September 21, 2001

Mr. Anthony R. Pietrangelo, Director
Risk and Performance Based Regulation
Nuclear Energy Institute
Suite 400
1776 I Street, NW
Washington, DC 20006-3708

Dear Mr. Pietrangelo:

Enclosed for industry consideration are NRC staff comments on the Initiative 5 White Paper describing a proposed process for controlling surveillance test intervals outside of technical specifications. These comments are from knowledgeable staff who will be involved in subsequent consideration of the industry proposal, but at this stage the comments should not be considered NRC or staff positions. We trust that this early feedback will assist in the further refinement of your thinking.

Sincerely,

***/RA/***

William D. Beckner, Chief
Technical Specifications Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

cc: R. Barrett, SPSB
C. Carpenter, RGEB
P. Kuo, EMEB
E. Imbro, REXB
RITSTF members

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COMMENTS ON PRELIMINARY DRAFT REPORT
"RISK-INFORMED STI EXTENSION PROCESS"

NRR/DSSA/SPSB

1. Although the draft paper presents a partial and rather high-level description of a risk-informed process for extending surveillance testing intervals, the proposed process appears to be a step in the right direction. As the authors clearly state, the described process refers mostly to only a part (risk evaluation) of one element (engineering analysis) out of the four elements identified in regulatory guides on risk informed regulation. Also, the described process does not address PRA quality. It is expected that the four elements of a risk-informed process will be implemented in an integrated fashion and that PRA quality will be addressed.

2. Step 2 calls for a qualitative check to determine whether the STI has a potential impact on PRA results, in terms of CDF and LERF. As an example of an STI system that has no effect on either the CDF or LERF is mentioned the instrumentation that measures containment pressure after a severe accident. However, many systems which appear to have no direct impact on CDF and LERF may actually contribute to the values of recovery probabilities by providing cues to operators and/or input to actuation logic of mitigation systems. The STI extension process should provide adequate guidance for Step 2 to ensure that such systems are not screened out (sent to the Expert Panel) without a risk-based evaluation.

3. There are several structures, systems and components (SSCs) in the TS which have negligible or no contribution to CDF and/or LERF but have the important function of controlling delayed radiation releases to the environment. A risk-informed approach for extending the STIs of such SSCs based on an effective surrogate risk metric, such as the expected SSC challenge, may be appropriate and useful.

4. There is no clear need for Steps 2 and 3 to be separate. Step 2 (determine whether STI has potential impact on PRA results) could be merged with Step 3 (determine whether STI or associated component is modeled in the PRA).

5. The STI process should provide adequate guidance for Step 23 (determine whether the STI can be modeled in the PRA) to ensure that this step is not used by licensees to bypass the need for a risk-based evaluation. For example, licensees with less than "good" quality PRAs could follow this step to justify using "engineering judgement" to extend STIs even in cases where a risk-informed decision is possible. The type of modeling that would be acceptable (e.g., detailed vs bounding) should be discussed. If a detailed modeling is possible, Step 4 could be used to determine risk significance (LSSC vs HSSC). If only a bounding-type modeling is possible, Step 4 could be used to get risk insights which would be evaluated by the Expert Panel in selecting a new STI.

Enclosure

6. In determining the risk significance of the associated STI component, Step 4 considers only the risk from internal events at power operation. If a component is found to fall in the LSSC category, no further risk evaluation is performed (Step 22). Step 22 leads to Step 15 which bypasses all steps calling for external event and shutdown risk evaluations. The risk impact from external events and shutdown operations should be considered even for SSCs that fall into the LSSC category.

