Line Management Lessons Learned During Development and Implementation of a New Authorization Basis

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Abstract

The Rocky Flats Environmental Technology Site (RFETS) has been developing new authorization bases (ABs) for nuclear facilities that are nearing the end of their mission life and entering into deactivation, decontamination, and decommissioning. This paper addresses lessons learned during development and implementation of the new Building 776/777 Basis for Interim Operation (BIO) and Technical Safety Requirements (TSRs) from a line manager's perspective.

Some of the key lessons learned of things that worked well during development of the AB included: (1) establishing a well-defined AB project plan and using it to justify initial funding; (2) aggressively managing the project scope and schedule to meet milestones; (3) assigning a senior line manager with extensive plutonium processing experience at RFETS, including detailed knowledge of the facility's operations and past history; (4) establishing a diversified team of experienced AB, facility, and support personnel who were able to stay together for most of the development phase; (5) more active facility participation in the Preliminary Hazards Analysis to identify and evaluate unmitigated hazards – this was instrumental in identifying hazards associated not only with current activities, but also with previous plutonium processing operations and past accidents; (6) more active facility participation in the subsequent accident analysis and development of TSRs – this helped to eliminate or minimize implementation issues that had occurred with recently-approved ABs due to establishing preventive or mitigative controls without the right floor-level input such that some of the new TSRs were difficult or infeasible to implement; and (7) having a single point of contact within the Department of Energy who was involved from BIO development through implementation – this helped promote open dialogue, timely responses to issues, communicated the regulators expectations to the building, and kept DOE management informed.

After DOE approval of the new AB, a vital lesson learned from previous ABs was to develop a detailed implementation plan to address hardware and administrative upgrade issues. Then an Implementation Validation Review (IVR) was performed by the contractor and DOE to assure that the new AB would be adequately implemented. Lessons were learned when the facility failed the first IVR. The facility line management did not allow ample time to "own the AB" because they were performing numerous risk reduction activities to meet performance measures while at the same time trying to train Configuration Control Authorities (CCAs) and facility personnel to the new AB requirements. General knowledge of building personnel of the BIO/TSRs was basically adequate. The schedule was also compressed due to constant changes to the approved AB because the Site chose to use this facility as a pilot to develop and implement a TSR Administrative Control template after the original BIO/TSRs were approved. For the second IVR, the facility curtailed operations to focus on the IVR preparation. They also instituted interactive training to involve the workers more, and several drills were performed to perfect performance.

Some of the other lessons learned relate to areas that could have been improved upon. These include the lack of understanding of the magnitude of the project and commitment by higher levels of management (e.g., funding was pulled after the DOE cross-table review which caused significant delays and need for a Justification for Continued Operation) and passing ownership of the new AB from the AB project leader to the rest of the facility line management. The greatest benefit for AB development and implementation came from the use of an AB project team owned and funded by the facility. This approach facilitates a strong sense of ownership and the necessary timely responses to information needs for AB development and implementation issues and timely effective project management decisions to be made.

Background

In the past few years, RFETS has been developing new ABs for nuclear facilities that are nearing the end of their mission life and entering into the deactivation phase. These new ABs have been developed per the guidelines of DOE Standards DOE-STD-3011 and DOE-STD-3009 to establish a new BIO and TSRs that replace the facility's late 1980s-vintage Final Safety Analysis Reports (FSAR) and Operational Safety Requirements.

Kaiser-Hill Company (K-H) and Rocky Mountain Remediation Services (RMRS) are responsible for the facility's remaining missions to stabilize plutonium residues and to store residues and transuranic waste containers. The new AB also addressed deactivation activities to transition the facility to a decommissioning-ready phase, and set up the framework for a future revision to address decontamination and decommissioning.

