From:	Kurt Schaefer
To:	RulemakingComments Resource
Subject:	[External_Sender] Request for Rule Making - Defining “Important to Safety”
Date:	Monday, July 20, 2015 4:07:25 AM
Attachments:	Request for Rule Making.pdf

Office of the Secretary;

I have been performing nuclear power plant (NPP) licensing since in 1980, and have never met two people that agree about what nonsafety-related structures, systems and components (SSCs) should be categorized as "important to safety." That is because there is only a general description of what is "important to safety" in 10 CFR 50 Appendix A, and the regulations do not provide a specific set of criteria for determining which SSCs are "important to safety."

The term “important to safety” is used in numerous regulations and NRC guidance documents. In addition, one of the regulations most used at NPPs, 10 CFR 50.59, has used and after a number of revisions still uses that term for evaluating changes to determine if a license amendment is required before making a change. Therefore, there are regulations, regulatory guidance and routinely generated regulatory evaluations, based on SSCs with no specific criteria that determines what are the applicable SSCs.

Since 1984, there have been differences of opinion on what SSCs are “important to safety.” The nuclear industry is on its third generation of engineers and regulators with no clear definition of what is “important to safety.” At this point, there is no excuse for not having a concise set of functional criteria defining such a used term. The attachment provides a request for rule making to define (i.e., provide criteria for determining) "important to safety."

Regard;

--
Kurt Schaefer
Principal Licensing Engineer

ktschaefer@gmail.com

P.S. I am currently working in Korea, and my cell phone does not function here. Therefore, please contact me by email.

Request for Rule Making

A definition providing the following set of specific criteria for determining which structures, systems, components and functions are “important to safety” should be added to 10 CFR Part 50.2.

Important to safety means those structures, systems, components and functions that are:

a) Safety-related structures, systems and components (including supporting auxiliaries) as defined in 10 CFR Part 50.2 and their associated safety-related functions;

b) Equipment and function(s) assumed or used to mitigate the AOOs and non-accident events evaluated in the Final Safety Analysis Report (as updated) or Design Control Document Tier 2 safety analyses;

c) Equipment and functions assumed or used to prevent or mitigate internal events that involve common cause failures and/or failures beyond the 10 CFR Part 50 Appendix A single failure criterion, which have been postulated to demonstrate some specific mitigation capability in accordance with regulatory requirements, as described in the Final Safety Analysis Report (as updated) or Design Control Document Tier 2;

d) Equipment and functions whose failure or malfunction could impair the ability of other equipment to perform a safety-related function;

e) Equipment and functions requiring (for ensuring nuclear safety) elevated quality assurance or design requirements (i.e., special treatment), but not to full safety-related standards;

f) Nonsafety-related readiness functions of installed plant equipment and their associated plant condition(s) assumed, prior to the initiation of an accident, in any accident safety analysis described in the Final Safety Analysis Report (as updated) or Design Control Document Tier 2;

g) Nonsafety-related structures, systems, components and functions specifically included in the plant design to control the release of radioactive materials within 10 CFR 20 limits, as described in the Final Safety Analysis Report (as updated) or Design Control Document Tier 2;

h) Specific (10 CFR Part 50.150) aircraft impact assessment design features and functional capabilities, as described in the Final Safety Analysis Report (as updated) or Design Control Document Tier 2;

i) Fukushima Daiichi accident mitigation related new or modified manual actions and equipment (including associated functional capabilities), as described in the current plant licensing basis; and

j) Severe accident mitigation related new or modified manual actions and equipment (including associated functional capabilities), as described in the current plant licensing basis.

Notes and clarifications:

1. The safety-related criterion a) addresses the prevention and mitigation of accidents.
2. Chapter 15 in most Final Safety Analysis Reports and all Design Control Documents include analyses of events whose probabilities are below the threshold for an AOO, as defined 10 CFR Part 50 Appendix A, and whose radiological effects are not comparable

(i.e., significantly less than) guideline exposures set forth in 10 CFR 50.34(a)(1) or 10 CFR 100.11. Therefore, those events are addressed as "non-accident" events in criterion b).

3. Criterion h) is not applicable to plants that were in commercial operation prior to 2009.

3. Fukushima Daiichi and severe accident mitigation capabilities may not be documented in a plant's FSAR (as updated), thus the term "current licensing basis," is used in criteria i) and j).

