

## DATA ANALYSIS OF WHITE ACTION MATRIX INPUTS

As discussed in the body of the paper, the staff's recommended option for changes in the Assessment area (Option 2) would:

- (1) Eliminate the minimum four-quarter requirement for safety-significant inspection findings to remain as inputs into the U.S. Nuclear Regulatory Commission (NRC) Reactor Oversight Process (ROP) Action Matrix. Safety-significant inspection findings would be closed when the licensee satisfactorily meets all of the objectives of the appropriate supplemental inspection, i.e., the exit meeting date for the supplemental inspection.
- (2) Revise the assessment process so that Performance Indicators (PI) that have crossed a significance threshold and subsequently returned to Green remain as Action Matrix inputs until the licensee satisfactorily meets all of the objectives of the appropriate supplemental inspection.

This enclosure contains additional staff analyses in support of the staff's recommendation.

Data Analysis:

### Inspection Findings

Number of Plants by Quarters When Supplemental Inspection Successfully Completed for White Inspection Findings (since ROP inception) - the time from the first quarter in which the inspection finding was an Action Matrix input (start date as defined in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program") until the supplemental inspection was satisfactorily completed, based on exit meeting date:

Quarters	Region I	Region II	Region III	Region IV	Total
2	2	5	0	2	9
3	17	16	13	6	52
4	25	40	32	18	115
5	7	4	15	4	30
>5	10	4	11	14	39
Percent ≥ 4	69%	70%	82%	82%	75.1%
Percent ≥ 5	27.9%	11.6%	36.6%	40.9%	28.2%

Average Days from Licensee Notification of Readiness to Completion of Supplemental Inspection - the time from the licensee's notification of readiness for the supplemental inspection until the supplemental inspection was completed (notification dates documented in supplemental inspection reports beginning in 2006):

Region	I	II	III	IV	Overall
Average Days	55.6	64.1	71.9	53.2	63.2

Failures to Satisfactorily Complete Supplemental Inspection on First Visit:

2000-2018
30

## Impact of the Proposed Change for Inspection Findings

The elimination of the minimum four-quarter requirement will likely only affect White findings, since licensee preparations for supplemental inspections for Yellow and Red findings typically require more than three quarters.

The staff reviewed the historical data for all safety-significant inspection findings since ROP inception. In many cases, nearly two full quarters elapsed from the time a safety-significant inspection finding counted as an Action Matrix input until the NRC issued a final significance determination letter. A review of the history of White inspection findings revealed that, on average, they counted as Action Matrix inputs for 161 days before issuance of a final significance determination and assessment follow-up letter. Because of the length of time for completing significance determinations, and the backdating of the inspection findings to the quarter in which the NRC identified the finding, there is a low probability that supplemental inspections can be completed in less than three quarters from the start date of the inspection finding, especially when there are licensee challenges to the significance determination. Therefore, the effective impact is likely to be a reduction of one quarter during which Action Matrix inputs can aggregate. Whether the inspection finding can be closed in less than four quarters depends on licensee challenges to the significance determination, how quickly licensees can prepare for the supplemental inspection, and how quickly inspectors can complete the inspection and close out the finding. The proposed revision to Inspection Procedure (IP) 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs," eliminates the requirement for licensees to perform a root cause vice causal analysis may also reduce the time for licensees to prepare for the supplemental inspection.

Historically, over 75 percent of supplemental inspections for White inspection findings were completed in 4 or more quarters from the start date of the finding.

The staff reviewed licensees that moved to Column 3 to determine the potential impact of a reduced period of aggregation. Column 2 licensees were not considered, as accumulation was not relevant for that column. The staff acknowledges that, because there was no incentive to complete supplemental inspections sooner, the analysis may not be completely representative of what licensee behavior might have been had the incentive been in place. The staff reviewed 75 reactor units that transitioned to Column 3 of the Action Matrix. Ten of those units moved to Column 3 because of two White inspection findings. Of those 10, 7 received a second White inspection finding in less than 4 quarters from the start date of the first finding, so those units would likely not have been affected by this change, since on average nearly 2 quarters have passed before a finding has been finalized, and licensees would be challenged to have the supplemental inspection completed in less than 3 quarters. Three reactor units received a second White inspection finding in the fourth quarter after the first White inspection finding. The NRC completed the supplemental inspection for only one of those reactor units under IP 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs," for the first White finding before the start date of the second White finding. For the two sites, it is not possible to predict whether the IP 95001 supplemental inspections would have been completed sooner had the minimum four-quarter requirement not been in effect. In summary, only three reactor units might not have transitioned to Column 3 absent the minimum four-quarter requirement. However, because the definition of a degraded cornerstone changed in 2016 from two White inputs to three White inputs in the same cornerstone, none of those units would have met the new criteria for Column 3.

