

March 8, 2007

MEMORANDUM TO: Chairman Klein
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko

FROM: Commissioner Lyons */RA/*

SUBJECT: DEVELOPMENT OF A U.S. DIGITAL INSTRUMENTATION AND
CONTROL AND HUMAN-MACHINE INTERFACE TEST FACILITY

As the Commission heard at its November 2006 meeting on the status of incorporating digital instrumentation, controls, and safety systems into nuclear power plants in the U.S., this technology brings new regulatory challenges along with potential safety benefits. To address these challenges, both in the near term and on a continuing basis into the future, the NRC must develop research tools and capabilities to independently evaluate (e.g., test and demonstrate) digital safety systems (DSSs) and human-machine interfaces (HMIs) in order to confirm the results of licensee, vendor, or applicant analyses during the licensing process. Such capabilities are needed to help maintain sound technical bases upon which to license and oversee DSSs and highly computerized control room HMIs. In addition, these capabilities could enable the identification and resolution of safety questions that might arise after licensing and may further provide simulation capabilities in support of NRC staff training initiatives. The need for such capabilities can only be expected to increase as this technology expands and evolves.

The current approach for NRC research in this area is to contract with a variety of national laboratories, universities, and international research facilities on a case-by-case basis. This piece-meal approach has caused the NRC's regulatory framework to lag behind the state-of-the-art and the gap between technology and regulation in this area continues to widen. To close this gap, related research tools could be integrated into a single facility within the U.S. with an NRC-supported capability and expertise to operate and manage (or co-manage) it. This would likely create synergies and efficiencies that are not evident in our current approach. This could also have the added significant benefit of attracting new graduates, experienced professionals, and researchers in what will clearly remain a very competitive job market for digital systems expertise.

Therefore, staff should conduct a public workshop, using a third party if needed, to draft conceptual approaches for an integrated facility to meet NRC regulatory needs in the digital I&C, DSS, and HMI technical areas into the future, to engage potentially interested stakeholders to examine these approaches, and to consolidate the responses. Stakeholders with existing capabilities should be invited, as well as others who may be interested in participating, such as national laboratories, universities, other federal agencies, research and development centers, and vendors. The conference should seek to develop a defined set of viable concepts for such a facility, with corresponding potential benefits and challenges for each concept. The following questions, at a minimum, should be considered:

1. What potential participants might be interested in joint participation, collaboration, and funding of such a facility, and to what extent might this include industries outside the nuclear industry?
2. If nuclear industry participated, how could conflict-of-interest issues be addressed?
3. Do examples of similar facilities currently exist and, if so, what can be learned from their successes and challenges?
4. What siting options are most viable (e.g., universities where integration with graduate studies might be encouraged, national laboratories, etc.), taking both cost and ease of technical information exchange into account?
5. To what extent could such a facility be designed to be reconfigurable to the expected variety of plant control room and HMI designs?
6. To what extent could such a facility be designed to also be used as an advanced reactor training simulator for NRC staff?
7. What impediments, if any, to information sharing among participants and to external stakeholders might exist?
8. What could be the benefits, or adverse impact, to existing and established international collaborative activities in this area?
9. What could be the NRC's legal, budgetary, and oversight role?

If possible, the workshop should seek consensus on a set of over-arching principles that should be met for the success of any of the conceptual approaches discussed. The results of the workshop should be conveyed to the Commission in a paper with the staff's recommendation on whether or how to proceed.

SECY, please track.

cc: L. Reyes, EDO
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A. Vietti-Cook