Assessment

The Mitigating Systems Performance Index (MSPI) is a substantial improvement over the existing Safety System Unavailability (SSU) Performance Indicator in indicating safety performance in the mitigating systems cornerstone. It more accurately indicates risk significance for system performance and does not introduce any new unintended safety or performance consequences. The MSPI has been proven effective during the pilot program for determining the safety significance of single failures of monitored components, the significance of multiple failures over time, and the risk-weighted unavailability of systems within the scope of the MSPI.

The MSPI was developed to improve upon the current SSU PI which only captures system unavailability. It has been an NRC and industry goal since the inception of the Reactor Oversight Process to include the effects of unreliability in the mitigating systems performance indicators. (This desire was first expressed in SECY 99-007, Recommendations for Reactor Oversight Process Improvements.) In addition to including unreliability, the MSPI was developed to address other complications and weaknesses in the current SSU PI:

- The performance thresholds of the SSU are generic and do not necessarily align with plant specific maintenance rule performance goals, creating the potential for confusion and unintended consequences.
- The use of a highly subjective fault exposure term in place of unreliability creates confusion, contention, and extended wasteful argument. In addition, it overstates the risk, as evidenced by SDP results and PRA analyses.
- The SSU focuses on deterministic design basis operability as opposed to applying risk insights which will focus resources in the most effective areas.
- The counting rules for SSU require extensive data gathering efforts to sort out the cascading effects of support systems on front line systems, when the system is required to be available, and the possible impact of discovered design basis errors on past availability.
- The SSU is one of three different indicators of equipment performance required to be tracked by system engineers, the other two being the WANO unavailability and the Maintenance Rule. This duplication of effort, which affects both the licensee's engineers and the NRC inspectors, is unnecessary.

The MSPI consists of an unavailability element and an unreliability element, which are summed to provide an indication of a change in core damage frequency. This single number is compared to thresholds of performance which mirror the thresholds established in the reactor SDP. Reporting of these two elements per system is similar to the current reporting process (except that fewer data elements need to be submitted). The data can be displayed just as it is now on the NRC website (windows, trend charts with colored thresholds, data), and the regulatory oversight process will work in the exact same manner as today. Data will be collected by the licensees and the elements will be calculated using industry designed software. Data elements will be submitted to the NRC in the same manner as the SSU. More data will need to be collected than under the SSU; however, this information is already collected for the Maintenance rule,

EPIX, and PRA applications. Some initial data setup of risk information will be required with infrequent updates.

The MSPI was developed in a series of public meetings involving NRC staff, an industry working group, and interested members of the public. Under the lead of NRC Research, a significant amount of time and resources have been expended to develop and then pilot the MSPI in all NRC regions at nine sites with twenty nuclear units. The end result is a proposed indicator with compelling attributes:

1. **The MSPI addresses both reliability and availability and integrates their impact on plant risk.** Generally, reliability is a dominant factor in measuring performance. The SSU PI does not adequately address reliability, leaving a key area without an effective indication of performance. Additionally, the MSPI uses measures of availability and reliability in a manner that is more consistent with Maintenance Rule and Probabilistic Risk Assessment requirements. As a result, MSPI will achieve consolidation of the reporting "definitions," reducing the burden on licensees to collect and report this data.

2. **The MSPI is plant specific, with plant specific thresholds, and the thresholds are risk informed.** The MSPI eliminates the generic thresholds currently used in the SSU PI. Therefore, the MSPI provides:
   - better indication of significant departures from expected performance
   - a tool for assessing the risk impact of changes in plant specific performance
   - better assurance that resources are appropriately placed on safety significant conditions that warrant increased attention
   - better alignment with the maintenance rule
   - better alignment with the risk thresholds of the reactor SDP

3. **The MSPI addresses the weaknesses associated with the current SSU PI which have unnecessarily burdened both NRC and licensee resources.** Definitions of terms are more closely aligned with PRA and maintenance rule. The need to cascade support system unavailability has been eliminated (and a support system PI added). There is no need to distinguish between planned and unplanned unavailability. Required hours do not need to be painstakingly calculated. The rules for determining unavailability are shifted from design basis considerations to the risk significant success criteria used for the maintenance rule and PRA. The SSU applies a confusing and difficult to determine unavailable fault exposure term in place of unreliability. When compared to Significance Determination Process (SDP) calculations and plant PRAs, fault exposure used in the SSU was found to provide an inaccurate estimate of risk. Both NRC and industry found the fault exposure term unsatisfactory, and understanding that the MSPI was going to replace that term, the NRC temporarily altered the SSU to eliminate the estimate for fault exposure when the time of failure was unknown (T/2). In the interim, each of these occurrences is evaluated under the SDP. When the MSPI is implemented these additional evaluations will be unnecessary.

