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(Tuesday, November 24, 1992)

NOTE TO EDITORS:

The Nuclear Regulatory Commission has received from its Advisory Committee on Reactor Safeguards two letter-type reports that provide comments on risk-based regulation and the environmental qualification requirements for digital instrumentation and control systems.

The ACRS also sent two letter reports to the NRC's Executive Director for Operations that comment on revised guidelines for prioritization of generic safety issues and revised regulatory analysis guidelines.

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Attachments:  
As stated

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November 12, 1992

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  
Advisory Committee on Reactor  
Safeguards

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November 16, 1992

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

Dear Chairman Selin:

SUBJECT: RISK-BASED REGULATION

During the 391st meeting of the Advisory Committee on Reactor Safeguards, November 5-7, 1992, we reviewed a draft Commission paper on Risk-Based Regulation. The paper responds to the Staff Requirements Memorandum (SRM) dated March 26, 1992. During this meeting, we had the benefit of discussions with representatives of the NRC staff, and of the document referenced.

We interpret the Commission's charge to the staff as reflecting a recognition of the increasingly sophisticated and widespread use of analytical risk assessment techniques in the nuclear enterprise, a natural evolution of a process that began with the 1975 publication of the Reactor Safety Study, WASH-1400. Since it is now possible to make informed and quantitative statements about many (but not all) of the contributors to nuclear risk, it is correspondingly possible to optimize the deployment and use of the regulatory resources available to the Commission. The SRM directed the staff to both examine the feasibility of such a risk-based approach to regulation and to suggest means by which it could be implemented. The draft paper on which we were briefed is the preliminary response to that charge.

We would prefer not to comment in detail on the paper itself, except to note that it needs a great deal of work before it can be considered responsive to the Commission's charge at the level of sophistication demanded by the importance of the question. The staff is still working on the paper, and we expect to see a later and improved version. It is simply not yet ready for public comment.

Far more important to us is the issue of coherence of the various efforts now in progress in various parts of the staff to develop and implement activities that could be collected under the name of risk-based regulation. We have commented earlier about the Maintenance Rule, Regulations Marginal to Safety, and other initiatives involving the use of risk analysis, and have at this meeting heard about Risk-Based Regulation, revision of the Regulatory Analysis Guidelines, and the Prioritization of Generic Safety Issues. Each of these requires informed use of quantitative risk information and appropriate attention to the Commission's safety goals, yet each is being analyzed by an independent group, with an independent perspective on the NRC's needs. In addition to this, there is the PRA Working Group, whose progress we have been following closely. We are unable to find any focal point for all these efforts, except at the level of the EDO.

We continue to call for increased coherence in the treatment of all these matters, bound to each other by the common need to weave the threads of the safety goals (the expression of the ultimate objective of regulation) and quantitative risk assessment (the tool that makes more directed risk management possible) into the NRC fabric. If it is not done at the level of the EDO it will not be done, and resources that could be devoted to assuring nuclear safety will be squandered.

In the past we have suggested strong measures to address this problem. While not pushing any particular solution, we still believe that the collection of issues discussed here is important to the future performance of the agency. The coherence problems will not be solved by an incoherent effort.

Sincerely,

Paul Shewmon, Chairman  
Advisory Committee on Reactor  
Safeguards

Reference:

Memorandum dated October 16, 1992, from Warren Minners, Office of Nuclear Regulatory Research, NRC, for Raymond F. Fraley, ACRS, transmitting Draft SECY Paper (undated) from James M. Taylor, Executive Director for Operations, for The Commissioners, Subject: Risk-Based Regulation (Predecisional)

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November 12, 1992

Mr. James M. Taylor  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission

Washington, D.C. 20555

Dear Mr. Taylor:

SUBJECT: REVISED GUIDELINES FOR PRIORITIZATION OF GENERIC  
SAFETY ISSUES

During the 391st meeting of the Advisory Committee on Reactor Safeguards, November 5-7, 1992, we reviewed a proposed draft Revision 4 of NUREG-0933, "A Prioritization of Generic Safety Issues." Our Subcommittee on Safety Philosophy, Technology, and Criteria considered this matter during a meeting on October 28, 1992. During these meetings, we had the benefit of discussions with representatives of the NRC staff, and of the documents referenced.

