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Evaluation of "Safety Related" and "Important to Safety" terminology for safety classification of nuclear installation items in Brazil

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ABSTRACT

In general terms, safety demonstration of nuclear installations is carried out through an assessment of compliance with design criteria and safety requirements established in national and international codes and standards applicable to each type of installation. In addition, a safety analysis consisting of installation behavior study during its useful lifetime, shall be developed considering normal operating conditions, transients, and postulated accidents, to determine safety margins and verify the adequacy of items designed to prevent accidents or mitigate their consequences. Also, design requirements applicable to each installation item depend on its classification with respect to safety. Thus, safety classification of structures, systems, and components (SSCs) must be performed based on adequate methods and clear and consistent criteria to ensure that an overall safety level expected for the installation is achieved. It is worth emphasizing the importance of the terminology adopted and the understanding of concepts definitions used in a safety classification process. The objective of this paper is to present a review of the application of "safety related item" and "item important to safety" terminology, evaluating definitions and interpretations given by the International Atomic Energy Agency (IAEA), the United States Nuclear Regulatory Commission (U.S.NRC) and the National Nuclear Energy Commission (CNEN) of Brazil. In this work, this subject is raised to demonstrate that divergent definitions and misinterpretations of concepts may result in inconsistencies in SSCs safety classification.

Keywords: **Safety Related, Important to Safety, Nuclear Safety Classification.**

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1. INTRODUCTION

Potential hazards of radioactive releases may have consequences for the population and the environment and may affect their safety beyond the territorial limits of nations carrying out activities involving nuclear and radioactive materials While the adoption of proper regulation and the safe use of nuclear energy and its applications are responsibilities assumed by each nation individually, joint efforts and international collaborations have provided the means to improve nuclear safety and radiological protection, through the continuous increment and revision of analyses, methodologies and criteria.

National regulations associated with international recommendations and guidelines must provide objective and clear content on practices, requirements and analyzes necessary for demonstrating the safety of nuclear facilities. Therefore, the terminology and definitions used in this context must be consistent and promote an adequate understanding of the concepts and their applications.

However, in the safety classification of nuclear structures, systems and components (SSCs), the terminology referring to "Safety Related Item" and "Item Important to Safety" may generate inconsistencies in certain applications, as it has different definitions and correlations, depending on regulatory guidance evaluated. Thus, a comparative analysis of the use of this terminology in CNEN standards and IAEA documents will be carried out. Taking into account that the regulation and standardization of the nuclear area in Brazil derive essentially from those used in the USA, this work will also expand its comparative analysis to the normative framework of the U.S.NRC.

It is important to emphasize that a clear and consistent definition of terminologies and their understanding in the safety classification process of SSCs is fundamental to establish an adequate set of design requirements (proportionate to SSC importance to installation safety and in accordance with quality standards), ensuring an acceptable risk level under current regulations, and contributing to a proper distribution of project financial resources. In this sense, conservative decisions can lead to the use of equipment with a more rigorous safety classification than necessary, which may have a high impact on project physical and financial schedule, compromising its feasibility and deployment.

According to [1], in which a comparison of acquisition costs is presented, it can be observed that, for example, "Safety Related" valves (Gate Valve 3" SS) may cost 50 times more than similar "Non-safety Related" ones. Thus, it can be concluded that using "Non-safety Related" SSCs instead of "Safety Related", considering a classification scheme with consistent criteria and clearly defined concepts, may reduce purchasing cost of nuclear facilities items by millions of dollars. Table 1 shows a comparison among acquisition costs of "Safety Related", "Dedicated" and "Non-safety related" items.

Table 1: *Nuclear power plants items procurement cost comparison* [1].

Item	Safety-Related	Dedicated[2]	Nonsafety-related
Relief Valve 1 ½" X2"	$11,000	$4400	$3600
Operator (valve)	$30,000	$15,000	$9900
Gate Valve 3" SS	$7000	$800	$130
Butterfly Valve 36"	$36,000	$13000	$9500
Operator (large bore)	$70,000	$23,000	$18,000
Check valve	$3200	$1000	$320
Ball Valve 2"	$3500	$1000	$560
Gate Valve 6"	$15,000	$2600	$600
Butterfly valve 20"	$30,000	$7000	$5000

It is important to emphasize that Table 1 was only used to present a cost comparison between "Safety Related" and "Non Safety Related" items, since 10 CFR 50.69 [1] "*addresses the risk-informed embodied in this rule in order to establish an alternative scope of SSC subject to special treatment requirements*" considering "*a regulatory approach that maintains safety and is consistent with the NRC's efforts to risk-inform its regulatory activities*".

Thus, the approach proposed in 10 CFR 50.69 [1] consists of using the risk-informed categorization methodology and special treatment of SSC, which is not the objective of the current paper, which addresses inconsistencies in the use of the terms "Safety Related" and "Important to Safety" in the safety classification process, in a deterministic analysis.

