

PROJECT PLAN - TWG #1 CYBER SECURITY

1. BACKGROUND:

In December 2005 the NRC Office of Nuclear Security and Incident Response (NSIR) endorsed Nuclear Energy Institute (NEI) guidance document NEI 04-04, "Cyber Security Programs for Power Reactors," Revision 1, dated November 18, 2005, as an acceptable method for establishing and maintaining a cyber security program at nuclear power plants. In January 2006, the NRC published Revision 2 to Regulatory Guide (RG) 1.152, "Criteria for Use of Computers in Safety Systems of Nuclear Power Plants," as "acceptable for complying with the Commission's regulations for promoting high functional reliability, design quality, and cyber security for the use of digital computers in safety systems of nuclear power plants."

In October 2006, NRC, NEI, and industry representatives met and discussed, among other things, how to resolve differences between the various regulatory guidance documents pertaining to cyber security of power reactors. The primary objective of this effort will be to provide a coherent set of guidance for future Combined License Applications, or existing licensees who may be developing plant-specific Digital Instrumentation and Control (DI&C) system upgrades. Specific problem statements (see Section 3) were developed based on the October meeting and subsequent input from industry for consideration by the Cyber Security Task Working Group (TWG).

2. SCOPE:

This TWG will be focusing its efforts in addressing inconsistencies within existing NRC and industry cyber security guidance documents. Specifically, the working group will be evaluating the differences between Regulatory Guide 1.152, and NEI 04-04. Chapter 7 of the SRP (e.g., SRP Appendix 7.1-D) will be reviewed at a later date to assure consistent cyber security guidance. The resulting deliverable will be used to modify these documents to build a coherent set of guidance. These documents will potentially be consolidated to provide consistent guidance based on existing requirements.

The development of guidance documents in support of the final cyber security rule, 10CFR73.55(m), is beyond the scope of this working group. The evaluation of specific cyber security technologies, such as firewalls and IDS, is also not within the scope of this task.

3. PROBLEM STATEMENT:

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.

4. DELIVERABLES:

Develop one or more interim guides to document the regulatory and design guidance developed by the Cyber Security TWG relative to cyber security for digital systems used at nuclear power plants and fuel facilities.

Draft

5. Milestones, Assignments, and Deliverables:

NEI Comments: Dates previously agreed upon with NRC staff on these issues were not in the April 13 project plans. The dates need to be re-established and agreed upon.

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due date	Fsct/Actual	Lead	Support
Complete gap analysis of RG1.152R2 and NEI 04-04	✓	Apr 30	A	NRC	NEI
CRGR interaction (as needed)		TBD	F	NRC	n/a
Issue draft interim guidance for public comment	✓	July 20	F	NRC	NEI
Receive public comments		TBD	F	NRC	n/a
CRGR interaction (as needed)		TBD	F	NRC	n/a
ACRS interaction (as needed)		TBD	F	NRC	n/a
Issue final interim guidance if appropriate	✓	Sept 28	F	NRC	n/a
LONG-TERM					
Revise RG 1.152 and SRP	✓	TBD	F	NRC	n/a
Complete Rulemaking on 10CFR73.55(m)		TBD	F	NRC	n/a
Develop consensus standard that addresses acceptable cyber security practices		TBD	F	NEI	n/a
Issue regulatory guidance related to final rule 10CFR73.55(m), including endorsement of industry standard(s)	✓	TBD	F	NRC	n/a

PROJECT PLAN - TWG # 2 DIVERSITY AND DEFENSE-IN-DEPTH

3. PROBLEM STATEMENT:

Nuclear industry and NRC guidance does not explicitly identify what constitutes acceptable diversity and defense-in-depth in nuclear facility safety system designs. The following issues should be addressed to resolve this issue.

- g. 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
5. Containment conditions

~~Current nuclear power plant designs maintain the above safety functions within safe margins using the following echelons of defense:~~

BTP-19 guidance references the following echelons of defense, described in NUREG-6303, for currently operating nuclear power plants:

1. Control systems
2. Reactor Trip System (RTS)
3. Engineered Safety Features Actuation System (ESFAS)
4. Monitoring and indications

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 procedures that affect how diversity and defense-in-depth are actually used to maintain the safety functions.

NEI Comment 1.

In problem statement 3g (Echelons of Defense), replace "Current nuclear power plant designs maintain the above safety functions within safe margins using the following echelons of defense" with "BTP-19 describes the following echelons of defense". The current wording implies that existing plants use all four echelons to provide back-up functions for each other.

In reality, not all echelons are required for a given transient.

Proposed Staff Resolution: The staff agrees on the comment, and the wording would be modified as noted above in blue letters.

- h. Single Failure: Additional clarification is needed regarding the acceptance criteria for addressing common cause failures versus the acceptance criteria for addressing single failures in safety system designs.

Draft

5. MILESTONES, ASSIGNMENTS AND DELIVERABLES:

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fsct/Actual	Lead	Support
1 Adequate Diversity					
1a) Propose acceptable diversity and defense-in-depth strategies on the basis of approaches used by other countries, industries, and agencies and recommendations by academia and scientific organizations.		TBD	F	NEI	N/A
1b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
1c) Receive public comments		TBD	F	NRC	N/A
1d) CRGR interaction (as needed)		TBD	F	NRC	N/A
1e) ACRS interaction (as needed)		TBD	F	NRC	NEI
1f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A
2 Manual Operator Actions					
2a) Develop criteria for specifying response times for manual operator actions as a component of a diversity and defense-in-depth strategy		TBD	F	NEI	N/A
2b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
2c) Receive public comments		TBD	F	NRC	N/A
2d) CRGR interaction (as needed)		TBD	F	NRC	N/A
2e) ACRS interaction (as needed)		TBD	F	NRC	NEI
2f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A
3 Credit for Leak Detection					
3a) Identify bases and criteria for crediting leakage detection as part of an acceptable diversity strategy.		TBD	F	NEI	N/A

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fscst/Actual	Lead	Support
3b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
3c) Receive public comments		TBD	F	NRC	N/A
3d) CRGR interaction (as needed)		TBD	F	NRC	N/A
3e) ACRS interaction (as needed)		TBD	F	NRC	NEI
3f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A
4 BTP-19, Position 4 Challenges					
4a) Clarify BTP-19 guidance regarding the use of component-level and system-level manual initiations of safety functions.		TBD	F	NRC	NEI
4b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
4c) Receive public comments		TBD	F	NRC	N/A
4d) CRGR interaction (as needed)		TBD	F	NRC	N/A
4e) ACRS interaction (as needed)		TBD	F	NRC	NEI
4f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A
5 Effects of Common-Cause Failure					
5a) Develop guidance for evaluating potential common-cause failures and for specifying the failure states that should be integrated into safety system design basis analyses, considering both failures to actuate and spurious actuations.		TBD	F	NRC	NEI
5b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
5c) Receive public comments		TBD	F	NRC	N/A
5d) CRGR interaction (as needed)		TBD	F	NRC	N/A
5e) ACRS interaction (as needed)		TBD	F	NRC	NEI

