Enclosure 3
March 2009 Meeting Handouts
Meeting Summary of the 03/19/09 Reactor Oversight
Process Working Group Public Meeting
**Dated April 10, 2009**

## Industry Proposed Resolution of PMT – Available/Operable Issue

Revise language in 99-02 to say:

Following maintenance, equipment is considered available for MSPI purposes at the time the Post Maintenance Testing was successfully completed.

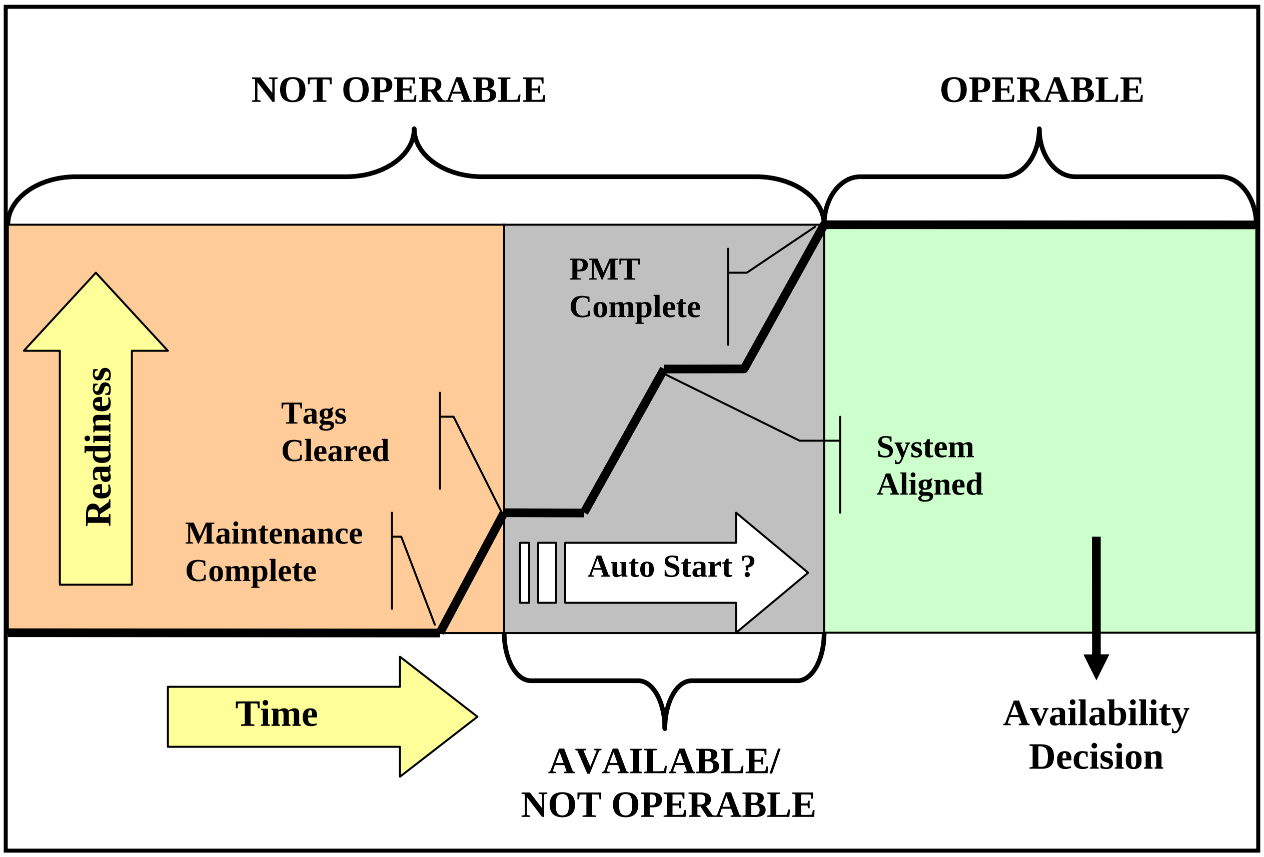
This definition of availability applies only to MSPI, regardless of what other definitions licensees use for maintenance rule.

At their option, licensees may revise their baseline planned unavailability to reflect any additional unavailability included due to this change.

## Issue

An industry practice (used by some licensees for some equipment) is to consider equipment potentially “available,” upon completion of maintenance but prior to the performance of the post maintenance test (PMT). This determination of availability is typically performed independent of operations personnel, and is made after the completion of the PMT. If the equipment passes its PMT, the status of the equipment between the completion of maintenance and the PMT is scored for MSPI purposes as “available.” If the equipment fails its PMT, the status of the equipment between the completion of the maintenance and the PMT is “unavailable.” This practice is illustrated in Figure 1.

**Figure 1: Available / Not Operable**




The staff’s concern with this approach is:

- Lack of clear guidance
- Potential for limited operator awareness
- Potential for non-conservative treatment of equipment reliability
- Potential for regulatory inconsistency

Following a discussion of the Industry's Approach and the Staff Analysis of the industry's approach, each of these concerns is discussed in the summary section below.

# Industry's Approach

The following bullets summarize staff's understanding of industry's approach:

1. **Unavailability/Availability Transition Point:** Clearance of tags = "availability" unless the subsequent PMT fails.
2. **Unreliability Contribution:** The failure rate during the "available"-not operable period is the same as the failure rate during the operable period. There is no presumed difference in reliability between the "available"-not operable period and the operable period.
3. **Failure Impact:** PMT failures are not indicative of equipment reliability for unreliability "UR" purposes. Rather, they imply incompleteness of the maintenance action. Therefore, a PMT failure has the effect of causing the hours between tag clearance and PMT to be scored as "unavailable." The exception to this, in principle, is that if the cause of the PMT failure is completely independent of the reason for the maintenance and the maintenance actions themselves, then the PMT counts as a demand and failure in the UR calculation. This calls for a high level of insight into the PMT failure's root cause.
4. **Risk Importance:** The Birnbaum importance of a PMT failure is equivalent to the Birnbaum importance of unplanned unavailability.
5. **On-line Risk Assessment:** Maintenance Rule (a)(4) risk assessment is different from the unavailability monitoring for (a)(2). The Industry's White Paper states: "It is not impossible currently for systems to be available in (a)(4) while a segment of the system is unavailable under the guidance in (a)(2)."

# Staff Analysis

1. **Unavailability/Availability Transition Point:**

   **Unreliability during " 'Available'- Not Operable" > Unreliability during "Operable".**

   a. Clearance of tags does not necessarily mean that the SSC is restored to its normal operating state.
      i. SSCs are tagged for personnel safety and equipment protection. Removal of tags does not necessarily mean that the SSC is ready for automatic operation, only that a particular personnel hazard associated with energizing the equipment has been removed.
      ii. During maintenance, SSC controls are often placed into Pull-to-Lock (e.g., not capable of automatic start). Clearance of tags does not necessarily result in the SSC's controls being placed in a position for auto activation.
      iii. Once tags are clear, SSCs often need to be aligned for service in accordance with the appropriate operating instructions. System refill and venting may be required.
   b. Operators may or may not believe that the system is available. If considered available, operators may allow entry into more challenging maintenance configurations. If the

system is considered by operators to be unavailable, operators may be less likely to initiate manual recovery actions. According to Industry's White Paper, the availability determination is made by other personnel, usually system engineers.

c. Adjustments or tuning may occur as the result of the PMT resulting in improved SSC reliability.

   i. SSCs that are tuned or adjusted during a PMT are unlikely to be reported as having failed.

d. Current guidance exists for when maintenance, test, or alignment unavailability can be screened from contributing to MSPI as stated in NEI 99-02 Section F1.2.1:

   > *The test or operational alignment configuration is automatically overridden by a valid starting signal, or the function can be promptly restored either by an operator in the control room or by a designated operator stationed locally for that purpose. Restoration actions must be contained in a written procedure, must be uncomplicated and must be capable of being restored in time to satisfy PRA success and must not require diagnosis or repair.*

   This guidance considers that recovery is so likely that the time does not need to be counted as unavailability.

   A similar discussion pertains to the "available" / not operable period. The unavailability-to- availability transition point should be that point where restoration actions are virtually certain to be successful during accident conditions. This implies operator awareness, system alignment, and confidence in the equipment reliability.

2. **Failure Impact:** A failure during the available - not operable period is not indicative of the failure rate during the operable periods, unless the cause of the failure is completely independent of the maintenance action. This NRC staff position is consistent with Industry's White Paper.

