

Development and Implementation of the Los Alamos National Laboratory Independent SAR Review Process

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LAUR-01-2455

Abstract

Contractor independent review of contractor prepared safety documents has ceased as a requirement under DOE orders. However, a recent study to determine root causes of the poor quality and extremely long approval times for Los Alamos National Laboratory nuclear safety document has identified such a review as a crucial step in ensuring quality. LANL has teamed with the DOE Field Office to reinstate an independent review process modeled after DOE-STD-1104. A review guide has been prepared predicated on the content of DOE-STD-3009. Discipline has been enforced to ensure that comments reflect important issues and that resolution of the comment is possible. Safety management at both LANL and DOE have embraced this concept. This process has been exercised and has resulted in improvements in safety analysis quality and a degree of uniformity between DOE and LANL reviews.

Motivation for Contractor Review Process

The difficulties LANL has experienced over the years in producing quality nuclear safety documents for authorization basis has been well known within both DOE and LANL. Older safety documents have been based on DOE Order 5481.1B and DOE-STD-3009 as well as DOE-STD-3011 for Basis for Interim Operation (BIO). In order to better understand what factors contributed to the poor quality of these older LANL documents, a study was performed. This study, "Los Alamos National Laboratory Self-Assessment of Older Safety Analysis Reports¹" identified the contractor independent review process as one of the contributing factors to the poor quality of the older SARs.

Internal reviews had been performed, but they were done after the facilities had essentially completed their document preparation. Authorization Basis (AB) documents were generally well beyond their original schedule and over budget. Pressure within LANL and DOE to complete the documents and submit them to DOE for approval was often significant. Independent contractor review was too late, too inconsistent, and too

costly in terms of revision to be of much value. Contractor review comments were frequently ignored or superficially treated. In short, little value was gained by the review process.

Development of the Review Process

There was a considerable body of knowledge from which to draw in developing a review process. DOE had experienced their own quality of review problems resulting from their inability to finally approve AB documents submitted to them from the field. DOE-STD-1104, Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports, was developed to address this issue. Clearly the contractor independent review did not need to echo the review and approval process of the DOE, but did need to ensure an appropriate level of quality for those documents submitted to DOE for their review and approval.

A team was assembled to determine how the review would be conducted. Writing assignments were made to draw upon a variety of experiences in numerous phases of the review process as well as the development of an AB document. DOE-STD-3009 was taken as the baseline for AB preparation, although the review process clearly needs to be tailored to the actual standard that is used in preparation of the AB document. The development of “safe harbor” standards in 10 CFR 830² illustrates the variety of predefined acceptable formats for a variety of AB efforts and the review process would have to fit the development standard.

Assessment of the quality of LANL AB documents¹ also identified the need to develop AB documents as a project. Therefore integration of the review into the AB project was not only reasonable, it was essential. An end of project review, as the sole review, had already been identified as problematic in both the LANL study and DOE-STD-1104. Therefore, a phased review was indicated. The general review process in relation to the AB development is shown in Figure 1.

Key Elements of the Review Process

Examination of the needs of the review process resulted in the identification of several key elements that were to be addressed at LANL. These key elements are identified and discussed in the following list.

- **Information presentation format:** LANL has several methods of invoking requirements and guidance. The most flexible method is to develop an unregulated document for voluntary use. This method was chosen for the initial development process. A new process, called an Operational Support Tool, is now available and will likely be used for a future revision of the review guide.
- **Document content:** Should the review guide focus only on review or also cover related topics? LANL decided that the review guide had to put the review in prospective with respect to the AB development process. Consequently, there is considerable discussion of roles and responsibilities, review objectives, management of comments, and associated administrative elements in addition to specific review issues from –3009.

- Phases of the review:** Because a single review at the end of the AB development is not effective, how many and when should reviews take place? Logically the AB development can be broken into several phases that we term 0%, 30%, 70% and 90% with a final review at 100% to ensure comments are appropriately incorporated. These phases are discussed later in this report.
- Independence of reviewers:** How independent do reviewers need to be? Initially DOE took the position that reviewers could not be involved in the preparation of the AB in any way. Therefore, if a person in the same organization as a proposed reviewer was involved in AB preparation, then the reviewer was not independent. This proved to be fundamentally unworkable and a current approach of “fully objective” is applied.
- Review consistency:** Many reviewers have opinions on how information should be presented or what requirements really mean. This has led to conflicting comments on past reviews. Assigning a team lead to ensure that comments are consistent and valid helps address this issue.
- Review authority:** Must the review (and the reviewers) be satisfied before the AB document is submitted to DOE? A principle of Integrated Safety Management (ISM) is that line management is responsible for safety. The review document was prepared for the Owing Division Director to assess the quality of the document. The ODD is responsible for the decision to submit to DOE.

