March 22, 2007

MEMORANDUM TO: William E. Kemper, Chief
Instrumentation and Electrical Engineering Branch
Division of Engineering, Fuel, and Radiological Research
Office of Nuclear Regulatory Research

FROM: Gabriel Taylor, NSPDP General Engineer **/RA/**
Instrumentation and Control Branch
Division of Engineering
Office of Nuclear Reactor Regulation

SUBJECT: TASK WORKING GROUP MEETING WITH THE NUCLEAR REGULATORY COMMISSION, NUCLEAR ENERGY INSTITUE, AND NUCLEAR INDUSTRY CONCERNING HIGHLY INTEGRATED CONTROL ROOM – COMMUNICATION ISSUES

On February 23, 2007, the Nuclear Regulatory Commission (NRC) staff met with Nuclear Energy Institute (NEI) and other nuclear industry shareholders as a Task Working Group (TWG) for Highly Integrated Control Room (HICR) – Communication Issues to develop a draft project plan. The meeting took place at the U.S. Nuclear Regulatory Commission Headquarters office located in Rockville, MD. Attachment 1 lists the meeting attendees.

A public meeting notice was issued on February 9, 2007, and was posted on the NRC's external (public) web page (Agencywide Document Access Management System (ADAMS) Accession No. ML070400380, Attachment 2). The notice included the meeting agenda, which was also available as a handout at the meeting. The discussions included (1) problem statements, (2) goals and success criteria, (3) critical path and steps to achieve goals, (4) identify milestones and actions needed to address the problem statement, (5) meeting action items and (6) future meeting topics.

Development of Project Plan

A draft project plan was developed prior to this meeting and was distributed to the participants as a handout. (The handout can be found in ADAMS Accession No. ML070650515, Attachment 3.)

Using the handout draft project plan as a baseline the TWG clarified the definitions of "channel" and "division." The TWG agreed that throughout the project plan these two terms are to be used in accordance with the definition provided in the Institute of Electrical and Electronics Engineer, Inc (IEEE) Standard 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations."

In section 3.2, "Goals & Criteria for Success," the TWG suggested adding one more goal to the five that are presented in the handout.

The addition was: “make recommendations for modification of industry standards as needed.” This addition is intended to assist in conformity between future NRC guidance and industry standards.

In section 3.3, “Critical Path and Steps to Success,” the TWG suggested making several changes which would streamline the critical steps to achieve the goals outlined in the previous section of the project plan.

The last section that the TWG made changes to was section 6.3, “Milestones, Assignments, and Deliverables.” In this section the TWG assigned due dates to all of the milestones and deliverables that were identified in the handout.

After making the above suggestions, along with some other minor editorial changes, the TWG agreed that the HICR – Communications project plan adequately addressed the various facets of the plan and identified needed actions.

Action Items & Next Meeting

At the end of the meeting, the TWG addressed a list of action items that need to be completed before the next meeting. The listing of action items is provided below.

Item #	Description of Action Item	Responsibility
1	Identify NRC & Industry - Fuel Cycle Facilities representative to become a member of TWG.	NRC & NEI
2	NEI to provide a schedule for the HICRc TWG to complete issuance of RIS (or other document) to support simulator procurement. A tentative date of September 30, 2007 was used in the meeting.	NEI
3	NRC to revise project plan document and make available to TWG	NRC
4	NRC to provide clarification on use of communication bus for I/O	NRC
5	Review with NRC management the possibility of adding a milestone in 6.3 for Industry to review and comment on draft guidance.	NRC

The TWG decided to conduct the next meeting on March 8, 2007, where it will discuss finalization of the HICRc project plan along with various technical issues relating to digital I&C communications issues.

Attachments: 1. Meeting Attendees
2. Meeting Notice
3. Draft Project Plan Handout

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ADAMS ACCESSION NO. ML070820077

OFFICE	NRR/EICB/PM	RES/IEEEB/BC
NAME	G. Taylor	W. Kemper
DATE	03/22/ 2007	03/22/ 2007

OFFICIAL RECORD COPY

DISTRIBUTION FOR MEETING SUMMARY

Dated: February 23, 2007

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PRebstock
WKemper
MWaterman
WilkSmith
GSingh
GShukla