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fscst/Actual	Lead	Support
5f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A
6 Common-Cause Failure Applicability					
6a) Identify acceptance criteria for design attributes that could eliminate consideration of common-cause failures in safety system designs. These attributes could include, for example, the degree of simplicity, complexity measurements, and robustness of system design.		TBD	F	NRC	NEI
6b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
6c) Receive public comments		TBD	F	NRC	N/A
6d) CRGR interaction (as needed)		TBD	F	NRC	N/A
6e) ACRS interaction (as needed)		TBD	F	NRC	NEI
6f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A
7 Echelons of Defense					
7a) Develop guidance and acceptance criteria for appropriate levels of defense-in-depth in safety system designs, and application principles for defense-in-depth in safety system designs.		TBD	F	NRC	NEI
7b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
7c) Receive public comments		TBD	F	NRC	N/A
7d) CRGR interaction (as needed)		TBD	F	NRC	N/A
7e) ACRS interaction (as needed)		TBD	F	NRC	NEI
7f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fscst/Actual	Lead	Support
8 Single Failure					
8a) Develop guidance that addresses consideration of software failures with respect to single failure licensing basis considerations.		TBD	F	NRC	NEI
8b) Issue draft interim guidance if appropriate	✓	TBD	F	NRC	N/A
8c) Receive public comments		TBD	F	NRC	N/A
8d) CRGR interaction (as needed)		TBD	F	NRC	N/A
8e) ACRS interaction (as needed)		TBD	F	NRC	NEI
8f) Issue final interim guidance if appropriate	✓	TBD	F	NRC	N/A
LONG-TERM					
Revise consensus standards (e.g., IEEE), if appropriate Work with other organizations to incorporate diversity and defense-in-depth standards into consensus standards, if appropriate		TBD	F	NEI	N/A
Issue permanent regulatory guidance for milestones 1-8, if appropriate	✓	TBD	F	NRC	N/A

NEI Comment 2.

The Milestones, Assignments, and Deliverables table has a long-term item to “Revise consensus standards (e.g., IEEE), if appropriate.” That item should be revised as follows: “Work with other organizations to incorporate diversity and defense-in-depth standards into consensus standards, if appropriate.”

Proposed Staff Resolution: The staff agrees on the comment, and the wording would be modified as noted above in blue letters.

PROJECT PLAN - TWG # 3 RISK-INFORMING DIGITAL I&C

3. PROBLEM STATEMENT:

The NRC and nuclear power industry share the goal of risk-informing the decision-making in licensing reviews of digital systems for current and future reactors and fuel facilities. However, currently there is no detailed guidance on what would constitute adequate digital system modeling in probabilistic risk assessments (PRAs), including: modeling of digital system common-cause failures (including software), level of modeling detail, failure data, adequacy of modeling methods, uncertainties and interfacing digital system models with the rest of the PRA. There is also no detailed guidance on integrating risk insights into digital system reviews or risk-informing digital system reviews.

PROBLEM 1

Existing guidance does not provide sufficient clarity on how to use current methods to properly model digital systems in PRAs for design certificate applications or license applications (COL) under Part 52. The issue includes addressing common-cause failure modeling and uncertainty analysis associated with digital systems.

PROBLEM 2

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 in operating reactor licensing action requests.

We believe Problem Statements 1 and 2, and the associated plans, reflect our concerns. We appreciate NRC staff input at the April 12, 2006 Risk TWG meeting regarding comments and observations on PRAs submitted for Design Certification applications (Problem Statement 1). NEI will continue to develop a technical paper that we believe will facilitate a more efficient licensing process for both COL and Design Certification applications. In addition, we agreed to provide a technical paper on a screening process associated with using risk insights in diversity and defense in depth evaluations (Problem Statement 2).

PROBLEM 3

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 for current and future reactors and fuel facilities.

With respect to Problem Statement 3, we do not believe that this statement adequately depicts the issue and state of the art in PRA modeling of digital systems. We do not believe that either industry or NRC has clearly determined that “detailed modeling” or an “advancement in the state-of-the-art” are needed to permit risk-informed decision making relative to digital system applications. NRC Research has not clearly shown that the current PRA modeling methods are unsatisfactory for digital systems in nuclear power plants. Therefore we believe:

- Research should focus current efforts on analyzing the vulnerabilities in traditional PRAs that we use today, and gaining consensus in this area among stakeholders.
- Once vulnerabilities are identified, NRC staff should collaborate with stakeholders to identify possible ways to address them without new modeling techniques.

We do not believe that dynamic modeling has been shown to be viable or necessary in modeling digital systems. For example, NUREG 6901 lists the characteristics of digital I&C systems for which dynamic modeling may provide benefit. We believe that designers can address these characteristics, obviating the need for dynamic modeling. We are concerned that the cost of implementing this type of modeling tool would be prohibitive and unnecessary given no safety benefit has been shown from the use of this tool. We believe that current research should be directed toward improving current modeling techniques by:

- Defining software failure probabilities
- Identifying failure modes and effects
- Assessing failure data

Further discussion is needed to reach consensus on a path forward relative to identifying a meaningful and effective approach for risk informing digital application reviews. We believe this Problem Statement 3 should be revised to reflect the lack of consensus regarding the adequacy of current modeling techniques for risk informing digital system application reviews.

4. DELIVERABLES:

For Problem 1:

- a. Issue interim guidance addressing use of current methods in modeling of digital systems for design certification and COL application PRAs.
- b. In the longer term, update regulatory guidance as needed (SRP, Regulatory

Guides, etc.).

For Problem 2:

- a. Develop, if possible, an acceptable approach for using risk insights in operating reactor and fuel facility licensing reviews of digital systems, including consideration of proposed industry methods.
- b. If an acceptable approach can be established, issue interim guidance and acceptance criteria for use of risk insights in operating reactor and fuel facility licensing reviews of digital systems.
- c. In the longer term, update regulatory guidance as needed (SRP, Regulatory Guides, etc.).

