



# **NRC DISCUSSION ON A CLARIFICATION OF THE STAFF'S PREVIOUS ENDORSEMENT OF NEI 01-01**

**David L. Rahn, P. E., Sr. Electronics Engineer**

**Office of Nuclear Reactor Regulation**

**Wendell Morton, Electronics Engineer**

**Office of New Reactors**

Category 2 Public Meeting, March 30, 2017

# Agenda

- Opening Remarks, Introductions, Safety Procedures
- Staff Understanding of Industry Needs for Clarified Guidance for Low Risk-Significant Plant Modifications
- Proposed New RIS to Clarify Staff's Previous Endorsement of NEI 01-01 Regarding Adequacy of Qualitative Assessments supporting Likelihood of Failure Determinations
- Schedule for Staff Drafts, Stakeholder Reviews, and Issuance for Use
- Framework for Use of Qualitative Assessments
- Overview of Staff Proposed Guidance on Development and Documentation of Qualitative Assessments
- Action Items, Path Forward, Stakeholder Participation



# Staff Understanding of Industry Needs for Clarified Guidance

- NEI/Stakeholder input to staff at recent meetings regarding NRC Integrated Action Plan (IAP) Activities related to addressing CCF
  - Permanent guidance under development for addressing CCF (NEI 16-16)
  - Permanent guidance for addressing 50.59 process (NEI 96-07 App. D)
  - Efforts will require several months of interactions
- Staff has made revisions to its Modernization Plan 1a and 1b. based on:
  - Response to industry’s request for guidance for addressing the potential for CCF in digital modifications or upgrades to lower safety-significant auxiliary and/or support systems
  - Staff’s findings with regard to the feasibility of guidance based solely on coping and bounding criteria
- NEI/stakeholder specific request to have durable guidance to be available by Summer, 2017 to enable implementation of lower risk DI&C modifications



## **Proposed New RIS to Clarify Staff's Previous Endorsement of NEI 01-01**

- Staff plans to provide clarification to its endorsement of NEI 01-01 (previously endorsed in RIS 2002-22) by developing a new RIS
- This regulatory product development path was deemed the most streamlined process for clarifying previous regulatory issue guidance, enabling completion by Summer 2017
- Proposed clarification is planned in three areas:
  - Clarifying staff guidance on producing adequate Qualitative Assessments to serve as technical bases supporting responses to 10 CFR 50.59 Qs 2 and 6
  - Statement regarding staff's expectations regarding applicability (limitation) on use of the new guidance (scope of low risk-significant systems covered)
  - Providing staff clarifications on some of the 12 issues/concerns previously expressed by the staff that are directly related to the scope



## **Proposed New RIS to Clarify Staff's Previous Endorsement of NEI 01-01**

### **Key Criteria for Developing the New RIS:**

- Must be compatible with aspects of NEI 01-01 still endorsed
- Must be able to support future staff endorsement of NEI 16-16
- Must be able to support future staff endorsement of NEI 96-07, Appendix D
- Must be producible by Summer 2017
- Must support a common understanding by licensees and NRC staff as to what is considered to be an adequate evaluation of potential failures of low safety-significant digital I&C modifications
- Guidance is intended to be forward-looking--no backfit intended

## **How Can We Possibly Pull this Off???**

1. Working quickly/efficiently to develop & comment on drafts
2. Minimizing scope of the clarification to only what is absolutely needed by Summer, 2017
3. Frequent stakeholder working level public meeting interactions
4. Regular communications on schedule and needs/expectations in between public meetings
5. 30-day formal public/stakeholder comment period
6. Keeping NRC/NEI/Licensee CNO management apprised of status