As part of the program for resolution of Generic Safety Issues (GSIs), the staff historically has attempted to prioritize the issues in order to appropriately focus resources. After considerable experience (9 years) in using this prioritization methodology, the staff has concluded that the conservatisms provide too much margin and that "resources appeared to have been devoted to resolving a large number of issues with no safety improvement resulting."

The revised guidelines being proposed by the staff are intended to reduce the perceived excessive margins in the prioritization criteria, presumably so that a higher fraction of those issues subjected to the full Regulatory Analysis (RA) would also require some regulatory action as a result of the RA. The staff's proposal is to modify the "prioritization formula" by increasing the risk-reduction thresholds by an order of magnitude (10X) and to simplify the way in which costs enter into the priority ranking.

We agree with the basic concepts that underlie a prioritization scheme based on risk reduction potential and impact/value criteria, but believe additional work is needed before the specific proposed modifications are brought to the Commission for approval.

The proposed modifications are mostly arbitrary and do not have firm technical bases. We submit that the objective of such a prioritization scheme should be to essentially capture as many as possible of those issues for regulatory analysis that will result in some regulatory action (i.e., would pass the RA criteria) while at the same time screening out as many issues as possible that would not pass the RA criteria. This is not an easy objective to accomplish because, with any scheme approximating risk and costs, some significant issues that would have required regulatory action will likely be lost (relegated to LOW or DROP priority) whereas some number of issues that will not require any regulatory action will be prioritized to be given an RA.

The proposed modifications will surely result in a much higher percentage of "hits" but will also likely result in a higher number of issues being discarded that would have proven to have been significant if given an RA.

We recommend that all of those GSIs that have already been given a full regulatory analysis with the result being that regulatory action was called for (there are apparently 16 of these) be placed on the decision chart grid (impact/value vs. delta-risk) and that empirical boundaries be drawn for thresholds that would capture all of these. For insight, it would be useful also to put on the grid all the other already-screened issues. This empirical determination of the thresholds will not guarantee optimization of the process for future issues, but we think it would go a long way toward removing the arbitrariness of the proposed thresholds presented in the draft document.

Sincerely,

Paul Shewmon, Chairman  
Advisory Committee on Reactor  
Safeguards

Reference:

Memorandum dated August 5, 1992 (corrections dated August 19, 1992), from C. J. Heltemes, Jr., Office of Nuclear Regulatory Research, for Raymond F. Fraley, Advisory Committee on Reactor Safeguards, Subject: Request for ACRS Review of Revised Guidelines for Prioritization of Generic Safety Issues, transmitting:

- (a) Draft SECY paper for the Commission from James M. Taylor, Executive Director for Operations, Subject: Revised Guidelines for Prioritization of Generic Safety Issues (Predecisional)
- (b) Draft Markup of Introduction Section, NUREG-0933, Revision 4, "A Prioritization of Generic Safety Issues," August 5, 1992 (Predecisional)

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November 12, 1992

Mr. James M. Taylor  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Taylor:

SUBJECT: REVISED REGULATORY ANALYSIS GUIDELINES

During the 391st meeting of the Advisory Committee on Reactor Safeguards, November 5-7, 1992, we reviewed a draft of NUREG/BR-0058, Revision 2, "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission." Our Subcommittee on Safety Philosophy, Technology, and Criteria considered this matter during a meeting on October 28, 1992. During these meetings, we had the benefit of discussions with representatives of the NRC staff, and of the document referenced.

This brochure will be NRC's policy-setting document with respect to regulatory analyses. As such, it deals with a number of very important issues that bear directly on the overall NRC regulatory philosophy and approach. Some of the positions taken in the proposed guidelines represent departures from current practice, have never been formalized before, or differ from the industry and the Office of Management and Budget (OMB) positions.

