NEI 99-02 FAQ 14-02
Fort Calhoun MSPI

Plant: Fort Calhoun Nuclear Station

Date of Event: 12/18/2013 (Reactor Critical)

Submittal Date: 05/14/2014

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

Site-Specific FAQ (Appendix D)? Yes

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

Question Section

NEI 99-02, Revision 07, Guidance needing interpretation and/or additional information:

The MSPI Section (starting on page 32) does not provide guidance on the process involved in reporting performance indicator data for licensees that have started up after having been in a shutdown condition for an extended period of time. MSPI values are sensitive to unavailability hours when the critical hours for a unit are low, as is the case with a plant starting up after an extended shutdown. In this, MSPI may not be a valid indication of performance and should be considered not valid until sufficient critical hours are accrued.

The draft NRC Staff White Paper on Performance Indicator Validity during Extended Shutdown and Subsequent Startup, last discussed at the April 2014 ROP Working Group meeting notes:

"For plants that are in extended shutdown conditions, the MSPI data elements continue to be reported. Once the licensee anticipates that a shutdown will enter an extended period (six months), a FAQ shall be submitted for the ROP Working Group to determine MSPI validity. The licensee shall submit an additional FAQ to establish MSPI validity upon subsequent startup."

Timeline of significant events for Fort Calhoun Station:

April, 2011 – Fort Calhoun Nuclear Station shut down: 26 Refueling Outage.

June 6, 2011 – Declared a Notification of Unusual Event – Rising flood waters

August 29, 2011 Exited Notification of Unusual Event – River Level 1003'6" and lowering

June 7, 2011 – 1B4A Load Center fire

December, 2011 – FCS entered Inspection Manual Chapter 0350.

December 21, 2013 – Breakers closed and extended outage ended.

NRC Resident Comments

Residents Inspector had no comments.

Licensee Position

FCS will continue monitoring MSPI and reporting data elements on a quarterly basis. The performance indicator shall remain N/A until reported data is expected to be a more accurate reflection of current plant performance.

The lack of critical hours for the past 12 quarters has and will continue to skew the performance indicators validity. As critical hours are accrued, performance and predictability becomes increasingly representative of actual performance of the station. As one of the basic premises of MSPI is that a single failure should not result in an adverse indicator, the following criteria were used by Ft. Calhoun Station to determine when there will be sufficient critical hours to avoid a false positive indicator:

1. There should be at least 4 quarters of data following the startup from the extended outage, and
2. The MSPI value should be able to tolerate the worse single failure and unavailability equal to a full LCO Completion time and remain Green (≤1.0E-6/yr) following startup from the extended outage.

A plant specific PWR Owners Group "What-If" tool was used to predict future MSPI values using expected plant data (Unavailability and Unreliability).

The charts below illustrates the impact for the EAC and RHR systems from having a failure and associated unavailability in the 4th quarter 2014 and the impact on MSPI as additional critical hours are accrued:

