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FINAL REPLY:

Marvin S. Fertel
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TO:

Reyes, EDO

FOR SIGNATURE OF : ** GRN ** CRC NO:

Reyes, EDO

DESC:

NEI Report, "Improving the Timeliness and Efficiency of the NRC's Significance Determination Process"

ROUTING:

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NUCLEAR ENERGY INSTITUTE

Marvin S. Fertel
SENIOR VICE PRESIDENT AND
CHIEF NUCLEAR OFFICER

March 24, 2005

Mr. Luis A. Reyes
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Reyes:

The NRC reactor oversight process has proven to be successful in focusing NRC inspection resources towards safety significant matters. While the significance determination process (SDP) has been a key element in this regard, it is widely recognized that the timeliness and efficiency of the SDP warrant improvement. To this end, NEI formed an industry task force that has developed the enclosed paper, "Improving the Timeliness and Efficiency of the NRC's Significance Determination Process," for NRC consideration.

The primary recommendation is that NRC and industry form a joint working group to address process improvements based on our mutual experience. Further, we have identified specific improvements in the area of green versus white finding determinations, which have proven to consume both NRC and industry resources to an extent that is out of context with their low risk significance. These proposed improvements would focus licensee and NRC resources more towards corrective action, rather than exhaustive technical analysis, and would also serve to improve the timeliness of the process.

We look forward to working with the NRC staff to discuss these proposed improvements, as well as other approaches that the NRC staff may have under consideration. We believe this effort will result in a process that is more aligned with risk significance, and better achieves NRC's goal of timely and safety focused inspection and enforcement.

Please contact me if you have any questions.

Sincerely,

Marvin S. Fertel

Enclosure

Improving the Timeliness and Efficiency of the NRC's Significance Determination Process

Nuclear Energy Institute
March 2005

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Executive Summary

The NRC's significance determination process (SDP) has been in place since the revised Reactor Oversight Process began in 2000. In general, the process has been successful in determining the safety significance of inspection findings, particularly those pertaining to the reactor safety strategic performance area, where SDP evaluations rely almost entirely on probabilistic risk assessment methods to determine significance.

In the last few years, concerns have been raised about the timeliness and efficiency of the SDP. The NRC has been unable to attain its performance goal of processing 80% of all SDP evaluations within 90 days from the issuance of an inspection report. In addition, many licensees as well as NRC staff have spent inordinate resources evaluating inspection findings of very low to moderate safety significance (green/white threshold determinations), well beyond the original intent of the program to process the evaluations in a timely, efficient manner.

NEI formed an industry task force in September 2004 to review the SDP and develop recommendations for improving the timeliness and efficiency of the process. This report is the product of the task force effort. The major recommendation of the task force is to form a joint NRC/industry working group to, in part, consider the following proposals:

- After readily available information has been used to determine the preliminary significance of a finding (green versus white), and there is a reasonable difference between the results of the licensee and NRC evaluations, the NRC should proceed with its 95001 follow up inspection. If the licensee's corrective action on the initial finding is found adequate, the initial finding will be considered green. If not, the NRC should label the finding as a preliminary white and follow the current process (i.e., choice letter, regulatory conference, final determination).

- Data should be gathered on the current process to determine if bottlenecks exist, as well as to compare performance when any changes to the process are implemented.

- Timeliness goals for more risk-significant findings (yellow or red) and complicated SDPs such as fire protection should be longer (e.g., 180 days) to allow more thorough analysis.

- Revise consideration of external events to a more practical threshold than the current 1E-7 core damage frequency or use a separate threshold.

- Reconsider the need for NRC issuance of press releases at the preliminary determination phase.

I. Introduction

Since the beginning of the revised reactor oversight process (ROP) in 2000, the NRC has employed a significance determination process (SDP) to characterize the safety significance of findings from its inspection program. The results of the SDP are combined with the results from the ROP performance indicators to determine the appropriate level of NRC oversight/inspection for a licensee.

While SDP evaluations are conducted in all of the strategic performance areas of the ROP, the reactor safety area, which includes the initiating events, mitigating systems, and barrier integrity cornerstones, lends itself to evaluations using probabilistic risk assessment (PRA) methods. These evaluations are essentially risk-based and use risk assessment tools available to licensees and the NRC.

