NEI 00-01, CHAPTERS 1-2 AND GENERAL COMMENTS

Use of NEI 00-01

Type of Issue	Risk Significant	Not Risk Significant
Licensing basis (compliance)	Report and address through CAP	Use risk analysis to support exemption request
Not clearly compliance or licensing basis	Address through CAP	Document risk analysis

NEI 00-01 Chapters 1-2 and General	NRC
4.4. "... [T]he screening of a circuit failure scenario cannot be driven solely by the numerical results of the PRA screening ... The integrated decision process therefore includes consideration of the following: the screening PRA result;, safety margins and defense-in-depth; uncertainty of the results." 4.3.5. "... Model and parameter uncertainty is sometimes more effectively treated with sensitivity analysis rather than statistical uncertainty ... **For the ... screening process ...:** • **Scenarios screened in the qualitative screening, or with a risk at least a factor of lower than all acceptance criteria ..., can be treated with a qualitative discussion of uncertainty. If uncertainty is determined to be too large ..., then a more detailed consideration of uncertainty is needed.** • **[For] [s]cenarios whose risk ... is within a factor of 10 of the acceptance criteria, quantitative uncertainty and/or sensitivity analysis is required."**	3/6/02 NRC Comments on NEI 00-01, Draft C, Comment L.2. "... [I]t may be appropriate to retain some deterministic acceptance criteria for high consequence events, i.e., not screen them out, unless an appropriate degree of rigor can be attached ... **[T]he treatment of uncertainty associated with a risk tool such as NEI 00-01 should be explicitly and carefully considered."**

NEI 00-01 Chapters 1-2 and General	NRC
1.1. "... [T]he deterministic method, derived from NRC regulations, guidance and long-held industry interpretations of the foregoing (incorporated into plant's licensing basis) is provided for analyzing and resolving circuit failure issues. Risk-informed methods are provided to determine the risk significance of identified issues ..." 1.1.1. (Issues within the Licensing Basis). "...NEI 00-01 can be used to support exemptions or deviations in areas where the plant configuration clearly does not meet its own long-standing licensing basis ..." 1.1.2. (Issues Beyond the Licensing Basis). "... Exemptions or deviations should not be required where there has been a legitimate and long-standing difference in interpreting the regulations ..." 9/11/02 NEI Response to NRC Comments, Comment G.1. "... While it is true that plant-specific safety evaluations were not intended for application to the industry at large, **the restatement of similar staff positions in multiple SERs and inspection reports is indicative of a trend, or mode, in [NRC] staff positions. Staff cannot discount such trends** merely be stating that they were intended only for the plants in question."	3/6/02 NRC Comments on NEI 00-01, Draft C, Comment G.1. "... Staff approvals documented in safety evaluations were specifically applicable to the plant under consideration and do not represent staff endorsement of a particular approach for industry-wide application. Further, **plant-specific exemptions granted in accordance with 10CFR50.48 and 50.12 do not constitute a new regulatory position generically applicable to all licensees."**

NEI 00-01 Chapters 1-2 and General	NRC
Rev. 0, **"Guidance for Post-Fire Safe Shutdown Analysis"** 9/11/02 NEI Response to NRC Comments, Comment G.4. **"NEI will consider a title change** that appropriately reflects the content of the document [NEI 00-01]."	3/6/02 NRC Comments on NEI 00-01, Draft C, Comment G.4. **"The title** ['Guidance for Post-Fire Safe Shutdown Analysis'] for this document [NEI 00-01] **should be revised as the document discusses primarily circuit failure analysis,** and is not a comprehensive guide to post-fire safe-shutdown analysis ..."
1.1. "... The methods in this document **do not require** the systematic re-evaluation of a plant's post-fire safe shutdown analysis, nor do they take precedence over specific requirements accepted by the NRC in a plant's post-fire safe shutdown analysis." 9/11/02 NEI Response to NRC Comments, Comment G.6. "... In response to Generic Letter 88-20, plants performed *extensive risk analysis* [my emphasis] to determine potential vulnerabilities to fire as part of the IPEEE program ... **NRC later concluded that the IPEEE program was successful** in meeting the intent of Supplement 4 to GL 88-20 ,,, [Therefore], **there is no need for another systematic search for vulnerabilities** ... [T]his methodology ... has always been intended for plant-specific use to address plant-specific issues. Therefore, by its very nature, **it must be 'selectively' applied."**	3/6/02 NRC Comments on NEI 00-01, Draft C, Comment G.6. "... [T]he NEI guidance states that, 'The methods in this document **are not intended to require** systematic re-evaluation of a plant's post-fire safe shutdown analysis, nor do they take precedence over specific requirements accepted by the NRC in a plant's post-fire safe shutdown analysis. **This appears to allow a selective implementation** of this methodology by licensees when issues related to post-fire safe shutdown are identified **and to discourage intentions to use the approach to identify 'risk-significant' vulnerabilities** ..."

NEI 00-01 Chapters 1-2 and General	NRC
1.3.2.6. "...[T]he analyst identifies the potential impacts to safe shutdown equipment, systems, paths and functions relied upon for each fire area, and then **mitigates** the effects on safe shutdown for each safe shutdown component impacted by the fire. The process of identifying and **mitigating** impacts ..." 3.4.1. "The following criteria and assumptions apply wen performing fire area compliance assessment to **mitigate** the consequences of the circuit failures identified ... for the required safe shutdown path ..." E.3. **"... [M]anual actions are equivalent in mitigation capability to automatic operation."** E.6. "...[M]anual actions specified as precautionary or confirmatory backup actions ... for a primary **mitigating** technique ..."	Draft NUREG-1778, Chapter 2 (Terminology). "Mitigating Action: A manual action ... designed to **stop the progression or reduce the severity of** the unwanted condition." 3/6/02 NRC Comments on NEI 00-01, Draft C, Comment 1.7. "Section 1.3.7 [of NEI 00-01, Draft C {Section 1.3.2.6 in Rev. 0}] introduces **a new approach that suggests that mitigating the impacts to the required safe shutdown paths is an acceptable alternative to providing the protection required** in Section III.G.2 of Appendix R to 10 CFR Part 50 ..."

NEI 00-01 Chapters 1-2 and General	NRC
2.1. "... [I]n Section III.G [of Appendix R] ... the only performance goal identified is the requirement to initially achieve and maintain hot shutdown and to subsequently achieve cold shutdown ... [that] can be further defined as follows: 'To **assure that a single fire in any plant fire area will not result in any fuel cladding damage *[breach of first defense-in-depth barrier, i.e., core damage]* [my emphasis], rupture of the primary coolant boundary *[breach of second defense-in-depth barrier, i.e., core damage with radioactive release into containment]* [my emphasis] or rupture of the primary containment *[breach of third defense-in-depth barrier, i.e., core damage with radioactive release into and ultimately from containment, i.e., offsite]* [my emphasis]...'"**	App. R, I. "... When considering the effects of fire, those systems associated with achieving and maintaining **safe shutdown** conditions assume major importance ... because damage to them **can *lead* [my emphasis] to core damage** ... The phrase **'safe shutdown'** will be used throughout this appendix as applying to both **hot and cold shutdown functions** ... [T]he loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions **does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents.** 10/17/03 Comments on NEI 00-01, Rev. 0. **Assuring that core damage, or worse, will not result is less conservative than assuring no loss of ability to achieve and maintain safe (hot) shutdown.**

