

# Process Improvement Review of the Significance Determination Process

This report summarizes the efforts of NRC staff from 9/4/12 -2/4/14



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# 1. Background

A Business Process Improvement (BPI) project was undertaken to identify opportunities to improve the existing Significance Determination Process (SDP). The Team was comprised of Senior Reactor Analysts (SRA) and a Branch Chief representing each Region as well staff from the Office of Nuclear Reactor Regulation (NRR) and the Office of Enforcement (OE).

A BPI Team as formed and the project formally launched on September 4, 2012.

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## 2. Project Steps

A SharePoint site was established to house all relevant background materials, meeting agendas and summaries, and any information pertinent to the effort. The project began in earnest with a formal kickoff on September 4, 2012. The initial effort consisted of 1.5 hour weekly meetings with Team Members. This effort followed the phased “DMAIC” (**D**efine, **M**easure, **A**nalyze, **I**mprove, **C**ontrol) methodology.

### A. Define

The Define Phase begins with the development, ratification, and approval of a Project Charter to guide the efforts of the team throughout the process.

#### **Project Charter**

##### **Goals**

- Conduct a review of SDP resource and timeliness data
- Critically evaluate established practices and guidance
- Identify opportunities for improvement (SDP and other impacted programs)

##### **Business Impact**

Successful completion will balance the goal of having reliable significance determination process outcomes against the need for efficient and timely regulatory decision making. Proposed process changes will contribute to the Agency’s strategic goals and maintain internal and external stakeholder confidence in the Reactor Oversight Process (ROP).

##### **Opportunity Statement**

A detailed review of the SDP may identify efficiencies to improve the overall effectiveness of the process.

##### **Scope**

- Only three of the seven safety cornerstones were explored: Initiating Events, Mitigating Systems, and Barrier Integrity.
- SDP resource data (e.g. screening, NRC risk evaluation, review of licensee technical/risk information, documentation, and processing effort)
- SDP timeliness data (e.g. event, identification of finding, inspection exit, inspection report, preliminary/final significance determination, supplemental inspection)
- Significance and Enforcement Review Panel (SERP) process
- SDP Metrics (e.g. annual ROP self-assessment, Active SDP Issues Tracker)
- Review of applicable IMC 0609 appendices and attachments

The Team also completed the following steps during the “Define” phase:

- Reviewed internal guidance and analyses relative to SDP:
  - IMC 0609 (including applicable attachments and appendices)
  - IMC 0612
- Developed a formal Communications Plan.

## **B. Measure/Analyze**

The Team completed the following steps during the “Measure/Analyze” phases of the BPI methodology. Though these are typically conducted as separate events, the nature of the subject matter and availability of staff led to pursuing a hybrid, combined phase. The following summarizes the efforts during this phase:

### Measure Phase:

- Thoroughly examined completed SDPs over the past 4 years
  - From 2009-2012, a total of 49 findings resulted in a preliminary significance of White, Yellow, Red, or Greater than Green.
  - For each of finding several data points were recorded:
    - NRC identified date (Event or Degraded Condition)
    - Inspection Report Issue Date
    - Exit Date
    - Preliminary SERP Date
    - Preliminary Significance Determination Letter Date
    - Regulatory Conference Date
    - Final SERP Date
    - Final Significance Determination Letter Date
    - Type of Inspection (Quarterly, Team, Reactive)
    - SDP Appendix Used
    - Hours spent per SDP (NOTE: inaccurate data since hours charged to IR number and sometimes several IR numbers were used per finding)
- Below are some statistics derived from the data set:
  - The average duration from the NRC identified date to the preliminary determination letter issue date was 206 days (median 171 days)
  - The average duration the inspection report issue date to the final determination letter issue date was 70 days (median 77days)
  - 80% of the Preliminary SERPs were held prior to the issuance of the inspection report

- In addition to the spreadsheet, some anecdotal examples were developed by the Regional team members to provide a deeper level of understanding for some of the examples. Essentially, the anecdotal examples provided some underlying context that the data (i.e., dates) did not provide.

## Analyze Phase:

As part of the Measure/Analyze phase of the project, the team performed a Causal Analysis using available data and anecdotal evidence. The approach the team took in developing the Causal Analysis was similar to the root cause “Why Staircase” framework. Basically, the team decided that the underlying outcome was that documenting an inspection finding with the significance “to be determined” in inspection reports can be delayed. All the other causes stem from this outcome and in turn cause other circumstances to occur. The following paragraphs discuss the results of this analysis.

**a. Inspection Reports with TBD findings are often delayed.**

Inspections are often prolonged due to completion of the root cause, engineering evaluations, operability/functionality determination, to identify a performance deficiency and/or more-than-minor determination.

