REQUEST FOR ADDITIONAL INFORMATION
Westinghouse Electric Company LLC
License Renewal
(CAC L33317, Docket 70-1151)

Contents of Requests

A. Organization

RAI 1. Section 2.1.1.3 (d) of the license application (Ref. 1) states the responsibilities of the Regulatory Component. The responsibilities include, "Verification of installed equipment for conformance to requirements for environmental and radiation protection, nuclear criticality safety, and emergency planning; and, for documentation of said conformance"; and "Ensuring reviews are conducted of environmental and radiation protection, fire and chemical safety, nuclear criticality safety, occupational safety and health, and emergency plan aspects of changes to equipment and operations associated with the processing, handling, and storage of licensed material in accordance with the governing regulations."

1. Discuss how Westinghouse conducts reviews for individual safety disciplines.
2. Discuss how and whether Westinghouse performs collective (i.e., integrated) reviews (e.g., by use of a multi-disciplinary Review Board). For example, in some facilities, Review Board consisting of members of safety disciplines (e.g., fire, chemical hazards) meet to discuss changes to a process or facility. The collective meeting follows individual reviews in specific disciplines.
3. Discuss how the experience of operators familiar with the system being changed are factored into the review process.
4. Discuss how differing views are dispositioned.

See also the explanatory discussion of RAI 42 (page 15) and RAI 48 (page 18).

Regulatory Basis

Title 10 of the *Code of Federal Regulations* (10 CFR) Paragraph 70.22(a)(8) requires the proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures, etc.).

RAI 2. Discuss how the components of the Columbia Fuel Fabrication Facility (CFFF) organization depicted in Figure 2.2 of the license application interact with each other (i.e. when changes are to be made in plant systems and procedures). Describe the extent of interactions between functions under different components (e.g., Safety, Quality Regulatory, Engineering, and Security) and specific roles in each component group. Describer how the implementation of maintenance changes are evaluated to avoid a decrease in established safety.

Figure 2.2 of the license application is an organizational chart of the CFFF. The chart shows five components (i.e., Safety, Regulatory, Quality, Engineering, and Security) under the plant manager. Similarly, under the Safety and Regulatory Components are (organizational) Functions without discussion how the Functions interact, either within a Component or across Components. The license application lacks a discussion of how the components and functions interact to ensure that changes to plant systems, daily operations and procedures do not have adverse effects on safety. For example, explain how an engineering change to a non-IROFS does not decrease safety or how this change is addressed as a whole system not a single component.

Regulatory Basis

10 CFR 70.22(a)(8) requires the proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures, etc.).

B. Integrated Safety Analysis

RAI 3. Describe the features of the ISA program that periodically evaluate the assumptions on which the elements used to determine likelihood and consequence are based (e.g. initiating event frequencies, failure modes, failure rates, and release rates). Discuss the periodicity of these evaluations, the personnel involved, and the criteria applied to determine the validity of the original assumptions.

Regulatory Basis

10 CFR 70.62(c)(ii) requires a licensee to conduct and maintain an ISA, that is of appropriate detail for the complexity of the process.

10 CFR 70.72(a) requires a licensee to establish a configuration management system to evaluate, implement, and track each change to the site, structures, processes, systems, equipment, components, computer programs, and activities of personnel. This system must be documented in written procedures and must assure that stated topics are addressed prior to implementing any change.

10 CFR 70.22(a)(6), the licensee must demonstrate that its staff has the training and qualifications necessary to engage in the activities proposed in the application.

C. Nuclear Criticality Safety

RAI 4. Commit to the 2005 version of American National Standards Institute/American Nuclear Society (ANSI/ANS) standard ANSI/ANS-8.19, or justify using an older version of the standard.

Section 6.1 of the license application (Ref. 1) states that the Nuclear Criticality Safety (NCS) Program meets the requirements of ANSI/ANS-8.19-1996 as pertains to organization and administration. Section 5.4.3.2 of Nuclear Regulatory Commission (NRC) guidance (Ref. 2), states that the license application should contain justification if committing to other than the most current version of a standard endorsed by the NRC. Regulatory Guide 3.71 endorses the 2005 version of ANSI/ANS-8.19.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 5. Clarify use of the word "configuration" in the first paragraph of Section 6.1.1 of the license application (Ref. 1), which lists mass, moderation, and "configuration" as examples of controlled parameters.