NEI 00-01 Chapters 1-2 and General	NRC
5. "Free of Fire Damage: Achieved when the SSC under consideration is capable of performing its intended function during and after the postulated fire, as needed. **It may perform this function automatically, by remote control ... or by local operation."** 9/11/02 NEI Response to NRC Comments, Comment 2.2. **"... [T]he second sentence in the definition [above] is the statement that adds clarity ... and is consistent with the long-standing practice in the nuclear industry, reviewed on many occasions by NRC staff as being in conformance with NRC requirements."**	Draft NUREG-1778, Chapter 2 (Terminology). "... [T]he SSC under consideration is capable of performing its intended function during and after the postulated fire, as needed. **Licensees seeking exemptions from Section III.G.2 must show that the alternative proposed provides reasonable assurance that this criterion is met ..."** 3/6/02 NRC Comments on NEI 00-01, Draft C, Comment 2.2. **"... [T]he NEI definition represents a relaxation from the current NRC regulations and guidance ..."**

NEI 00-01 Chapters 1-2 and General	NRC
2.1. "... [I]n Section III.G [of Appendix R] ... the only performance goal identified is the requirement to initially achieve and maintain hot shutdown and to subsequently achieve cold shutdown ... [that] can be further defined as follows: 'To **assure that a single fire in any plant fire area will not result in any fuel cladding damage *[breach of first defense-in-depth barrier, i.e., core damage]* [my emphasis], rupture of the primary coolant boundary *[breach of second defense-in-depth barrier, i.e., core damage with radioactive release into containment]* [my emphasis] or rupture of the primary containment *[breach of third defense-in-depth barrier, i.e., core damage with radioactive release into and ultimately from containment, i.e., offsite]* [my emphasis]...'"**	App. R, I. "... When considering the effects of fire, those systems associated with achieving and maintaining **safe shutdown** conditions assume major importance ... because damage to them **can *lead* [my emphasis] to core damage** ... The phrase **'safe shutdown'** will be used throughout this appendix as applying to both **hot and cold shutdown functions** ... [T]he loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions **does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents."** 10/17/03 Comments on NEI 00-01, Rev. 0. **Assuring that core damage, or worse, will not result is less conservative than assuring no loss of ability to achieve and maintain safe (hot) shutdown.**

NEI 00-01, CHAPTER 3
"DETERMINISTIC METHODOLOGY"

NEI 00-01 Chapter 3 (Deterministic Methodology)	NRC
3.1. "'Free of fire damage' allows for the **use of manual operator actions** to complete the required SSD functions ... In conjunction with **allowing the use of manual operator actions and repairs** in support of post-fire SSD, the NRC ..." Figure 3.1. "Develop Methods for Mitigation: ... 3. Perform **Manual** Action ..." 3.1.1.5. "... Compliance to the separation requirements of Sections III.G.1 and III.G.2 may be **supplemented by the use of manual actions** ..."	GL 86-10. "10CFR50 App. R utilizes the term 'free of fire damage.' In promulgating App. R, the Commission has provided **methods acceptable for assuring that necessary SSCs are free of fire damage (see Section III.G.2a, b and c)** ..." App. R, III.G.1a. "... These features shall be capable of limiting fire damage so that (a) One train of systems necessary to achieve and maintain HSD conditions **from either the control room or emergency control station(s)** is free of fire damage ..." 10/17/03 Comments on NEI 00-01, Rev. 0. **There is no mention of manual actions in either III.G.1 or III.G.2.**
3.4.1.4. "... Refer to Appendix E for additional guidance on the use of **manual actions as a mitigating technique.**" 3.4.2.4 (title). "Develop a Compliance Strategy or Disposition to **Mitigate** the Effects Due to Fire Damage to Each Required Component or Cable"	App. R, III.G.2. "Except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits could **prevent operation or cause maloperation** ..."

NEI 00-01 Chapter 3 (Deterministic Methodology)	NRC
3.1.1.3. "... Feed and bleed is **one method for accomplishing safe shutdown recognized in plant procedures and risk analysis [for PWRs]. Therefore, it may be used for post-fire safe shutdown** ... This guidance ... allows the use of mitigation strategies acceptable for other accident analyses."	Richards (NRC) to Kenny (BWROG) 12/12/00 Letter on GE-NE-T43-0002-00-03-R01). "... The staff ... has concluded that the September 1, 1999, BWROG SRV/LPS position, as revised, establishes that **SRV/LPS meets the requirements of a redundant means of post-fire safe shutdown [for BWRs] under Section III.G.2 of 10 CFR Part 50, Appendix R ..."** 10/17/03 Comments on NEI 00-01, Rev. 0. Feed and bleed is a contingency to **avert core damage, not maintain hot shutdown**, when other means of averting core damage have been expended.
3.2.1.2. "Assume that **exposure fire damage to manual valves ... does not adversely impact their ability to perform their ... safe shutdown function ... Fire damage to a manual valve is not postulated to affect the ability to manually open or close the valve** should this be necessary as a part of the post-fire safe shutdown scenario."	10/17/03 Comments on NEI 00-01, Rev. 0. **Not all parts of a manual valve are necessarily immune to fire effects**, e.g., valve packing. Without subjecting manual valves to qualifying tests for fire immunity, this assumption is not justified.

NEI 00-01 Chapter 3 (Deterministic Methodology)	NRC
3.2.1.6. "Identify equipment that could spuriously operate and impact the performance of equipment on a required SSD path during the equipment selection phase." 3.2.2.2. "... Assure that any equipment that could spuriously operate and adversely affect the desired [SSD] system function(s) is also identified ..." 9/11/02 NEI Response to NRC Comments, Att. D. "... NRC believes that the licensee should consider more than one simultaneous hot short within a single multiconductor cable if damaged by fire ... **NEI addresses multiple spurious actuation, but does so in a risk context ... [T]he deterministic portion of the method (Chapter 3) does not evaluate the plant for multiple spurious actuations ...**" 9/11/02 NEI Response to NRC Comments, Comment 3.35. "... **The GL 81-12 'systems approach' methodology requirements does not include postulating the spurious operation of every circuit in the fire area** ... This methodology has been reviewed and approved by the NRC during numerous site inspections ... **Requests ... for consideration of specific combinations of potential failures outside the SSD flow path can be evaluated for risk significance using Section 4 methodology** ... [T]he industry position is that **only those spurious operations resulting from fire-induced damage to SSD components and associated circuits whose failure can cause a direct effect on SSD equipment operation require evaluation during the deterministic analysis.**"	3/6/02 NRC Comments on NEI 00-01, Draft C, Comment 3.26. "**... The potential for multiple spurious operations or maloperations must be considered during the equipment identification process [Chapter 3].**" 3/22/82 "Clarification" to GL 81-12, "Systems Approach." "... [I]n accordance with Section III.G.3 of Appendix R ..., the following information is required ...: ... **Show that fire induced failures (hot shorts, open circuits or shorts to ground) of each of the cables ... [in the associated circuits of concern located in the fire area] ... will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.**" 12/16/02 NRC Comments on NEI 00-01 Draft Rev. D, #1. "... [T]he methodology ... must **address spurious equipment operation, or maloperations in non-essential shutdown systems** that may have a significant effect on shutdown capability."

