New Reactor Fire Protection Programs

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Presentation Summary

- Regulatory requirements and guidance for new reactor fire protection programs
- Current status of fire protection program reviews
- NFPA 804 application to new reactors
- NFPA 806 application to new reactors
- Multiple spurious actuations
- Fire PRA requirements
- Aircraft impact assessment and large fire response

Regulatory Requirements and Guidance

- Current fire regulations, including 10 CFR 50.48(a) and GDC 3, will apply
- Criteria for enhanced fire protection provided in SECYs-93-087 and 90-016
- SRP 9.5.1 and RG 1.189 have been revised to include guidance for new reactor FPPs
- COL application guidance in RG 1.206

Enhanced Fire Protection

- Applicable to all new reactors
- Ensure safe shutdown assuming all equipment in any one fire area (excluding control room and containment) will be rendered inoperable by fire and that re-entry is not possible for mitigation
- Ensure that smoke, hot gases, or the fire suppressant will not migrate into other fire areas to the extent that safe shutdown could be adversely affected

Current Status of FPP Reviews

- Standard Designs have been certified by the NRC for
- ABWR and AP1000

- Standard Designs in review

  ESBWR, EPR, US-APWR and the AP1000-amendment

Current Status of FPP Reviews

RCOL applications

ABWR (South Texas)	ESBWR (North Anna)
AP1000 (Vogtle)	EPR (Calvert Cliffs)

SCOL applications

Bell Bend	Nine Mile Point
Bellefonte	River Bend
Callaway	Shearon Harris
Comanche Peak	Turkey Point
Fermi	Virgil Summer
Grand Gulf	William States Lee
Levy County	

2 Additional Applications are expected

Review Highlights

- In general, fire protection programs comply with regulatory requirements and guidance, including enhanced fire protection features per SECYs.
- Most vendors are taking exception to MCR protection – staff has accepted based on final fire hazards analysis and control procedures.
- Vendors are addressing multiple spurious actuations in accordance with staff expectations.
- Virtually no crediting of operator manual actions and minimal electrical raceway fire barrier systems.
- Smoke affects on digital equipment still needs to be evaluated by staff and industry

NFPA 804 – Standard for ALWRs

- Provides acceptable guidance when used in conjunction with NRC regulations and guidance – not formally endorsed by NRC
- Deterministic approach to FPP
- Does not fully conform with the criteria for enhanced fire protection
- Committee has agreed to delete requirement for one-at-a-time approach to MSAs
- Referenced by AP1000, ESBWR, US-APWR, and EPR
- Referenced by COLAs for site specific fire protection

NFPA 806 Performance-Based FPP

- Committee agreed to revise scope to only address the plant change process
- Change process is similar to the NFPA 805 process
- No applicants have proposed a performance-based approach to plant changes yet
- First issuance scheduled for 2010 – license holders would likely need license amendment to adopt.
- Staff will consider endorsing the standard

Multiple Spurious Actuations

- Staff position is that a one-at-a-time approach may not adequately address the potential risk due to fire
- Staff position for addressing multiple spurious actuations for new reactors will likely be consistent to that for existing reactors
- Train separation by barriers and use of fiber optic cables should minimize spurious actuations for new reactors

Multiple Spurious Actuations and Digital I&C Systems

- Generally assumed that fiber optic cables are not susceptible to hot shorts
- Effects of heat and smoke on digital equipment have not been well established
- Further testing may be needed
- Staff encourages industry to demonstrate viability of assumptions made with respect to fire effects on digital cabling and equipment

Fire PRA Requirements

- 10 CFR 50.71(h)(1) requires new reactor license holders to develop a Level 1 and Level 2 fire PRA - once a standard is issued and endorsed by the NRC
- Until endorsement, COL applicants can use the methods described in the applicable certified design for addressing fire risks

Aircraft Impact – New Reactors

- Aircraft Impact Assessment (AIA) Rule became effective July 13, 2009
- Draft Regulatory Guide (DG-1176) endorsing NEI 07-13, “Methodology for Performing Aircraft Impact Assessments for New Plant Designs” was issued for public comment on July 10, 2009
- Developing format and content guidance for AIA input to FSAR Chapter 19
- Future SRP section is planned

Loss of Large Areas

- Rule 50.54 (hh)(2) would require plants to develop guidance and mitigation strategies to address loss of large areas of the plant due to explosions or fires from a beyond-design basis event
- NEI 06-12 Rev. 3 includes “B.5.b Phase 2&3 Submittal Guideline” has been revised to include new reactors
- FPP (Phase 1) aspect primarily the fire fighting response strategies via MST tables

Summary

- Current regulations and guidance, with enhancements, are applicable to new reactor FPPs
- NFPA 804 is the standard of choice for most designs to date – but does not fully meet staff expectations
- NFPA 806 will provide option for performance-based approach to plant change evaluation
- Multiple spurious guidance will likely follow resolution for existing plants
- Fire effects on digital I&C components may need further study
- Fire PRA which meet fire PRA Standard will be required for new reactor plants
- Aircraft impact assessment includes postulated fire damage
- Fire fighting strategies will be required for explosions and large fires