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# Increased Efficiencies in the INEEL SAR/TSR/USQ Process

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# Increased Efficiencies in the INEEL SAR/TSR/USQ Process

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Abstract

The Idaho National Engineering and Environmental Laboratory (INEEL) has implemented a number of efficiencies to reduce the time and cost of preparing safety basis documents. The INEEL is continuing to look at other aspects of the safety basis process to identify other efficiencies that can be implemented and remain in compliance with Title 10 Code of Federal Regulations (CFR) Part 830. A six-sigma approach is used to identify areas to improve efficiencies and develop the action plan for implementation of the new process, as applicable. Three improvement processes have been implemented: The first was the development of standardized Documented Safety Analysis (DSA) and technical safety requirement (TSR) documents that all nuclear facilities use, by adding facility-specific details. The second is a material procurement process, which is based on safety systems specified in the individual safety basis documents. The third is a restructuring of the entire safety basis preparation and approval process. Significant savings in time to prepare safety basis document, cost of materials, and total cost of the documents are currently being realized.

## Background

The Idaho Engineering and Environmental Laboratory (INEEL) Site is located in southeast Idaho, occupying approximately 889 square miles. There are nine Site areas that have housed as many as 31 nuclear facilities. Additionally, there are more than 300 buried waste sites. Under the new rule found in Title 10 Code of Federal Regulations (CFR) Part 830, Subpart B, each nuclear facility is required to have an approved Documented Safety Analysis.

In June 1999, a plan was created to prepare Safety Analysis Reports (SARs) for each nuclear facility to comply with and meet requirements of U.S. Department of Energy (DOE) Order 5480.23 and DOE Standard 3009-94; and to develop appropriate technical safety requirements (TSRs) to meet the requirements of DOE Order 5480.22. At this time, only 5 of the 31 nuclear facilities had safety basis documents written in accordance with these orders.

Realizing the need to write a large number of SARs, a team of facility personnel and safety analysts made the determination to prepare a set of standardized SAR chapters that would be in compliance with DOE Std 3009-94. This standardized SAR was prepared containing Chapters 1, 7,8 and 10-17. The methodology chapters were not included because of the diversity of the nuclear facilities at the INEEL. This new generic SAR (SAR-100) was prepared and subsequently approved by both INEEL and DOE-ID management. The plan for preparation of DOE Order-compliant SARs committed to utilize SAR-100 in all the new nuclear SARs.

INEEL and DOE management approval proved to be very important when it came to obtaining funding for SAR preparation. Management on both sides had agreed to the need for SARs and the timeframe for SAR preparation. Funding was made available and the SARs have been prepared according to the plan schedule. Additionally, DOE ID assigned fee for the completion of the SAR documents based on the plan schedule. Bechtel BWXT Idaho, LLC (BBWI) and DOE-ID developed a quality checklist that is used by DOE to verify that each SAR is ready for DOE review. DOE uses the checklist to determine the amount of fee awarded to BBWI. Over the past two years, BBWI has successfully issued 11 SARs for review and approval. Only one SAR could not be issued, due to a large overrun in its budget. Issuance of the SAR was delayed to the next year.

## Discussion

If the INEEL is to succeed in the preparation of all the required new SARs, it will be necessary to reduce the number of nuclear facilities, and/or improve the efficiency of the process to greatly reduce the cost and amount of time required to prepare a SAR. Combinations of these approaches have been taken. The number of nuclear facilities has been reduced from 31 to 25, and an additional 3 facilities will be downgraded to less than Hazard Category 3 nuclear facilities.

Two Process Improvement Programs (PIPs) have been initiated to reduce the cost of nuclear facility safety programs and the number of full-time employees (FTEs). The first PIP was

initiated to reduce the material cost of the facilities and the second was to reduce SAR preparation cost and time.