External E-mail
kah@nei.org
kak@nei.org

LIST OF ATTENDEES

MEETING REGARDING TASK WORKING GROUP ON

HIGHLY INTEGRATED CONTROL ROOM – COMMUNICATION ISSUES

THURSDAY, MARCH 8, 2007

NAME	ORGANIZATION
G. Taylor	NRC/NRR/EICB
W. Bowers	Exelon Corporation
J. Mauik	Hurst
R. Beacom	NRC/NRR/EICB
P. Lobner	DS&S
D. Herrell	MPR
W. Kemper	NRC/RES
G. Singh	NRC/NRR/EICB
M. Waterman	NRC/RES
P. Rebstock	NRC/RES
Y. Kawanago	MNES (Mitsubishi)
M. Chiramal	NRC/NRR
B. Marcus	NRC/NRR/EICB
E. Coffman	NRC/NRO
M. Gibson	Progress Energy
T. Hayes	Westinghouse
D. Hill	MPR
M. Giles	Entergy
S. Mitra	NRC/NRO/DNRL
R. Zwards	Toshiba
R. Jarrett	TVA

JOINING MEETING VIA TELECONFERENCE BRIDGE LINE

NAME	ORGANIZATION
J. Naser	EPRI
R. Torok	EPRI
D. Raleigh	Scientech
K. Keithline	NEI
T. Harris	NEI

NRR = Office of Nuclear Reactor Regulation
NRC = Nuclear Regulatory Commission
EICB = Division of Engineering Instrumentation and Control Section
NRO = Office of New Reactors
RES = Office of Nuclear Regulatory Research
NEI = Nuclear Energy Institute
EPRI = Electric Power Research Institute

February 9, 2007

MEMORANDUM TO: William Kemper, Chief
Instrumentation and Electrical Engineering Branch
Division of Fuel, Engineering, and Radiological Research
Office of Nuclear Regulatory Research

FROM: John M. Smith, Project Manager **/RA/**
EPR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: CATEGORY 2 PUBLIC MEETING WITH THE NUCLEAR ENERGY INSTITUTE (NEI) AND NUCLEAR POWER INDUSTRIES REGARDING HIGHLY-INTEGRATED CONTROL ROOM—COMMUNICATION ISSUES (TASK WORKING GROUP MEETING)

DATE, TIME: Friday, February 23, 2007

LOCATION: 9:00 a.m. - 4:00 p.m
US Nuclear Regulatory Commission (NRC)
One White Flint Commissioners' Conference Room (O1F16/O1G16)
11555 Rockville Pike
Rockville, Maryland 20852

PURPOSE: NRC staff and industry representatives will discuss current Digital I&C issues and develop problem statements and goals relevant to highly-integrated control room—communications.

CATEGORY 2:* This is a Category 2 public meeting. Arrangements have been made to allow participation in this meeting via a toll-free teleconference. Interested members of the public are strongly encouraged to take advantage of the teleconferencing accommodations. Contact the meeting contact 3 business days prior to the meeting to obtain the teleconference number and passcode."

PARTICIPANTS: Refer To The Enclosure For A List of Participants

Project No. 689

Enclosure:
Agenda

cc w/encl: See next page

CONTACT: John M. Smith, NRO,
301-415-1320

* Commission's Policy Statement on “Enhancing Public Participation in NRC Meetings," 67 *Federal Register* 36920, May 28, 2002

ATTACHMENT 2

AGENDA FOR THE FEBRUARY 23, 2007, PUBLIC MEETING
BETWEEN NUCLEAR POWER INDUSTRIES AND
THE NRC REGARDING HIGHLY-INTEGRATED
CONTROL ROOM—COMMUNICATIONS

Time (approx)	**Topic**	**Lead**
9:00	Introductory Remarks	NRC
9:15	Review Objectives of meeting	NRC/NEI
9:30	Identify Problem Statement	NRC/NEI
10:30	Identify Goals and Success Criteria	NRC/NEI
11:30	Lunch	
12:30	Identify Critical Paths and Steps to Achieve Goals	NRC/NEI
2:30	Identify Milestones and Actions Needed by NRC and Industry to Address the Problem Statement	NRC/NEI
3:00	Discuss and Come to Consensus on Open Issues Related to Communications	NRC/NEI
3:30	Establish the Path Forward and Summarize Action Items	NRC/NEI
3:50	Public Questions and Comments	NRC
4:00	Closing and Adjournment	NRC

ATTACHMENT 2

NRC DIGITAL I&C PROJECT PLAN

Task Working Group # 4:
Highly-Integrated Control Rooms: Communications Issues (HICRc)

1 PLAN OBJECTIVES

(generic)

2 DESCRIPTION

(detail input for this issue only)