"Configuration" is not included in the list of parameters in Section 6.1.3 of the license application (Ref. 1), nor is this a normally recognized controlled parameter. This information is needed for clarity.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 6. Section 6.1.1 of the license application (Ref. 1) states, "The defense consists of the bounding assumptions, criticality safety limits, and criticality safety constraints that, as a set, are uniquely sufficient to maintain the minimum subcritical margin against an initiating event." Clarify the difference between criticality safety "limits" and "constraints". Clarify what is meant by "uniquely sufficient to maintain the minimum subcritical margin against an initiating event." The minimum subcritical margin is an allowance for any unknown uncertainties in calculating k_{eff} and is not typically associated with any particular initiating event or limits.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 7. Explain the difference between “audits” and “compliance audits” in relation to ensuring the reliability of administrative controls the third paragraph of Section 6.1.1 in the license application (Ref. 1).

Section 5.4.3.2 of NRC guidance (Ref. 2) states expectations for various types of audits and assessments. Various terms are used throughout the nuclear fuel industry, and it is therefore necessary the terms be clearly understood.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 8. In Section 6.1.3 of the license application (Ref. 1), commit that when using a single NCS control to maintain the values of two or more parameters, this constitutes only one component necessary to meet double contingency.

By Section 5.4.3.2 of NRC guidance (Ref. 2), double contingency requires that at least two changes in process conditions are necessary for criticality, and that those changes in process conditions be independent. Though double contingency is not required for existing facilities by the rule, double contingency is both a commonly practiced and effective means to limit the risk of a nuclear criticality accident.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 9. In Section 6.1.3 of the license application (Ref. 1), commit to when the control of parameters is based on measurement, the instrumentation used will be subject to facility management measures.

Though Section 5.4.3.2 NRC guidance (Ref. 2) mentions this criterion when applied to specific controlled parameters (e.g., mass, density, enrichment), the concept applies to any parameter where control relies on measurement.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 10. Section 6.1.3.1(2) of the license application (Ref. 1) states that an evaluation will be done to determine the controls necessary to prevent reaching the safety limit. Define the term "safety limit".

The term "safety limit" is used in Section 6.1.3.1(2) of the license application, but not elsewhere in the chapter. Clear and unambiguous terms are necessary to communicate and implement nuclear safety concepts.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 11. In Section 6.1.3.2 of the license application (Ref. 1), commit to evaluate the effect of fire suppressants and firefighting activities in areas subject to moderation control.

By Section 5.4.3.2 NRC guidance (Ref. 2), the use of moderating fire suppressants can challenge moderation and possibly other controls and should be evaluated.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 12. Define the term "interstitial moderator" in Section 6.1.3.2(3) of the license application (Ref. 1).

Commonly, the term is used to refer to the density of water filling the space between fissionable units in an array or other collection of units, but the term has also been used to refer to moderator that is intimately mixed with fissionable material. Clear and unambiguous terms are necessary to communicate and implement nuclear safety concepts.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 13. In Section 6.1.3.2(4) and (5) of the license application (Ref. 1), clarify the statement that Westinghouse will follow the "guidelines" of ANSI/ANS-8.22-1997. State whether "guidelines" consist of the requirements of the standard, its recommendations, or both.

By Section 5.4.3.2 of NRC guidance (Ref. 2), when an applicant intends to conduct activities to which an NRC-endorsed standard applies, the application should contain a commitment to follow the requirements ("shall" statements) of the standard. The term "guidelines" is vague and does not make clear to what sections the licensee is committing. Clear and unambiguous terms are necessary to communicate and implement nuclear safety concepts.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 14. In Section 6.1.3.2(4) of the license application (Ref. 1), clarify whether the bulleted commitments apply whenever moderation control is used, or only when moderation is the sole controlled parameter.

The subject commitments are sub-bullets under the paragraph that starts "When moderation control is used as the sole controlled parameter…", but appear appropriate to moderation control generally. Clear and unambiguous terms are necessary to communicate and implement nuclear safety concepts.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 15. In Section 6.1.3.3(3) of the license application, commit that all physical and chemical mechanisms that can affect concentration so as to challenge a concentration control limit will be considered and documented in Criticality Safety Evaluations (CSEs), or justify that the list of phenomena mentioned (e.g., precipitation, evaporation, freezing) is sufficiently all-inclusive.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 16. In Section 6.1.3.3 of the license application (Ref. 1), commit that when using tanks containing concentration-controlled solution, the tank will be closed and locked to prevent unauthorized access.

By Section 5.4.3.2 of NRC guidance (Ref. 2), all credible abnormal conditions must be considered to ensure that precipitating agents are not inadvertently introduced.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 17. Section 6.1.3.4(5) of the license application (Ref. 1) states, "Geometry controls will be maintained through management measures that include procedure reviews, training, experience, and audits." Section 6.1.3.10 of the license application states, "Spacing controls will be maintained through management measures that include procedure reviews, training, experience, and audits." Explain what is meant by these statements.