NEI 00-01 Chapter 3 (Deterministic Methodology)	NRC
3.3.1.6. "The automatic initiation logics for the credited post-fire safe shutdown systems are not required to support safe shutdown. **Each system can be controlled manually by operator actuation ...**"	10/17/03 Comments on NEI 00-01, Rev. 0. **Manual actions by an operator are currently allowed only in the control room.**
3.4.1.3. "Address all cable and equipment impacts affecting the required safe shutdown path in the fire area. Mitigate **each potential impact one at a time** ..."	Draft NUREG-1778, Chapter 2 (Terminology). "Any-and-All/One-at-a-Time: **All potential spurious actuations** that may occur as a result of fire in a single fire area must be addressed and either prevented, or the effects of each actuation appropriately mitigated, **on a one-at-a-time basis** ..."
3.4.1.6. "... **Use exemptions, deviations and licensing change processes** to satisfy the requirements mentioned above [III.G.1a and b; III.G.2 a through f] and to demonstrate equivalency depending upon the plant's license requirements."	10/17/03 Comments on NEI 00-01, Rev. 0. **Compliance, not exemptions, etc., should be the rule, not the exception.**

NEI 00-01 Chapter 3 (Deterministic Methodology)	NRC
3.4.1.7. "... [E]ach equipment impact, including spurious operations, is **to be addressed on a one-at-a-time basis.** The focus is to be on addressing ... and mitigating the effects of each **individually** [References: Licensing Citation, Byron SSER 5, pp. 9-11; WNP2 Submittal dated 5/23/86; Browns Ferry Inspection Report for 7/17 though 7/21, Question #23, Item (3); Duane Arnold Response to NRC RAI dated 4/20/82, Item 2.b, p. 14]. 3.5.1.1. "Consider the following circuit failure types **on each conductor (one at a time)** ... Consider the three types of circuit failures identified above [hot short, open circuit, short to ground] to **occur individually on each conductor** ... For failures within the licensing basis, evaluate the effects of each of these types of circuit failures **on each conductor one at a time ...**" 9/11/02 NEI Response to NRC Comments, Comment G.1. "... While it is true that plant-specific safety evaluations were not intended for application to the industry at large, **the restatement of similar staff positions in multiple SERs and inspection reports is indicative of a trend, or mode, in [NRC] staff positions. Staff cannot discount such trends** merely be stating that they were intended only for the plants in question."	NRC Proposed Generic Communication, "Risk-Informed Inspection Guidance for Post-Fie Safe-Shutdown Inspections - Attachment: Draft Guidance for Risk-Informing NRC Inspection of Associated Circuits. "... **For any multiconductor cable (thermoset or thermoplastic), any and all potential spurious actuations that may result from intra-cable shorting, including any possible combination of conductors within the cable, may be postulated to occur concurrently regardless of number** ... To facilitate an inspection ..., inspectors should consider only a few (three or four) of the most critical postulated combinations. **For any thermoplastic cable, any and all potential spurious actuations that may result from intra-cable and inter-cable shorting with other thermoplastic cables, including any possible combination of conductors within or between the cables, may be postulated to occur concurrently regardless of number ...**" 3/6/02 NRC Comments on NEI 00-01, Draft C, Comment G.1. "... Staff approvals documented in safety evaluations were specifically applicable to the plant under consideration and do not represent staff endorsement of a particular approach for industry-wide application. Further, **plant-specific exemptions granted in accordance with 10CFR50.48 and 50.12 do not constitute a new regulatory position generically applicable to all licensees.**"

NEI 00-01 Chapter 3 (Deterministic Methodology)	NRC
3.4.2.3. "Using the **circuit analysis and evaluation criteria** contained in Section 3.5 ..., determine the equipment on the required SSD path that can potentially be impacted by a fire in the fire area, and what those possible impacts are." 3.5. "App. R Section III.G.2 identifies the **fire-induced circuit failure types that are to be evaluated** for impact from exposure fires on SSD equipment ... [and] ... requires consideration of hot shorts, shorts-to-ground and open circuits." B.2. "10CFR50 App. R requires that equipment required for SSD be free of fire damage and that **these circuits be evaluated** for the fire-induced effects of hot shorts, shorts-to-ground and open circuits ..."	3/6/02 NRC Comments on NEI 00-01, Draft C, Comment 3.45. "... **[A]lternative approaches that rely on an analysis** of the types of circuit faults that may occur as a result of fire damage **may significantly reduce the safety margin that would be achieved through compliance with regulatory requirements** ...Because the consequence of failure may be high, NEI 00-01 should be revised to **assure that the use of analytical methods** for determining the potential effects of fire damage **be limited** to circuits of equipment whose failure or inadvertent actuation would not have a direct and immediate impact on the ability of selected HSD systems to perform their intended function. In the absence of a plant-specific exemption or deviation, **required flow path components ... should be provided with fire protection features sufficient to meet Section III.G.2 of App. R ...**"
3.4.2.4 (title). "Develop a Compliance Strategy or Disposition to Mitigate the Effects Due to **Fire Damage to Each Required Component or Cable**"	App. R, III.G.2. "Except as provided for in paragraph G.3 of this section, ... one of the following means of ensuring that **one of the redundant trains is free of fire damage** shall be provided: ..."

NEI 00-01, TABLE 4-1
"PRELIMINARY SCREENING"

		Fire frequency (F_f)		
		High (>0.001/yr) [assume max = 1/yr]	Medium (1E-4/yr - 0.001/yr)	Low (<1E-4/yr)
Probability of spurious actuation of component combinations (P_{SA})	High (0.1-1)	>1E-4/yr	1E-5/yr - 0.001/yr	<1E-4/yr
	Medium (0.01-0.1)	>1E-5/yr	1E-6/yr - 1E-4/yr	<1E-5/yr
	Low (<0.01)	<0.01/yr	<1E-5/yr	<1E-6/yr

		Fire frequency (F_f)		
		High	Medium	Low
Probability of spurious actuation of component combinations (P_{SA})	High	MAY BE >1E-5/yr NEVER SCREEN		
	Medium			ALWAYS <1E-5/yr
	Low		SCREEN ONLY IF SUPPRESSION SHUTDOWN CAN BE FULLY	IF BOTH AUTO AND HOT CAPABILITY CREDITED

TABLE 4-1
Preliminary Screening

Probability of spurious actuations of components combinations (P_{SA})	Fire frequency (F_f)		
	High	**Medium**	**Low**
High	**Analyze**	Screen if all 3 of automatic suppression, detection and manual suppression, or hot shutdown capability can be credited.	Screen if 2 of automatic suppression, detection and manual suppression, or hot shutdown capability can be credited.
Medium	Screen if all 3 of automatic suppression, detection and manual suppression, or hot shutdown capability can be credited.	Screen if 2 of automatic suppression, detection and manual suppression, or hot shutdown capability can be credited.	Screen if 1 of automatic suppression, detection and manual suppression, or hot shutdown capability can be credited.
Low	Screen if 2 of automatic suppression, detection and manual suppression, or hot shutdown capability can be credited.	Screen if 1 of automatic suppression, detection and manual suppression, or hot shutdown capability can be credited.	**Screen**

TABLE 4-2
Criteria for Evaluating F_f and P_{SA} (High, Medium or Low) in Table 4-1

