Terminology Alignment for NEI 96-07, Appendix D and NEI 16-16

NRC question: How are various terms in NEI 96-07, Appendix D and NEI 16-16 being used and defined, so that the documents can be used together to perform a 50.59 evaluation? How are NEI 96-07, Appendix D and NEI 16-16 intended to be used together if there is distinctive terminology in each document?

Table 1 below is an example (not all inclusive) of the different terminology used in each document to address likelihood considerations for CCF.

Table 1 – Likelihood Consideration

	NEI 16-16 (May 2017 version)	***NEI 96-07 Appendix D (May 2017 version)***	***NEI 01-01***	***RIS 2017-XX***
1	**CCF Not Credible** *(page 5)* The likelihood of a CCF caused by an I&C failure source is no greater than the likelihood of a CCF caused by other failure sources that are not considered in a deterministic safety analysis described in the FSAR ---------- Some Factors to Consider: - Preventive Measures can be credited to make this finding - CCF requires no further consideration	**CCF Not Credible** *(page D-24)* The likelihood of a CCF caused by an I&C failure source is not greater than the likelihood of a CCF caused by other failure sources that are not considered in the UFSAR ---------- Some Factors to Consider: - Software Development - Digital Increases Reliability - CCF Susceptibility Analysis - Intended Benefits - Design Attributes/Features		
2		**CCF Credible** *(page D-24)* The likelihood of a CCF caused by a I&C failure source is greater than or equal to the likelihood of a CCF caused by other failure sources that are considered in the UFSAR.		
3	**CCF Credible but limited** *(page 17)* Use of limiting measures to limit credible CCF, but it does not reduce the likelihood. ---------- Some Factors to Consider: - CCF requires further consideration - CCF Susceptibility Analysis - Design Attributes			

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4	**CCF Credible & significant likelihood** **Design Basis** (*page 9*) Presumptive: The likelihood is the same as or greater than a single random hardware failures, which are expected in plant lifetime and result in AOOs. ---------- *Limiting Measures* can be used to limit number of affected SSCs Safety related mitigating systems can be used to address CCF ---------- Some Factors to Consider: - Use design basis (conservative) methods - Bounding is based on previously analyzed AOO/PA	**CCF Credible - But Not Attributable** *(page D-27, D-35)* The likelihood of CCF caused by an I&C failure source is greater than or equal to the likelihood of a CCF caused by other failure sources that are considered in the UFSAR Attributable Determination The component is not an initiator of an accident or malfunction ---------- Some Factors to Consider: - CCF Susceptibility Analysis - FMEA	**CCF Likelihood** (*page 4-16*) The definition of likelihood of malfunction refers to NEI 96-07, Section 4.3.2. Likelihood of potential failures is based on a broad, usually qualitative, assessment of the dependability of the digital equipment. Need to determine if the failure due to software are as likely as other potential failures addressed in the UFSAR. ---------- Some Factors to consider: - Complexity of the system can create uncertainty with respect to defining the likelihood of software-related failure of the device - The D3 analysis can show that the likelihood of a software CCF is below a single active hardware failure	**Likelihood of a failure** (*page 3*) The likelihood is normally demonstrated qualitatively, particularly for systems that rely on software. ---------- Some Factors to consider: - Methods are needed to evaluate digital system likelihood of failure (e.g., based on reliability and dependability of the modified digital components). For digital systems, there may be no well-established, accepted quantitative methods that can be used to estimate reliability or likelihood of failure. Therefore, for digital systems, reasonable assurance of low likelihood of failure may be derived from a qualitative assessment. - Design attributes of the proposed modification should prevent or limit failures from occurring or mitigate the consequences of such possible failures.
5	**CCF Credible & Low likelihood** **Beyond Design Basis** *(page 5)* The likelihood of a CCF caused by an I&C failure source is reduced such that it is no more likely than a CCF resulting from other failure sources that are not considered in the deterministic analyses described in the FSAR. ---------- *Likelihood Reduction Measures* can be used to consider CCF beyond design basis Safety or non-safety related mitigating systems can be used to address CCF ---------- Some Factors to Consider: - Use best estimate methods - Bounding is based on previously analyzed AOO/PA	**CCF Credible & Attributable - But Negligible** *(page D-29, D-37)* The likelihood of CCF caused by an I&C failure source is greater than or equal to the likelihood of a CCF caused by other failure sources that are considered in the UFSAR Negligible Determination The magnitude portion is so small or the uncertainties in determining whether a change in frequency has occurred are such that it cannot be reasonably concluded the frequency has actually changed (i.e., no clear trend). ---------- Some Factors to Consider: - Software Development - Digital Increases Reliability - CCF Susceptibility Analysis - Intended Benefits - Design Attributes/Features	**Low CCF likelihood** (*page 3-5, 4-20*) For digital systems, the likelihood of software-related failures is reduced by controlling the design, implementation, operation and maintenance processes. Compliance with industry standards and regulatory requirements couple with tests, evaluations, and reviews assure a very low likelihood. Sufficiently low means much lower than the likelihood of failures that are considered in the UFSAR and comparable to other CCF that are not considered in the UFSAR. ---------- Some Factors to consider: - Assessment of the likelihood of failure - System-level effects and the impact on the plant - Options available to mitigate - Engineering evaluations to determine the risk of the failure and then establish if the likelihood of failure is sufficiently low so risk is negligible	**Low likelihood** (*page 1, Attachment page 3*) Use of qualitative assessment to provide reasonable assurance of a low likelihood of failure. Need to establish that there is reasonable assurance that potential failures are not as likely as those described in the UFSAR. ---------- Some Factors to consider: - Qualitative assessment, quality of the design process, and operating history are used for reasonable assurance of low likelihood - Documentation of qualitative assessment is key - Reliance on high quality development or design processes alone may not always serve as a sufficient qualitative justification - The ability to provide reasonable assurance that the digital modification will exhibit a low likelihood of failure is a key element of 10 CFR 50.59 evaluations.