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The Honorable Ivan Selin
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Selin:

SUBJECT: ENVIRONMENTAL QUALIFICATION FOR DIGITAL INSTRUMENTATION
AND CONTROL SYSTEMS

During the 390th meeting of the Advisory Committee on Reactor Safeguards, October 8-10, 1992, we were briefed on the staff's research program to define the environmental qualification requirements needed for digital instrumentation and control systems. In addition, on June 16, 1992, our Subcommittees on Computers in Nuclear Power Plant Operations, and Reliability and Quality met jointly to consider this matter. During these meetings, we had the benefit of discussions with members of the NRC staff and its contractors.

As part of its continuing effort to meet the challenges posed by the emergence of modern digital instrumentation and control systems, the staff is concerned about the peculiar vulnerabilities of such systems to environmental stress. There is, therefore, a research program responsive to NRR's perceived needs, directed at uncovering enough information to provide regulatory guidance. The program is far from complete. We were told that it will ultimately study about a dozen environmental stressors, including temperature, moisture, smoke, etc., but the preliminary results presented to us were in fact confined to the area of EMI/RFI (electromagnetic/radio-frequency interference).

We were told that the staff had made no effort to set priorities or to assess the risk levels associated with the various stressors before deciding to concentrate on EMI/RFI, and are therefore concerned that it may be emphasizing the problem easiest to solve, rather than the most risk-significant. A coherent approach to risk management and regulation would assign the NRC's scarce resources and expertise through risk-based criteria.

Our judgment (in fairness, also not based on detailed priority analyses) is that the problems of EMI/RFI are receiving unwarranted emphasis. This is not to say that they are unreal; there are many anecdotes of interference-induced failure; but only that the nature of the threat and of its solutions are well understood, from work done in different contexts. Careful attention to shielding and to grounding, together with electromagnetic discipline when shielding is compromised (as, perhaps, by opening metal cabinets), can go a long way toward alleviating any vulnerabilities that may exist. The techniques are well known, and in no way mysterious.

Indeed, in the military world, where susceptibility to intentional

jamming is a constant threat, and even vulnerability to extremes of temperature, moisture, and smoke is an endemic concern, there is an enormous body of information about measures and countermeasures. We were therefore surprised to be told that NRC had made no contact with the relevant agencies before embarking on its own research program.

We do agree that the NRC must develop guidance for the protection of vital electronic systems (and indeed for all other vital systems) from potentially disabling environmental influences, but we heard no rationale for the specific concentration on the one threat singled out for attention.

We recommend that the direction of the program be reassessed to account for some kind of risk ordering of a suite of likely stressors, and that diligent efforts be made to draw on the experience of the community, including the military community, for relevant information. None of these phenomena are unique to the nuclear world.

Sincerely,

Paul Shewmon
Chairman