U. S. DEPARTMENT OF ENERGY

National Nuclear Security Administration

Los Alamos Site Office/Safety Authorization Basis Team

SAFETY BASIS PROCEDURE AND OPERATIONS PLAN

Revision 7

APPROVED FOR USE:

Los Alamos Site Office
Senior Authorization Basis Manager

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This Document is UNCLASSIFIED and contains no UNCI
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REVISION LOG

Version	Description	Date	Reason
0	All	November 15, 1999	Publish Procedure @ LAAO
1	Added Appendix D	November 29, 1999	Strengthen Document to include robust Review Guidance not previously present
2	All	August 1, 2000	Rewrite to add review criteria, review processes, roles & responsibilities. Remove AL-specific wording. Modify LAAO procedure to incorporate lessons learned based upon McClure Report, previously noted issues in reviews and to specifically add lessons learned tracking mechanism. Address open EH assessment requirements written against Operations Office in 1996 before LAAO had any formal approval authorities for USQs or other Authorization Basis Documents
3	Lessons Learned Section SABM Responsibilities/ Accountabilities Section 3.2	January 17, 2001	Added lessons learned from ongoing and past SAR, USQD, HA, etc. reviews Added SABM numbers 3.2.19, 3.2.20. This will help with the LAAO ISM Review in the March

Revision No.	Affected Pages	Date	Reason
			2001 Timeframe
	Review Team Leader Responsibilities/ Accountabilities Section 3.3		Added Review Team Leader numbers 3.3.16, 3.3.17. This will help with the LAAO ISM Review in the March 2001 Timeframe
	Added Memo from LANL AB Office stating LANL AB policy is to use interim SAR review plan		Added before Appendix E
4	ALL	April 2002	Update to reflect OLASO realignment; lessons learned update; reflect recent staff qualifications, incorporate new LANL Review Procedure and changes to reflect how SABT does business
5	ALL	May 2003	Annual update to reflect new responsibilities (e.g. ADC), lessons learned, organizational changes and other improvements including merging Operations Plan with Review Plan.
6	ALL	September 2003	Editorial Changes
	2-3 [Section 3.2]		Amended SABM Responsibilities to include new Deputy
	25 [Appendix A]		Update for John Fredlund; Delete Capshaw; Editorial
	3-4 [Responsibilities] 32-33 [Appendix D]		Incorporate HQ (Beckner) direction as Lessons Learned on DNFSB Recommendation 2000-2 and DOE O 420.1

			Crosswalk
	41 [New Appendix F]		Added standard review comment form as new appendix
	New Appendix G		Elements of DOE 0 420.1 Crosswalk
7	NA	April 2004	Add Table of Contents
	3 & 4 [Responsibilities]		Added new responsibilities (3.2.22 & 3.3.21) for SABM and Team Leads
	11 [Section 4.6]		Expanded section to document SABT self-assessment process
	26		Updated Appendix A
	33 & 34 [Appendix D]		Added new lessons learned V& W
	40 & 41 [Operations Plan]		Revision 1 to SABT FY 2004 Operations Plan to address self-assessments and April 2004 NNSA Strategic Planning Guidance
	46		Added Appendix H
	General		Deleted all references to Deputy and added references to Appendix H

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Summary

This procedure describes the mechanisms for providing review, approval, and maintenance of safety basis documentation at the Los Alamos Site Office (LASO) for Los Alamos National Laboratory (LANL) facilities and operations. The intent of this procedure is to ensure technical reviews conducted by the LASO Safety Authorization Basis Team (SABT) include the appropriate level of rigor and consistency with respect to the application of requirements, including content of hazard/accident analyses and classification review. The authorization basis is documented in approved safety basis documents, NNSA Safety Evaluation Report, and Unreviewed Safety Question Determinations (USQDs). Safety basis documents may include Documented Safety Analysis (DSA), Safety Analysis Reports (SARs), Basis for Interim Operations (BIO) documents, Safety Assessment Documents (SADs), Safety Assessments (SAs), Hazard Analysis (HA) and Technical Safety Requirements (TSRs). Safety basis documents will be reviewed in a systematic manner, integrated with LANL's processes for document preparation and approval. The fundamental goal is safe operation of the facility. This procedure supports that goal by ensuring that LASO's reviews of safety basis documents are value-added as opposed to a bureaucratic hurdle or rubber stamp. That is, review team comments and interactions will focus on adequacy of the safety basis in accurately identifying hazards and derivation of safety controls that result in a residual risk acceptable to the NNSA approval authority. This process will be completed with the minimum impact on facility schedules and resources, and in general, follow the metrics established in the attached SABT Operational Plan (Appendix E).

1. Purpose

The purpose of the LASO Safety Basis Review Procedure is to ensure a consistent, systematic, technically adequate, and integrated (with LANL) review and approval of safety basis documents prepared for LANL facilities and operations. This review procedure documents the purpose, scope, roles & responsibilities, review process, personnel qualifications, and review criteria for LASO review and approval of LANL safety basis documents. Appendix A identifies qualified review team leaders and members. Appendix B provides a generic schedule that can be used to develop a review-specific procedure. Appendix C provides definitions of commonly encountered terms. Appendix D supplies a formal tracking mechanism for AB process lessons learned. Attachment 1 provides the "LANL *Review Plan for Nuclear Safety Analysis Documents*," which will be considered for all NNSA reviews of AB documentation at LANL. The purpose of including the LANL Review Plan is to ensure integration and common understanding of expectations for AB reviews that are accepted by the Department and promotes efficient and defensible production of AB documentation. The overall objective of LASO review and approval of safety basis documents is to approve an adequate and documented safety basis for facilities at LANL.

This procedure is based on the principles for SAR reviews that are discussed in DOE-STD-1104 (Reference 7.1).

2. Scope

This procedure applies to SABT and support contractor personnel, who provide review and technical based recommendations for approving safety basis documents for NNSA facilities and operations at LANL. This procedure also applies to the NNSA oversight of LANL facility authorization bases. The approval authority for safety basis documents for all existing LANL facilities has been formally delegated

to the LASO Senior Authorization Basis Manager. For complete details on delegated authorities, roles, and responsibilities are documented in the LASO FRA and Integrated Safety Management Description.

3. Roles and Responsibilities

3.1 LASO Manager

3.1.1 Holds line management responsibility and accountability for ensuring adequacy of LANL facility safety bases.
3.1.2 Approves safety basis documents for which approval authority has not been delegated to the LASO SABM.
3.1.3 Delegates in writing as appropriate authorities for AB documentation.

3.2 LASO Senior Authorization Basis Manager (SABM)

3.2.1 Maintains ongoing contact with LANL facility and ES&H organizations and LASO Project Management to obtain early notice of safety basis document development efforts.
3.2.2 Identifies, assesses, and approves resources and plans support for safety basis document reviews.
3.2.3 Appoints or assigns review team leaders or leads for conducting reviews of safety basis documents.
3.2.4 Approves Safety Basis documents based upon recommendations of review team leaders or leads (SABM only).
3.2.5 Assists and supports LANL safety basis document development projects.
3.2.6 Approves qualifications of team leaders and reviewers
3.2.7 Ensures review team members understand and follow this procedure.
3.2.8 Provides safety analysis review direction to review team leaders and review team members consistent with NNSA and LASO policy
3.2.9 Approves safety basis review plans when necessary.
3.2.10 Determines need for facility-specific safety basis document review plans
3.2.11 Obtains support from subject matter experts from within and outside LASO to assist in the review of AB documentation reviews
3.2.12 As necessary, provides AB documentation review guidance, procedures and direction to review team leaders or leads.
3.2.13 Makes staff assignments that will facilitate on-the-job training for safety analysts in the process of qualifying to the LASO SABT Qualification Card.
3.2.14 Ensures interface with the program principals in the Albuquerque Service Center (ASC) and HQ as appropriate so that when an AB document is signed there is coordination on any new potential funding requirements that are placed into the AB as conditions of approval or upgrades.
3.2.15 Ensure appropriate qualification standards are developed and approves qualification cards for staff that enables them to be able to competently perform their assigned duties.
3.2.16 Negotiates with LANL on the NNSA/LANL prioritized list to ensure that it includes program priorities, ESH weighting for worker and the public, timeliness considerations, cost weighting, and mission priorities.
3.2.17 Ensure compliance with the Branch (SABT) Security procedure approved by SABM.
3.2.18 Per delegation memo from Area manager as well as his position description, SABM is

responsible for all Authorization Basis issues at LANL including LIR and Work smart Standards reviews as they apply to authorization basis (SABM only).

3.2.19 The SABM is accountable for the proper coordination with the legal Branch on issues when appropriate. This includes for example contract interpretations, FOIA requests, contract issues, unallowable costs, ethics issues, issues involving the Code of Federal regulations, Price Anderson Issues, or other issues that legal needs to be informed about.

3.2.18 The SABM is accountable for the proper coordination of signed safety analyses, approved USQs, Hazard Analyses and other safety documentation with FO for the purpose of handing off Readiness Verification activities such as ORRs/RAs to FO.

3.2.19 Promotes early consideration in the AB development and review process of safety basis implementation with feedback from LASO FO as appropriate.

3.2.20 Assures basis of approval or SER requires verification of completeness of Master Equipment List (MEL) and System Design Descriptions (SSD) as appropriate to address those systems or equipment important to safety identified in the approved AB.

3.2.21 Assures all received correspondence or actions are routed through the SABT Program Analyst.

3.2.22 Issues the annual self-assessment plan that ensures all aspects of how SABT does business per this review procedure is internally reviewed by qualified staff at least once over a three (3) year period.

3.3 Review Team Leader or Leads

3.3.1 Provides NNSA support when requested to assigned safety basis document planning and scheduling at LANL. Ensures planning is realistic so that NNSA review activities and resources can be dependably scheduled. Recommends necessary contractor direction to LASO SABM.

3.3.2 Sufficiently knowledgeable of the requirements in the references in Section 7 to be able to clarify and provide direction to the Laboratory on implementation of those requirements.

3.3.3 Selects and makes arrangements for review team members as appropriate.

3.3.4 Manages NNSA review of assigned safety basis document as a project, and coordinates with LANL development and review managers to ensure the development, review, and approval efforts are coordinated and managed like an integrated project. In that regard, ensures integration as appropriate with the LANL review process (Attachment 1).

3.3.5 Participate in the 0% scoping meetings, interim progress reviews as agreed to in the 0% scoping meeting, comment consolidation, and comment resolution meetings.

3.3.6 Provides interface to LANL safety basis document development and review leaders.

3.3.7 Consolidates comments from review team members, validates essential comments, and provides comment package to LANL

3.3.8 Provides recommendation on approving the assigned safety basis document to LASO SABM, and if not, a path forward to fix it.

3.3.9 Prepares NNSA Safety Evaluation Report for assigned safety basis document (if one is to be prepared) and approval/reject memo including the ADC review of the SABT correspondence.

3.3.10 Captures lessons learned from safety basis document reviews and propose to SABM for possible inclusion to Appendix D of this procedure. In addition, applies lessons learned in Appendix D in the current review process. For example, confinement ventilation systems important to safety may require verification of injection and sampling ports being present to support testing of HEPA filters.

3.3.11 Responsible for verifying during the AB review that the most current and applicable Orders, Standards, and other regulatory guidance are being used per required NNSA guidance/applicable LANL contract requirements. Note: If the NNSA approved contract

excludes the most current DOE directives, the contract requirements will be the requirements applicable to the review.