BIOs were started for several nuclear facilities in the mid-1990's. The first BIO was approved by DOE in 1995 for a facility storing enriched uranium solutions (Building 886), and the next BIO based on more in-depth analyses was approved in 1997 for the first plutonium facility, Building 371/374. Since then, RFETS has developed and approved seven new AB documents using the BIO-based methodology to support Site closure (the others include Building 779 BIO for deactivation, decontamination, and decommissioning [DD&D], Building 569 BIO for TRU waste assay and storage, Building 776/777 BIO, Building 707 BIO, Building 664 FSAR for TRU waste storage, Building 991 FSAR for TRU waste storage, and a Site SAR addressing onsite transportation of plutonium, uranium, and TRU wastes). These ABs, based on the BIO methodology for the most part, meet the requirements of DOE Order 5480.23 (SARs) and 5480.22 (TSRs). The Site has also approved two ABs based on the DOE necessary and sufficient standards development process, called a Basis for Operations for Building 771/774 (including a major revision to authorize DD&D) and Building 440 TRU waste storage, but these were not based on the BIO methodology.

Building 776 BIO Development

There were 14 revisions (draft A through N) through a period of several months. BIO development began on July 1997. The initial Building 776/777 BIO was started by a K-H Nuclear Safety team, based on the Building 371/374 second-generation BIO model approved by DOE. Unfortunately, the initial draft BIO development effort occurred without significant input from facility personnel and lacked building management support. This was by design. The traditional model for AB development at RFETS did not seek facility input until the control set was ready for review. Building personnel were not consulted except during the occasional times the BIO Development Team toured the facility. Due to a lack of interface with building personnel, there was not an in-depth familiarity with the facility, and all facility hazards and controls were not identified. Consequently an adequate accident analysis and control set was not developed. Attempts to rewrite the initial BIO were abandoned after it was determined that development of an entirely new BIO would be more time and cost effective. It also was based on an unrealistic schedule that planned for seven days per week with no allowances for holidays, and had

unreasonable review cycle assumptions to meet a date imposed by DOE/contractor agreement during the fiscal year budget planning and approval process.

Based on Safe Sites of Colorado (the subcontractor who previously operated the building and also provided nuclear safety support) and K-H review comments on the first draft BIO, the project was reassigned to the facility in early 1998. In addition to AB project personnel from K-H and RMRS, a contractor team was established at that time and included other building operations and support personnel, as well as Nuclear Safety analysts from Safe Sites of Colorado and subcontracted support from Westinghouse Safety Management Solutions. Although there was some turnover of team personnel, the key team leads and safety analysts were able to stay together until the BIO was approved, even though the project was interrupted for a few months due to funding shortfalls.

The first major lesson learned was to develop a detailed AB project plan for approval by the contractor and DOE senior management. A second schedule was developed to address scoping issues identified that were then outlined in a BIO development plan used to acquire the necessary funding and resource allocation. Once approved and funded, it was much easier to aggressively manage the scope and schedule with the necessary priority from support groups. The major differences between the project plan with resource-loaded schedule and the initial development effort were a realistic time frame and Building personnel participation. The AB project plan and the subsequent development of the Building 776/777 BIO and TSRs also benefited from lessons learned from several recently approved ABs for other facilities at the Site and resolutions of DOE comments.

Facility line management actively participated in a Preliminary Hazards Analysis to identify and characterize hazards, and evaluate them in the unmitigated accident analysis. This participation was instrumental in identifying hazards associated not only with current activities, but also with previous plutonium processing operations and past accidents (e.g., this is the facility that had the most expensive fire in United States history at the time due to a pyrophoric plutonium fire, and still has a number of legacy issues associated with it). The PHA was accomplished by surveying each glovebox, which included approximately 250 gloveboxes in Buildings 776/777 with associated tanks, hazardous chemicals, potential energy, high voltage, direct radiation, radioactive materials, pressure sources, kinetic energy, inadequate ventilation, material handling, hydrogen generation in waste containers, floor loading, etc.

Line management also participated in the subsequent accident analysis and development of TSRs. This helped to eliminate or minimize implementation issues that had occurred in the past for other facilities due to establishing preventive or mitigative controls without the right floor-level input such that some of the new TSRs were difficult or infeasible to implement. This was especially important during the development of the TSR Administrative Control (AC) template that was being established for all ABs at the Site.