3. **Risk Significance of the "Available / Not Operable" Condition:** It is staff's understanding that various approaches associated with operator awareness are used; this results in varying impacts on the Birnbaum values. As these values are included as a multiplier in the MSPI equation, a variation in these values results in a variation in the MSPI results.

   If operations considers SSCs to be unavailable during this available / not-operable period, then the risk importance of a failure during this period may be slightly overestimated, in that the operators would have avoided more complex maintenance activities that are likely assumed as having a potential to occur in the plant's PRA. This condition appears to be the predominant approach, given the information provided in Industry's white paper.

   If operations considers SSCs to be available during this available / not operable period, then the risk importance of a failure may be underestimated as more challenging maintenance alignments may be entered. It is recognized that even if the equipment is considered available, alignments that are not allowed by the plant's technical specifications would also be excluded during this available / not-operable period. However, alignments that are not excluded could be entered (e.g., EDG is available / not operable and AFW is removed from service).

4. **On-line Risk Assessment:** The Industry's White Paper implies that there is not (or there should not be) coordination between the availability status used in the MSPI program and that used in the MR (a)(4) program. Its primary basis for this position is the NUMARC 93-01 statement that differentiates between MR (a)(2) and MR (a)(4):

   *The assessment may take into account whether the out-of-service SSCs could be promptly restored to service if the need arose due to emergent conditions. This would apply to surveillance testing, or to the situation where the maintenance activity has been planned in such a manner to allow for prompt restoration. In these cases, the assessment may consider the time necessary for restoration of the SSC's function, with respect to the time at which performance of the function would be needed. [Note the definition of "unavailability" in Appendix B applies to monitoring of SSC unavailability to comply with other paragraphs of the maintenance rule, and is not intended for direct applicability to the configuration assessment.]*

   Figure 2 summarizes the equipment unavailability recovery guidance for the various programs.

## Figure 2: Equipment Unavailability Recovery Guidance

| **MSPI** | **MR (a)(2)<br>Performance Monitoring** | **MR (a)(4)<br>Risk Assessment** |
|---|---|---|
| • Capable of being restored to satisfy PRA success criteria<br>– Written procedure<br>– Uncomplicated (single action)<br>– No diagnosis or repair<br>– Probability nearly = 1 | • Same as MSPI | • Promptly restored to service - time necessary assessed with respect to time needed<br>– (a)(2) guidance stated as <u>not intended for direct applicability</u> to configuration assessment<br>– **No clarifying guidance is provided** |
| NEI 99-02 Rev 5 Page F-7 | NUMARC 93-01 Rev 3 Page B-6 | NUMARC 93-01 Rev 3 Page 43 |

Statement could be considered either a requirement relaxation (specific guidance removed) or recognition of PRA capability (sequence evaluation may show near certain recoveries with less requirements and recoveries that are less than 1.0 can be explicitly modeled.)

The NUMARC 93-01 statement that (a)(2) guidance is not intended for direct applicability to configuration assessment could be considered either a requirement relaxation in that specific guidance is removed, or recognition of PRA capability that is beyond that which can be obtained in the simplified formulation of the MSPI and MR (a)(2) indicators. In the PRA, one can perform a sequence evaluation that may show recoveries are virtually certain with less requirements than those stated for MSPI and MR (a)(2). However, the successful use of sequence evaluation to identify near-certain recoveries is thought to be rare, especially for equipment addressed by MSPI where the response times are short.

A comparison of the treatment of unavailability between the regulatory programs is further illustrated in Figure 3.

## Figure 3: Equipment Unavailability Comparison

| Equipment Status | MSPI | MR (a)(2) | MR (a)(4) |
|---|---|---|---|
| Operable | Available | Available | Available |
| Available | Available | Available | Available |
| Unavailable but Pr(Recovery) ~ 1 **(Meeting NEI 99-02 Guidance)** | Available | Available | Available |
| Unavailable but Pr(Recovery) ~ 1 **(Does Not Meet NEI 99-02 Guidance)** | Unavailable | Unavailable | Available |
| Unavailable but Pr(Recovery) < 1 | Unavailable | Unavailable | Unavailable with recovery |
| Unavailable – Not Recoverable | Unavailable | Unavailable | Unavailable |

Figure 3 shows that there are two conditions where differences in the treatment of unavailability may occur between the programs. The first is where recovery is determined to be virtually certain, but does not meet the MSPI or MR (a)(2) guidance as previously discussed. The second difference occurs when recovery is not certain (probability of recovery <1). For this case, it is expected that all programs would consider the equipment unavailable. However, the MR(a)(4) program can include recovery actions where these actions have the failure probabilities applicable to the sequences for which they are being used.

# Summary Discussion of Concerns

### Lack of Clear Guidance

Unlike operability, recovery of testing or operational alignment (NEI 99-02 Revision 5, Section 1.2.1), and treatment of test-related human errors (Industry White Paper), there is no explicit guidance in NEI 99-02 or NUMARC 93-01 on requirements for scoring the transition from an unavailable state to an available state. Although industry guidance for the recovery of testing or operational alignment could be considered a minimum set of requirements, as these requirements are related to the determination of equipment availability, it appears that application of this guidance to post-maintenance return to service is not a typical practice. One significant difference between the test/operational alignment recovery, and post-maintenance return to service, is the extra failure potential that exists in the latter case, owing to the maintenance action's possible inefficacy. As a result, more requirements, not fewer, would need to be met in order to justify a conclusion of "availability." The present lack of clear guidance results in the potential for scoring the transition from an unavailable state to an available state based on the use of a post-maintenance decision process in which availability is considered to commence on removal of clearance tags, independent of operations. Such a practice does not meet the staff's expectations.

**Potential for Limited Operator Awareness**

The industry's white paper on this subject dated December 10, 2008 states that most of the licensees contacted use a process in which operators determine "operability" while other personnel (usually system engineers) determine "availability." The paper further states that this determination is made several days or weeks after the SSC was declared operable. The paper also states that most (but not all) licensees do not credit the availability of a SSC, in this available/not operable state, in their online risk assessment.

A logical conclusion is that plant operations is largely decoupled from the process of determining the degree of credit that is taken for the mitigation capability of these monitored components. This decoupling increases the staff concern regarding the industry presumption that recovery of the equipment (if not readied for operation or aligned for auto-start) at the time it is considered transferred for the unavailable to available state is so likely that additional unavailability time does not need to be counted.

**Potential for Degraded Equipment Reliability**

There are two key considerations associated with equipment reliability during the "available" / not operable state: (1) transition point from unavailable to available, and (2) role of the post-maintenance test.

<u>Transition Point from Unavailable to Available</u>

Although this is not stated explicitly by industry, the staff believes that the transition point used by industry is the time at which the clearance tags are logged as being removed. However, as noted above, it is the staff's understanding that the removal of these tags does not necessarily mean that the equipment is aligned and fully functional. The equipment may require additional alignments in accordance with the appropriate operating instructions (e.g., system refilling and venting may be required) prior to being returned to service. In addition, the equipment controls may remain in pull-to-lock pending completion of equipment line-ups and the post-maintenance tests. If operators are aware that the equipment has not been tested, they are less likely to initiate manual recovery actions. The criterion for determining "availability" should be that restoration actions are virtually certain to succeed. This criterion corresponds to the criterion used for restoration following testing.

<u>Post Maintenance Testing</u>

Equipment adjustments or tuning may occur during the PMT. Such adjustments are unlikely to be reported as a PMT failure, but may improve the reliability of the equipment.

<u>Calculated Unavailability</u>

Industry has provided a white paper that demonstrates that the current industry approach is correct *given certain assumptions*. These assumptions are:

1. The transition point from an unavailable state to an available state represents a transition to a return to service condition where the system is aligned for operations, and

operations is aware that it is aligned and that it will automatically start on a valid starting signal or can be promptly restored.

2. No equipment adjustments or tuning occur during the PMT.

Under these conditions, the calculations presented by industry appear correct.

**Potential for Inconsistency in the ROP**

The lack of guidance on determining the “available” / not operable state and the noted variability in this determination lead to inconsistency in the MSPI indicators, which can result in a reduction of public confidence.

# Recommendations

1. **Establish Criteria for Equipment Availability Determination**

**Either satisfy criteria for "operability," or satisfy all of the following:**

- For standby equipment, **can automatically start** by a valid starting signal or can be promptly restored either by an operator in the control room or by a designated operator stationed locally for that purpose. Restoration actions must be contained in a written procedure, must be uncomplicated (a single action or a few simple actions), must be capable of being restored in time to satisfy PRA success criteria, and must not require diagnosis or repair.
- Operator concurs that equipment is **returned to service** prior to it being declared available
  - Clearance tags have been removed
  - System is aligned for operation
  - System has been prepared for operation (e.g., filled and vented)
  - Equipment adjustment is not required or expected as the result of the PMT
- **Documented process** that demonstrates availability conditions have been met
- If failure results, that is associated with the maintenance performance, then previously screened-out unavailability hours are to be counted.

