NEI 16-16 [Draft 2]

NRC Staff Comments

NEI Discussion Points for Telecon 8-10-2017

The staff has reviewed Nuclear Energy Institute (NEI) 16-16 "Guidance for Addressing Digital Common Cause Failure [Draft 2]" [Agencywide Document Access and Management System (ADAMS) Accession Number <u>ML17135A253</u>] which was submitted on May 12, 2017. The enclosed comments are provided solely on the contents of the as-written document.

Before engaging and moving forward on resolving the attached comments, however, the staff requests resolution of the following:

- The NRC needs to understand the relationship between NEI 96-07, Appendix D and NEI 16-16. For example
 - NEI 96-07, Appendix D uses terms such as CCF credible but not attributable and CCF credible and attributable, but negligible in the Evaluation Section Guidance. These terms are not considered, nor defined, in NEI 16-16 even though Appendix D states in Section 1.1 that NEI 16-16 can be used as a technical guidance for Appendix D. NEI 16-16 only provides guidance to evaluate the likelihood of a credible CCF based on applying defensive measures, and thus determine if a CCF likelihood is significantly reduced, and whether it is design-basis or beyond design-basis.

<u>NEI Discussion Point</u>: NEI views the "attributable" and "negligible" terms as used for licensing purposes, not technical. NEI 16-16 is only evaluating the likelihood of a CCF to determine 1) is it credible or not, and 2) if it's credible, is it in the design basis or beyond the design basis? There is no need to discern attributable and/or negligible in these two determinations.

• NEI 96-07, Appendix D provides guidance to use qualitative assessments to reduce the likelihood of the CCF. However, NEI 16-16 does not consider qualitative assessments in its discussion to address credible CCF, reducing its likelihood. Thus, NEI 16-16 does not provide guidance to use qualitative assessment.

<u>NEI Discussion Point</u>: At face value, NEI understands this comment to say that NEI 16-16 does not consider qualitative assessments, when in fact the CCF susceptibility analysis described in NEI 16-16 is nothing but a qualitative assessment. In addition, a qualitative assessment cannot by itself "reduce the likelihood of the CCF," which is only a function of the technical attributes of the system.

2. Will guidance and terminology in RIS 2017-XX, "Clarification of the Staff Endorsement of the Use of EPRI/NEI Joint Task Force Report, 'Guideline on Licensing Digital Upgrades: EPRI TR-102348,

Revision 1, NEI 01-01: A Revision of EPRI TR-102348 to Reflect Changes to the 10 CFR 50.59 Rule'" be incorporated into NEI 16-16? If so, what is the process and timing for incorporation?

<u>NEI Discussion Point</u>: NEI is open to discussing the coordination of guidance, terminology and underlying technical bases from the RIS.

The staff recommends a public meeting to better understand the relationship between NEI 96-07, Appendix D and NEI 16-16. After clarity has been reached on the relationship between the two documents, the attached comments also need to be addressed.

Comments from NEI 16-16 [Draft 1] and additional comments identified during the staff's review of Draft 2 have been merged and are presented in the table below.

These comments are being provided for the purpose of early engagement on identified concerns and to support future meetings on the linkage and similar terminology between NEI 16-16 and 96-07, Appendix D and meetings to resolve NEI 16-16 specific comments.

No.	Text	NRC Comments	Proposed Action	NEI Discussion Points on
	Section		(i.e., addition, deletion or	Comment
			modification)	
1.	General	This guidance proposes using the results	NRC and NEI should continue	NEI agrees.
		from the coping analysis in a comparison	discussions to determine if results	
		to analyses described in the FSAR.	from an FSAR can be compared to	
			results obtained using best estimate	
			methods during upcoming	
			interactions.	
2.	General	At what level (at the system level or at	NRC and NEI should discuss and	NEI agrees that plant level
		the plant level) can results be evaluated	resolve this difference during	versus system level results
		and compared to analysis in the FSAR?	upcoming interactions.	should be discussed. The
				presentation by Pete LeBlond
				at the 8/1/17 App. D meeting
				provides a basis for
				evaluating malfunction
				results at the plant level.
3.	General	Follow-up to comments 3 and 4 from	Clarify how the qualitative	NEI would like to discuss this
		Draft 1.	assessments proposed in the	question to gain a better
		What methodology or deterministic	document can address deterministic	understanding of what type
		criteria are used for determining the	licensing criteria.	clarification the NRC is
		likelihood that a CCF can occur?		seeking. There are two
				comments in this comment.
				The question in the cell to
				the left is technical and is
				answered by NEI 16-16 via
				CCF susceptibility analysis.
				The comment in the middle
				cell is about licensing criteria,
				but not sure which specific

