

Draft

Attachment 4

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, DC 20555-0001

April 1, 2006

**NRC REGULATORY ISSUE SUMMARY 2006-XX  
PROPOSED CHANGES TO THE SAFETY SYSTEM UNAVAILABILITY  
PERFORMANCE INDICATORS**

**ADDRESSEES**

All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

**INTENT**

The U.S. Nuclear Regulatory Commission (NRC) is issuing this regulatory issue summary (RIS) to inform addressees that beginning on April 1, 2006, the agency will replace the safety system unavailability (SSU) performance indicators (PIs) with the Mitigating Systems Performance Index (MSPI). This RIS and the guidance in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," provide guidance to participating addressees for calculating and submitting MSPI data to the NRC. This RIS also contains background material to convey to interested members of the public and others a general understanding of the MSPI. Addressee participation in this PI program is voluntary. Therefore, this RIS requires no action or written response on the part of an addressee.

**BACKGROUND INFORMATION**

From the very beginning of the development of the ROP, the staff has foreseen the need to refine the use of PIs. In SECY 99-007, "Recommendations for Reactor Oversight Process Improvements," dated January 8, 1999, the staff discussed refining the PIs through the future development of risk-based performance indicators (RBPIs). Experience gained from initial efforts to develop RBPIs was insightful in addressing problems with the current PIs, particularly the safety system unavailability (SSU) PIs.

During the first two years of ROP implementation, the staff and industry identified problems with the SSU PIs, and worked to implement incremental changes to the SSU PIs. By spring of 2001, the staff and industry formed a working group to address the problems which included:

- 1) the use of fault exposure hours that overestimated the risk significance of the unavailability,

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2) inconsistency in the use of unavailability between the SSU PI and the maintenance rule, 3) the use of generic, deterministic performance thresholds, and 4) the undesirable effects from cascading failures of cooling water support systems onto the front line monitored systems.

Over the course of four years, the working group developed a PI that not only addresses these problems, but accounts for plant specific design, uses probabilistic risk analysis (PRA) data, and is risk-informed. This new PI is called the Mitigating Systems Performance Index, or MSPI.

In 2002, after nearly a year of PI development by the MSPI working group, the staff and industry conducted a one year MSPI pilot at 20 plants, consisting of six months of data collection, and six months of data analyses and assessment. Results of the MSPI pilot proved the feasibility of the MSPI, as well as identifying areas for further refinement. Throughout the development and conduct of the MSPI pilot, the staff and industry held routine monthly public meetings, gave presentations to the Advisory Committee on Reactor Safeguards (ACRS) and the Commission on developmental progress, received comments from interested members of the public, and worked with other countries who have expressed interest in the MSPI for use in their own nuclear programs.

During the development of the MSPI, the industry had proposed to suspend the significant determination process (SDP) for equipment failures and conditions that were covered by the MSPI. This approach would have placed responsibility for promptly assessing performance deficiencies associated with equipment failures on the MSPI. However, the staff evaluation of the pilot experience showed that the MSPI was not suited for this task, and it was subsequently determined that the SDP process was to remain intact and unchanged.

Since conclusion of the MSPI pilot in 2003, the staff and industry continued to finalize the technical guidance needed for implementing the MSPI, define and address a minimum level of PRA quality needed for MSPI, develop the databases and software necessary for each licensee to be able to implement the MSPI, conduct training of the industry and staff, and answer frequently asked questions posed by the staff and industry.

## SUMMARY OF ISSUE

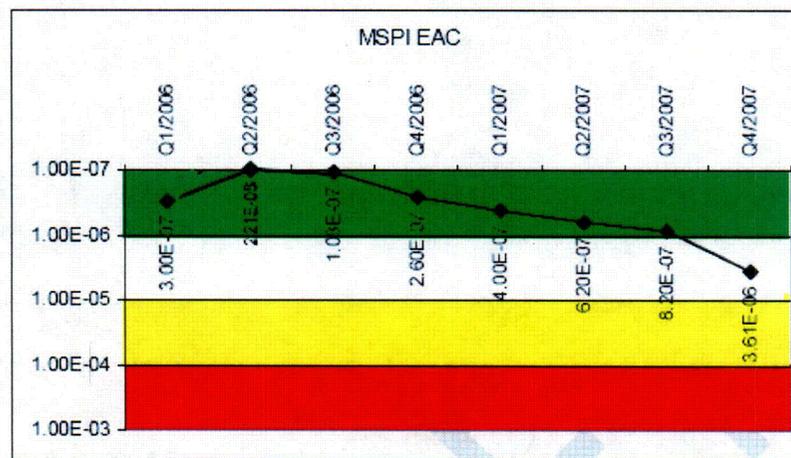
The MSPI is the risk-informed performance indicator that the NRC and the nuclear industry have jointly developed a replacement for the current set of SSU PIs. In simple terms, the MSPI reflects the composite averaged performance of important components and trains within a monitored system over a 12 quarter (three year) period. Licensees will report two values for each of the five monitored systems, a UAI, or unavailability index number and a URI, or unreliability index value. The staff will then add the two together for a total MSPI index value for the system and that value will be displayed on the NRC website. The overall value is expressed in units of core damage frequency<sub>index</sub> ( $CDF_{index}$ ). The  $CDF_{index}$  term is used to denote that MSPI is not reflective of a true core damage frequency as would be calculated from a plant PRA. If the value exceeds a performance threshold, then the appropriate PI color will be indicated. The performance thresholds are risk-based and the threshold values are the same for all systems and for all licensees. They are set at  $>1E-6 \Delta CDF_{index}$  (white),  $>1E-5 \Delta CDF_{index}$  (yellow), and  $>1E-4 \Delta CDF_{index}$  (red). Data and information used in the MSPI calculation are derived from the at-power, internal events, level 1 plant PRA.