For Problem 3:

- a. Identify an approach to implement appropriate collaboration with and leverage the capabilities of the industry, international counter parts, other industries and NRC staff and contractors to develop the technical basis for state-of-the-art methods for modeling of digital systems to support risk-informed decision-making for digital systems, including: (1) review of current modeling methods (including software modeling), (2) characteristics of acceptable modeling methods, (3) assessment of failure data, (4) criteria for level of modeling detail, (5) assessment of uncertainties, and (6) defining how to interface digital system models with the rest of the PRA. [See NEI Comments above](#)
- b. Issue regulatory guidance on risk-informed decision-making review methods applicable to digital I&C systems. [See NEI Comments Above](#)
- c. Update NRC PRA data, models and tools to support NRC assessment of digital system risk and reliability. [See NEI Comments above](#)

5. MILESTONES, ASSIGNMENTS AND DELIVERABLES:

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due date	Fscf/Actual	Lead	Support
From Problem Statement 1					
1a) Industry provides technical paper that discusses lessons learned and proposed guidelines associated with modeling of digital systems for DC and COL applications	✓	May 2007	F	NEI	N/A
1b) CRGR interaction (as needed)			F	NRC	
1c) Issue draft interim guidance if appropriate	✓	April 2008	F	NRC	N/A
1d) Receive public comments.		May 2008	F	NRC	N/A
1e) CRGR interaction (as needed)			F	NRC	
1f) ACRS interaction (as needed)			F	NRC	
1g) Issue final interim guidance if appropriate	✓	September 2008	F	NRC	N/A
From Problem Statement 2					
2a) Industry provides technical paper that proposes simplified modeling methods using risk insights to support reviews of operating plant digital systems.	✓	May 2007	F	NEI	N/A
2b) CRGR interaction (as needed)			F	NRC	
2c) Issue draft interim guidance if appropriate	✓	April 2008	F	NRC	N/A

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due date	Fsct/Actual	Lead	Support
2d) Receive public comments.		May 2008	F	NRC	N/A
2e) CRGR interaction (as needed)			F	NRC	
2f) ACRS interaction (as needed)			F	NRC	
2g) Issue final interim guidance if appropriate	✓	September 2008	F	NRC	N/A
LONG -TERM					
From Problem Statement 3 Dynamic and Traditional PRA					
3a) Develop risk-Informed decision-making review methods applicable to digital systems.	✓	March 2009	F	NRC	N/A
3b) CRGR interaction (as needed)					
3c) Issue draft guidance	✓	July 2009	F	NRC	N/A
3d) Receive public comments.		September 2009	F	NRC	N/A
3e) ACRS interaction		December 2009	F	NRC	
3f) CRGR interaction		February 2010	F	NRC	
3g) Issue final guidance	✓	April 2010	F	NRC	N/A

PROJECT PLAN - TWG #4 HIGHLY INTEGRATED CONTROL ROOM - COMMUNICATIONS ISSUES

1. BACKGROUND:

The Highly Integrated Control Room-Communications Issues (HICRc) Task Working Group (TWG) will address HICR design issues related to communications involving digital equipment in nuclear safety service. This action is needed to support development of the design and procurement specification for simulators for new plants and for the design and implementation of digital retrofits at existing plants. Specifically, this TWG will address all communication design provisions between safety divisions¹, and between safety and non safety divisions. In this context, "communication" means any transmittal or reception of data, information, or commands.

There are clear potential advantages to the implementation of some types of cross-divisional communication within digital systems. However, preservation of adequate independence for digital systems communications is essential. The objective of this task working group is to evaluate cross-divisional communication interactions and to clarify design and licensing criteria by which beneficial interactions may be accomplished while maintaining adequate safety margin.

2. SCOPE:

The following types of communication interactions will be addressed by the TWG:

- a. Communication among redundant electrical divisions
- b. Communication between any safety channel and anything external to that division
- c. Control of safety equipment in multiple divisions from a single workstation
- d. Control of safety equipment from a nonsafety workstation
- e. Commingling of safety and nonsafety controls or indications on a single workstation
- f. Connection of nonsafety programming, maintenance, and test equipment to redundant safety divisions during operation

The following are explicitly excluded from the scope of this task:

- g. Communication within a single safety division
- h. Communications which do not involve a safety channel

Cyber-Security, Diversity and Defense-in-Depth, and Human Factors (HF)

¹ The terms "channel" and "division" are used herein in accordance with the definitions of those terms in IEEE 603-1991.

considerations are all closely related to the general concept of cross-divisional communications. However, these issues are being addressed by other TWGs. Therefore coordination with each associated TWG will be necessary to ensure that HICRc TWG activities are consistent with, and supportive of, the solutions that they will provide.

Except as specifically addressed in the resolution of the issues identified above, physical separation and electrical isolation requirements for digital equipment are the same as for non-digital equipment. Physical separation and electrical isolation will not be addressed separately in this task. Similarly, seismic and environmental qualification requirements are not included in this task.

3. PROBLEM STATEMENT:

Industry and NRC guidance documents do not define at a sufficient level of detail the expectation 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 Generating Stations") do not provide sufficient guidance for inter-divisional 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 capability to accomplish the safety function during and following any design basis event requiring that safety function."
- d. Standard Review Plan Chapter 7 includes conflicting guidance regarding communication independence.

4. DELIVERABLES:

- a. Issue interim guidance that will document an acceptable degree of communications independence for digital systems.
- b. Facilitate a revision to IEEE 7-4.3.2.
- c. Revise Regulatory Guide 1.152.

- d. Update the Standard Review Plan guidance to provide acceptable regulatory and licensing criteria for communications independence of digital systems.

5. DISCUSSION:

The TWG will consider the possibility that the needs of new and existing facilities are different, and will include accommodation of such differences in the guidance documentation if necessary. It is initially anticipated that there will be no difference in the guidance for new and existing facilities.

Final guidance relating to control room design is needed to support final specification and design of the simulators for new plants. It is anticipated that the first simulators will need to be ordered in mid-2009, and that about 18 months will be required between the time the guidance is issued and the first simulators are ordered. The guidance is therefore needed by early 2008. To allow for a reasonable amount of schedule float, the TWG anticipates completing its work in mid-2007.

It is noted that support of simulator procurement requires only that the conceptual design of the control room be completed. It does not require that the details of the internal workings of the operator interfaces be fully developed. The efforts of this TWG will influence the nature and layout of the control room in that requirements relating to the disposition and application of operator interface workstations could be affected, but those influences will be limited to whether various operator-interface design provisions will or will not be considered acceptable (for example, whether or under what design constraints it might be acceptable for a single control station to include both safety and nonsafety functions). The efforts of other TWG will have greater influence upon control room design and layout, such as the TWG working on Diversity and Defense-in-Depth (D3) requirements, and the TWG working on details of Human-Machine Interfaces (HMI) from a Human Factors (HF) standpoint.