4. **The MSPI is a robust indicator which was thoroughly piloted and can be effectively implemented.** Twenty units at nine plant sites participated, representing about 20% of the reactor fleet. (In addition, the companies actively participating in the working group on MSPI development represent over sixty per cent of the industry.) NRC headquarters, regional and resident resources were also directly involved and required to actively participate and assess the indicator. This extensive pilot effort ensures that there is a good understanding of the definition of the indicator, how to implement it, and what the benefits and costs are. The lessons learned from the pilot can be readily transferred to the rest of industry and NRC by the pilot participants – both NRC and industry – who have a significant familiarity with the new PI.

5. **Significant NRC and industry resources can be saved using the MSPI to eliminate the need to conduct SDPs for single failure situations.** (Multiple concurrent failures, common cause failures, failures of components not covered by the MSPI, and conditions not capable of being discovered during surveillance tests would continue to be addressed by the SDP.) The MSPI evaluates the risk impact of individual failures and the rate of failure over time. With the SSU PI, the NRC performs time-consuming phase II & III evaluations of many single failures. Industry must also devote unnecessary resources to respond to the NRC. This work will be reduced thereby providing better utilization of both industry and NRC resources.

When the initiative to develop the MSPI began, goals and success criteria were established to determine whether to proceed with implementation after the pilot. These success criteria were published in RIS 2002-14 and 2002-14, Supplement 1. The criteria fall into two categories: success criteria of a broad or general nature, addressed in Attachment 1, and success criteria dealing with the resolution of technical issues, addressed in Attachment 2. The success criteria have been sufficiently addressed to proceed with implementation.

The principal challenge associated with the MSPI is that it will take time to setup and establish the indicator. NRC inspectors will need to understand the indicator and have clear direction on how to verify PI data. The MSPI working group (NRC and Industry personnel) have recognized this potential drawback and have developed a sequence of three comprehensive workshops and a detailed communication plan to help NRC and industry personnel through this initial setup effort. The workshops and communication plan will help to ensure a smooth transition from the SSU PI to the MSPI. A summary of these proposed workshops is included in Attachment 3 and a proposed communication plan is provided in Attachment 4.

While there are a few remaining issues to resolve, none are unattainable. The MSPI is a very significant improvement over the SSU PI and its implementation offers an opportunity to vastly improve the reactor oversight process. The MSPI has numerous compelling features, but like any other indicator, is not perfect. On balance the improvements clearly outweigh any weaknesses, which will be readily overcome by a rigorous implementation and change management process. Therefore, industry strongly recommended prompt action to implement the MSPI in the second half of 2004.

Attachment 1
General Success Criteria

The general success criteria published in the original RIS 2002-14 have been met. An assessment of how each one was met follows. The specific criterion is listed first followed by the assessment:

1) differences between data collected for the current Safety System Unavailability (SSU) Performance Indicator (PIs) and the MSPI;
   Assessment: Data collection will consist of a one-time collection of historical and risk information[1], and ongoing quarterly data collection. The one time effort is estimated at several person-weeks per site. On an ongoing quarterly basis, less data need to be collected for the unavailability portion of MSPI than SSU (SSU requires planned, unplanned, and fault exposure unavailability and required hours; MSPI requires unavailable hours and critical hours). There is an increase in data collection due to adding reliability (demands, which will be constant for most quarters, and failures) and cooling water system data; however, this additional data is already collected for other purposes (i.e., Maintenance Rule and EPIX), and some of it replaces data collected under the SSU PI (e.g. failure and demand information that replaces fault exposure inputs). Thus there will be virtually the same data collection required under SSU or MSPI. Data collection will be greatly simplified by not needing to consider cascading of support systems, when the system was required, whether the hours were considered overhaul hours, and whether the hours were planned or unplanned. In addition, the data collection process and quality control will be improved in combination with the new Consolidated Data Entry (CDE) system such that licensee data will be recorded only one time.

2) the comparability of the data reported for the SSU PI and the MSPI;
   Assessment: Under SSU, all of the data collected are reported to NRC each quarter. For MSPI, only two data elements will be reported, the Unavailability Index and the Unreliability Index. The MSPI is superior to the SSU in that a) it includes unreliability which provides a much more accurate picture of system performance than the fault exposure data, b) it captures the risk significance of unavailability and unreliability, and c) it does so with fewer reported data elements. The addition of a cooling water system performance indicator eliminates the need to cascade support system performance onto the other MSPIs; therefore the MSPI more accurately reflects monitored system performance. Raw data (individual hours of unavailability, test successes and failures, etc.), under both SSU and MSPI, will be available for inspection at each plant.

[1] When the plant PRA is updated, the risk weights may need to be adjusted. This will not be a major effort and the frequency of these changes will be limited.