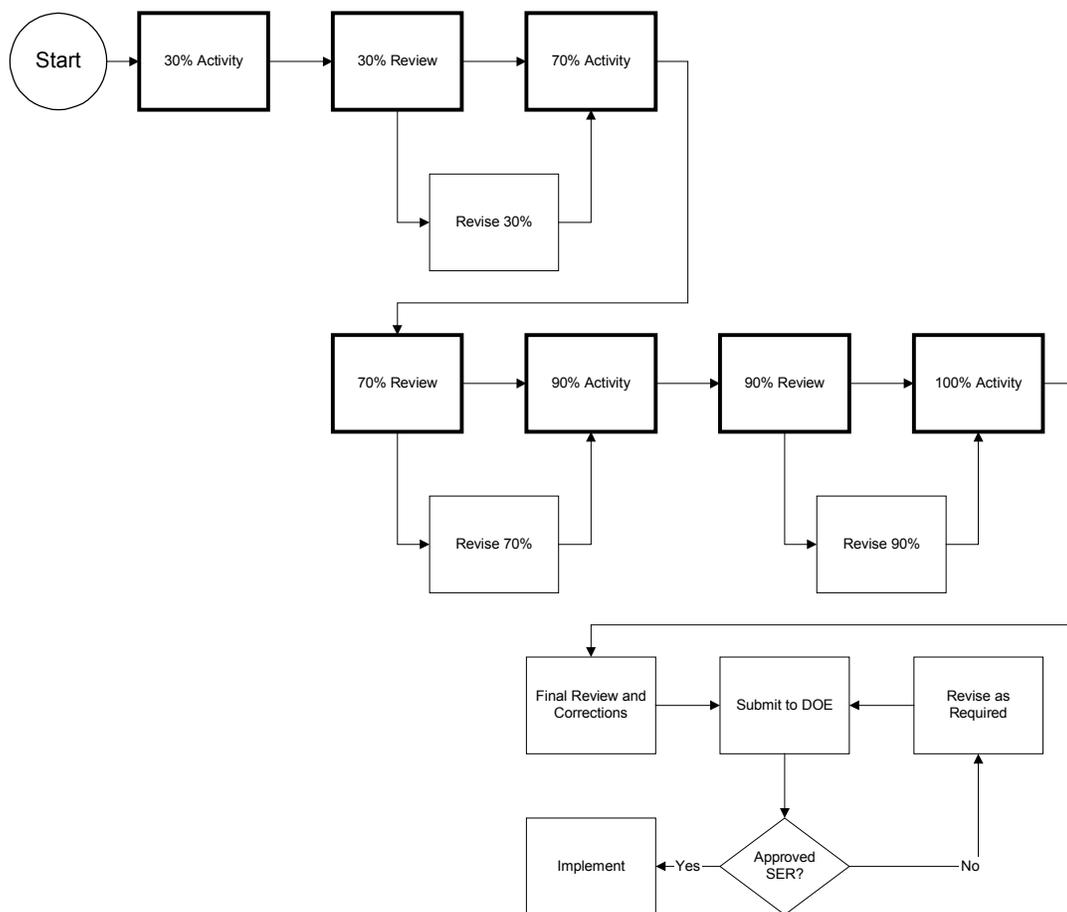


Figure 1: Reviews in the Developmental Process

Review Milestones

Reviews are held incrementally at logical break points. These break points and the review objectives and focus are discussed below for safety analyses that focus on existing facilities and operations. These functions are summarized in Table 1.

- **0% Review:** This has been characterized as the most important of all the reviews. It is used to establish the basis upon which the future phases of the safety document development will depend. Functionally it is a plan that indicates key hazards, prospective accidents to be analyzed, schedules, roles and responsibilities, and qualification of workers involved in key roles. Formats for presenting information and grading are defined as are the important operations to be addressed. Most would view this as the project plan. Agreement at this stage avoids many of the second-guesses that are characteristic of many safety analysis development efforts. A basis for change control is established that supports subsequent adjustment of costs and schedules if requirements change or the basis proves faulty. Line management responsibility is codified in the plan and the safety analysts is allowed to do the job they do the best; apply the appropriate techniques to divine the hazards and their controls in a rigorous manner.