2. **Establish Guidance for MR (a)(4) Availability Determination**

- Addresses: "… the assessment may consider the time necessary for restoration of the SSC's function, with respect to the time at which performance of the function would be needed."
- Elements for considering the equipment available
  - Clearance tags have been removed
  - System is aligned for operation
  - System has been prepared for operation (e.g., filled and vented)
  - Equipment adjustment is not required or expected as the result of the PMT
  - For standby equipment, **can automatically start** by a valid starting signal or can be promptly restored
    - Primary Approach: Either by an operator in the control room or by a designated operation stationed locally for that purpose. Restoration actions must be contained in a written procedure , must be uncomplicated (a single action or a few simple actions), must be capable of being restored in time to satisfy PRA success criteria and must not require diagnosis or repair

    – Alternate Approach: Human reliability analysis and sequence timing indicate that recovery is virtually certain (recovery probability of 1.0)

- – **Documented process** that demonstrates availability conditions have been met

# Status of Staff and Industry White Papers and Disposition of Issues

NRC Staff White Papers

The present white paper replaces the NRC staff's white paper dated September 18, 2008, titled "Staff White Paper on Counting MSPI Failures that Occur after Maintenance Has Been Completed but Prior to Equipment Being Returned to an Operable Status."

Industry White Papers

The present white paper addresses comments received in the two industry white papers.

Re: NEI White Paper dated December 10, 2008, titled "Industry White Paper on Counting MSPI Failures that Occur after Maintenance Has Been Completed but Prior to Equipment Being Returned to an Operable Status."

The points made by the industry's December 10 paper are summarized below, together with the staff response:

- **Industry's Paper:** Personnel other than operators (usually system engineers) determine whether equipment is available, and this determination usually takes place several days or weeks after SSC was declared operable.

  **Staff Response:** The present white paper contains discussion on the limited awareness operators have as to the reported availability status of their equipment.

- **Industry's Paper:** The long duration of a delay in performing the PMT (up to several days) is rare and the example provided is not germane.

  **Staff Response:** The present white paper no longer includes any statement on the duration between the completion of maintenance and the PMT.

- **Industry's Paper:** Reporting of unavailability is not confined to MSPI, and staff's position would result in a difference between MSPI and MR

  **Staff Response:** The original and present white paper both seek regulatory consistency. It is staff's intent to keep the MSPI and MR programs consistent. Additional discussion has been added to the present white paper in order to address this comment.

- **Industry's Paper:** The MR (a)(2) and (a)(4) guidance for counting segments of systems as unavailable is different

  **Staff Response:** The present white paper addresses the differences between MSPI / MR (a)(2) and MR (a)(4).

Re: NEI White Paper dated January 3, 2009, titled "Accounting for Post Maintenance Test Failures in the Mitigating Systems Performance Index."

The industry's January 3 paper made the following point:

- **Industry's Paper:** Provides a mathematical discussion demonstrating that the industry's approach to failure counting is correct.

  **Staff Response:** The present white paper shows agreement by staff to the industry's approach, for the case that the transition point from unavailability to "availability" returns the equipment to full operating capability.

## Proposed Change to Risk Cap

### Problem Statement
With several years of MSPI experience, the current treatment of statistical significance of failure (aka, Risk Cap) has resulted in several unanticipated conditions. These conditions can result in an unstable indicator or results that cannot be easily predicted. These problem areas can be summarized as follows:

- A single failure, even with no positive contribution to UAI, can result in White or Yellow index. Given the short (3 year) monitoring period, a single failure is not statistically significant and should not result in a change in color. This is due to elimination of the risk cap if the MSPI exceeds 1E-5.
- A single failure of one failure mode, in addition to failure of other failure modes (e.g., 1 FTR and several FTS) can result in a Yellow indicator, Treated separately, the FTS failures are not sufficient to warrant a change in color and the FTR is not statistically significant.
- The addition of a single failure can result in the MSPI jumping from Green to Yellow. This is due to elimination of the risk cap if the MSPI exceeds 1E-5.
- Increases in UAI can result in a decrease in MSPI. This can occur if there has been a failure and the additional UAI results in exceeding 1E-6, which invokes the Risk Cap, which was not previously invoked for the failure.

### Background
As noted in NUREG-1816, the risk cap was developed to "balance a high rate of "true positives" (correctly identifying degraded performance) while minimizing "false positives". The risk cap was intended to have the following attributes:

- No single failure alone results in a WHITE indication.
- Two significant failures (each with a risk contribution greater than $5x10^{-7}$) would very likely result in a WHITE indication.
- One significant failure with other less-significant failures could exceed the GREEN/WHITE threshold.
- One significant failure with a significant UAI contribution could exceed the GREEN/WHITE threshold.
- A situation in which the URI is near zero but the UAI is greater than $1x10^{-6}$ would result in a WHITE indication.

NUREG-1816 also noted that no instances were identified by the pilot plants where a single failure resulted in a URI >1E-5 and only a few cases where 2 failures resulted in a URI >1E-5. It is important to note, however, that the values used for the NUREG-1816 study did not include the impact of other changes to the index, specifically the addition of common cause correction factors and initiating event impacts for cooling water systems. These other changes to MSPI have resulted in significantly larger Birnbaum values used for calculation the index. As a result, revisiting the treatment of the risk cap is warranted.

### Proposed Resolution
A proposed resolution aimed at providing a more stable implementation of the risk cap is to limit the benefit of the risk to 7.5E-6/yr, rather than restricting any use of the risk cap when the total MSPI value exceeds 1.0E-5/yr. In addition, it is proposed that the risk cap

be applied any time there is a failure which has a risk impact greater than 5E-7 (application of the risk cap to the most significant failure was part of the original concept of the risk cap). The following examples show how the risk cap would work.

**Example 1: EDG Failures**

A plant has an MPSI with no failures of -9.00E-06. The risk worth of a failure for the 3 EDG failure modes are:

Demand = $X_D$ = 2.51E-06
Run = $X_R$ = 1.74E-05
Load/Run = $X_L$ = 2.41E-06

It is assumed that the UAI associated with correcting an EDG failure is 2E-6.

Figure 1 shows the impact of each additional EDG failure to start. It should be noted that both the current and proposed risk cap treatment results in the same MSPI color regardless of the number of failures.

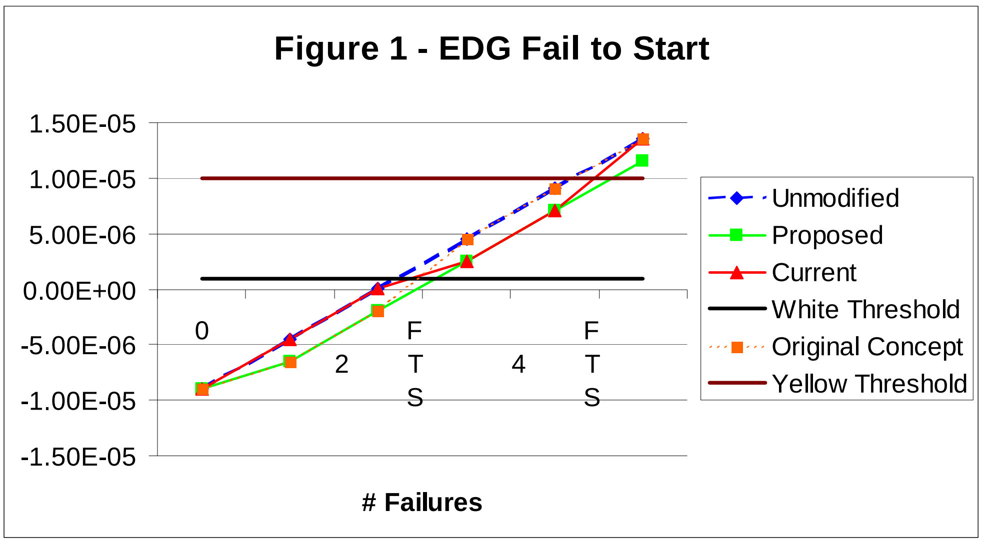



Figure2 shows the impact of each additional EDG failure to load/run. As with failures to start, both the current and proposed risk cap treatment results in the same MSPI color regardless of the number of failures.