3) the ability of licensees to report the requested data accurately and with minimal need for clarification;

Assessment: The MSPI underwent a substantial pilot effort in order to determine what issues needed to be addressed and to answer questions regarding the guidance for collection and reporting. By the end of the pilot, all plants were able to provide accurate information. Twenty units at nine plant sites participated, representing about 20% of the reactor fleet. This extensive pilot effort ensures that there is a good understanding of the MSPI as well as positioning a significant percentage of the industry (NRC and Industry personnel) with detailed knowledge of the new PI. The guidance document will be revised based on the lessons learned during the pilot. With an effective change management plan, including a series of training and implementation workshops, the number of FAQs will likely be less than during initial implementation of the ROP. In addition, the new Consolidated Data Entry (CDE) software system will simplify data entry and enhance quality control, reducing errors.

4) the ability of the MSPI to reduce the potential for unintended consequences

Assessment: Like the maintenance rule, the MSPI is plant specific with plant specific thresholds instead of the generic thresholds currently used in the SSU PI. Therefore, the MSPI provides a much more accurate assessment of plant performance. This increased accuracy translates to better decision making, including those decisions involving the allocation of resources to examine or correct performance problems. The elimination of generic thresholds ensures that the plant's actual performance is characterized adequately thereby eliminating unintended consequences. The MSPI balances unavailability and unreliability, which the SSU does not. In addition, the unavailability element of the MSPI does not "punish" a plant for performing planned maintenance (planned maintenance is part of the baseline) whereas the SSU does. Since the MSPI was extensively piloted, the potential for unintended consequences upon industry wide implementation has been greatly reduced. Please see the technical success criteria section (Attachment 2) of this paper for a discussion of how the technical issues that arose during the pilots were addressed.

5) whether the MSPI will satisfy ROP objectives:

- Maintain safety: Can MSPI indicate significant departures from expected performance that warrant additional attention?

Assessment: The MSPI provides a better indication than the SSU of significant departures from expected performance that warrant additional inspection, since the MSPI is risk informed, plant specific, and balances the effects of unavailability and unreliability. The SSU only indicates unavailability variances from an industry threshold, whereas the MSPI considers the variance above planned maintenance and assesses the risk of the variance. The SSU is limited in handling unreliability issues, whereas the MSPI incorporates unreliability and the risk significance of the unreliability. The SSU is not sensitive to repeat failures whereas the MSPI

does include the impact of failure rates. In those cases where failure rates are not risk significant, but clearly exceed the industry norm, the MSPI will be triggered to flag that variance. The MSPI is a robust indicator which will ensure that attention is appropriately placed on safety significant conditions, and which will work better in concert with the inspection process and the SDP than the SSU.

The MSPI will provide a greatly improved indicator of mitigating system performance over the SSU. Inspection resources to verify the MSPI will not need to be increased, and, in fact, current resources will be better able to focus on more important issues and components through the PRA insights gained from MSPI. Overall, NRC's ability to meet its mission of maintaining safety will increase.

- Increase public confidence: Is the MSPI at least as understandable as the current SSU PI?
  Assessment: The MSPI performs the same task as the SSU in rolling up mitigating system equipment performance data into a single performance-related figure of merit for each monitored system. However, the MSPI is far more meaningful that the SSU in that it addresses both unreliability and unavailability, and provides risk insights into the equipment performance. It adds this information in fewer reported data elements.

  The NRC public website will continue to show color coded windows of performance as it does now. At the next level, it will continue to show charts of performance over time and the red, yellow, white and green thresholds of performance. Instead of displaying the planned, unplanned, and fault exposure unavailable hours and the required hours, the MSPI will list the change in risk due to unavailability and the change due to unreliability. For those interested in determining how the indicator is calculated, the website will have a link to the Performance Indicator Guideline and NRC basis documents. Just as the current indicator does not display individual instances of equipment failure or train unavailability, the MSPI will not provide this level of detail. Members of the public interested in more detail can read the inspection reports which describe individual failures in the plant. The public will be provided with information in the same format as before, but with additional information regarding the significance of changes in unavailability and new information on the significance of changes in unreliability. The vast majority of the public are interested in NRC's assessment of the plant's performance and will accept, as they have over the past several years, the convenience of color coded levels of safety performance and trending charts.

  For the broader aspects of public confidence, the MSPI is a substantially more accurate tool for assessing changes in plant specific performance than the SSU PI. This improvement arises because the MSPI uses plant specific, risk informed thresholds. In addition, the MSPI has a more logical

technical foundation and employs state of the art technology to evaluate risk. These characteristics increase public confidence. The generic SSU PI lacks the technical basis and rigor of the MSPI. Although it is state of the art, the MSPI is relatable to first principle approaches to risk and readily understandable to individuals with engineering and science backgrounds. In addition, although the indicator is developed from PRAs, the results are delivered publicly in easy to understand terms.