2. MATERIALS AND METHODS

2.1. "Safety Related Item" and "Item Important to Safety" according to IAEA terminology

According to the IAEA Safety Glossary [2], "safety related items" are a subgroup of "items important to safety", considering the definitions presented below and the categorization scheme shown in Figure 1.

> *"**Safety related item**. An item important to safety that is not part of a safety system."*[1]

> *"**Item important to safety**. An item that is part of a safety group and/or whose malfunction or failure could lead to radiation exposure of the site personnel or members of the public.*
> *Items important to safety include:*
> *- Those structures, systems and components whose malfunction or failure could lead to undue radiation exposure of site personnel or members of the public;*
> *- Those structures, systems and components that prevent anticipated operational occurrences from leading to accident conditions*
> *- Safety features (for design extension conditions);*
> *- Those features that are provided to mitigate the consequences of malfunction or failure of structures, systems and components."*

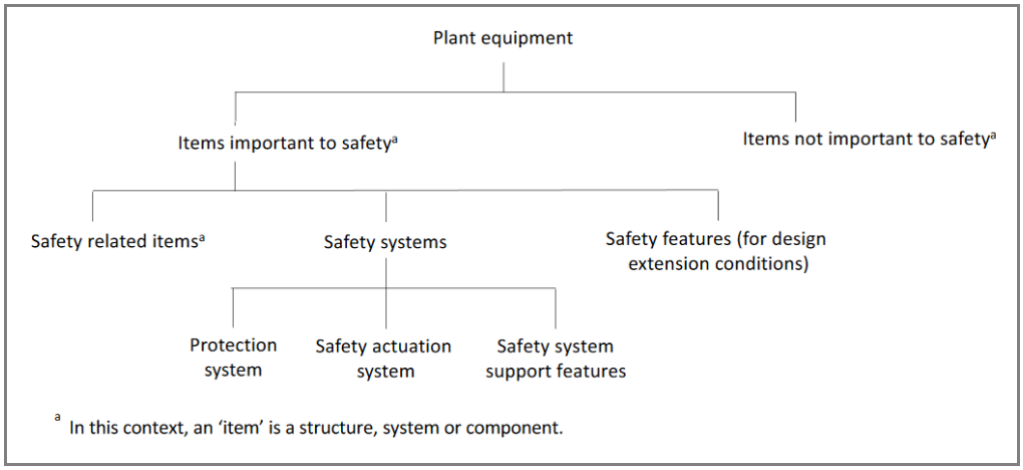


Figure 1: *Nuclear safety categorization scheme according to IAEA* [2].

[1] "***Safety system***. *A system important to safety, provided to ensure the safe shutdown of the reactor or the residual heat removal from the reactor core, or to limit the consequences of anticipated operational occurrences and design basis accidents*." [2]

2.2. "Safety Related Item" and "Item Important to Safety" according to CNEN terminology

Regarding CNEN standards, such terms may vary depending on the standard used. The CNEN glossary [3] contains a definition for "Item Important to Safety" which, except for minor variations[2], is maintained in most of its standards:

> *"**Item important to safety** - Item that includes or is included in:*
> *a) structures, systems and components whose failure or malfunction may result in undue radiation exposure to facility personnel or members of the public;*
> *b) structures, systems and components that prevent anticipated operational occurrences from resulting in accident conditions;*
> *c) features necessary to mitigate the consequences of failure or malfunction of structures, systems and components mentioned in "a" and "b" above."*

However, standards CNEN 1.11 [4], CNEN 1.08 [5] and CNEN 1.09 [6] contain a definition for "Item Important to Safety" that differs from the definition presented in other CNEN standards, that is:

> *"**Item Important to Safety** – facility, system, structure, component, or nuclear power plant component, whose failure may lead to exposure to radiation or release of radioactivity at levels above the limits established in the relevant CNEN standards."*

The CNEN glossary [3] does not contain the definition of the term "Safety Related Item", but in its standards, except for CNEN NE 1.11 [4][3], the following definition is presented:

> *"**Safety Related Item***
>
> *Important to Safety Item does not contain radioactive material."*

[2] Some CNEN standards show the c) item as:
"*c) devices or characteristics necessary to mitigate the consequences of failure or malfunction of structures, systems and components important to safety."*

[3] The CNEN NE 1.11 [4] standard shown the following definition:
*"**Safety Related Item***
Facility, system, structure, component or equipment containing or not radioactive material, whose failure may affect its safety."