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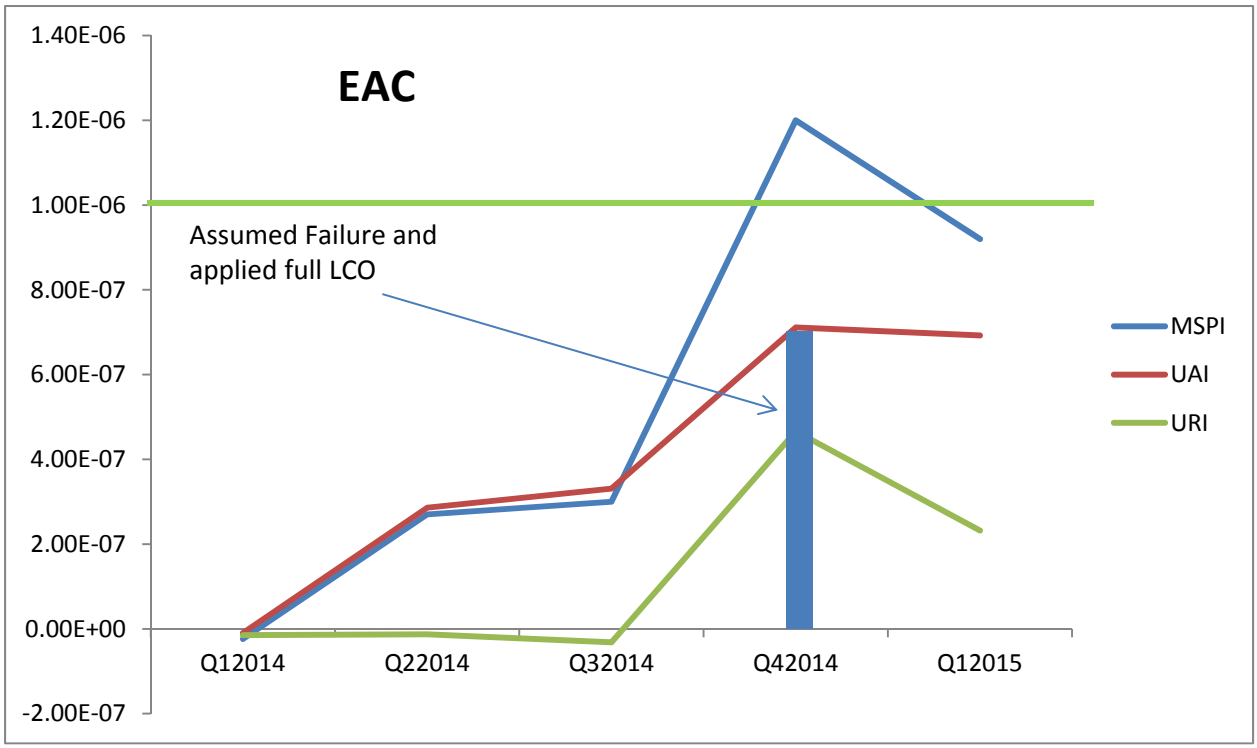

EAC	Q12014	Q22014	Q32014	Q42014	Q12015
MSPI	-2.4E-08	2.7E-07	3.0E-07	1.2E-06	9.2E-07
UAI	-9.50E-09	2.86E-07	3.31E-07	7.11E-07	6.92E-07
URI	-1.49E-08	-1.31E-08	-3.18E-08	4.66E-07	2.32E-07
% Baseline Crit Hrs	9.7%	18.7%	27.8%	35.6%	45.8%

Q1 2015 MSPI decrease reflects a Feb 2012 failure dropping out of the 3 year monitoring period.

Both DG 2 Year Overhauls (103 hours each) are included in 2014 estimate.

Past MSPI values reflect original estimate for observed period.