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			modification)	
				criteria
4.	General	During NRC-NEI public meetings, NEI	To facilitate this review:	
		representatives have stated that some	1. If any measures have already	There are several examples
		defensive measures in NEI 16-16 have	been endorsed, please cite the	of where the NRC staff has
		previously been endorsed by the NRC.	endorsed guidance. Please do	approved highly integrated
		No citations to NRC endorsed guidance	not rephrase or change	digital I&C designs, where
		was found in the document. Citations	endorsed content if it is	design techniques and design
		would facilitate and expedite review of	included in this document.	attributes (aka Defensive
		NEI 16-16.		Measures) were used by the
				designers. These are
				available to the NRC staff,
				and NEI has no intention of
				citing them in NEI 16-16, as
				much of this material is
				proprietary.
				During the public meetings,
				examples such as the Watts
				Bar Unit 2 SER, and some
				new plant Design
				Certifications were used as
				an example.
				NEI 16-16 is not a copied and
				pasted list of endorsed
				defensive measures. But
				neither are they made of

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				whole cloth. NEI would like
				to agreement on the
				defensive measures via
				discussions and workshops
				using the RIS as a backdrop.
5.	General	The document claims that preventive	Justify why the defensive measures	The NEI position is that
		measures, when applied as a set, provide	proposed in Appendix A eliminate CCF	reasonable assurance is what
		reasonable assurance that a CCF from a	concerns (i.e., lead to "CCF not	is required, not absolute
		specific I&C failure source is not credible.	credible") from further consideration.	assurance. This concept has
		What is the technical basis for this claim?		been discussed and is
		Appendix A provides preventive		addressed in the current
		measures for various sources of common		version of the RIS 2017-xx.
		cause failures but does not provide the		
		technical basis that leads one to conclude		NEI 16-16 provides methods
		that a CCF is "not credible."		and design techniques and
				practices to support the
				reasonable assurance
				approach. For example, the
				technical bases for many of
				the design attributes in
				Section 3.2.1 of the RIS
				should be the same technical
				bases staff is seeking for NEI
				16-16.
6.	1.1	Comment 1 from Draft 1. The staff did	NRC and NEI should discuss and	NEI requests that the NRC
		not locate content in Draft 2 that resolves	resolve this difference during	staff please provide the
		this comment.	upcoming interactions.	formal NRC position and

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		This section, as well as elsewhere in the		technical basis for the NRC
		document, considers the occurrence of		definition of CCF.
		CCF, which does not fully align with the		
		NRC definition and interpretation of CCF.		This will allow a better
		During the December 2016 meeting NEI		understanding of this
		and NRC, staff identified the differences		question.
		on definition of CCF. The meeting		
		summary report summarizes this as: "The		
		NRC staff uses the term to identify an		
		error in software regardless of the		
		consequences of that error. NEI uses the		
		term to identify an error in software that		
		has been triggered to affect multiple		
		instances of the software, and it then		
		focuses attention on the plant effect		
		rather than on the software error itself."		
7.	1.1	Comment 2 from Draft 1. The staff did	Since 100% testing and diversity	NEI agrees that diversity and
		not locate content in Draft 2 that resolves	remain viable options for eliminating	100% testing are viable
		this comment.	concerns related to further	options. They are included in
		This section states "there are only two	consideration of CCF, consider	NEI 16-16 Appendix A,
		design attributes that may be credited to	mentioning them in the document.	measures A33-P4, A35-P1,
		eliminate the need for further		A35-P2, A35-P4, A37-P1, and
		consideration of CCF: diversity within the		А37-Р5.
		digital I&C system, or "testability' based		
		on device simplicity." The staff		
		understands that the guidance in this		
		document seeks to expand the use of		