Section 5.4.3.1 of NRC guidance (Ref. 2) states that applicants should commit to the double contingency principle, which requires that at least two changes in process conditions are necessary for criticality, and that those changes in process conditions be unlikely. Management measures are applied to controls to ensure that their failure is unlikely. However, management measures listed do not appear appropriate to passive geometry or spacing controls.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 18. In Section 6.1.3.6(2) of the license application (Ref. 1), explain the phrase, "control of enrichment to less than the licensed limit…." State whether enrichment limits lower than the licensed limit will be used for criticality control. If so, state the controls that will be used to ensure limiting enrichments will not be exceeded.

Section 5.4.3.2 of NRC guidance (Ref. 2) states that when enrichment is controlled, either a method of segregating enrichments is used to ensure different enrichments are not interchanged, or the most limiting enrichment is applied to all materials.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 19. Section 6.1.3.7(2) of the license application (Ref. 1) states, "Nuclear criticality safety calculations have demonstrated that for particle sizes ≤ 150 microns in diameter, the material can be considered homogeneous." Provide technical justification for this assertion.

Section 5.4.3.2 of NRC guidance (Ref. 2) states that heterogeneous effects should be considered whenever relevant. The technical basis for the subject statement is needed to determine if this is an adequate criterion for when heterogeneous effects should be considered.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 20. Provide technical justification for the exceptions to ANSI/ANS-8.5-1996 stated in Section 6.1.3.8(2) of the license application (Ref. 1), especially given the statement in the standard that raschig rings should not be used in basic solutions unless chemical and physical limits have been determined and documented, due to the known corrosion of borosilicate glass in basic environments.

Section 5.4.3.2 of NRC guidance (Ref. 2) states that if the applicant intends to conduct activities to which an NRC-endorsed standard applies, the application should contain a commitment to follow the requirements ("shall" statements) of the standard, subject to exceptions as discussed in Regulatory Guide 3.71. The technical basis for these additional exceptions needs to be understood.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 21. In Section 6.1.3.8(3) of the license application (Ref. 1), clarify whether the measurement of neutron absorbers includes verification of absorber dimensions in addition to composition.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 22. Explain the significance of defining the terms "full reflection" and "partial reflection" as used in Section 6.1.3.9 of the license application (Ref. 1). These terms are not used elsewhere in the license application. Clarify if the definitions include that the 12-inches or 1-inch of water be "tight-fitting" and how these definitions apply in the presence of reflectors other than water (e.g., concrete).

Regulatory Basis

10 CFR 70.61(d) requires that all processes be shown to be subcritical under normal and credible abnormal conditions. Calculations performed to demonstrate subcriticality must therefore bound actual process conditions, including allowance for any fixed and transient reflectors.

RAI 23. In Section 6.1.3.10 of the license application (Ref. 1), justify the first criterion for neutron isolation, specifically "units may be considered non-interacting when they are separated by a 12-foot air distance."

Regulations require that all processes be shown to be subcritical under normal and credible abnormal conditions. Calculations performed to demonstrate subcriticality must therefore bound actual process conditions, including consideration for interaction between neighboring units. Neutron isolation may not be adequately ensured by a 12 foot air distance for sufficiently large units.

A guideline often employed in the nuclear industry has been that single units may be considered isolated if separated by the "larger of 12-foot air distance or the greatest distance across an orthogonal projection of the largest fissile accumulations on a plane perpendicular to the line joining their centers." The criterion stated in Section 6.1.3.10 is deficient in this regard.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 24. In Section 6.1.3.10 of the license application (Ref. 1), commit to having engineered controls, or where not feasible, augmented administrative controls that will be used for interaction control, and that their structural integrity will be sufficient for normal and credible abnormal conditions.

By Section 5.4.3.2 of NRC guidance (Ref. 2), spacing upsets where spacing is only controlled administratively have commonly occurred.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 25. Section 6.1.4.2(1) of the license application (Ref. 1) states, "The evaluation identifies … the Safety Significant Controls necessary to ensure double contingency." Explain the statement. Define the term "Safety Significant Controls," how they are used, and whether they include administrative or only engineered controls.

The term “Safety Significant Controls” is used in Section 6.1.4.2(1) of the license application, but is not defined anywhere else in the license application. Clear and unambiguous terms are necessary to communicate and implement nuclear safety concepts.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 26. In Section 6.1.4.2(8) of the license application (Ref. 1), clarify whether CSEs must be performed by qualified NCS staff.

Section 6.1.4.2(8) states that CSEs must be reviewed by a qualified Criticality Safety Technical Reviewer, but makes no mention of who performs and documents the CSEs. Similarly, Section 6.1.6 of the license application refers to a qualified Criticality Safety Technical Reviewer, but only in terms of performing independent verification of the CSEs.