2.3. "Safety-Related" and "Important to Safety" according to U.S.NRC terminology

Concerning the U.S.NRC, the definition of "Safety-related" SSCs presented in 10 CFR 50.2 [7] is:

> *"**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:*
> *(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 applicable guideline exposures set forth in § 50.34(a)(1) or §100.11 of this chapter, as applicable."*

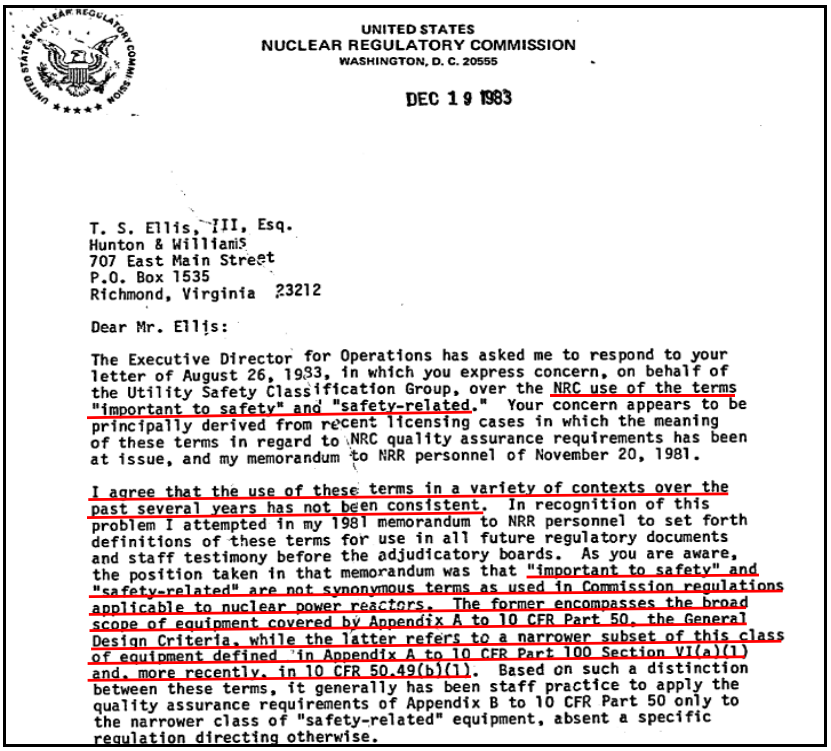
Although the term "important to safety" is not included in the definitions of 10 CFR 50.2 [7], the following interpretation is given in the introduction of Appendix A of 10 CFR 50 [8]:

> *"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**."*

10 CFR 50 Appendix A [8] contains the General Design Criteria (GDC) that set out the minimum requirements for the design criteria of Light Water Reactors (LWR) and which are also generally applicable to other types of nuclear plants.

2.4. Identification of Inconsistencies in the terminology adopted by the U.S.NRC

The term "Safety Related" is not used in Appendix A of 10 CFR 50 [8], raising the hypothesis that, in this Appendix A, the term "Important to Safety" has been used as equivalent to "Safety Related", as shown, in Figure 2. This figure shows an excerpt from U.S.NRC Generic Letter 1984-001 [9], which is a response to an applicant, confirming inconsistency in the use of "Safety Related" and "Important to Safety" and explaining that these terms are not synonymous. Moreover, the concept of "Safety Related" should be understood as a subgroup of "Important to Safety".



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DEC 19 1983

T. S. Ellis, III, Esq.
Hunton & Williams
707 East Main Street
P.O. Box 1535
Richmond, Virginia 23212

Dear Mr. Ellis:

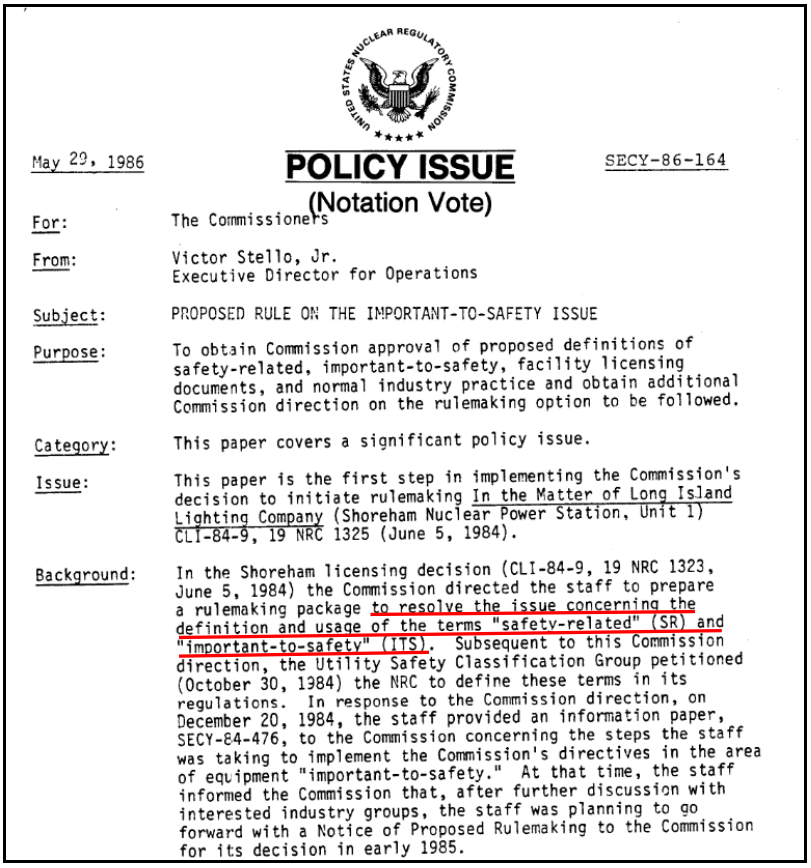
The Executive Director for Operations has asked me to respond to your letter of August 26, 1983, in which you express concern, on behalf of the Utility Safety Classification Group, over the NRC use of the terms "important to safety" and "safety-related." Your concern appears to be principally derived from recent licensing cases in which the meaning of these terms in regard to NRC quality assurance requirements has been at issue, and my memorandum to NRR personnel of November 20, 1981.