3.3.12 Works to the goals in the SABT Operational Plan (Appendix E) and direction established by the SABM to conduct timely reviews and approvals.

3.3.13 Works to the NNSA/LANL prioritized list to ensure that it includes program priorities, ESH weighting for worker and the public, timeliness considerations, cost weighting, and Division priorities.

3.3.14 Responsible to the SABM for ensuring that there is adequate interface with the program management in ASC and HQ as appropriate so that when an AB document is signed there is coordination on any new potential funding requirements that are placed into the AB as conditions of approval or upgrades.

3.3.15 Ensures that when required for guidance that the current LASO FRA is used/referenced.

3.3.16 The Review team leader is accountable to the SABM for coordinating with the legal Branch on issues when appropriate. This includes for example contract interpretations, FOIA requests, contract issues, unallowable costs, ethics issues, issues involving the Code of Federal regulations, Price Anderson Issues, or other issues that legal needs to be informed about.

3.3.17 The Review Team Leader or Leads are accountable to the SABM for the proper coordination of approved Authorization Basis (AB) documents (examples: signed safety analyses, approved USQs, Hazard Analyses and other safety documentation) with other responsible LASO groups for the purpose of handing off appropriate verification activities. For example, other responsible LASO groups may have oversight or the lead for certain implementation activities such as ORRs/RAs. In this case, wording such as **"Before the operation is authorized, verification of controls implementation is required by FO. FO will determine the level of the review required."** could be used in the SER or safety analysis approval memoranda to hand off verification to FO. Based on lessons learned, approved AB documents may also require supportive documents to be updated or revised, which may not be necessarily AB documents, such as master equipment lists (MELs) or system design descriptions (SSDs). As applicable, the Review Team Leader or Leads shall ensure words are in the SER or approval basis that hand off the verification activity for these supportive documents to the appropriate LASO group. For example, FO can be tasked to verify the MEL reflects the safety related equipment in the approved AB documents. Project Management could be tasked to verify the SSD for respective safety systems in approved AB documents, define the appropriate functional and performance criteria necessary for such systems to perform its intended safety function. In all cases, the Review Team Leader or Leads are expected to follow up with the other LASO groups on verification activities, and when necessary, offer assistance, but not do the verification task.

3.3.18 Promotes early consideration in the AB development and review process of safety basis implementation with feedback from LASO FO as appropriate.

3.3.19 Assures all received correspondence or actions are routed through the SABT Program Analyst.

3.3.20 Documents closure of identified pertinent safety deficiencies or concerns from previous reviews/evaluations in the SER. Examples of such reviews/evaluations could be the LANL McClure Report, NNSA accepted operational readiness assessment reports, NNSA SERs that fixed JCOs or NNSA accepted Defense Board recommendations.

3.3.21 Prepares the review plan for the conduct of SABT self-assessments when assigned by the SABM.

3.4 Review Team Members and SABT Staff

3.4.1 Attends review team kickoff meeting, including performing facility walk-downs and familiarization tours to become knowledgeable of affected facility or processes subject to the review.
3.4.2 Read all references in Section 7 for background and guidance, and becomes familiar with the LANL review process (Attachment 1).
3.4.3 Support interim progress reviews as directed by SABM, review team leader or leads. Participate in comment consolidation and resolution meetings as directed by the SABM, review team leader or leads.
3.4.4 Interface with, but not provide direction to, safety basis document chapter leads to clarify material and resolve questions before providing comments.
3.4.5 Interface with other staff or review team members to verify appropriate linkages between safety basis document chapters.
3.4.6 Develop and provide comments to the SABM, review team leader or leads according to the specified format and by the due date(s) specified.
3.4.7 Assist in preparing Safety Evaluation Report as requested by the SABM or review team leader
3.4.8 Defend generated comments from the review during the SABT internal review process, as necessary.
3.4.9 Assist, but not provide direction to (i.e. do it for them), LANL safety basis document authors to assure underlying issues in comments are resolved or fixed.
3.4.10 As appropriate, bring significant issues and unresolved comments to the timely attention of the SABM, review team leader or lead.
3.4.11 Review revised assigned safety basis documents for adequate incorporation of comment resolutions.
3.4.12 Upon receipt of LANL correspondence or submittals for NNSA action, date and initial the document to reflect the date received.
3.4.13 Perform the ADC review of generated SABT correspondence to assure proper classification.
3.4.14 Gives early consideration in the AB development and review process of safety basis implementation with feedback from LASO FO as appropriate.
3.4.15 When selected, participate in conduct of SABT self-assessments.
3.4.16 Assures all received correspondence or actions are routed through the SABT Program Analyst.

3.5 Program Analyst

3.5.1 Maintains with input from safety analysts and SABM the SABT Assignment Database
3.5.2 Assists SABT staff and SABM in the technical editing reviews of SABT correspondence
3.5.3 Logs in all external correspondence for SABT action
3.5.4 Assists SABM and SABT staff in the distribution of correspondence
3.5.5 Establishes and maintains a SABT filing or document management system (paper or electronic)
3.5.6 For the SABM, maintains the SABT "White Board"
3.5.7 Is the SABT point of contact for scheduling SABM/SABT meetings
3.5.8 Prepares with input from SABT staff and SABM the SABT Weekly Report
3.5.9 Supports SABT staff in maintaining office supplies
3.5.10 Assumes new assignments relative to facilitating SABT being able to support critical mission needs
3.5.11 Tracks assignment dates to staff & completion times for tasks. Maintains this tracking data base (see 3.5.1 above) and in this regard is a direct report to the SABM.

4. Processes

4.1. Review Planning and Team Formation Process

For existing and new (excluding projects) facilities, the LASO SABM will coordinate, plan, review, and manage the flow of AB documents from LANL with the LANL Safety Basis Office (SBO). This includes schedules, milestones, resources, and prioritization in accordance with the annual fiscal LANL AB performance measures. The results are documented in a Priority List issued by SBO. For projects including major modifications to existing nuclear facilities, the SABM will work with LASO Project Management to assure coordination, planning and management of LANL project AB documents is through SBO. The SABM and/or the Review Team Leader will work through the respective NNSA project manager to assure the guidelines in Appendix G are considered in the Project Execution Plan or equivalent project documentation before dedicating SABT resources to support the project. When an AB document is delivered to LASO from LANL for action, the LASO SABM establishes the review task and appoints a review team leader or lead. Based on information from counterparts at LANL, the review team leader or lead is responsible for scheduling reviews as well as establishing the necessary team composition if needed. The manner in which reviews are scheduled and tracked is up to the review team leader or lead. The review team leader or lead can then identify qualified team members to compose the team if required, and assure availability. Review team leaders, leads and/or members can be drawn from LASO, the NNSA Core Technical Group, AL Service Center or support contractors (cannot be a team leader or lead). Appendix A identifies qualified NNSA reviewers and their capabilities. The team leader or lead will ensure adequate coverage of all technical areas.

Review team members should meet or achieve the following general qualifications. Additional qualification requirements are delineated in the DOE Technical Qualification Standard for Safety Analyst.

- Knowledge of the general purpose, function, organization and content of SARs and TSRs as specified by 10 CFR 830 Subparts A & B, and applicable safe harbors. (References 7.3, 7.5, 7.6, and 7.7)
- Familiarity with the applicable DOE Orders, LANL contract requirements and standards and the Laboratory's Work Smart Standards applicable to the assigned functional area. Specifically for projects, familiarity with DOE O 420.1, DOE G 420.1-1, DOE O 413.3 and DOE M 413.3-1
- Familiarity with the LANL Review Process (Reference 7.2 and Attachment 1)
- General knowledge of hazard analysis/accident analysis, such as that covered by the DOE-STD-3009 (Reference 7.3) training course or equivalent
- Previous technical experience and on-the-job training in the preparation or review of safety documents

The team leader should have extensive experience involving safety analyses for NNSA facilities. The team leader should have demonstrated leadership ability and strong skills in both oral and written communication. **The Team Leader is expected to be qualified in accordance with the LASO SABT Safety Analyst Technical Qualification Standard**. In the interim, the SABM may have Team Leaders for the purpose of on-the-job training, but all major decisions will be made by the SABM until the Team Leader is fully qualified to lead reviews. In addition, Team Leaders that are not fully qualified Safety Analyst, shall obtain the review and concurrence of a qualified SABT Safety Analyst prior to submitting a position to the SABM on a major decision or approval of a safety basis document.

Team composition can be as small as one for review of a USQ approval, non-nuclear facility HA, or

Category 3 Nuclear Facility. More complex reviews such as for a Category 2 Nuclear Facility, may involve from 5 to 7 members for full review of a Safety Analysis Report with an accompanying Technical Safety Requirements document. For these larger teams, topical leads may be assigned as necessary that are responsible for the work of several reviewers. For example, a Chapter 3 topical lead may compile and consolidate the comments involving Chapter 3.

The review team leader should be cognizant of the overall schedule and prioritization (using the LANL Prioritization List) of incoming AB documents (including project AB documents) negotiated by the LASO SABM with LANL SBO/Management. From this, the team leader is empowered to work within the framework of this Review Procedure to conduct an adequate review and resulting in possible approval of the assigned AB. The team leader is encouraged to work with LANL counterparts to plan the review and develop a schedule that supports the LANL commitments, while still ensuring adequate time for the review team to fulfill its functions. The extent of planning and scheduling related to how the review will be conducted, shall be determined by the review team leader or lead. An extensive review plan will not be necessary unless the LASO SABM and the Review Team Leader determine one is necessary.

4.2 In-Process Reviews

The SABM and review team leader will determine the need for and as necessary, schedule concurrent reviews with scheduled LANL in-process reviews identified at the 0% scoping meeting. These reviews can take place at approximately the 30-70-90 percent intervals of document completion as determined by the SABM (only). In some cases, a formal review (see section 4.3) will be conducted at 90% completion. The review team leader will determine the extent of team participation in in-process reviews including meetings, walkdowns and tours.

For projects including major modifications to nuclear facilities, the extent of SABT in-process review of project AB documents per the guidelines of Appendix G shall be negotiated between the SABM and LASO Project Management based on prioritization by LANL.

In-process reviews can provide LANL with high-level comments regarding the adequacy of the safety basis document and are intended to be a coaching or mentoring opportunity at various stages of completion so that there is reasonable confidence in promoting a once-through process for approval, with a minimum of defects and no "do-loops" involving whole AB documents. Such interim reviews can identify systemic issues and glaring deficiencies in the analysis or methodology used in the analysis early on in the process. The following table provides typical guiding expectations for such in-process reviews of SAR/TSR packages.