One concern expressed by a single member of the public is that the MSPI is developed from plant specific PRAs not generally available to the public. Information from these documents was removed from public purview due to security concerns after 9/11. However, these individual plant PRAs are frequently compared with NRC SPAR models as part of the process to obtain approval for Technical Specification changes or NOEDs, and also during the Significance Determination Process to evaluate inspection findings. (NRC does not share the PRA details in these decision making processes either.) The most recent comparison of the SPAR models with the pilot plant PRAs indicates that when actual plant configuration is considered, the PRAs require far less modification than the SPAR models. Therefore, although the PRAs are not public documents, public confidence is increased via the checks and balances employed by the NRC as well as the NRC's and industry's efforts to continuously improve these PRAs.

To increase public confidence in the MSPI, a communication plan has been developed (Attachment 4). Key elements of this plan include a simplified description of MSPI and an explanation of how the MSPI results will be communicated to the public. The public is a key stakeholder in the proposed communication plan.

- Improve the efficiency and effectiveness of NRC processes: Are fewer NRC resources being spent on single-demand failure SDPs and fault exposure data issues?
  Assessment: Upon implementation of the MSPI, the efficiency and effectiveness of NRC processes will be improved, as will the current deployment of NRC resources. While there will be additional one time NRC resources required to perform initial inspections to support implementation of the MSPI, the overall NRC resource requirement should be reduced over time. Because the MSPI will use the same definitions for unavailability and failures as the Maintenance Rule, NRC inspection resources should be able to be saved in validating data. Also, since the MSPI uses plant-specific thresholds to determine the significance of performance changes, fewer NRC resources should be required to achieve an accurate characterization of a given issue or performance problem at a plant.

  The principal challenge associated with the MSPI is that it takes a focused, one-time effort to setup and establish the indicator. The MSPI Working Group (NRC and Industry personnel) has recognized this need and

developed a sequence of three comprehensive workshops and a detailed communication plan to help NRC and industry personnel through this initial setup effort. These workshops also will help to ensure a smooth transition from the SSU PI to the MSPI. A summary of these workshops and communications plan are included in Attachment 3 and 4.

MSPI will initially represent some resource tradeoffs. The initial data verification will require additional effort. This inspection will look at system boundaries, selection of components, success factors, historical data and the MSPI risk weight factors. Based on experience and lessons learned from the pilot program, this effort will enhance the inspectors ability to understand the risk significance of equipment and where they should focus their inspection efforts, making them more effective and efficient. Changes to the risk weight factors should not be changed on a frequent basis and should not add significant additional burden.

Subsequent to implementation, NRC resource requirements will decrease. Ongoing inspection burden to validate performance indicators will be easier than it is today. Unavailability will be easier to check because it is only measured at power, it is consistent with maintenance rule data collection, and the complication of determining the effect of cascading will not be necessary. Unreliability consists of failures and demands which are also readily available. The MSPI's treat component reliability similar to the treatment described in NUREG-1753. This treatment is based on a failure-per-demand approach rather than using the fault exposure time as a surrogate measure of reliability as used in the SSU PIs. Furthermore, new industry software to consolidate equipment performance data collection and improve quality will further simplify data verification.

Reducing the number of required phase II and III evaluations will also improve effectiveness and efficiency. Last year, NRC inspectors complained about the burden imposed by the significance determination process to assess failures which their intuition told them were of little safety significance, but their procedures required many hours of assessments using phase II notebooks. The MSPI will remove the need to conduct these low value add phase II assessments because single failures will be assessed using the MSPI. In addition, the MSPI will provide quicker results, which will address another concern of the public: the time it takes to reach a conclusion using the SDP process.

An open NRC resource allocation question concerns the potential need to perform single-demand failure evaluations for external event initiators. A threshold can be established through MSPI on when to perform an external events SDP. If the reliability of the component is better than industry baseline, then any SDP, internal or external should conclude the impact is green. If MSPI > E-7 do the external event SDP.

The MSPI will be much more effective than the SSU in focusing NRC resources on the most safety significant SSCs at each plant. A risk informed plant specific performance index will direct NRC resources to the safety significant issues and avoid wasting resources on issues and equipment that have little or no safety significance.

- Reduce unnecessary regulatory burden: Does the MSPI reduce licensee reporting burden and resource expenditure. For example, does the MSPI avoid duplication of records for the maintenance rule, probabilistic risk assessment, and the ROP and reduce resources allocated to single demand failure SDP evaluations?

  Assessment: The initial startup of MSPI will create a one-time burden increase. Data need to be collected for the historical three year period (this data for the most part already exists in EPIX, ROP, and maintenance rule data bases). Additionally, risk weights need to be calculated. These risk weights will only change when the PRA model is adjusted and PI guidance will be developed to limit the frequency of changing the risk information. Pilots estimate this one time burden as several person-weeks per site.