In the near term (defined as in support of simulator procurement for the first of the anticipated new plants), the TWG will produce guidelines describing appropriate design provisions and limitations. These guidelines will include a statement of the fundamental requirements and specific regulatory criteria that must be observed. The HICRc TWG will also provide recommendations for revisions to RG1.152, IEEE 7-4.3.2, applicable Standard Review plan sections, and other regulatory guidance and industry standards as deemed necessary.

The TWG will give due consideration to the burdens (e.g., costs, labor) that might be imposed upon both applicants and NRC staff as a result of specific guidance. For example, acceptance of a certain provision might require detailed staff review in an area not presently subject to such review. This would impose a burden upon an applicant in that additional materials must be assembled for inclusion in the application package, some of which may be proprietary and thus require the development of a redacted version as well as the full version, and upon the NRC in the actual review of the subject details. The cost of such a provision in terms of resources, review effort, and review time extension should be considered in relation to the potential benefits of such an

approach relative to an approach that is simpler from a regulatory point of view.

In addition, it is anticipated that the TWG will make all reasonable efforts to provide guidance that will not involve significant changes in NRC policy and will not require rulemaking. It is anticipated that industry objectives can be met within the existing regulations.

6. CRITICAL PATH AND STEPS TO SUCCESS:

In order to accomplish its mission, the HICRc TWG may need to have timely access to detailed information concerning proposed reactor designs. The TWG will make every reasonable effort to obtain specific design information needed to support its work, relying principally upon the efforts of the industry contacts assigned by NEI. However, if extended correspondence with reactor vendors is required in an effort to obtain the needed information, or if information availability is restricted by intellectual property rights issues or other issues, the TWG may recommend deferral of review of the respective designs until such design details are made available, or recommend other compensatory action to the NRC Digital I&C Steering Committee. In such a case, the TWG would proceed on the basis of generic considerations. The NRC Digital I&C Steering Committee should be advised promptly if such a situation occurs.

The primary efforts of the TWG will include the following:

- a. Develop a statement describing the existing regulatory requirements and regulatory guidance associated with cross-divisional interactions, without consideration of specific proposed designs. This statement will establish the fundamental restrictions and requirements, or boundaries, for the ultimate products of the HICRc TWG.
- b. Develop a detailed and prioritized listing of the design concepts to be considered by the TWG. The TWG will address the associated design and licensing issues in accordance with this prioritization. To support the development and prioritization of this listing, the TWG will request that the industry contacts provide their collective best estimate of the types of cross-channel interactions that have actually been proposed or planned, with indication of the level of interest in the use of each type. Consideration should include new plants, existing plants, and fuel cycle facilities. The objective of this advice is to ensure that the TWG addresses the types of interactions that are of greatest interest to industry. For example, perhaps many system designers plan to use scratchpad-based data exchange and some but very few plan to use Ethernet-based direct communication between safety processors: then the TWG would address the more widespread practice first and the less widespread practice later. If it determines that some type of interaction is planned for use by only a very few suppliers but that type of interaction is highly desirable or problematical, the TWG may choose to address that issue early in order to get the word out that type of

interaction may be easy or difficult to license.²

- c. Obtain preliminary results of the on-going NRC/RES research project concerning communications issues regarding highly-integrated control rooms. This research is exploring similar issues in other countries, and it is expected that the results may be useful to this TWG.
- d. Develop a list of regulatory and design requirements applicable to each type of interaction. Include the basis for each requirement.
- e. Develop a draft annotated outline for the guidance document(s), including draft acceptance criteria for each item.
- f. Industry (via NEI) review and comment on the draft outline and proposed acceptance criteria.
- g. Develop detailed guidance recommendations to be implemented in the interim guidance document(s).
- h. Develop regulatory and design guidance document(s) addressing communications independence for digital systems. The guidance should include specific acceptance criteria for types of interactions found to be acceptable, and should also include descriptions of types of interactions found to be unacceptable.

² This prioritization will not preclude or affect NRC consideration of interactions proposed in license requests that have already been submitted or that are submitted in the future. License requests that fall outside the recommendations of the TWG or that are contrary to them will be considered by the NRC on a case-by-case basis.

7. MILESTONES, ASSIGNMENTS AND DELIVERABLES:

NEAR-TERM					
Milestones, Assignments and Deliverables	deliverable	Due Date	Fcst /Actual	Lead	Support
1. Communication Independence					
1a) Receive industry proposals for HICR communication design concepts	✓	June 1, 2007 ³	F	NEI	N/A
1b) Identify regulatory & design requirements with basis for each type of interaction		June 22, 2007 ⁴	F	NRC	NEI
1c) Issue draft interim guidance if appropriate	✓	Sept 7, 2007 ⁵	F	NRC	N/A
1d) Receive public comments			F	NEI/NRC	N/A
1e) CRGR interaction (as needed)			F	NEI/NRC	N/A
1f) ACRS interaction (as needed)			F	NRC	NEI
1g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
LONG-TERM					
1h) Work with IEEE on modifications to 7-4.3.2 – anticipate issue by:	✓		F	NEI	NRC
1i) Issue revised RG 1.152	✓		F	NRC	N/A
1j) Issue revised SRP	✓		F	NRC	N/A

Excerpt from NEI letter of April 25, 2007:

TWG #4: Highly Integrated Control Room – Communications Project Plan Comments

1. The following changes should be made to the Milestones, Assignments, and Deliverables table on page 6:

a. NEI is listed as the lead for items 1d (Receive public comments) and 1e (CRGR interaction). NRC should be the lead for those items.

b. Based on discussions between industry and the NRC Task Working Group, the due dates should be June 1, 2007, for deliverable 1a (Receive industry proposals for HICR communication design concepts) and September 7, 2007, for deliverable 1c (Issue draft interim guidance if appropriate).

³per NEI letter of April 25, 2007

⁴agreed in HICRc TWG public meeting of April 24, 2007

⁵per NEI letter of April 25, 2007

PROJECT PLAN - TWG #5

HIGHLY INTEGRATED CONTROL ROOM - HUMAN FACTORS

3. PROBLEM STATEMENT:

Existing Human Factors Engineering (HFE) regulatory positions, review guidance, and acceptance criteria for the areas discussed below are obsolete, insufficiently detailed, subject to interpretation, or, in some cases, non-existent. Therefore, their application to new reactors, modernizing programs, and fuel facilities should be reviewed to determine applicability, modified as needed, or newly developed to facilitate the licensing of such facilities. The following should be addressed to resolve this issue:

NEI Comment: Existing Human Factors Engineering (HFE) regulatory positions, review guidance, and acceptance criteria for the areas discussed below may be insufficient for application to new digital Human-System Interface (HSI) technology. Therefore, the guidance, positions, and acceptance criteria should be modified or developed, as needed, to facilitate consistent and efficient licensing of operating and new reactors and fuel facilities.