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		design attributes and methods beyond		
		diversity and 100% testing.		
8.	1.1	In section 1.1, NEI states: "This guideline	Clarify the relationship between NEI	The results of NEI 16-16
		is applicable to facility changes done	16-16 and NEI 96-07, Appendix D.	technical work is used in the
		under 10 CFR 50.59 and facility changes		same way as other technical
		that require a license amendment."		analyses that are developed
		However, this guidance does not indicate		as part of the plant
		how to use the results or provide a cross-		modification process, that
		reference to the guidance being		are used for input to licensing
		developed in Appendix D of NEI 96-07.		processes.
9.	1.1	This section states that one of the	Clarify the scope of applicability for	NEI understands this
		primary barriers in the current regulation	this guidance.	question to mean that the
		is software common cause failure.		scope of NEI 16-16 should be
		However, the guidance addresses more		clear that it applies to other
		than software CCF.		sources of common cause
				failure other than software.
				Please validate this
				understanding.
10.	1.1	This section states that "This document	NRC and NEI should discuss and	It is not the intent of NEI 16-
		provides technical guidance for	resolve this issue during upcoming	16 to be consistent with
		addressing CCF for compliance to	interactions.	current NRC guidance. The
		deterministic licensing criteria and NRC		intent of NEI 16-16 is to
		policies and positions such as SRM-SECY-		introduce alternate
		93-087 and BTP 7-19." It is not clear how		approaches to address the
		the guidance provided in this draft is		potential impact of common
		consistent with NRC current position, as		cause failure for digital I&C
		described in the SRM-SECY 93-087 and		designs.

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11.	1.2 (1)	BTP 7-19. This item states: "Part 1 determines if a CCF in the target digital equipment is a safety analysis or licensing concern." Not clear what this means. Please provide clarification. Also, how does this statement relate to the scope defined in the previous paragraph, which states "digital I&C systems or components that can affect a design function described in the FSAR." Please clarify.	Provide clarifications to the statements and question.	NEI agrees that this should be a point of discussion. NEI agrees that clarification is required. The intent is to describe the scope of digital SSCs to which NEI 16-16 applies. NEI proposes to use "design functions described in the FSAR". This is consistent with what the approach is in the current version of RIS 2017-xx. However, NEI 16- 16 will still direct the focus on the specific SSCs affected by an I&C failure and how they relate to one or more design functions, because "design functions" may be described nebulously in some ESARs
12.	1.2 Flowchart	Comment 6 from Draft 1. The staff did not locate content in Draft 2 that resolves this comment. The process and reasoning advocated for determining "Is a CCF Credible?" is not sufficiently articulated.	NRC and NEI should continue discussions on the question "Is a CCF Credible?" and proposed engineering method to answer the question during upcoming interactions.	NEI agrees that discussion is needed on this subject. The preventive measures are formulated with sufficient depth and criteria so that any residual uncertainty in CCF likelihood still leaves that

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		Section 4.2.2.2 states that preventive	The staff recommends that the	likelihood in the range of
		measures "provide reasonable assurance	discussion focus on the level of	sufficiently low enough to be
		that a CCF from a specific I&C failure	uncertainty remaining in a digital	considered not credible. This
		source is not credible" but does not state	system to a CCF vulnerability and that	is why NEI 16-16 states that a
		why they provide that assurance.	independent parties can reach the	Appendix A is not good
			same conclusion after the proposed	enough to conclude that a
			engineering method is applied.	CCF is not credible.
13.	1.2	Comment 7 from Draft 1. The staff did	During the February 2017 meeting, NEI	NEI agrees that more
	Flowchart	not locate content in Draft 2 that resolves	clarified that NEI 16-16 considers all	discussion is required with
		this comment.	type of CCF, not only software, and	respect to "beyond design
		During the December 2016 meeting, the	therefore this question was necessary	basis", and how that is to be
		question in Part 2 to determine if CCE is	to address CCF resulting from single	addressed within NEI 16-16.
		beyond design basis. At the time, the	failures or AOOs (design basis).	
		staff understood that this document was		
		intended to only address software CCF	The staff recommends that the	
		due to software errors – which is	document be revised to clarify why the	
		currently considered beyond design basis	question "Is the CCF Beyond Design	
		IN SRM-SECY-93-087.	Basis" is relevant with examples.	
14.	1.2	Comment 8 from Draft 1. The staff did	NRC and NEI should discuss and	See response to comment
	Flowchart	not locate content in Draft 2 that resolves	resolve this issue during upcoming	#8
		this comment.	interactions.	NEI and NRC staff should
		Expansion of the process diagram or an		discuss this point further.
		additional diagram that specifically		
		analysis support specific sections of the		
		Draft Appendix D to NEI 96-07, with		
		respect to CCF issues, would be helpful.		
		The staff needs this information to		