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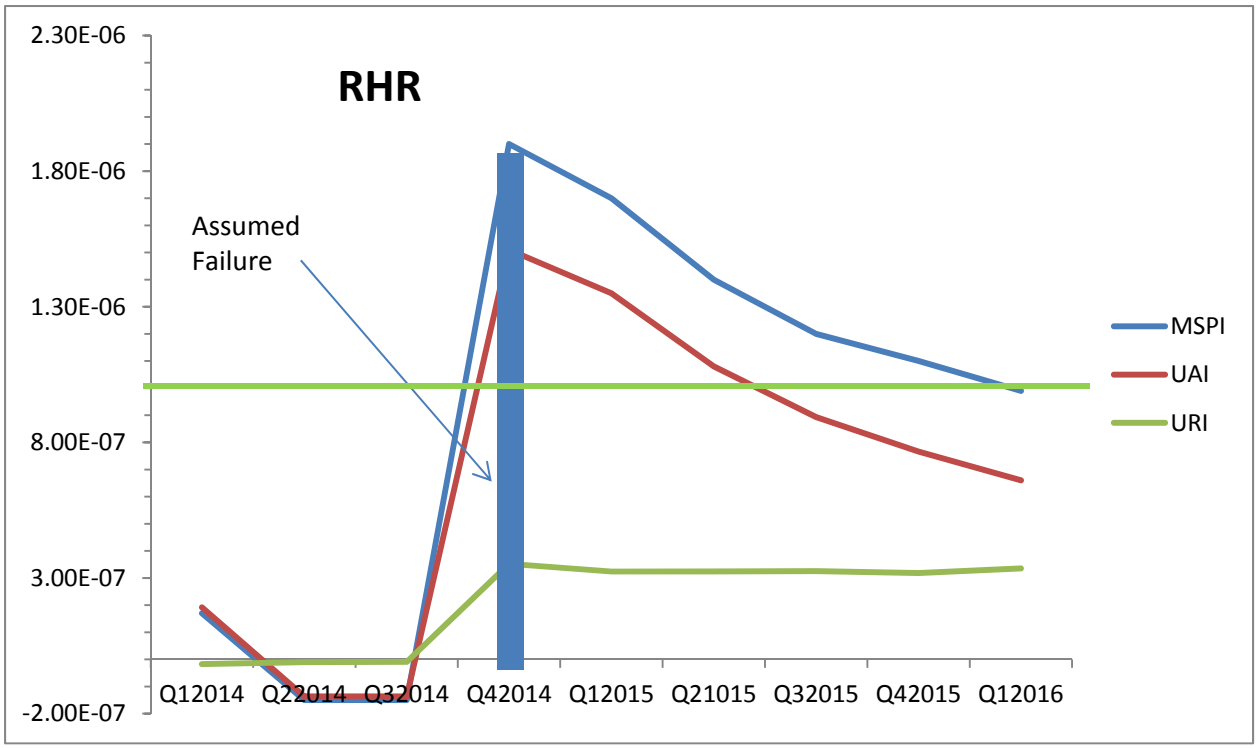

RHR	Q12014	Q22014	Q32014	Q42014	Q12015	Q21015	Q32015	Q42015	Q12016
MSPI	1.7E-07	-1.5E-07	-1.5E-07	1.9E-06	1.7E-06	1.4E-06	1.2E-06	1.1E-06	9.9E-07
UAI	1.92E-07	-1.37E-07	-1.37E-07	1.51E-06	1.35E-06	1.08E-06	8.93E-07	7.66E-07	6.60E-07
URI	-1.73E-08	-1.05E-08	-9.47E-09	3.52E-07	3.24E-07	3.24E-07	3.25E-07	3.18E-07	3.35E-07
% Baseline Crit Hrs	9.7%	18.7%	27.8%	35.6%	45.8%	50.2%	59.4%	68.5%	77.5%

Estimated planned unavailability hours for each quarter: 7 hours.

RFO27 is scheduled for 45 days during Q2_2015.

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Potentially relevant existing FAQ numbers: None

Response Section

Based on the results of this sensitivity study, the following table identifies when each MSPI should be considered valid:

MSPI System	Effective Date	Limiting Criteria
MS06 – Emergency AC Power	1st quarter 2015	Single Failure plus associated unplanned unavailability (full LCO) yields white indicator in 4th quarter 2014 but green in 1st quarter 2015
MS07 – High Pressure Injection System	4th quarter 2014	4 quarters data
MS08 – Heat Removal System	4th quarter 2014	4 quarters data
MS09 – Residual Heat Removal System	1st quarter 2016	Single Failure plus associated unplanned unavailability (full LCO) yields white indicator in 4th quarter 2015 but green in 1st quarter 2016
MS10 – Cooling Water System	4th quarter 2014	4 quarters data

NRC Response

FAQ 14-02: FCS MSPI Validity

NRC Response

According to the "Simulation of MSPI Indicator Reaction to Plant in Long Term Shutdown and Initial Startup Page" white paper discussed in the ROP Working Group (The last documented version of this white paper is available through Agencywide Document Access and Management System (ADAMS) Accession No. ML13079A728), the ROP Task Force recommended and the NRC staff agreed with the following:

ROP Task Force Recommendations

The data from this study (Figure 1) shows that MSPI is very reactive when critical hours are low. This indicates that these situations should be treated on a case-by-case basis. Fortunately, these situations have been uncommon over the life of the ROP, so that it is practical to consider a case-by-case approach. As a starting point for these case-by-case discussions, the ROP Task Force recommends the following decision rules for the display of MSPI on the NRC web page:

