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May 12, 2001

Mr. Michael T. Lesar
Acting Chief, Rules and Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop: T-6 D59
U.S. Nuclear Regulatory Commission
Washington DC 20555-0001

SUBJECT: Comments on "Risk-Based Performance Indicators: Results of Phase-1 Development"

Dear Mr. Lesar:

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI) is submitting the enclosed comments on the draft document "Risk-Based Performance Indicators: Results of Phase-1 Development," as requested by the Nuclear Regulatory Commission in the *Federal Register* on February 1, 2001 (66 *Fed. Reg.* 8606). The comment period was extended to May 14, 2001 in the *Federal Register* on March 16, 2001 (66 *Fed. Reg.* 15302). The enclosure provides responses to the questions posed in the Federal Register Notice. This cover letter provides key concerns of the industry in how the proposed indicators fit into the regulatory scheme and the regulatory oversight process.

We believe it is appropriate for NRC to pursue improvements to the Reactor Oversight Program (ROP) performance indicators. The first year of program implementation has shown that the current set of performance indicators can be collected and reported in a consistent and accurate manner, and that the indicators provide valuable information in conjunction with risk-informed inspection findings from the baseline inspection program. However, improvements are necessary, and the Office of Research has been pursuing purely risk-based alternatives and additions. The initial results described in the Phase 1 Development report appear to provide some opportunities for improvement, particularly in the area of replacing start and demand fault exposure unavailability with unreliability indicators. The unavailability performance indicator has been the most difficult to implement during the first year of the new oversight program. In addition to the problems with fault exposure, the distinction between design basis availability and risk basis

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availability must be resolved. However, we have several key concerns, which must be addressed prior to considering the use of the purely theoretical risk-based performance indicators (RBPI) in the real world oversight process.

1. It is essential that there be an overall plan for how the RBPIs are integrated with current regulations. Currently, technical specifications provide allowed outage times and configuration control requirements which are based primarily on design basis requirements. Alternatively, maintenance rule implementation requires out of service target times and configuration management activities based more on risk insights. This situation is already creating conflicts and problems at plants. Without a well-thought out strategy for integrating these requirements and the RBPIs, licensees will be facing a third set of potentially conflicting performance targets. This is an unacceptable outcome.

2. RBPIs, while they may be technically feasible, must prove themselves through the MC 0608 Change Management Process for performance indicators. This change management process requires that any change to performance indicators add value to the process as it currently exists. The change must provide additional risk-significant insights not being gathered through the current process (of performance indicators and inspection findings), avoid unnecessary regulatory burden, and reduce inspection activity. The Phase 1 report may show that there are additional indicators, which could be reported; however, it does not address the key question of whether these indicators even have the potential to pass the MC 0608 tests. A key policy issue which needs to be addressed is: What is NRC's policy regarding reductions in inspection resources should additional performance indicators be added?

3. There may be significant unintended safety consequences from several of the proposed indicators. In particular, the shutdown indicator is suspecting in this regard. For example, while time spent in mid-loop operation should be limited, one does not want to rush through evolutions to avoid crossing performance thresholds of very short duration. We believe that part of the problem with the indicator thresholds may be that little or no credit has been given for NUMARC 91-06 compensatory measures. There is also a scarcity of data on baseline periods of time in the configurations discussed in the proposed indicator. We believe that this indicator is far from ready for recommendation even as a potential indicator to be piloted.

4. Another question which must be addressed to determine the potential viability of these RBPIs is, how are they to be calculated? To be implemented in the program, indicators must be relatively simple to collect and to calculate. It is not clear from the Phase 1 report how the RBPIs are defined and calculated. A majority of the burden associated with the current PIs has to do with definitions

and clarifying notes. The calculation methodology and definitions are not addressed in sufficient detail to determine if they can pass this crucial test.

5. The use of risk-based, plant specific thresholds has much to recommend it; however, there may be problems in adhering too strictly to pure risk numbers. For example, it appears that the green-white threshold for a loss of heat sink performance indicator for one of the plants would be 0.72 over a three-year period – in effect a "threshold" of zero. Another example is the wide variance between plants in the green-white threshold for general transients, which varied between 1.2 and 8.2 per year. It is hard to believe that the public and industry would understand or support such a wide variance for the green-white threshold for supplemental inspection for this indicator.