The staff also reviewed the licensees that met the criteria for a repetitive degraded cornerstone. Of the eight, only three moved to Column 4 solely from White inputs. All three would still have met the criteria for a repetitive degraded cornerstone with the proposed elimination of the four-quarter requirement. Considering the cumulative changes to the ROP, one licensee would not have met the criteria for transition to Column 4. That licensee transitioned to Column 4 for a repetitive degraded cornerstone because of two parallel White inspection findings in the same cornerstone for failing to adequately address the objectives of the supplemental inspection for two White PIs, along with an additional White finding in a different cornerstone. The same licensee would not have moved to Column 4 after the staff revised the definition of degraded cornerstone to three White inputs in the same cornerstone. It is difficult to predict what the impact would have been for this licensee if they had not moved to Column 4; however, the staff continuously assesses licensee performance, and the oversight process provides adequate margin in the assessment of licensee performance so that appropriate licensee and NRC actions are taken before unacceptable performance occurs. This licensee had no additional safety significant inputs into the Action Matrix despite the scrutiny of the supplemental inspection.

PI Review Summary

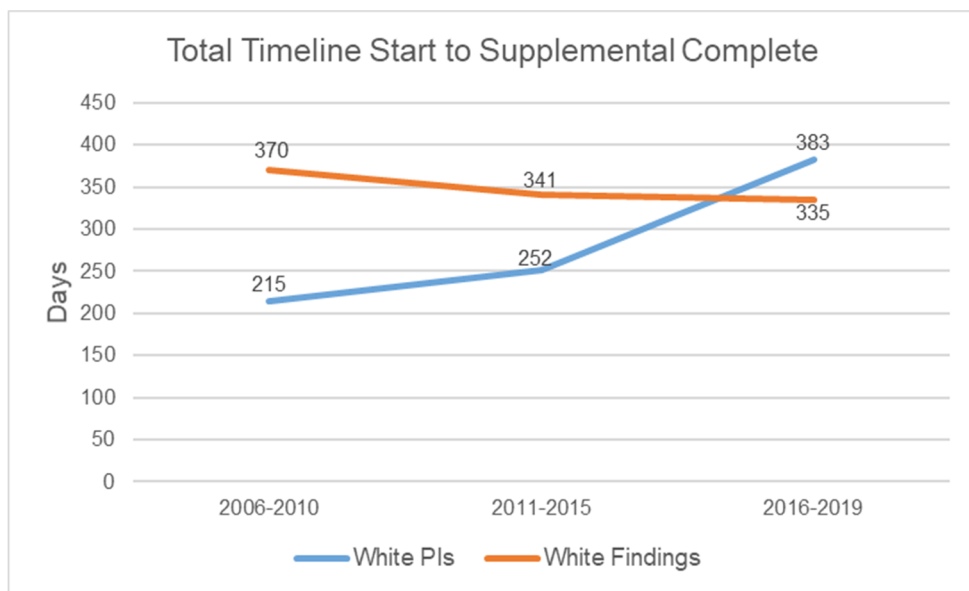
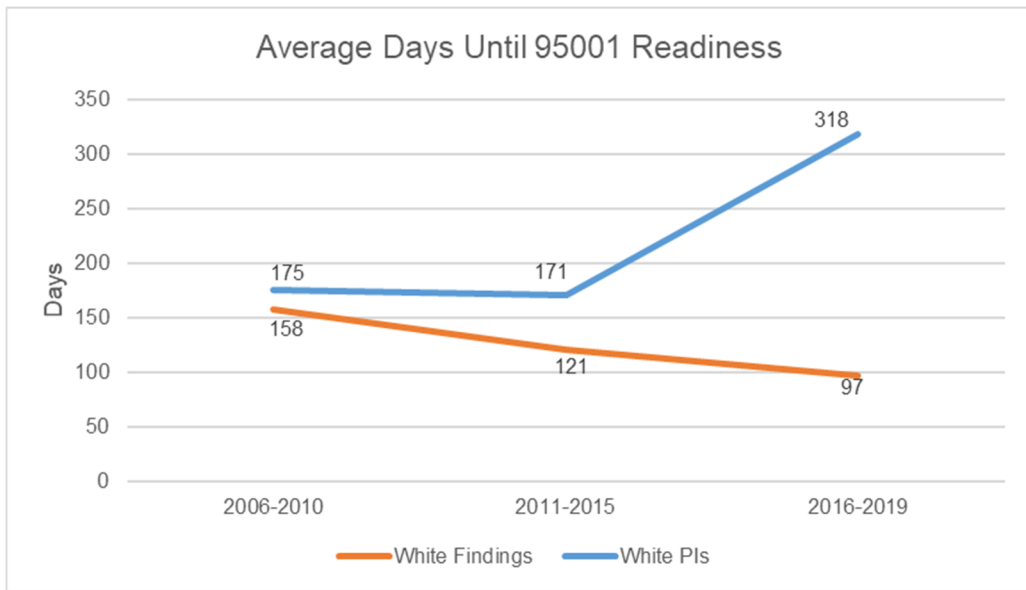
Number of Plants by Quarters When Supplemental Inspection Successfully Completed for White Performance Indicators (since ROP inception)

