

**NEI 99-02 FAQ 15-03 (Final)**  
**Unavailability Monitoring of Low-Risk Trains**

**Plant:** Generic  
**Date of Event:** N/A  
**Submittal Date:** 06/16/2015  
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**Performance Indicator:**

Mitigating System Performance Index (Emergency AC Power Systems) (MS06)  
Mitigating System Performance Index (High Pressure Injection Systems) (MS07)  
Mitigating System Performance Index (Heat Removal Systems) (MS08)  
Mitigating System Performance Index (Residual Heat Removal Systems) (MS09)  
Mitigating System Performance Index (Cooling Water Systems) (MS10)

**Site-Specific FAQ (Appendix D)?** No [This is generic]

**FAQ requested to become effective:** When approved

**Question Section**

[This FAQ implements a whitepaper approved by the ROP Working Group in the spring of 2015. The whitepaper addressed the following question: Can low risk worth trains be excluded from monitoring based on a low Birnbaum value?]

**NEI 99-02, Rev. 7 Guidance needing interpretation (include page and line citation):**

F.1.1.2 Identification of Trains within the System

There is no allowance to exclude a train based on a low Birnbaum value, though there is exclusion for low risk valves and circuit breakers

**Event or circumstances requiring guidance interpretation:**

**Introduction/Background**

MSPI monitors URI and UAI for a rolling period of three years. NEI 99-02 section F 2.3.5 discusses Birnbaum importance as it relates the exclusion of some valves and circuit breakers from the requirement to monitor those components for failures. For

$$B = CDF*[FV/UR]_{max}$$

If the Birnbaum importance (B) of a component (adjusted for Common Cause failure and Initiating Event frequency) is less than 1.0E-06, it may be excluded from the requirement to monitor for failures. Currently, in NEI 99-02, there is no similar exclusion for monitoring the unavailability of trains or segments that have a low Birnbaum importance.

**Summary of Issues**

In a three year period, there are 26,280 hours. Throughout the industry, it is not unusual to see trains or segments that can incur tens, if not hundreds of thousands of unavailability hours and remain Green. This means that they could be unavailable over the entire monitoring period and not make the indicator go white. Similar to monitored components, one can calculate the Birnbaum importance of individual trains or segments:

$$B = CDF*[FVUAP/UAP]_{max}$$

Where FVUAP is a Basic Event in the PRA model and UAP is the Basic Event probability adjusted for Initiating Event frequency, if applicable.

The following was calculated from a plant's data. The plant name and names of the segments have been changed:

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Plant X Cooling Water Unavailability							
Segment	Segment <sub>A</sub>	Segment <sub>B</sub>	Segment <sub>C</sub>	Loop B	Loop A	Train B	Train A
CDF	1.07E-05	1.07E-05	1.07E-05	1.07E-05	1.07E-05	1.07E-05	1.07E-05
FV <sub>UAP</sub>	2.13E-03	9.54E-04	1.42E-03	3.62E-03	2.61E-03	1.98E-02	1.69E-02
UAP	1.18E-02	1.07E-02	1.18E-02	7.32E-04	7.32E-04	2.59E-03	2.59E-03
Birnbaum	1.93E-06	9.54E-07	1.29E-06	5.29E-05	3.82E-05	8.18E-05	6.98E-05
Hours to White	14,240	29,120	21,360	519	720	355	407

The hours to White in this table came from the plant's MSPI Margin report. This indicates that the hours to remain Green reaches the three year total of 26,280 when the Birnbaum importance is approximately 1E-06. Since the impact of the train or segment unavailability is added to other trains and URI to calculate MSPI, the impact of a train with a Birnbaum of 1E-06 can't be ignored.

**If licensee and NRC resident/region do not agree on the facts and circumstances explain:** N/A

**The Licensee's Position:** Industry recommends that any train or segment that has a Birnbaum of < 1E-07 be excluded from the requirement to monitor for unavailability.

**The NRC's Position:** TBD

**Potentially relevant existing FAQ numbers:** None

## Response Section

### Proposed Resolution of FAQ

Add a third bullet under Section F.1.1 of NEI 99-02 as follows:

- Identify trains/segments with an adjusted Birnbaum value of less than 1.0E-07 (these may be excluded from unavailability monitoring).

Add a new last paragraph under F.1.1.2 as follows:

#### Systems with no monitored Trains:

If all trains/segments within a system have been excluded, a pseudo train will be reported in CDE<sup>1</sup>. The train should be identified by the name of the system followed by the word pseudo (e.g., RHR pseudo). The following values should be applied to all pseudo trains:

FV = 0.0

UA = 1.0

Baseline planned unavailability = 0.0

Baseline unplanned unavailability = 0.0

Monthly Unavailability Hours (planned and unplanned) = 0

<sup>1</sup> CDE requires all systems to have at least 1 train to calculate MSPI values.

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Add a new Section F.1.3.5 to NEI 99-02 as follows:

**F 1.3.5. BIRNBAUM IMPORTANCE**

One of the rules used for determining the trains/segments to be monitored in this performance indicator is that licensees are given the option of excluding trains/segments with an adjusted Birnbaum importance less than 1.0E-07. This is an option, not a requirement. Thus the last two columns of Table G1 ("Adjusted Birnbaum Value" and "Monitored") are required only if the licensee chooses to exclude trains/segments with low adjusted Birnbaum values. A licensee may choose to use this exclusion in one system without using it in any other system(s). To apply this screening rule the Birnbaum importance is calculated from the values derived in this section as:

$$B = CDF*[FV/UA]_{ind} = CDF*[FV/UA]_{max}$$

Ensure that the support system initiator correction (if applicable) is included in the Birnbaum value used to exclude components from monitoring.

In Section G.3, revise Table G1 as shown below.

**Table G 1 Unavailability Data HPSI (one table per system)**

Train	Basic Event Name	Basic Event Description	Basic Event Probability (UAP)	Basic Event FVUAP <sup>1</sup>	FVUAP/UAP	Adjusted Birnbaum Value <sup>1, 2</sup>	Monitored? <sup>2</sup>
A	1SIAP02- --- MP6CM	HPSI Pump A Unavailable Due to Mntc	3.20E-03	3.19E-03	9.97E-01	1.99E-6	Yes
B	1SIBP02-- --MP6CM	HPSI Pump B Unavailable Due to Mntc	3.20E-03	3.85E-03	1.20E+00	2.4E-06	Yes

Note 1. Adjusted for IEF correction if used

Note 2: These two columns are needed only if the licensee chooses the option of excluding trains/segments with an adjusted Birnbaum importance of less than 1.0E-07.

**NRC Response**

The NRC staff agrees with the proposed changes and recommends incorporation of these into NEI 99-02.