**Figure 2 - EDG Fail to Load/Run**

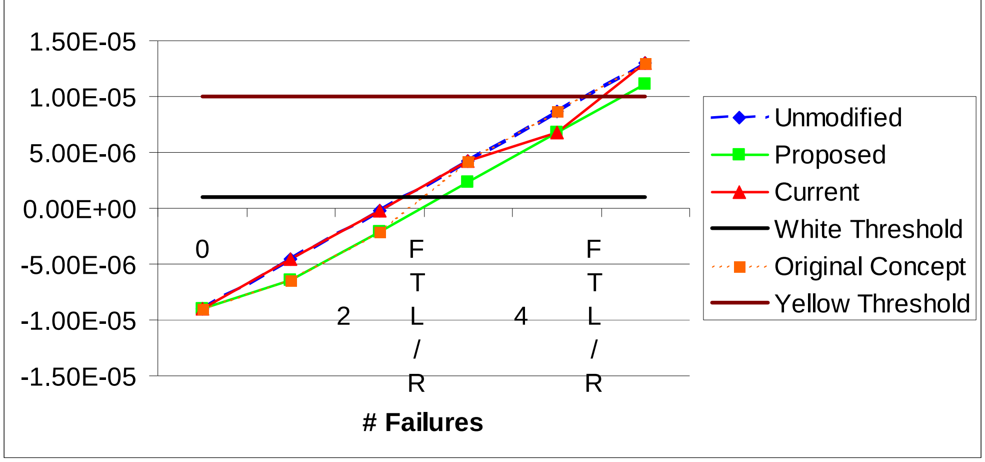



Figure3 shows the impact of each additional EDG failure to run. The primary difference between the current Risk Cap and the proposed Risk Cap is that under the current risk cap, a single failure (with the included contribution from unavailability) results in a Yellow MSPI, while under the proposed change to the Risk Cap, this results in a White Configuration. A second failure results in a Yellow MSPI from both approaches.

**Figure 3 - EDG Fail to Run**

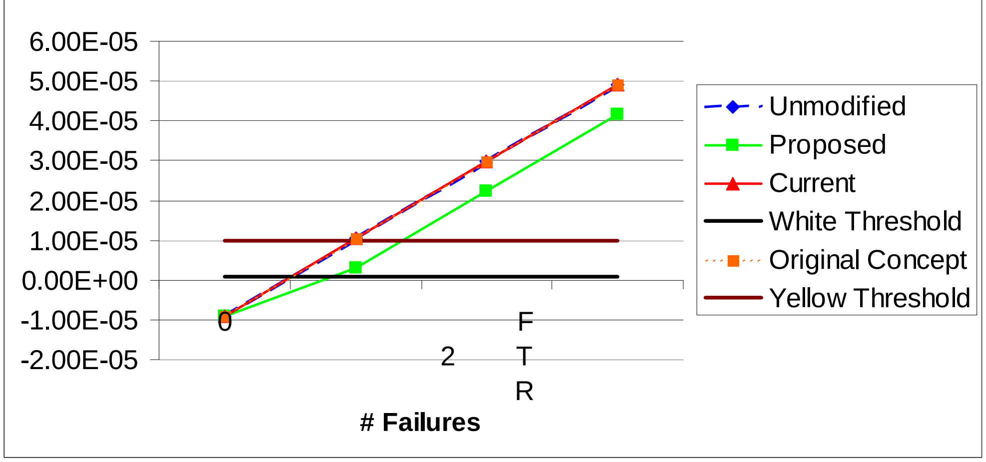



Figure 4 shows the impact of from different failure modes. The first failure is assumed to be a failure to start, followed by a failure to run then additional failures to start. Under the current Risk Cap treatment, the MSPI jumps from Green to Yellow following the failure to run, even though neither failure may be statistically significant. The proposed Risk Cap change results in a smoother transition (Green, White, Yellow) as additional failures are added.

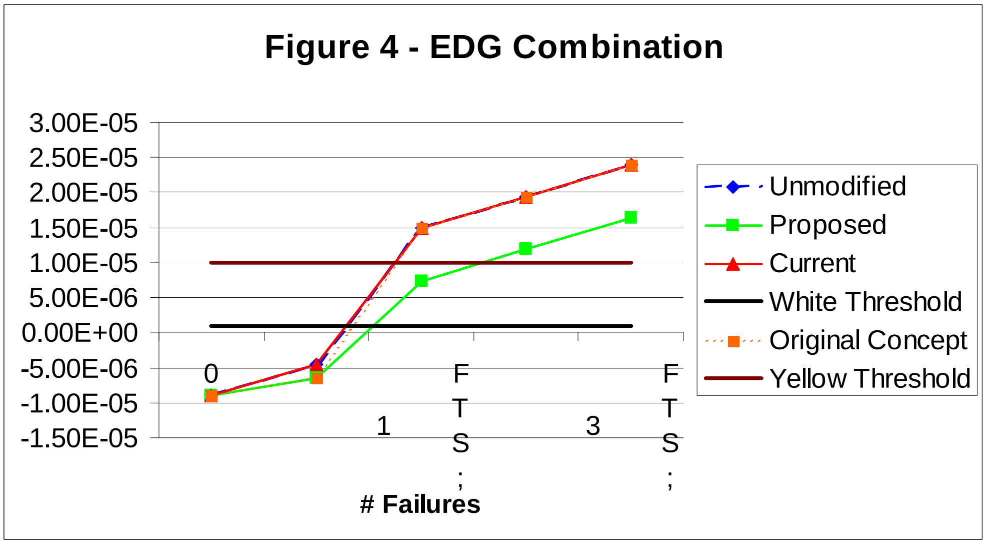



Figure 4 - EDG Combination

## Example 2: NUREG-1816, Case 1

For this example, a plant experiences a start failure of an Auxiliary Feedwater motor-driven pump. Prior to the failure, the UAI = $1x10^{-7}$. The delta URI associated with the start failure is $4x10^{-6}$. No other failures have occurred during this reporting period yielding an URI baseline of zero (this is a simplification since baseline could be below zero). The UAI contribution resulting from the repair unavailability is $2x10^{-7}$. For this scenario, both the current Risk Cap and proposed change result in exceeding the White Threshold after the 2$^{nd}$ failure. However, it does require 1 additional failure (4 failures versus 3 failures) to exceed the Yellow threshold under the proposed change to the Cap (See Figure 5).

