

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

OVERALL STATUS

Task Working Group	No. of Problem Statements	Closed	Open
TWG 1 Cyber Security	1	1	0
TWG 2 Diversity & Defense-In-Depth	6	5	1
TWG 3 Risk Informing	3	0	3
TWG 4 HICR – Communications	1	1	0
TWG 5 HICR – Human Factors	5	3	2
TWG 6 Licensing Process	4	0	4
TWG 7 Fuel Cycle Facilities	5	0	5
TOTALS	25	10	15

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

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TASK WORKING GROUP 1: CYBER SECURITY

TOTAL PROBLEM STATEMENTS: 1 OPEN: 0 CLOSED: 1

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 1	Problem Statement 1: Cyber Security Requirements for Safety Systems: Regulatory Positions 2.1 - 2.9 of RG 1.152 and NEI 04-04 provide conflicting guidance for implementing cyber security requirements for safety systems at nuclear power plants.	<ol style="list-style-type: none"> 1. ISG issued 12/31/07, No revisions required 2. NEI 04-04 revised to Rev 2 3. Awaiting draft Reg Guide 4. Awaiting rulemaking 5. Duke's Pilot Project validating ISG, providing lessons learned 6. Problem Statement considered closed 	Problem Statement addressed by ISG issued 12/31/07. The staff considers this closed.

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

TASK WORKING GROUP 2: DIVERISTY & DEFENSE-IN-DEPTH

PROBLEM STATEMENTS: 6

OPEN: 1

CLOSED: 5

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 2	Problem Statement 1: Adequate Diversity. Additional clarity is desired on what constitutes adequate diversity and defense-in-depth. Determine: 1) How much diversity and defense-in-depth is enough; 2) If there are precedents for good engineering practice; 3) If sets of diversity attributes and criteria can provide adequate diversity; 4) How much credit can be taken for designed-in robustness in determining the required amount of diversity; and 5) Identify consensus standards that could be endorsed, if available.	<ol style="list-style-type: none"> 1. ISG issued 09/26/07, Revisions required 2. Awaiting ORNL Report to develop industry white paper on Adequate Diversity 3. Industry draft report 3 months after ORNL report – Project Plan says 4/15, but this will change 4. NRC to receive ORNL Report & share with Industry 5. Problem Statement considered open 	<p>Problem Statement addressed by ISG issued 09/26/07. The staff considers this closed.</p> <p>There are long-term activities (industry white paper/ORNL NUREG) that may result in additional guidance. Any additional guidance will be addressed during updates to regulatory documents, such as the SRP.</p>
TWG 2	Problem Statement 2: BTP-19 Position 4 Challenges. Current guidance policy addresses system-level actuation in BTP-19, Position 4. Industry has proposed that further clarification is needed relative to when and if credit can be taken for component-level versus system-level actuation of equipment. Clarification is needed on the rationale for when and why BTP-19, Position 4 would not be applicable.	<ol style="list-style-type: none"> 1. NRC has indicated that ISG will be revised to allow component-level. 2. Staff agrees with industry position 3. NRC action to revise ISG 4. Problem Statement considered open 	<p>Problem Statement addressed by ISG issued 09/26/07. The staff's view is that the ISG's citing of 10 CFR 50.55a and IEEE-603 should be corrected.</p> <p>The staff also agrees with the industry request to allow both component- and system-level actuation, since the backup controls can be non-safety. This requires a change to the Commission guidance provided in SRM 93-087. The staff will pursue this change.</p>