6. If the proposed RBPIs can meet all of the concerns expressed above, and show their indicative value through piloting, there remains the important issue of how they are used in the assessment process, i.e., the action matrix. If there are to be additional performance indicators, there must be a strategy for how this will affect NRC supplemental inspection activities. Rolling up the performance indicators to a higher level does not solve the problem of additional burden in collecting, reporting and exposure to inspection verification. In addition, there are problems in rolling up system train information to higher levels of abstraction, which are not actionable or easily understood by the public. The simplicity of the current system of indicators, which directly measure performance outcomes, should not become too abstract and model driven.

We look forward to working with the NRC to refine the new oversight process and its performance indicators. The ROP should be a continuously improving process which corrects weaknesses, while maintaining stability through well thought out change management processes. We believe the program is now operating in an effective manner, and is a vast improvement over the previous process of industry oversight. Changes in performance indicators must consider the key issues described above to be successful.

Please call (202-739-8078) or email me at sdf@nei.org if you have any questions.

Sincerely,

Stephen D. Floyd

Stephen D. Floyd
Enclosure

RESPONSE TO FEDERAL REGISTER NOTICE QUESTIONS

Comments regarding the technical adequacy of the RBPIs as expressed in the following criteria:

The RBPIs are compatible with, and complementary to, the risk-informed inspection activities of the oversight process.

In order to be compatible with, and complementary to, the risk-informed inspection activities of the reactor oversight process, any additional PI would need to provide additional value to the current scheme of PIs and inspection activities. That is to say, an addition to the current PIs would need to provide better understanding of licensee performance such that inspection activity could be decreased. Or, alternatively, the value could be provided by replacing a current PI with one which better assessed licensee performance, with the same, or less, licensee and NRC resource burden. An example of the first type of improvement would be reducing maintenance inspection activities based on the addition of a PI. An example of the second type of improvement would be to replace the fault exposure term in the unavailability PI with an unreliability PI (if such a PI could be derived which was easy to compute, easily understood, and not subject to aleatory problems). It does not appear that this type of assessment has been undertaken in the Phase 1 development report. This is unfortunate, because these are key considerations for new PIs as part of the ROP.

The RBPIs cover all modes of plant operation.

It is appropriate to attempt to cover all modes of plant operation. The current PIs and the proposed RBPIs would cover operational modes. The indicator proposed to assess performance while the plant is in a shutdown mode, however, is at a rudimentary stage and appears to have several weaknesses: (1) The indicator does not appear to be consistent with maintenance rule, technical specifications, and shutdown procedures in place; (2) The short time periods used for performance thresholds will encourage licensees to rush through maintenance and surveillance procedures to avoid exceeding thresholds – this is not an appropriate use of a performance indicator. It is also questionable whether a shutdown indicator is appropriate. The reason is that shutdowns are now relatively short and receive significant inspection coverage which would not likely be decreased if there were a shutdown PI in place. Also, the risk profiles used allow very little time between thresholds (e.g., 2 hours), so one could easily move from green to yellow or red while performing actions in a prudent and compliant manner. There are also very few plant specific models such that it would be hard to set plant specific thresholds. In addition, it does not appear that credit for the compensatory measures established in NUMARC 91-06 was taken into consideration in the risk analysis.

Within each mode, the RBPIs cover risk-important SSCs to the extent practicable.

The purpose of the PIs in the reactor oversight process is to assess licensee performance and assist NRC in determining what level of resources above the baseline level are necessary to assure safety. The purpose is NOT to cover all risk-important SSCs. The proposed scheme covers some additional systems, and therefore some additional aspects of total plant risk. While covering additional SSCs, the additional RBPIs must provide additional value to the ROP, as stated above. Addition of classes of components does not appear to meet the test of reducing inspection resources and it will add resource reporting burden to licensees. Another aspect of this question is: the RBPIs are generic (i.e., are the same for all BWRs and PWRs) and therefore do not necessarily cover the most risk significant SSCs at each plant. This situation is necessary in order to be able to compare plants across industry and illuminates another difference between PIs that are useful for reactor oversight, as opposed to PIs that are constructed to maximize determination of total plant risk. The PIs used in the ROP must be chosen to meet both criteria.

