staff and external stakeholder perspectives for prioritizing approaches to improve the fire protection SDP. The handout materials distributed to the meeting participants are also included in this attachment.

CONTACT: See-Meng Wong, 415-1125  
NRR/DSSA/SPSB

Attachments: As stated

August 7, 2002

MEMORANDUM TO: Michael R. Johnson, Chief  
Probabilistic Safety Assessment Branch  
Division of Systems Safety and Analysis  
Office of Nuclear Reactor Regulation

FROM: See-Meng Wong/**RA**  
Licensing Section  
Probabilistic Safety Assessment Branch  
Division of Systems Safety and Analysis  
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY MINUTES OF JULY 09, 2002 PUBLIC MEETING TO  
DISCUSS THE IMPROVEMENT INITIATIVE FOR FIRE PROTECTION  
SIGNIFICANCE DETERMINATION PROCESS (SDP) METHODOLOGY

Attached is the summary minutes of the July 09, 2002 public meeting between NRC staff and external stakeholders which summarizes the discussions on the current status of the fire protection SDP, and provides the NRC staff and external stakeholder perspectives for prioritizing approaches to improve the fire protection SDP. The handout materials distributed to the meeting participants are also included in this attachment.

CONTACT: See-Meng Wong, 415-1125  
NRR/DSSA/SPSB

Attachments: As stated  
G:\SPSB\July09Mtg1.wpd

OFFICE	*SPSB	SC:SPSB
NAME	SWong:nyc	MReinhart
DATE	08/02/02	08/7/02

OFFICIAL RECORD COPY

# **FIRE PROTECTION SDP REVISION TASK**

## **Summary Minutes of Public Meeting Conference Room O9B4, One White Flint North, Rockville, Maryland July 09, 2002**

### 1. Meeting Objectives

- (a) To discuss the current status of the fire protection SDP methodology, and its improvement initiative
- (b) To elicit feedback to obtain NRC and external stakeholder perspectives for prioritizing approaches to improve the current version of the fire protection SDP methodology

### 2. Agenda

M. Johnson, SPSB Branch Chief, started the meeting with introductory remarks on NRC expectations on the task of revising the fire protection SDP tool for use by NRC inspectors. M. Reinhart was the chair and moderator of all discussions in the meeting.

M. Reinhart provided an update on the background and current status of the fire protection SDP, and its improvement initiative.

F. Emerson, NEI provided the industry views and positions on the fire protection SDP changes, and recommended approaches to revise the SDP tool.

NRC staff and industry participants discussed both NRC and external stakeholder perspectives regarding issues and suggested priorities for improving the fire protection SDP methodology. The meeting participants also discussed proposed approaches for interim and long-term fixes to resolve the identified issues.

### 3. Background and Current Status of Fire Protection SDP (M. Reinhart)

Copies of minutes of the May 23, 2002 meeting of NRC staff at NIST, Gaithersburg, Maryland were distributed to all participants present during the meeting to provide an update on the background and current status of the fire protection SDP. An outcome of the May 23rd meeting was that the participants arrived at a consensus view that revising the current fire protection SDP and its guidance for use, was preferable to reverting to the deterministic, compliance approach for assessing the importance of fire protection inspection findings.

M. Reinhart provided a summary of the issues concerning the current version of the fire protection SDP. The major issues are: (a) selection of fire ignition frequencies, (b) bases for degradation ratings for defense-in-depth elements, (c) use of fire severity factors, (d) development of "credible" fire scenarios, and (e) definition of SDP entry conditions in the Phase 1 screening process. Other issues identified include the need

for clearer guidance for crediting manual actions for safe shutdown, fire brigade performance evaluations, and alternate shutdown capability.

As documented in the May 23, 2002 meeting minutes, the NRC staff had proposed interim and long-term fixes for resolving the identified issues. The proposed interim fixes include continuing to use the Ignition Source Data Sheet (FIVE methodology) data as a reasonable data source for fire ignition frequency data, and providing clearer guidance for Phase 1 SDP entry conditions. Some of the proposed long-term fixes include developing the bases for degradation ratings for fire protection defense-in-depth elements, reviewing the fire risk equation to appropriately weight the factors in the fire mitigation frequency formulation, providing guidance on use of severity factors in Phase 3 analyses, and development of "credible" fire scenario and fire growth modeling (e.g., positive identification of likely ignition sources, and appropriate inputs for fire modeling).