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 2	<p>Problem Statement 3: Effects of Common-Cause Failure. BTP-19 guidance recommends consideration of CCFs that "disable a safety function." However, additional clarity is desired regarding the effects that should be considered (e.g., fails to actuate and/or spurious actuation).</p>	<ol style="list-style-type: none"> 1. NRC staff thought to be drafting edits to clarify ISG 2. 'Effects of Common Cause Failure' White Paper of Aug07 under revision 3. NRC action to revise ISG 4. Problem Statement considered open 	<p>Problem Statement addressed by ISG issued 09/26/07. The staff considers this closed.</p> <p>Additional guidance may be included in the SRP update.</p>
TWG 2	<p>Problem Statement 4: Common-Cause Failure Applicability. Clarification is desired on identification of design attributes that are sufficient to eliminate consideration of CCFs (e.g., degree of simplicity).</p>	<ol style="list-style-type: none"> 1. 'Common Cause Failure Applicability' White Paper submitted 02/29/08 2. NRC action to review White Paper and to revise ISG 3. Problem Statement considered open 	<p>Problem Statement addressed by ISG issued 09/26/07 (fully tested or built-in diversity).</p> <p>Additional guidance may be included in the SRP update.</p>
TWG 2	<p>Problem Statement 5: Echelons of Defense. As described in NUREG-0737 Supplement 1, Clarification of TMI Action Plan Requirements, the following plant safety functions must be controlled to mitigate plant accidents: 1) Reactivity control, 2) Reactor core cooling and heat removal from the primary system, 3) Reactor coolant system integrity, 4) Radioactivity control, and 5) Containment conditions. Additional clarification is desired regarding how the echelons of defense for maintaining the above safety functions should factor into diversity and defense-in-depth analyses. A particular concern is that the current BTP-19 guidance does not consider plant design characteristics and operating</p>	<ol style="list-style-type: none"> 1. Proposed new language for the first sentence of the echelons of defense ISG submitted 02/29/08 2. NRC action to review White Paper and to revise ISG 3. Problem Statement considered open 	<p>Problem Statement addressed by ISG issued 09/26/07. The staff considers this closed.</p> <p>Industry feedback will be considered as part of the SRP update.</p>

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

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	procedures that affect how diversity and defense-in-depth are actually used to maintain the safety functions.		
TWG 2	Problem Statement 6: Single Failure. Additional clarification is needed regarding the acceptance criteria for addressing CCFs versus the acceptance criteria for addressing single failures in safety system designs.	<ol style="list-style-type: none"> 1. Clarifies earlier Staff position that digital CCFs are not classified as single failures 2. NRC and Industry agree 3. Problem Statement considered closed 	Problem Statement addressed by ISG issued 09/26/07. The staff considers this closed.

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

TASK WORKING GROUP 3: RISK INFORMING

PROBLEM STATEMENTS: 3

OPEN: 3

CLOSED: 0

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 3	Problem Statement 1: Evaluation of digital systems in PRA. Existing guidance does not provide sufficient clarity on how to use current methods to properly evaluate digital systems in PRAs for DC or COL under Part 52. The issue includes addressing common-cause failure modeling and uncertainty analysis associated with digital systems.	<ol style="list-style-type: none"> 1. ISG issued 01/31/08; Revisions required 2. Industry and NRC reached consensus on draft ISG on 2/8/08 3. NRC now revising ISG, which was to be issued 3/28/08 4. NRC action to revise ISG 5. Problem Statement considered open 	The staff is preparing an ISG to address this issue. The staff expects to issue the ISG in July, 2008.
TWG 3	Problem Statement 2: Risk Insights. Using current methods for PRAs, NRC has not determined how or if risk-insights can be used to assist in the resolution of specific key digital system issues.	<ol style="list-style-type: none"> 1. Industry preparing White Paper on benefits and risks associated with proposed automated DAS (expected 4/30/08) 2. Paper intended to assist utilities in determining which automatic DAS functions are most beneficial to include 3. Preliminary results presented to NRC 3/21/08 4. Other risk-insight pilot activities postponed until resolution of this issue 5. Industry to prepare White Paper 6. NRC action to review White Paper and to revise ISG 7. Problem Statement considered open 	On 5/12/08, NEI provided a matrix comparison and gap analysis of industry's risk assessment approach and NRC's draft NUREG and draft ISG for Problem Statement 1. The industry white paper on risk insights and D3 is expected 5/19/08.