Grounds for the Action

The NRC staff's current position is that SSCs "important to safety" consists of two subcategories, "safety-related" and "nonsafety-related."

10 CFR 50.2 defines safety-related structures, systems and components by providing specific criteria that are to be used for determining which SSCs shall be classified as safety-related. From 10 CFR 50.2,

> "*Safety-related* structures, systems and components means those structures, systems and components that are relied upon to remain functional during and following design basis events to assure:
>
> a) The integrity of the reactor coolant pressure boundary;
>
> b) The capability to shut down the reactor and maintain it in a safe shutdown condition; or
>
> c) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in § 50.34(a)(1) or § 100.11 of this chapter, as applicable."

However, the regulations do not provide an equivalent set of criteria for determining which nonsafety-related SSCs are "important to safety."

10 CFR Part 100, Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," provides the fundamental criteria that has been used for the siting all US nuclear power plants and determining which SSCs must be seismically qualified. 10 CFR Part 100, Appendix A, Section I, "Purpose," states

> "General Design Criterion 2 of Appendix A to part 50 of this chapter requires that nuclear power plant <u>structures, systems, and components important to safety be designed to withstand the effects</u> of natural phenomena such as <u>earthquakes</u>, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions."

10 CFR Part 100, Appendix A, Section I, "Definitions," Item (c) states

> "The *Safe Shutdown Earthquake* is that earthquake which is based upon an evaluation of the maximum earthquake potential considering the regional and local geology and seismology and specific characteristics of local subsurface material. It is that earthquake which produces the maximum vibratory ground motion for which <u>certain structures, systems, and components are designed to remain functional. These structures, systems, and components are those necessary to assure:</u>
>
> (1) The integrity of the reactor coolant pressure boundary,

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition, or

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of this part.”

The above “important to safety” criteria are equivalent to the 10 CFR 50.2 “safety-related” criteria. As a result, the nuclear power industry historically considered the terms "important to safety" and "safety-related" to be synonymous.

A 1981 NRC Memorandum (Reference 1) defines “important to safety” as part of a past NRC internal instruction. Reference 1 provides the following general guidance for determining SSCs “important to safety:”

- Definition - From 10 CFR 50, Appendix A (General Design Criteria) - see first paragraph of “Introduction.”

  “Those structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.”

- Encompasses the broad class of plant features, covered (not necessarily explicitly) in the General Design Criteria, that contribute in an important way to safe operation and/or protection of the public in all phases and aspects of facility operation (i.e., normal operation and transient control as well as accident mitigation).

- Includes Safety-Grade (or Safety-Related) as a subset.

An attachment (December 19, 1983 letter) to NRC Generic Letter 84-01 (Reference 2) clarified the NRC staff’s use of the terms “important to safety” and “safety-related.” The attachment states that “important to safety” encompasses the broad scope of equipment covered by Appendix A to 10 CFR Part 50, the General Design Criteria.” However, the generic letter nor its attachment provide a specific set of criteria for determining which nonsafety-related SSCs are to be categorized as “important to safety.”

The term “important to safety” is used in numerous regulations and NRC guidance documents. In addition, one of the regulations most used at nuclear power plants, 10 CFR 50.59, has used and after a number of revisions still uses that term for evaluating changes to determine if a license amendment is required before making a change. Therefore, there are regulations, regulatory guidance and routinely generated regulatory evaluations, based on SSCs with no specific criteria that determines what are the applicable SSCs.

Issued Involved Requested Rule Change

Since 1984, there have been differences of opinion on what SSCs are “important to safety.” The nuclear industry is on its third generation of engineers and regulators with no clear definition of what is “important to safety.” At this point, there is no excuse for not having a concise set of functional criteria defining such a used term. The following presents the basis and rational for the criteria in the requested rule change.

The introduction to 10 CFR Part 50, Appendix A, General Design Criteria (GDC), provides the following general description of SSCs “important to safety.”

> “The principal design criteria establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety; that

is, structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public."

The GDC address SSCs and functions used to prevent and mitigate abnormal events (e.g., accidents and AOOs) and SSCs that normally contain and/or process radioactive material (e.g., radioactive wastes). With respect to providing "reasonable assurance that the facility can be operated without undue risk to the health and safety of the public," the nonsafety-related SSCs specifically included in the plant to control the release of radioactive materials within 10 CFR 20 limits should be considered "important to safety."