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		determine if endorsement or partial endorsement of the guidance as an acceptable methodology to address CCF concerns for use in Appendix D is		
15.	2	Comment 9 from Draft 1. The staff did not locate content in Draft 2 that resolves this comment. The definitions provided in these sections read more like descriptions and approaches rather than formal definitions of the terms. Some definitions are not consistent with how the terms have been used in regulations and regulatory guidance. Endorsement or partial endorsement would be facilitated if the terms are defined consistently with other regulatory guidance documents or that the terms are consistently used in this document and in any documents that may later refer to it.	Recommend that formal definitions, similar to those recommended by the staff for use with NEI 96-07 Appendix D, be used.	NEI agrees that definitions should be consistent with other guidance. This should be a topic of discussion going forward.
16.	2.1	Comment 10 from Draft 1. The staff did not locate content in Draft 2 that resolves this comment. The definition for best estimate method in this section implies that relaxed criteria can be used for this method. Rather, best estimate methods use the same	The staff recommends clarification of the definition.	This should be discussed further. Relaxed criteria has been used in the past. For example, the Oconee RPS/ESFAS upgrade applied relaxed acceptance criteria

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		plant conditions and parameters.		Service Level C at 3250 psia) and containment pressure (125 psi, or 98% of ultimate strength).
17.	2.4	Comment 11 from Draft 1. The staff did not locate content in Draft 2 that resolves this comment. The definition for "CCF Beyond Design Basis" is not clear. The text provided comes across as a description, not a definition and is not consistent with SRM-SECY-93-087.	Clarify that the method proposed in NEI 16-16 refers to all types of CCFs, not only to the CCFs covered in SRM- SECY-93-087.	This point needs to be discussed further.
18.	2.5	The relationship of the terminology used in NEI 16-16 to terminology used in NEI 96-07 is not clear. For example, the use of the terms credible and not credible in NEI 16-16 are not consistent with NEI 96- 07, Appendix D. The word "bounding" also seems to be inconsistent. Staff reviewing NEI 96-07, Appendix D have also asked about how the words "negligible" and "attributable" (which are used in Appendix D) relate to content in NEI 16-16 (which does not use these words).	Clarify relationship between the terminology used in NEI 96-07, Appendix D to the terminology in NEI 16-16. Where appropriate, ensure alignment of the terms used in both documents.	NEI agrees that more discussion is needed on key terms.
19.	2.5	The definition provided for "CCF Not Credible" is based on the likelihood of a CCF. This is confusing because the	The staff recommends defining what a "Credible CCF" is instead of defining	NEI's view is that a "credible CCF" is the inverse of the

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		guidance provided requires	what "CCF not credible" means.	definition of "not credible" in
		determination of a credible CCF and how		16-16. Credible would then
		likely the CCF is.	NRC and NEI should continue	be defined as (emphasis
			discussions to address CCF credibility	added): "A CCF can be
			and its likelihood.	considered not credible only
				if the likelihood of a CCF
			Discussions should include "the	caused by an I&C failure
			proposed graded approach to	source is no greater than the
			eliminating the need for further	likelihood of a CCF caused by
			consideration of CCF in safety support	other failure sources that are
			systems (such as chillers as have been	not considered in a
			presented by NEI)" as mentioned in	deterministic safety analysis
			comment 12 on Draft 1.	described in the FSAR." This
				definition of credible is
				consistent with Figure 4-3 in
				NEI 01-01.
20.	2.8	Comment 13 from Draft 1. The staff did	Consider eliminating the definition of	The term "digital engineer"
		not locate content in Draft 2 that resolves	"Digital Engineer."	was expunged and replaced
		this comment.		with "design engineer" in
		define the role of the Digital Engineer.		Draft 2.
21.	2.12	Since Section 2.12 defines "mitigating	Include a definition for event initiator.	NEI will consider defining
		system," consider defining "event		this.
		initiator."		
22.	3.1	Comment 15 from Draft 1. The staff did	The staff recommends that NEI use the	This comment needs to be
		not locate content in Draft 2 that resolves	exact text from SRM-SECY-93-087	discussed further. Section
		this comment.	where applicable.	3.1 does not refer to the