	30% Review	70% Review	90% Review
Expectations & Goals	• Facility description including facility processes and major work activities • LANL Peer Review of 30% Complete and available for 30% meeting and SBO formal transmittal has occurred	• All content in 30% review package updated and with comments incorporated • Comment resolution for the 30% review complete • LANL Peer Review of 70% Complete and available for 70% meeting and SBO formal transmittal has occurred for 70% document • Accident analysis complete	• Finalization of: • Accident analysis safety functions, safety system descriptions, functional and performance requirements, and system evaluations

	30% Review	70% Review	90% Review
	for 30% document • Hazard analysis is complete • Hazard analysis and accident analysis methodologies • Hazard identification, characterization, and evaluation • Risk ranking of postulated accident scenarios • Identification of candidate safety SSCs (SC and SS) • Identification of candidate accidents to be analyzed	• Safety functions and safety system descriptions per DOE-STD-3009-94, Ch. 4 for safety SSCs • Refined performance requirements identified through safety system evaluations • Criticality safety evaluations and controls identified • Preliminary set of TSRs (LCOs) and operational considerations for maintaining safety SSCs • Emergency management program described • Radiation and hazardous material protection programs described	• Derivation of technical safety requirements TSRs complete • Institutional programmatic controls • LANL Peer Review of 90% Complete and available for 90% meeting and SBO formal transmittal has occurred for 90% document • Comment resolution for the 70% review complete
Considerations	• Arrange facility presentations and conduct facility walkthroughs	• Defense in depth strategies identified and evaluated • Verification of accident analysis computational code applicability and use	

4.3 Formal Review Process

Document reviewers should support a 0% scoping meeting prior to beginning their review. This scoping meeting should be conducted by LANL at the start of the formal review process. The meeting may be a joint meeting with the LANL review team in attendance. The agenda for the meeting may include:

- Determination of LASO participation at the different stages of the in-process review
- Walk-down/tour facility (if existing facility) - See Appendix H
- Define review goals and expectations
- Specification of team roles & responsibilities
- Identify/meet counterparts, other reviewers, and observers
- Review schedule & milestones
- Outline of SAR Review Plan and assignments
- Records Management and QA considerations
- Security considerations

The SABT review will start only after the safety basis document is formally submitted by LANL to the LASO through SBO. As a minimum, the review should do the following:

- Use DOE-STD-1027-92 to verify the hazard categorization for nuclear facilities
- Verify the adequacy and content of the AB documentation to ensure that it meets DOE requirements and objectives
- Review the technical adequacy of the safety analysis methodology and results using technical judgment, applicable technical support documentation, and walk-downs of the facility (See

Appendix H) and operations

- Review the adequacy of safety analysis by reviewing the assumptions used, ensure that all hazards, relevant scenarios and controls are identified and that reasonable and conservative likelihood of occurrence estimates have been applied to unmitigated accident scenarios
- Obtain independent verification of analyses or calculations utilized in safety basis analyses as necessary
- Review the proposed controls for the prevention or mitigation of potential accident scenarios and the designation of their importance to safety for nuclear facilities.
- Evaluate whether selection of controls follows the guidance and preferences provided in DOE-STD-3009, Appendix A, Section A.4.
- Evaluate the identified defense-in-depth controls to understand the actual level of risk due to the operating facility.
- Evaluate whether sufficient information is presented to enable an assessment of the adequacy of identified controls and an understanding of the residual risk that the NNSA is accepting if the facility or operation is authorized.

Reviews will consider the review criteria provided in section 5 of this procedure. Criteria may be added or deleted as appropriate. There is no intention to document a response to each criterion. Rather, reviewers are expected to ask themselves these questions as they review the document, and generate appropriate detailed comments if the answer to a criterion is "No."

The review team will generate comments based upon their review. There is no DOE form that comments must be entered but there is a SABT comment form template (See Appendix F) that addresses the following:

- Identification of the team member, who authored the comment.
- Section or paragraph from the area of the document of which the comment applies. If the comment does not apply to a specific area, the abbreviation "Gen." may be used. Tables or Figures may be referenced also.
- Page number of the paragraph (as applicable)
- Designation on whether the comment is "Recommended" or "Suggested" (or equivalently required or suggested). There are no suggested comments on final submitted document.
- Recommended content of the comment: Comments shall not be phrased as questions. The intent of this requirement is that it has been noted that often questions are disguises for unrestricted "fishing expeditions". The NNSA reviewer is responsible for investigating all potential issues to the point that it is either determined to be an issue or is found to not be an issue. Once the issues are validated, the reviewer is responsible for translating the issue into a simple, detailed declarative statement about a deficiency for action and resolution by the contractor.
- Provide a clear statement of the deficiency or concern in the comment, so the Laboratory can understand and develop the appropriate resolution. Note: Discussions relative to clarification must be used with some discretion, as the contractor is responsible for producing a defensible document, which the Department can approve. Hence, DOE personnel should be careful when discussing how deficiencies can be addressed as they can at this time essentially could become writers of the document (a contractor responsibility) and thus loose vital independence and objectivity in relation to the document being produced.
- The DOE directive, code, standard, or clear logical argument that provides the basis for the comment. The intent of this requirement is to supply a traceable logic train back to

contractual requirements so that the comment is objective and not, for example, a "pet peeve".

- Editorial comments shall not be submitted as part of the official comment package but may be included at the end of the review as suggestions if authorized by the review Team Leader. The review team leader may elect to allow editorial comments to be informally provided to LANL.
- Review team members shall refrain from posing philosophical comments.

Reviewers should follow the guidance in rules 1 to 10 of section 3.5 of Reference 7.2.

4.4 Comment Resolution Process

Review team members will provide their comments to the review team leader in support of scheduled review milestones specified by the review team leader. The team leader consolidates and validates team comments in draft form, checks for and removes redundancies, and assembles them into one draft package. The team leader next calls the review team members together (i.e. internal review meeting) and reviews the comments together so that consensus is reached and misunderstandings are clarified before the draft package of comments is discussed with LANL at the review meeting. If applicable, the draft comments are brought by the review team leader to the 30%, 70%, or 90% meetings with LANL for discussion, verification and negotiation with LANL at the meetings as well as negotiating a path forward on comments as appropriate. During the 30%, 70%, or 90% meetings, the comments are again checked for logical defensibility with LANL. At the conclusion of the meeting, all comments are final (not draft), including LANL peer review comments, facility comments and NNSA comments. The finalized package of all comments are then attached to a NNSA transmittal memo and forwarded to LANL for action by the SABM or by the NNSA review team leader.

The team leader is expected to work with reviewers in a professional manner to either delete or rewrite comments that are not supportable as written. The review team leader makes the final determination on which comments are forwarded in the comment set to LANL. Unresolved disputes will be raised to the SABM.

The review team leader will accept the proposed comment resolution package back from LANL as part of the next review cycle. After a cursory review to ascertain that the resolutions appear to be responsive to the submitted comments, the team leader will forward the comment resolutions to the team members. Team members will then review the comment resolutions for acceptability. Team members will work with their assigned counterparts from LANL to identify satisfactory resolutions as necessary. The comment resolution at this stage should have been adequately fostered by the previous review meeting with LANL (30%, 70%, or 90%). The review team and the LANL AB document team will meet to discuss and agree on outstanding comment resolutions if needed. Both LASO and LANL leaders must be present so that closure can be formally agreed on. Ground rules for the meeting should be that all comments and issues will be resolved, or a path to resolution agreed on, before the meeting is adjourned. There are two possibilities for "forced closure:"

- If the LASO review team leader is not satisfied with a resolution, then an issue may be slated for inclusion in the SER in the form of conditions of approval to LANL.
- If the LASO review team leader and the SABM is satisfied with a LANL resolution, but a review team member remains unsatisfied, then the issue can be slated for inclusion in the SER as a minority opinion.

4.5 SER Preparation & Approval

The review team leader, with help from the review team, develops the SER to present the results of the review and provide a recommendation for approval. The SER content shall follow the guidance in DOE-STD-1104-96 graded for the specific safety basis document being reviewed. Significant deviations from DOE-STD-1104-96 should be discussed and justified as appropriate. A SER written for a non-nuclear facility should reasonably adapt the intent of DOE-STD-1104.

All review team members may sign the SER (recommended action, but not a requirement). If any team member has a significant disagreement with the content of the SER, that disagreement shall be documented in the SER to the team member's satisfaction, and the team member can sign the SER.

The SER should discuss the review team's findings. The basis for the findings should be included. Findings should be categorized based on their significance to safety to clearly distinguish those that are significant enough to warrant recommendation of disapproval of the AB documentation or approval of AB documentation with conditions for approval of the facility or operations. Also the SER should reflect the value added associated with the safety basis changes (e.g. hazard analyzes more complete resulting in higher confidence by the NNSA approval authority that the safety control set is adequate)

Prior to issuing the SER, the review team leader shall ensure factual accuracy of findings by providing LANL line management a copy of the draft SER and other pertinent information for validation of findings.

4.6 Capture Lessons Learned/Assessments

When possible, the review task will include a conscientious effort to record any lessons learned. One of the drivers for this revision to the SABT procedure is based upon lessons learned from the McClure report. An example is the incorporation of the 30%, 70% and 90% reviews into this procedure as well as guidance on content of reviews and structure of comments. The review team leader discusses the review with team members, LANL counterparts, and the LASO SABM. If a substantive change in this procedure is indicated, the review team leader prepares and makes the change. The facts behind such changes, plus other lessons learned, will be recorded in Appendix D.

The SABM will issue an annual self-assessment plan, which assigns staff to conduct internal reviews on a specific aspect on how SABT does business. In general, the plan will try to ensure all areas of how SABT does business per this procedure is reviewed at least once over a three (3) year period. The SABT team leaders for these self-assessments shall be qualified safety analysts and have either lead auditor/assessor training or experience. The assigned SABT team leader shall prepare a review plan, which documents the review acceptance criteria and identifies the other team members. The results of the self-assessment shall be documented in an internal memo from the team leader to the SABM. The SABM shall direct staff on areas needing improvement. Any lessons learned from such self-assessments shall be rolled into the next revision of the SABT review procedure.

Assessments of the Laboratory are done on a continual basis based on the quality of AB submittals and safety related issues that may arise for SABM /SABT action. The results of these assessments are typically documented in the LASO Memo from SABM to the Laboratory that transmits the official

NNSA position. If necessary, corrective actions will be closed as a condition of approval and verified by OFO. At the discretion of the SABM, results of SABT assessments may be informally conveyed to the responsible LANL group in a teaming approach to allow the Laboratory the opportunity to fix any deficiencies in their internal processes. In this case, any corrective actions are tracked by the internal LANL action tracking system.

5. Review Criteria

The criteria presented on the following pages as well as in Attachment 1 are recommended as an aid to focus the review and identify essential comments. There are three sets of criteria. The first set applies to Safety Analysis Reports and similar documents. The second set applies to Technical Safety Requirements and similar documents. The third set applies to Unreviewed Safety Question approvals.

Review comments that indicate that one or more of the following criteria are not met can be identified as essential, and must be resolved before the safety document can be approved.

All of the criteria will not apply to every safety basis document. The review team and review team leader determine applicability as part of the review process. There is no requirement for a documented response to individual criteria. Comments that indicate a criterion is not met will provide specific explanation and, if applicable, one or more examples of how the criterion is not met.

I. Criteria for SARs and Similar Documents

Has LANL completed its internal review according to reference 7.2 and determined that all relevant criteria have been met?

Chapter 1, Site Characteristics

Is the description of the location of the site, location of the facility within the site, its proximity to the public and to other facilities, and identification of the point where EGs are applied (i.e., location of MOI) clearly identified?

1.1 Are aspects of the surrounding area to the site that relate to assessment of the protection of the health and safety of the public clearly identified

1.2 Is the description of the basis for site characteristics in meteorology, hydrology, geology, seismology, volcanology, and other natural phenomena sufficient?

1.3 Have design basis or evaluation basis natural phenomena criteria been identified based upon proven and accepted methods?