Element	High	Medium	Low
Fire Frequency. Defined as the frequency of those fires with a potential to damage critical equipment if left alone.	**Criteria:** High number of fixed ignition sources that have potential for damaging fire. These sources include switchgear, ignition sources with liquid combustibles or flammables such as large pumps and compressors, transformers. Example fire areas are: switchgear room, Turbine Building, control room, diesel generator rooms, cable spreading rooms or electrical rooms with more than a few cabinets, and pump rooms. Fire areas in the Auxiliary Building or Reactor Building with high concentration of fixed ignition sources, e.g., relay room or auxiliary electrical equipment room should be categorized as high. **Basis:** The quantitative criterion used in Table 4-1 for "High" is based on a frequency of fire of 1E-2/yr. Fires greater than 1E-03/year are categorized as high. Fire areas mentioned above could have area fire frequencies around 1E-2/yr depending on the number of the location type at each plant (FIVE).	**Criteria:** The fire area has limited number of fixed ignition sources that have potential for damaging fires, or no fixed combustibles but transient combustible for extended periods. The area has higher potential for transient fires due to maintenance activities in the area or its adjacent rooms. Example fire areas are those cable spreading rooms with few, i.e., one or two electrical cabinets, and battery rooms. Fire areas in the Auxiliary Building or Reactor Building that do not contain more than one or two fixed ignition source may be categorized as Medium. **Basis:** The quantitative criterion used in Table 4-1 for "Medium" is based on a frequency of fire of 1E-3/yr. Fires between 1E-3 /year and 1E-4/year are categorized as "Medium." With few fixed ignition sources the frequency of a damaging fire in a cable spreading room will remain below 1E-3/yr. The frequency of a fire in a battery room is around 1E-3/yr in a plant with at least two battery rooms. .	**Criteria:** No fixed ignition source such as pumps or electrical cabinets. Transient combustibles are administratively controlled with provisions for possible staging of combustibles when fire watch will be in effect. Example fire areas are; cable tunnels and cable spreading rooms with no fixed ignition source. **Basis:** The quantitative criterion used in Table 4-1 for "Low" is based on frequency of fire of 1E-4/yr. Fires less than 1E-04/year are categorized as "Low" fire frequency. The plant wide transient fire ignition frequency is between 1E-02/year and 1E-03/year (FIVE), with a majority of these fires occurring due to welding or cutting. The area specific frequency depends on several factors, including the possible ignition sources in the area, the procedural controls performed at the plant for both ignition sources and combustible controls, and the location of sufficient combustibles needed to damage equipment. A damaging transient fire needs to pass the presence of the plant personnel (maintenance worker or fire watch in case of welding and cutting) and occur in specific location with respect to the potential targets to be of damaging potential. Combined with these factors, fire area ignition frequency in an area with no fixed ignition source and administratively controlled combustibles will be less than 1E-4/yr.

Note: When available, IPEEE or fire PRA initiating event frequencies should be used to categorize the fire frequency. The frequency used in this screening is the total fire area fire frequency, either severe or non-severe.

TABLE 4-2 (continued)
Criteria for Evaluating F_f and P_{SA} (High, Medium or Low) in Table 4-1

Element	High	Medium	Low
Probability of Spurious Actuation of Component(s) Probability of undesirable or non-recoverable spurious actuation of the redundant component. Note that at this point in the screening some information on the component combinations including their circuits and routing including the raceway may be known. Factors to be considered include circuit design, e.g., normally de-energized circuits that are required to remain de-energized, timing, e.g., lock-in device that prevents damage from a momentary hot short resulting in spurious signal and proximity of the circuits associated with the component combinations.	**Criteria:** The conductors of component combinations as follows: a) Thermoset/ Thermoplastic Inter-cable, b) Thermoset/ Thermoplastic, M/C or 1/C to 1/C Intra-cable, or c) Cable in Conduit w/o CPT. Basis: Quantitative criterion for "High" is based on conditional probability of 0.1 to 1. See Table 4-4 and EPRI TR-1006961, "Spurious Actuation of Electrical Circuits due to Cable Fires," Table 7-2 (Ref. 6.4-39).	**Criteria:** The conductors of the component combination(s) are routed: ■ In cable tray(s) within separate multi-conductor (MC) cables with CPT, OR ■ In conduit where: a) located in same cable with CPT, OR located separate single conductor cables (1C-1C) with CPT, OR separate 1C-MC or MC-MC cables w/o CPT ■ In armored cables w/o fuses. Additionally, one can include combinations such as two T-set intra-cable failures with CPT where the product of the failures is between 0.01 and 0.1. Lastly, the Medium category will include combinations where the initial probability is greater than 0.1, but is required to be sustained for greater than 5 minutes (see below). Basis: The quantitative criterion for "Medium" is based on conditional probability of 0.01 to 0.1. See Table 4-4 and EPRI TR-1006961, "Spurious Actuation of Electrical Circuits due to Cable Fires," Table 7-2.	**Criteria:** Conductors of the component combination(s) are routed in separate conduits or in fused armored cables. Additionally, one can include combinations such as two cables in conduit (with CPTs) where the product of the failures is less than 0.01. Lastly, the "Low" category will include component combinations where the initial probability is between 0.1 and 0.01, but is required to be sustained for greater than 5 minutes (see below). Basis: The quantitative criterion for "Low" is based on conditional probability of less than 0.01. See Table 4-4 and EPRI TR-1006961, "Spurious Actuation of Electrical Circuits due to Cable Fires," Table 7-2 (Ref. 6.4-39).

NEI 00-01, CHAPTER 4
RISK SIGNIFICANCE ANALYSIS

[Limited Comparison Based Solely on Steps in Process, Using April 2003 Draft of Proposed Update to Fire SDP]

PRELIMINARY (PHASE 1 INITIAL) SCREENING

NEI 00-01 Chapter 4 (Risk Significance Analysis)

- Identify adverse component combinations potentially resulting from spurious cable actuations
  1. Exclude MCCs, panels, SWGR
  2. Select bounding (most risky) combinations

- Estimate probability of spurious actuation (P) and frequency of fire (F), each L/M/H based on qualitative considerations
- Assign credit (all or none), based qualitatively, for as many of the following as applicable:
  1. Auto suppression
  2. Detection or manual suppression
  3. HSD capability
- Screen based on P-F pair rankings and number of above credits

Fire SDP Section 4.0 (... Significance Determination)

- Identify finding; assign to one of following categories:
  1. Admin control or FP program
  2. Fixed detection
  3. Fixed suppression
  4. Fire barrier
  5. Post-fire SSD program

- Assign degradation rating (L/M/H) to finding
  Screen all LOWs and any non-HSD
- Assign duration factor (DF) to finding
- Estimate total fire frequency (λ) for affected area
- Screen if DF * λ < screening value for finding category

RISK SIGNIFICANCE (PHASE 2) SCREENING

NEI 00-01 Chapter 4 (Risk Significance Analysis)

- Estimate fire area frequency (F)
- Estimate fire size (Z), i.e., fraction of fires in area that can damage cables/circuits
- Estimate probability of spurious actuation (A)
- Screen if F * Z * A < 1E-7 for component combo in fire area and < 1E-6 for all areas if safety margin and defense-in-depth considerations permit

Fire SDP Section 4.0 (... Significance Determination)