Staff Revision: Existing Human Factors Engineering (HFE) regulatory positions, review guidance, and acceptance criteria for the areas discussed below may not be sufficient for application to new digital Human-System Interface (HSI) technology. Therefore, the guidance, positions, and acceptance criteria should be modified or developed, as needed, to facilitate consistent and efficient licensing of operating and new reactors and fuel facilities. The following should be addressed to resolve this issue.

- a. Minimum Inventory ~~There is no clear guidance or acceptance criteria for the definition of minimum inventory for alarms, controls, and displays, nor an accepted process for its development.~~

NEI Comment: "Existing guidance and acceptance criteria are not sufficiently detailed for computerized procedures to determine their effect on safety." Also, re-title to "Computerized Procedures" to ensure the scope is sufficiently limited. Note as "High" priority item.

Staff Revision: The term minimum inventory, as associated with alarms, controls, and displays, is used inconsistently in various regulatory documents and existing review guidance and acceptance criteria may not be sufficiently detailed to facilitate consistent and efficient regulatory review. (High priority)

- b. Procedures: ~~Existing guidance and review criteria are not sufficiently detailed for review of procedures, including computerized procedures, or to determine their effect on safety.~~

NEI Comment: “Computerized Procedures” Existing guidance and acceptance criteria are not sufficiently detailed for computerized procedures to determine their effect on safety. (“High” priority)

Staff Revision: Computerized Procedures: Existing review guidance and acceptance criteria may not be sufficiently detailed to facilitate consistent and efficient regulatory review of computerized procedures, especially in the areas of automation, operation under degraded conditions, and soft controls. .(High priority)

- c. ~~Manual Operator Actions: If credit for manual actions to replace failed digital systems is allowed by diversity and defense in depth guidance, a consistent and appropriate method is desired to demonstrate that operators can take timely and appropriate actions.~~

NEI Comment: “Support the Diversity and Defense in Depth (D3) TWG effort in developing a process to define the feasibility and reliability of operator actions in D3 evaluations.” (High priority).

Industry believes that the lead on this effort should clearly be the Diversity and Defense in Depth TWG

Staff Revision: Credit for Manual Operator Actions To the extent that the D3 guidance allows for credit for operator manual actions, the HFE review guidance and acceptance criteria may need to be enhanced.(High priority)

- d. ~~Soft Controls: Additional guidance may be needed for the review of soft controls given advancing technology (to reflect current state-of-the-art and anticipated state-of-the-art in future designs).~~

NEI Comment: “Current guidance needs to be reviewed to ensure it adequately addresses soft controls.” (“Low” priority).

Although the industry agreed with the proposed re-write, we (the industry) believe that the existing guidance is adequate.

Staff Comment: *Staff suggests merging into computerized procedures effort*

- e. ~~Emergency Response Capability: Current guidance and acceptance criteria for the review of the HFE aspects of the safety parameter display system may not be adequate for some adaptations to new digital systems.~~

NEI Comment: “Determine the need to revise 50.34 (f)(iv) or associated guidance relative to safety parameter display consoles.” (“Low” priority)

10 CFR 50.34 contains the following statement: “Provide a plant safety parameter display console that will display to operators a minimum set of parameters defining the safety status of the plant, capable of displaying a full range of important plant parameters and data trends on demand, and capable of indicating when process limits are being approached or exceeded. (I.D.2)” The industry determined that there does not appear to be an issue with new plant SPD consoles; however, we agreed to review to “Determine the need to revise 50.34 (f)(iv) or associated guidance relative to safety parameter display consoles.” This action is intended to ensure that existing guidance is not overly restrictive relative to the displays. We note this as a “Low” priority item.

Staff Revision: SPDS The term “console” in 10CFR50.34 (f)(iv) could be interpreted to require a stand alone SPDS station and existing review guidance and acceptance criteria may not be sufficiently detailed to facilitate consistent and efficient regulatory review of the various alternatives available for performing the SPDS function in a highly integrated control room (High priority)

Comment - Staff believes that enhancements to review guidance may be needed to ensure consistency in interpretation of the rule term “console” and that the priority should be High in order to avoid having to process multiple exemptions from the rule

- f. Role, Number, and Qualifications of Personnel: ~~Review guidance and acceptance criteria for the role of personnel, including staffing levels, training and qualifications (e.g., 10CFR50.54, 10CFR50.120, 10CFR55, ANS-3.1, Reg. Guides 1.8 and 1.114), may need to be updated.~~

NEI Comment: “Ensure that existing regulatory guidance and positions can accommodate changes to personnel roles and responsibilities that may result from implementing digital technology.” (“Medium” priority)

The group also clearly identified the need to ensure that the process for licensing operators is outside the scope of this group. NEI has developed a task force for new plant operator licensing issues and will be publicly meeting with NRC staff in the near future to discuss new plant issue

Staff Revision: Existing regulatory positions and guidance may not accommodate changes to personnel roles and responsibilities that may result from implementing a highly integrated control room. (Medium priority)

- g. Degraded Digital I&C: ~~Current guidance and acceptance criteria for the review of the HFE aspects of I&C systems may not adequately address conditions where the I&C systems are degraded, as opposed to failed, such that the operator may not have sufficient situational awareness to be able to take appropriate action.~~

NEI Comment: Delete this item.

Industry and NRC staff did not agree that this is an issue for digital I&C. The industry believes that existing design guidance is adequate to ensure that operators are knowledgeable and able to respond appropriately to degraded instrumentation. The industry recommend deleting this item.

Staff Comment: *Staff suggests merging into computerized procedures effort*

- h. ~~**Remote Shutdown Capability:** Current guidance and acceptance criteria for the review of the HFE aspects of remote shutdown capability may need to be modified for totally digital systems where there may be unique features of the new system or if the capability of the system is enhanced.~~

NEI Comment: Delete this item.

Industry and NRC staff did not agree that this is an issue for digital I&C. We believe existing guidance is sufficient if designers and licensees desire to expand the use of the remote shutdown panel beyond the traditional functionality. We therefore recommend deleting this item.