1.4 Have sources of external accidents been clearly identified?

1.5 Have nearby facilities impacting, or impacted by, the facility under evaluation been identified?

Chapter 2, Facility Description

2.1 Does the facility overview include a clear discussion of facility inputs, outputs, mission, and history?

2.2 Is a description of the facility structure provided?

2.3 Is a description of the facility process systems provided?

2.4 Is a description of facility confinement systems provided?

2.5 Is a description of the facility safety support systems provided?

2.6 Is a description of the facility utilities provided?

2.7 Is a description of facility auxiliary systems and support facilities provided?

Chapter 3

Hazard Identification

3.1 Have hazards been systematically identified by type, quantity, form, and location?

3.2 Do the hazards and quantities identified cover all operations described in Ch. 2, Facility Description?

3.3 Are the hazards and quantities identified consistent with statements and assumptions made in the hazard and accident analysis detailed throughout Ch. 3?

3.4 Is the hazard category assigned for the hazards identified consistent with the methodology of DOE-STD-1027-92?

Hazard Evaluation

3.5 Is the hazard evaluation methodology (1) stated explicitly, (2) consistent with the analysis methods in reference 7.3, and (3) reasonably tailored to the type and complexity of operations examined?

3.6 Were facility operating personnel involved in the evaluation?

3.7 Was available information used for the analysis (e.g., procedures, process and equipment descriptions, flowcharts) consistent with that reasonably available from the facility?

3.8 Where holes existed in available information, was supporting information generated (e.g., summary descriptions, drawings, and flowcharts) sufficient to provide basic understanding of significant operations, key parameters, and controls?

3.9 Is a complete set of hazard evaluation worksheets/tables available and, if so, do they contain sufficient information?

3.10 Are the bases for consequence and likelihood binning at least qualitatively defined?

3.11 Is the scenario binning technique functional and applied consistently throughout the evaluation?

3.12 Are there any additional significant aspects of facility operations known to the reviewer(s), or noted in facility walkthroughs, that the hazard evaluation fails to cover?

Planned Design and Operational Safety Improvements

3.13 Is there evidence, documented in the SAR or separately, that the hazard analysis generated action items and recommendations that were assessed by facility and operations management?

Defense in Depth/Worker Safety

3.14 Is the selection and identification of safety significant SSC and TSR commitments in these sections consistent with those identified in the hazard analysis and indicative of a coherent process?

Environmental Protection

3.15 Are all major pathways for environmental insult identified and characterized?

3.16 Do the defense in depth measures identified provide reasonable and prudent prevention and mitigation for potential environmental releases?

Accident Selection

3.17 Is the accident selection consistent with the hazard analysis and the associated scenario binning?

3.18 Is the selection of natural phenomena and externally initiated events in accordance with DOE standards?

3.19 Do the accidents selected include all unique and representative accidents that could exceed Evaluation Guidelines and require unique controls?

Accident Analysis

3.20 Are the general principles or references used for accident modeling, including any computer codes used, characterized with sufficient amplifying information to clarify the bases for input and calculation?

3.21 Are standard accident analysis codes used, and is there evidence they were applied correctly, including code validation?

3.22 Is each scenario described in a clear sequence?

3.23 Are the functions of preventive and mitigative features associated with each scenario clearly explained?

3.24 Is documentation needed to support scenario description (e.g., seismic damage) presented, either in detail or as summary of a cited reference?

3.25 Is each complete scenario consistent with the hazard analysis and the rest of the SAR, and does it accurately reflect the findings of separate studies referenced?

3.26 Are the parameters used for calculation supported by technical references and/or reasonable experience from relevant and reliable sources and credible in the context of each overall scenario?

3.27 Are unmitigated consequences clearly identified and directly compared with Evaluation Guidelines to determine if a need for safety class SSC designation exists?

3.28 Does each scenario whose unmitigated consequences exceed EGs document a logical selection of safety-class SSCs and any additional TSR commitments?

3.29 Is there a clear understanding of mitigated consequences given the functioning of safety class SSCs?

Chapter 4, Safety Structures, Systems, and Components

4.1 Are design codes, standards, regulations, and DOE Orders specific to establishing the safety basis of the facility SSCs in this chapter identified.

4.2 Is the following information provided in a summary presentation: (1) identification of safety class and safety significant SSCs; (2) bases for identifying safety SSCs (i.e., accident(s) for which the safety SSC is needed).

4.3 Is each safety-class and safety-significant SSC designated in Ch. 3 covered in Ch. 4?

4.4 Has each safety-class SSC been assessed against standard criteria for safety class SSCs?

The remaining criteria in this section apply to each safety SSC:

4.5 Is there a clear and concise description of the safety function, including identification of specific accidents that the safety SSC prevents or mitigates?

4.6 Is there a description of its boundaries and interface points with other SSCs relevant to its safety function?

4.7 Are supporting and support systems identified?

4.8 Are functional requirements clearly and concisely provided (i.e., limited to those requirements necessary for the safety function)?

4.9 Do the functional requirements specifically address pertinent response parameters and environmental stresses related to each specific accident that the SSC has a safety function?

4.10 Are plant or process parameters that need to be monitored as part of the operation of the system identified?

4.11 Is there a description provided that specifies the principles by which it performs its safety function?

4.12 Are performance criteria necessary for the SSC to meet its functional requirements identified?

4.13 Is there a System Design Description referenced?

4.14 Have TSRs needed to ensure the safety function of the SSC been identified?

Chapter 5, Derivation of Technical Safety Requirements

5.1 Are the codes, standards, regulations, and DOE orders relevant to establishing TSR controls identified?

5.2 Is each control identified in Ch. 3 and 4 for TSR coverage discussed in Ch. 5?

5.3 Is the following information provided in a summary presentation: (1) relevant hazards; (2) major features relied on for protection against each hazard; and (3) the associated TSR coverage in terms of SLs, LCOs, SRs, ACs, and/or design feature designation?

5.4 Are the basic operational modes established in a way that the status of safety systems can be distinctly defined?

5.5 Are controls for auxiliary systems needed to support safety systems identified and included in the TSR?

5.6 Where necessary, are important assumptions or parameters used in the hazard analysis or accident analysis identified for establishing SRs and operability?

5.7 Does the Design Features section identify the important aspects of the passive design features not specifically required to have TSRs?

5.8 Are TSRs from other facilities that can affect

this facility's operations identified and summarized?

Chapter 6, Prevention of Inadvertent Criticality

6.1 Are fissile materials and their locations identified? Are potential criticality hazards identified? Do these hazards correspond with Ch. 3 identification?

6.2 Are engineering controls and their design basis and limits identified? Do these provide a basis for design limits and criteria to ensure criticality safety under normal, abnormal and accident conditions?

6.3 Are administrative controls summarized? Do administrative controls include procedures for handling, storing, and transporting fissile material?

6.4 Is the application of the double contingency principle characterized?

6.5 Are SSCs identified for criticality safety and parameters needed for TSR control identified and referenced to the appropriate sections of Ch 3, 4, and 5?

6.6 Is the criticality safety organization identified and described including staffing levels, positions of authority and responsibility, and staff qualifications? (This should address both the institutional organization and the facility element.)

6.7 Are criticality safety procedures characterized?

6.8 Is the training provided to workers for criticality safety described, including facility and activity specific training?

6.9 Are the analytical approaches used to determine criticality limits identified (codes, methods, and analysis techniques)? Are the approaches selected justified and appropriate?

6.10 Are the criticality safety inspections and audits described? Are the responsibilities, authorizations, and the criteria used to select items, functions, etc., included? Is record keeping described?

6.11 Is the criticality infraction program described including discussion of the provisions for infraction recovery? Is there a process for lessons-learned incorporation?

6.12 Are the criticality instrumentation and alarm systems used to detect and mitigate criticality events characterized? Are the methods and procedures used to place equipment described?

Chapter 7, Radiation Protection

7.1 Is the radiation protection program and its organization described?

7.2 Is the ALARA policy and program described?

7.3 Is radiological protection training characterized including that for general employees, radiation workers, radiation protection technicians, supervisors, and mangers involved in operations or maintenance for which radiation protection is required?

7.4 Are administrative limits established and identified for radiation exposure?

7.5 Are radiological practices for exposure control characterized and directly associated with radiological activities?

7.6 Is the basis and content of the dosimetry program characterized?

7.7 Is the plan and procedures for respiratory protection characterized?

7.8 Is the radiological program for material sampling and monitoring characterized?

7.9 Is radiological protection instrumentation characterized? Is calibration addressed?

7.10 Are the procedures for radiological protection record keeping characterized?

7.11 Are the predicted annual exposures for workers characterized? If new operations are addressed, is the exposure estimated and is a basis provided? Are the measured, predicted, and annual radiological exposure limits listed and compared with discrepancies addressed

Chapter 8, Hazardous Material Protection

8.1 Is the hazardous materials protection program and its organization characterized?

8.2 Is the ALARA policy and program characterized to a level consistent with the hazardous materials in the facility?

8.3 Are hazardous materials training requirements characterized for workers, supervisors, and mangers whose work involves hazardous materials, protection or training?

8.4 Is the program to identify hazardous materials described? Does the program include evaluation of material hazards and interface with relevant Laboratory programs and requirements?

8.5 Are administrative limits including control levels and exposure times identified and characterized?

8.6 Is the occupational medicine program characterized? Are applicable elements of the Laboratory's program identified?

8.7 Is the respiratory protection program characterized to include the types of equipment used during normal, abnormal, and accident conditions? Are testing, inspection, and other applicable elements of the program identified?

8.8 Is the hazardous material monitoring program and its relation to the Laboratory programs characterized?

8.9 Are hazardous material instrumentation requirements identified? Is the program associated with this instrumentation and its use characterized?

8.10 Are plans and procedures for the documentation and maintenance of the documentation for hazardous materials described?

8.11 Is the hazardous materials communication program described?

8.12 Are the operational predicted annual exposures to workers characterized? If applicable is this based on historical records? If a new operation, are estimates and their bases provided? Are predicted, actual, and limiting exposures compared and discrepancies discussed?

Chapter 9, Radioactive and Hazardous Waste Management

9.1 Is the radioactive and hazardous waste management program and organization described? Are interfaces between facility and Laboratory elements clearly defined? (If necessary, refer to Ch 17 for this information.)

9.2 Are the solid, liquid, and gaseous waste streams and sources, including estimates of inventories, characterized?

9.3 Are waste management and handling processes or treatment systems characterized for radioactive, mixed, and hazardous waste?

9.4 Are descriptions and summaries consistent with hazards identified in Ch 3 and processes described in Ch 2?

9.5 Are emission limits and permits applicable to the waste streams identified?

Chapter 10, Initial testing, In-service Surveillance, and Maintenance

10.1 Is the initial testing program characterized, including that required for a facility modification?

10.2 Is the in-service surveillance program characterized, including provisions for testing

and calibration, control and calibration of test equipment, trending of results, programmatic review and training for personnel performing surveillances?

10.3 Is the maintenance program characterized?

Chapter 11, Operational Safety

11.1 Is the conduct of operations program characterized?

11.2 Are the results of facility fire assessments, such as Fire Hazard Analyses, and actual facility walkdowns characterized? Do these summaries put the fire hazards into proper prospective and relate the important fire characteristics of concern?

11.3 Is the fire protection program characterized including fire management policies and philosophies as the basis for the program?

11.4 Is the combustible loading program characterized?

11.5 Is the fire fighting equipment, personnel, training, response procedures, etc., identified or referenced?

11.6 Is the fire prevention inspection program characterized including scheduling, discrepancy resolution, types and frequency of drills, and record keeping requirements?

Chapter 12, Procedures and Training

12.1 Is there a summary of how procedures are selected for development? Is there a description of how procedures are verified as technically correct, verified, and validated for normal, abnormal, and emergency operations, and for surveillance testing and maintenance?