#### 4. NEI & Industry Views (F. Emerson)

F. Emerson reiterated the general comments from NEI and industry (as provided in NEI letter dated October 18, 2001) that the fire protection SDP was unnecessarily complex and subjective, and difficult to use. He also provided the industry views that the revision of the fire protection SDP should address industry concerns, provide improved bases for determining degradation of defense-in-depth (DID) elements, and provide clear guidance for interim SDP use. He indicated that the revised SDP should have the following attributes:

1. Be risk-informed
2. Allow use of the plant PSA
3. Address all DID elements
4. Be useful to inspectors and licensees
5. Effectively screen out low significant issues
6. Credit compensatory measure and manual action
7. Be consistent with the other SDPs
8. Provide for transparent use

F. Emerson also suggested that the revised SDP should address the treatment of exemptions, clarify the DID ratings and their associated bases, and improve the Phase 1 screening questions. He discussed a proposed industry approach (i.e., a fire risk analysis equation) for evaluating the change in risk due to deficiencies in fire protection DID elements. He also suggested the application of prevention or safe shutdown considerations for screening out fire scenarios of very low probability occurrence.

#### 5. Discussions of Proposed Approaches to Resolve the Identified Issues (M. Reinhart, et. al)

The meeting participants discussed the approach for proceeding with the resolution of the identified issues. There was consensus agreement on the immediate need to address the resolution of issues related to the Phase 1 screening process, prioritize the interim and long-term fixes for the Phase 2 SDP methodology, and develop further guidance for performing fire protection Phase 3 SDP analyses in the longer term.

The meeting participants discussed the construct of the current Phase 1 screening process. It was found that the current guidance for Phase 1 screening process was confusing and could be improved when considering (i.e., screening in) fire protection issues affecting safe shutdown capability, and screening out low likelihood fire scenarios. The meeting participants discussed the potential improvements to the Phase 1 screening process. There was general agreement on an overall approach to simplify the current screening process, and allow for considerations of safe shutdown issues. The proposed approach for improving the Phase 1 screening process include the development of appropriate Phase 1 screening questions (action item for R. Langstaff, Region III), and the development of a suitable method for effective screening out of low significant issues (action item for F. Emerson, NEI).

A minor interim fix to improve the SDP process was a revision to page A1-8 of IMC 0609A, Question 1 to include alternate/safe shutdown as a fire protection feature for SDP evaluation (action item for P. Koltay, IIPB).

There was general agreement to establish a focus group to determine what are the issues associated with the Phase 2 SDP methodology, and decide on how to resolve the identified issues expeditiously. The focus group would also evaluate the formulation of the fire risk equation as a cornerstone for the revised Phase 2 SDP methodology, and develop guidance on how to implement the selected fire risk equation for the fire protection Phase 2 SDP analyses. The proposed members for the core group are Gareth Parry, See-Meng Wong, Ron Langstaff, Walt Rogers, James Trapp, Paul Lain, J.S. Hyslop, Steve Nowlen, and Fred Emerson.

#### 6. Wrap-Up/ Action Items/Next Meeting (M. Reinhart)

The meeting participants discussed the plans for future activities. These activities include preparing a strawman for the Phase 1 screening process, and establishing a core group to assess the issues associated with the Phase 2 SDP methodology. The action items for these activities are:

1. Development of appropriate Phase 1 screening questions (R. Langstaff)
2. F. Emerson, NEI volunteered to provide for NRC review, a proposed Phase 1 methodology for screening out of low significance issues.
3. Establishing the core group and scheduling a meeting in August (S. Wong)

The proposed date for the next meeting of the group was tentatively scheduled to be September 4, 2002. The proposed date for a meeting of the smaller focus group was tentatively scheduled for the week of August 12, 2002.

## 7. Meeting Attendees

Mark F. Reinhart, NRC/NRR  
Suzanne Black, NRC/NRR  
Gareth Parry, NRC/NRR  
Walt Rogers, NRC/Region 2  
Charlie Payne, NRC, Region 2  
Rebecca Nease, NRC/Region 4  
Steve Nowlen, SNL  
Tom Houghton, NEI  
Chris Pragman, Exelon  
Les Bailey, Southern Nuclear  
Deann Raleigh, Scientech

Michael Johnson, NRC/NRR  
See-Meng Wong, NRC/NRR  
Peter Koltay, NRC/NRR  
Ron Langstaff, NRC/Region3  
Paul Lain, NRC/NRR  
J.S. Hyslop, NRC/RES  
Kendra Hill, NRC/RES  
Fred Emerson, NEI  
Ira Heatherly, TVA  
Roger Sims, Progress Energy

## Fire Protection SDP Revision Task

### Minutes of Meeting at NIST, Gaithersburg, Maryland May 23, 2002

#### 1. Meeting Objectives

- (c) To have a common understanding of the issues concerning the implementation of the fire protection SDP methodology
- (d) To attain alignment on the proposed resolutions for revising and improving the current version of the fire protection SDP methodology

#### 2. Agenda

M. Johnson, SPSB Branch Chief, started the meeting with introductory remarks on NRR expectations on the task of revising the fire protection SDP tool for use by NRC inspectors. M. Reinhart was the chair and moderator of all discussions in the meeting.