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		This section paraphrases the information		SRM.
		in SRM-SECY-93-087 which may lead to		
		confusion.		
23.	3.3,	Comment 20 from Draft 1 (originally in	Suggest define "preferred malfunction	NEI would like to discuss this
	4.2.2.3	section 4.1.2.2.2). The staff did not	state" or rewording the sentences	further, and align with the
		locate content in Draft 2 that resolves	using this term. Perhaps something	NRC on this term and the
		this comment.	like "preferred state when a	"safe state" term used in the
		What is a "preferred malfunction state?"	malfunction occurs.	current version of RIS 2017-
				xx.
24.	3.4	Comment 18 from Draft 1. The staff did	NRC and NEI should continue	The 3 possible conditions are
		not locate content in Draft 2 that resolves	discussing the appropriate	correct. Conditions 2 and 3
		this comment.	characterization of CCF in terms of	may be further "conditioned"
		It appears that this draft guidance is	credibility, design basis, and beyond	as a) bounded by a previous
		treating 3 possible conditions: (1) "CCF is	design basis during upcoming	analysis, or b) not bounded
		not credible;" (2) CCF is credible but	interactions	by a previous analysis.
		beyond design basis; or (3) CCF is credible		
		and is within design basis.		NEI agrees that examples
				would be useful. These will
		Review of the document would be aided		be pursued once better
		by specific examples of digital		alignment between NEI and
		modifications that could fall with the		NRC on the NEI 16-16
		three categories proposed in the		content and methods are
		document. The staff's review will be		achieved.
		aided by a practical understanding on the		
		implications and use of this methodology.		
25.	3.4	The description provided in this section	Clarify this statement: "a credible CCF	NEI agrees to discuss this
		does not explain how a credible CCF	is within the plant licensing basis."	point with NRC staff and

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		affects the plant's licensing basis and		clarify. A credible CCF that is
		design basis. It describes the use of		considered within the plant
		preventive measures to determine if a		licensing basis does not
		CCF is credible, and then the method to		necessarily mean that it is
		perform a coping analysis.		already described as-is in the
				UFSAR (the converse is that if
				the CCF is <u>not</u> credible, then
				it is <u>not</u> considered within the
				plant licensing basis). In
				Section 3.4, considering a
				credible CCF within the plant
				licensing basis means it must
				be further addressed using
				the balance of the guidance
				in 16-16. The user needs to
				determine if the credible CCF
				is previously analyzed, and if
				the results are bounded by
				the previous analysis, end the
				CCF technical evaluation.
				Otherwise, perform a new
				analysis.
26.	3.4	The description from the second	Add content that describes how a CCF	NEI would like to discuss this
		paragraph to the end seems to belong to	can affect the plant's licensing basis	further with NRC staff to
		Part 2 in Figure 1. This section, however,	and design basis.	better understand the exact
		does not describe how a CCF can affect		question. See comment
		the plant's licensing basis and design		response above.

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		basis.		
27.	4.0	This statement: "The design engineer	Clarify how the results of the	See response to comment #8.
		should document the completed CCF	evaluation will be used.	
		technical evaluation, and preserve the		
		document as a quality record," tells the		
		design engineer what to do with the		
		results of the evaluation. However, this		
		document does not describe how to use		
		the result of this evaluation when		
		performing changes under 10 CFR 50.59		
		or license amendments.		
28.	4.1	This section lists three criteria. However,	Please clarify what the three criteria in	NEI agrees to clarify this
		it is not clear what that criteria is	this section are referring to.	section. As the comment
		referring to. It seems that this is to		says, the three criteria are for
		determine if the digital system is an		determining if the digital
		event initiator or credited for event		system is an event initiator or
		mitigation.		credited for event mitigation.
29.	4.1	Comment 17 from Draft 1 (content was in	Consider adding examples that result	NEI agrees that these type of
		Section 3.3 of Draft 1). The staff did not	in a NO answer. Examples would	examples would be useful.
		locate content in Draft 2 that resolves	clarify what types of systems result in	These will be pursued via
		this comment.	a "NO" answer.	new Appendices once better
		Examples of support systems that result		alignment between NEI and
		in a "YES" to the question "is the digital		NRC on the NEI 16-16
		equipment an initiator, or credited for		content and methods are
		event mitigation?" in the flowchart, Part		achieved.
		1 are provided in this section. The staff		
		finds that these examples are useful for		

