

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

June 12, 2006

**NRC REGULATORY ISSUE SUMMARY 2006-07
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 replaced the safety system unavailability (SSU) performance indicators (PI) with the Mitigating Systems Performance Index (MSPI). This RIS and 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 information for interested members of the public and other stakeholders. 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

The NRC inspection program is implemented within the framework of the Reactor Oversight Process (ROP). The ROP includes two major inputs into the assessment of licensee performance. These inputs are inspection findings and PIs. From the beginning of the development of the ROP, the staff recognized 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.

During the first 2 years of ROP implementation, the staff and industry identified problems with the SSU PIs and worked to implement incremental changes to the SSU PIs. In the spring of 2001, the staff and industry formed a working group to address the following problems with the SSU PIs: (1) the use of fault exposure hours that overestimated the risk significance of unavailability of the systems, (2) inconsistency in the use of unavailability data between the

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SSU PI and the maintenance rule, (3) the use of generic deterministic performance thresholds, and (4) the undesirable effects of cascading failures of cooling water support systems on the front-line monitored systems.

Over the course of 4 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 was named 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 1-year MSPI pilot at 20 plants consisting of 6 months of data collection and 6 months of data analyses and assessment. The results of the MSPI pilot proved the feasibility of the MSPI and identified 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 and the Commission on developmental progress, received comments from interested members of the public, and worked with other countries that have expressed interest in the MSPI for use in their own nuclear programs.

During the development of the MSPI, the industry proposed to suspend the significance 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 would not be impacted by MSPI implementation.

Since conclusion of the MSPI pilot in 2003, the staff and industry finalized the technical guidance needed for implementing the MSPI, defined and addressed a minimum level of PRA quality needed for MSPI, developed the databases and software necessary for each licensee to be able to implement the MSPI, conducted training of the industry and staff, and answered questions posed by the staff and industry.

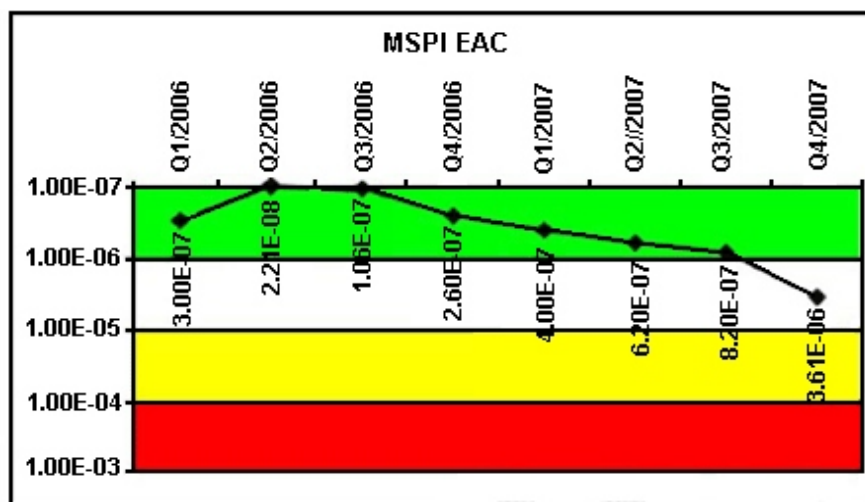
SUMMARY OF ISSUE

The MSPI is the risk-informed PI that the NRC and the nuclear industry have jointly developed to replace 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 (3-year) period. Licensees will report an unavailability index (UAI) number and an unreliability index (URI) number for each of the five monitored systems. The staff will combine these inputs to arrive at 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_{index} (CDF_{index}). The CDF_{index} term is used to denote that MSPI is not reflective of a true CDF such 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 an unreliability index (URI) that taken together, provide a single value for a monitored system in terms of a change in core damage frequency (ΔCDF_{index}).

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

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

A graph of the MSPI for a sample emergency alternating current system is given 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 to give stakeholders general information on the MSPI, the results of the pilot program, and the implementation guidance documents.

MSPI took effect at the beginning of the second quarter of 2006 or April 1, 2006. The MSPI data for the second quarter of 2006 will be reported on July 21, 2006. The NRC will post the results of the MSPI on its Website in a fashion similar to the posting of the results from other PIs. 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.

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 ROP.

10 CFR 50.9 requires that information provided to the Commission by a licensee shall be complete and accurate in all material respects. This includes the voluntary submittal of PI information by licensees, and this information is considered material because the NRC uses it to access licensee performance and to make decisions on regulatory action. As a result, submitting inaccurate PI information is a violation of 10 CFR 50.9. However, some errors in this data are expected because of the time constraints to gather and submit historical data, because the NRC and licensees are in a learning process for the submission and review of this data, and because of the large volume of data (12 quarters of data) needed to calculate and verify MSPI. Therefore, if significant non-willful errors in the collection and transmittal of MSPI data are identified, enforcement discretion in accordance with Section VII.B.6 of the Enforcement Policy is appropriate for a period of 1-year from the start of MSPI data collection (April 1, 2006). After April 1, 2007, enforcement discretion as normally provided under the enforcement policy would be applied.

Specific guidance for the NRC processing of this enforcement discretion is currently being generated, and it is anticipated that it will be consistent with the existing enforcement discretion guidance in Enforcement Guidance Memorandum (EGM) 99-006, Revision 1, Extension of the Guidance for Implementation of the Interim Enforcement Policy for Use During the Reactor Oversight Pilot Program, dated December 20, 1999. EGM 99-006, Revision 1, can be located at <http://www.nrc.gov/reading-rm/basic-ref/enf-man/egm99006r1.pdf>. This enforcement guidance (as well as any pending guidance) can also be located on the NRC's Web site at www.nrc.gov; select **What We Do, Enforcement, Enforcement Guidance, Enforcement Manual**, then **Appendix A: Temporary Enforcement Guidance**.

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 information collection requirements subject to the Paperwork Reduction Act of 1995 ((44 U.S.C. 3501 et seq.). These information collection requirements were approved by the Office of Management and Budget (OMB), approval number 3150-0011, which expires February 28, 2007.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

CONTACT

Please direct any questions about this matter to the technical contact listed below.

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Note: NRC generic communications may be found on the NRC public Web site, <http://www.nrc.gov>, under Electronic Reading Room/Document Collections.