  Ongoing data collection will not increase, because the data is already being collected for EPIX, maintenance rule, and ROP. In fact data collection burden should actually decrease for two reasons:

  1) ***Data definitions between maintenance rule, ROP, WANO and EPIX are converging. The NRC has agreed conceptually with industry to support modifying NUMARC 93-01 to align maintenance rule data collection with the MSPI. (Some changes, such as not monitoring unavailability during outages and not counting failures of passive components, will need to be made before they are fully integrated.) WANO will permit MSPI data to be used in its indicators.***

  2) ***The new industry Consolidated Data Entry (CDE) will allow one time entry of equipment information to be used by EPIX, ROP, and WANO. This resource savings in data entry will be accompanied by improvements in data quality and auditability.***

  Additional burden reduction will occur because the accounting rules for the MSPI are far simpler than the SSU. There will be no need to determine whether support system unavailability cascades onto the MSPI systems, no need to determine when the system was required to be available (all unavailability while critical is counted), no need to distinguish between planned and unplanned unavailability, no need to consider whether the unavailability is excludable as overhaul hours, and no need to try to discern fault exposure hours. One support system is added to the current four SSU indicators.

The MSPI is simple to calculate. The MSPI requires only baseline industry and plant performance inputs and a set of risk importance measures (Fussell-Veselly values) derived from the plant PRA model. Once these constant importance measures are derived, manipulating the plant PRA model is no longer necessary in order to quantify the MSPI. Given the above parameters, the MSPI could be calculated by hand although the process will be handled electronically to ensure consistency. Changes in the PRA model will occasionally necessitate changes in the risk importance measures, but these will be limited in the PI guidance document.

Data reporting burden will be less than the current SSU, in that fewer data elements will be reported to the NRC.

Thus the burden of data collection and reporting, once the initial data has been entered, will be reduced for licensees. NRC will have a one time burden of verifying initial data. Ongoing verification for NRC inspectors will be easier for unavailability, and for unreliability will only consist of ensuring monitored equipment failures are entered and that demands are properly estimated (this effort will cover both MSPI and maintenance rule verification).

The other burden reduction that will occur will be in the reduction of phase II analyses for single monitored equipment failures. The NRC staff has complained about the unnecessary burden of performing full phase II analyses for failures which intuitively do not require risk assessment (obviously green). The licensees will also be spared the burden of responding to phase II assessments. Two more points need to be made.

1) *The MSPI will not limit the NRC's ability to inspect the licensee's response to single failures, to assess more complicated failures (such as issues which cannot be revealed in surveillances, common mode failures, and multiple simultaneous failures which will receive phase II SDPs), and to assess events which receive Management Directive 8.3 risk assessments.*
2) *The MSPI will identify the risk of repetitive single failures which the SDP is blind to.*

Attachment 2
Technical Success Criteria

The Mitigating System Performance Index (MSPI) technical success criteria (criteria from RIS 2002-14, Supplement 1, Attachment 3) listed below have also been met:

a. The occurrence of a single failure of an MSPI monitored component by itself, absent any other failures or unavailabilities, should rarely exceed the green/white MSPI threshold as measured from the baseline value. The term "rare" is defined as minimizing the inconsistencies across plants, within plants, and within systems such that there is no undue burden on resources, and the objective of having consistent publicly displayed results can be achieved.
Assessment: A technical resolution to this success criterion has been developed which will eliminate all situations in which a single failure causes the indicator to exceed the green/white threshold (called an "invalid" indicator). Initial pilot plant results estimated that about 38% of the systems have at least one component that results in an invalid indication and 5% of all monitored components within the scope of the MSPI pose an invalid indicator problem based on the current analytical approach. Several potential solutions were evaluated and a "front stop" approach was selected. This approach utilizes a "risk cap" of 5E-7 that is set for the most risk significant failure. This solution is compatible with the unavailability portion of the indicator and unreliability of other monitored components in the system, while still maintaining overall indicator sensitivity. The impact of multiple failures and the mechanism to display the indicator are still under discussion, but the technical issue has been satisfactorily resolved.

b. False positive and false negative rates can be established for the chosen statistical method, and instances where the MSPI cannot meet the criteria are rare.
Assessment: A technical resolution for this success criterion has been developed. False positive rates were covered under "a." False negative rates are typically referred to as "insensitive indicators." These are indicators which would require greater than 20 failures to reach a white threshold. Based on pilot plant results, approximately 11% of the systems have at least one insensitive component. Several potential solutions to this technical issue were evaluated and a "backstop" performance limit was selected. This statistically based "backstop" employs a plant specific maximum number of allowed failures before performance is considered "degraded" resulting in the MSPI being colored WHITE. The maximum number of allowed failures is based on a regression analysis of industry data. The strategy for this solution was adapted from Risk-Informed Tech Specs where maximum allowed outage time ("completion time") is 30 days for systems that could be out of service for longer periods without exceeding the limiting delta CDF of 5E-7/yr. The technical solution is acceptable, based on pilot plant results, and will be implemented on a plant specific basis.