- **30% Review:** This review addresses the hazard analysis element that is the foundation of much of the safety analysis. Information on the site, facility, and operations is prepared (Ch 1, 2, and 3 of a –3009 SAR) to the level needed to understand the hazard analysis. Candidate safety significant SSCs derived from the hazards analysis are identified along with important administrative controls related to worker safety and preservation of analysis assumptions. Candidate accidents are identified for future analysis. The review seeks to ensure that the descriptions are consistent with the facility and its operations and that the analysis is complete in its coverage. It also seeks to ensure that the qualitative assessments of consequences and likelihoods of the uncontrolled (unmitigated) and controlled (mitigated) postulated upsets are reasonable. A successful review at this stage ensures that the SAR basis is sound.

- **70% Review:** This review includes the assessment of the completed accident analysis, final selection of safety class and safety significant SSC, completion of the site, facility, and operations descriptions and the hazards analysis chapters (Ch 1, 2, and 3 of a -3009 SAR). Safety systems are described and preliminary TSRs are derived (Ch 5 plus draft TSR) including key programmatic descriptions. Previous comments resolutions are reviewed to be sure they are included. The objective of this review is to ensure that the whole package fits together and that controls and postulated upsets are appropriately congruent. At the completion of this review phase, polishing the final document should be possible.

- **90% Review:** This is the final formal review. It examines the document that should be essentially complete with all comments from the 70% review adequately addressed. Few comments are expected at this phase.

- **100% Review:** This review is not shown in Table 1. However, it is the final check to ensure any issues identified in the 90% review are accommodated. With the assumption that the comments at 70% did not cause major rework, this is mostly an administrative quality assurance type of task.

Table 1: Review Phase Activities.

0% Review	30% Review	70% Review	90% Review
<ul style="list-style-type: none"> ▪ Orient team ▪ Tour facility ▪ Define review goals and expectations ▪ Specify team roles and responsibilities ▪ Identify external reviewers and observers ▪ Review schedule and milestones ▪ Outline SAR Review Plan and assignments ▪ Review records management, QA, and security considerations 	<ul style="list-style-type: none"> ▪ Facility description, including facility processes and major activities ▪ Hazard analysis and accident analysis methodologies ▪ Hazard identification, characterization, and evaluation ▪ Risk ranking of postulated accident scenarios ▪ Identification of candidate safety SSCs ▪ Identification of candidate accidents to be analyzed 	<ul style="list-style-type: none"> ▪ All content in 30% review package updated and comments incorporated ▪ Preliminary accident analysis provided ▪ Safety functions and safety system described per DOE-STD-3009-94, Chapter 4, for safety SSCs ▪ Refined performance requirements identified through safety system evaluations ▪ Criticality safety evaluations and controls identified ▪ Preliminary set of TSRs (LCOs) write out and operational considerations for maintaining safety SSCs provided ▪ Emergency management program described ▪ Radiation and hazardous material protection programs described 	<p>Finalize:</p> <ul style="list-style-type: none"> ▪ accident analysis ▪ safety functions, safety system descriptions, functional and performance requirements, and system evaluations ▪ derivation of TSRs ▪ TSR document ▪ institutional programmatic controls

Review Plan

The review guide does not substitute for the review plan although most elements of the review plan can be lifted directly from the guide. The review plan is prepared by the review team lead and other reviewers. It is coordinated with the document developers to ensure they understand what will be reviewed and what criteria may be applied.

Key elements of the review plan include the review schedule (which dovetails with the development plan), review activities, comment guidelines, review criteria, and other guidance needed to perform an effective review. The review guide is predicated on a full –3009 SAR and extracts all the significant expectations for document content from that standard. The content checklist is used to ensure that all information expected in a SAR is addressed. Specific comments are prepared to focus on identified deficiencies.

The general review plan includes rules for comments. These rules, the enforcement of which is the responsibility of the review team lead, ensure that comments are graded with those that must be addressed identified and others that may improve document quality. The comment rules and an elaboration of their intent are listed below.