Similarly, Section 6.1.6 refers to a qualified Criticality Safety Technical Reviewer, but only in terms of performing independent verification of the CSEs. Organizational positions, functional responsibilities, experience, and qualifications of NCS personnel are necessary attributes of nuclear criticality safety.

Section 5.4.3.2 of NRC guidance (Ref. 2) states that the applicant should meet the criteria in Section 2.4 of the same guidance, as it relates to the organizational positions, functional responsibilities.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 27. In Section 6.1.7 of the license application (Ref. 1), commit to provide distinctive NCS postings in areas, operations, work stations, and storage locations relying on administrative controls.

By Section 5.4.3.2 of NRC guidance (Ref. 2), distinctive NCS postings ensure the operators understand the criticality safety significance of controls in their areas.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 28. Section 6.1.8 of the license application (Ref. 1) states, "The CAAS [Criticality Accident Alarm System] radiation monitoring detectors are located to pursue conformance to the guidance of ANSI/ANS-8.3(1997)…." Clarify the statement.

By Section 5.4.3.2 of NRC guidance (Ref. 2), states that if the applicant intends to conduct activities to which an NRC-endorsed standard applies, the application should contain a commitment to follow the requirements ("shall" statements) of the standard. The term "pursue conformance" is vague and does not make clear to what provisions in the standard the licensee is committing.

Regulatory Basis

10 CFR 70.24(a) requires, in part, a licensee, who is authorized to possess special nuclear material in stated quantities, to have a monitoring system using gamma- or neutron-sensitive radiation detectors which will energize clearly audible alarm signals if accidental criticality occurs. The monitoring system must be capable of detecting a criticality that produces an absorbed dose in soft tissue of 20 rads of combined neutron and gamma radiation at an unshielded distance of 2 meters from the reacting material within one minute. Coverage of all areas shall be provided by two detectors.

RAI 29. In Section 6.1.8 of the license application (Ref. 1), commit that the criticality accident alarm system (CAAS) will be designed to remain operational during credible events.

By Section 5.4.3.1 of the NRC guidance (Ref. 2), a CAAS should be designed to remain operational during credible events such as a seismic shock equivalent to the site-specific, design-basis earthquake or equivalent value as specified by the Uniform Building Code, and during events such as fires, explosions, a corrosive atmosphere, and other credible conditions.

Regulatory Basis

10 CFR 70.24(a) requires, in part, a licensee, who is authorized to possess special nuclear material in stated quantities, to have a monitoring system using gamma- or neutron-sensitive radiation detectors which will energize clearly audible alarm signals if accidental criticality occurs. The monitoring system must be capable of detecting a criticality that produces an absorbed dose in soft tissue of 20 rads of combined neutron and gamma radiation at an unshielded distance of 2 meters from the reacting material within one minute. Coverage of all areas shall be provided by two detectors.

RAI 30. In Section 6.1.8 of the license application, commit to having a criticality alarm that is clearly audible in areas to be evacuated or to provide alternative notification methods documented effective in notifying personnel that evacuation is necessary.

By Section 5.4.3.1 of NRC guidance (Ref. 2), the purpose of the alarm is to initiate timely evacuation.

Regulatory Basis

10 CFR 70.24(a) requires, in part, a licensee, who is authorized to possess special nuclear material in stated quantities, to have a monitoring system using gamma- or neutron-sensitive

radiation detectors which will energize clearly audible alarm signals if accidental criticality occurs. The monitoring system must be capable of detecting a criticality that produces an absorbed dose in soft tissue of 20 rads of combined neutron and gamma radiation at an unshielded distance of 2 meters from the reacting material within one minute. Coverage of all areas shall be provided by two detectors.

RAI 31. In Section 6.1.8 of the license application (Ref. 1), commit to having fixed and personnel accident dosimeters in areas requiring a CAAS, and that they will be readily available to personnel responding to an emergency, with a method for prompt onsite dosimeter readout.

By Section 5.4.3.1 of NRC guidance (Ref. 2), fixed and personnel accident dosimeters in areas requiring a CAAS ensure and protect response personnel from the consequences of a nuclear criticality accident. Such dosimeters ensure that response personnel are protected from the consequences of a criticality.

Regulatory Basis

10 CFR 70.24(a)(3) requires, in part, that a licensee maintain emergency procedures for each area in which this licensed special nuclear material is handled, used, or stored to ensure that all personnel withdraw to an area of safety upon the sounding of the alarm. These procedures must include the conduct of drills to familiarize personnel with the evacuation plan, and designation of responsible individuals for determining the cause of the alarm, and placement of radiation survey instruments in accessible locations for use in such an emergency.