Regional Office feedback on the field use of the fire protection SDP were provided by W. Rogers (Region II), R. Fuhrmeister (Region I), and R. Langstaff (Region III).

Feedback from NEI and industry, and ACRS comments on the fire protection SDP were provided by S. Wong (SPSB).

Comments from RES/SNL review of the fire protection SDP were provided by J.S. Hyslop (RES).

The summary of major issues for prioritization of proposed resolutions was provided by M. Reinhart

#### 3. Regional Office Feedback (W. Rogers, R. Fuhrmeister, R. Langstaff)

- 3.1 Region II strongly recommended reverting back to a compliance approach for determining the significance of fire protection issues. Specific comments on the deficiencies of the fire protection SDP were:
  - (a) Group 1 questions were incomplete to encompass all fire protection features
  - (b) Phase 2 methodology did not address performance deficiencies associated with control room evacuations
  - (c) No well-founded bases for degradation ratings of fire mitigative features
  - (d) Limited guidelines to determine failure probability of recovery from remote shutdown operations
  - (e) No NRC standards for fire ignition frequencies and fire severity factors

- 3.2 Region I supports the two-phase methodology as a logical approach for making risk-informed determination of significance of fire protection findings. Specific comments on the fire protection SDP were:
- (a) Limited guidance on quantification of specific fire ignition frequencies
  - (b) Unclear guidance on using Phase 2 SDP worksheets/sequences for determining mitigation systems capability when multiple systems are affected in a fire scenario
  - (c) No specific guidance on credit for alternate safe shutdown equipment or manual recovery actions.
- 3.3 Region III considers the use of the fire protection SDP to be a time-consuming and resource-intensive activity (e.g., Kewaunee and Palisades issues). Specific comments were:
- (a) Phase 1 screening criteria may not be well defined to screen in functional degradations of some fire protection defense-in-depth elements
  - (b) No clear guidance on credit for manual suppression effectiveness
  - (c) No clear guidance on fire scenario development
- 3.4 Region IV (Hyslop presentation) recommends a new approach for assessing the significance of fire protection findings. The proposed alternate approach is based on defensive barriers and loss of function matrix to determine risk significance. Specific comments were:
- (a) No guidance on using the fire model spreadsheets for fire modeling
  - (b) No clear explanation on how to assess findings involving multiple fire areas
  - (c) No guidance on assessing credit of one manual action versus multiple manual actions
  - (d) Problems with using the Phase 2 SDP worksheets

#### 4. NEI & Industry and ACRS Feedback (S. Wong)

- 4.1 General comments from NEI and industry were that the fire protection SDP was excessively complex and subjective, and lack transparency to the licensee. Specific comments were:
- (a) Definition of fire protection weaknesses or findings need further clarification
  - (b) Delete consideration of single-room vs double-room terms
  - (c) Credit for detection and administrative controls should be decoupled from suppression terms
  - (d) Add additional degradation ratings on Table 5.1, Appendix F, and adjust failure probabilities
  - (e) Systems needed to prevent core damage not on Table 5.6

- (f) Deviations from code-of-record as allowed by GL 86-10 not factored in the two-phase screening process
- (g) Insufficient credit for manual actions for post-fire safe shutdown
- (h) Problems with fire brigade performance evaluation, fire barrier degradation ratings, and definition of fire scenarios
- (i) More credit should be given for rigorous compensatory measures
- (j) Treatment of exemptions should be clarified

4.2 ACRS comments were general in nature; the fire protection SDP is overly subjective, and involves very qualitative inputs to a quantification process of uncertain pedigree.