The output of these SDP evaluations is a probability number (probability of core damage) that is compared with pre-established thresholds to determine the safety significance of an inspection finding. For example, if the probability is less than 1E-6, the finding is considered to be of very low safety significance and is labeled "green." If the probability is greater than or equal to 1E-6, the finding is considered to be of low to moderate safety significance and is labeled "white." Thus, 1E-6 is the threshold for determining whether a finding is green or white. Two other labels are used: "yellow" for findings whose probabilities are greater than or equal to 1E-5 and "red" for those greater than or equal to 1E-4.

While the SDP has improved the safety focus of regulatory oversight and assessment, the industry believes there are improvements that can enhance its efficiency and effectiveness. NEI formed an industry task force in September 2004 to examine the process and develop recommendations for improvements. This report is the product of that effort.

The following sections of this paper will (1) describe the SDP in more detail; (2) describe the problems that have resulted from implementation of the process; and (3) provide recommendations for improving the process.

II. Process description

Figure 1 is a flowchart of the NRC significance determination process, and Figure 2 is a flowchart of a typical licensee's corresponding process. As depicted in the NRC process chart, there are three phases to the SDP, involving increasingly detailed analysis.

- Phase 1 is a relatively simple generic worksheet used by NRC inspectors to screen findings as either green, or potentially more significant than green. A green finding in Phase 1 represents the final determination. A finding that is potentially more significant than green is evaluated using Phase 2.

- Phase 2 is a qualitative process using more detailed worksheets reflecting different plant designs. The Phase 2 process considers classes of initiating events, and remaining levels of mitigation, and assigns colors based on order of magnitude risk levels. Phase 2 is a rough approximation of a PRA approach. As the SDP has evolved, Phase 2 worksheets have become more complex, and specific worksheets have been developed for many regulations (fire protection, maintenance rule, etc.) and other plant conditions (shutdown operations, containment integrity, etc). Phase 2 will generally provide a conservative result when compared to a full PRA approach. A green finding in Phase 2 represents the final determination. A finding that is potentially more significant than green in Phase 2 may be evaluated using Phase 3.

- Phase 3 involves the use of the PRA to quantify the significance of the finding. Both the licensee PRA and the NRC SPAR models may be used in Phase 3.

The Phase 1 and 2 determinations are performed by an NRC inspector. If the Phase 2 result is more significant than green, additional reviews are performed by the Senior Reactor Analysts (SRA) at the NRC Regional office. The SRA typically communicates with the licensee to obtain readily available information to support the evaluation, and the NRC SPAR models may be used in conjunction with this information to verify the Phase 2 result. Alternatively, NRC can perform a Phase 3 evaluation using the SPAR model or licensee PRA.

Following verification by the SRA, the finding is then evaluated by the NRC Significance Determination Process/Enforcement Review Panel (SERP). If the SERP determines that the finding is greater than green, the NRC issues a press release noting its preliminary determination and sends the licensee a "choice letter" with the option of accepting the NRC determination, or formally providing more information through a public regulatory conference. NRC issues a final determination after the regulatory conference. An appeals process is available should the licensee wish to contest the finding.

NRC's goal is that 80% of all SDP evaluations should be complete within 90 days of the issue date of the inspection report. This is irrespective of the risk significance (color) of the finding. The NRC has reported that less than 50% of the evaluations are being completed within its 90 day goal.

The primary result of a white finding is an NRC inspection under Inspection Procedure 95001, which is intended for a single white input within a cornerstone. This type of inspection reviews a licensee's root cause evaluation and checks on whether the original performance issue has been addressed. A 95001 inspection entails 8 to 40 hours of direct NRC inspection and the associated licensee preparation time and resources. However, as discussed in the next section, there are other impacts from a white finding that are the real drivers of the resource and timeliness concerns.