c. Instances where the results from the MSPI calculational methodology are not consistent with the SPAR-3 models are rare and the differences are explainable.
Assessment: Instances where the results from MSPI and SPAR-3 models are not consistent were very rare and all explainable. In order to confirm the relationship between the plant PRAs and the SPAR models, NRC conducted benchmarking visits at MSPI pilot plants to compare Fussell-Veselly values from the SPAR models with the utility PRA results. As a result of these benchmarking visits, NRC staff determined that, with updated plant-specific information, the SPAR models produced results that closely (within a factor of two) mirrored the utility results. This was a highly encouraging outcome, and one that demonstrated that the consistency between the NRC and utility models is sufficient to support a meaningful indicator. In addition, the individual plant PRAs are frequently compared with NRC SPAR models as part of the process to obtain approval for licensing changes and when applying the SDP to inspection findings. In general, the PRAs employed today are substantially better than the PRAs that existed ten years ago. Collectively, this demonstrates an improving trend for plant PRAs with the end result being fewer differences between SPAR model results and plant PRA results.

d. The MSPI pilot plant participants can identify and compile the risk significant functions for the monitored systems in a readily inspectable format and can compile a set of predetermined success criteria for those risk significant functions.
Assessment: Pilot results indicate that this criterion was achieved. The Temporary Instruction inspection conducted as part of the pilot activities specifically focused on the system risk significant functions, mission times, and predefined success criteria. Based on the pilot experience, this area will be covered in industry guidance and discussed during the implementation workshops. The pilot plants will participate in the workshops and share their lessons learned with other plants, including samples of documentation deemed acceptable during the pilot TI inspections.

e. The active components in the monitored systems are appropriate for inclusion in the MSPI and are a manageable number of components under the MSPI.
Assessment: This success criterion was achieved. Draft NEI 99-02 Guidelines call for monitoring all active valves, i.e., those whose failure to change state render the train incapable of performing its risk-significant functions (note in the future these will be called monitored components to distinguish them from the design basis definition). While some valves are excluded (e.g., redundant valves within a train), some ambiguities arose when multiple pumps feed common headers or when multiple series/parallel valves supply multiple lines. In addition, valves on infrequently used test lines, or alternate tank make-up flow paths would need to be included. The lessons learned during the pilot will be used to revise the guidance and provide input to the implementation workshops for the rest of industry.

In some cases, as many as 50 valves may need to be monitored, though some have no appreciable contribution to URI. The solution is to set a cutoff which will include most of the risk, while reducing the number of valves to be

reported. The valves eliminated do not provide a significant contribution to URI, based on a Birnbaum importance. The only open aspect to this issue is whether industry will implement it as an optional feature (Some plants may choose to include all valves regardless of Birnbaum importance to support a more meaningful population of components).

f. By the end of the pilot, MSPI data can be accurately reported and quality checked.
Assessment: Pilot results indicate that this criterion was achieved. Lessons learned from the pilot will be covered specifically in industry guidance and within the workshops. In addition, the excel spreadsheet approach used during the pilot, which is more susceptible to error, will be replaced with a more robust and auditable system for full implementation.

g. By the end of the pilot program, inspection procedures and MSPI pilot guidelines are sufficiently detailed to minimize MSPI Questions and NRC feedback forms.
Assessment: The industry guidance will be revised by the end of 2003 to reflect pilot FAQs and inspection results. This revised industry guidance will be in the form of revision 3 to NEI 99-02. If necessary, it will be revised again following implementation workshops. Inspection guidance will be issued in the spring of 2004 and would probably be a revision to inspection guidance for mitigating systems PI verification (currently contained in Inspection Procedure 71151). While questions will likely continue following full implementation, they most likely will be plant specific and incident specific, as are current FAQs.

h. MSPI Questions and NRC feedback do not reveal any unresolvable issues.
Assessment: All technical issues have potential resolutions at this time. A proposal to address the contribution of common cause to reliability was piloted in August with somewhat unexpected results. Additional study of this solution is in progress. In addition, it has been proposed that this area be covered outside the MSPI. Common cause analysis is currently addressed in several areas including the Technical Specifications, plant corrective action programs, and NRC Maintenance Effectiveness inspections. These areas may provide a better vehicle for assessing common cause which is a highly variable, knowledge based area.

i. Data collection inconsistencies between the maintenance rule and the MSPI can be reconciled in order to eliminate or significantly reduce separate reporting.
Assessment: Revision of the maintenance rule industry guidance in NUMARC 93-01 is still required to complete alignment between MSPI and maintenance rule reporting requirements (see response to last item in Attachment 1). These changes include (but may not be limited to) only monitoring system unavailability when the reactor is critical and achieving a common definition of "operator action" in response to unavailability. Achieving this consistency is an important aspect of overall burden reduction associated with the MSPI. However, the current inconsistencies do not preclude implementation of MSPI for the industry.

j. Differences between the linear approximation models generated by licensee probabilistic risk assessments and those generated by the NRC SPAR-3 models can be reconciled.
Assessment: See item c. above.

k. The MSPI produces no new unintended consequences that cannot be resolved.
Assessment: The extensive pilot effort has not identified any unintended consequences. The scope of the pilot effort was relatively large and this substantial industry and NRC effort provides assurance that no new unintended consequences will arise. A common cause analysis approach (see item h. above) is the most significant open issue.