**b. Concern over meeting the 90-Day SDP metric.**

This is attributable to a number of factors including:

- SDP logistics can consume vast resources
- Risk analysis can take weeks or months to complete.
- If a single SDP exceeds the 90-day performance metric, at least 9 more Greater Than Green findings must be completed on time in the same calendar year in order to meet the metric. There is no way of forecasting whether there will be 10 or more GTG findings in a given CY, therefore having one late final significance determination letter is considered unacceptable.

**c. SDP Logistics consume vast resources.**

- Preliminary SERP package development, review, and execution can be inefficient
- Licensee can take a significant amount of time to provide information.
- NRC does not have enough time to sufficiently review new licensee info prior to the 90-day clock end date.

**d. Preliminary SERP Package Development can be inefficient**

- NRC manager/decision-maker perception that the preliminary result should be close to what the final determination will be.
- The characterization of the inspection finding and how the finding is the proximate cause of the degraded condition changes.
- SERP package template is mostly boiler plate and redundant (e.g., EXSUM not a summary).
- Some staff do not clearly understand the duties and responsibilities of other organizations in the process.
- Coordinating efforts might be delayed with certain staff unavailable (i.e., out of the office).

**e. Preliminary SERP Package Review can be inefficient**

- NRR risk analysts receive all the information at once with a short turnaround.
- NRR risk analysts are assigned the work late in the process and/or do not have a clear direction as to the expectations and scope of the review.
- NRR risk analysts expect to review the preliminary SERP package and provide input/comments prior to package distribution to SERP members described in IMC 0609. This preliminary review of the package is not explicitly described in the SDP guidance documents and is not accounted for in any published timelines (IMC 0609 or Regional guidance).
- Regional SRA peer reviewer receives all the information at once with a short turnaround.
- SERP package template is mostly boiler plate and redundant (e.g., EXSUM not a summary).

**f. Preliminary SERP Execution can be inefficient**

- SERP members sometimes do not have sufficient time to review complex cases (i.e., SERP package involving an external event) prior to the SERP.
- Technical staff and SERP decision-makers do not efficiently communicate background and risk information in a timely manner.
- SERP package template is mostly boiler plate and redundant (e.g., EXSUM not a summary).

**g. Licensee can take a significant amount of time to provide information**

- There may be incentives and/or disincentives for licensees to share information early on in the process.
- Licensee may not have resources to perform analysis
- Licensees may not know what information to provide.

**h. NRC does not have enough time to sufficiently review new licensee information prior to the 90-day clock end date**

- Licensee controls a large portion of 90-day timeframe.
- Difficult to determine if information provided via letter or Regulatory Conference is "new".

**i. Risk Analysis takes weeks or months**

- Some SERP members may expect that the preliminary risk estimate should be close to the final result and align with the licensee's evaluation.
- Some findings are challenging to model and may require additional time and assistance.
- Regional management and SRAs may need to better communicate the resources and time estimates for completing a risk evaluation (i.e., establish an expectation).

**j. Some SERP members may expect that preliminary risk estimate will be very close to the final result and align with the licensee's evaluation.**

- Concern that a licensee will successfully appeal (IMC 0609, Att 2) the risk significance.
- Concern that SDP-2 metric from IMC 0307, App A will be missed
- SERP panel members' challenge in making a decision based on highly uncertain inputs and assumptions.
- Need for training to improve an understanding of probabilistic risk analysis (PRA) (i.e., uncertainty, quantification) for some SERP members.
- Challenges in providing complex uncertainty information in a succinct manner and/or the preference to discuss risk in terms of "point estimates" instead of ranges/distributions.
- SERP packages may not present the risk information in an optimal manner
- Concern that there might not be enough time within the 90-day goal.
- Licensee may not be able to perform and risk analysis, given potential time and resource constraints, to compare to the NRC's risk analysis.

**k. Some findings are challenging to model and may require additional time and assistance**

- Certain SDP tools cannot be used to quantify significance which suggests the use of 0609, App M.
- Certain SDP tools can be used to quantify significance to a certain extent (i.e., there is still a large uncertainty such as an external event initiating event frequency) but can be confusion regarding whether or not to use of 0609, App M.
- 0609, App M entry conditions are not clear and is supposed to be used infrequently.

The team summarized the causal analysis by identifying 6 high-level challenges associated with the SDP, categorizing each as being associated with various Principles of Good Regulation. The applicable principles are Efficiency (**E**) Openness (**O**), Reliability (**R**), Clarity (**C**), or Independence (**I**).

- Expectation by the staff and management to always meet the 90-day metric (E).
- Since the SDP can involve a lot of resources/time, there is a disincentive in characterizing the significance of a finding as "TBD" prior to the completion of the detailed risk evaluation or Preliminary SERP decision (O, E, R).
- Since the SDP can involve a lot of resources/time, there is an expectation that the preliminary determination needs to be very close to the final determination (O, E, R).
- Difficulty in getting appropriate licensee risk perspectives to support timely decision making (I, E).
- The expectations on how and when to use Appendix M may not be clearly understood by decision makers and analysts (C, R).