RAI 32. Section 6.1.9 of the license application (Ref. 1) states, "… audits and assessments address the guidelines of ANSI/ANS-8-19(1996)." Clarify the statement. Confirm if it is the intent that audits and assessments will be done in accordance with the requirements of ANSI/ANS-8.19-1996.

Section 5.4.3.2 of NRC guidance (Ref. 2) states that if the applicant intends to conduct activities to which an NRC-endorsed standard applies, the application should contain a commitment to follow the requirements ("shall" statements) of the standard. The term "guidelines" is vague.

Regulatory Basis

10 CFR 70.22(a)(8) Proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures, etc.).

RAI 33. Justify the triennial NCS program audit frequency in Section 6.1.9 of the license application (Ref. 1).

Section 5.4.3.2 of NRC guidance (Ref. 2) states that all operating SNM process areas should be reviewed at some specified frequency, which depends on such factors as the complexity of the process, degree of process monitoring, and degree of reliance on administrative controls. A graded approach may be used to justify an alternative schedule. Section 6.1.9 of the license application states, "Program audits schedules are developed annually, with the complete NCS program assessed on a triennial frequency." No reasons are given for the triennial frequency.

Regulatory Basis

10 CFR 70.22(a)(8) states that each application for a license shall contain proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures).

RAI 34. Justify the 5-year frequency of NCS compliance audits in Section 6.1.9 of the license application (Ref. 1).

Section 5.4.3.2 of NRC guidance (Ref. 2), states that all operating SNM process areas should be reviewed at some specified frequency, which depends on such factors as the complexity of the process, degree of process monitoring, and degree of reliance on administrative controls. A graded approach may be used to justify an alternative schedule. Section 6.1.9 of the license application (Ref. 1) states, "Formal compliance audit schedules are developed annually, with one fifth of the fissile material processing areas described in the ISA audited annually, so that the complete set of operations making up the CFFF Integrated Safety Analysis (ISA) are assessed on a five year frequency." The assessments described in Section 6.1.9 have different frequencies, but the difference between them is not clear.

Regulatory Basis

10 CFR 70.22(a)(8) states that each application for a license shall contain proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures).

RAI 35. Describe the difference between the 5-year program assessments, described as "compliance audits that evaluate implementation of NCS requirements" and quarterly or semiannual facility walkthrough assessments, described as having "a focus on field compliance with established NCS controls" in Section 6.1.9 of the license application (Ref. 1). State how Westinghouse distinguishes between "higher risk" (requiring quarterly assessments) and "lower risk" (requiring semiannual assessments) operations.

Section 5.4.3.2 of NRC guidance (Ref. 2) contains acceptance criteria for various types of audits and assessments. These assessments described in Section 6.1.9 of the license application have different frequencies, but the difference between them is not clear.

Regulatory Basis

10 CFR 70.22(a)(8) states that each application for a license shall contain proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures).

RAI 36. In Section 6.1.10 of the license application (Ref. 1) clarify what is meant by stating that the combined process for procedures, training, and qualification "meets the guidelines of ANSI/ANS-8.19(1996) and ANSI/ANS-8.20(1991)." Confirm if it is the intent of Westinghouse

that this process will satisfy the requirements of ANSI/ANS-8.19-1996 and ANSI/ANS-8.20-1991.

Section 5.4.3.2 of NRC guidance (Ref. 2) states that if the applicant intends to conduct activities to which an NRC-endorsed standard applies, the application should contain a commitment to follow the requirements ("shall" statements) of the standard. The term "guidelines" is vague.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 37. Provide minimum qualifications for qualified NCS staff, including those who will perform and document CSEs and perform other NCS Program functions, and for qualified NCS Technical Reviewers who will perform independent verification. Describe the various positions related to NCS and their duties and minimum qualifications.

Section 11.4.3.3 of NRC guidance (Ref. 2) states that the application should contain commitments regarding personnel qualification for managers, supervisors, technical staff, and others who perform regulated activities.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 38. Commit to follow the requirements of ANSI/ANS-8.23-1997, in regard to emergency response as related to NCS.

Section 5.4.3.1 of NRC guidance (Ref. 2) contains this acceptance criterion. This is needed to ensure personnel are protected from the consequences of criticality.

Regulatory Basis

10 CFR 70.24(a)(3) requires, in part, that a licensee maintain emergency procedures for each area in which this licensed special nuclear material is handled, used, or stored to ensure that all personnel withdraw to an area of safety upon the sounding of the alarm. These procedures must include the conduct of drills to familiarize personnel with the evacuation plan, and designation of responsible individuals for determining the cause of the alarm, and placement of radiation survey instruments in accessible locations for use in such an emergency.

RAI 39. Commit to require personnel to perform activities in accordance with written, approved procedures, and that unless a specific procedure deals with the situation, personnel shall take

no action until NCS has evaluated the situation and provided guidance. Commit to require personnel to report defective NCS conditions to the NCS Program.