## 5. RES/SNL Review of Appendix F (J.S. Hyslop)

5.1 The general comment was that the fire protection SDP process represents a reasonable approach for the assessment of inspection findings. Major specific comments were:

- (a) Guidance lacking on impact of inspections/deviations on the assessment
- (b) Concerns with significance assessments of fire brigade findings
- (c) Bases of degradation level assignments need to be clarified
- (d) Guidance for selection of ignition frequencies needed
- (e) Impact of spurious actuations needs clarification
- (f) Treatment of single-room versus double-room terms needs to be improved
- (g) Findings against safe shutdown identified in fire protection inspections should be addressed
- (h) Better guidance to identify fire scenarios should be provided

## 6. HQ Feedback (SPLB)

- (a) Distinguish between electrical raceway fire barrier and walls in establishing degradation ratings
- (b) Credit for fire barrier should reflect more time for fire brigade response

## 7. Summary of Major Issues and Prioritization for Resolution (M. Reinhart)

7.1 The major issues concerning the current version of the fire protection SDP were identified as follows:

### 7.1.1 Technological issues

- (a) Fire ignition frequencies
- (b) Degradation ratings for defense-in-depth elements
- (c) Fire severity factors
- (d) Development of fire scenario

### 7.1.2 Issues related to Phase 1 screening process

- (a) Definition of SDP entry conditions

### 7.1.3 Other technical issues identified for interim and long-term fixes

- (a) Single-room versus double-room terms
- (b) Credit for remaining mitigation capability, i.e., calculation of CCDP
- (c) Credit for manual actions
- (d) Fire brigade performance evaluations
- (e) Credit for alternate shutdown capability
- (f) Simpler format for reproducibility of SDP analysis

7.2 Four options were proposed for the forward path to improve the SDP. The four options were:

- (a) Revert to a deterministic, compliance approach
- (b) Fix the current version of fire protection SDP
- (c) Develop an alternate SDP based on defensive barriers and loss of function matrix
- (d) Develop an additional SDP solely for fire brigade performance evaluations

Prior to discussions on each of the above issues by all participants in the meeting, there were 4 votes for Option 1, 7 votes for Option 2, and no votes for Option 3. Option 4 is part of the fix in Option 2. After discussions on all of the identified issues, there were 1 vote for Option 1, 10 votes for Option 2, and no votes for Option 3.

7.3 The proposed resolutions for the major issues were as follows:

#### 7.3.1 Interim Fixes

- (a) Continue to use the Ignition Source Data Sheet (FIVE methodology) data as a reasonable data source for fire ignition frequency data
- (b) Define Phase 1 SDP entry conditions by review of IMC 0612, and SPLB input to be provided after the Fire Protection Inspectors Workshop, June 11-13, 2002

#### 7.3.2 Long-term Fixes

- (a) Translate RES fire events database into database of fire ignition frequencies by component level within fire compartments or rooms
- (b) Develop bases for degradation ratings for fire protection defense-in-depth elements, i.e., revise the logic in Table 5.1
- (c) Review the fire risk equation to appropriately weight the factors in the fire mitigation frequency formulation (e.g., fire barrier effectiveness in a challenging fire scenario)

- (d) Guidance on use of severity factors in Phase 3 analyses
- (e) Guidance on development of “credible” fire scenario and fire growth modeling (e.g., positive identification of likely ignition sources, and appropriate inputs for fire modeling)
- (f) Development of separate SDP for fire brigade performance

8. Wrap-Up/ Action Items/Next Meeting (M. Reinhart)

The proposed date for the next meeting of the group was tentatively scheduled for the week of July 8-15, 2002.

9. Meeting Attendees

Mark F. Reinhart (Chair)	Michael Johnson	See-Meng Wong
Gareth Parry	Peter Koltay	
Roy Fuhrmeister	Walt Rogers	
Ron Langstaff	Charlie Payne	
Ed Connell	Mark Salley	
Nathan Siu	J.S. Hyslop	
Eric Weiss	Amarjit Singh	

Fire Protection SDP Improvement Initiative Public Meeting  
One White Flint North  
Tuesday, July 9, 2002  
Room O9B4

**AGENDA TOPICS**

9:00 a.m.	Welcome and Introduction	M. Johnson
9:05 a.m.	Meeting Purpose and Objectives	M. Reinhart
9:15 a.m.	Background (History and Current Status) of Fire Protection SDP	M. Reinhart S. Wong
10:00 a.m.	NRC and Stakeholder Perspectives Regarding Issues and Suggested Priorities	NRC staff, NEI and others
10:45 a.m.	Break	
11:00 a.m.	Continue Discussion on NRC and Stakeholder Perspectives	NRC staff, NEI and others
12:00 p.m.	Lunch	
1:00 p.m.	Issue Prioritization	All
2:30 p.m.	Break	
2:45 p.m.	Discussion of Proposed Approaches to Resolve Issues	All
4:00 p.m.	Adjourn	