# RIS Development Schedule

	Activity	Schedule
A.1	Prepare preliminary drafts of RIS 2017-XX, clarifying the staff's previous endorsement of NEI 01-01	March 6-27, 2017
A.2	Share preliminary drafts with NEI/Stakeholders/Public ADAMS ahead of 1 <sup>st</sup> public meeting	March 28, 2017
A.3	Discuss NRC strategy and concepts with NEI/industry stakeholders at public meeting	March 30, 2017
A.4	Issue subsequent drafts of RIS in support of next public working-level meeting	April 5-18, 2017
A.5	Hold public working-level meeting to discuss NEI/industry stakeholder comments	April 20, 2017
A.6	Address/Resolve NEI/industry stakeholder comments	April 21-May 1, 2017
A.7	FRN to issue RIS	May 10, 2017
A.8	30-day Formal Public Comment Period	May 10 – June 9, 2017
A.9	Brief ACRS on Rationale for Staff's Revised Endorsement of NEI 01-01	May 17, 2017
A.10	Resolve Public Comments, Develop Final RIS	June 12-30, 2017
A.11	Issue RIS for Use	July 2017



# Framework for Use of Qualitative Assessments

The qualitative assessment is needed to support the process for making the following types of conclusions supporting a 50.59 evaluation:

1. There is adequate evidence that the activity does not result in more than a minimal increase in the likelihood of failure of an SSC important to safety to perform its intended design functions as described in the UFSAR or credited in the plant safety analyses. (Question 2 of 50.59)

For activities that do not meet this condition, the licensee would be required to justify the increased likelihood of failure. NRC staff approval of such a change (via 10 CFR 50.90) would be required.

## Framework for Use of Qualitative Assessments (continued)

The qualitative assessment is needed to support the process for making the following types of conclusions supporting a 50.59 evaluation:

2. For activities that could introduce a potential CCF, there is adequate evidence providing reasonable assurance that the likelihood of a CCF is much lower than the likelihood of failures that are already considered in the current design basis described in the UFSAR.

For activities that could introduce a new potential CCF with likelihood on the order of magnitude of CCFs already considered, the new CCF would need to become part of the design basis. The licensee would be required to update the UFSAR to reflect the revised design basis accounting for the CCF and update the UFSAR safety analyses that must be revised to account for the CCF using design basis methods and acceptance criteria, as currently used in the abnormal operating occurrences and postulated accidents of the UFSAR. NRC staff approval of such a change (via 10 CFR 50.90) would be required.

## Framework for Use of Qualitative Assessments (continued)

The qualitative assessment is needed to support the process for making the following types of conclusions supporting a 50.59 evaluation:

3. For activities that could introduce a potential CCF, there is adequate evidence providing reasonable assurance that the likelihood of the new CCF is comparable to other CCFs that are not considered in the UFSAR.

For activities that could introduce a potential CCF that meets the above condition, the new very low likelihood CCF would not be further considered in the UFSAR; no additional analysis is required to determine the effect of the CCF.

## Framework for Use of Qualitative Assessments (continued)

The qualitative assessment is needed to support the process for making the following types of conclusions supporting a 50.59 evaluation:

4. For activities that could introduce a potential CCF with a likelihood significantly less than failures already considered, is there evidence providing reasonable assurance that the resulting malfunction is of a type that has been previously analyzed? If so, is the potential result of the failure bounded by a previous analysis?

For activities that could introduce a potential new CCF that meets the above condition, the new CCF could be analyzed using best estimate methods, and coping methods could be identified for it.

For malfunctions of a new type or where the potential consequences are not bounded, the safety analysis and UFSAR must be revised, and a LAR would be required.