Starting in 2005, Section 1.2.1 of ESBWR DCD Tier 1, Revisions 0 through 3 (see Reference 3), included the following definition of "important to safety."

"For the ESBWR, equipment/functions/conditions *important to safety* means:

(1) Safety-related SSCs (including supporting auxiliaries) as defined in 10 CFR 50.2 and their associated safety-related functions;

(2) Equipment/function(s) assumed or used to mitigate the AOOs and infrequent events evaluated in the Final Safety Analysis Report (FSAR) safety analyses;

(3) Equipment/function(s) assumed or used to prevent or mitigate the special events (e.g., ATWS, Station Blackout and Safe Shutdown Fire), as described in the FSAR;

(4) Equipment/function(s) whose failure or malfunction could impair the ability of other equipment to perform a safety-related function;

(5) Equipment/function(s) requiring (for ensuring nuclear safety) elevated quality assurance or design requirements (i.e., special treatment), but not to full safety-related standards;

(6) Nonsafety-related readiness functions of installed plant equipment and their associated plant condition(s) assumed, prior to the initiation of an accident, in any accident safety analysis described in the FSAR;

(7) As described in the FSAR, nonsafety-related SSCs specifically included in the plant to control the release of radioactive wastes within 10 CFR 20 limits; and

(8) As defined in the FSAR, the nonsafety-related equipment and their associated supporting auxiliary system(s) that are essential in performing Regulatory Treatment of Non-Safety Systems (RTNSS) functions."

For Revisions 0 through 3 of the ESBWR DCD, the NRC did not comment on nor issue a request for additional information (RAI) with respect to the "important to safety" definition, thus at that point the definition appeared to be acceptable to the NRC. However, the term "important to safety" was not used in ESBWR DCD Tier 1, and as a result, was definition was deleted from Tier 1 in Revision 4 of the DCD.

The ESBWR's criteria for categorizing safety-related and nonsafety-related SSC "important to safety" were derived from

- Design basis abnormal events (e.g., AOO, infrequent events and accidents) analyzed in the safety analyses within Design Control Document (DCD) Tier 2 Chapters 6 and 15;

- Internal events involving common cause failures and/or failures beyond the 10 CFR Part 50 Appendix A single failure criterion, which are postulated to demonstrate some specific mitigation capability in accordance with regulatory requirements,
  - Reactor shutdown from outside control room,
  - Anticipated transient without scram (ATWS),
  - Station blackout (SBO), and
  - Safety shutdown fire;
- Considerations about SSCs whose failures or malfunctions could lead to an accident, or impair the ability of other equipment to perform a safety-related function;
- Considerations about SSCs that require elevated quality assurance or design requirements, but not to full safety-related standards;
- 10 CFR Part 50 Appendix A GDC to ensure compliance with10 CFR Part 20 limits; and
- Nonsafety-related equipment and their associated supporting auxiliary system(s) that are essential in performing Regulatory Treatment of Non-Safety Systems (RTNSS) functions for NPPs that rely on passive safety-related core and containment cooling system (e.g., ESBWR and AP1000).

Since 2005, regulatory requirements for two new external events, i.e., aircraft impact assessment (10 CFR 50.150) and Fukushima Daiichi accident, have been issued. Therefore, the following additional consideration for determining SSCs “important to safety” is warranted.

- Specific external events that have been postulated to demonstrate some additional mitigation or coping capability in accordance with regulatory requirements, e.g., specific aircraft impact assessment design features and functional capabilities and Fukushima Daiichi accident related (new and changed) manual functions and equipment, including associated functional capabilities.

In addition, following the Fukushima Daiichi accident, there has been greater emphasis on severe accident mitigation capabilities.

References

1. USNRC, MEMORANDUM FOR: All NRR Personnel, FROM: Harold R. Denton, Director Office of Nuclear Reactor Regulation, “STANDARD DEFINITIONS FOR COMMONLY-USED SAFETY CLASSIFICATION TERM,” November 20, 1981.
2. USNRC, Generic Letter 84-01, ‘NRC use of the terms, "Important to Safety" and "Safety Related",’ January 5, 1984.
3. GE Energy Nuclear, “ESBWR Design Control Document Tier 1,” 26A6641AB, Revision 3, February 2007.