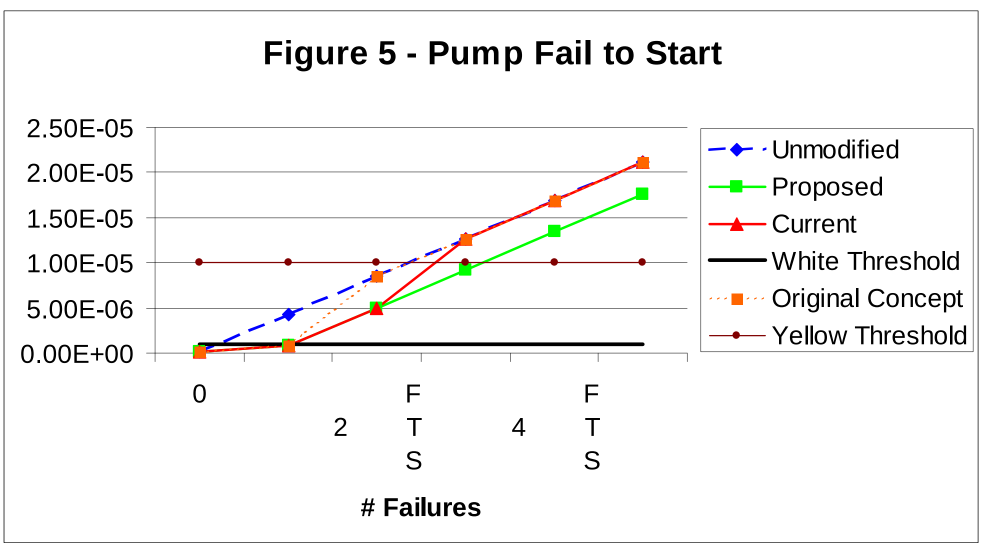



Figure 5 - Pump Fail to Start

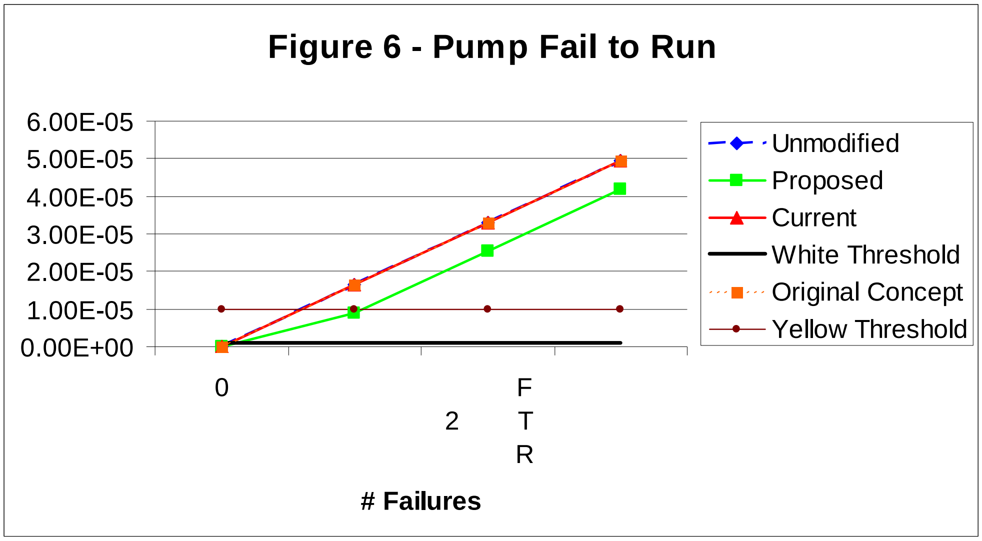
## Example 3 – Essential Service Water Pump Failure to Run

A plant has a URI with no failures of -4.50E-06. The MSPI value is –4.2E-6 with a UAI of 2.7E-7. (Note that there are 2 pump failures in the other CWS, each with a URI contribution of 9.85E-9). It is further assumed that each failure results in a UAI contribution of 4E-7. The risk worth's of the two failure modes are:

Demand = $X_D$ = 4.69E-07

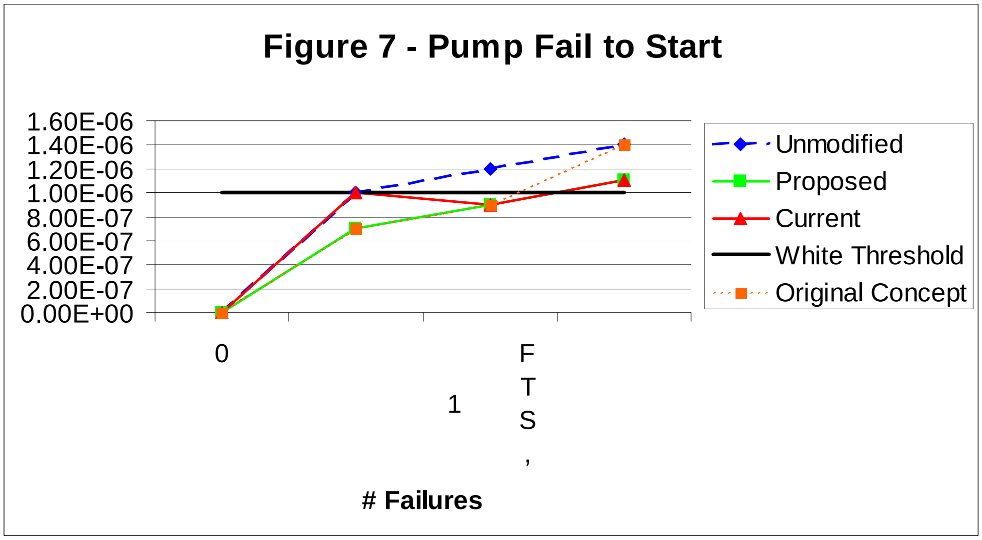
Run = $X_R$ = 1.61E-05

For this plant, a single failure to run results in a Yellow MSPI under the current Risk Cap. With the proposed Risk Cap, the MSPI is White following a single Failure to Run and Yellow after the second failure (See Figure 6).




**Example 4 – Increasing UA**

For this example, it is assumed that the MSPI is at 0 and that a Failure to Start has a URI contribution of 8E-7. Following the first failure, the UA contribution is increase in 2E-7 increments. As can be seen in Figure 7, since the current Risk Cap is only applied once the MSPI exceeds 1E-6, increases in UAI can result in a decrease to the MSPI value. The revised Risk Cap eliminates this discrepancy.



## Proposed Change to Risk Cap

**<u>Treatment of the 1E-5 Limit for applying the Risk Cap</u>**

The existing Risk Cap has an upper limit, above which, the Risk Cap is not applied. The Risk Cap is not applied if the unadjusted MSPI is greater than 1E-5. This treatment was developed to address a concern regarding identifying a delta URI that is greater than 1E-5. This limit is not applied in the proposed change, but by limiting the maximum benefit from the Risk Cap to 7.5E-6, a similar effect is achieved, while allowing the Risk Cap to be applied for any single failure. The following examples demonstrate how this is achieved.

> **Risk Impact >7.5E-6**
>
> If the risk impact of a single failure is greater than 1E-5, the first failure will likely result in a White indicator, as the URI associated with that failure will be 7.5E-6. This may still be a False positive, as it would be White index as the result of a single failure. Under the current Risk Cap, these failures could be Green, White or Yellow. Following a second failure, the MSPI would always be Yellow under both approaches, providing an appropriate regulatory response. The benefit of the proposed change is that it provides a sequential response to failures, avoiding the jump from Green to Yellow.
>
> **5E-6 < Risk Impact <7.5E-6**
>
> In this range, the MSPI under both approaches for a single failure would be Green. However, the $2^{nd}$ failure under the current approach would most likely jump Green to Yellow, while the proposed approach would make a smoother transition (White on the $2^{nd}$ failure and Yellow on the $3^{rd}$).

**Summary**

A comparison of the existing Risk Cap versus the proposed changes is provided below:

| Risk Cap Goal | Current Approach | Proposed Approach |
|---|---|---|
| No single failure alone results in a WHITE indication. | Though no single failures result in White indication, there are single failures that can result in a Yellow indication | All single failures result in a Green indication |
| Two significant failures (each with a risk contribution greater than $5x10^{-7}$) would very likely result in a WHITE indication. | Two significant failures will likely result in White indication, but some higher worth failures (contribution greater than 5E-6) are likely to result in jumping from Green to Yellow. | Two significant failures will likely result in a White indication, even for higher risk worth failures |

**Proposed Change to Risk Cap**

| Risk Cap Goal | Current Approach | Proposed Approach |
|---|---|---|
| One significant failure with other less-significant failures could exceed the GREEN/WHITE threshold. | The goal is achieved if the risk contribution from other failures is greater than 5E-7. | For risk significant failures with risk impacts less than 7.5E-6, the goal is achieved if the risk contribution from other failures is greater than 5E-7. For risk significant failures with risk impacts greater than 7.5E-6, the required risk impact from other failures to reach the White threshold is less. |
| One significant failure with a significant UAI contribution could exceed the GREEN/WHITE threshold. | The goal is achieved if the risk contribution from UAI is greater than 5E-7. | For risk significant failures with risk impacts less than 7.5E-6, the goal is achieved if the risk contribution from UAI is greater than 5E-7. For risk significant failures with risk impacts greater than 7.5E-6, the required risk impact from UAI to reach the White threshold is less. |
| A situation in which the URI is near zero but the UAI is greater than $1x10^{-6}$ would result in a WHITE indication. | For failures that result in unadjusted MSPI values being near but below the White Threshold, increases in UAI can result in a decrease in the MSPI when the risk cap gets applied. | Any increases in UAI always result in an increase in MSPI and a White index once the White Threshold is exceeded. |

The most significant differences between the approaches that the proposed approach may require one additional failure to reach Yellow for high-risk failures. This is balanced by having the MSPI transition from Green to White to Yellow versus the current approach, which can go directly from Green to Yellow. The proposed approach may also result in a few false positive Whites.

**Proposed Guidance Changes**
To be determined.

Staff White Paper on NEI 99-02 Guidance Changes for MSPI for Clarification of Planned UA Expectations

Background:

The staff conducted a review of MSPI planned unavailability (UA) baselines and found that there are some plants that have made large or frequent UA baseline changes. The staff has also found indications that for many plants there are disconnects between the UA baseline values and the associated values contained in the PRAs.

