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<H1>Revised Requirements for the Domestic Licensing of Special Nuclear

Material, 10 CFR Part 70</H1>

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10 CFR 70, SRP Chapter 5, Nuclear Criticality Safety, Draft dated 15
March, 1999

<p>
From: Thomas P. McLaughlin tpm@lanl.gov
Date: 3/29/99 21:58:58
Thread ID: 9
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COMMENTS ON DRAFT NUREG-1520, CHAPTER 5,

NUCLEAR CRITICALITY SAFETY (NCS)

MARCH 15, 1999

by

Thomas P. McLaughlin, Group Leader,

Nuclear Criticality Safety,

Los Alamos National Laboratory,

Match 29, 1999

General:

This revision is significantly improved over its predecessor that others and I commented on. The underlying regulatory basis is NRC RG 3.71, which invokes, with a few exceptions, all the ANS-8 national consensus standards, a commendable basis.

The ISA seems to be analogous to the SAR in the DOE. If that is the case, then the ISA should be the place for a Design Basis or Worst Credible criticality accident scenario in order for the applicant to demonstrate that criticality accidents are very unlikely and that they

have essentially zero off-site consequences. I.e., they are worker safety issues and not a threat to the public or the environment. Individual criticality safety evaluations (CSE) should be where each separate process is documented, not in the ISA. Perhaps more so in the

DOE world, but operations are continually changing and new ones are being added such that requiring regulatory approval except for those

new or changed operations which represent a greater risk than that currently in the ISA, is not justified. Similarly, the CSE is where the justification for active Vs passive controls should be justified.

There is an over-emphasis on the Double Contingency Principle to the detriment of the control of criticality risks. ANS-8.1 and 8.19 make it clear that the requirement is to prevent criticality accidents (see 4.1.2 of 8.1) and that an aid to achieving this is to be doubly contingent (see 4.2.2 of 8.1, a recommendation). For most operations there are several contingencies, and they all can vary in a smooth manner, including out of specification conditions. For example, supposing mass, spacing, moderation and reflection impact the NCS of a particular operation, a common combination, then it is also common that each of these factors could exceed their operating/design limits by almost any amount. Take mass, given sufficient operator mistakes, a limit can be exceeded by 1%, 10%, 100%, 1000%, etc.; it’s simply a matter of likelihood, which will always be judgmental.

Specific:

5.4.1 (6) and repeated in 5.4.2 (1) (d) - "……take no further action….."
This seeming prohibition to not allow risk-reducing actions is inconsistent with the ANS-8 standards and the philosophy implicit in section 5.4.3.3 (8) - "……because shutting down certain processes, even to make them safe, may carry a larger risk……"

5.4.2 (3) (b) - "……weekly walkthroughs of all operating…..all operating areas should be reviewed at least every two weeks…." This frequency is far beyond that of most, if not all, DOE regulated facilities and is not supported on the basis of performance-based and risk-informed regulation. A commitment to walkthroughs based on performance and risk would be consistent with DOE practices.

5.4.3.1 (3):

(a) Reference to, and a commitment to have copies of, appropriate reports should be sufficient. Otherwise it is unnecessary duplication.

(f) "…..plant specific benchmark experiments….." is an unattainable ideal. If the intent is to require that the benchmark experiments chosen for code validation cover, to the extent available, the credible ranges of the process parameters, then that is realistic.

(i) "…..a verification process….." What does this mean?

5.4.3.1 (4) all subparts - This section is duplication of the prior subpart but with a different application. I suggest that the applications (headings) be combined and then the body would not have to be repeated.

5.4.3.1 (6) (c & d) - Where are "NCS safety limits" and "NCS operating limits" defined? Can they be one and the same as they are at most, if not all DOE facilities?

5.4.3.2 (3) - "…provide justification in the ISA." This should be a part of a CSE, not the ISA.

5.4.3.2 (6) - "…..credible abnormal conditions…." Certainly mass is the most common controlled parameter and yet it would generally not be considered "incredible" that a mass limit be violated, i.e., it would be considered credible. Thus the applicant could not meet this requirement.

5.4.3.2 (9 & 10) - The numerical values (45%, 75%, 85%, 90%) have no basis in consensus standards or other recognized criticality documents .
They should be deleted as they can only lead to a false sense of risk control. For example, "….When double batching is possible…" it would generally be also true that triple, quadruple, etc. batching is possible.

5.4.3.2.(12) (a) - "….the SNM is segregated by enrichment." Why would it be unacceptable for the applicant to have assumed in the CSE that the highest credible enrichment was always present?

5.4.3.2 (13) (a) - The "one foot" restriction has no technical basis; it should be deleted.

5.4.3.2 (15) (b) - "High concentrations" needs to be defined.

5.4.3.3 (3) (a) - "….shall be required in each area…." This unilateral

requirement does not allow for competing risks, or likelihoods that ar e
judged to be in the incredible range, to be considered.

5.4.3.4 - The repetition of the ANS-8 standards as requirements seems unnecessary.

5.4.3.4 (8) - I am not aware of a definition for "administrative k-eff

margins", but in general each process will have different margins of subcriticality and each will be highly judgmental based on the chosen conditions of analysis. These should be approved by line management an d
documented in the CSE. As stated under General, such information shoul d
not be in the ISA or otherwise require pre-approval outside of line management within the company.

5.4.3.5 - This is another example of putting the recommendation, ANS-8.1, section 4.2.2, ahead of the requirement, section 4.1.2.

5.4.3.6 (3) (b) Again, an over- and misleading-emphasis on Double contingency is evident. Suppose that a process has four contingencies,

not an uncommon situation, would it be a loss of double contingency to

lose one? two? contingencies. Also it is clear that no two contingencies are equally likely.

We in the NCS group at Los Alamos welcome further discussion on any of

these issues by any of the staff. The comments have been submitted in an attempt to assure that, consistent with the guidance in the ANS-8 standards, there will be practical, cost-effective criticality acciden
t
risk control.

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