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		clarifying which types of systems result in		
		a "YES" answer.		
30.	4.2	This section mostly focuses on using	Provide more information in this	The purpose of Section 4.2 is
		preventive measures, but it does not	section on how to perform and	to articulate how CCF
		clearly articulate how the susceptibility	implement the susceptibility analysis.	susceptibility analysis is to be
		analysis is performed. Before using		performed. For example, the
		preventive measures, the design		design engineer can
		engineer should assess the hazards,		determine if available P or L
		vulnerabilities or susceptibilities.		will address susceptibility of
				CCF caused by various I&C
				failure sources.
31.	4.2	Comment 23 from Draft 1. The staff did	The staff recommends adding a	NEI would like to discuss this
		not locate content in Draft 2 that resolves	description on what constitutes an	point further with the NRC
		this comment.	analysis of the CCF malfunction,	staff. Section 4.2 only covers
		This section does not describe how to	methods, and acceptance criteria.	Part 2 of the CCF Technical
		perform an analysis of the CCF		Evaluation. However, an
		malfunction.		overview of CCF malfunction,
				methods and acceptance
				criteria is provided In Section
				4.2.1, on page 14. Detailed
				guidance on these issues is
				provided in Section 4.3.
32.	4.2	This section states: "Note that the CCF	Explain/describe how the use of	NEI would like to discuss this
		susceptibility analysis can make use of a	preventive or limiting measures can be	point further with the NRC
		wide range of potentially applicable	used and what they can accomplish (in	staff. The purpose of the
		preventive or limiting measures provided	terms of eliminating CCF from further	paragraph from which the
		in Appendix A" but does not elaborate on	consideration).	sentence is quoted is simply

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		how preventive or limiting measures can		to point out that one cannot
		be used nor what they can accomplish.		read the title of a defensive
				measure and apply it. The
				details matter. In addition,
				the remainder of Section 4.2
				explains/describes how the
				use of preventive or limiting
				measures can be used and
				what they can accomplish (in
				terms of eliminating CCF
				from further consideration).
33.	4.2.1	This section is labeled as an overview but	Consider moving specific details to the	NEI will review the content in
		is fairly detailed. This section provides a	subsections in which these details are	this section and consider
		detailed description of the CCF	addressed? For example, any	moving detailed content to
		susceptibility analysis, including steps	description related to the use of	other sections. However,
		that are performed later in the process.	preventive measures should be part of	Section 4.2.1 provides
			Section 4.2.2.2	guidance for addressing
				issues not addressed in later
				sections, such as what to do
				with a new, previously
				unidentified failure source, or
				an incomplete defensive
				measure. NEI feels that it is
				necessary to summarize
				these issues in an overview,
				before the user gets involved
				in a detailed analysis.

No.	Text	NRC Comments	Proposed Action	NEI Discussion Points on
	Section		(i.e., addition, deletion or	Comment
			modification)	
34.	4.2.1	Comment 19 from Draft 1 (content was in	The technical basis provided should be	NEI proposes to discuss
		Section 4.1.1 of Draft 1). The staff did	strengthened by additional	adding some of these key
		not locate content in Draft 2 that resolves	information that includes design	points to NEI 16-16, in a way
		this comment	rationale, analyses, data, or	that is consistent with the
		This section states that the digital	operational experience to justify a	information in the current
		engineer confirms the applicability of <u>at</u>	"credibility" determination.	version of RIS 2017-xx. For
		least one P measure, L measure, or LR		example, the technical bases
		measure from Appendix A. If an		for many of the design
		alternate P, L, or LR measure is credited,		attributes in Section 3.2.1 of
		the digital engineer is responsible for		the RIS should be the same
		providing documented justification for		technical bases staff is
		each alternate measure. The section, in		seeking for NEI 16-16.
		part, later states that a CCF that is not		
		credible requires no further assessment.		
35.	4.2.1	This section should require that any	Require that any preventive, limiting	The executive summary and
		preventive, limiting or likelihood	or likelihood reduction measure,	section 1.2 already state that
		reduction measure, described or not in	described or not in the Appendices,	CCF technical evaluations
		the Appendices, used should be	used should be documented in the CCF	shall be documented. To
		documented in the CCF susceptibility	susceptibility analysis.	improve clarity regarding CCF
		analysis.		susceptibility analysis, NEI
				can add a paragraph at the
				front of Section 4.2.1 that
				states the analysis shall be
				documented per the
				worksheet in Appendix C.
36.	4.2.1	This section does not provide guidance to	NRC and NEI should discuss the use of	Section 4.2.1 is only an
		determine if a CCF is credible or not.	these terms.	overview. To improve clarity,