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 3	<p>Problem Statement 3: State-of-the-Art. An acceptable state-of-the-art method for detailed modeling of digital systems has not been established. An advancement in the state-of-the-art is needed to permit a comprehensive risk-informed decision making framework in licensing reviews of digital systems</p>	<ol style="list-style-type: none"> 1. No near term work planned 2. Industry suggests dropping this problem statement and continuing work outside of the project plan 3. NRC remove Problem Statement from Project Plan 4. NRC action to revise ISG 5. Problem Statement considered open 	<p>The staff agrees that work on this Problem Statement should be pursued outside the Project Plan. The TWG will defer work on this Problem Statement until NRC/RES or Industry can develop sufficiently mature state-of-the-art. This will be reflected in the next revision to the Project Plan.</p>

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

TASK WORKING GROUP 4: HICR - COMMUNICATIONS

PROBLEM STATEMENTS: 1

OPEN: 0

CLOSED: 1

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 4	<p>Problem Statement 1: Inter-Divisional Communications Independence. Industry and NRC guidance documents do not define at a sufficient level of detail the requirements for inter-divisional communications independence. A) Industry Standards (e.g. IEEE 7-4.3.2-2003, "IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power rating Stations") do not provide sufficient guidance for interdivisional communications independence within digital systems. B) NRC regulatory guidance (e.g. Regulatory Guide 1.152, "Criteria for Digital Computers in Safety Systems of Nuclear Power Plants") does not provide explicit guidance for inter-divisional communications independence within digital systems. C) The protection system division separation and isolation requirements in existing regulations (10CFR50.55a (h), "Protection and Safety Systems," which incorporates IEEE603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations," among other things) does not define for digital systems "the degree [of independence] necessary to retain the</p>	<ol style="list-style-type: none"> 1. ISG issued 09/28/07; Minor Revision required 2. Minor wording change to prevent mis-interpretation 3. Duke's Pilot Project validating ISG, providing lessons learned 4. NRC and Industry agree 5. NRC action to incorporate new wording in permanent guidance 6. Problem Statement considered closed 	<p>Problem Statement addressed by ISG issued 09/28/07. The staff disagrees that an ISG revision is needed. The staff considers this closed.</p>

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

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	capability to accomplish the safety function during and following any design basis event requiring that safety function.” D) Existing Standard Review Plan (SRP) Chapter 7 includes conflicting guidance regarding communication independence.		

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

TASK WORKING GROUP 5: HICR – HUMAN FACTORS

PROBLEM STATEMENTS: 5

OPEN: 3

CLOSED: 2

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 5	<p>Problem Statement 1: Minimum Inventory. Review existing NRC regulatory positions and acceptance criteria, and make necessary changes, to better define minimum inventory of alarms, controls, and displays needed to implement the emergency operating procedures and bring the plant to a safe condition; eliminate any inconsistencies in the use of minimum inventory that exist in current NRC guidance; and consider development of a process approach to the development of a plant-specific minimum inventory of alarms, displays and controls.</p>	<ol style="list-style-type: none"> 1. ISG issued 09/28/08; Revisions required 2. NRC Staff is incorporating Minimum Inventory portion of ISG into SRP (NUREG 800) 3. The industry provided comments on the ISG for minimum inventory to the NRC staff in a public meeting on March 19 for consideration of incorporation of improved guidance into the SRP. 4. Industry has submitted an EPRI Report further defining Minimum Inventory to the NRC for comment and will be the topic of an April 16 public meeting. The goal of the industry is to have the NRC staff formally endorse the EPRI document as an acceptable method for determining minimum inventory. 5. NRC action to review White Paper and to revise ISG 6. Problem Statement considered open 	<p>Problem Statement addressed by ISG issued 09/28/07. The staff disagrees that an ISG revision is needed. The staff considers this closed.</p> <p>Any new information or comments will be considered for incorporation into a revision of the SRP.</p>
TWG 5	<p>Problem Statement 2: Computerized Procedures and Soft Controls. Review existing NRC regulatory guidance, positions, and acceptance criteria, and make necessary changes, to facilitate</p>	<ol style="list-style-type: none"> 1. The industry provided comments on the ISG for minimum inventory to the NRC staff in a public meeting March 19 for consideration of incorporation of improved guidance into the SRP. 	<p>Problem Statement addressed by ISG issued 09/28/07. The staff disagrees that an ISG revision is needed. The staff considers this closed.</p>