I agree that the use of these terms in a variety of contexts over the past several years has not been consistent. In recognition of this problem I attempted in my 1981 memorandum to NRR personnel to set forth definitions of these terms for use in all future regulatory documents and staff testimony before the adjudicatory boards. As you are aware, the position taken in that memorandum was that "important to safety" and "safety-related" are not synonymous terms as used in Commission regulations applicable to nuclear power reactors. The former encompasses the broad scope of equipment covered by Appendix A to 10 CFR Part 50, the General Design Criteria, while the latter refers to a narrower subset of this class of equipment defined in Appendix A to 10 CFR Part 100 Section VI(a)(1) and, more recently, in 10 CFR 50.49(b)(1). Based on such a distinction between these terms, it generally has been staff practice to apply the quality assurance requirements of Appendix B to 10 CFR Part 50 only to the narrower class of "safety-related" equipment, absent a specific regulation directing otherwise.

Figure 2: *Excerpt from U.S.NRC Generic Letter 1984-001* [9].

In a paper published in the proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP) [10], the author also concluded that the terms “Safety Related” and “Important to Safety” are not synonymous. In this paper, the author interpreted that “important to safety SSCs” are those “safety related” and “non-safety related SSCs” whose function is to protect the health and safety of the public. “Safety related SSCs” are those “important to safety SSCs” that perform one of the three important safety functions.

Thus, the lack of a clear definition of the correlation between the terms "Important to Safety" and "Safety Related" generated a series of communications between license applicants and the U.S.NRC staff. As exemplified in Figure 3, difficulties and inconsistencies were pointed out and necessary clarifications were requested to establish proper distinction between these terms.



May 29, 1986

POLICY ISSUE
(Notation Vote)

SECY-86-164

For: The Commissioners

From: Victor Stello, Jr.
Executive Director for Operations

Subject: PROPOSED RULE ON THE IMPORTANT-TO-SAFETY ISSUE

Purpose: To obtain Commission approval of proposed definitions of safety-related, important-to-safety, facility licensing documents, and normal industry practice and obtain additional Commission direction on the rulemaking option to be followed.

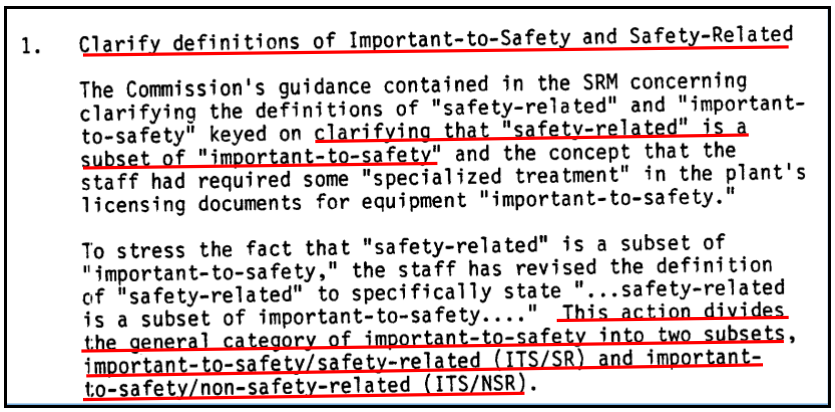
Category: This paper covers a significant policy issue.

Issue: This paper is the first step in implementing the Commission's decision to initiate rulemaking In the Matter of Long Island Lighting Company (Shoreham Nuclear Power Station, Unit 1) CLI-84-9, 19 NRC 1325 (June 5, 1984).

Background: In the Shoreham licensing decision (CLI-84-9, 19 NRC 1323, June 5, 1984) the Commission directed the staff to prepare a rulemaking package to resolve the issue concerning the definition and usage of the terms "safety-related" (SR) and "important-to-safety" (ITS). Subsequent to this Commission direction, the Utility Safety Classification Group petitioned (October 30, 1984) the NRC to define these terms in its regulations. In response to the Commission direction, on December 20, 1984, the staff provided an information paper, SECY-84-476, to the Commission concerning the steps the staff was taking to implement the Commission's directives in the area of equipment "important-to-safety." At that time, the staff informed the Commission that, after further discussion with interested industry groups, the staff was planning to go forward with a Notice of Proposed Rulemaking to the Commission for its decision in early 1985.