- Determine fire damage states (FDS's) based on finding category from Phase 1
  1. Fixed detection and suppression are combined as fire protection
  2. Fire barrier is divided into fire confinement and localized protection for cable or component
- Identify fire ignition source by type or general class
- Assign fire severity (expected and upper bound) and location to each source
- Identify nearest, most vulnerable ignition and damage targets
- Screen if fire ignition source cannot ignite secondary combustibles nor cause damage consistent with applicable FDS scenarios
- Estimate nominal fire frequency (F) per ignition source
- Adjust F based on status of combustible controls programs, hot-work permitting programs or activities, and fire watches
- Assign severity factor (V) based on results from previous screening for fire ignition source
  1. V = 1.0 if previously screened at both expected and upper bound severity
  2. V = 0.1 if previously screened only at upper bound severity
- Screen if DF (from Phase 1) * sum of (V * F) for all ignition sources < screening value for finding category and level of degradation finding (MED or HI)

RISK SIGNIFICANCE (PHASE 2) SCREENING

NEI 00-01 Chapter 4 (Risk Significance Analysis)

Fire SDP Section 4.0 (... Significance Determination)

- Identify specific sets of targets as a function of FDS, with the higher FDS's encompassing more widely-distributed targets
- Using simplified fire modeling tools, determine if fire growth and exposure time will damage the targets in any of the applicable FDS's
- Estimate screening CCDP (C) for each SSD success path surviving the postulated fire scenario
- Screen if DF * sum of (V * F * C) for all fire scenarios < 1E-6

- Estimate probability of automatic detection and suppression failing to prevent undesirable consequences to the cables of the component combo (X)
- Screen if F * Z * A * X < 1E-7 for component combo in fire area and < 1E-6 for all areas if safety margin and defense-in-depth considerations permit
- Estimate probability of manual detection and suppression failing to prevent undesirable consequences to the cables of the component combo (Y)
- Screen if F * Z * A * X * Y < 1E-7 for component combo in fire area and < 1E-6 for all areas if safety margin and defense-in-depth considerations permit

- Estimate time to fire detection, automatic or manual
- Assess performance and timing of fixed (automatic) fire suppression
- Estimate timing associated with manual fire suppression by fire brigade, fire watch or general plant personnel
- Estimate probability of non-suppression (X * Y)
- Screen if DF * sum of (V * F * C * [X * Y]) for all fire scenarios < 1E-6

RISK SIGNIFICANCE (PHASE 2) SCREENING

NEI 00-01 Chapter 4 (Risk Significance Analysis)

- Estimate increase in CCDP given fire-induced failures for the component combos of concern (Δ)
- Screen if F * Z * A * X * Y * Δ < 1E-7 for component combo in fire area and < 1E-6 for all areas if safety margin and defense-in-depth considerations permit

- Estimate increase in LERF given fire-induced failures for the component combos of concern (Δ')
- Screen if F * Z * A * X * Y * Δ' < 1E-8 for component combo in fire area and < 1E-7 for all areas if safety margin and defense-in-depth considerations permit

Fire SDP Section 4.0 (... Significance Determination)

- Identify systems and functions, including ones beyond licensee post-fire SSD analysis, that can be credited to prevent core damage
- Identify manual actions, both in and outside of the Control Room, to compensate for degraded elements of the SSD program, including those specified by procedure to be performed at the remote shutdown panel
- Estimate CCDP (C') from appropriate initiating event worksheets, including probabilities of failure of additional manual actions identified above [Note: C' is a more refined value than that used previously for screening (C).]
- Calculate DF * sum of (V * F * C' * [X * Y]) for all fire scenarios and assign risk significance as follows:
  1. Red if ≥ 1E-4
  2. Yellow if ≥ 1E-5 but < 1E-4
  3. White if ≥ 1E-6 but < 1E-5
  4. Green if < 1E-6

NEI 00-01, CHAPTER 5
"DEFINITIONS"

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
Associated circuits • "... less than that *required* by Appendix R ..." • "... steam generator atmospheric valves, ..." • "... (e.g., raceway, panel, junction) ..."	Associated circuits *(of concern)* • "... less than that *specified* by Appendix R ..." • "... steam generator atmospheric *dump* valves, ..." • "... (e.g., raceway, panel, junction *box*) ..."
Cable • reference: IEEE Standard 100-*1984*	Cable • reference: IEEE Standard 100-*1988*
Circuit • reference: IEEE Standard 100-*1984* • "... electric current *is intended to flow*." • No equivalent statement	Circuit • reference: IEEE Standard 100-*1988* • "... electric current *flows*." • *"... Interconnection of components to provide an electrical path between two or more components."*
Circuit failure modes: hot short • *"A fire-induced insulation breakdown ..."* • No equivalent statement • "... impressed voltage or signal on a *specific* conductor."	Hot short • No equivalent statement • *"...a specific type of short circuit fault condition between energized and de-energized conductors."* • "... the voltage, *current* or signal ... impressed onto one or more of the *de-energized* conductors."

NEI 00-01 Chapter 5 (Definitions)	**NUREG-1778 Chapter 2 (Terminology)**
Circuit failure modes: open circuit • No equivalent reference • "A *fire-induced* break ..." • No equivalent statement	Open circuit • reference: Reg. Guide 1.189 • "... loss of conductor integrity due to *heat or physical damage* (break)" • *"... Clarification: A circuit fault condition where the electrical path has been interrupted or 'opened' at some point so that current will not flow. ..."*
Circuit failure modes: short-to-ground • *"A fire-induced breakdown of a cable's insulation system ..."* • "... applied to ground/*neutral*."	Short to ground • No equivalent statement • "... a grounded *reference point (e.g., grounded conductor, conduit, raceway, metal enclosure, shield wrap or drain wire within a cable)*."
Cold shutdown repair • *"... fire-damaged equipment ..."* • *"... for the required safe shutdown path."*	Cold shutdown repair • No equivalent statement • No equivalent statement
Conductor • reference: IEEE Standard 100-*1984* • No equivalent statement	Conductor • reference: IEEE Standard 100-*1988* • *"... A wire or combination of wires, not insulated from one another, suitable for carrying an electric current."*
Design basis fire	No equivalent definition

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
Emergency control station • No equivalent statement • "... includes the remote shutdown panel(s), local starters, electrical distribution panel, MOV hand wheels and other equipment locations ..." • No equivalent statement	Emergency control station • "... *located outside the MCR* ..." • No equivalent statement • "... *to manipulate plant systems and their controls to achieve safe shutdown of the reactor.*"
Enclosure • reference: IEEE Standard *380-1975*	Enclosure • reference: IEEE Standard *100-1988*
Exposure fire • reference: *SRP Section 9.5.1* • utilizes the term *"train"*	Exposure fire • reference: *Reg. Guide 1.189* • utilizes the term *"success path"*
Fire area • No equivalent statement • "... *Where fire areas were not approved under the Appendix A process, ...*" • No equivalent statement	Fire area boundaries • "... *However, all unsealed openings should be identified and considered when evaluating the effectiveness of the overall barrier ...*" • No equivalent statement • "... *This analysis must be performed by at least a fire protection engineer and, if required, a systems engineer.*"
Fire barrier	No equivalent definition
Fire frequency	No equivalent definition
Fire protection design change evaluation	No equivalent definition