12.2 Is there a summary of the provisions for documenting and controlling procedures including introduction of new procedures and changes in human-machine interfaces covered by procedures?

12.3 Is the process used to determine, develop, verify, and validate the technical content of training characterized? Are the subtopics in Section 12.4.1 of DOE Std 3009-94 addressed?

12.4 Are the provisions to ensure that training reflects the actual facility conditions characterized to include the introduction of new equipment and the reflection of current and modified procedures?

12.5 Is the process for maintaining training records characterized?

Chapter 13, Human Factors

13.1 Is the process for systematically evaluating the importance of human factors in facility safety characterized?

13.2 Are the measures used to perform a systematic inquiry into the human-factors interfaces with safety SSCs identified?

Chapter 14, Quality Assurance

14.1 Is the quality assurance organization and program characterized, including the policies and philosophies that are the basis for the program?

14.2 Is the organization structure of the quality assurance organization characterized including staffing levels, qualifications, positions of authority and responsibilities, interfaces with other safety organizations?

14.3 Are the programs, processes, and procedures used for quality improvement characterized, including those used for correcting adverse conditions that affect quality such as the identification and control of nonconforming materials, parts, and components?

14.4 Is the document and record control management program described as it is associated with quality assurance?

14.5 Are the processes used to ensure quality assurance is integrated into work control process(s), design, procurement, and testing and

inspection characterized?

14.6 Is the process for internal independent assessment and external verifications and audits of the quality assurance program described?

Chapter 15, Emergency Preparedness Program

15.1 Is the spectrum of emergencies that the emergency preparedness program is expected to respond to identified and characterized? Is this spectrum consistent with the hazards identified and analyzed in Ch 3?

15.2 Is the emergency response organization identified including authorities of key individuals and groups? Is the communications chain defined for notifying, alerting, and mobilizing necessary personnel? Is the position of the person with overall authority identified?

15.3 Is the process by which the onset of an operational emergency is recognized characterized? Are methods used to obtain meteorological data and estimate source terms described including specifics of type of code, if such is used?

15.4 Is the provision for notification of emergency response personnel identified and characterized? Are notification methods for DOE, federal, state, county, tribal, and other non-Laboratory organizations defined?

15.5 Are pertinent aspects of emergency facilities and equipment required to support the emergency response program identified and characterized?

15.6 Are the protective actions necessary to minimize the exposure to the public and workers characterized? Is medical and decontamination support characterized? Are important elements of evacuation plans characterized including times, routes, and methods of alerting?

15.7 Is the emergency response training program described to include initial and annual refresher training for all emergency response personnel? Are the drills and exercises that are part of the emergency response program characterized and is the range of different populations exposed to facility hazards characterized? If Ch 12 is referenced, is that information supportive and accurate?

Chapter 16, Provisions for Decontamination and Decommissioning

16.1 Is the conceptual plan for D&D characterized? Does the plan summary address design features to minimize the potential for spread of contamination?

Chapter 17, Management, Organization, and Institutional Safety Provisions

17.1 Is the facility organization characterized to include interfaces with respect to the management of the facility beyond the operating organization?

17.2 Are organizational responsibilities and authorities summarized? Are organizational interfaces characterized in this chapter or referenced to other programmatic chapters?

17.3 Are the bases for staffing levels and skills, knowledge, and abilities of personnel in identified organizations discussed? Are the programs and provisions for monitoring safety performance of this staff described?

17.4 Is the program and procedures used to ensure independent oversight, safety review, USQ determination, and appraisal of the safety performance of the organization characterized?

17.5 Is the configuration and document control program characterized?

17.6 Is the occurrence reporting program characterized?

17.7 Are the policies and programs used to promote an interest and involvement of workers in facility safety, facility a questioning attitude toward safety, and ensure workers understand risks to them and their coworkers described? Are methods used to promote and maintain a safety culture identified?

Common Criteria for all SAR Programmatic Chapters

(To be used with each Ch. 6 to Ch. 17 checklist)

18.1 Are all the relevant major topics of DOE-STD-3009 addressed?

18.2 If a major topic specified in DOE-STD-3009 is not covered due to application of the graded approach, is this discussed?

18.3 Are the applicable codes and standards identified? Are the applicable LANL Work Smart Standards included?

18.4 Do the descriptions of the major program elements reference the existing supporting documentation (i.e., LANL program LIR and/or facility plan)?

18.5 Do the descriptions of the major program elements include brief abstracts of referenced documentation with enough of the salient facts to provide an understanding of the referenced documentation and its relation to this chapter?

18.6 Do the program descriptions include the administrative controls identified in the Ch. 3 hazard analysis?

18.7 Are cross-references to material in other chapters accurate and is the referenced material adequate to address the subject of the chapter under review.

II. Criteria for TSRs and Similar Documents

0.1 Has LANL completed its internal review according to reference 7.2 and determined that all relevant criteria have been met?

TSRs - Sections 1 and 2

1.1 Does Sec. 1 include a list of defined terms that contain the terms used in the TSR document that require clarification of the intent of their use?

1.2 Are the definitions clear, and are they consistent with standard usage and with the intended use of the terms?

1.3 Does Sec. 1 define the operating modes of the facility clearly in terms of operational conditions? Is there an adequate explanation of the use and application of operating modes?

1.4 Does Sec. 1 include the standard use and application explanations for the following TSR devices:

- Logical Connectors
- Completion Time
- Frequency Notation
- Safety Limits
- Limiting Control Settings
- Limiting Conditions for Operation
- Surveillance Requirements

2.1 Are the safety limits included in Sec. 2 consistent with the safety limits established in the SAR? If no safety limits are required does Sec. 2 so state?

TSRs - Section 3, LCOs

3.1 Do the LCOs identified in the TSR agree with those identified in Ch. 3 and 5?

3.2 Are the operability requirements for each of the SSCs covered by LCOs been clearly identified? Are they unambiguous, concise, so as to not lead to misinterpretation?

3.3 Is the mode applicability adequate for each of the LCOs?

3.4 Is the facility or activity applicability adequate for each of the LCOs?

3.5 Are the remedial actions adequate for the conditions? Do they ensure or complete the necessary safety function or take the facility to a safer condition as they are implemented?

3.6 Does each of the remedial actions have completion times, and are they adequate to allow implementation and ensure safety?

TSRs - Section 4, Surveillances

4.1 Is there at least a one-to-one correspondence between LCOs requirements and SRs?

4.2 Are the SRs explicit enough to ensure the LCOs' requirements are met?

4.3 Does each of the SRs have a completion time?

4.4 Is each of the completion times adequate?

4.5 Does the bases provide enough information to support the SRs and their completion times?

TSRs - Section 5, Administrative Controls

5.1 Is Conduct of Operations as implemented at the Laboratory included?

5.2 Is there a commitment to the appropriate Quality Assurance program?

5.3 Are minimum staffing requirements addressed? Are staffing requirements by mode or operation addressed? (Ref DOE G 423.1-1, Section 5.2.4, Step 5)

5.4 Is there a specific commitment to personnel qualification and training? Does this commitment identify the program or requirement that will govern qualification and training? Is the commitment consistent with information found in the SAR, particularly Ch 12 and 14? (Ref DOE G 423.1-1, Section 5.2.4, Step 7)

5.5 Is a program for conduct of in-service inspection and testing committed to and is it consistent with the commitments in Ch 10?

5.6 Is there a commitment to configuration management program that includes document control, work control, and change control. Is the USQ program as required by 10 CFR 830.203 committed to?

5.7 If criticality safety is applicable, is there a commitment to criticality safety including the physical and administrative controls essential for the program. Is the criticality control program briefly described. Is the description consistent with Ch 6 of the SAR?

5.8 Are material inventory controls addressed? Are all materials requiring control identified? Do material controls identify where the limits apply? Do material limits address how the limits will be controlled?

5.9 Is fire protection adequately addressed.

5.10 If the requirements of 29 CFR 1910.119 are applicable, do the TSR administrative controls contain a commitment to process safety management?

5.11 Are radiological effluent control and ventilation filter testing addressed?

5.12 Is radiological protection addressed?

5.13 Is emergency planning addressed? Is there a specific commitment to an emergency plan and is this commitment consistent with the emergency planning SAR programmatic discussion?

5.14 If applicable, are explosive gas or toxic substances monitoring programs addressed?

5.15 Are other safety programs committed to in the SAR and relied upon for worker or public safety in the hazard and accident analysis included and consistent with the SAR?

5.16 Are facility procedures addressed? Does this description include how changes in the TSR are included in the procedures? Are specific procedure types identified that are managed under this control? Do these types encompass all the TSR commitments that would require a procedure? Are other documents referenced that detail how these commitments are met? Are the discussions consistent with corresponding discussions in the SAR?

5.17 Is the contractor organization and management structure addressed?

5.18 Is the safety review and audit process addressed?

5.19 Are reporting requirements for TSR deviations included in the administrative controls? A commitment to report deviations in accordance with DOE requirements should be included.

5.20 Is there a description of the process for revising the TSRs?

5.21 Is recordkeeping addressed? Does the discussion include the types of records that are kept, storage requirements, retention times, and retrievability requirements?

TSRs – Appendix A, Bases

6.1 Are all technical bases presented in a clear, logical and concise manner that follows the format of the Attachment to DOE 5480.22 and facilitates the evaluation of unreviewed safety questions that may arise from investigating changes to operating parameters of safety controls or potential changes to the margin of safety?

6.2 For each TSR specified (e.g., SL, LCO, LCS), are the technical bases directly based upon specific sections (including references) the hazard or accident analyses contained within Ch. 3 of the SAR/BIO?

6.3 For each TSR specified (e.g., SL, LCO, LCS) that impacts the operation of a safety SSC, are the technical bases directly based upon safety function and system evaluations (including references) contained within Ch. 4 of

the SAR/BIO?

6.4 For each TSR specified (e.g., SL, LCO, LCS), do the technical bases take into account assumptions or uncertainties that have potential impact to the hazard/accident analyses?

6.5 For each TSR specified (e.g., SL, LCO, LCS), are the technical bases for not considering specific operating modes provided?

6.6 For each action statement contained within a LCO, do the technical bases allow for the conclusion that the margin of safety has not been compromised?

6.7 For each action statement contained within a LCO, do the technical bases allow for the conclusion that the completion time for an action is acceptable?

6.8 For each action statement contained within a LCO where actions partially compensate for loss of a safety function, do the technical bases allow for the conclusion that the margin of safety has not been compromised?

TSRs – Appendix B, Design Features

7.1 Is a detailed description of each vital passive component, including functions, dimensions, design criteria, applicable codes and standards, materials used, in-service inspection required, manufacturer, and all details that must be considered prior to alteration, modification, or replacement discussed in a clear and concise manner?

7.2 Is the configuration and physical arrangement, for cases where it is a safety concern, discussed? Are details pertaining to the design provided (e.g., configuration or physical arrangement including dimensions) and the reasoning behind the design?

7.3 For cases where the safe operation of the facility is dependent on any component being constructed of a particular material, is the component and system identified, as well as the special material involved, any in-service inspections required of the material or component, and any special operational considerations such as maximum/minimum temperature, pressure, flow, or chemical concentration?

7.4 Are site characteristics such as the locations of public access roads, collocated facilities, facility area boundaries, site boundaries, nearest residence distances, etc., presented?

