FAQ Number: 09-0056 **FAQ Revision:** 1

FAQ Title: Radioactive Release Transition

Plant: N/A **Submittal Date:** July 22, 2010

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Purpose of FAQ:

A sufficient level of information is required to demonstrate compliance with NFPA 805 Radioactive Release Criteria.

Interpretation of guidance? Yes / **No**

Proposed new guidance not in NEI 04-02? Yes / No

Details:

NEI 04-02 guidance needing interpretation (include section, paragraph, and line numbers as applicable):

NEI 04-02, Section 4.3.4 and Appendix G

Circumstances requiring guidance interpretation or new guidance:

The subject of radioactive release transition review is discussed in NEI 04-02 Section 4.3.4 and Appendix G. However, it is unclear how following the stated guidance will show that the plant's fire protection program (FPP) meets the NFPA 805 radioactive release goals, objectives, and performance criteria.

Detail contentious points if licensee and NRC have not reached consensus on the facts and circumstances:

N/A

Potentially relevant existing FAQ numbers:

None

Background

NFPA 805 Section 1.3.2, Radioactive Release Goal, states:

> *The radioactive release goal is to provide reasonable assurance that a fire will not result in a radiological release that adversely affects the public, plant personnel, or the environment.*

NFPA 805 Section 1.4.2, Radioactive Release Objective, states:

Either of the following objectives shall be met during all operational modes and plant configurations.
(1) Containment integrity is capable of being maintained.
(2) The source term is capable of being limited.

NFPA 805 Section 1.5.2, Radioactive Release Performance Criteria, states:

Radiation release to any unrestricted area due to the direct effects of fire suppression activities (but not involving fuel damage) shall be as low as reasonably achievable and shall not exceed applicable 10 CFR, Part 20, Limits.

While not specifically endorsed by 10 CFR 50.48(c), NFPA Section A.4.3, Radiation Release, states:

Radioactive releases can take the form of solids, liquids, or gases generated from the combustion of radioactive material, the fire-related rupture of holding vessels, or fire suppression activities." The model used for determining the plant risk can be a bounding risk analysis, a qualitative risk analysis, or a detailed risk analysis such as a Level III PRA. Effects from radioactive releases can be estimated from comparison of source terms and do not necessarily require detailed determination of health effects.

Release of radioactivity is defined to include releases from all sources such as primary containment buildings, radioactive waste processing, and so forth.

Information presented in pilot LARs

The information provided in the pilot LARs describes review of the fire pre-plans and fire brigade training to address potential effluent (water run-off and smoke) release during a fire per the NEI 04-02 guidance. However, neither LAR specifically addressed the NFPA 805 radioactive release goals, objectives, and performance criteria, nor did they provide an assessment of whether and how the FPP will meet the criteria.

Response Section:

Proposed resolution of FAQ and the basis for the proposal:

Revise NEI 04-02 Section 4.3.4 and Appendix G to clearly identify the information needed to demonstrate compliance with the radioactive release goals, objectives, and performance criteria, including:

- identification of FPP elements, measures / systems / procedural control actions / flow paths, credited to meet the criteria

- description of plant programs, such as fire brigade training that are relied upon to implement the radioactive release performance criteria.

- description of plant engineering controls that demonstrate containment of gaseous and liquid fire fighting related effluents within station boundaries or an analysis that demonstrates that the appropriate limits are met

Furthermore, methods for achieving radioactive release performance criteria must be addressed on a fire area-by-fire area basis (NFPA 805 Section 2.2.4). However, with proper justification, this criterion may be met on a finer or coarser level, such as fire zone or grouping fire areas together if the same measures, systems, procedural control applies. Additionally, the review for radioactive release must cover all plant operational modes, including full power and non-power modes.