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
Fire protection program	No equivalent definition
Fire zone • No equivalent reference • *"... for analysis purposes that is not necessarily bound by fire-rated barriers."* • No equivalent statement	Fire zones • reference: *Reg. Guide 1.189* • No equivalent statement • *"...Note: Compliance with Section III.G.2 cannot be based on rooms or zones. (GL 86-10, Question 3.1.5)"*

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
<u>Free of fire damage</u> • No equivalent reference • No equivalent statement • *"... It may perform this function automatically, by remote control (which includes manual operations and/or remote manual operations), or by local operation."* • No equivalent statement • No equivalent statement	<u>Free of fire damage</u> • reference: *GL 86-10* • *"In promulgating Appendix R, the Commission has provided methods acceptable for assuring that necessary SSCs are free of fire damage (see Section III.G.2a, b and c), ..."* • No equivalent statement • *"... Licensees seeking exemptions from Section III.G.2 must show that the alternative proposed provides reasonable assurance that this criterion is met. The term 'damage by fire' also includes damage to equipment from the normal or inadvertent operation of fire suppression systems."* • *"... Note: Section III.G.2 of Appendix R and Position C.5.b of SRP Section 9.5.1 establish fire protection features necessary to ensure that systems needed to achieve and maintain hot shutdown conditions remain free of fire damage."*
<u>Generic Letter 86-10 fire hazards evaluation</u>	No equivalent definition

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
<u>High impedance fault; multiple high impedance fault</u> • reference: GL 86-10 • "... electrical fault below the trip point ... • No equivalent statement • Discussed in Appendix B.2, "Justification for the Elimination of Multiple High Impedance Faults"	<u>High impedance fault</u> • references: GL 86-10, *Question 5.3.8; Reg. Guide 1.189* • "An electrical fault *of a value* that is below the trip point ..." • *"... A circuit fault condition resulting in a short to ground, or conductor to conductor hot short, where residual resistance in the faulted connection maintains the fault current level below the component's circuit breaker long-term setpoint ..."* • Clarification provided as well as discussion of multiple high impedance faults
<u>High/low pressure interface</u> (from Appendix C) • "... A valve whose spurious *opening* ..." • Discussed in Appendix C, "High/Low Pressure Interfaces"	<u>High/low pressure interface</u> • "Reactor coolant boundary valves whose spurious *operation due to fire* ..." • "... in excess of the available makeup capability"
<u>Isolation device</u> • reference: IEEE Standard *380-1975*	<u>Isolating/isolation device</u> • reference: IEEE Standard *100-1988; Reg. Guide 1.189*
<u>Local operation</u> • No equivalent statement • *"... when automatic, remote manual, or manual operation are no longer available ..."*	<u>Local operation</u> • *"... from a location outside of the main control room ..."* • No equivalent statement

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
Manual operation • No equivalent statement • "... *using the control room control devices (e.g., switches) in the event that automatic control of the equipment is either inhibited based on plant procedures or unable to function as a result of fire-induced damage.*" • No equivalent statement	Operator Actions • "... *to achieve and maintain post-fire safe shutdown ...*" • No equivalent statement • "... equipment *located remote from the MCR.*"
Probability of spurious operation	No equivalent definition
Raceway • reference: IEEE Standard *380-1975* • No equivalent statement • "... not restricted to *cable trays*, conduits ..."	Raceway • reference: IEEE Standard *100-1988; Reg. Guide 1.189* • "*An enclosed channel of metal or non-metallic materials ... with additional functions as permitted by code ...*" • "... not limited to, *rigid metal tubing, ... and busways.*"
Remote control • No equivalent reference • "... combination of electrically powered *control switches and relays ...*" • "... *including the remote shutdown panel and other locations with control capability outside the control room.*"	Remote control • reference: IEEE Standard *100-1988* • "... *a link ... between the control device and the apparatus to be operated ...*" • "*Control of an operation from a distance ...*"

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
Remote manual operation • No equivalent statement • "... *using remote controls* ..."	Operator manual actions • "... *to achieve and maintain post-fire safe shutdown* ..." • "... *performed locally by operators typically at the equipment.*"
Remote shutdown location • No equivalent statement	Remote shutdown location • "... *used to manipulate or monitor plant equipment during the safe-shutdown process. Examples include the remote shutdown panel or valves requiring manual operation.*"
Remote shutdown panel • reference: GDC 19 • "... If electrical isolation and redundant fusing are provided ..." • "... for an event such as a control room fire."	Remote shutdown panel • references: GDC 19; *GL 86-10, Question 5.3.11* • "... *The control panel included in the plant design for the purpose of controlling and monitoring alternative shutdown functions from outside the MCR. Note: Alternative shutdown systems need not be redundant but must be both physically and electrically independent of the control room* ..." • "... GDC 19 *(shutdown due to loss of control room habitability) ... For GDC 19, damage to the control room is not considered* ..."

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
Repair *activity* • "... *failed as a result of fire-induced damage* ..." • "... may include installation, *removal, assembly disassembly* ..." • "... materials, tools, procedures and personnel *available on site* ..." • *"... Repairs may require additional, more detailed instructions, including tools to be used, sketches, and step-by-step instructions for the tasks to be performed. Repair activities are intended to restore functions and not equipment since the equipment may be destroyed by a fire event. Repair activities may rely on exterior security lighting or portable lighting if independent 8-hour battery backed lighting is unavailable."*	Repair • No equivalent statement • *"... a modification of a plant SSC ..."* • No equivalent statement • *"... Notes: (1) [A]ppropriately controlled equipment provided to facilitate the implementation of procedurally directed operator manual actions such as ladders, flashlights, fuse pullers, extension bus/handles are not considered tools. (2) [T]he removal of fuses (fuse pulling) is generally not considered a repair. However, this determination must be made on a case-by-case basis that considers such factors as feasibility, time, adequacy of emergency lighting, potential for human error and personnel safety hazard. (See IN 84-09, Attachment I, XI, for additional information)"*
Required safe shutdown path	No equivalent definition
Required *safe* shutdown system • "... required *safe shutdown functions* ..."	Required shutdown system • "The systems *credited* ... each *nuclear safety function*."
Required safe shutdown equipment/component	No equivalent definition
Required safe shutdown cable/circuit	No equivalent definition

NEI 00-01 Chapter 5 (Definitions)	NUREG-1778 Chapter 2 (Terminology)
Safe shutdown	No equivalent definition
Safe shutdown capability	No equivalent definition
Safe shutdown equipment/component • No equivalent statement • *"... to demonstrate compliance with Appendix R."* • No equivalent statement	Safe-shutdown equipment list; safe shutdown system • *"... that must operate or be prevented from maloperating ..."* • *"... accomplished within established criteria ..."* • "... equipment *(components, cables, raceways, cable enclosures, etc.)* ..."
Spurious operation • "The *inadvertent* operation or repositioning ..." • No equivalent statement • No equivalent statement	Spurious *actuation/operation* • No equivalent statement • *"A change (full or partial) ..."* • *"... but not limited to: (a) opening or closing normally closed or open valves, (b) starting or stopping of pumps or motors, (c) actuation of logic circuits, (d) inaccurate instrument readings."*

NEI 00-01, CHAPTER 6
"REFERENCES"

References in NEI 00-01, Rev. 0, Chapter 6, that are not in Draft NUREG-1778 Chapter 9