- *Gray out MSPI when a unit has been shut down for six months.*
  - *On plant startup, if the calculated MSPI is greater than 1.0E-6 (White) for the quarter prior to startup, MSPI will remain grayed out until 12 months of operation have accumulated after startup.*
  - *On plant startup, if the calculated MSPI is less than or equal to 1.0E-6 (Green) for the quarter prior to startup, MSPI will remain grayed out until there is a total of 12 months of operation in the 3-year monitoring period.*
- *Gray out MSPI for the startup of new plants until 12 months of operation have accumulated*

Given that FCS restarted on December 2013, the quarter prior to startup is 3Q-2013. All MSPI values for FCS were green in 3Q-2013. Therefore, the starting point in treating the validity of the MSPI indicators is that: *MSPI will remain grayed out until there is a total of 12 months of operation in the 3-year monitoring period.* For this particular case, 4Q-2014 represents the time-frame at which a total of 12 months of operation have been accumulated.

In this FAQ, the licensee, FCS, proposes that the High Pressure Safety Injection (HPSI) system MSPI, Heat Removal System (HRS) MSPI, and Cooling Water System (CWS) MSPI become valid on the 4th quarter of 2014. However, FCS proposes that the Emergency AC (EAC) power and Residual Heat Removal (RHR) system MSPI indicators become valid on the 1st quarter of 2015 and 1st quarter of 2016, respectively.

FCS predicted future MSPI values using a Pressurized Water Reactor Owners Group "What-if" tool and expected plant data for unavailability and unreliability. These estimated MSPI values defined the licensee's proposal of the respective effective dates for each MSPI indicator to become valid. The NRC staff agrees with the proposal for the HPSI, HRS, and CWS MSPIs to become valid on 4Q2014, and for the EAC MSPI to become valid on 1Q2015. However, the NRC staff does not agree with the proposal for the RHR MSPI to become valid on 1Q2016.

The staff recognizes that the approach to maintain the RHR MSPI indicator invalid before 9 quarters of operational data have been accrued proactively prevents the indicator from resulting in a false positive due to accrued unplanned unavailability. However, various factors such as increase in inspection resources, aggregation of various inputs to the indicator, alignment with previously established positions, and external stakeholder communications should also be taken into consideration when defining an effective date for the indicator to become valid.

- Having the RHR MSPI invalid before 9 quarters of data have been accrued will increase inspection resources. While a baseline inspection approach would be applied to all other systems covered by MSPIs, additional inspection hours would have to be implemented to gain performance insights on the RHR system.
- Having the RHR MSPI invalid before 9 quarters of data have been accrued limits the indicator from providing insights on RHR performance based on the estimated outcome of accrued unplanned unavailability. It does not allow the indicator to provide insights on RHR performance that might result from any other failures and/or unavailability observed under this indicator.
- The approach of having the RHR MSPI invalid before 9 quarters of data have been accrued results in a significantly different treatment from that used for the other MSPIs. It also diverges noticeably from the starting point for evaluation of such situation that was discussed through white papers in the ROP WG (ADAMS Accession No. ML13079A728), and the initial characterization of this FAQ. Such divergent approach can impact the overarching ROP goals of understandability and predictability.
- Having the RHR MSPI invalid before 9 quarters of data have been accrued while all other MSPI indicators are treated as valid performance indicators can present communication challenges to external stakeholders. Such unique approach would impact the clarity of the performance indicator program.

Since historical data on RHR unplanned unavailability was not considered, accounting for the Technical Specifications (TS) Allowed Outage Time (AOT) (i.e., 7 days) could be a highly conservative estimate. If an indicator is really “invalid” for 9 of a total of 12 quarters (75%), what other types of implications can be inferred? Although TS SSCs in general make-up the list of monitored components in MSPI, the AOTs, surveillance frequencies, etc. do not necessarily correlate with risk importance (i.e., maybe TS AOTs is not a good input to use for a risk-based calculation).

The NRC staff concludes that: (1) the HPSI, HRS, and CWS MSPIs should become valid on 4Q2014, and (2) the EAC and RHR MSPIs should bercome valid on 1Q2015.