This Task Working Group (TWG) will address Highly-Integrated Control Room (HICR) design issues, focusing, in particular, upon communications involving digital equipment in nuclear safety service and needed to support the specification and design of simulators for new plants or the design and implementation of digital retrofits at existing plants. Specifically, this TWG will address all communications and influences which involve any safety channel[1] and anything outside that same safety channel. In this context, "communications" means any transmittal or reception of data, information, or commands, and "influence" means any provision for anything outside a safety channel1 to affect the operation of that safety channel in any way (including both effects involving safety functions and effects involving functions not related to safety). For example, the following will be addressed:

1. communications between redundant safety channels
2. communications between any safety channel and anything external to that channel1
3. control of safety equipment from a workstation in a different safety channel
4. control of safety equipment from a nonsafety workstation
5. commingling of safety and nonsafety controls or indications on a single workstation
6. connection and operation of programming, maintenance, and test equipment

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

7. communications within a single safety channel1, even if physically dispersed
8. communications which do not involve a safety channel
9. cyber-security
10. Diversity and Defense-in-Depth (D3) considerations

[1] The term "safety channel" as used herein refers to a set of devices which function together to accomplish a specific safety-related task, but also to a grouping of such task-specific channels within a single power-supply division. References to things external to a safety channel mean things that are in a different power-supply division or that are not safety-related.

11. Human Factors (HF) considerations
12. communications protocols

Cyber-security, D3, and HF considerations are all closely related to the general concept of cross-channel interactions, and coordination with the associated Task Working Groups will be necessary. However, those concepts are related more to the application of cross-channel interactions than to the means of implementation of such interactions. The HICRc TWG will address the means of implementation, rather than the manner in which the provisions for such interactions are used. The objective of anticipated interactions with other TWG is to ensure that HICRc TWG activities are consistent with, and supportive of, the solutions that the other TWG 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 PROJECT PLAN

(detail input for this issue only)

3.1 Problem Statement

There are clear potential advantages to the implementation of some types of cross-channel influences, but the abandonment of established channel independence criteria would be difficult to justify and would require modification of the Code of Federal Regulations. The objective of this task is to evaluate the potential benefits of cross-channel interactions and to establish specific design and licensing criteria by which beneficial interactions may be accomplished.

The following specific problem areas are noted:

- Industry Standards (i.e. IEEE-4.3.2) do not provide sufficient guidance regarding communication independence for digital systems.
- NRC Regulatory criteria (i. e. RG 1.152) do not explicitly address inter-channel communications.
- The protection system channel separation and isolation requirements in existing regulations (10CFR50.55a(h), which incorporates IEEE603-1991 among other things) can be interpreted as precluding cross-channel interactions of any sort.
- SRP Chapter 7 includes conflicting guidance regarding communication independence.

3.2 Goals & Criteria for Success

The goal of this TWG is to:

1. Establish criteria permitting a safety channel to accept information and commands from external sources while retaining complete separation, isolation, and functional independence in accordance with existing requirements.

2. Develop a document describing the design and licensing requirements needed to implement the criteria developed in goal #1.
3. Produce recommendations for alteration of existing regulations if necessary. Include consideration of timing issues relative to anticipated licensing submittals vs time required to accomplish the recommended rulemaking.
4. Produce recommendations for alteration of existing regulatory guidance, if appropriate, for clarification of particular provisions applicable to digital systems.
5. Prepare one or more Regulatory Information Summaries (RIS) (or other vehicle as designated by the Digital I&C Steering Committee) to disseminate and facilitate the implementation of the TWG recommendations.

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

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 by 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.

The HICRc TWG will focus on issues related to the technical aspects of communications. It will not specifically address the application of such communications provisions in regard to D3 or HF considerations, and will not specifically address cyber-security concerns. HICRc TWG will interact with the TWG that are addressing those issues.

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. These recommendations will be considered “long-term” and will be addressed by the NRC independently of the TWG and probably at a time following the disbandment of the TWG.

The TWG will give due consideration to the burdens 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 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.

3.3 Critical Path and Steps to Success

In order to accomplish its mission, the HICRc TWG will need to have timely access to detailed information concerning each proposed reactor design. The TWG will make every reasonable effort to obtain specific design information needed to support its work, 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 decide to suspend consideration of design details related to the associated supplier or may decide to 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:

6. Develop a statement describing the existing regulatory requirements and regulatory guidance associated with cross-channel interactions, without consideration of specific proposed designs. This statement will establish the recommended boundaries for the ultimate products of the HICRc TWG.
7. For each type of new reactor, summarize the supplier's design concept in terms of:
   - sharing or isolation of safety channels on control stations
   - provision of hard controls and indicators (physical switches, indicating lights, analog indicators, etc.) on computer-based control consoles
   - provision of hard controls and indicators (physical switches, indicating lights, analog indicators, etc.) on panels dedicated to the support of manual actuations
   - use of, and licensing credit taken for, manual actuation systems
   - intended flow of data and commands into each safety channel from external sources
   - intended flow of data and commands out of each safety channel
   - commingling of safety and non-safety functions or processes in a single processor or software package, and commingling of safety functions from different channels
   - other aspects as deemed appropriate by the TWG members