Section 5.4.3.2 of NRC guidance (Ref. 2) contains these acceptance criteria. They are needed to ensure an adequate response to off-normal conditions.

Regulatory Basis

10 CFR 70.22(a)(8) states that each application for a license shall contain proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures).

RAI 40. State whether density is relied on as a controlled parameter, and if so, commit that when process variables can affect the assumed density, the process variables are identified as controls.

Section 5.4.3.2 of NRC guidance (Ref. 2) contains acceptance criteria for the use of density as a controlled parameter.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 41. Section 6.1.2 of the license application (Ref. 1) states, “The relative effectiveness and reliability of NCS controls are considered during the CSE process.” Describe what is meant by “relative effectiveness” and state that the effectiveness and reliability of NCS controls will be justified in the CSE.

One of the main issues during an event (Ref. 3) with the S-1030 scrubber that controls did not work because they were based on invalid assumptions. Much effort is typically put into showing that controls are “reliable” by appealing to the type of control (e.g., passive, active) and describing management measures. An often overlooked consideration is ensuring that controls actually work and can fulfill their safety functions. That requires a much more detailed kind of review.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 42. Section 6.1.3(b) of the license application states that when less-than-optimum (worst case credible) conditions are assumed to a given parameter, the basis will be documented and

justified in CSEs. In Section 6.1.3(c), state that the independent review of any assumptions, and the basis for their acceptance, will be documented.

Another main issue in the event of the S-1030 scrubber (Ref. 3) was that of unvalidated assumptions, several of which turned out to be false even though they were carried forward through several revisions of the CSE. They were subject to peer review, yet there are no firm criteria for performing the peer review and there is very little documentation of that review was conducted. Requiring an independent assessment of any assumptions would at least ensure that more than one person has had to think carefully about them.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 43. In Section 6.1.3.1 of the license application (Ref. 1), state that when mass limits are derived for material assuming a given weight percent of uranium, compliance will be verified by either weighing the material and ascribing the entire mass to uranium, or conducting physical measurements to establish the actual weight percent. State that process variables that can affect the weight percent of uranium are identified as controls. State that any material associated with a fissile process will be treated conservatively as having a high content of uranium until demonstrated otherwise.

An issue in the event involving the S-1030 scrubber (Ref. 3) was the non-conservative assumption that the material from the S-1030 scrubber was of low uranium content. This assumption was found to be incorrect. If all the material had been assumed to be uranium until measurements showed otherwise, the material would have been handled in a conservative manner (e.g., not pushed into two corners of the S-1030 scrubber when cleaning the scrubber of deposits). The assumption was based on process conditions that were not controlled.

These commitments are not included in the section on mass control, even though there are acceptance criteria in NRC guidance (Ref. 2). The specific acceptance criteria listed above are from Section 5.4.3.2 (for parameters such as density, but the same principle applies generally to other parameters, including mass).

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 44. In Section 6.1.3.5(2) of the license application (Ref. 1), state that when credit is taken for process characteristics (e.g., the physical and chemical properties of a process and/or process materials), the bounding assumptions and limits are documented and justified in the applicable CSE.

Section 6.1.3.5(2) requires that credit for process characteristics must be documented, but does not require that it be justified. This is taken from Section 5.4.3.2 of NRC guidance (Ref. 2), where it states that process variables that can affect parameters should be controlled.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 45. Section 6.1.3.5(3) of the license application (Ref. 1) states, "Utilization of process and/or material characteristics as controls is based on known scientific principles, established physical properties or chemical reactions, and/or experimental data supported by CFFF operational history." Explain what is meant by "known scientific principles". Explain what is meant by "established physical properties" and "experimental data," and provide examples. State that such credit cannot be based on operating history alone. Explain in detail how Westinghouse meets the commitments in Section 6.1.3.5(3) for the S-1030 scrubber, including which of the methods (i.e., known scientific principles, established physical properties or chemical reactions, experimental data) are being relied on, how they are being relied on, and how they are supported by operating history.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 46 Explain what is meant by "most reactive credible conditions" as applied to reflection in Section 6.1.3.9 of the license application (Ref. 1). Provide an example of how this would be applied within an enclosed process, such as a glovebox or ventilation ductwork.