DOE's involvement throughout the development phase helped to resolve many issues real time, which prevented delays and expedited the review and approval cycle. This was accomplished by assigning a single point-of-contact from the DOE AB Division who was involved from BIO development through implementation – this helped promote open dialogue, timely responses to issues, communicated the regulator's expectations to the building, and kept DOE management informed. Other DOE personnel participated during the cross-table review, which provided a forum to discuss comments face-to-face – this streamlined the comment resolution phase.

Oversight from K-H and the technical review process involving the Independent Safety Review (a.k.a. Plant Review Committee), K-H, and DOE also could have been improved. K-H's oversight should have been more timely as the BIO was being developed to help control the scoping issues that continued to arise (e.g., the K-H cross-table review resulted in significant changes based on recent lessons learned

from other facility AB approvals that weren't anticipated in the project management plan but needed to be addressed to establish an adequate AB). The Plant Review Committee used their meeting time to perform in-depth reviews rather than concentrating on resolution of identified issues. Having two cross-table reviews, one for K-H and then another for DOE in May 1998, also was not efficient because it resulted in confusing and sometimes conflicting guidance, as well as schedule slips. There were mixed expectations on scope of the cross-table review. The BIO development team partially contributed to this review cycle problem by not allowing sufficient time to review the entire document prior to the cross-tables, which could have prevented many review comments. Consequently, there were numerous inconsistencies both within the document between the various chapters, and when compared to recently approved AB documents. The Site needs to do a better job in communicating significant issues and their resolutions within their own facilities and with the DOE from multiple AB projects that are being developed concurrently, or have just been approved, to prevent recurrence of those issues and to expedite the review cycles.

AC Template Integration

During the last hours before approval of the new AB, RFETS decided that the Building 776/777 BIO should be the pilot project for implementation of the AC template. The purpose of the AC template was to standardize the TSR ACs and safety management programs (SMPs) among the various ABs at RFETS, yet allow for tailoring to building-specifics when appropriate. Numerous ACs that were previously established were replaced by a commitment to implement SMPs via one general AC. The SMPs and their key attributes are relied on only to provide for worker protection and defense-in-depth safety functions, not credited preventive or mitigative safety functions in the nuclear accident analysis. Other specific, discrete ACs continue to be included in the TSRs, such as Inventory Control and Material Management, Control of Combustible Materials and Ignition Source, Maintenance and Surveillance of SC-3 SSCs (i.e., primarily Safety Significant SSCs that are discussed later), Organization and Management, and Emergency Response. The AC template also revised the General AC Application rules to address individual failures, programmatic deficiencies, and AC violations.

The AC template was undergoing numerous revisions due to comments from all affected facilities, as well as from K-H and DOE. The facility did not have a thorough understanding of the integration effort required between the AC template and the 776/777 BIO. It caused last minute revisions to three chapters of the BIO (SMPs, hazards and accident analysis, derivation of TSRs) as well as to the TSRs and their Bases. Another issue was the facility's lack of understanding of "credited programmatic elements" that had special TSR coverage. They did not understand the difference between Credited Programmatic Elements and SMP Credited Attributes. One was enforced through the TSR, and the other through Price Anderson.

BIO Implementation

After DOE approval of the Building 776/777 BIO and TSRs, a detailed implementation plan was developed prior to the decision to incorporate the AC template. This addressed hardware issues (e.g., some upgrades were required to meet the new TSR Limiting Conditions for Operation or Surveillance Requirements), revisions to existing and development of new procedures including walk-downs, and a lot of training. An inordinately large amount of resources were required to also upgrade the fire protection procedures to NFPA standards rather than the previous RFETS surveillance practices.

The AC template integration effort resulted in compressing the BIO implementation schedule due to several consecutive changes to the approved AB after the original BIO/TSRs were approved and it's domino effect on procedural revisions and training. RFFO approved the B776/777 BIO Rev. 1 in early January 1999. Implementation began later that month using draft Rev. K of the AC template. By the end of February 1999, the final AC template (Rev. N) was put into the BIO. Rev. 2 of the BIO was submitted

to RFFO in May 1999. RFFO approved part of Rev. 2 in June 1999, and the remaining in July 1999 along with technical directions that impacted the TSRs and implementing procedures and training plans. This May to August timeframe was not enough time to adequately implement the AC template and DOE technical directions because changes from versions K to N were so extensive that they caused a lot of procedure revisions and changes to training plans.