In addition, it should be noted that some actual and potential unintended consequences will be reduced. For example, because the MSPI balances unavailability and unreliability, the "reward" for not conducting maintenance under SSU (which does not include unreliability) will be balanced by the potential for additional failures. Also, the MSPI measures unavailability against a baseline which includes planned maintenance; therefore, conducting planned maintenance does not "penalize" a plant as it does under the SSU, which includes all unavailability. Furthermore, the convergence of using risk approaches for maintenance rule and in the MSPI will reduce the unintended consequence of having conflicting goals between the maintenance of the plant and the performance indicator.

Attachment 3
MSPI Implementation Workshop Summary

The purpose of the MSPI Workshops is to ensure a smooth transition from the SSU unavailability indicator. The workshops will be a crucial change management tool providing training and lessons learned, and facilitating NRC initial PI verification.

Workshop A

This national one and a half day workshop for Licensees and NRC personnel will involve licensee PRA, system engineer, and licensing personnel and NRC Regional Senior Reactor Analysts, resident inspectors (where possible), and appropriate NRR personnel. It will cover MSPI derivation, required data and documentation, success criteria, risk significant functions, system boundaries, monitored components, and lessons learned. Breakout sessions will be used to provide examples by reactor type led by pilot plants. The goal is for NRC and industry personnel to leave the workshop with a good understanding of the bases for the MSPI, what is required for the development of a plant-specific MSPI, and how the NRC & Industry will interface with respect to the MSPI (e.g. data transfer, inspection). Licensees will leave with homework to develop their plant specific information and data.

Workshop B

This national workshop will focus on reviewing information assembled by licensees (system boundaries, monitored components, success criteria, risk factors for trains and components). Breakout sessions by reactor type will be held, allowing plants of similar configuration to compare their results and correct or resolve the differences. The workshop will be two days in duration and attendees will be similar to (or have equivalent knowledge as) those who attended Workshop A. The goal of this workshop is to resolve any questions on how to develop plant-specific MSPIs. Licensees will leave the workshop with tasks to finalize their MSPIs and their plant specific procedures, and NRC personnel will begin reviews of licensee MSPI information (under guidance in a TI). A list of issues that cannot be resolved at the workshop will be developed. These issues will be discussed and resolved in public meetings prior to the third workshop.

Note: Between Workshop B and Workshop C, licensees will interface with Resident Inspectors on the plant-specific MSPI in order to provide them with plant-specific information and permit them an opportunity to discuss the information with the region SRAs prior to implementation. The majority of the TI should be completed during this period, so that Workshop C can focus on exceptions and open issues.

Workshop C

Four regional workshops will focus on a review of plant specific issues from the second workshop. The workshops will be held on a regional level to facilitate participation by NRC residents and interaction with licensees. The duration of these workshops is expected to be one day, but this will be finalized after workshop B. There will be breakout sessions by reactor type to support comparisons of system scoping information and thresholds. The goal of these workshops is to resolve any remaining issues and finalize the plant-specific information needed to implement MSPI.

Attachment 4
Communication Plan

Objectives

1. Communicate the benefits of the change to MSPI.
2. Communicate the ongoing status of this change as it is occurring.
3. Communicate the information necessary to prepare & facilitate NRC & Industry personnel to implement this change.

Stakeholders

- Public
- NRC Management (from Commissioners through NRR and Regional managers
- NRC Staff (SRAs, Resident Inspectors, headquarters NRR and RES staff)
- Utility Management (CNOs, Site Vice Presidents, Managers)
- Utility Personnel (PRA staff, individuals responsible for data entry)
- Industry Groups and Representatives (NEI & INPO)