Figure 3: *Excerpt from SECY-86-164 (page 1)* [11].

In SECY-86-164 [11], the category "Important to Safety" was divided into "Safety Related" and "Non-safety Related", as shown in Figure 4 and Figure 5.

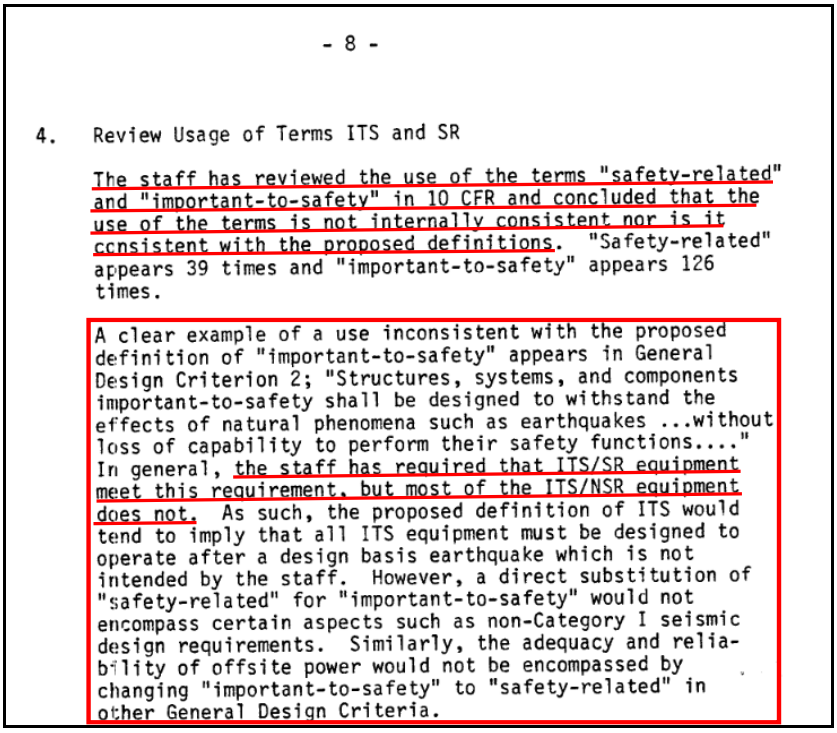


1. Clarify definitions of Important-to-Safety and Safety-Related

The Commission's guidance contained in the SRM concerning clarifying the definitions of "safety-related" and "important-to-safety" keyed on clarifying that "safety-related" is a subset of "important-to-safety" and the concept that the staff had required some "specialized treatment" in the plant's licensing documents for equipment "important-to-safety."

To stress the fact that "safety-related" is a subset of "important-to-safety," the staff has revised the definition of "safety-related" to specifically state "...safety-related is a subset of important-to-safety...." This action divides the general category of important-to-safety into two subsets, important-to-safety/safety-related (ITS/SR) and important-to-safety/non-safety-related (ITS/NSR).

Figure 4: *Excerpt from SECY-86-164 (page 3)* [11].



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4. Review Usage of Terms ITS and SR

The staff has reviewed the use of the terms "safety-related" and "important-to-safety" in 10 CFR and concluded that the use of the terms is not internally consistent nor is it consistent with the proposed definitions. "Safety-related" appears 39 times and "important-to-safety" appears 126 times.

A clear example of a use inconsistent with the proposed definition of "important-to-safety" appears in General Design Criterion 2; "Structures, systems, and components important-to-safety shall be designed to withstand the effects of natural phenomena such as earthquakes ...without loss of capability to perform their safety functions...." In general, the staff has required that ITS/SR equipment meet this requirement, but most of the ITS/NSR equipment does not. As such, the proposed definition of ITS would tend to imply that all ITS equipment must be designed to operate after a design basis earthquake which is not intended by the staff. However, a direct substitution of "safety-related" for "important-to-safety" would not encompass certain aspects such as non-Category I seismic design requirements. Similarly, the adequacy and reliability of offsite power would not be encompassed by changing "important-to-safety" to "safety-related" in other General Design Criteria.

Figure 5: *Excerpt from SECY-86-164 (page 8)* [11].

However, the term “Non-safety Related” (NSR) was not clearly defined in the U.S.NRC regulations, as evidenced in Table 2 and Table 3. In these table, an equivalence of terms is presented, which does not include a designation for SSCs “Important to Safety” that are not part of the “Safety Related” category. In [12], it was suggested that the “Non-safety Related” category defined by the IEEE should be equivalent to and limited to the IAEA “Not Important to Safety” category, and both IEEE and U.S.NRC does not have a name for items that are important to safety, but are not classified as “Safety Related” (also shown in [13]).

Table 2: *Correlation among safety classification terms of I&C functions and systems presented in* [12].