MSPI does not penalize licensees unless their UAs exceed the baseline UA values. Frequent baseline changes will result in a licensee never incurring a significant UAI contribution if changing baselines closely track actual values. NEI 99-02 Revision 5 provides guidance that allows licensees to revise their planned UA baseline, with no periodicity restriction, when changes in maintenance program philosophy occur. However, this should not be interpreted to mean that it is appropriate to change baseline planned unavailability to accommodate emergent work or frequent periodic maintenance activities.

NEI 99-02 also states that baseline UA values should reflect current maintenance practices. It is also an expectation of the ASME PRA Standard that the PRA reflect the as-built, as operated plant. It is recognized that it is impractical to update the PRA constantly to capture short-term changes in maintenance philosophy, but the intent of the MSPI program requires that the assessed risk impacts of maintenance activities reflect the as-built, as-operated plant. In particular, it is necessary that the Birnbaum values used in the MSPI program adequately reflect the maintenance philosophy currently in effect.

Proposal:

To address the problem of having too frequent baseline revisions, the staff is proposing to clarify the definition of maintenance program philosophy and the addition of a requirement to ensure that changes in the UA baseline are consistent with the unavailability assumptions contained in the PRA.

**Maintenance Program Philosophy**

Section F.1.2.1 of NEU-99-02 Rev 5 states: "Planned unavailable hours: These hours include time a train or segment is removed from service for a reason other than equipment failure or human error. Examples of activities included in planned unavailable hours are preventive maintenance, testing, equipment modification, or any other time equipment is electively removed from service to correct a degraded condition that had not resulted in loss of function." Therefore, planned unavailability includes all unavailability not related to failures, and includes more than just those activities associated with preventive maintenance and testing.

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Section F1.2.2 states that "The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004. (Plant specific values of the most recent data are used so that the indicator accurately reflects deviation from expected planned maintenance.) These values are expected to change if the plant maintenance philosophy is substantially changed with respect to on-line maintenance or preventive maintenance. In these cases, the planned unavailability baseline value should be adjusted to reflect the current maintenance practices, including low frequency maintenance evolutions." The point of changing the planned unavailability values is to account for philosophy changes to the on-line maintenance or preventive maintenance program.

Section F1.2.2 also includes a discussion of significant maintenance events and states that "Some significant maintenance evolutions such as EDG overhauls, are performed at an interval greater than the three year monitoring period (5 or 10 year intervals). The baseline planned unavailability should be revised as necessary during the quarter prior to the planned maintenance evolution and then removed after twelve quarters." This guidance recognizes that some program variations can occur and should result in revisions to the planned unavailability values.

As this UA baseline definition includes all non-failure activities, the concept of making changes to the UA baseline tied solely to the maintenance program philosophy appears to have created inconsistencies in the implementation of maintenance program philosophy changes. It is the staff's expectation that the performance or condition of the SSCs is effectively controlled by preventive maintenance and testing programs (a maintenance rule expectation). These programs and condition monitoring activities should be periodically evaluated to ensure that the objective of preventing failures of SSCs through maintenance is appropriately balanced against the objective of minimizing unavailability of SSCs. Changes to the maintenance program philosophy refer to changes to the preventive maintenance and testing programs. Other additions of unplanned unavailability, such as equipment modifications, except as discussed below, or responses to degraded conditions, are not considered to be a change in maintenance program philosophy. Changes to baseline unavailability for equipment modifications are allowed only if the modification is consistent with the assumptions in the PRA that were used to develop the MSPI Birnbaum values and are not already reflected in the MSPI UA baseline. That is, the unavailability values contained in the PRA include unavailability hours consistent with those needed for the proposed modification, and current maintenance and testing programs; and the hours in the MSPI UA baseline do not reflect this total unavailability. If the MSPI baseline is adjusted as a result of a modification, the MSPI baseline changes should be removed at the conclusion of the 3-year monitoring period that encompasses the modification.

The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004 and may not be fully consistent with current practices. However, it is expected that changes to baseline unavailability will reflect the appropriate balancing of preventing failures of SSCs against the objective of minimizing

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This is not to say that hours associated with equipment modification, or any other time equipment is electively removed from service (to correct a degraded condition that had not resulted in loss of function) are not allowed in the baseline. The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004 likely includes these types of activities. However, it is expected that changes

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unavailability of SSCs and, as such, the unavailability should not be increasing with time unless a maintenance program philosophy change has been implemented.

**UA Baseline Changes Consistent with PRA**

The Birnbaum values used in the MSPI are derived from plant-specific PRAs and are dependent, in part, on the unavailability values assumed in the PRA. The ASME PRA Standard Section 5 states the PRA configuration control requirements including the expectation that the PRA is to be consistent with the as-built, as operated plant. Supporting requirement DA-D7 of the ASME PRA Standard includes requirements to limit the use of old data if modification to plant design or operating practice leads to a condition where past data are no longer representative of current performance.

Therefore, it is staff's expectation that the UA baseline is consistent with that used in the PRA and that changes to the UA baseline should only occur as a result of or consistent with changes to the PRA. As a minimum, an evaluation of a proposed change's impact on the PRA should be performed to determine that consistency is maintained.

Recommended Changes

Change Section F1.2.2(lines 35 to 41) from:

The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004. (Plant specific values of the most recent data are used so that the indicator accurately reflects deviation from expected planned maintenance. These values are expected to change if the plant maintenance philosophy is substantially changed with respect to on-line maintenance or preventive maintenance. In these cases, the planned unavailability baseline value should be adjusted to reflect the current maintenance practices, including low frequency maintenance evolutions.)

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To:

The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004. (Plant specific values of the most recent data are used so that the indicator accurately reflects deviation from expected planned maintenance. These values are expected to change if the plant maintenance philosophy is substantially changes with respect to on-line maintenance or preventive maintenance. In these cases, the planned unavailability baseline value should be adjusted to reflect the current maintenance practices, including low frequency maintenance evolutions.) Prior to implementation of an adjustment to the planned unavailability baseline value, the impact of the adjusted values on all MSPI PRA inputs should be assessed. A change to the PRA model and associated changes to the MSPI PRA inputs values is required prior to changing the baseline unavailability. If the PRA inputs to MSPI (Birnbaum values) change by 25% or greater, they are expected to be updated with the implementation of the updated UA baseline value.

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Note: An alternate approach to the 25% change criterion was proposed by industry. This approach uses a criterion based on a ΔCDF > 1E-7 where all the proposed changes in unavailability are considered within the formulation of the MSPI equation. A test of this approach found that for a risk significant train (e.g., EDG A with a Birnbaum of 3.4E-6) the proposed criterion would allow nearly a 300% increase in the baseline unavailability (ΔUA = (0.04 – 0.01) = 0.03 where the 0.04 proposed baseline value results in a change that just exceeds the 1E-7 threshold. The new UA value was then entered into a SPAR model to determine the impact of the increased unavailability on the reliability Birnbaums for EDG and AFW turbine-driven pumps. As expected the importance of EDG B increased (EDG B failure to start and failure to run Birnbaums increased by over 50%) and the importance of the AFW turbine-driven pump increased by approximately 12%. As the proposed approach has the potential to result in Birnbaum changes that are significantly greater than staff's proposed 25%, the original approach of 25% is being maintained.

The following changes are considered a "change in plant maintenance philosophy:"

- A change in frequency or scope of a current preventative maintenance activity or surveillance test.
- The addition of a new preventative maintenance activity or surveillance test.
- The occurrence of a periodic maintenance activity at a higher or lower frequency during a three year data window (e.g., a maintenance overhaul that occurs once every 24 months will occur twice 2/3 of the time and once 1/3 of the time)
- Planned maintenance activities that occur less than once every 3 years (e.g., 5 or 10 year overhauls).
- The performance of maintenance in response to a condition-based preventive maintenance activity.
- Performance of an on-line modification that has been determined to be consistent with the unavailability values contained in the PRA in that the PRA includes unavailability hours for the proposed modification, and current maintenance and testing programs; and the hours in the MSPI UA baseline do not reflect this total unavailability.

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The following changes are not considered a "change in plant maintenance philosophy:"

- The performance of maintenance in response to a degraded condition (even when it is taken out of service to address the degraded condition) unless this action is in response to a condition-based preventive maintenance activity.
- Planned maintenance activity that exceeds its planned duration.
- The performance of an on-line modification that do not meet the change in plant maintenance philosophy online modification criterion.

# Staff White Paper on NEI 99-02 Guidance Changes for MSPI for Clarification of Planned UA Expectations

## Background:

The staff conducted a review of MSPI planned unavailability (UA) baselines and found that there are some plants that have made large or frequent UA baseline changes. The staff has also found indications that for many plants there are disconnects between the UA baseline values and the associated values contained in the PRAs.