If appropriate, provide proposed rewording of guidance for inclusion in the next Revision:

NEI 04-02 Section 4.3.4, Radioactive Release Transition Review

A licensee must also show that the radioactive release goals, objectives, and performance criteria are met. Therefore, licensees must now evaluate fire risks and fire protection for various scenarios (most likely not involving fuel damage (see below)) that could lead to radioactive release to an unrestricted area.

The treatment of radiological release to any unrestricted area due to fire is focused on potential radioactive release due to potential fuel damage and fire fighting activities.

Fuel Damage

- The Nuclear Safety Performance Criteria (NSPC) already requires the prevention of fuel cladding damage. As such, radiological release due to fuel damage should not require a separate examination since no such damage is assumed to occur without violating the basic requirements of NFPA 805. This effectively limits the source of radiation (release source term). Containment integrity should not require specific examination. This means the scope of the fire protection analyses need not be expanded to include all containment isolation valves.

- The use of NFPA 805 Section 4.2.3 explicitly meets the radioactive release objective by limiting the source term (no fuel damage). The use of NFPA 805 Section 4.2.4 and Section 4.2.4.1 also explicitly meets the radioactive release objective by limiting the source term (no fuel damage and success path free of fire damage with margin between MEFS and LFS). The use of NFPA 805 Section 4.2.4 and Section 4.2.4.2 meets the radioactive release goal by providing “reasonable assurance that a fire will not result in a radiological release that adversely affects the public, plant personnel, or the environment” via a measure of CDF and LERF along with defense in depth and safety margin considerations.

Fire Fighting Activities

- The Radioactive Release Performance Criteria (NFPA 805 Section 1.5.2) requires that radiation release to unrestricted areas due to direct affects of fire suppression activities shall be low a s reasonably achievable and shall not exceed the limits designated in the plant’s Technical Specifications.

The combination of the above limits the radioactive release review to fire fighting activities and the control of combustion products (smoke and particulates) and the control of fire fighting agents (primarily water).

- The potential for radiological release due to fire fighting activities should be addressed via fire pre-plans, fire brigade training, and engineering controls. The objective is to address the potential for the loss of boundary control for contaminated spaces.

To demonstrate compliance with the radioactive release goals, objectives, and performance criteria, the following strategy is recommended:

- Review fire pre-plans and fire brigade training materials to identify FPP elements (e.g., systems / components / procedural control actions / flow paths, etc.) that are being credited to meet the radioactive release goals, objectives, and performance criteria during all plant operating modes, including full power and non-power conditions.

- Review engineering controls for to ensure containment of gaseous and liquid effluents (e.g., smoke and fire fighting agents). This review shall cover all plant operating modes (including full power and non-power conditions). Otherwise, provide a bounding analysis, quantitative analysis, or other analysis that demonstrates that the limitations for radioactive effluent release specified in the unit's Technical Specifications are met. (See Figure 4.3.4.1)

Refer to Appendix G for examples of this process and the documentation requirements anticipated.

G. Considerations for Radioactive Release

To demonstrate compliance with the radioactive release goals, objectives, and performance criteria, the following tasks should be performed:

- **Determine radioactive release analysis compartmentation.** If the radioactive release reviews are to be performed other than on a fire area basis, provide a justification for this approach.

- **Review pre-fire plans.** Ensure for locations that have the potential for contamination that specific steps are included for containment and monitoring of potentially contaminated gaseous and liquid effluents (typically smoke and suppression water). This review shall cover all plant operating modes (including full power and non-power conditions). Update pre-fire plans as necessary. Summarize how the radioactive release goals, objectives and performance criteria are met for each area. Provide the details of any changes to pre-fire plans made to address radioactive release goals, objectives and performance criteria. For fire pre-plans that are not revised at the time of the LAR provide a summary of planned changes and provide a schedule for implementation as part of the overall NFPA 805 implementation schedule.