- There are several inefficiencies (both communications and coordination related) associated with the development, review, and execution of SERP packages and conducting the SERP (E, C, R).

## C. Improve

During the Improve Phase, the team reviewed the challenges identified in the Measure/Analyze phase and developed several recommendations that were divided into four major categories: Communication, Coordination, Management, and Policy.

### 1) **Communication**

The team identified three key recommendations to improve Communication throughout the SDP:

- a) Revise IMC 0609, Attachment 1, Exhibit 1 to improve the EXSUM of the SERP Package template to limit its length and redundant information found elsewhere in the package. The purpose is to develop a more efficient package to improve the technical staff's communication of complex risk-insights to decision makers.
- b) Revise IMC 0609 and IMC 0609, Attachment 1 to improve SDP background information sharing with OE and NRR technical staff and management earlier in the process.
- c) Revise IMC 0609 and IMC 0609, Attachment 1 to include incentive (or disincentive) measures to promote licensees providing information earlier in the process.

### 2) **Coordination**

The team identified three key recommendations to improve Coordination throughout the SDP:

- a) Review Regional enforcement guidance relative to SERP and SDP logistics to ensure consistency with IMC 0609.
- b) Review and update as necessary the descriptions of roles and responsibilities of SRAs, Branch Chiefs, Sponsor, and other decision makers involved in SDP (IMC 0609).
- c) Revise IMC 0609 and IMC 0609, Attachment 1 to clarify the expectations regarding the scope and structure of the regional and HQ peer review of the SERP package. Include goals that provide an expected timeframe for HQ to review.

### 3) Management

The team identified three key recommendations to improve Management throughout the SDP:

- a) Promote training on treatment of uncertainty in risk-informed decision-making for SERP members.
- b) Early identification by SRAs of lengthy research/complex modeling requirements (e.g., estimating a Category 5 hurricane initiating event frequency) to management to ensure efficient use of resources.
- c) Determine if there are any best practices for regional management to implement that would provide technical staff with an initial expectation of the resources needed to complete the SDP tasks and also some process trigger points that would allow management to re-assess the allocation of resources to an SDP.

### 4) Policy

The team identified four key recommendations to improve Policy throughout the SDP:

- a) Revise IMC 0609 and IMC 0609, Attachment 1 to make it a standard practice to classify a finding as GTG as the preliminary determination if there is not enough information to confidently assert that the finding should be classified as a specific color (G, W, Y, or R).
- b) Revise IMC 0609, Attachment 1 to clarify what constitutes "new" information to in support of the decision to hold a Post Conference Review or a Final SERP.
- c) Revise IMC 0612, Appendix B (and possibly 0308, Attachment 2 and/or 3) to provide guidance to inspection staff on what the threshold is for "causality" with regards to the formulation of a performance deficiency and the more-than-minor screening determinations
- d) Establish a Working Group to revise IMC 0609, Appendix M to:
  - i. Clarify entry conditions,
  - ii. Determine how Appendix M should be used in conjunction with other SDP appendices (e.g., IMC 0609, Appendix A) to support risk-informed decision-making, and
  - iii. Develop a framework that takes the inputs (bounding analysis and decision attributes) and arrives at an integrated risk-informed decision.
- e) Add Additional Data to the SDP Tracker

Start date: The date the NRC is made aware that an initiating event occurred OR that a degraded condition (e.g., SSC inoperable, failed surveillance, etc.) is identified.

End date: The date the preliminary determination letter is issued.

Criterion: 80% within 150 days with all Regional data pooled annually; the 150-day span equals the difference between the end dates and start dates.

Concept:

- i. The metric will be piloted internally for 1 year (CY 2014). The data from the Measure Phase (CY 2009 – CY 2012) will also be used. CY 2013 data will be acquired as well for completion.
- ii. Data will be assembled by the SDP Lead in NRR/DIRS/IPAB and tracked on the internal SDP tracker maintained on the ROP Digital city internal web page.
- iii. Following the pilot, HQ and Regional management will decide how to incorporate any insights gained into current ROP guidance (e.g., ROP Annual Self-Assessment).

### 3. Project Results and Next Steps

The team presented its recommendations to the Project Sponsor, Ho Nieh, on February 4, 2014. All recommendations were accepted as proposed. The next steps that were identified were:

- Brief SDP internal stakeholders (technical staff and management) on BPI recommendations. Share recommendations with external stakeholders via public meeting(s).
- Assign responsibility to revise IMC 0609, IMC 0609, Attachment 1, and potentially IMC 0612 and other technical basis documents. The SDP lead in headquarters will develop a milestone schedule that will track the progress and status of all the recommendations.
- Establish a Working Group comprised of regional and headquarters subject matter experts to revise IMC 0609, Appendix M and other SDP guidance as practicable.

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