We believe this to be such an important document that even a draft version to be issued for public comment should reflect high levels of intellectual and technical content, coherence, and clarity of thought and presentation. Although the draft document does have much to commend it, we believe the subject deserves better. We recommend that substantial additional effort be put into rethinking and redeveloping some of the regulatory positions and into developing a "showcase" document with respect to content, style, and quality of prose. We do not see any urgent need for, and recommend against, issuing the draft document at this time. We expect to review the revised document before it is issued for public comment.

In its presentations to us, the staff identified some specific issues for particular attention. Although we agree with some of the positions taken on these in the document, we have fundamental differences with several of them. We provide you with our comments below.

#### Safety Goal Implementation

This document suffers from the absence of a clear statement of the means by which the Commission's overall regulatory philosophy will be implemented through the concepts of adequate protection, safety goals, the backfit rule, ALARA principles, etc. Whether here or elsewhere, such a statement is urgently needed.

The safety goal decision chart only deals with issues that result in changing the core-damage frequency. We believe it should also consider issues that could change the conditional containment failure probability.

#### Quantification of Benefits

Figure 3.1 of the proposed guidelines should include a step in which a determination is made on whether the proposed enhancement is something that can be evaluated by quantitative risk estimates. If so, we believe that PRAs must be used to quantify the benefits. If not, the analysis would go to a different decisionmaking scheme (e.g., expert opinion, engineering/regulatory judgment).

#### Treatment of Voluntary Actions

We agree with the position taken on voluntary actions in the proposed guidelines. However, we are concerned that this will tend to discourage voluntary actions. Some means, outside the regulatory analysis process, should be sought to promote and encourage such actions.

#### Discount Rate

While the OMB directive of 1981 (which has never been rescinded) applied specifically to executive agencies, NRC ought to have good reasons for ignoring it. The fact that others do so is not a good reason. We were told that efforts had not been made to better understand OMB's rationale. We recommend that this be done.

#### Simultaneously Satisfying the Requirements of the Backfit Rule and/or the Committee to Review Generic Requirements

We agree that regulatory analyses should be made in such a manner that they also meet these other needs.

#### Treatment of Averted Onsite Costs

The staff intends to treat averted onsite costs (AOSC) as an offset to the costs incurred by the utilities in implementing the associated requirement. We believe AOSC should be included in the benefits column and not the costs column. We are concerned, however, that the methods and assumptions used for computing AOSC are highly uncertain and can dominate the final answer. Accordingly, we recommend that further effort be given to establishing definitive guidance for AOSC evaluations.

In the draft document, the staff recommends that the results be presented in terms of net value (value minus impact) rather than as a ratio (value/impact). This should not be an issue because these are entirely different measures and both should be part of the decision process.

#### Discounting of Health and Safety Effects

We are unconvinced by the arguments presented for the staff's position that health and safety effects not be discounted in the value/impact analyses. Appropriate balancing of costs and benefits require discounting of each.

### Monetary Value of a Person-Rem Averted

There is, in principle, no problem with the staff's proposed interim position, "continuing to use the value of \$1000/person-rem until a final recommendation can be made after further review and analysis," except that such a position has existed for about 15 years, and can persist indefinitely. We recommend that an appropriate treatment of the monetary values to be associated with onsite and offsite health effects (both early and latent) and land contamination be developed promptly.

Sincerely,

Paul Shewmon, Chairman  
Advisory Committee on Reactor  
Safeguards

### Reference:

Letter dated September 11, 1992, from C. J. Heltemes, Jr., Office of Nuclear Regulatory Research, to Raymond F. Fraley, Advisory Committee on Reactor Safeguards, transmitting:

- (a) Draft SECY paper (undated) for the Commissioners from James M. Taylor, Executive Director for Operations, NRC, Subject: Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission (Predecisional)
- (b) Draft NUREG/BR-0058, Revision 2 (undated), "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission" (Predecisional)
- (c) Separate Enclosures (undated) on Averted Onsite Costs and Discounting of Health and Safety (Predecisional)