Figure 1 - NRC SDP Process and Timeline

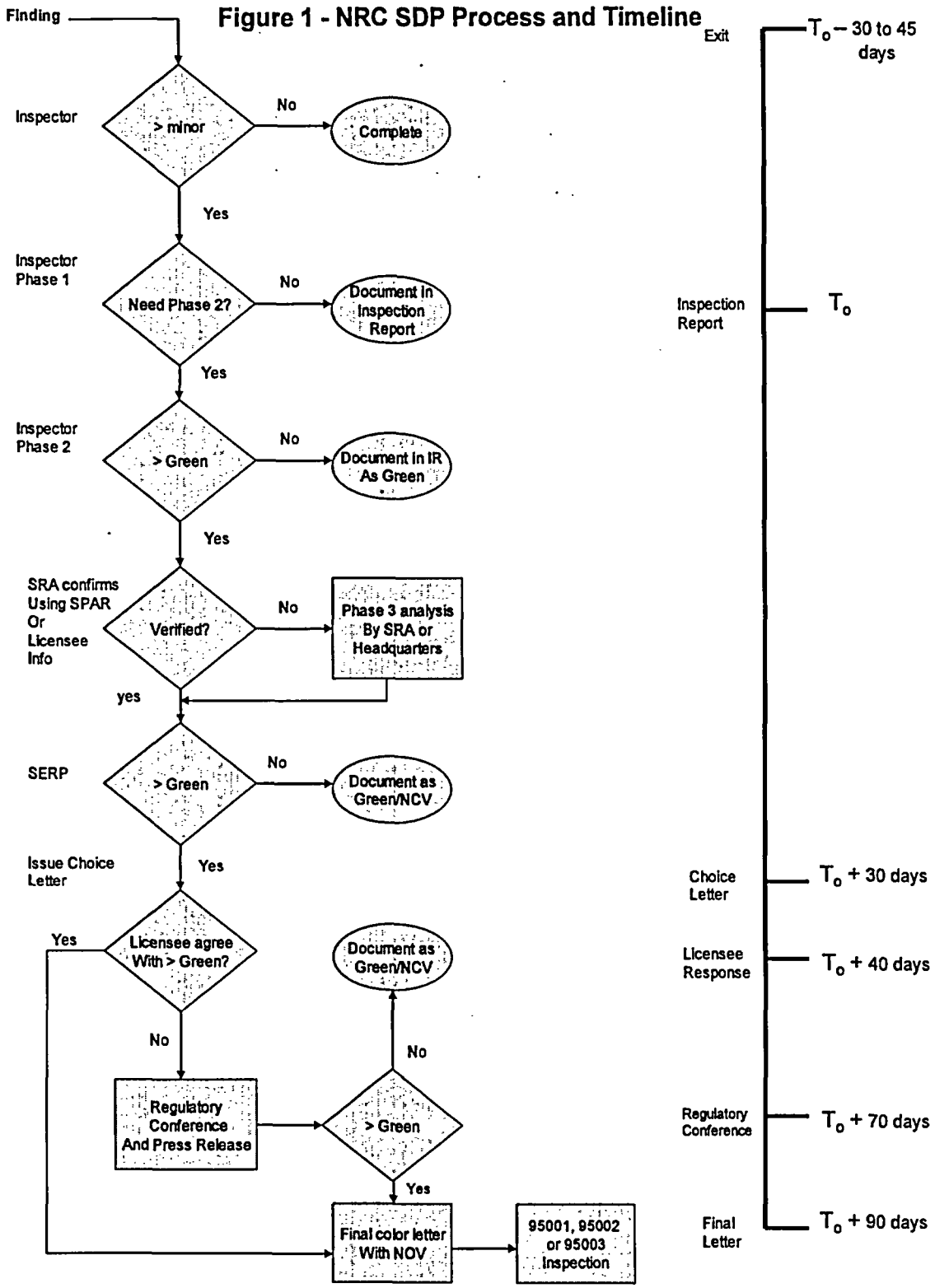