MSPI does not penalize licensees unless their UAs exceed the baseline UA values. Frequent baseline changes will result in a licensee never incurring a significant UAI contribution if changing baselines closely track actual values. NEI 99-02 Revision 5 provides guidance that allows licensees to revise their planned UA baseline, with no periodicity restriction, when changes in maintenance program philosophy occur. However, this should not be interpreted to mean that it is appropriate to change baseline planned unavailability to accommodate emergent work or frequent periodic maintenance activities.

NEI 99-02 also states that baseline UA values should reflect current maintenance practices. It is also an expectation of the ASME PRA Standard that the PRA reflect the as-built, as operated plant. It is recognized that it is impractical to update the PRA constantly to capture short-term changes in maintenance philosophy, but the intent of the MSPI program requires that the assessed risk impacts of maintenance activities reflect the as-built, as-operated plant. In particular, it is necessary that the Birnbaum values used in the MSPI program adequately reflect the maintenance philosophy currently in effect.

## Proposal:

To address the problem of having too frequent baseline revisions, the staff is proposing to clarify the definition of maintenance program philosophy and the addition of a requirement to ensure that changes in the UA baseline are consistent with the unavailability assumptions contained in the PRA.

### Maintenance Program Philosophy

Section F.1.2.1 of NEU-99-02 Rev 5 states: “Planned unavailable hours: These hours include time a train or segment is removed from service for a reason other than equipment failure or human error. Examples of activities included in planned unavailable hours are preventive maintenance, testing, equipment modification, or any other time equipment is electively removed from service to correct a degraded condition that had not resulted in loss of function.” Therefore, planned unavailability includes all unavailability not related to failures, and includes more than just those activities associated with preventive maintenance and testing.

Section F1.2.2 states that “The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004. (Plant specific values of the most recent data are used so that the indicator accurately reflects deviation from expected planned maintenance.) These values are expected to change if the plant maintenance philosophy is substantially changed with respect to on-line maintenance or preventive maintenance. In these cases, the planned unavailability baseline value should be adjusted to reflect the current maintenance practices, including low frequency maintenance evolutions.” The point of changing the planned unavailability values is to account for philosophy changes to the on-line maintenance or preventive maintenance program.

Section F1.2.2 also includes a discussion of significant maintenance events and states that “Some significant maintenance evolutions such as EDG overhauls, are performed at an interval greater than the three year monitoring period (5 or 10 year intervals). The baseline planned unavailability should be revised as necessary during the quarter prior to the planned maintenance evolution and then removed after twelve quarters.” This guidance recognizes that some program variations can occur and should result in revisions to the planned unavailability values.

As this UA baseline definition includes all non-failure activities, the concept of making changes to the UA baseline tied solely to the maintenance program philosophy appears to have created inconsistencies in the implementation of maintenance program philosophy changes. It is the staff’s expectation that the performance or condition of the SSCs is effectively controlled by preventive maintenance and testing programs (a maintenance rule expectation). These programs and condition monitoring activities should be periodically evaluated to ensure that the objective of preventing failures of SSCs through maintenance is appropriately balanced against the objective of minimizing unavailability of SSCs. Changes to the maintenance program philosophy refer to changes to the preventive maintenance and testing programs. Other additions of unplanned unavailability, such as equipment modifications, except as discussed below, or responses to degraded conditions, are not considered to be a change in maintenance program philosophy. Changes to baseline unavailability for equipment modifications are allowed only if the modification is consistent with the assumptions in the PRA that were used to develop the MSPI Birnbaum values and are not already reflected in the MSPI UA baseline. That is, the unavailability values contained in the PRA include unavailability hours consistent with those needed for the proposed modification, and current maintenance and testing programs; and the hours in the MSPI UA baseline do not reflect this total unavailability. If the MSPI baseline is adjusted as a result of a modification, the MSPI baseline changes should be removed at the conclusion of the 3-year monitoring period that encompasses the modification.

The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004 and may not be fully consistent with current practices. However, it is expected that changes to baseline unavailability will reflect the appropriate balancing of preventing failures of SSCs against the objective of minimizing unavailability of SSCs and, as such, the unavailability should not be increasing with time unless a maintenance program philosophy change has been implemented.

**UA Baseline Changes Consistent with PRA**

The Birnbaum values used in the MSPI are derived from plant-specific PRAs and are dependent, in part, on the unavailability values assumed in the PRA. The ASME PRA Standard Section 5 states the PRA configuration control requirements including the expectation that the PRA is to be consistent with the as-built, as operated plant. Supporting requirement DA-D7 of the ASME PRA Standard includes requirements to limit the use of old data if modification to plant design or operating practice leads to a condition where past data are no longer representative of current performance.

Therefore, it is staff's expectation that the UA baseline is consistent with that used in the PRA and that changes to the UA baseline should only occur as a result of or consistent with changes to the PRA. As a minimum, an evaluation of a proposed change's impact on the PRA should be performed to determine that consistency is maintained.

<u>Recommended Changes</u>

Change Section F1.2.2(lines 35 to 41) from:

The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004. (Plant specific values of the most recent data are used so that the indicator accurately reflects deviation from expected planned maintenance. These values are expected to change if the plant maintenance philosophy is substantially changed with respect to on-line maintenance or preventive maintenance. In these cases, the planned unavailability baseline value should be adjusted to reflect the current maintenance practices, including low frequency maintenance evolutions.)

To:

The initial baseline planned unavailability is based on actual plant-specific values for the period 2002 through 2004. (Plant specific values of the most recent data are used so that the indicator accurately reflects deviation from expected planned maintenance. These values are expected to change if the plant maintenance philosophy is substantially changes with respect to on-line maintenance or preventive maintenance. In these cases, the planned unavailability baseline value should be adjusted to reflect the current maintenance practices, including low frequency maintenance evolutions.) Prior to implementation of an adjustment to the planned unavailability baseline value, the impact of the adjusted values on all MSPI PRA inputs should be assessed. A change to the PRA model and associated changes to the MSPI PRA inputs values is required prior to changing the baseline unavailability. If the PRA inputs to MSPI (Birnbaum values) change by 25% or greater, they are expected to be updated with the implementation of the updated UA baseline value.

Note: An alternate approach to the 25% change criterion was proposed by industry. This approach uses a criterion based on a ΔCDF > 1E-7 where all the proposed changes in unavailability are considered within the formulation of the MSPI equation. A test of this approach found that for a risk significant train (e.g., EDG A with a Birnbaum of 3.4E-6) the proposed criterion would allow nearly a 300% increase in the baseline unavailability (ΔUA = (0.04 – 0.01) = 0.03 where the 0.04 proposed baseline value results in a change that just exceeds the 1E-7 threshold. The new UA value was then entered into a SPAR model to determine the impact of the increased unavailability on the reliability Birnbaums for EDG and AFW turbine-driven pumps. As expected the importance of EDG B increased (EDG B failure to start and failure to run Birnbaums increased by over 50%) and the importance of the AFW turbine-driven pump increased by approximately 12%. As the proposed approach has the potential to result in Birnbaum changes that are significantly greater than staff's proposed 25%, the original approach of 25% is being maintained.

The following changes are considered a "change in plant maintenance philosophy:"

- A change in frequency or scope of a current preventative maintenance activity or surveillance test.
- The addition of a new preventative maintenance activity or surveillance test.
- The occurrence of a periodic maintenance activity at a higher or lower frequency during a three year data window (e.g., a maintenance overhaul that occurs once every 24 months will occur twice 2/3 of the time and once 1/3 of the time)
- Planned maintenance activities that occur less than once every 3 years (e.g., 5 or 10 year overhauls).
- The performance of maintenance in response to a condition-based preventive maintenance activity.
- Performance of an on-line modification that has been determined to be consistent with the unavailability values contained in the PRA in that the PRA includes unavailability hours for the proposed modification, and current maintenance and testing programs; and the hours in the MSPI UA baseline do not reflect this total unavailability.

The following changes are not considered a "change in plant maintenance philosophy:"

- The performance of maintenance in response to a degraded condition (even when it is taken out of service to address the degraded condition) unless this action is in response to a condition-based preventive maintenance activity.
- Planned maintenance activity that exceeds its planned duration.
- The performance of an on-line modification that do not meet the change in plant maintenance philosophy online modification criterion.