1. **Focus on significant deficiencies rather than marginal issues or minor discrepancies.** As stated in STD-1104, a significant deficiency identifies a problem or concern that affects the utility or validity of the SAR. Such issues are generally those involving: (1) hazardous material or energy release with significant consequences to the public, worker, or environment that will otherwise be left without coverage in the SAR; (2) technical errors that invalidate major conclusions relevant to the safety basis; or (3) failure to cover topical material required by DOE directives and guidance on safety basis documents. Do not focus on pet issues that are not central to the primary functions of the SAR.
2. **Comments must be based on a failure to adequately address a requirement in DOE Order 5480.23 (per DOE-STD-3009 guidance) or other applicable requirements document.** The comment should indicate how the deficient item does not comply with the applicable requirement or with Laboratory or DOE interpretations of applicable requirements. In addition, material must be presented clearly. Material that is confusing, illogical, not readable, internally inconsistent, or incomplete does not meet SAR standards and should be considered deficient.
3. **Comments should be specific.** Avoid general statements that do not clearly identify a deficiency. Personnel resolving the comment should not have to guess at a comment's intent. If material is significantly deficient in content or technical accuracy, the comment should be worded in a way that explains the deficiency. Comments should be "resolvable;" that is, there should be a clear path forward for resolution.
4. **Do not use the SAR review process to raise issues that are appropriate for another forum.** Examples include issues related to the programmatic mission of the facility or questions about DOE policy that are outside the scope of the SAR.
5. **Do not provide comments that deal with personal preferences.** There is always more than one way to present material or perform an analysis. Review comments must identify real deficiencies and should not promote a different or "better" way of doing something when there is no actual deficiency.
6. **Comments must not ask open-ended questions.** At times, material may be confusing or incomplete and its adequacy cannot be evaluated and specific comments cannot be posed. Comments should be phrased as a statement of the problem (e.g., the material does not address a certain topic clearly), rather than as an open-ended question that is difficult to resolve.
7. **Comments should offer a resolution to the identified deficiency, if one is known.** Resolutions should be based on an applicable standard or requirements document.
8. **No "Essential" editorial comments.** Editorial errors and improvements identified by reviewers should be submitted as "Suggested" comments. The SAR development team should attempt to correct errors to improve the presentation of the material, but

“Suggested” comments do not need to be tracked and do not require resolution. Comments that identify confusing or poorly written material that is impossible to follow or very difficult to understand are not editorial comments if the material is essential. These are deficiencies if the analysis, safety program, activity, etc., is not described adequately and cannot be evaluated.

9. Review comments should not be submitted just because a reviewer does not have the basic information to determine whether a deficiency actually exists.

Comments should be based on knowledge of the facility and operations. Reviewers should obtain information through facility tours, interviews with facility personnel, and review of source documents. An active interface between the review team and the facility operating organization should be established to facilitate the flow of information to the review team.

10. Comments should be worded in a professional manner and tone. Personal insults, innuendo, and harsh remarks are not acceptable and should not be voiced in review comments. Comments should be worded in the spirit of contributing to the goal of producing a quality SAR. Comments should stick to the facts and be geared toward improving and enhancing the document rather than conveying a negative tenor or attempting “one upmanship.” The SAR review process should not be used to advance personal or organizational agendas.

11. Comments should not address material that was previously reviewed. With a few exceptions, once material has been reviewed and commented on in an interim review, it should not be revisited in subsequent reviews. Reviewers are responsible for completing reviews of interim packages and should not consider later reviews an opportunity to “catch up.” Previous material should be revisited if it has been revised, if other changes were made that affect the subject material, if new Laboratory requirements have been issued, if new DOE interpretations have been communicated, or for other similar developments. This problem sometime occurs when a reviewer is replaced between review phases. New reviewers should accept the conclusions of earlier reviews unless clear and significant deficiencies are discovered in previously reviewed material.

Review Process Results

The review process has evolved at the local DOE office and LANL over the past two years. Initial reviews of several nuclear facility SARs has been conducted with several SARs receiving approval from DOE. A learning aspect of the reviews was provided by holding joint LANL/DOE reviews. Recent reviews, however, have not generally followed the plan as new AB support organization at LANL has had to deal with other pressing issues.

The joint LANL/DOE reviews have been extremely beneficial. DOE has been able to assess the quality of the LANL review which provides them with a better sense the value of the LANL review process. In turn, LANL has been able to better gauge the issues

DOE finds important. As a result, the review process has significantly improved. DOE has even incorporated portions of the LANL review guide into their own review process helping ensure a uniformity of review heretofore unrealized.

A revision to the review guide has been prepared that incorporates lessons-learned from the past reviews. The review process will be integrated into the AB development process helping ensure that the review is adequately integrated. Full adoption of the review guide promises to produce more effective reviews with a higher quality AB document. The ultimate goal is to provide DOE with an approval AB document with DOE only providing the final review.

References:

1. P. McClure and A. Nuels, "LOS ALAMOS NATIONAL LABORATORY SELF-ASSESSMENT OF OLDER SAFETY ANALYSIS REPORTS," LAUR-00-1475, Los Alamos National Laboratory, 2000.
2. 10 CFR Part 830, Nuclear Safety Management.