Staff Revision: Remote Shutdown Capability Determine if regulatory guidance or positions need to be enhanced to review expanded control capability at remote locations. (Medium priority)

- i. **NEI Comment:** New Problem Statement: "Work with the Communications TWG to address the HSI aspects of safety to non-safety communications." ("High" priority).

During a recent Communications TWG meeting, a potential issue was discussed related to Human-System Interface (HSI) and digital communications. At the April 19 meeting, industry and NRC staff agreed NEI would provide in this response a proposed problem statement (pending Steering Committee approval)

Staff Comment: *HFE staff has indicated to the Communications TWG, that control of safety related equipment from non-safety qualified VDUs would be unacceptable unless a stronger technical justification is provided based on OpE or research.*

- J. **NEI Comment:** New Problem Statement: "There currently are no clear guidance or acceptance criteria on a process to implement a graded approach to Human Factors Engineering." ("High" priority)

This problem statement was agreed upon at the March 1 meeting; however, it

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was deleted from the list in the April 6 and April 13 letters regarding a graded approach to Human Factors evaluations.

Although NUREG-0711 and the Standard Review Plan allow a graded approach to reviewing HFE analyses and activities, there is no NRC or industry guidance on how to accomplish this approach. This would include guidance for determining the specific types of HFE activities and levels of rigor that should be applied in those activities for designs or design changes having different levels of complexity and/or risk.

Staff Comment: *Comment - The Graded Approach to HFE was not discussed at the April 18 meeting. Staff needs to better understand industry's concern given the guidance available in the SRP, Chapter 18 and NUREG-1764.*

4. DELIVERABLES:

- a. Interim guidance describing or clarifying the current regulatory guidance and acceptance criteria on each of the identified problem areas will be developed.
- b. A listing of regulatory guidance documents, industry standards, and regulations (if needed) that should be revised.
- c. Final guidance, acceptance criteria, and regulations (if needed) addressing each of the problem areas will be developed.
- d. Update the Standard Review Plan guidance to provide acceptable regulatory and licensing criteria for new reactors, modernized LWRs, and fuel facilities.

5. MILESTONES, ASSIGNMENTS AND DELIVERABLES:

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fsct/Actual	Lead	Support
1 Minimum Inventory					
1a) Receive industry proposal on minimum inventory			F	NEI	N/A
1b) CRGR interaction (as needed)			F	NRC	N/A
1c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
1d) Receive public comments			F	NRC	N/A
1e) CRGR interaction (as needed)			F	NRC	N/A
1f) ACRS interaction (as needed)			F	NRC	NEI
1g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
2 Procedures					
2a) Receive industry white paper on computer-based procedures (Reference guidance - NUREG-0700, NUREG-0899, Reg. Guide 1.33, NUREG/CR -6634 & -6690, EPRI documents, ANS 3.2, IEC 964)			F	NEI	N/A
2b) CRGR interaction (as needed)			F	NRC	N/A
2c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
2d) Receive public comments			F	NRC	N/A
2e) CRGR interaction (as needed)			F	NRC	N/A
2f) ACRS interaction (as needed)			F	NRC	NEI

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fsct/Actual	Lead	Support
2g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
3 Crediting Operator Actions					
3a) Receive industry white paper on use of manual actions to determine the most effective means to credit operator actions (Reference guidance ANS-58.8, NUREG-1852, NUREG-1764)			F	NEI	N/A
3b) CRGR interaction (as needed)			F	NRC	N/A
3c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
3d) Receive public comments			F	NRC	N/A
3e) CRGR interaction (as needed)			F	NRC	N/A
3f) ACRS interaction (as needed)			F	NRC	NEI
3g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
4 Soft Controls					
4a) Agree on definition of the term "soft controls" and how it is best used in the regulatory context			F	NRC	NEI
4b) CRGR interaction (as needed)			F	NRC	N/A
4c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
4d) Receive public comments			F	NRC	N/A
4e) CRGR interaction (as needed)			F	NRC	N/A
4f) ACRS interaction (as needed)			F	NRC	NEI

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fsct/Actual	Lead	Support
4g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
5 Emergency Response Capability					
5a) Review safety parameter display system and related guidance to determine if gaps or inadequacies exist as related to digital systems to determine if 10CFR50.34(f) needs to be revised so that exemptions would not be needed to address SPDS and related functions			F	NRC	NEI
5b) CRGR interaction (as needed)			F	NRC	N/A
5c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
5d) Receive public comments			F	NRC	N/A
5e) CRGR interaction (as needed)			F	NRC	N/A
5f) ACRS interaction (as needed)			F	NRC	NEI
5g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
6 Role, Number, and Qualifications of Personnel					
6a) Review guidance and acceptance criteria for the role of personnel, including staffing levels, training and qualifications (e.g., 10CFR50.54, 10CFR50.120, 10CFR55, ANS-3.1, Reg. Guides 1.8 and 1.114) Establish scope of effort			F	NRC	NEI
6b) CRGR interaction (as needed)			F	NRC	N/A

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fsct/Actual	Lead	Support
6c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
6d) Receive public comments			F	NRC	N/A
6e) CRGR interaction (as needed)			F	NRC	N/A
6f) ACRS interaction (as needed)			F	NRC	NEI
6g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
7 Degraded Digital I&C					
7a) Define the scope of the issues associated with degraded I&C systems and review existing guidance and industry documents to determine any potential gaps in guidance			F	NRC	NEI
7b) CRGR interaction (as needed)			F	NRC	N/A
7c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
7d) Receive public comments			F	NRC	N/A
7e) CRGR interaction (as needed)			F	NRC	N/A
7f) ACRS interaction (as needed)			F	NRC	NEI
7g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
8 Safe Shutdown Capability					

NEAR-TERM					
Milestones, Assignments and Deliverables	Deliverable	Due Date	Fsct/Actual	Lead	Support
8a) Review current regulations and guidance related to safe shutdown capability and determine if there are gaps and if there is a technical basis for changes to HFE			F	NRC	NEI
8b) CRGR interaction (as needed)			F	NRC	N/A
8c) Issue draft interim guidance if appropriate	✓		F	NRC	N/A
8d) Receive public comments			F	NRC	N/A
8e) CRGR interaction (as needed)			F	NRC	N/A
8f) ACRS interaction (as needed)			F	NRC	NEI
8g) Issue final interim guidance if appropriate	✓		F	NRC	N/A
LONG-TERM					
Revise consensus standards (e.g., EPRI, ANS, IEEE, IEC) if appropriate			F	NEI	N/A
Issue permanent regulatory guidance for milestones 1-8, if appropriate	✓		F	NRC	N/A

PROJECT PLAN - TWG #6 LICENSING PROCESS ISSUES

3. PROBLEM STATEMENT:

The NRC and nuclear power industry share common goals for the safe, secure and efficient licensing of digital technology for both new reactors and operating reactors and fuel facilities. Key attributes that need to be addressed to facilitate digital technology licensing include:

- a. Adequate guidance on the level of detail in COL applications for new reactors and licensing action applications for operating reactors and fuel facilities necessary to begin, and complete, the regulatory reviews.
- b. Clear applicability of guidance for operating reactors and fuel facilities compared to new reactors, including the applicability of operating reactor change processes to new plant COLs and the applicability of Chapter 7 and Chapter 18 of the Standard Review Plan (NUREG-0800) to digital instrumentation and control upgrades for operating reactors and fuel facilities.