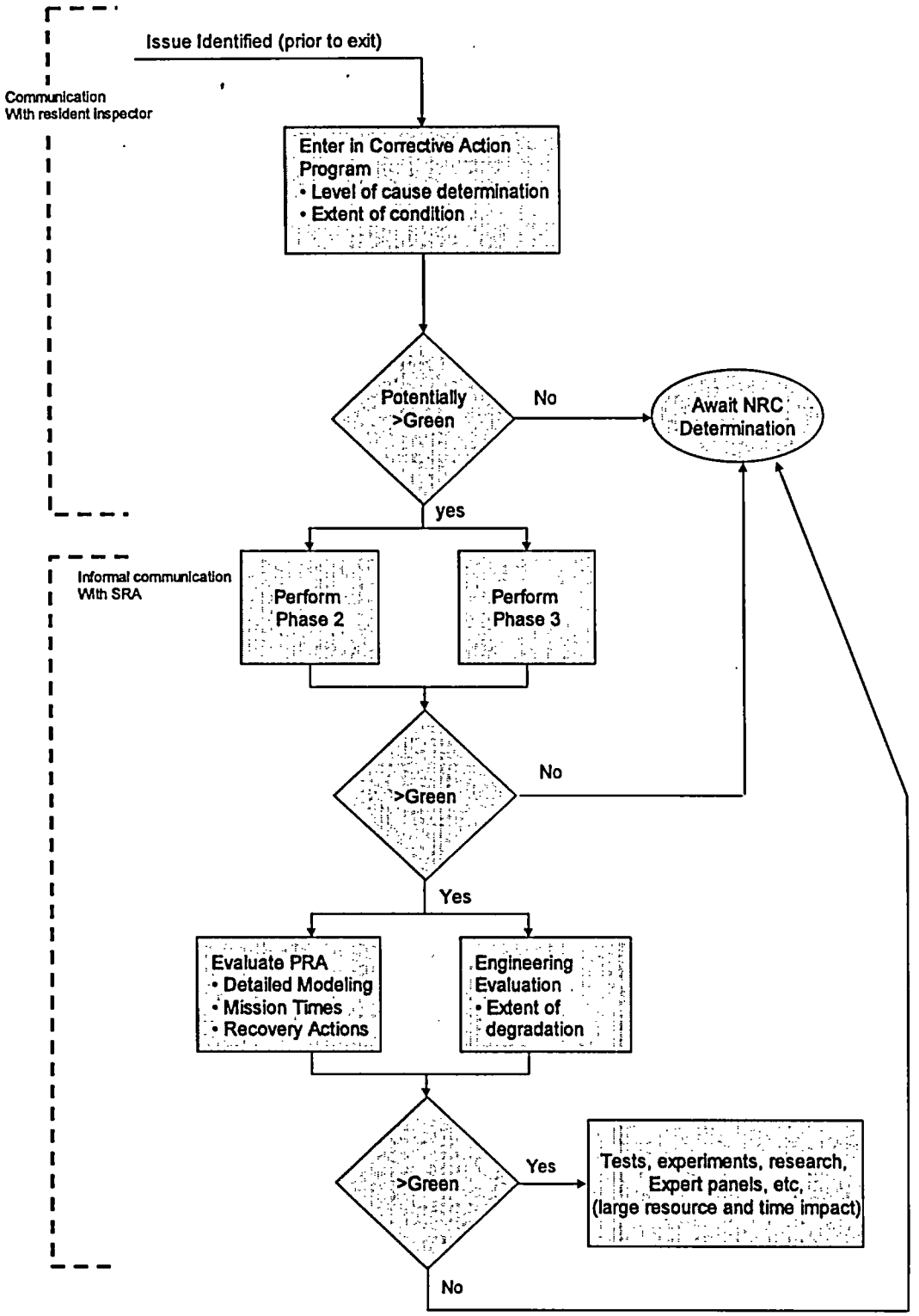