7. Two criteria are proposed in Step 4 for categorizing an SSC as either a low safety significance component (LSSC) or a high safety significance component (HSSC). In the description of Step 4, it is stated: "A system is considered HSSC if its RAW is grater than 2.0 or its Fussel-Vesely value is larger than 0.005." However, in the same description it is also stated (see Note in parentheses): "To keep it simple, it may be adequate to say if RAW is greater than 2.0 and FV is greater than 0.005, then the system or component is HSSC." Is the "and" (instead of the "or") in the second statement intended? Also, the numerical values in the criteria for extending STIs should reflect the scope and objectives of the Technical Specifications (TS) surveillance testing requirements and how they impact the PRA results. Therefore, such criteria may differ from those used in the in-service testing program.

8. The proposed process does not appear to address PRA uncertainties, both in data and modeling, in assessing the risk impact of extending STIs according to guidance provided in regulatory guides related to risk-informed regulation such as RG 1.174. Uncertainties are usually present even when a "good" quality PRA is available.

9. In Step 6 and 10, the changes in CDF and LERF from internal events at power operation, respectively, are compared to RG 1.174 guidelines. Similarly, in Steps 14 and 17, the changes in CDF and LERF from external events and shutdown operation, respectively, are compared to RG 1.174 guidelines. The following observations are made with respect two the above mentioned Steps of the proposed process.

   – RG 1.174 limits apply to <u>total</u> risk changes and not to changes associated with internal events at power operation only, as used in Steps 6 and 10 of the proposed STI extension process. If risk changes from internal events at power operation only are used, qualitative arguments should be made to show that the contributions from external events and shutdown are negligible with respect to the contribution from internal events at power operation. Alternatively, bounding-type calculations can be used to assess the contribution from external events and shutdown operation and add the result to the contribution from internal events at power operation to obtain a conservative total risk change.

   – The risk changes from external events and shutdown operation are compared to RG 1.174 limits in Steps 14 and 17. These changes should be combined with the risk changes from internal events and the result be compared to the RG 1.174 limits.

10. Steps 18 though 20 address the need for a phased approach in implementing any STI extensions as well as the need to monitor their long-term impact in terms of increases in failure rates. For each step of STI extension, criteria for determining the size of the STI extension, the minimum time in the step and the acceptability of the resulting increase in failure rates need to be established to ensure that risk would not increase unacceptably.

Additional Staff Comments

NRR/DRIP/RGEB

1. For the Option 2 rule, the NRC staff has not been using the terminology high safety significance (HSSC) and low safety significance (LSSC) as described in Step 4. The terminology used by the staff has been safety significance and low safety significance. Recent feedback from RILP states that they prefer “risk-significant” as the appropriate terminology.

NRR/DE/EMEB

1. It is not clear as to what this document accomplishes, i.e., risk informing STI extensions or risk-informed basis for removing STIs from TS to licensee controlled document.

2. No guidance is provided to the Expert Panel. This guidance should be on a plant design level.

3. Although the risk-informed Regulatory Guides are mentioned in the draft document, there are no instructions to use the RGs except for comparing CDF and LERF limits described in RG 1.174. Additionally, only one piece of implementation of RG 1.175 is mentioned.

4. The draft document did not discuss how a licensee should handle defense in depth and safety margins for STI extensions. The draft document should also provide guidance on these aspects.

5. Step 1.21 is not consistent with the risk-informed IST document.

6. PRA should be at a component level not a system level as implied by steps 1.03 and 1.04.

7. Draft document concentrates effort on evaluating failure rates. This may not be appropriate for STI extensions. A better mechanism to monitor would be degradation for STI extensions.

8. STI extensions are based on difficulty of the test, cost, potential for error and consequence and role of test on reliability of the function. PRA is used afterward to justify the extension. No details are provided as to which criteria to use for STI extensions. This also implies that the PRA is the only important part of the engineering evaluation. PRA alone cannot be the justification for STI extensions.

9. Draft document should evaluate the overall change in risk and should be consistent with the other RGs. The draft document does not make this point clear.

10. Step 1.16 should rebaseline the PRA.

11. Writers of the draft document should look at staff position presented in the South Texas Project safety evaluation report.