NEI 4/25/07: Problem statement b should apply to both Chapter 7 and Chapter 18 of the Standard Review Plan. Revise this problem statement as follows: "...and the applicability of Chapter 7 and Chapter 18 of the Standard Review Plan..."

- c. Clear licensing process protocols for implementing the submittal and NRC review of digital technology applications, including the consideration of the licensee submitting and NRC completing its review in stages, [and] considering the applicability of NRC review activities being conducted in the field.

NEI 4/25/07: Make the following editorial changes to problem statement c: "Clear licensing process protocols for implementing the submittal and NRC review of digital technology applications, including consideration of the licensee submitting and NRC completing its review in stages, and considering the applicability of NRC review activities being conducted in the field."

4. DELIVERABLES:

- a. Issue interim guidance addressing future Nuclear Energy Institute (NEI) Guideline (such as NEI 06-02 "License Amendment Request Guidelines"), which will provide specific guidance on the: (1) level of detail for digital instrumentation and control applications; and (2) applicability of NRC guidance for both new plant COLs, operating reactors, and fuel facilities.

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- b. NRC Regulatory Issue Summary 2002-22, dated November 25, 2002, endorsed the EPRI/NEI joint task force report, EPRI TR-102348, Rev. 1, NEI 01-01. The subject of that report was licensing digital upgrades. The issues discussed in that NRC endorsed report will be reviewed to assure the effectiveness of licensing process protocols. Discrepancies identified will be addressed by proposing permanent changes to guidance documents.
- c. Conforming changes for licensing process to Chapter 7 and Chapter 18 of NUREG-0800 and Regulatory Guide 1.206, as necessary to support outcomes of the other task working groups.

NEI 04/25/07: Revise deliverable c as follows to include Chapter 18: "Conforming changes for licensing process to Chapter 7 and Chapter 18 of NUREG-0800..."



NUCLEAR ENERGY INSTITUTE

Alexander Marion
EXECUTIVE DIRECTOR
NUCLEAR OPERATIONS & ENGINEERING
NUCLEAR GENERATION DIVISION

April 25, 2007

Mr. John A. Grobe
Associate Director for Engineering
and Safety Systems
U.S. Nuclear Regulatory Commission
Mail Stop O-5 E7
Washington, DC 20555

Subject: Comments on Task Working Group

Project Number: 689

Dear Mr. Grobe:

This letter provides the Nuclear Energy Institute's (NEI's)¹ comments to the six Task Working Group (TWG) project plans and problem statements provided by NRC staff letters dated April 6 and April 13, 2007. These comments were developed with input from industry participants on TWG and NEI's Digital I&C and Human Factors Working Group. We recommend that the schedules already established by TWGs be reflected in the project plans.

The TWG and Steering Committee concept provide us a unique opportunity to address digital technology issues in a more proactive manner and, therefore, ensure a more predictable licensing process. We appreciate NRC staff's efforts in identifying and addressing issues associated with Digital I&C applications in commercial nuclear power plants. We look forward to continued interactions with the NRC Steering Committee and the successful resolution of the issues we have jointly identified.

¹ NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

Mr. John A. Grobe

April 25, 2007

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If you have any questions regarding this letter, please contact me (202-739-8080; am@nei.org) or Jim Riley (202-739-8137; jhr@nei.org).

Sincerely,

A handwritten signature in cursive script that reads "Alexander Marion".

Alexander Marion

Attachment

Industry Comments on Task Working Group Plans

Project Plan General Comments

Industry has no comments on the Project Plan provided in the April 13 letter. Industry considers the priority of each item "High" unless otherwise noted.

TWG #1: Cyber Security Project Plan Comments

Dates previously agreed upon with NRC staff on these issues were not in the April 13 project plans. The dates need to be re-established and agreed upon.

TWG #2: Diversity and Defense-In-Depth Project Plan Comments

1. In problem statement 3g (Echelons of Defense), replace "Current nuclear power plant designs maintain the above safety functions within safe margins using the following echelons of defense" with "BTP-19 describes the following echelons of defense". The current wording implies that existing plants use all four echelons to provide back-up functions for each other. In reality, not all echelons are required for a given transient.
2. The Milestones, Assignments, and Deliverables table has a long-term item to "Revise consensus standards (e.g., IEEE), if appropriate." That item should be revised as follows: "Work with other organizations to incorporate diversity and defense-in-depth standards into consensus standards, if appropriate."

TWG #3: Risk-Informing Digital I&C Project Plan Comments

We believe Problem Statements 1 and 2, and the associated plans, reflect our concerns. We appreciate NRC staff input at the April 12, 2006 Risk TWG meeting regarding comments and observations on PRAs submitted for Design Certification applications (Problem Statement 1). NEI will continue to develop a technical paper that we believe will facilitate a more efficient licensing process for both COL and Design Certification applications. In addition, we agreed to provide a technical paper on a screening process associated with using risk insights in diversity and defense in depth evaluations (Problem Statement 2).

With respect to Problem Statement 3, we do not believe that this statement adequately depicts the issue and state of the art in PRA modeling of digital systems. We do not believe that either industry or NRC has clearly determined that "detailed modeling" or an "advancement in the state-of-the-art" are needed to permit risk-informed decision making relative to digital system applications. NRC Research has not clearly shown that the current PRA modeling methods are unsatisfactory for digital systems in nuclear power plants. Therefore, we believe:

- Research should focus current efforts on analyzing the vulnerabilities in traditional PRAs that we use today, and gaining consensus in this area among stakeholders.
- Once vulnerabilities are identified, NRC staff should collaborate with stakeholders to identify possible ways to address them without new modeling techniques.

