

February 3, 2003

MEMORANDUM TO: Jack R. Strosnider, Deputy Director
Office of Nuclear Regulatory Research

FROM: Steven A. Arndt /RA/
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Office of Nuclear Regulatory Research

SUBJECT: EVALUATION OF HALDEN CY2003 RESEARCH PROGRAM IN THE
AREA OF DIGITAL SYSTEM SAFETY

This memorandum is to inform you of the feedback that we will be providing to Halden staff and the Halden Program Group associated with Halden's CY2003 Research Program in the Digital System Safety and Operation and Maintenance areas. Attached for your information is the input we will be providing.

The Halden Program Group will meet on February 25 and 26, 2003 in Garching, Germany for their semi annual meeting. The Office of Nuclear Regulatory Research will not be sending a representative in the Digital System Safety area. Since it will not be practical to provide feedback at the meeting, I am providing this input to the Halden Staff and the Halden Program Group by e-mail correspondence instead.

Attachment: As stated.

Distribution:

ERAB r/f, J. Persensky, S. Browde, E. Lois, D. Dorman, M. Mayfield

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Evaluation of Halden 2003 Research Program Plan and Input to Halden for the Halden Program Group Meeting, February 25 and 26, 2003, in the areas of Digital System Safety Research and Operation and Maintenance.

Based on a review of the Halden 2003 Research Program Plan in the area of Digital Systems Safety Research and Operation and Maintenance areas and the Halden Workshop on Digital System Reliability conducted in November 2002, the NRC has the following recommendations for the conduct of the 2003 Research Program.

- 1) The NRC is interested in closely following the Joint Halden/EPRI cooperative development of on-line monitoring and validation of sensor signals to identify those sensors needing calibration, we are also interested in your work in the Diagnosis and Early Fault Detection efforts, particularly the effort to develop the existing PEANO code package into a licensable sensor calibration assistant. We would like to provide our input into the issues associated with the general licensability as well as the issues that may be raised in an NRC Standard Review Plan (SRP) Chapter 7 review.
- 2) The NRC is very interested in the Feedwater Flow Measurements work that is being done at the Tecnatom experimental facility. The U.S. Nuclear Industry has done several ultrasonic feedwater flow meter installations at its nuclear power plants, and the NRC is currently reviewing the capabilities of these systems. The NRC would strongly encourage Halden to continue its review of the ultrasonic meters, especially the transit time and cross correlation type ultrasonic meters, rather than spending effort on vibration type meters. The ultrasonic meters are the most commonly used meters for power upgrades and power recovery applications and the NRC is very interested in the results of this work. We believe this to be the case of other Halden member countries as well.
- 3) The work on new numerical techniques for testing the condition and monitoring the degradation of electrical cables on operating reactors is also of interest to the NRC. However, there has been extensive work done in this field included work sponsored by the NRC. If this work has not been factored into your ongoing research in this area, we urge you to do so. NRC will provide the references, as needed.
- 4) The NRC is interested in working with Halden in evaluating the use of formal methods as part of the Integrated Tool Environment. NRC would be particularly interested in this as it relates to practical examples such as the TELEPERM XP and Common Q platforms.
- 5) In the area of development of assessment tools and the integration of quantitative and qualitative information, the NRC recommends that an NRC tool developed by LLNL several years ago may be a useful basis for this integration. The tool is an automated version of the areas that need to be reviewed to complete a SRP Chapter 7 evaluation of a digital safety system. Halden could use its BBN methods with this tool as a basis for the development of an assessment tool.
- 6) The NRC would like to work with Halden and ISTec in Germany on the Model Based Risk Assessment project, particularly in the area of the application of model based risk analysis on

realistic test cases. The NRC would propose to use a model of a digital feedwater control system that it is currently developing for the NRC part of the project.

These are the areas of the Operations and Maintenance and Digital Systems Safety Research Program that the NRC is most interested in. We welcome continued discussion on this matter.