Figure 2 - Licensee SDP Process



III. Problem Statement

A key attribute of the revised Reactor Oversight Process is its transparency. Inspection reports, SDP results and performance indicator results are all available on the NRC's website for any interested party to observe. While this attribute is highly positive in that it enhances understanding of and credibility in NRC and industry roles and performance, it also increases licensee sensitivity to how its performance is perceived. This sensitivity is due to the following factors:

1. White findings are relatively rare (about 20 to 30 per year). Thus, even a single white finding can lead to a perception of being in the "bottom quartile" of plants with respect to regulatory performance.

2. Wall Street perceptions can be influenced by preliminary and final findings, with attendant financial implications for the operating companies.

3. NRC issues press releases at various stages of the process (preliminary significance determination, enforcement conference letter). Despite the low risk significance of these findings, these press releases generate adverse publicity and create the impression that there are more findings than there actually are.

4. For the above reasons, licensee performance evaluations are often tied to the plant's standing in the ROP.

5. At the second white finding within a cornerstone, a "degraded cornerstone" is declared, leading to additional inspections (i.e., 95002), NRC attention, and negative financial impacts.

6. Regardless of the corrective action taken by the licensee, a white finding remains for at least 4 quarters. In this period, a single additional white finding in that cornerstone leads to a degraded cornerstone.

As a result of the above factors, licensees will go to great lengths to ensure that the output of the SDP is accurate. This manifests itself in Phase 3 of the process. Because the process defines a probability number of 1E-6 as a "hard" green/white threshold, any number of PRA modeling issues, assumptions, data or other information can have an impact on the result and the final color of the finding. This leads to two problems: Licensees are willing to spend large resources to refine PRA modeling assumptions, including tests, experiments, and expert elicitations. The resources spent are out of context with the very low risk significance of findings at this threshold. Second, these complexities also lead NRC to spend additional resources and contribute to difficulty in meeting their own timeliness goals for the process. Some evaluations may require over a year, again out of context to the very low risk significance, and leading also to public perception difficulties for NRC.

The situation is exacerbated by potential external event impacts which are generally not included in the licensee PRA model, and must be considered (and potentially added to the result) for findings that are an order of magnitude below the green/white threshold. This threshold (core damage frequency of 1E-7) is very low (for comparison, normal licensee maintenance activities ordinarily incur risk impacts one to two orders of magnitude above this number), and requires licensee attention to many findings that are trivial with respect to risk.

IV. Recommendations

A joint NRC/industry working group should be formed to, in part, consider the following proposals:

1. After readily available information has been used to determine the preliminary significance of a finding, and there is a reasonable difference in the results of the licensee and NRC evaluations, the NRC should proceed with its 95001 follow up inspection. If the licensee's corrective action on the initial finding is found adequate, the initial finding should be considered green. If not, the NRC should label the finding as a preliminary white and follow the current process (i.e., choice letter, regulatory conference, final determination).

   Rationale: This approach would restore much of the original intent of the SDP as a tool to direct inspection resources in an efficient and timely manner. There would be incentive for licensees to allocate more resources to corrective action versus characterization of the significance of the finding. This approach would also allow NRC to conduct closely linked follow up inspection leading to timely final determinations. Finally, this approach would preserve valuable licensee and NRC PRA resources for issues of higher safety significance.

2. Revise consideration of external events be more realistic and practical than the current 1E-7 CDF threshold. Use separate thresholds for risk contributors (e.g. internal events, external events, fires, seismic, shutdown), or develop other rules for consideration of external events, such as 50% of internal events risk threshold, versus existing 10%.

   Rationale: This change is needed to remove the current artificially low threshold of 1E-7 CDF for consideration of external events. This requires licensee attention to external events issues (which may be not modeled or conservatively modeled in the current PRA) at an unrealistically low level.

3. Increase NRC timeliness goals to 180 days for more risk-significant findings (potential yellow or red) and complicated evaluations such as fire protection to allow more thorough analysis.

Rationale: This recommendation is aimed at solving NRC's timeliness issues by invoking a more realistic schedule for the identification of risk significant findings, which, by their nature, will generally justify more involved methods to determine their significance.

4. Collect additional data on the SDP to obtain a better understanding of the process elements leading to NRC timeliness concerns.

   Rationale: Identification of the pertinent process steps and bottlenecks could lead to simple and effective solutions, such as augmentation of key NRC resources.

5. Reconsider need for NRC press releases at the preliminary determination phase for white findings. These press releases are controlled by the NRC office of public affairs (OPA) which is an independent office reporting directly to the Commission.

   Rationale: Press releases are one of the primary drivers for major licensee actions to contest potential findings. Press releases for preliminary determinations can be misleading, especially when final determinations are different. Press releases should be limited to final determinations of the SDP. A simple public meeting notice would suffice for regulatory conferences.

6. Establish ability in Phase 2 to credit degraded condition as something other than 1 or 0 success likelihood. Allow SRA to apply judgment.

   Rationale: Many issues of threshold determination involve equipment whose performance was degraded in some manner, but would have still allowed the safety function to be performed for some period of time prior to failure. There is no option in the current Phase 2 process to give some partial credit for this equipment performance. Allowing partial credit (e.g., setting the availability/reliability to 0.5) would be a reasonable compromise for many situations, and would avoid the need to enter Phase 3.