We do not believe that dynamic modeling has been shown to be viable or necessary in modeling digital systems. For example, NUREG 6901 lists the characteristics of digital I&C systems for which dynamic modeling may provide benefit. We believe that designers can address these characteristics, obviating the need for dynamic modeling. We are concerned that the cost of implementing this type of modeling tool would be prohibitive and unnecessary given no safety benefit has been shown from the use of this tool. We believe that current research should be directed toward improving current modeling techniques by:

- Defining software failure probabilities
- Identifying failure modes and effects
- Assessing failure data

Further discussion is needed to reach consensus on a path forward relative to identifying a meaningful and effective approach for risk informing digital application reviews. We believe this Problem Statement 3 should be revised to reflect the lack of consensus regarding the adequacy of current modeling techniques for risk informing digital system application reviews.

TWG #4: Highly Integrated Control Room – Communications Project Plan Comments

1. The following changes should be made to the Milestones, Assignments, and Deliverables table on page 6:
 - a. NEI is listed as the lead for items 1d (Receive public comments) and 1e (CRGR interaction). NRC should be the lead for those items.
 - b. Based on discussions between industry and the NRC Task Working Group, the due dates should be June 1, 2007, for deliverable 1a (Receive industry proposals for HICR communication design concepts) and September 7, 2007, for deliverable 1c (Issue draft interim guidance if appropriate).

TWG #5: Highly Integrated Control Room - Human Factors Project Plan Comments

The Human Factors project plan states: "The following Human Factors problems, identified during the initial meetings of the Working Group, will be addressed..." Only one meeting has been held between industry and this TWG (March 1, 2007). The list provided in the April 6 and 13 NRC letters is not consistent with the list developed at the March 1 Human Factors TWG Meeting. In addition, no communication between industry and TWG members occurred from the time of the meeting and

the publication of the problem statements on April 6 regarding the changes to the jointly developed list.

This TWG met for the second time on April 19, 2007. At this meeting, industry provided several comments on the April 6 and 13 Problem Statements. Herein are the comments industry provided at the meeting, including the relative priority of the issues.

Problem Statement a: Revise as agreed upon at the April 19 meeting: "Eliminate the inconsistent use of the term "minimum inventory" and define acceptance criteria for "minimum inventory" associated with alarms, controls, and displays in regulatory documents." Note as "High" priority item.

Problem Statement b: as agreed upon at the April 19 meeting: "Existing guidance and acceptance criteria are not sufficiently detailed for computerized procedures to determine their effect on safety." Also, re-title to "Computerized Procedures" to ensure the scope is sufficiently limited. Note as "High" priority item.

Problem Statement c: Industry believes that the lead on this effort should clearly be the Diversity and Defense in Depth TWG – we suggest revising the problem statement as follows: "Support the Diversity and Defense in Depth (D3) TWG effort in developing a process to define the feasibility and reliability of operator actions in D3 evaluations." Note as "High" priority item.

Problem Statement d: as agreed upon at the April 19 meeting, "Current guidance needs to be reviewed to ensure it adequately addresses soft controls." Although the industry agreed with the proposed re-write, we believe that the existing guidance is adequate. Therefore, we note this as a "Low" priority item.

Problem Statement e: 10 CFR 50.34 contains the following statement: "Provide a plant safety parameter display console that will display to operators a minimum set of parameters defining the safety status of the plant, capable of displaying a full range of important plant parameters and data trends on demand, and capable of indicating when process limits are being approached or exceeded. (I.D.2)" The group determined that there does not appear to be an issue with new plant SPD consoles; however, we agreed to review to "Determine the need to revise 50.34 (f)(iv) or associated guidance relative to safety parameter display consoles." This action is intended to ensure that existing guidance is not overly restrictive relative to the displays. We note this as a "Low" priority item.

Problem Statement f: as agreed upon at the April 19 meeting, re-write as "Ensure that existing regulatory guidance and positions can accommodate changes to personnel roles and responsibilities that may result from implementing digital technology." We agreed this is a "Medium" priority item. We also clearly identified the need to ensure that the process for

licensing operators be outside the scope of this group. NEI has developed a task force for new plant operator licensing issues and will be publicly meeting with NRC staff in the near future to discuss new plant issues.

Problem Statement g: industry and NRC staff did not agree that this is an issue for digital I&C. We believe existing design guidance is adequate to ensure that operators are knowledgeable and able to respond appropriately to degraded instrumentation. We recommend deleting this item.

Problem Statement h: industry and NRC staff did not agree that this is an issue for digital I&C. We believe existing guidance is sufficient if designers and licensees desire to expand the use of the remote shutdown panel beyond the traditional functionality. We therefore recommend deleting this item.

New Problem Statement: During a recent Communications TWG meeting, a potential issue was discussed related to Human-System Interface (HSI) and digital communications. At the April 19 meeting, industry and NRC staff agreed NEI would provide in this response a proposed problem statement (pending Steering Committee approval): "Work with the Communications TWG to address the HSI aspects of safety to non-safety communications." Industry considers this a "High" priority item.

New Problem Statement: The following problem statement was agreed upon at the March 1 meeting; however, it was deleted from the list in the April 6 and April 13 letters regarding a graded approach to Human Factors evaluations. "There currently are no clear guidance or acceptance criteria on a process to implement a graded approach to Human Factors Engineering." Although NUREG-0711 and the Standard Review Plan allow a graded approach to reviewing HFE analyses and activities, there is no NRC or industry guidance on how to accomplish this approach. This would include guidance for determining the specific types of HFE activities and levels of rigor that should be applied in those activities for designs or design changes having different levels of complexity and/or risk. Industry considers this a "High" priority and requests this be added back to the list of issues for this TWG.

As noted above, although several agreements were reached during the April 19 meeting, some issues remain open or unresolved. In addition, because this meeting focused on revisiting and agreeing on problem statements, we do not believe it is appropriate to comment on the details of the project plan until agreement is reached on the various problem statements. Industry did agree and indicate to the staff that we would provide technical papers to advance the dialogue for three high priority items: minimum inventory, computerized procedures, and manual operator actions. We further believe that these three items should be addressed in upcoming meetings to begin developing proposed solutions for the issues.

TWG #6: Licensing Process Issues Project Plan Comments

1. Problem statement b should apply to both Chapter 7 and Chapter 18 of the Standard Review Plan. Revise this problem statement as follows: "...and the applicability of Chapter 7 and Chapter 18 of the Standard Review Plan..."
2. Make the following editorial changes to problem statement c:

"Clear licensing process protocols for implementing the submittal and NRC review of digital technology applications, including consideration of the licensee submitting and NRC completing its review in stages, ~~and~~ considering the applicability of NRC review activities being conducted in the field."
3. Revise deliverable c as follows to include Chapter 18: "Conforming changes for licensing process to Chapter 7 and Chapter 18 of NUREG-0800..."