The contractor and DOE performed an IVR in August 1999 to assure that the new AB would be adequately implemented. Lessons were learned when the facility failed the first IVR. The facility line management did not allow ample time to "own the AB" because they were performing numerous risk reduction activities to meet performance measures while at the same time trying to train Configuration Control Authorities and facility personnel to the new AB requirements. Knowledge of the BIO/TSRs by building personnel was acceptable, but not outstanding. Initial training efforts involved large groups in "all hands" meetings. There was a general lack of interest in the new AB and poor attendance for the scheduled classes. The AB document was not actually approved until 3 weeks prior to the IVR (this was not sufficient time for training and implementation, especially incorporation of changes directed by DOE). In addition, the Implementation Team was also the Development Team, which created too much of a diversion from implementation because they had to first initiate the AB page changes and then help with the procedural and training changes.

For the second IVR in November 1999, the facility curtailed operations to focus on the IVR preparation. While preparing for the second IVR, a good issue tracking system was developed not only for the TSR LCO and Surveillance Requirements, but also for all of the SMPs and the AC required controls. They also instituted interactive training to involve the workers more, and several drills were performed to perfect performance. The interactive training was an effective tool that involved the use of cross-table reviews. The contractor and the DOE conducted these reviews to assess how the facility would respond to postulated scenarios and address specific areas of concern that surfaced during the formal interviews and assessment activities. This forum allows the contractor and DOE to present focused lines of inquiry that were designed to evoke verbal response from selected and multiple project personnel using the BIO as they worked through the upset conditions. Many upset scenarios were posed to the facility, which allowed the contractor and DOE to observe how the facility operates as a team and evaluate if the level of knowledge was isolated in pockets or spread throughout the Building 776/777 staff. The second IVR was passed and the BIO implemented in November 1999.

Some of the other lessons learned identified other opportunities for improvement. One area is to develop a better understanding of the magnitude of the project for higher levels of management and the overall importance of their commitment to the project. For example, the DOE and contractor senior management pulled funding after the DOE cross-table review due to budget shortfalls within the Building 776/777 Project and re-allocation to higher priorities. This caused significant delays and need for a Justification for Continued Operation because the Authorization Agreement based on the previous FSAR expired. When funding was pulled from the project, several key personnel were lost. New support was acquired to replace those key personnel. Additional funding and time was spent training and briefing the new personnel who replace those who could not be rehired after funding was restored for BIO Implementation. The combined impact of loss of building and implementation knowledge, and schedule compression, proved disastrous to the initial BIO implementation scope, cost, schedule, and IVR performance.

Another improvement needed was passing ownership of the new AB from the AB project leader to the rest of the facility line management. Facility line management did not originally take ownership due to their focus on numerous performance measures. The competing priorities made it difficult to commit the requisite time and resources into BIO implementation. This was recognized after the first failure.

From a line management perspective, the greatest benefit for AB development and implementation came from the use of an AB project team owned and funded by the facility. This facilitates a strong sense of ownership and the necessary timely responses to information needs for AB development and implementation issues and timely effective project management decisions to be made, including involving the DOE AB staff as early as possible for resolutions. A summary of the lessons learned is included in the Abstract at the beginning of this paper. However, some of the more significant lessons learned from a facility manager's perspective is to have early building personnel involvement from the right people, minimize changes to facility personnel during development and implementation, hold facility status meetings throughout the development and implementation processes, hold frequent drills, and lastly, limit changes to the AB document during implementation to only those that are absolutely necessary. Developing a detailed project plan for AB development and again for implementation that gets approved by the contractor and DOE senior management as well as the AB technical support groups, and involving the DOE AB staff at key milestones of BIO development and implementation also facilitated success of the project.