Audience	Medium	Message	Timing/WHO
Go, No-Go Decision			
NRC & Utility Management	1. White Paper evaluation of Success Criteria 2. Simplified Description	Provide assessment of MSPI, benefits, lessons learned, key benefits & disadvantages.	Support go, no-go decision/NRC and industry
NRC & Utility Management	Powerpoint Presentation	Provide assessment of MSPI, lessons learned, key benefits & disadvantages.	Support go, no-go decision./NRC and industry
NRC & Utility Management & Personnel	Implementation Schedule	Provide a schedule that would be implemented upon approval by NRC (go decision).	Support go, no-go decision/NRC and industry
NRC & Utility Management & Personnel	Cost estimates (NRC costs & utility costs)	Provide an estimate of the costs required implementing the MSPI.	Support go, no-go decision/NRC and industry
NRC, Industry, & Public	News Article/Press Release (RIS Update)	Provide overview of MSPI, benefits, lessons learned key actions.	Develop after go, no-go decision is made/NRC (RIS) Industry (press release)
Guidance Material			
NRC & Utility Personnel, Public	Revision to NEI 99-02	Incorporate lessons learned and refinements to NEI 99-02.	Develop in parallel with or after go, no-go decision is made/industry with NRC review and approval
NRC, Utility Personnel, Public	Revision to inspection guidance	Incorporate lessons learned and refinements.	Develop in parallel w/ or after go, no-go decision made/NRC
Workshops			
NRC, Industry personnel, and public	Agenda for Workshop A	Define who will deliver presentations, setup meeting etc. Issue letter to NRC & Utility personnel and news release.	After revision of guidance documents/NRC and industry (MSPI group)
NRC, Industry	Examples for	Provide examples of documentation,	Bring examples to

Audience	Medium	Message	Timing/WHO
personnel, and public	Workshop A	system boundaries and components, risk weights, and other helpful information to be provided to plants not involved in the pilots.	Workshop A/MSPI industry group
NRC & Utility Personnel and public	Workshop A (handouts and materials will be made available for NRC and Industry personnel that could not attend).	This workshop will cover the MSPI including required data and documentation, success criteria, risk significant functions, system boundaries, active components, and lessons learned. NEI 99-02 will be revised based on information from the pilots and will be used for this training. The goal of this workshop is for NRC and Industry personnel to leave the workshop with a good understanding of the bases for the MSPI, what is required for the development of a plant specific MSPI, and how the NRC & Industry will interface with respect to the MSPI (TI). Licensees to be assigned homework for Workshop B	First Qtr 2004/NRC (for basis and inspection portions) and industry (for examples and training materials related to NEI 99-02)
Industry personnel, NRC, & public	Agenda for Workshop B	Define who will deliver presentations, setup meeting etc. Issue letter to NRC & Utility personnel and news release.	MSPI Working Committee (with NRC participation)
NRC & Utility Personnel and public	Workshop B (handouts and materials will be made available for NRC and Industry personnel that can not attend).	The goal of this workshop is to resolve any questions on how to develop plant specific MSPIs. Licensees will bring their first draft documentation. The Licensees will leave the workshop with tasks to finalize their MSPIs & plant specific procedures and NRC personnel will begin reviews of licensee MSPI information (under guidance in a TI). A list of issues that cannot be resolved at the workshop will be developed. These issues would be resolved prior to the third workshop.	Late April or Early May/NRC (for TI guidance and review of expectations) and industry (for issues and FAQ resolutions)
NRC Resident Inspectors	Briefing Paper & Agenda	A briefing paper and agenda will be established for Resident Inspector briefings. This package will be sent to a contact person at each plant. This contact person will ensure the resident inspectors receive a structured briefing to assist in TI.	After Workshop A / MSPI Working Committee will draft and provide to each utility contact to "personalize" for briefing resident.
Resident Inspectors	Briefing	Industry personnel will brief Regional Inspectors on their plant specific MSPI.	Between Workshops B & C. / Industry contacts at each utility
NRC, industry and public	Agenda for Workshop C	Define who will deliver presentations, setup meeting etc. Issue letter to NRC & Utility personnel and news release.	After Workshop B / MSPI Working Committee & NRC

Audience	Medium	Message	Timing/WHO
NRC, industry & public	Workshop C (handouts and materials will be made available for NRC and Industry personnel that could not attend).	The workshop will be held on a regional level to facilitate participation by NRC residents with industry personnel. The duration of this workshop will be determined after workshop B and at this time it is expected to be two days. There will be breakout sessions by reactor type. The goal of this workshop is to resolve any remaining issues, facilitate completion of TI and finalize MSPIs.	Late June or Early July / MSPI Working Committee with NRC input
NRC & Industry - General Ongoing			
Audience	Medium	Message	Timing
Appropriate NRC & Utility Management	Quarterly Updates	Status of implementation effort.	December, March, June. / MSPI Working Committee & NRC
NRC & Utility Personnel	Video ??	Provide overview of MSPI, benefits, lessons learned key actions.	Prepare based on Workshop A
Other Forums & Communications			
Audience	Medium	Message	Timing
ACRS & Commission	Meetings	Status of MSPI	As determined by NRC
Appropriate NRC & Utility Management	Routine meetings (NEI/NRC, Utility/NRC)	Provide status and determine key concerns. Provide another line of communication.	As meetings occur.
General Public	Pamphlet	Provide simple overview of MSPI, benefits, lessons learned key actions.	January
General Public	News release	Provide status update or notification of final implementation.	May