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			modification)	
				NEI can add a sentence in an
				appropriate paragraph that
				points the reader to Section
				4.2.2.2, which provides
				guidance for determining CCF
				credibility.
37.	4.2.1	This section does not describe what the	Describe what one should do if the	Section 4.2.1 is only an
		design operator should do if the result of	malfunction result is similar to the one	overview. However, to
		that malfunction is similar to the system	described.	improve clarity, NEI can add a
		level or component level malfunction		sentence that says if the
		results included in a previous		system or component level
		deterministic analysis. The guidance only		results are the same as
		addresses what to do if they are		previously analyzed, then the
		different.		CCF technical evaluation ends
				here (as already illustrated in
				Figure 1).
38.	4.2.1	This section states: "If the FSAR identifies	NRC and NEI should discuss at what	NEI agrees that further
		a malfunction result at the plant system	level the malfunction result can be	discussion is required on this
		level, with or without a description of	evaluated and compared with existing	point. The presentation by
		lead to this plant system level	results (at the plant or system level).	Pete LeBlond at the 8/1/17
		malfunction result, only the plant system		App. D meeting provides a
		level malfunction result is pertinent to		basis for evaluating
		the CCF malfunction assessment."		malfunction results at the
				plant level.
39.	4.2.1	This section states: "the design engineer	Provide guidance to describe how to	Section 4.2.1 is on overview.
		assesses the likelihood of the CCF based	assess the CCF likelihood using the	NEI can add a sentence in the
		on available likelihood reduction	likelihood reduction measures.	last paragraph of Section

No.	Text	NRC Comments	Proposed Action	NEI Discussion Points on
	Section		(i.e., addition, deletion or	Comment
			modification)	
		measures to determine the appropriate		4.2.1 that will point the
		method and acceptance criteria for the		reader to Sections 4.2.2.3
		analysis of the plant-level CCF		and 4.2.2.4 where LR
		malfunction result." This guidance does		measures are used, if
		not describe how to assess the CCF		applicable, to determine that
		likelihood using the likelihood reduction		a credible CCF is BDB.
		measures.		Otherwise, a credible CCF is
				DB.
40.	4.2.1	This section states: "The plant-level	Explain how to use CCF likelihood to	Section 4.2.1 is an overview.
		analysis uses analytical methods and	perform a plant-level analysis and the	In the last paragraph, it
		related acceptance criteria	acceptance criteria.	states: "The plant-level
		commensurate with the CCF likelihood."		analysis uses analytical
		However, it is not clear how the CCF		methods and related
		likelihood can be used to perform plant-		acceptance criteria
		level analysis.		commensurate with the CCF
				likelihood. Therefore, if a CCF
				is credible and the
				subsequent malfunction
				result is different at the
				system or component level,
				the design engineer assesses
				the likelihood of the CCF
				based on available likelihood
				reduction measures to
				determine the appropriate
				method and acceptance
				criteria for the analysis of the

No.	Text	NRC Comments	Proposed Action	NEI Discussion Points on
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			modification)	
				plant-level CCF malfunction
				result, which follows, using
				the guidance in Section 4.3."
41.	4.2.2	For consistency, use the same text in	This section title should be consistent	4.2.2 does not appear in the
		Figure 1 for this section title.	with the terminology used in Figure 1.	flow chart, please clarify the
				comment. It would probably
				be too busy, but NEI could
				add a box to Figure 1 that
				encapsulates 4.2.2.2, 4.2.2.3
				and 4.2.2.4, and label the
				new box as 4.2.2.
42.	4.2.2	Are the CCF sources listed in Appendix A	Clarify that Appendix A describes	NEI agrees that a note in
		the only potential CCF sources?	potential CCF sources, but that there	Section 4.2.2 to this effect
			could be others not described in the	would be helpful, to reiterate
			Appendix.	what Section 4.2.1 states: "
				the design engineer identifies
				any other potential sources of
				CCF not listed in Appendix A
				that may be unique to a
				specific application."
43.	4.2.2	If this section is describing the sources,	Edit Figure 1 or the content in this	Further discussion is needed
		why does it include determination of CCF	section to ensure consistency within	with the staff to better
		credibility and likelihood? These	the document.	understand this comment.
		determinations seem to belong in other		Section 4.2.2 is not just about
		sections to be consistent with Figure 1.		failure sources. It describes
				how defensive measures can
				be used to determine