III. Criteria for Approval of Unreviewed Safety Questions

0.1 Has SBO completed its internal review and determined that the 7 questions have been adequately answered?

0.2 Has the scope of desired/incumbent change been clearly identified and justified?

0.3 Have new or altered hazards been systematically identified and analyzed?

0.4 Are hazards commensurate with the scope of the identified changes?

0.5 Are evaluations or conclusions to relative to affect on current approved safety basis defendable?

0.6 If any new or modified controls are needed, have they been identified and described?

0.7 Have the functions and functional requirements of new or modified safety SSCs been described?

0.8 Is the appropriate level of approval (i.e. NNSA vs. LANL) for changes identified?

6. Records

Controlled copies of the following documents will be maintained for the lifetime of the facility.

6.1 Approved AB Document(s) - This document is controlled by LANL.

6.2 SER - This document is controlled by LASO.

6.3 AB document changes and USQs - These documents are controlled by LANL.

6.4 Comments Resolutions - Record only, no changes expected.

7. References

7.1 DOE-STD-1104-96, "Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports"

7.2 LANL Review Plan for Nuclear Safety Analysis Documents, Rev.1, 1/15/02

7.3 DOE-STD-3009-94, "Preparation Guide For U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports"

7.4 10 CFR 830, Subparts A & B - "Nuclear Safety Management"

7.5 DOE G 423.1-1, "Implementation Guide for Use in Developing Technical Safety Requirements"

7.6 DOE G 421.1-2, "Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830"

7.7 DOE-STD-1027-92, "Hazard Categorization and accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports"

7.8 DOE O 420.1, "Facility Safety"

7.9 DOE G 420.1-1, "Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide For Use with DOE O 420.1, Facility Safety"

7.9 DOE O 413.3, "Program and Project Management For the Acquisition of Capital Assets"

7.11 DOE M 413.3-1, "Project Management for the Acquisition of Capital Assets", Chapter 13, "Integrated Safety, Environmental, Quality Assurance, and Safeguards and Security"

Appendix A - Review Team Capability Matrix)

Note: Changes to Appendices will not result in a new revision of this procedure. Instead, the decimal part of the revision number will be incremented. For example, Rev. 2.0 will become Rev. 2.1

	Team Leader	Site Characteristics	Facility Description	Hazard & Accident Analyses	Safety SSCs	Derivation of TSRs	Prev. of Inadvertent Crit.	Radiation Prevention	Haz. Matl. Protection	Waste Management	Testing, Surv., & Maint.	Operational Safety	Procedures & Training	Human Factors	Quality Assurance	Emergency Preparedness	Decontam. & Decom.	Mgt., Org., & Inst. Safety	TSRs	USQs
Chris Steele, LASO SABM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dae Chung, DOE/EM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Richard Tom, LASO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Daisy Nez, LASO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nick Sandoval, LASO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lee Knoell, LASO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Randy Janke, LASO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
John Fredlund, LASO		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Joe Houghton, LASO		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X
Frank Rowsome, HQ																				
Doug Minnema, HQ																				

Appendix B - Generic Review Schedule (This section for guidance only)

Note: Changes to Appendices will not result in a new revision of this procedure. Instead, the decimal part of the revision number will be incremented. For example, Rev. 2.0 will become Rev. 2.1

This appendix identifies typical milestones and possible durations (in weeks) for tasks supporting the review of LANL safety basis documents. Since Safety Analysis Reports (and similar documents) and Technical Safety Requirements (and similar documents) are subject to a graded approach, a range of durations is provided. When the duration or scheduling of a task is LANL's responsibility, the duration is just "LANL."

	Safety Analysis Reports, etc.			Technical Safety Requirements, etc.			Unreviewed Safety Questions
	S	M	L	S	M	L	
Review Task Established	0	0.5	1	0	0.5	1	On delivery
Preliminary Schedule	0	1	2	0	1	2	N/A
Identify Team Members	0.5	2	3	0.5	1	2	0.5
Qualify Team Members	0.5	1	2	0.5	1	1	0.5
Develop Review Plan	0.5	1	1	0.5	1	1	N/A
30% In-process review	N/A	LANL	LANL	N/A	LANL	LANL	N/A
70% In-process review	N/A	LANL	LANL	N/A	LANL	LANL	N/A
90% In-process review	N/A	LANL	LANL	N/A	LANL	LANL	N/A
Review Kick-off meeting	LANL	LANL	LANL	LANL	LANL	LANL	N/A
Formal Review	3	3-4	4	3	3	4	0.5 - 4
Package/Fwd comments	0.5	1	2	0.5	0.5	1	0.5
Resolutions from LANL	LANL	LANL	LANL	LANL	LANL	LANL	LANL
Review resolutions	0.2	0.5	1	0.2	.5	1	<1
Prepare SER	2	3	3	Coordinate w/SAR			0.2
Approve/Issue SER	0.2	0.2	0.2	Coordinate w/SAR			0.2
Closeout/lessons-learned	0.2	0.2	0.5	0.2	0.2	0.5	0.2

S - Small (not complex) M - Medium (moderate complexity) L - Large (very Complex)

Appendix C - Definitions

Note: Changes to Appendices will not result in a new revision of this procedure. Instead, the decimal part of the revision number will be incremented. For example, Rev. 2.0 will become Rev. 2.1

1. **Accident**. An unplanned sequence of events that results in undesirable consequences.
2. **Accident Analyses**. Refers to those bounding analyses selected for inclusion in the safety analysis. These analyses refer to design or evaluation basis accidents. Consequences are compared with Evaluation Guidelines to identify safety-class structures, systems, and components.
3. **Administrative Controls**. Provisions relating to organization and management, procedures, record keeping, assessment, and reporting necessary to ensure safe operations.
4. **Albuquerque Operations Office Safety Management Functions, Responsibilities, and Authorities** (AL FRA). Documents AL organizational roles, relationships, and delegations of authority (obsolete due to realignment to Service Center).
5. **Approval Authority** (AA). Head of a Departmental Element who has been delegated the authority to approve safety basis documentation required to authorize operations.
6. **Authorization Agreement**. A documented agreement between DOE and the contractor incorporating the results of NNSA's review of the contractor's proposed authorization basis for a defined scope of work. Authorization agreements are usually developed for high hazard nuclear facilities (Category 1 and 2). The authorization agreement contains key terms and conditions (controls and commitments) under which the contractor is authorized to perform work. Any changes to these terms and conditions would require DOE approval.
7. **Authorization Basis**. Those aspects of the facility design basis and operational requirements relied upon by NNSA to authorize operation.
8. **Basis for Interim Operation (BIO).** Documented establishment of a safety basis for current facility operations and operational controls until more detailed documentation is developed and approved by the Department or until the facility is removed from service.
9. **Defense-in-depth**. Successive layers of barriers used to reduce risks associated with the facility and operations, and constructed in a manner that no one layer is completely relied upon.
10. **Design Basis**. The set of requirements that bound the design of systems, structures, and components within the facility. These design requirements include consideration of safety, plant availability, efficiency, reliability, and maintainability. Some aspects of the design basis are important to safety, although others are not.
11. **Design Basis Accidents** (DBA). Accidents that are postulated for the purpose of establishing functional requirements for safety significant structures, systems, components, and equipment.
12. **Engineered Safety Features**. Systems, components, or structures that prevent and/or mitigate the consequences of all potential accidents including the bounding design basis accidents.
13. **Evaluation Guidelines**. Hazardous material dose/exposure values that the safety analysis evaluates

against. The intention is that theoretical individual doses/exposures exceeding the Evaluation Guidelines should not occur at a given point, unlike other values, such as emergency planning thresholds. Offsite Evaluation Guidelines are established for the purpose of identifying and evaluating safety-class structures, systems, and components. Onsite Evaluation Guidelines are not required for adequate documentation of a safety basis.

14. **Facility**. Any equipment, structure, system, process, or activity that fulfills a specific purpose.

15. **Hazard**. A source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to an operation or to the environment (without regard for the likelihood or credibility of accident scenarios or consequence mitigation).

16. **Hazard Analysis**. A determination of material, system, process, and plant characteristics that can produce undesirable consequences, followed by the assessment of hazardous situations associated with a process or activity. Largely qualitative techniques are used to pinpoint weaknesses in design or operation of the facility that could lead to accidents.

17. **Hazard Classification**. Evaluation of the consequences of unmitigated releases to classify facilities or operations into the following hazard categories:

    - Hazard Category 1: The hazard analysis shows the potential for significant offsite consequences.
    - Hazard Category 2: The hazard analysis shows the potential for significant onsite consequences.
    - Hazard Category 3: The hazard analysis shows the potential for only significant localized consequences.

18. **Important to Safety**. Equipment important to safety is intended to include any equipment whose function can impact safety either directly or indirectly. This includes safety-class, safety-significant, and defense-in-depth equipment, equipment relied upon for safe shutdown, and in some instances, balance-of-plant equipment.

19. **Justification for Continued Operations** (JCO). A formal means for a Managing and Operating (M&O) contractor to obtain DOE approval of operations on a temporary or interim basis when the current authorization basis requirements can not be fully met. (No longer use because not a recognized safe harbor per 10 CFR 830, Subpart B)

20. **Limiting Conditions for Operation** (LCO). The lowest functional capability or performance level of safety-related structures, systems, components and their support systems required for normal safe operation of the facility.

21. **Limiting Control Settings** (LCS). Settings on safety systems that control process variables to prevent exceeding Safety Limits.

22. **Line Management**. Any management level within the line organization, including contractor management, who is responsible and accountable for directing and conducting work.

23. **Line Organization**. That unbroken chain of command that extends from the Office of the Secretary to Secretarial Offices that set program policy and plans and develop assigned programs, to the field element organizations responsible for execution of these programs, to the contractors that conduct the work.

24. **Margin of Safety**. That margin built into the safety analyses of the facility as set forth in the authorization basis acceptance limits.

25. **Mitigative Feature**. Any structure, system, or component that serves to mitigate the consequences of a release of hazardous materials in an accident scenario.

26. **Non-Reactor Nuclear Facility**. Those activities or operations that involve radioactive and/or fissionable materials in such form and quantity that a nuclear hazard potentially exists to the employees or the general public. Included are activities or operations that:

    - Produce, process, or store radioactive liquid or solid waste, fissionable materials, or tritium;
    - Conduct separation operations;
    - Conduct irradiated materials inspection, fuel fabrication, decontamination, or recover operations;
    - Conduct fuel enrichment operations; or
    - Perform environmental remediation or waste management activities involving radioactive materials.

    Incidental use and generating of radioactive materials in a facility operation (e.g., check and calibration sources, use of radioactive sources in research and experimental and analytical laboratory activities, electron microscopes, and X-ray machines) would not ordinarily require the facility to be included in this definition. Accelerators and reactors and their operations are not included.

27. **Nuclear Facility**. Reactor and nonreactor nuclear facilities.

28. **Potentially Inadequate Safety Analysis** (PISA). Situations in which the safety analysis supporting the current/interim authorization basis which DOE relies to limit the risks associated with operation of the facility to an acceptable level is potentially inadequate.

29. **Preventive Feature**. Any structure, system, or component that serves to prevent the release of hazardous material in an accident scenario.

30. **Reactor**. Unless modified by words such as containment, vessel, or core, the entire reactor facility, including the housing, equipment, and associated areas devoted to the operation and maintenance of one or more reactor cores. Any apparatus that is designed or used to sustain nuclear chain reactions in a controlled manner, including critical and pulsed assemblies, and research, test, and power reactors, is defined as a reactor. All assemblies designed to perform subcritical experiments that could potentially reach criticality are also to be considered reactors. Critical assemblies are special nuclear devices designed and used to sustain nuclear reactions. Critical assemblies may be subject to frequent core and lattice configuration change and may be used frequently as mockup of reactor configurations.