- **Review fire brigade training materials.** Ensure that training materials deal specifically with the containment and monitoring of potentially contaminated gaseous and liquid effluents (typically smoke and suppression water). Update training materials as necessary. Provide the details of any changes to training materials made to address radioactive release goals, objectives and performance criteria. For materials not completed by the time of the LAR provide a summary of the planned changes and provide a schedule for implementation as part of the overall NFPA 805 implementation schedule..

- **Review engineering controls for gaseous effluents.** Ensure for locations that have the potential for contamination that gaseous effluents (for example contaminated smoke and related particulates) are contained within the station boundaries. One example might be to demonstrate that such effluents would be contained within the area's ventilation envelope, leading to a monitored, filtered, and elevated release. This review shall cover all plant operating modes (including full power and non-power conditions). Otherwise, provide a bounding analysis, quantitative analysis, or other analysis that demonstrates that the limitations for radioactive effluent release specified in the unit's Technical Specifications are met.

- **Review engineering controls for liquid effluents.** Ensure for locations that have the potential for contamination that liquid effluents (for example automatic or manual fire-fighting water) are contained within the station boundaries. One example might be to demonstrate that such effluents would be contained within the area's floor drain system, which leads to a monitored storage tank system that is sized for the expected volume of runoff. This review shall cover all plant operating modes (including full power and non-power conditions). Otherwise, provide a bounding analysis, quantitative analysis, or other analysis that demonstrates that the limitations for radioactive effluent release specified in the unit's Technical Specifications are met.

- **Document results.**

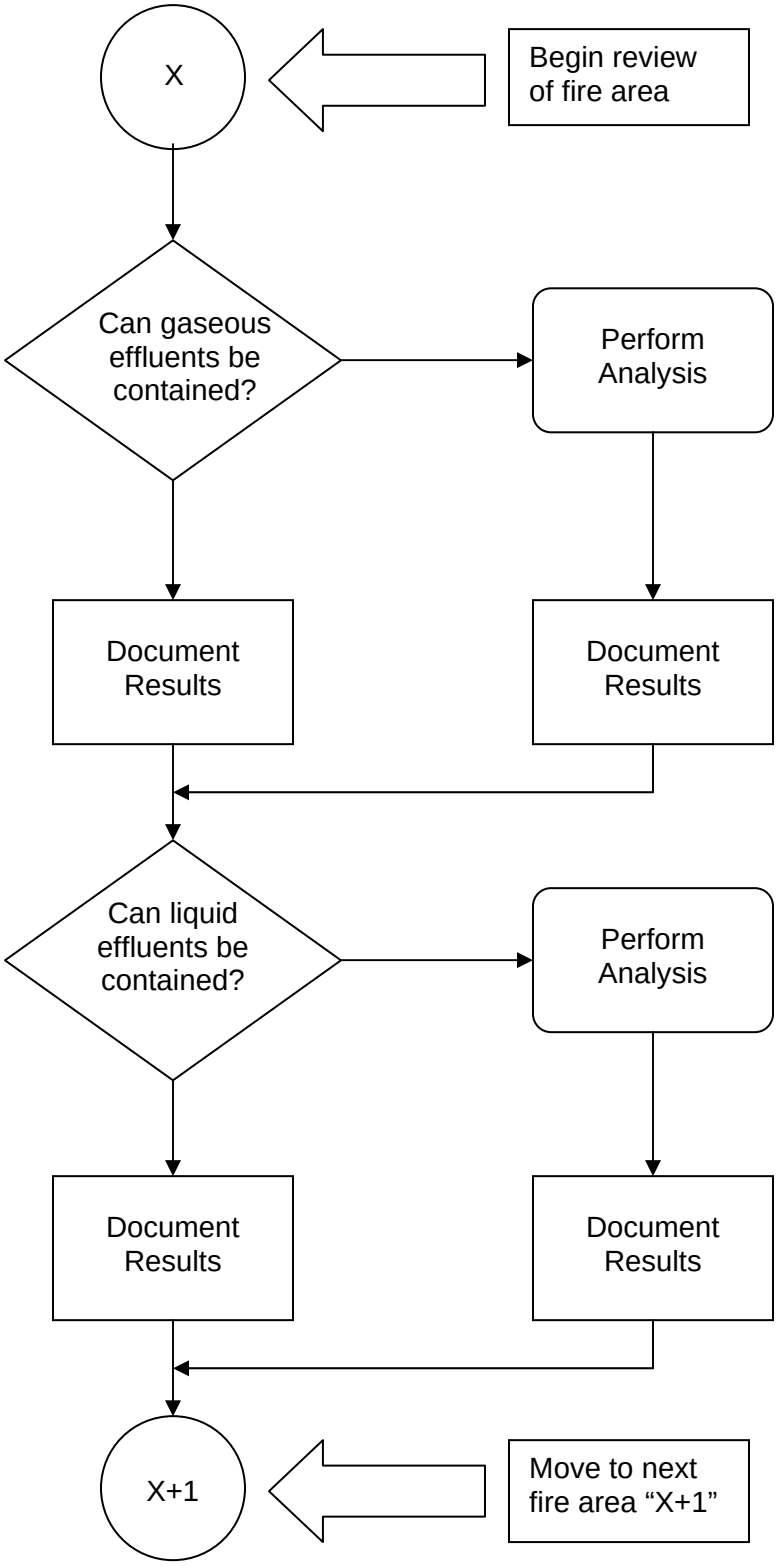
X
Begin review of fire area
Can gaseous effluents be contained?
Perform Analysis
Document Results
Document Results
Can liquid effluents be contained?
Perform Analysis
Document Results
Document Results
X+1
Move to next fire area “X+1”