RAI 22 asked for clarification on commitments related to reflection. When reflection is not controlled, standard industry practice is that it is represented by 1 foot of tight-fitting water or 2 feet of concrete. Section 6.1.3.9 of the license application (Ref. 1) goes beyond this in allowing a third possibility, namely demonstrating that "the reflection conditions modeled are the most reactive credible conditions." This needs to be justified, especially where models of material within the scrubber included 1 inch tight-fitting water, even though there is a large amount of water present in and around the material under normal conditions. Using less conservative reflection conditions can result in a significantly higher mass limit than if full (1 foot) reflection is modeled.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 47. Explain what is meant by "establishes bounding assumptions for…system parameters" in Section 6.1.4.2(1) of the license application (Ref. 1), in regard to the contents of CSEs. Clarify whether the word "establishes" means that assumptions will be documented, justified (consistent with the words in Section 6.1.3.5[3]), or something else.

The use of unvalidated assumptions has been a key issue in the event involving the S-1030 scrubber (Ref. 3). The commitment to "establish" bounding assumptions in analysis needs clarification.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 48. Section 6.1.4.2(8) of the license application (Ref. 1) states that the independent review of CSEs by a qualified NCS Technical Reviewer, and the justification for their conclusions, must be documented.

The CSEs for the S-1030 scrubber (Ref. 3), and related CSEs reviewed as part of the extent-of-condition review, were reviewed by multiple individuals over the course of several revisions, yet were based on assumptions that turned out to be invalid. A robust peer review should have caught at least some of these issues (which were subsequently identified both by the NRC inspectors and by the contractors hired to do an independent assessment). To ensure a more thorough review, it must be more than a mere checklist that is signed off. The peer reviewer should have to document what was looked at and why it was acceptable, including looking at any assumptions (see language in Section 6.1.3).

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 49. Describe what is looked at during the triennial NCS Program audits, and who performs them, in Section 6.1.9 of the license application (Ref. 1). Justify the independence of the auditors from the program, and the basis for the triennial frequency. State how audit findings will be resolved.

Section 5.4.3.2 of NRC guidance (Ref. 2) states that NCS program audits should be conducted at least once every 2 years, whereas Section 6.1.9 of the license application (Ref. 1) commits to assessing the entire program every 3 years. It is unclear what is meant by "auditing the entire program". In addition, mention is made of internal and external audit findings, but it is not clear if this is a commitment to conducting internal audits, external audits, or both, or who performs them. NRC guidance (Ref. 2) also says that reviews and audits should be independent. As follow-up to the event involving the S-1030 scrubber (Ref. 3), Westinghouse hired external

contractors, who identified a number of issues with plant CSEs similar to those found by inspectors. A periodic external review of facility CSEs would seem beneficial.

Section 5.4.3.3.4 of NRC guidance (Ref. 2) states that weaknesses identified during audits should be referred to the corrective action program, which is responsible for promptly and effectively resolving them. Section 6.1.9 of the license application (Ref. 1) states that the results of audits are documented and maintained, but does not state that they will be put into the licensee's corrective action program.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

RAI 50. In Section 4.1.3.2 of the license application (Ref. 1), state that all changes to operations involving SNM will be evaluated by NCS and the affected operations. If safety analysis is not required for the change, the justification for that determination will be documented on the Configuration Change Control Form. This shall include evaluating whether the validity of any underlying assumptions is impacted by the proposed change. In other words, ensure that NCS reviews all changes to fissile material operations, and justify if an analysis is not needed.

In the event involving the S-1030 scrubber (Ref. 3), changes were made that invalidated the assumptions and controls in the process's safety basis; the event ensured partly as a result of the cumulative effect of many such changes. Section 4.1.3.2 of the license application states, "All subsequent changes that might affect the Baseline ISA are reviewed by the same safety disciplines that were involved in preparation of the Baseline ISA." However, this does not clearly state whether NCS (or operations) will be involved in the review of all facility changes. Such reviews are often done by a checklist; the analyst should rather be required to document the basis when deciding that a more detailed safety review is not required.

Regulatory Basis

10 CFR 70.61(d) requires, in part, that the risk of nuclear criticality accidents must be limited by assuring that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety. Preventive controls and measures must be the primary means of protection against nuclear criticality accidents.

D. Chemical Process Safety

RAI 51. Chapter 7 of the license Application, Section 7.1.3.1 states that "Hazard and Operability Analysis, What if/Checklist, and/or other recognized methods are used to systematically evaluate safety of chemical operations at the CFFF. The hazard evaluation method selected is based on the complexity of the process being analyzed". For the event in May 2016 involving the S-1030 scrubber, Westinghouse conducted a What-if/checklist hazard evaluation of the scrubber system; neither the method nor the application of the method did not adequately characterized the processes/hazards for the various safety disciplines.

1. Describe the criteria used for determining the hazard evaluation method used for each process, node or equipment. If the method selection considers process complexity or uncertainty discuss this factor and provide examples where process complexity or uncertainty has influenced the selection of the hazard evaluation method.