NEI 00-01, Rev. 0	
Admin Let 95-06	Relocation of Tech Spec Administrative Controls
ANSI/ANS-512.1	Nuclear Safety Criteria for the Design of Stationary PWRs
ANSI/ANS-52.1	Nuclear Safety Criteria for the Design of Stationary BWRs
Bulletin 77-08	Assurance of Safety
Bulletin 81-03	Flow Blockage due to Clams and Mussels
Bulletin 92-01	Failure of Thermo-Lag, with Supplement 1
EPRI TR-100370	FIVE
EPRI TR-105928	Fire PRA Implementation Guide, with Supplement SU-105928
GL 80-45	Proposed Rule: FP Program for NPPs
GL 80-48	Proposed Rule: FP Program for NPPs
GL 80-56	Memorandum and Order Re: UCS
GL 82-21	Tech Specs for FP Audits
GL 88-20	Supplement 4: IPEEE
GL 89-13	Supplement 1: Biofouling of FP Systems
GL 92-08	Thermo-Lag Fire Barriers
GL 93-06	Use of Combustible Gases in Vital Areas
GL 95-01	FP for Fuel Cycle Facilities
IN 80-25	Transportation of Pyrophoric Uranium
IN 83-41	Actuation of FPS Causing Inoperability of Safety-Related Equipment
IN 83-69	Improperly Installed Fire Dampers
IN 83-83	Use of Portable Radio Transmitters Inside NPPs
IN 84-16	Failure of Auto Sprinkler System Valves to Operate
IN 84-92	Cracking of Flywheels on Fire Pump Diesel Engines
IN 85-85	System Interaction Event Resulting in Reactor Safety Relief Valve Opening
IN 86-106	Surry Feedwater Line Break, with Supplements 1-3
IN 86-17	Update - Failure of Auto Sprinkler System Valves
IN 86-35	Fire in Compressible Material
IN 87-14	Actuation of Fire Suppression Causing Inoperability of Safety-Related Ventilation
IN 87-49	Deficiencies in Outside Containment Flooding Protection
IN 88-04	Inadequate Qualification of Fire Barrier Penetration Seals, with Supplement 1
IN 88-05	Fire in Annunciator Control Cabinets
IN 88-56	Silicone Fire Barrier Penetration Seals
IN 88-60	Inadequate Design and Installation of Watertight Penetration Seals
IN 88-64	Reporting Fires in Process Systems
IN 89-52	Fire Damper Operational Problems

References in NEI 00-01, Rev. 0, Chapter 6, that are not in Draft NUREG-1778 Chapter 9

NEI 00-01, Rev. 0	
IN 91-18	Resolution of Degraded and Non-conforming Conditions
IN 91-37	Compressed Gas Cylinder Missile Hazards
IN 91-47	Failure of Thermo-Lag, with Supplement
IN 91-53	Failure of Remote Shutdown Instrumentation
IN 91-79	Deficiencies in Installing Thermo-Lag, with Supplement 1
IN 92-14	Uranium Oxide Fires
IN 92-28	Inadequate Fire Suppression System Testing
IN 92-46	Thermo-Lag Fire Barrier Special Review Team Final Report
IN 92-55	Thermo-Lag Fire Endurance Test Results
IN 92-82	Thermo-Lag Combustibility Testing
IN 93-40	Thermal Ceramics Fire Endurance Tests
IN 93-41	Fire Endurance Tests - Kaowool, Interam
IN 94-12	Resolution of GI 57 Effects of FPS Actuation on SR Equipment
IN 94-22	Thermo-Lag 3-Hour Fire Endurance Tests
IN 94-26	Personnel Hazards from Smoldering Material in the Drywell
IN 94-28	Problems with Fire-Barrier Penetration Seals
IN 94-31	Failure of Wilco Lexan Fire Hose Nozzles
IN 94-34	Thermo-Lag Flexi-Blanket Ampacity Derating Concerns
IN 94-58	RCP Lube Oil Fire
IN 94-86	Legal Actions Against Thermal Science, Inc., with Supplement 1
IN 95-27	NRC Review of NEI Thermo-Lag Combustibility Evaluation methodology
IN 95-32	Thermo-Lag 330-1 Flame Spread Test Results
IN 95-49	Seismic Adequacy of Thermo-lag Panels, with Supplement 1
IN 95-52	Fire Test Results of 3M Interam Fire Barrier Materials, with Supplement 1
IN 96-23	Fire in Emergency Diesel Generator Exciter
IN 97-01	Improper Electrical Grounding Results in Simultaneous Fires
IN 97-23	Reporting of Fires at Fuel Cycle Facilities
IN 97-48	Inadequate FP Compensatory Measures
IN 97-59	Fire Endurance Tests of Versawrap Fire Barriers
IN 97-70	Problems with Fire-Barrier Penetration Seals
IN 97-72	Problems with Omega Sprinkler Heads
IN 97-73	Fire Hazard in the Use of a Leak Sealant
IN 97-82	Inadvertent Control Room Halon Actuation
Misc.	Appendix S Proposed Rule-making
NRC IP 64150	Triennial Post-Fire Safe Shutdown Capability

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NEI 00-01, Rev. 0	
NRC Memo 2003/03/19	Proposed Risk-Informed Inspector Guidance for Post-Fire Safe-Shutdown Associated Circuit Inspections
NSAC-179L	Automatic and Manual Suppression Reliability Data for NPP Fire Risk Analysis
NUREG/BR-0195	Enforcement Guidance
NUREG-0654	Criteria for Preparation of Emergency Response Plans
NUREG-75/087	Standard Review Plan, with Rev. 1-2
RG 1.120	FP Guidelines for NPPs, with Rev. 1
SECY-82-13B	FP Schedules and Exemptions
SECY-82-267	FP Rule for Future Plants
SECY-85-306	Recommendations Regarding the Implementation of 10CFR50 App. R
SECY-96-134	FP Regulation Improvement
Temp Instr 2515/61	Inspection of Emergency Lighting and Oil Collection Requirements
Temp Instr 2515/62	Inspection of Safe Shutdown Requirements of 10CFR50
Temp Instr 2515/XXX	FP Functional Inspection