Organizations or Countries		Safety Classification of I&C Functions and Systems in nuclear plants				
Main international standard organizations						
IAEA NS-G-1.3		Systems Important to Safety				Systems not important to safety
		Safety	Safety-related			
IAEA SSG-30	Function	Safety category 1	Safety category 2	Safety category 3		
	System	Safety class 1	Safety class 2	Safety class 3		
IEC 61226		Systems Important to Safety				Non-classified
	I&C function	Category A	Category B	Category C		
	I&C system	Class 1	Class 2	Class 3		
IEEE		Systems Important to Safety				Non-safety-related
		Safety-related	[5]			
EUR[6]	Safety level of functions / I&C systems	F1A	F1B	F2		NS (non-safety)
MDEP member states						
Canada		Category 1	Category 2	Category 3		Category 4
France		F1A	F1B	F2		Non-classified
Finland		Class 2	Class 3	EYT/ STUK		EYT (classified non-nuclear)
UK		Class 1	Class 2	Class 3		Non-classified
United States		Systems Important to Safety				(not specified)
		Safety-Related	[5]			
India		IA	IB	IC		NINS
Japan		PS1/MS1		PS2/MS2	PS3/MS3	Non-nuclear safety
Korea		IC-1		IC-2		IC-3
Russia		Class 2	Class 3			Class 4 (Systems not important to safety)
Others nuclear states						
Switzerland		1	2	3		Non-classified
Germany	I&C function	Category 1	Category 2	Category 3		Non-classified
	I&C equipment	E1		E2		

[2] IEC 61226 (3rd edition) is currently under revision and should be read in association with the IAEA guides and IEC 61513.
[3] previously IAEA NS-R-1 5.1
[4] Such a table gives only a qualitative mapping between the various classification systems.
[5] IEEE/NRC does not have a name for items that are important to safety, but not classed as 'safety-related'.
[6] EUR is being revised to follow the SSG-30 principles.

Table 3: *Correlation among safety terminologies presented in* [13].

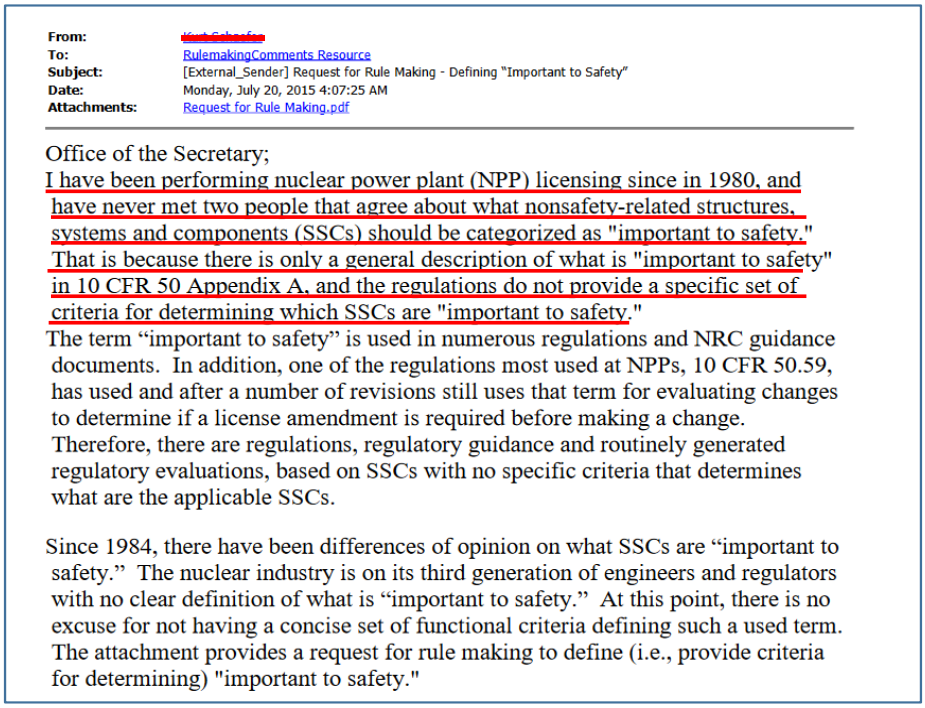
National or international standard	Classification of the importance to safety				
IAEA NS-R-1	Systems Important to Safety				Systems Not Important to Safety
	Safety		Safety Related		
IEC 61226 Functions Systems	Systems Important to Safety				Unclassified
	Cat. A Class 1	Cat. B Class 2	Category C Class 3		
Canada	Category 1	Category 2	Category 3		Category 4
France N4	1E	2E	SH	Important to safety	Systems Not Important to Safety
European Utility Requirements	F1A (Auto)	F1B (Auto and Man.)	F2		Unclassified
Japan	PS1/MS1*	PS2/MS2	PS3/MS3		Non-nuclear Safety
Rep. of Korea	IC-1	IC-2			IC-3
Russian Federation	Class 2	Class 3			Class 4 (Systems Not Important to Safety)
Switzerland	Category A	Category B	Category C		Not Important to Safety
UK Functions Systems	Systems Important to Safety				Unclassified
	Cat. A Class 1	Cat. B Class 2	Category C Class 3		
USA and IEEE	Systems Important to Safety				Non-nuclear Safety
	Safety Related, Safety or Class 1E	(No name assigned)			

Additionally, in Table 4, a comparison among the terminologies used by the Canadian Nuclear Safety Commission (CNSC), IAEA and U.S.NRC is presented. It is observed that the classification “Non-safety Related” used by the U.S.NRC permeates both SSCs “Important to Safety” and SSCs "Not Important to Safety", evidencing the understanding that SSCs "Non-safety Related" would not be limited to being fully included in the category "Not Important to Safety", and may also permeate the class "Important to Safety", depending on its application.