PIs are inputs into the Action Matrix at the start of the quarter in which the threshold was crossed. The staff reviewed the number of quarters it took for the supplemental inspection to be completed from the quarter in which the PI crossed the White threshold. This would be analogous to the start date for a proposed parallel inspection finding until the exit meeting for the supplemental inspection in which the licensee met the objectives of the inspection. The following table summarizes the results:

Number of Quarters	Number of Supplemental Inspections Completed Region I	Number of Supplemental Inspections Completed Region II	Number of Supplemental Inspections Completed Region III	Number of Supplemental Inspections Completed Region IV	Total
2	3	5	5	4	17
3	5	9	5	6	25
4	6	6	8	7	27
5	3	8	5	3	19
>5	6	1	1	4	12
Percent ≥ 4	65%	52%	58%	58%	58%
Percent ≥ 5	39%	31%	25%	29%	31%

The staff only counted White PIs that were inspected using IP 95001 supplemental inspection procedure to not skew the data.

The staff reviewed the timeliness for licensees to notify the NRC that they were ready for the supplemental inspection, as well as the total time for the supplemental inspection to be completed for White PIs and inspection findings. The data was separated into three distinct periods to better discriminate any trends. The results are summarized below:



The staff noted that the time it takes for licensees to notify the NRC of readiness for the supplemental inspection for White PIs has increased significantly over the past few years, while notification of readiness for White inspection findings has steadily decreased. The staff noted a similar trend for overall timeliness to complete supplemental inspections. Industry stakeholders suggest that it takes longer to complete causal evaluations for multiple events that result in a PI crossing a significance threshold. However, that would not account for the increasing trend in timeliness.

## Performance Indicator Review Conclusions

The staff reviewed 132 greater-than-Green PIs and found the following:

- 127 would not have been affected because there were no additional Action Matrix inputs, or there would have been no change in the Action Matrix column if the PI had remained an Action Matrix input until completion of the supplemental inspection.
- One unit would have transitioned from Column 2 to 3 under the original criteria for Column 3 because of two White PIs in initiating events. This unit would not have transitioned using the revised criteria for a degraded cornerstone implemented in 2016.
- One unit would have transitioned from Column 3 to 4 under the original definition of a repetitive degraded cornerstone if the White PI had remained an Action Matrix input because the cornerstone would have been degraded for more than four quarters. This unit would not have transitioned using the revised criteria for a repetitive degraded cornerstone implemented in 2014.
- Three units would have transitioned from Column 3 to 4 under the definition of multiple degraded cornerstones in 2006 if security had been integrated into the ROP. Because it was not, the units remained in Column 3.

The staff found five instances where licensees were issued a parallel inspection finding for not addressing all objectives of the supplemental inspection. In one case, the parallel findings combined with other Action Matrix inputs resulting in the licensee transitioning to Column 4.

The staff also found eight instances where a licensee exceeded the Green/White threshold for a PI, the PI returned to Green, and then the PI subsequently tripped the Green/White threshold a second time either before the supplemental inspection was completed, or within two quarters of inspection completion. The same PI crossing the White threshold a second time shortly after completion of the supplemental inspection may be indicative of corrective actions that had not yet been implemented, or that may have been ineffective.

In summary, five reactor units would have moved to higher Action Matrix columns if the safety-significant PI had continued to count as an Action Matrix input after the PI returned to Green using the original definition of a degraded cornerstone of two White inputs in the same cornerstone. None of these licensees would have been impacted under the current definition of a degraded cornerstone requiring three White inputs.

The staff identified an increasing trend in the length of time licensees are taking to prepare for supplemental inspections for White PIs, while the trend is decreasing for White inspection findings. The staff believes that the proposed change in the treatment of White PIs will provide an incentive for licensees to complete preparations for supplemental inspections sooner and potentially reverse the timeliness trend.