Figure 4.3.4.1

Table G-1 Radioactive Release Transition Report

Table G-1 NFPA 805 – Radioactive Release Transition Review Guidance

Part 1

Description and justification of radioactive release analysis compartmentation. [Non-Table Format Content]

Part 2a

Fire Pre-Plan	Fire Area	Screened Out	Evaluation	Conclusion
Identification/name of the pre-plan being considered.	Identification/name of the compartments being covered by the pre-plan. Consider second column if required to define the exact compartment under consideration.	Provide information that this pre-plan is screened in (affects radioactive release) or screened out (cannot affect radioactive release). This can be a yes/no column provided the process to determine this is presented elsewhere.	Describe how the pre-fire plan supports the containment and monitoring of potentially contaminated gaseous and liquid effluents.	

Part 2b:

Fire Pre-Plan	Fire Area	Screened Out	Change	Conclusion
Identification/name of the pre-plan being considered.	Identification/name of the compartments being covered by the pre-plan. Consider second column if required to define the exact compartment under consideration.	Provide information that this pre-plan is screened in (affects radioactive release) or screened out (cannot affect radioactive release). This can be a yes/no column provided the process to determine this is presented elsewhere.	Describe any changes to the pre-fire plan made to address radioactive release goals, objectives and performance criteria.	

Part 3

Description of changes to training materials made to address radioactive release goals, objectives and performance criteria. [Non-Table Format Content]

Part 4

Fire Area	Screened Out	Engineered Controls		Conclusion
		Gaseous Effluents	Liquid Effluents	
Identification/name of the compartment being considered. Consider second column if required to define the exact compartment under consideration.	Provide information that this compartment is screened in (affects radioactive release) or screened out (cannot affect radioactive release). This can be a yes/no column provided the process to determine this is presented elsewhere.	Describe how gaseous effluents are contained within the station boundaries. This should cover all plant operating modes. Otherwise, provide a reference to an analysis, detailed elsewhere, that demonstrates that the limitations for radioactive effluent release specified in the unit's Technical Specifications are met.	Describe how liquid effluents are contained within the station boundaries. This should cover all plant operating modes. Otherwise, provide a reference to an analysis, detailed elsewhere, that demonstrates that the limitations for radioactive effluent release specified in the unit's Technical Specifications are met.	