Table 4: *Correlation among CNSC, IAEA, and U.S.NRC safety terminologies* [14].

	All Structures, Systems and Components			
CNSC	Important to Safety [1]			Not Important to Safety
	Important to Safety [2]		Not Important to Safety	
	Special Safety System	EHRS	Not Safety System	
	Safety System			
	Safety-Related			Not Safety-Related
IAEA	Important to Safety			Not Important to Safety
	Safety System		Safety-Related	
NRC	Important to Safety			Not Important to Safety
	Safety-Related		Not Safety-Related	
	Safety System		Not Safety System	

However, in [15], license applicants expressed their difficulties to determine which "Non-safety Related" SSCs should be categorized as "Important to Safety" (as shown in Figure 6), contributing to the conclusion that "Non-safety Related" SSCs are not limited to the "Not Important to Safety" category, but may be classified as "Important to Safety"[4].



From: [redacted]
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."

Figure 6: *Excerpt from an email written by a license applicant to the U.S.NRC staff* [15].

The definitions of "Safety Related" and "Non-safety Related" terms, as well as their correlations with other references used in the U.S.NRC regulatory framework (Table 5), can be found in [16]:

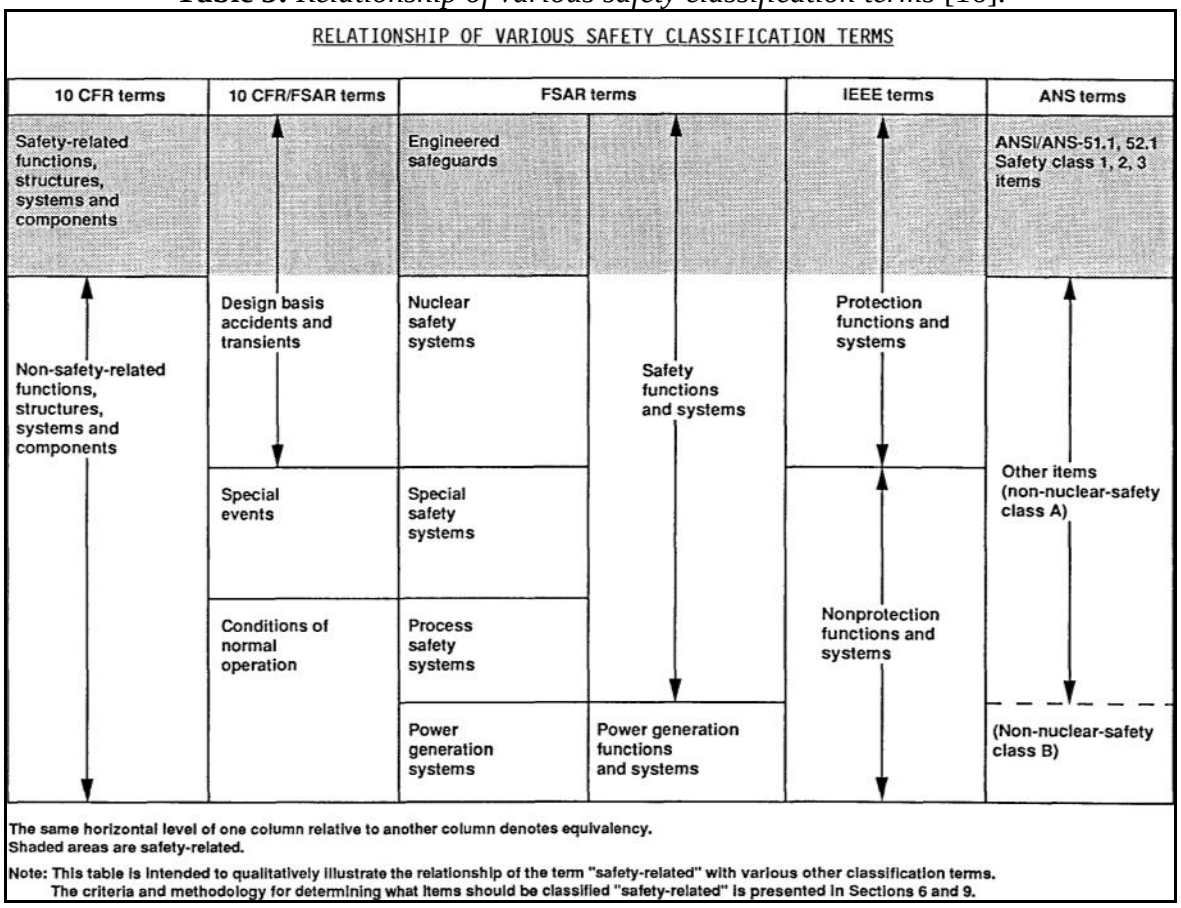
> *"6.1.1 General Criteria*
>
> ***Safety-related*** *structures, systems, components, or parts thereof are those relied upon during or following design basis accidents and transients to assure:*
>
> - *the integrity of the reactor coolant pressure boundary (RCPB) within normal reactor coolant makeup capability,*