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				likelihood (aka credibility) of
				a CCF, and depending on
				likelihood of a credible CCF,
				whether or not its DB or BDB.
44.	4.2.2.1	This section states that fire, smoke, and	Remove the defensive measures in	NEI feels that the clarifying
		operations or maintenance human errors	sections A.2.5and A.4 and reference	information in the body of
		are also sources of CCF but that they are	the appropriate guidance.	NEI 16-16 is sufficient to
		addressed in other industry guidance and		cover this point.
		that the defensive measures on fire,		
		smoke, and human error are included for		
		interested users. No note to reflect this is		
		placed in Appendix A (Sections A.2.5 and		
		A.4).		
45.	4.2.2.1	This section states: "If a proposed I&C	Please provide a reference to a section	NEI agrees that an expanded
		system or component design has a failure	in the guidance that explains how it	discussion on this point is
		source that is not on the list provided	should be addressed.	needed in the document.
		above, it should be identified and		The idea here is that a new
		addressed using this guide." It is unclear		failure source may or may
		how this guide should be used for a		not be "prevented" per se; if
		failure source not on the list in this		it's not, then the CCF is
		section.		credible and should be
				analyzed using the remaining
				guidance. In other words,
				just because a new failure
				source is identified doesn't
				mean NEI 16-16 is N/A.
46.	4.2.2.4	This section seems to cover two different	Recommend dividing this section in	NEI will consider this in the

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		subjects: likelihood reduction and	two: (1) likelihood reduction and (2)	next update to NEI 16-16.
		determination of analysis.	determination of analysis.	Simply put, if an LR measure
				is applied, the CCF results are
				BDB; if not, the CCF results
				are DB.
47.	4.2.2.4	What is the justification or basis for this	Provide justification or technical basis	NEI would like to have
		text: "A likelihood reduction measure	for the statement. Why does a	further discussion with the
		allows a credible CCF to be considered	likelihood reduction method allow	NRC staff on this point.
		beyond design basis."	this?	Industry believes staff views
				quality and independence as
				the bases for treating SCCF as
				BDB per SECY/SRM 93-087.
				Conversely, without quality
				and independence, SCCF
				must be treated as DB.
48.	4.2.2.4	This section should refer to other	Provide appropriate references to	NEI agrees that an expanded
		sections in the guidance if likelihood	other sections.	discussion on this point is
		reductions cannot be used.		needed in the document. If
				an LR cannot be used for a
				credible CCF, then the CCF
				results are to be analyzed
				using conservative DB
				methods.
49.	4.2.2.4	Comment 21 from Draft 1 (content was in	The staff recommends that NEI	NEI requests that the NRC
		Section 4.1.2.2.3 of Draft 1). The staff did	incorporate or reference NRC guidance	staff provide the NRC
		not locate content in Draft 2 that resolves	on acceptable implementation of	documents that address
		this comment	conservative and best estimate	implementation of

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		The document partially describes the use	methods. Otherwise, provide	conservative methods and
		of "Conservative Methods" and "Best	justification for using alternate	best estimate methods.
		Estimate Methods." The staff's review	methods.	These will be considered for
		would be facilitated by incorporating and		incorporation into NEI 16-16.
		referencing NRC guidance on acceptable		
		implementation of these methods.		
50.	4.2.2.5	This comment is a follow up to comment	NRC and NEI should discuss this	NEI agrees that further
	and	22 from Draft 1 (content was in Section	comment during upcoming	discussion is needed with the
	4.2.2.6	4.1.2.2.4 of Draft 1) which stated that the	interactions to increase understanding	staff to better understand
		staff is willing to consider the use of risk	on the purpose and key takeaways of	these points. The purpose of
		insights in this document or future	these two sections.	4.2.2.5 is to explain that
		revisions.		some defensive measures,
		The purpose and key takeaways of		not all, provide a graded
		sections 4.2.2.5 and 4.2.2.6 are not clear.		approach based on safety
		Do some defensive measures apply only		classification (for example, a
		to non-safety equipment?		measure to protect against
				high temperature requires
				formal EQ for 1E, good
				practice for non-1E).
				The purpose of 4.2.2.6 is to
				explain that the PRA can be
				used to provide risk insights
				to influence system design.