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

Task Working Group	Problem Statement	NEI Status	NRC Status
	<p>consistent and efficient licensing of computerized procedures and soft controls in highly integrated control rooms. Develop guidance and acceptance criteria, if necessary, to minimize the impact of degraded digital instrumentation and controls associated with computerized procedures and soft controls on human performance.</p>	<ol style="list-style-type: none"> 2. The industry provided comments on the ISG for computerized procedures to the NRC staff in a public meeting on March 19 for consideration of incorporation of improved guidance into NUREG 711. 3. Industry has submitted an EPRI Report further defining Computerized Procedures to the NRC for comment. The goal of the industry is to have the NRC staff formally endorse the EPRI document as an acceptable method for developing computerized procedures. 4. NRC action to review White Paper and to revise ISG 5. Problem Statement considered open 	<p>Any new information or comments will be considered for incorporation into a revision or supplement of the NUREGs containing human factor review guidelines.</p>
<p style="text-align: center;">TWG 5</p>	<p>Problem Statement 3: Safety Parameter Display System (SPDS). Review existing NRC regulatory guidance, positions, and acceptance criteria to determine the need to revise 10CFR50.34 (f)(iv) and associated guidance, and make necessary changes, relative to safety parameter display consoles to ensure consistent understanding of the term "console."</p>	<ol style="list-style-type: none"> 1. No actions in progress with the NRC staff or Industry. 2. NRC and Industry agree 3. NRC action to incorporate new wording in permanent guidance 4. Problem Statement considered open 	<p>The staff agrees. The staff will pursue a rule change or other changes to regulatory guidance to address this issue. This Problem Statement is considered Open.</p>
<p style="text-align: center;">TWG 5</p>	<p>Problem Statement 4: Graded Approach to Human Factors. Review existing NRC regulatory guidance, positions, and acceptance criteria, and make necessary changes, to facilitate consistent and efficient licensing using a</p>	<ol style="list-style-type: none"> 1. The NRC staff and Industry have agreed at a working level that an ISG is not required and this problem statement should be closed. 2. NRC remove Problem Statement from Project Plan 	<p>The staff agrees. The staff will reflect closure of this Problem Statement in the next update to the Project Plan.</p>

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

Task Working Group	Problem Statement	NEI Status	NRC Status
	graded approach to the review of human factors aspects of highly-integrated control rooms.	3. Problem Statement considered open	
TWG 5	Problem Statement 5: Manual Operator Actions. Clarification is desired on the use of operator action as a defensive measure and corresponding acceptable operator action times.	<ol style="list-style-type: none"> 1. NRC Staff is developing an ISG with a due date for draft issuance in May 2008 and approval in July 2008. 2. The industry has prepared an EPRI report on a methodology for using manual operator action and has submitted the paper for NRC comment. This was the topic of a public meeting on March 19. The industry has incorporated comments and has emailed that revision to the NRC TWG. 3. The NRC staff and Industry are preparing a pilot program to test the industry white paper mythology. 4. NRC to prepare ISG 5. Problem Statement considered open 	The staff agrees that this Problem Statement is open. However, after the last public meeting, the staff has decided that the target date for issuance of ISG needs to be revised to 10/31/08.