[4] Additionally, the reference [15] annex has the following excerpt:
"***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"."

- *the capability to shut down the reactor within accident limits and maintain it in a safe shutdown condition, or*
- *the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable (i.e., greater than 10%) to the guideline exposure of 10 CFR 100.11.*

Items that are not relied upon to achieve these basic safety-related functions and whose failure would not prevent the accomplishment of these basic safety-related functions are NSR."

Table 5: *Relationship of various safety classification terms* [16].



3. RESULTS AND DISCUSSION

The definitions for "Important to Safety" presented by the IAEA, U.S.NRC and CNEN are equivalent. On the other hand, IAEA definition for "Safety Related" is equivalent to U.S.NRC

definition for “Non-safety Related”, which can cause confusion and misunderstanding, as they are denominations that configure opposition. “Safety Related” definition proposed by the U.S.NRC is equivalent to the IAEA definition for “Safety Systems”. It should be noted that "Non-safety Related" SSCs permeate both "Important to Safety" and "Not Important to Safety" categories, according to the U.S.NRC definitions. In this sense, it is worth discussing which “Non-safety Related” SSCs should be categorized as “Important to Safety”. There is not a direct equivalence of CNEN definition for “Safety Related Item” with those presented by the IAEA and U.S.NRC, nor the correlation of this definition with other terms used by these organizations. In Table 6, a correlation among IAEA, U.S.NRC and CNEN terminologies is proposed, according to the references used in the elaboration of this work.

Table 6: *Correlation among IAEA, U.S.NRC and CNEN terminologies.*

<table>
<tr><td rowspan="2">IAEA</td><td colspan="2">Important to Safety</td><td rowspan="2">Not Important to Safety</td></tr>
<tr><td>Safety</td><td>Safety Related</td></tr>
<tr><td rowspan="2">U.S.NRC</td><td colspan="2">Important to Safety</td><td>Not Important to Safety</td></tr>
<tr><td>Safety Related</td><td colspan="2">Non-safety Related</td></tr>
<tr><td rowspan="2">CNEN</td><td colspan="2">Important to Safety</td><td>Not Important to Safety</td></tr>
<tr><td colspan="3">[a]</td></tr>
</table>

[a] CNEN definition for “Safety Related Item” does not allow an adequate scope to be attributed to this classification and, consequently, it is not possible to make a clear proposition of its correlation with analogous terms defined by IAEA and U.S.NRC. In addition, the definition for “Non-safety Related Item” is not used in CNEN standards.

Regarding the proposition presented in Table 6, it can be noted that, for CNEN, the terminology “Item Important to Safety” is used in a clear contrast to SSCs that do not depend on nuclear licensing, as established in item 6.1.2 of CNEN NE 1.04 Standard [17]. Thus, particularities and possible distinctions between the categories “Safety Related” and “Non-safety Related” (the latter not defined in CNEN standards) are not used, evidenced, or even established.

Concerning the U.S.NRC, there is an additional discussion (as shown earlier in Figure 6), which is not within the scope of this paper, on the need of an objective definition to establish which “Non-safety Related” SSC should be categorized as “Important to Safety”.

4. CONCLUSION

The correlation between “Safety Related Item” and “Item Important to Safety” terminologies is not straightforward in the IAEA safety guides, U.S.NRC codes and regulatory guides and CNEN standards. Within the regulatory framework of the U.S.NRC, the definition, correlation and understanding of these terminologies may present inconsistencies, especially when “Non-safety Related” definition is considered. Therefore, it may be concluded that acquisition of "Non-safety Related" items that meet all safety and regulatory requirements may exempt the use of "Safety Related" items, avoiding additional costs to the project and undue impact on its schedule. Finally, a clear and consistent terminology and its correct understanding in safety classification process allows not only to assign appropriate design requirements to nuclear facility items, but also to perform an adequate allocation of financial resources. The considerations addressed in this work may contribute to the assessment of the economic viability of the Brazilian nuclear industry, aiming to preserve the level of safety of installations, workers, the public and the environment. Furthermore, CNEN shall have the possibility to reassess definitions and requirements adopted in its standards, in relation to the use of the terms “Item Important to Safety” and “Safety Related Item”.

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