8. Develop a listing of types of cross-channel interactions that have been or will be proposed. This listing should address both hardware connections and software issues, and should summarize the justification for the interaction as proposed by each reactor supplier.
9. Develop a prioritized listing of the types of proposed interactions to be considered in detail. The TWG will address the associated design issues on a prioritized basis associated with anticipated DCDs and COLs.
10. Develop licensing criteria and associated justifications for each specific type of interaction that is included in the TWG scope of consideration.
11. Develop one or more RIS (or other vehicle as directed by the NRC Digital I&C Steering Committee) to document the regulatory and design guidance developed by the TWG. This RIS is to include specific acceptance criteria for types of interactions found to be acceptable, and is also to include descriptions of types of interactions found to be unacceptable. The RIS should also include guidelines for the disposition of licensing requests that involve types of interactions that do not fall readily into any of the categories that are addressed.

4 REFERENCES

(detail input for this issue only)

1. NEI whitepaper
   - comments by Invensys
   - comments by MikeW
   - comments by Gary Johnson (via HL Dec11)
2. RG 1.152
3. SRP7.1-D
   - latest draft
   - comments by NEI (Feb7)
   - comments by Wes Bowers
   - also consider associated SRP sections
4. IEEE 7-4.3.2
   - draft from late January IEEE meeting
5. IEEE 603
6. Dec12 meeting
   - NRC slides
   - NEI slides
   - action items list
7. Feb2 meeting (HICRc portion only)
   - NRC slides
   - NEI slides
   - action items list

5 TASK WORKING GROUP (TWG) MEMBERSHIP

(detail input for this issue only)

NRC representatives:

William Kemper	(RES, TWG manager)
Paul Rebstock	(RES, TWG technical lead)
Gush Singh	(NRR)
Deanna Zhang	(NRO)
*(to be determined)*	(NMSS)

Industry representatives:

Wes Bowers	(Excelon)
Ron Jarrett	(TVA)
Kimberly Keithline	(NEI)

6 RESPONSIBILITIES AND MILESTONES

(detail input for this issue only)

6.1 NRC Representatives

The NRC representatives are responsible for the development of this Project Plan. The NRC representatives will draft all TWG deliverables except as explicitly agreed by the TWG as a whole.

6.2 Industry Representatives

The industry representatives are responsible for advising the NRC as to:

- whether the scope of this TWG and the activities described in the draft Project Plan address all of the industry concerns relating to safety system communications that must be addressed to support ordering new plant simulators by mid 2009
- whether the deliverables described in the draft Project Plan will support an efficient regulatory process
- whether the schedule expressed in the draft Project Plan and the industry schedules for associated activities are compatible with one another

In addition, it is the responsibility of the industry representatives to interact as necessary with reactor vendors and others to obtain design information needed to support the work of the TWG as described herein

The industry representatives are invited to provide comment and discussion concerning the items within the purview of this TWG, and to offer comments and other input on all TWG deliverables, in the interest of ensuring that industry's needs are appropriately addressed.

6.3 Milestones, Assignments, and Deliverables

Milestones and Deliverables	deliverable	Due Date (2007 or as-noted)	Fcst / Actual	Lead	Support
Near-Term					
initial TWG meeting		Feb 23	F	NRC	NEI
statement of fundamental restrictions & requirements	✓		F	NRC	NEI
submit final draft of HICRc Project Plan for integration into DI&C plan	✓		F	NRC	NEI
DI&C-SC endorsement of HICRc Project Plan			F		
listing of new reactor communication design concepts	✓		F	NEI	NRC
final prioritization	✓		F	NRC	NEI
regulatory & design requirements with justification for each type of interaction	✓		F	NRC	NEI
strategy for implementing regulatory and design requirements	✓		F	NRC	NEI
guidance outline & acceptance criteria	✓		F	NRC	NEI
advise DI&C-SC of strategy			F	NRC	NEI
initial draft of guidance document (RIS)	✓		F	NRC	NEI
DI&C-SC endorses guidance document (RIS)			F	NRC	NEI
issue guidance document (RIS)	✓		F	NRC	NEI
Long-Term					
work with IEEE on modifications to 7-4.3.2		1Q08		NEI	n/a
revise RG 1.152		2Q09		NRC	n/a