31. **Residual Risk**. Total qualitative risk posed by the operations using known hazards and controls information and the identification of areas where risk is not known, unclear or ill-defined.

32. **Risk**. The quantitative or qualitative expression of possible loss that considers both the probability that a hazard will cause harm and the consequences of that event.

33. **Safety Analysis**. A documented process: (1) to provide systematic identification of hazards within a given NNSA operation; (2) to describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and (3) to analyze and evaluate potential accidents and their associated risks.

34. **Safety Analysis Report**. A report that documents the results of safety analysis to ensure that a facility can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations.

35. **Safety Basis**. The combination of information relating to the control of hazards at a facility (including design, engineering analyses, and administrative controls) upon which DOE depends for its conclusion that activities at the facility can be conducted safely.

36. **Safety-class structures, systems, and components** (safety-class SSCs). Systems, structures, or components including primary environmental monitors and portions of process systems, whose failure could adversely affect the environment, or safety and health of the public as identified by safety analyses. For the purpose of implementing this Standard, the phrase "adversely affect" means Evaluation Guidelines are exceeded. Safety-class SSCs are systems, structures, or components whose preventive or mitigative function is necessary to keep hazardous material exposure to the public below the offsite Evaluation Guidelines. This definition would typically exclude items such as primary environmental monitors and most process equipment.

37. **Safety Evaluation Report** (SER). For a given facility or operation, documents that an appropriate review of the authorization basis documents was conducted. The SER also documents the bases for approving the documentation and may recommend any conditions for approval.

38. **Safety Limits** (SL). Limits on process variables associated with those physical barriers, generally passive, that are necessary for the intended facility functions and which are found to be required to guard against the uncontrolled release of radioactivity and other hazardous materials (this includes releases into the complex and/or the community).

39. **Safety-significant structures, systems, and components** (safety-significant SSCs). Structures, systems, and components not designated as safety-class SSCs but whose preventive or mitigative function is a major contributor to defense in depth (and/or worker safety as determined from safety analyses. As a general rule of thumb, safety-significant SSC designations based on worker safety are limited to those systems, structures, or components whose failure is estimated to result in an acute worker fatality or serious injuries to workers. Serious injuries, as used in this definition, refers to medical treatment for immediately life-threatening or permanently disabling injuries (e.g., loss of eye, loss of limb) from other than standard industrial hazards. It specifically excludes potential latent effects (e.g., potential carcinogenic effects of radiological exposure or uptake). However, dose assessments should consider significant chemical exposures in addition to radiological exposures. The general rule of thumb cited above is not an Evaluation Guideline. It is a lower threshold of concern for which safety-significant SSC designation may be warranted, not a quantitative criteria. Estimates of worker consequences for the purpose of safety-significant SSC designation are not intended to require detailed analytical modeling. Considerations should be based on engineering judgment of possible effects and the potential added value of safety-significant SSC designation.

40. **Safety structures, systems, and components** (safety SSCs). The set of safety-class structures, systems, and components, and safety-significant structures, systems, and components for a given facility.

41. **Technical Safety Requirements** (TSR). Those requirements that define the conditions, the safe boundaries, and the management or administrative controls necessary to ensure safe operations for nuclear explosives, and nuclear facilities. TSR for nuclear explosive operations are those controls that provide the greatest qualitative contribution to the protection of the public and facility workers by reducing the risk of meeting or exceeding the NEO Evaluation Guidelines.

42. **Unreviewed Safety Question Determination** (USQD). A risk-based process to determine if the authorization basis would be impacted and provide contractors at nuclear facilities with the

flexibility needed to conduct day-to-day operations by allowing contractor to make limited changes without NNSA approval.

43. **USQD Safety Evaluation**. The record that documents the review of a proposed activity, the scope of the evaluation, and the logic for determining whether or not a USQ exists. Safety Evaluations require professional judgement or technical analysis up to and including a probability and risk assessment.

44. **USQD Safety Evaluation Screen**. A formal methodology used by the contractor to determine if it is necessary to perform a USQD Safety Evaluation, reduce efforts when change has no safety significance, and focus efforts on changes that are important to safety.

45 **Undue Risk**. Level of identifiable risk that is excessive and unacceptable to the Department.

Appendix D - Lessons Learned

Note: Changes to Appendices will not necessarily result in a new revision of this procedure. Instead, the decimal part of the revision number will be incremented. For example, Rev. 2.0 will become Rev. 2.1

This appendix captures the lessons learned from safety basis document reviews. When such a lesson results in a change to the body of this procedure, the facts behind the change will be explained here.

LESSONS LEARNED

A. Submit an electronic copy of all SAR submittals along with the hard copy and ensure they are the same versions. The electronic copy should be in WORD format if possible.

B. Submit the actual TSR page change (ready to issue) with all TSR change requests.

C. Ensure that SAR submittals conform to requirements for submittal spelled out in the LANL review procedure appended to this procedure.

D. The Team Leader or who ever receives a submittal for review or approval shall date the received submittal on the date it was received from LANL because the date on the submittal letter does not always agree with the date received at LASO. This date is important for contractually required due items.

E. SERs written for SAR approvals shall in detail explicitly address how open findings (e.g., such as indicated in the McClure Report, EH findings, ISM findings, past audits, DNFSB findings, etc.) are closed out. A good example of how to do this is the TWISP SER signed in 2000.

F. TSR change requests do not require a USQD because a TSR change request already requires NNSA approval and a USQD would be redundant paper work.

G. When possible, walkdowns (See Appendix H) shall always be conducted for USQ, SAR, HA, or TSR changes.

H. Always request the actual contractor calculation files in support of AB documents.

I. The whole AB document should be reviewed, upon re-submittals by the Laboratory that incorporate previous NNSA comments. It is possible that changes may have been incorporated into areas of the AB document that NNSA did not comment on.

J. Laboratory should be requested to provide a document that show how and where NNSA comment resolutions are incorporated into the re-submitted AB documents.

K. Assigned SABT review team leads should issue assignments and schedule of team deliverables prior to start of AB reviews.

L. SABT staff shall follow the established internal quality procedures without deviation, or be held accountable to the SABM.

M. SABT staff shall not discuss nor disclose draft comments or issues with the Laboratory prior to the internal review process, or be held accountable to the SABM.

N. Federal subcontractors providing technical support to SABT shall not be allowed to provide direction to the Laboratory, and staff knowing of this situation without stopping it, shall be held accountable to the SABM.

O. The SABM or acting authorization basis manager shall not make behind the scene or backroom agreements with the Laboratory without briefing staff of such agreements. This precludes staff from being in a position of not knowing all of the facts related to performing their job. In addition, such "deals" result in poor moral, lack of trust and reflects inadequate leadership.

P. The LASO Facility Operations shall be given the opportunity to review and comment by an established due date on submitted AB documents for review and approval.

Q. The SABM or acting authorization basis manager shall not reject AB submittals based on "surface" issues only and before completion of the internal review process. This does not mean, a submittal would not be returned if the LANL Safety Basis Office (SBO) did not perform a quality check.

R. Provisions (condition of approval) shall be stated in the SER for important facility documentation such as the Master Equipment List (MEL) and final System Design Descriptions (SSDs) to be verified by LASO Facility Operations in being complete in identifying all safety systems and components from approved AB.

S. Provisions (condition of approval) shall be stated in the SER or SABT basis for approval/concurrence for LASO Project Management to verify that initial and interim SDDs or equivalent documentation are sufficiently linked and supports those safety systems described in AB documents (PDSA or DSA) submitted to NNSA for review and approval/concurrence for major modifications or new construction.

T. For a new nuclear facility, where the confinement ventilation system is identified to be important to safety, the SABT basis for approval/concurrence of the PDSA shall be conditional on LASO Project Management verifying provisions are made in the confinement ventilation SDD to support adequate testing of HEPA filters (i.e. location of injection and sampling ports). Likewise, if fire dampers are identified to be important to safety to preclude spread of a building fire, SABT approval/concurrence shall be conditional on Project Management verifying the SDD includes the appropriate functional requirements and performance criteria relating to the design, operation and testing of the fire dampers.

U. For an existing nuclear facility, where the confinement ventilation system is identified to be important to safety, the SABT SER for approval of the DSA shall be conditional on LASO Facility Operations verifying that sufficient injection and sampling ports are in place to support testing of the HEPA filters. If fire dampers are important to safety related to preventing the spread of a building fire, SABT approval shall be conditional on Facility Operations verifying procedures or engineered features are in place that ensures fire dampers can perform their intended safety function.

V. The SABT response to any verbal inquiries from LANL regarding AB issues, will be to tell the individuals to put their concerns in writing and route it through the appropriate LANL channels (i.e., LANL SBO) for formal NNSA response. This policy does not apply when the SABM has agreed to assist LANL on AB issues in a technical assistance mode.

W. Compliance with an approved Safety Basis or TSR Implementation Plan (IP) is mandatory as an Authorization Basis requirement and failure to comply with the IP constitutes an AB violation.

APPENDIX E

FY 2004 OPERATIONAL PLAN, REVISION 1
Safety Authorization Basis Team
(SABT)

U. S. Department of Energy
National Nuclear Security Administration (NNSA)
Los Alamos Site Office

National Nuclear Security Administration

I. GOAL: To ensure that LANL maintains a high quality Safety Analysis Program that results in adequate safety basis documentation.

Objectives:

1. Improve the quality and timeliness of all LANL Authorization Basis (AB) Documents, with particular emphasis on Basis for Interim Operations (BIO's) and Safety Analysis Reports (SAR's) and the supporting Hazards Analysis (HA's) and Technical Safety Requirements (TSR's).

2. Review of AB Documents is completed in a thorough and timely manner.

Actions:

1. During the review of LANL BIO's or SAR's, SABT staff will participate in the review of these documents at the levels (30%, 70%, 90% and 100%) negotiated during the zero percent "scoping" meeting. The quality of the SABT review will be judged by the lack of critical comments from LANL Safety Analysis professionals, the SABM, or other interested parties. 30-day timelines are the expected turnaround around times for these reviews.

2. The SABT member leading the review will develop a proper Safety Evaluation Report (SER) based on the guidance of DOE-STD-1104-96. The SER will be completed within one (1) month of completing the 100% review unless an extension is granted by the SABM.

3. The SABT will ensure that the Hazard Analysis (HA's) and/or Accident Analysis (AA) supporting the reviewed document is technically defensible. This shall be measured by a lack of critical comments concerning the SABT review from either LANL, the SABM, or other interested parties. Expectations for quality shall be conveyed to the LANL Safety Basis Office (SBO) only by qualified safety analysts. Analysts that are not yet qualified, shall obtain review by a qualified analyst prior to addressing quality issues to LANL.

4. Assignments and due dates for review of LANL AB Documents will be met on time. The SABM has the expectation that consideration of productivity and meeting schedule and quality requirements will be a major input into consideration for awards of all types.

5. SABT will partner with SBO to the maximum extent practical without comprising the necessary objectivity required to perform its oversight duties, in order to assist the Laboratory in developing and maintaining a technically sound authorization basis process.