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

TASK WORKING GROUP 6: LICENSING PROCESS

PROBLEM STATEMENTS: 4

OPEN: 4

CLOSED: 0

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 6	Problem Statement 1: Level of Detail. Adequate guidance on the level of detail in licensing actions for operating reactors necessary to begin and complete the regulatory reviews.	<ol style="list-style-type: none"> 1. ISG issued 10/15/07; Revisions required 2. Awaiting ISG expected 04/15/08 3. After receipt, creating a white paper on format and content on DI&C LAR 4. Duke's Pilot Project validating ISG, providing lessons learned 5. NRC action to revise ISG 6. All Problem Statements considered open 	The staff is preparing an ISG to address this issue. The ISG referenced is considered draft. Due to issues that are being worked out during the review of the Oconee submittal, the staff has decided that the target date for issuance of the ISG needs to be moved. This Problem Statement is considered open.
TWG 6	Problem Statement 2: Applicability. Clear guidance for operating reactors regarding the applicability of Chapter 7 of the Standard Review Plan (NUREG-0800) to digital instrumentation and control upgrades.		The staff is preparing an ISG to address this issue. The draft ISG provides guidance. This Problem Statement is considered open.
TWG 6	Problem Statement 3: Clear Process Protocols. Clear licensing process protocols for developing the application and NRC review of digital technology licensing actions.		The staff is preparing an ISG to address this issue. The ISG referenced is considered draft. Due to issues that are being worked out during the review of the Oconee submittal, the staff has decided that the target date for issuance of the ISG needs to be moved. This Problem Statement is considered open.

**DIGITAL INSTRUMENTATION AND CONTROLS
PROBLEM STATEMENT STATUS**

Last Updated: May 12, 2008

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 6	Problem Statement 4: Clear Guidance. Clear guidance on licensing criteria for cyber security in DI&C safety systems needs to be developed.		The staff will address this issue in future revisions to the ISG. This Problem Statement is considered open.

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

TASK WORKING GROUP 7: FUEL CYCLE FACILITIES

PROBLEM STATEMENTS: 5

OPEN: 5

CLOSED: 0

Task Working Group	Problem Statement	NEI Status	NRC Status
TWG 7	Problem Statement 1: Guidance is needed for reviewing and approving the adequacy of cyber security measures proposed for securing critical digital assets described within license and license amendment applications for fuel cycle facilities.	<ol style="list-style-type: none"> 1. No ISG issued 2. New Project Manager refining Problem Statements and Plan inputs 3. Draft ISG in progress; monthly meetings 4. NRC action to revise Project Plan 5. All Problem Statements considered open 	The staff is preparing an ISG to address this issue. This Problem Statement is considered open.
TWG 7	Problem Statement 2: For Part 70 fuel cycle facilities, clarification is needed as to what constitutes adequate diversity [as required in the performance requirements of 10 CFR 70.61 and 70.64 (a)(9)] and defense-in-depth [as stated in the context of 70.64(b)] in the design of digital systems.		The staff is preparing an ISG to address this issue. This Problem Statement is considered open.
TWG 7	Problem Statement 3: Guidance is needed to identify appropriate means of addressing the need for independence of control system channels and functions in order to meet the double contingency requirements of 10 CFR 70.64(a)(9) for criticality safety. Guidance is also needed to clarify the applicability and need for channel independence for digital I&C equipment performing noncriticality related safety		The staff is preparing an ISG to address this issue. This Problem Statement is considered open.

DIGITAL INSTRUMENTATION AND CONTROLS PROBLEM STATEMENT STATUS

Last Updated: May 12, 2008

Task Working Group	Problem Statement	NEI Status	NRC Status
	actions.		
TWG 7	Problem Statement 4: Guidance is needed to identify appropriate means of addressing the need for isolation, separation, and protection of input signals, logic operations, operator information, and actuation functions of digital I&C systems performing safety-related functions from those performing non-safety functions when they may be sharing common operator interface devices.		The staff is preparing an ISG to address this issue. This Problem Statement is considered open.
TWG 7	Problem Statement 5: Guidance is needed to clarify acceptable means of achieving high quality software used in digital I&C applications used for safety functions within fuel cycle facilities to minimize the occurrence of potential common cause software failures.		The staff is preparing an ISG to address this issue. This Problem Statement is considered open.