## Material Procurement Cost Savings PIP

Before the PIPs were initiated, systems in nuclear facilities and other areas at the INEEL were identified as safety systems, requiring that they be procured to a high quality level. The decision to purchase something to a high quality level was in many cases arbitrary, and made by almost anyone. At the time, there were four quality levels for procurements: Quality Level 1 was the highest and Quality Level 4 was the lowest. These quality levels were not well defined in company documentation; therefore, individuals procuring material were "on their own" in making that decision.

The company procedure that identified the requirements for procurement of materials was changed. The quality level term was eliminated and replaced with "Safety Class," "Safety Significant," "Low Safety Consequence," and "Consumer Grade." These terms were then defined bases on safety basis documents: Safety Class and Safety Significant being defined as standard safety basis terms, Low Safety Consequence being equivalent to defense in-depth, and Consumer Grade being off-the-shelve type of procurements.

A PIP team was assembled to implement the procedure and to identify additional changes to the procedure, if appropriate. The PIP team used the Six-Sigma approach in developing the existing, or AS-IS, process flow chart. Six-Sigma tools, such as input variables vs. output variables (X-Y) table, fish bone charts, and the potential failure mode and effect analysis (FMEA) template were utilized, along with the AS-IS flow chart, and input from many interviews with the procedure users, to develop a number of implementation activities including:

- Revise the procedure to simplify the forms for documenting the determination of system quality significance level. This ensures that the basis for the decision is retained.
- Identify the system engineer as the individual that determines procurement decisions regarding the level of quality to be applied.
- Develop training for Engineering management and the system engineers to define their respective Roles and Responsibilities and Authorization and Authority (R2A2).
- Establish metrics to monitor the process and evaluate results from its implementation.

Based on the first six months of 2002, the total quality significant procurements are down by between 35 and 50%, resulting in a saving of approximately $1.2 million. As the PIP becomes fully implemented, the total quality-significant procurements are expected to be less than 50% of what they were in the past. Moreover, these numbers only reflect the FTE savings. No attempt at this time has been made to look at the savings realized from reduced material costs. That is, the material cost for a quality-significant procurement is significantly higher than for consumer-grade procurement, due to the added costs incurred by the supplier.

# SAR Efficiency Improvement PIP

In an attempt to better understand the INEEL SAR process, at the beginning of fiscal year 2001, a table was prepared to track the cost of each element of the SAR. There are seven phases of the SAR preparation process:

- Determination that a hazard categorization is required
- Planning and preparation of the cost estimate
- Performance of hazard categorization
- Review and approval of the hazard categorization
- Preparation of the SAR
- Review and approval of the SAR
- DOE final approval.

The costs were documented based on the individual, the hours the individual worked, and the individuals fully loaded rate.

The last six SARs prepared in FY 2001 utilized SAR-100.. The cost and time required to prepare these six SARs was still considered to be too high.

A team of operations, safety analysis and other support personnel was assembled to look for additional efficiency improvements. The team reviewed the processes for the preparation of SARs at each of the nuclear facilities at the INEEL. As a result of this review, an AS-IS flow diagram was prepared. The costs were then evaluated and it was observed that the six SARs cost an average of $266,000 each. It was also observed that 45% of the total cost, or an average of $120,000 each, was spent on the review and approval process. The six SARs took approximately 365 days to prepare.

Using the tools discussed above, the team identified a several areas for efficiency enhancement. The first area to focus on was the review and approval process. The hazard categorization process involved five separate reviews, all performed in series, while the SAR process involved eight separate reviews, all performed in series. It was noted that the AS-IS process resulted in quality being inspected in the SAR; that is, a safety analyst was responsible for preparing the SAR initially. It was discovered that the safety analyst usually wasn't the most knowledgeable person, and in fact, usually was not involved in the operation of the facility. It was also noted that the reviewers considered the SAR review to be low priority. As a result, the first draft required a lot of rework, which resulted in many restarts, as each reviewer performed their respective reviews. Further, it was not uncommon for the various reviewer comments to be in conflict. This required extensive time and effort to resolve. The combination of these problems resulted in a SAR that received many DOE comments and criticism on the quality of the document.