To the extent practicable, the RBPIs identify declining performance before performance becomes unacceptable without incorrectly identifying normal variations as degradations.

It is not possible to understand the capability of the RBPIs to assess performance appropriately without knowing the definitions and methodology for computing the RBPIs. It is also not possible to answer this question without a benchmarking of the historical data against the chosen thresholds and a rigorous pilot program. Some of the thresholds chosen based solely on the methodology of decades to incremental risk do not appear to be reasonable operational goals. For example, setting a green/white threshold for loss of heat removal at 0.24 per year, or 0.72 over a three year period, does not even allow the plant one transient in three years without exceeding the threshold. It is also unlikely that the industry or public would understand thresholds which allowed one plant to have 1.2 general transients a year and another 8.2. This is what the methodology forces, but it does not pass the common sense and common acceptability needs of the ROP.

The RBPIs are capable of implementation without excessive burdens to licensees or NRC in the areas of data collection and quantification.

Once again, without knowing the definitions and methodology used to calculate the RBPIs, it is difficult to answer this question. The initiating event PIs appear to be capable of implementation without excessive burden. The shutdown PI and the mitigating PIs are not clear without more definition. The need to report so much

additional data will put a burden on licensees because of the need to ensure accuracy in reporting to the NRC. The NRC will also have to devote more effort in reviewing the additional data. What will be the offsetting benefit in terms of improved inspection coverage and resource savings?

The RBPIs are amenable to establishment of plant-specific thresholds consistent with the ROP.

Theoretically, plant specific thresholds can be developed, however, there are implementation issues which must be addressed: (1) Plant specific thresholds that vary too much from plant to plant will not be understood by the public and will be viewed as unfair and arbitrary by licensees. (For example, the General Transient PI green/white threshold varies from 1.2 to 8.2); (2) Mitigating system green/white PI threshold should not be inconsistent with technical specifications, allowed outage times, and maintenance rule action levels; (3) shutdown PIs that could force inappropriate actions to avoid exceeding tight thresholds and increase risk rather than managing it.

Comments on the key issues that affect the potential implementation of the results of the RBPI development in the ROP:

Are any additional performance indicators needed to enhance the ROP?

Once again, the answer for the ROP PIs is whether they provide additional value in determining the appropriate level of NRC inspection resources. The current level of resource expenditure is essentially the same as prior to the new program, and the current PIs assist NRC in redistributing them. The RBPIs do not appear to be capable of enhancing that resource distribution without significant additional burden. We do believe that the mitigating system PIs need to be enhanced to resolve difficulties associated with fault exposure (the solution of adding unreliability to unavailability (less fault exposure) is well worth pursuing). As stated above, we do not believe the addition of component classes or shutdown PIs adds value to the ROP. Similarly, if a support system is added, there should be a reduction in inspection levels. We also believe that a power level transient PI provides leading indication of potential plant problems and should be included, although enhancements are needed to the current indicator to address NRC and industry concerns. The physical security area should receive additional attention once the proposed rulemaking makes clear what potential targets of opportunity exist. (Of course, it will be difficult to use purely risk-based approaches in this area.)

Is the number of potential new indicators appropriate?/Which of the proposed indicators would be most beneficial?

The number of potential new indicators appears too high based on the minimal additional value they add to the ROP. The most beneficial change would be to restructure the mitigating systems into unavailability and unreliability, if this can be achieved without excessive burden, including false positives. Obviously, the action matrix would need to be reviewed based on the total number of indicators in a cornerstone. Aggregating PIs to some higher level does not take away the burden associated with collecting and reporting them.

Do the data sources for the RBPIs exist and have sufficient quality for use in the ROP?

Data sources exist for the initiating event PIs. Data quality for the additional mitigating system PIs and for unreliability data is problematic. This statement is based on our experience with the rollout of the current mitigating system PIs. Prior to being included in the regulatory arena, the data was good enough for management and control; however, in the regulatory arena, additional scrutiny is necessary to avoid violations for data inaccuracy. There is virtually no reliable data for the shutdown indicator.

Will SPAR Revision 3i models be available for setting plant-specific thresholds for all plants?

NRC must answer this question itself.

Will LERF models be available for setting thresholds for mitigating and containment systems?

NRC must answer this question itself.