In technical terms, the MSPI is the sum of two indices, an unavailability index (UAI) and unreliability index (URI) that taken together, provide a single value for a monitored system in terms of a change in core damage frequency ( $\Delta$ CDF) index.

$$\text{MSPI} = \text{UAI} + \text{URI}$$

The UAI for a given monitored system is the sum of all unavailability (UA) contributions on a train (or segment) basis within a monitored system. The URI for that same monitored system is the sum of all unreliability (UR) contributions on a component basis within that system. Because the two terms measure different aspects of equipment performance, it is necessary to convert them to the same units before they can be summed. This is accomplished by a conversion to units of  $\Delta$ CDF by multiplying the change in unavailability (current unavailability minus the historical baseline unavailability) by a Birnbaum risk importance value that represents the change in CDF for a given change in unavailability within the system. This results in a UAI value that is without units, but is expressed in terms of  $\Delta$ CDF<sub>index</sub>. The same approach is used for calculation of the URI.

A graph of the MSPI for a sample emergency AC system is listed below. For a complete technical discussion of the MSPI, please read NEI 99-02, Section 2.2 and Appendices F and G, "Methodologies For Computing the Unavailability Index, the Unreliability Index, and Determining Performance Index Validity," and "MSPI Basis Document Development," or NUREG-1816, "Independent Verification of the Mitigating Systems Performance Index (MSPI) Results for the Pilot Plants."



Thresholds: White > 1.00E-06, Yellow > 1.00E-05, Red > 1.00E-04

An external NRC Web site, <http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/mspi.html>, has been set up for stakeholders to obtain general information on the MSPI, the results of the pilot program, and the implementation guidance documents.

MSPI takes effect at the beginning of the second quarter of 2006, or April 1, 2006, with the reporting of MSPI data for the second quarter of 2006 on July 21, 2006. The NRC will post the results of the MSPI on its website in similar fashion to how the results from other PIs are posted. Additionally, the NRC expects that with MSPI implementation, some licensees who are currently green under the SSU PI may go white with MSPI in effect, and some who are white under the SSU PI will report green MSPIs. This impact is primarily due to the fact that the SSU PI and MSPI measure different attributes and aspects of plant performance, including accounting for risk contribution, and may not be due to any recent change in system performance. The staff also plans to evaluate any greater-than-green MSPIs to determine if additional inspection is warranted or if the staff has already reviewed the reason for the performance threshold change.

#### **COMPLETENESS AND ACCURACY OF INFORMATION DISCUSSION (10 CFR 50.9)**

This RIS requires no action or written response. The reporting of MSPI data, as with any PI data, will be used for assessment under the reactor oversight process. However, in light of the large volume of data (12 quarters of data) needed to calculate and verify MSPI, licensees are granted a probationary period of one year from the start of MSPI data collection (April 1, 2006) before the requirements of 10 CFR 50.9 must be met. The collection and transmittal of MSPI data by all licensees will adhere to the requirements of 10 CFR 50.9 after April 1, 2007.

#### **BACKFIT DISCUSSION**

This RIS requires no action or written response. Any action on the part of addressees to collect and transmit PI data in accordance with the guidance contained in this RIS is strictly voluntary and, therefore, is not a backfit under 10 CFR 50.109. Therefore, the staff did not perform a backfit analysis.

#### **FEDERAL REGISTER NOTIFICATION**

A notice of opportunity for public comment on this RIS was not published in the *Federal Register* because this RIS is informational.

#### **SMALL BUSINESS REGULATORY ENFORCEMENT FAIRNESS ACT**

The NRC has determined that this action is not subject to the Small Business Regulatory Enforcement Fairness Act of 1996.

#### **PAPERWORK REDUCTION ACT STATEMENT**

This regulatory issue summary contains no voluntary information collections that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.).

## Public Protection Notification

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Christopher I. Grimes, Director  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Technical Contact: John W. Thompson, NRR  
301-415-1011  
E-mail: [jwt1@nrc.gov](mailto:jwt1@nrc.gov)

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