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2001/07/12	Design Basis Document for App. R, Susquehanna Steam Electric Station Units 1 and 2
ANSI/IEEE C.2	National Electrical Safety Code
BNL JCN J-2427	US Commercial Nuclear Reactor Plant Post-Fire Safe-shutdown Circuit Analysis History and Safety Significance/Discussion of Potential Severity of Fire-Induced Reactor Plant Transients
BNL Memo 1996/09/23	Electrical Post-Fire Safe Shutdown Assistance for FPFI Procedures
BNL Memo 2003/04/09	Baseline Tri-Annual FP Inspection - Braidwood Nuclear Power Station
BWROG-99-079	BWROG App. R FP Committee Generic Guidance for BWR Post-Fire Safe-Shutdown Analysis
DOE/NE-0113	USDOE Reactor Core Protection Evaluation Methodology for Fires at RBMK and VVER NPPs
EC-013-0843	SSES 10CFR50 App. R Compliance Manual, Susquehanna 1 and 2
EPRI TR-1000894	Fire Events Database for US NPPs: Update through 1999
FR 1995/08/16	Use of PRA Methods in Nuclear Activities
G13.18.3.6*07	Safe Shutdown Common Enclosure Associated Circuit Analysis, Gulf States Utilities
GL 77-02	Nuclear Plant FP Functional Responsibilities, Admin Controls and QA
GL 91-18	Info to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Non-conforming Conditions
IEEE 100-1988	IEEE Standard Dictionary of Electrical and Electronics Terms
IEEE 141	IEEE Recommended Practices for Electric Power Distribution for Industrial Plants
IEEE 242	IEEE Recommended Practices for Protection and Coordination of Industrial and Commercial Power Systems
IEEE 383	IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generating Stations
IEEE 690-1984	IEEE Standard for the Design and Installation of Cable Systems for Class 1E Circuits in Nuclear Power Generating Stations
IEEE 835	Standard Power Cable Ampacity Tables
IMC-0609, App. F	FP Significance Determination Process
IN 98-31	FP System Design Deficiencies and Common Mode Flooding of ECCS Rooms at WNP-2
IN 99-17	Problems Associated with Post-Fire Safe-Shutdown Circuit Analyses
LaChance, et al.	Circuit Analysis - Failure Mode and Likelihood Analysis
LER 219/92-011	Design Deficiency Causes Non-compliance with App. R Criteria, Oyster Creek
LER 247/96-007-00	Potential Challenge of High/Low Pressure Interface, Indian Point 2
LER 247/96-014-00	Loss of Process Monitoring Function During Postulated Fires (App. R), Indian Point 2
LER 266/00-008-00	Inadequate Procedural Guidance for Spurious Opening of RHR to Containment Sump Valves During App. R Alternate Shutdown, Point Beach 1
LER 266/01-006-00	App. R Requirements Not Satisfied for Unalyzed Fire-Induced Damage to the Auxiliary Feedwater System, Point Beach 1 and 2
LER 266/97-020-01	Conditions Outside App. R Safe-Shutdown Analysis, Point Beach 1

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LER 266/99-008-00	Postulated Fire Could Lead to Loss of Redundant Trains of Charging Capacity, Point Beach 1
LER 272/99-011-00	125 VDC Control Power Circuits for 4 kV breakers do not Meet Requirements of 10CFR50 App. R, Salem 1
LER 280/99-003-00	Potential Loss of Charging Pumps due to main Control Room Fire, Surry 1
LER 298/00-002-00	App. R Safe Shutdown Analysis Vulnerability due to Potential Conductor to Conductor Hot Shorts
LER 298/96-009-00	App. R Safe-shutdown Analysis Vulnerabilities, Cooper
Misc.	Good Design Prevents High Impedance Fault, Actual Specifying Engineer, Vol. 17, No. 4, 1967
NEI 00-01	Guidance for Post-Fire Safe-shutdown Analysis
NFPA FP Handbook	NFPA FP Handbook, Section 6, 18th Edition
NRC IP 71111.05	Triennial FP Inspection Procedure
NRC IR 50-254/98-011	FP Inspection: Quad Cities Nuclear Generating Station Unit 1
NRC IR 50-259/00-08	FR Baseline Inspection: Browns Ferry Unit 1
NRC IR 50-260/00-08	FR Baseline Inspection: Browns Ferry Unit 2
NRC IR 50-265/98-011	FP Inspection: Quad Cities Nuclear Generating Station Unit 2
NRC IR 50-282/98-016	Inspection of Prairie Island Nuclear Generating Station Unit 1 FP Functional Inspection Self Assessment
NRC IR 50-296/00-08	FR Baseline Inspection: Browns Ferry Unit 3
NRC IR 50-306/98-016	Inspection of Prairie Island Nuclear Generating Station Unit 2 FP Functional Inspection Self Assessment
NRC IR 50-313/01-06	Triennial FP Baseline Inspection of ANO-1
NRC IR 50-335/98-201	FP Functional Inspection of St. Lucie Plant Unit 1
NRC IR 50-368/01-06	Triennial FP Baseline Inspection of ANO-2
NRC IR 50-387/97-201	FP Functional Inspection of Susquehanna Steam Electric Station Unit 1
NRC IR 50-388/97-201	FP Functional Inspection of Susquehanna Steam Electric Station Unit 2
NRC IR 50-3895/98-201	FP Functional Inspection of St. Lucie Plant Unit 2
NRC Memo 1978/06/08	Manpower Requirements for Operating Reactors
NRC Memo 1982/04/30	No Subject
NRC Memo 1982/07/02	Position Statement on Allowable Repairs for Alternative Shutdown and App. R Requirement for Time Required to Achieve Cold Shutdown
NRC Memo 1983/01/07	Statement of Staff Position Regarding Source Range Flux, Reactor Coolant Temperature and S/G Pressure Indication to Meet App. R Alternate Shutdown Capability
NRC Memo 1983/07/22	Task Interface Agreement: Physical Independence of Electrical Systems
NRC Memo 1983/12/21	Emergency Lighting Requirements
NRC Memo 1990/12/04	Determine Whether Two Hot Shorts in a Multi-Conductor Cable Associated with a Non-High/Low Pressure Interface Should be Analyzed for Fire-Induced Spurious Actuation
NRC Memo 1993/02/27	Report on the Reassessment of the NRC FP Program

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Draft NUREG-1778	
NRC Memo 1999/00/00	Summary of Meeting with BWROG App. R Committee of Post-Fire Safe-Shutdown Circuit Analysis Issues
NRC Memo 2000/12/12	BWROG App. R FP Committee Position on SRVs and Low Pressure Systems Used as Redundant Shutdown Systems Under App. R
NRC Memo 2001/02/01	NEI/EPRI Fire Testing: Comprehensiveness with Respect to Outstanding Circuit Analysis Issues
NUREG/CR-1742	Perspectives Gained from the IPEEE Program
NUREG/CR-2258	Fire Risk Analysis for NPPs
NUREG/CR-4537	Summary Report: Electric Equipment Performance Under Severe Accident Conditions
NUREG/CR-4586	Users Guide for a PC-Based NPP Fire Database
NUREG/CR-5546	An Investigation of the Effects of Thermal Aging on the Fire Damageability of Electric Cables
NUREG/CR-5565	Submergence and High Temperature Steam Testing of Class 1E Electrical Cables
NUREG/CR-6681	Ampacity Derating and Cable Functionality for Raceway Fire Barriers
NUREG/CR-6738	Risk Methods Insights Gained from Fire Incidents
NUREG/CR-6776	Cable Insulation Resistance Measurements Made During Cable Fire Tests
NUREG-0800, Sect 19.0	SRP: Use of PRA in Plant-Specific Risk-Informed Decision-making
RG 1.174	An Approach for Using PRA in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis
RG 1.32	Criteria for Safety-Related Electric Power Systems for NPPs
RG 1.6	Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems
RG 1.75	Physical Independence of Electrical Systems
SECY-80-438A	Rule on FP Program for NPPs Operating Prior to 1/1/79
SECY-96-267	FP Functional Inspection Program
SECY-99-040	Second Interim Status Report - FP Functional Inspection Program
SECY-99-140	Recommendations for Reactor FP Inspections
SECY-99-182	Assessment of the Impact of App. R FP Exemptions on Fire Risk
Tech Rep R7017/U7010	A Historical FP Licensing Document Describing Requirements for Commercial NPPs Operating in the US