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Dr. Carl A. Paperiello, Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Dr. Paperiello:

SUBJECT: Draft Proposed 10CFR70 and Associated SPR

I have recently become aware of the subject document and, as an employee of one of the National Laboratories, the following statement therein caught my eye: *"Applicants operating existing facilities that could become newly subject to the Commission's authority, such as DOE facilities, would be expected to ..."* I have read drafts of the NRC's review of the REDC facility at ORNL, and the criticality safety implications on Los Alamos portend to be enormous in cost and could be detrimental to worker safety if scarce criticality staff resources are required to respond to additional documentation requirements and prevented from spending time on the process floor.

Permit me to introduce myself so that it will be apparent where my interests lie. I am the Group Leader of the Nuclear Criticality Safety Group at Los Alamos National Laboratory Nuclear Criticality Safety Group (ESH-6). After ten years spent performing critical experiments, reactor design, and theoretical reactor safety research, I migrated into criticality safety fulltime and have been a practitioner for the last twenty years. Thus my interests and comments are limited to nuclear criticality safety. In the comments that follow, I am speaking as the Group Leader of the Nuclear Criticality Safety Group at Los Alamos National Laboratory.

Since there was little time to review this draft and its supporting documents, such as the Standard Review Plan (SRP), prior to the December 3-4 meeting, these comments are brief. Nevertheless, my quick review has convinced me that, while the intent of the revision, as stated and expressed in general terms such as 'performance-based' and 'risk-informed,' is completely reasonable, as the saying goes: "the devil is in the details." I will highlight my concerns with a few examples, and provide a more thorough, documented review at a later date should that be appropriate. Also, I am aware of comments provided by Dr. Cecil Parks, representing the Nuclear Criticality Safety Division of the American Nuclear Society, and will not cover issues and points previously addressed.

"Risk informed and performance based regulation" (words found in the Description of Proposed Action)

While these words imply a consistency in philosophy with the ANS-8 standards , they are followed by numerous uses of the term ‘consequence criteria’ and discussions and examples using ‘quantified likelihoods.’ Basing requirements for documentation, QA, training, etc. on the worst-case (of a criticality accident) consequence alone is certainly not risk-informed regulation. Further, the attempt to have PRA or any other form of quantified risk assessment become a major part of the safety basis of nuclear criticality safety at any facility would be inappropriate at best. The data on which to base failure rates simply do not exist. Considering the track record of criticality safety in the U.S. and worldwide, as evidenced by the accident rate, one can only conclude that the absolute performance and its trend have been very positive compared to other worksite hazards.

70.62 ISA Requirements

As a direct result of a criticality accident being labeled a ‘high-consequence’ event, there are potentially severe implications in the rule on required actions and documentation compared to how the DOE regulates criticality safety, the latter being consistent with the guidance and philosophy found in the ANS-8 standards. Examples are:

"(B) For new processes submit the results of the ISA and any revisions as part of the application for amendment of the license under 70.34."

The time delay inherent in this process would result in enormous costs at no practical risk reduction. Currently the DOE does not review and approve criticality safety evaluations before the contractor can implement operations unless an Unreviewed Safety Question (USQ) is found. For criticality safety, this is usually avoided by having a reasonably conservative criticality accident described in the Safety Analysis Report.

"70.64 Baseline design criteria....

"(a) Licensees shall maintain.....unless.....not relied on for safety.

"(1) Appropriate records of these items must be maintained.....throughout the life of the facility.

"(2) ... "

What does this mean? Would it include cans and process equipment such as 5-liter dissolution pots, 4-liter Erlenmeyer flasks, 7-liter filter boats, etc. that are not fixed in place on a glovebox floor and that truly do provide meaningful criticality protection? What if there are several barriers to reaching the critical state, a combination of vessel geometry and administrative controls such that none are dominant as is the case in many DOE operations?

"Appendix C to part 70 - Reportable Safety Events

"II(4 hours)....a deviation from safe operating conditions.....has the potential, as identified in the ISA,...."

This implies first that all gradations of upsets are identified in the ISA. This is impossible. Fissile mass is controlled for nearly all processes, but the limit can be exceeded in an infinitely variable amount. For example, consider an operator who is loading a melt crucible and exceeds the limit by 1, 10, 50, or 150%, etc. due to a simple human addition error. These incidents are clearly of varying likelihoods and significance. Should they all have been discussed in the ISA? Again, impossible. While overmass in general has the potential of leading to a criticality accident, should a 1% overmass be reported in 4 hours, 24 hours, 30 days, or not at all outside of the company? Within the DOE there is the flexibility to use a graded approach such that the process upset can be judged to be of such little significance locally and of such little learning value globally that it is recorded and tracked internally only. The consequences of not using this common sense approach have been painfully and expensively documented within the DOE!

"Standard Review Plan, Chapter 5

"5.4.6 ISA Results

"The nuclear criticality aspects of the applicant's ISA are acceptable if the following criteria are met:

"1. The applicant conducts and maintains an ISA that identifies specific control parameters...."

Should this requirement be interpreted to mean that controls for every operation or process are identified in the ISA? If so, either the ISA would be continually out of date or the DOE contractors nationwide would be shut down. Due to hundreds of independent operations, processes and limits in larger facilities are changing weekly if not daily in some cases.

"7. a. At least one of the two controlled parameters..."

This implies that there are only two controlled parameters, a very rare situation, and implies a misunderstanding of the double-contingency principle.

"5.4.5.2 NCS Limits

"5.a controlled parameters: When using experimental data, the applicant applies industry-accepted safety factors.....45%....75%....etc."

These 'industry-accepted' safety factors were never adopted by ANS-8, nor are they in any refereed publication. In fact I have no idea where they are documented except possibly in NRC guidance for licensees. The DOE has no such formal, specific limits since there is no indication that they would reduce accident frequency; they would clearly have a tremendous cost impact on many DOE sites.

"5.5 Procedures for Review

"5.5.2 Safety Evaluation

"14. The reviewer will determine that.....maintains a NCS review of the ISA.....that includes a review of identified potential accident sequences that result in an inadvertent nuclear criticality."

This does not state a 'representative worst-case' criticality scenario and thus it implies that this will be maintained for every operation in the ISA. This is contrary to the safety analysis guidance for DOE facilities and would be prohibitively expensive.

Closing Comment

Most of the issues and concerns raised in this letter revolve around the reasonableness of the application of the words. This will likely be highly reviewer-dependent and the cost and safety impact cannot be known at this time. In a few cases, for example, 'industry-accepted safety factors,' the section should be deleted unless a stronger basis can be provided.

I offer my services to the Commission in further reviewing and providing comments on the criticality safety aspects of these documents.

Sincerely,

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