From the assessment of the review and approval process, it was determined that the most knowledgeable people should write the SARs. The safety analyst should perform most of the methodology analysis and should act as the SAR project manager. Next, it was determined that the nuclear facility manager should be responsible for the SAR at first concept, and regard the

SAR as high priority; thus, committing the resources to prepare those chapters of the SAR requiring expert knowledge. To obtain this commitment and identify the resources required to prepare the SAR, better initial planning was crucial.

The planning process to date had not been performed in a rigorous or disciplined manner. That is, the organization would estimate the cost of preparing a SAR and submit that estimate during the next year's budget process. The PIP team concluded that a Primavera Project Planner (P3) resource-loaded schedule was required. This detailed schedule would be used to obtain a commitment for the resources necessary to prepare the SAR. This resulted in a more accurate cost estimate, allowing the nuclear facility manager to fully buy in to the commitment.

The review process will be reduced to one approval in both the hazard categorization and SAR reviews. Prior to the PIP, the eight SAR reviews included: (1) a subject matter expert review (usually 10 to 12 individuals), (2) a review of the SAR quality check list to verify meeting all criteria, (3) a facility review (which is the facility operation review board), (4) a radiological control engineering review, (5) an independent safety analysis review for consistence and for technical merit, (6) DOE-ID program review, (7) a review by one of the Site independent review committees (usually 3 to 6 knowledgeable individuals), and (8) review by the DOE-ID field representative. The proposed single review, known as the "Table Top" review, will be headed by the independent safety committee chair and include the reviewers listed above. Because the subject matter experts are now writing the SAR, a smaller group of independent reviewers will be involved in the review process. Participating reviewers will be advised of their respective responsibilities and arrive at the Table Top review prepared to present their comments. If it is determined that the SAR should be revised based on those comments, the team will meet one more time to approve the final version. Any conflicts or corrections/revisions will be resolved and concurred with before the "Table Top" review is complete.

The determined efficiency improvements include:

- Improved planning and resource commitment prior to the start of the fiscal year, using P3
- Subject matter experts writing the appropriate sections of the hazard categorization document and the SAR
- The review and approval process combined into one "Table Top" review, with all participants, including DOE, in the review.

It is estimated that by utilizing this process, including the use of SAR-100, the average SAR would cost approximately $200,000 and take approximately 243 days to prepare. This discussion does not include the final submittal to DOE for final approval and issue of the Safety Evaluation Report (SER). DOE-ID has a Senior Safety Review Panel (SSRP) that reviews all SARs/TSRs and changes to SARs/TSRs. Any comments generated from the SSRP must be resolved prior to issuance of the SAR. This additional cost is not addressed above.

Metrics have been identified to monitor the progress in achieving the PIP goals. These metrics include monitoring the average cost of new SARs/TSRs, based on the individuals that work on each document, as discussed above. The time required to prepare each section of the SAR/TSR will be monitored. Also, the comments received at each stage of the process will be monitored to

document the quality of the documents as they are being developed and to improve the quality of the documents sent to DOE for approval. Feedback loops have been developed and implemented into the new Should Be SAR flow process to allow for continual monitoring and improvement.

The INEEL is currently preparing 12 SARs/TSRs this fiscal year. Although preparation is well under way, the new process is being applied wherever possible. It is expected that the INEEL will realize a small cost saving this year, of approximately $100,000.

## Conclusion

The implementation of SAR-100, the material procurement cost savings PIP, and the SAR Efficiency Improvement PIP have resulted in or are expected to result in significant cost savings. Other areas in the SAR process where additional saving are expected and where future process improvement project will focus include the Unreviewed Safety Question (USQ) process, SAR implementation, Transportation of hazard category 2 or 3 quantities of nuclear material, and possible buried waste.