2. Discuss how the different disciplines (e.g. fire, criticality, chemical and radiological safety) are involved in a hazard evaluation in order to assure a common understanding of phenomena that could affect the individual safety analyses.

3. Discuss how CFFF shares or communicates the results of the hazard evaluation with the different safety disciplines.

Regulatory Basis

10 CFR 70.62(c)(1) states, in part, that each licensee or applicant shall conduct and maintain an integrated safety analysis, that is of appropriate detail for the complexity of the process.

10 CFR 70.65(b) states, in part, that the licensee shall submit an ISA Summary with its license renewal application that contains a description of each process analyzed in the integrated safety analysis in sufficient detail.

E. Authorizations

RAI 52. In Section 12.1.7 of the license application (Ref. 1), Westinghouse requested continued authorization to abandon or dispose of small quantities of radioactive materials that are present as minor contamination on certain papers, notebooks, computer print-outs, films, and/or similar items currently retained for record purposes. Contamination limit criteria were provided. This authorization was originally requested in the application for license renewal dated April 30, 1995 (Ref. 4).

Describe the nature of records that Westinghouse continues to need the authorization to dispose of small quantities of radioactive materials present as minor contamination. The authorization requests the desire to dispose of small quantities of radioactive material on these records, but a caveat states these records shall be kept in locations primarily used for record storage. Clarify if these are records to be retained or disposed of. Explain the method of disposal.

Regulatory Basis

10 CFR 70.22(a)(8) states that each application for a license shall contain proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures).

RAI 53. In Section 12.2.6 of the license application (Ref. 1), Westinghouse requests an exemption from the requirement to monitor the external surfaces of packaged radioactive material receipts for radioactive contamination relative to flatbed trailer shipments of fuel assemblies received from the General Electric Company for interim storage purposes only, provided the constraints, conditions and controls committed to in a letter, dated November 30,

1993, (identification # NRC-93-036), are satisfied; and further provided that the total number of such fuel assemblies stored at the site at any given time does not exceed 250.

This exemption was requested in the application for license renewal dated April 30, 1995 (Ref. 4) and approved in the license renewal dated November 3, 1995 (Ref. 5). Explain the need to continue this exemption, the interim storage requirements for fuel assemblies received from the General Electric Company, and update conditions and controls required to extend this exemption.

Regulatory Basis

10 CFR 70.22(a)(8) states that each application for a license shall contain proposed procedures to protect health and minimize danger to life or property (such as procedures to avoid accidental criticality, procedures for personnel monitoring and waste disposal, post-criticality accident emergency procedures).

F. Environmental Protection

RAI 54. Explain the investigation action the level of air effluents for dose to members of the public. Section 10.1.1 of the license application (Ref. 1) has set an investigation action level of air effluents for dose to the public at the regulatory limit of 100 mrem. Typically, an action level is significantly lower than 100 mrem than the regulatory limit in 10 CFR Part 20. Account for dose from liquid effluents which, together with the air effluents, cannot exceed 100 mrem.

Regulatory Basis

10 CFR 20.1301(1) states, in part, that a licensee to conduct operations so that the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year, exclusive of the dose contributions from background radiation, from any administration the individual has received, from exposure to individuals administered radioactive material.

G. Environmental Report

RAI 55. Table A-1 of Appendix A of the Environmental Report submitted by letter dated December 17, 2014 (Ref. 1) cites the permits, licenses, and certifications that Westinghouse with city, county, state, and federal agencies for the CFFF. Provide the periods of the permits, such as the date issuing and dated expired.

Regulatory Basis

10 CFR 51.45(d) states that the environmental report shall list all Federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land-use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental

protection. The discussion of alternatives in the report shall include a discussion of whether the alternatives will comply with such applicable environmental quality standards and requirements.

H. References

1. Letter from N. Parr, Westinghouse Electric Company LLC, “SNM-1107 License Renewal Supplement”, December 17, 2014. ADAMS accession number ML14352A111.

2. U.S. NRC, “Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility”, NUREG-1520, Rev 1, May 2010. ADAMS accession number ML101390110.

3. Letter from C. Haney, U.S. Nuclear Regulatory Commission, “Nuclear Regulatory Commission Augmented Inspection Team Report No. 70-1151/2016-007”, October 26, 2016. ADAMS accession number ML16301A001.

4. Westinghouse Electric Corporation Energy Systems, “Application For Renewal Of A Special Nuclear Materials License For The Commercial Nuclear Fuel Division At The Columbia, South Carolina Fuel Fabrication Facility”, April 30, 1995. ADAMS accession number ML062270174.

5. Letter from R. Pearson, U.S. Nuclear Regulatory Commission, “Renewal (TAC NO. L21674)”, November 3, 1995. ADAMS accession number ML060110462.