#5

# Unplanned Power Changes Per 7,000 Critical Hours

## Problem Statement

NEI 99-02, Revision 5, "Regulatory Assessment Performance Indicator Guideline," dated July 2007, states:

> *Unplanned changes in reactor power are changes in reactor power that are initiated less than 72 hours following discovery of an off-normal condition, and that result in, or require a change in power level of greater than 20% full power to resolve.*

The purpose of this white paper is to examine the basis for the aforementioned 72 hour period and determine if the possible need for power changes greater than 20%, which have not been specifically excluded by NEI 99-02, must be recognized (and documented) at least 72 hours prior to initiation of the power change in order to be considered "planned" and not counted as part of the indicator.

## Background

Unplanned power changes, under certain conditions, could challenge safety functions and may provide leading indication of risk-significant events. In consequence, nuclear power stations have reported unplanned power changes to the Nuclear Regulatory Commission (NRC) for several decades. Prior to implementation of the Reactor Oversight Process (ROP), nuclear power stations reported certain unplanned power changes in accordance with their operating licenses and Regulatory Guide (RG) 1.16, Revision 4, "Reporting of Operating Information – Appendix A, Technical Specifications," dated August 1975.

RG 1.16, Revision 4, identified operating statistics and shutdown experience information, including forced power reductions of more than 20%, which licensees reported to the NRC via Monthly Operating Reports. With regard to reporting power reductions of more than 20%, RG 1.16 states:

> *The term "forced reduction in power" as used in this guide and as normally defined in the electric power industry means the occurrence of a component failure or other condition that requires that the load on the unit be reduced for corrective action immediately or up to and including the very next weekend. Note that routine preventative maintenance, surveillance, and calibration activities requiring power reductions are not covered by this section [Section C.1.b].*
>
> *Forced shutdowns [and significant power reductions] include those required to be initiated by no later than the weekend following discovery of an off-normal condition. It is recognized that some judgment is required in categorizing shutdowns in this way. In general, a forced shutdown is one that would not have been completed in the absence of the condition for which corrective action was taken [Appendix D].*

The intent of the guidance in RG 1.16, Revision 4, was to capture those unplanned power changes of more than 20% which were initiated as an immediate corrective action in response to an off-normal condition and which, due to plant conditions, could not be deferred to a low load period such as a weekend. That intent appears to have been recognized by SECY-99-007, "Recommendations for the Reactor Oversight Process Improvements," dated 1/8/99, which states:

> *This indicator counts unplanned events (excluding scrams) that could, in certain plant conditions, challenge safety functions. It may be a leading indicator of risk-significant events. The PI includes all changes in reactor power of greater than 20% that are not planned. It includes uncontrolled excursions in reactor power as well as unplanned controlled power reductions and shutdowns. Unplanned power reductions and shutdowns are those that are initiated before the end of the weekend following the discovery of an off-normal condition. Examples of the types of transients included are runbacks, power oscillations, power reductions conducted in response to equipment failures or personnel errors, and unplanned power reductions to perform maintenance. It does not include manual or automatic scrams or load following power changes. This is similar to the information that is included by all licensees in their monthly operating reports.*

Moreover, SECY-99-007 reiterated the NRC's Principles of Good Regulation (refer to 60 FR56066 dated 11/6/95), noted weaknesses in the current inspection, assessment, and enforcement processes, and stated that the NRC intends to improve the scrutability and objectivity of existing processes and develop a new regulatory framework that improves public confidence in the oversight of licensed activities and addresses the agency's regulatory principles.

Subsequently, the Nuclear Energy Institute (NEI) Safety Performance Assessment Task Force, in conjunction with the NRC, developed NEI 99-02, Revision 0, "Regulatory Assessment Performance Indicator Guideline," dated 3/28/00. NEI 99-02, Revision 0, provided, among other things, initial guidance for collecting and reporting data elements used to compute the unplanned power change performance indicator. NEI 99-02, Revision 0, states:

> *This indicator monitors the number of unplanned power changes (excluding scrams) that could have, under other plant conditions, challenged safety functions. It may provide leading indication of risk-significant events but is not itself risk-significant. . .*
>
> *Unplanned changes in reactor power are changes in reactor power that are initiated less than 72 hours following the discovery of an off-normal condition, and that result in, or require a change in power level of greater than 20% full power to resolve. . .*
>
> *The 72 hour period between discovery of an off-normal condition and the corresponding change in power level is based on the typical time to assess the*

*plant condition, and prepare, review, and approve the necessary work orders procedures, and necessary safety reviews, to effect a repair. The key element to be used in determining whether a power change should be counted as part of this indicator is the 72 hour period and not the extent of planning that is performed between the discovery of the condition and initiation of the power change.*

NEI 99-02, Revision 0, included guidance similar to RG 1.16, Revision 4, but introduced the concept of a 72 hour period between discovery of off-normal conditions and initiation of power changes greater than 20%. Although it continued to tie unplanned power changes to the discovery of off-normal conditions, it omitted discussions of immediate corrective actions and deferral of power changes to low load periods such as weekends. Instead, the 72 hour period became a key element in deciding if the power change should be counted as part of the indicator.

Subsequent revisions to NEI 99-02, including the current revision (Revision 5), continued to focus on the 72 hour period and not the extent of planning performed between discovery of the off-normal condition and initiation of the power change.

## Discussion

When viewed in light of SECY-99-007, RG 1.16, and NRC Principles of Good Regulation, it appears NEI 99-02 introduced the concept of a 72 hour period to make the indicator scrutable. For example, all power changes greater than 20% initiated within 72 hours of discovering an off-normal condition clearly include, with margin, those required as an immediate corrective action in response to an off-normal condition. Such power changes are unplanned and could have, under other plant conditions, challenged safety functions. Conversely, power changes initiated more than 72 hours following discovery of an off-normal condition and not required as an immediate corrective action in response to the off-normal condition should not be counted as part of the indicator.

Another advantage of the 72 hour period is that it alleviates the need to document recognition of the need (or potential need) to perform power changes of more than 20% following discovery of off-normal conditions. Such documentation has no value with regard to power changes that were initiated as immediate corrective actions in response to off-normal conditions since initiation of the power changes occurred within 72 hours following discovery of the off-normal condition. Such power changes are clearly unplanned and must be counted as part of the indicator unless specifically excluded by NEI 99-02. Moreover, requiring such documentation for power changes not initiated as immediate corrective actions in response to off-normal conditions may create unnecessary burden by requiring licensees to wait 72 hours following recognition of the need (or possible need) for a downpower in lieu of waiting 72 hours following discovery of the off-normal condition. In such cases, recognition of the need (or possible need) for a planned power change should be allowed to occur at any time. They key factor is the 72 hour period following discovery of the off-normal condition and not how much time has passed since the need for a power change was recognized.

NEI 99-02 clearly states that the key element to be used in determining whether a power change should be counted as part of the indicator is the 72 hour period and not the extent of the planning that is performed between discovery of an off-normal condition and initiation of the power change. The 72 hour period ensures that unplanned power changes are counted in the indicator and allows sufficient time, when immediate corrective action is not required, to assess the plant condition, recognize the potential need or desire for a power change, and prepare, review, and approve the necessary work orders and procedures which are necessary to implement the power change.

Given the above, it is incumbent upon licensees to provide objective evidence that supports not counting unplanned power changes of more than 20% as part of the indicator. Specifically, licensees should have documentation that identifies when the off-normal condition was discovered and when the power change of more than 20% was initiated. Consistent with NRC Inspection Procedure 71151, "Performance Indicator Verification," such objective evidence may include logs, troubleshooting plans, meeting minutes, corrective action program documents, or similar type documentation.

## Conclusion

NEI 99-02 introduced the concept of a 72 hour period to make the unplanned power change indicator scrutable. The 72 hour period includes sufficient margin to ensure that all power changes greater than 20% which were required as an immediate corrective action in response to an off-normal condition are counted in the indicator.

It was never the intent of NEI 99-02 or RG 1.16 to require recognition (and documentation) of the possible need for a power change of more than 20% at least 72 hours prior to initiating such power changes. The key element to be used in determining whether a power change should be counted as part of the indicator is the 72 hour period between discovery of an off-normal condition and the corresponding change in power level. Recognition and documentation of the possible need for a power change of more than 20% or the extent of planning necessary to implement such power changes are not key factors.

H/0 #6

Initiating Events – Unplanned Scrams per 7,000 Critical Hours
3/17/09

RECOMMENDED NEI 99-02 GUIDANCE CHANGES

Page 11, line 10

10 Scrams that ~~occur as part of the normal sequence of~~ are initiated at less than or equal to 35% reactor power in accordance with normal operating procedures (i.e., not an abnormal or emergency operating procedure) to complete a planned shutdown and scram signals that occur while the reactor is shutdown.