# **CLARIFICATION TO RIS 2002-22: QUALITATIVE ASSESSMENT DRAFT FRAMEWORK**

**Wendell Morton, Electronics Engineer**

Office of New Reactors  
US Nuclear Regulatory Commission  
March 30, 2017



## Key Messages

1. Develop durable guidance that meets needs of NRC staff and industry
2. New clarifications for current guidance, not remove or modify previous endorsements and regulatory positions.
3. Ensure concerns from NRC Licensing, Inspections and Licensees are considered within the scope of this evolution
4. Maintaining focus on safety

## **Introduction**

- Qualitative assessments are cited in both NEI 96-07 and NEI 01-01
- Challenges with current guidance include:
  - Structure of qualitative assessment arguments
  - Level of documentation (of qualitative arguments) needed for SSCs of varying safety significance (e.g. MCR safety chillers)
  - “Codes and Standards”
  - Common cause failure (CCF)
- Leads to ambiguity and licensing uncertainty for both staff and industry
- Clarifying qualitative guidance to focus on addressing challenges and developing adequate ‘likelihood’ arguments

## **Purpose**

The qualitative assessment is needed to support the process for making the following conclusions:

- “The activity does not result in more than a minimal increase in the likelihood of failure of an SSC important to safety to perform its intended design functions as described in the UFSAR or credited in the plant safety analyses”
- “For activities that could introduce a potential CCF, there is reasonable assurance that the likelihood of a CCF is much lower than the likelihood of failures that are already considered in the current plant design basis described in the UFSAR.”
- “For activities that could introduce a potential CCF, there reasonable assurance that the likelihood of a CCF is comparable to other CCFs that are not considered in the UFSAR.”

## **Purpose** (continued)

- For activities that introduce a potential CCF that meets these conditions, CCF would not be considered in the UFSAR.
- For activities that introduce a potential CCF that do not meet the above conditions, the CCF would need to become part of the design basis.
- The licensee would be required to update the UFSAR to reflect the revised design basis accounting for the CCF and update the UFSAR safety analyses that must be revised to account for the CCF using design basis methods and acceptance criteria, as currently used in the abnormal operating occurrences and postulated accidents of the UFSAR. NRC staff approval of such a change (via 10 CFR 50.90) would be required.



## **Proposed Scope**

- Clarifies guidance in NEI 01-01, Sections 4.4 , 5.1, 5.3 as well as Appendix A (Items Nos. 2(i) & 6(b))
- Does not modify or revise previous endorsement of NEI 01-01 sections, RIS 2002-22 and any positions contained therein.
- Emphasis placed on safety support systems (low-risk significant systems)
- Not intended to cover all I&C systems (e.g. RPS or ESF initiation functions)

## **Proposed Qualitative Arguments**

- Design Attributes – Evidence of design attributes supporting arguments for the high reliability and dependability of the proposed modification should be described.
- Quality Processes – Software development, hardware and software integration processes, hardware design, and validation and testing processes that have been incorporated into the development process.
- Operating Experience – Evidence of significant operating history with comparable performance requirements (nuclear or non-nuclear)
- Defense-in-Depth – Evidence that the proposed design incorporates both internal and external layers of defense against potential failures

Staff expects qualitative assessments to address all four of these topics.



## Proposed Documentation Structure

- Similar to NEI 01-01 Appendix B, the staff is proposing a similar structure by which qualitative assessments should be documented
- Emphasis areas include:
  - *Consequences of failure of the proposed SSC to be modified*
  - Findings and Basis regarding likelihood of failure(s)
  - Evidence (qualitative arguments)
- Key consideration – Determine the appropriate level of evidence sufficient to consistently modify safety support systems under 50.59



## **Safety Support System mods under 50.59**

- Level of evidence commensurate to consequences of failure of modified SSC
- Takes into account differences in applications on site (e.g. MCR chillers versus Containment chillers)
- Consider use of risk insights or qualitative assessment of effects postulated SSC failure on plants critical safety functions (e.g. reactivity control, reactor core cooling, reactor coolant system integrity, etc.)

## **Conclusion**

- If it can be demonstrated that failure effects (especially if postulated SSC failure concurrent with an AOO/PA does not have safety impact), a lower level of evidence can be argued.
- Potential to be more specific on level of evidence (e.g. codes and standards)
- Ensure concerns from NRC Licensing Staff, Inspection Staff, and Licensees are considered during development of key criteria for qualitative assessment



# Discussion & Questions