6. SABT staff performance evaluations will take into account completion of actions 1,2,3,4 and 5 above.

Expected Results

1. All LANL facilities shall operate within their approved Authorization Basis, while minimizing programmatic impacts.

2. The quality of AB documents received from LANL should demonstrate sustained and significant improvement. The process, as overseen by SBO, should consistently produce documents that can be approved upon submittal. This should be demonstrated by a decreasing number of critical comments or formal rejection from SABT reviewers.

3. NNSA SERs written by SABT shall be technically defensible and receive little to no critical comments from external oversight groups or program customers.

II. GOAL: **The laboratory's USQ process will be adequate to ensure that all operational changes made to any nuclear facility are properly evaluated relative to the facility's Authorization Basis and all changes are appropriately authorized.**

Objectives:

1. Improve the quality of LANL Unreviewed Safety Question (USQ) process and the resultant USQ's.

2. Ensure the reviews of LANL USQ's are completed in a thorough and timely manner (30-day turnaround times).

Actions:

1. All USQ's will be properly dispositioned within one (1) month of receipt. Less complex USQ's are expected to be turn around in shorter times.

2. The SABT will ensure that any Hazard Analysis (HA) supporting a USQ is technically defensible. This shall be measured by a lack of critical comments concerning the SABT review from either LANL, the SABM or other interested parties. Expectations for quality shall only be conveyed to SBO by qualified safety analysts. Analysts that are not yet qualified, shall obtain review by a qualified analyst prior to addressing quality issues to LANL.

3. SBO review and transmittal of the USQD shall be confirmed by the SABT lead for the USQ. As necessary, the USQD will be formally returned immediately to LANL for SBO review and transmittal in accordance with established LANL USQ procedures.

4. SABT shall work with SBO to develop and initiate a performance feedback process to improve the LANL USQ process and quality of submittals. In part, this will involve the continued SABT review and concurrence with revisions to LANL USQ procedures.

5. SABT staff performance evaluations will take into account actions 1-4 above.

Expected Results

1. All LANL facilities shall operate within their approved Authorization Basis, while minimizing programmatic impacts.

2. The quality of USQ's received from LANL should demonstrate a gradual improvement. This should be demonstrated by a decreasing number of critical comments from SABT reviewers.

3. The USQ process, as overseen by SBO, should consistently produce USQD submittals that are approvable upon receipt by LASO.

III. GOAL: Ensure the safety and health of workers, members of the public, and the protection of the environment in providing AB support to Departmental mission critical programs, while striving to demonstrate organizational excellence in this process. .

Objectives:

1. Improve federal technical workforce capabilities.

2. Recruit, deploy and retain federal personnel with the demonstrated technical capability to safely accomplish the Department's safety missions and responsibilities.

3. Maintain technical proficiency and qualification.

Actions:

1. All SABT members will complete their NNSA safety analysis qualification card within 1 year of being hired into the job. Remedial plans for completing qualification will be submitted to and approved by the SABM if this criterion is not met.

2. Qualified Senior Safety Analysts will mentor and assist newly hired SABT members in completing their qualification. **Personnel seeking qualification should be sensitive to the time commitments of qualified personnel, and attempt to answer/study issues and determine answers prior to approaching qualified personnel for assistance.**

3. Qualified staff shall pursue and attend available technical training to maintain competency and increase value to NNSA as a technical resource.

4. SABT staff performance evaluations will take into account actions 1-3 above.

Expected Results

1. Enhanced credibility of SABT members with both LANL professionals and throughout the NNSA Complex.

2. Qualification shall be achieved within the suspense period.

3. Increased external requests for SABT technical assistance in the conduct of safety basis reviews or in the development and presentation of training related to the authorization basis process.

IV. GOAL: Improve flexibility and retention of limited technical resources through promotion of personal development and team building.

Objective:

1. Promote SABT development and professional growth activities.

2. Improve effectiveness of SABT with strong principles of team building in being able to support mission critical programs despite limited resources.

3. Openly recognize technical excellence by SABT staff.

Actions:

1. Each SABT member will be allowed to participate in a minimum of one (1) professional conference per year, contingent on budget.

2. SABT members will try to complete and present a minimum of one (1) paper at professional conferences as professional development. If this is not possible, SABT members will prepare and present in-house training or seminars to their SABT peers on a subject or topic approved by the SABM or Acting SABM pertinent to improving technical performance or capability of the group. As an alternative, staff can route within SABT prepared slide presentations on topics related to improving how business is done in a ready form for in-house training or seminars, but be studied on a self-reading basis versus formal classroom.

3. SABT members shall try to investigate courses at LANL and SNL that can be taken by team members and attend them (cost reduction benefit while maximizing engineering training).

4. Rotation assignments will be made within SABT that ensures the opportunity for all staff to become familiar with unique operations and processes being performed in the different LANL facilities. Staff will not be assigned nor be dedicated to a specific LANL facility.

5. SABT staff performance evaluations will account for actions 1-3 above.

Expected Results

1. The level of professionalism and credibility of the SABT will be enhanced with both the contractor and throughout the NNSA Complex.

2. Increased initiatives by staff to promote actions that will improve how the team does business and meet commitments.

3. Staff will be able to perform their safety analyst function for all LANL facilities.

4. SABT readily receives external recognition for technical excellence and achievements by staff in meeting commitments in support of mission critical programs.

5. The SABM will consider items detailed under the actions defined above as a major input into consideration for awards of all types.

V. GOAL: Contribute and improve value added as an organizational unit to LASO being an essential asset to NNSA mission critical programs at LANL.

Objective:

1. Meet commitments made in support of NNSA mission critical programs at LANL.

2. Be part of the "fix" or solution to resolution of safety basis issues that may arise with operations at LANL facilities.

Actions:

1. Support internal initiatives to improve how LASO does business in integrating corrective actions to resolve safety basis issues as part of the NNSA planning, programming, budgeting and evaluation (PPBE) process.

2. SABT staff shall become educated on the AB needs of other LASO groups sufficiently to be able to prioritize and maximize utilization of limited technical resources to assure accomplishment of critical missions in a safe manner. As necessary, SABT staff shall team with other LASO groups to assure related safety basis requirements are identified, so as to allow timely planning and consideration in scheduling and prioritization as appropriate.

3. SABT shall formalize its authorization basis review and approval process and assure a seamless interface with the established LANL AB process. Likewise, SABT shall assure interfaces internal within LASO are well understood with respect to roles and responsibilities.

4. SABT staff shall communicate in a timely manner with the Manager's Office through the SABM or Acting, and directly with other groups within LASO that may have a mutual interest because of possible mission impacts related to safety basis requirements or issues as they may arise. SABT staff shall be expected to not only identified safety basis issues, but be able to provide sound technical assistance in developing the path forward to resolve or fix the problem.

5. SABT staff shall be accountable and are expected to assure the quality and technical accuracy of technical positions that may become NNSA direction and/or guidance to the Laboratory. As appropriate, each SABT safety analyst is expected to solicit independent checks by other qualified or senior analysts to ensure a quality product.

6. A formal SABT self assessment program shall be developed and implemented to evaluate on a continual basis the effectiveness of SABT review processes, and factor in any identified improvements into the existing SABT lessons learned program (Appendix D of SABT Safety Basis Review Procedure and Operations Plan).

Expected Results

1. There is very little or no need to rescind or recant SABT issued technical positions to the Laboratory.

2. Ready acceptance of SABT comments by LANL and other LASO groups because of technical merit.

3. Recognition of excellence by LANL, other LASO groups or other NNSA organizations external to LASO on AB matters or achievements.

4. Little or no findings of significance related to weaknesses in the established AB process by external oversight groups.

5. SABT self assessments are conducted as scheduled.

APPENDIX F
Comment Review Form Example

Date Comments on XXX BIO Page

No.	Page	Sec/Para/Line	Reviewer Comment	S/R	Rev.	Resolution

S = Suggested comment.
R = Required comment (comment must be addressed).

APPENDIX G

Project Execution Plan Elements to Ensure Compliance with DOE O 420.1 at Los Alamos Site

Ensure that the Management Structure and Responsibilities (or equivalent) section identifies:

- Who will be responsible for nuclear safety aspects of the project
- Where this position is situated in the Project Organization
- Interfaces and lines of communication with other project participants, including contractor(s), LASO Project Management and the SABT
- Who will review safety aspects of project deliverables, including any team work required for preparation and review of preliminary and final analyses and documentation related to the authorization basis
- The LASO SABM as the Approval Authority for AB documents

Ensure that the following tasks related to the Authorization Basis are identified in the plan:

Note: The design stages and critical decisions discussed below echo those of a major project. Smaller projects will need to tailor these tasks to fit the project scope.

Conceptual Design

- Initial Hazard Categorization occurs after Mission Functional and Performance requirements are established and at the start of hazard analysis activities. Use DOE-STD-1027 for guidance.
- Preliminary Hazard Analysis and Preliminary Fire Hazards Analysis begins after Mission Functional and Performance requirements are established. These preliminary analyses are documented and reviewed prior to CD-1. Use DOE G 420.1-1, section 2 for guidance.
- Safety design criteria and project-wide codes & standards are identified and included in F&OR. Use DOE G 420.1-1, sections 3 through 6 for guidance.
- Safety function definitions - Based on hazard analyses, develop high-level definitions of what functions may be required from the facility and its systems. Use the guidance in DP SIL 96-04 and DOE G 420.1-1, section 2.
- Preliminarily identify structures and systems that could perform these functions. Document in first draft Facility Design Descriptions and System Design Descriptions that contain the information developed up to this point. FDD & SDDs identify safety functions, design criteria, and applicable codes & standards at this point. These documents need to be reviewed as part of Conceptual Design Review. Use the guidance in DOE G 420.1-1, sections 2 through 6.

Preliminary Design

- First draft FDD and SDDs - released to change control early during preliminary design. Includes system identification, safety function definition, applicable codes & standards. System requirements section includes any safety design criteria. Comply with DOE O 420.1, section 4.5. Use the guidance in DOE-STD-3024 and DOE G 420.1-1, section 2.4.

- Process Hazards Analyzed and Design Basis Accidents Identified - Worked concurrently with preliminary design phase. Results become part of the design basis of the facility and its systems, particularly safety systems. Results documented in the initial Preliminary Documented Safety Analysis (see below). Use DOE-STD-1027 for guidance.

- Apply safety design criteria and appropriate codes & standards to the preliminary design of structures and systems that will be relied upon for safety. Use DOE G 420.1-1, sections 3 through 6 for guidance.

- FDD, SDDs, and initial Preliminary Documented Safety Analysis (PDSA) produced as part of Preliminary Design Package. Preliminary design review includes assurance that the design of new or modified nuclear facilities is guided by safety analysis, safety criteria are incorporated into the design, and safety codes and standards are considered and appropriately included in the design. Compliance with DOE O 420.1 is verified. Reviewers ensure that the guidance in DOE G 420.1-1 or a similar design manual identifying acceptable practices, criteria, codes, and standards has been incorporated in the design. As prioritized by LANL, SABT will review the initial PDSA and preliminary supporting design document to support limited procurement (long lead procurement) and construction activities.

Final Design

- Detailed process hazard analysis is completed early during final design. Accident analysis and design basis accidents are established. Results are used to update the design basis of the facility and its systems, particularly safety systems. Results are documented in Preliminary Safety Analysis Report at the end of the Final Design Phase (see below). Use DOE-STD-1027 and DOE-STD-3009 for guidance.

- Safety SSCs functional, performance, and design requirements finalized. Codes & standards are finalized, now including construction codes & standards. FDD and SDDs are completed, finalized, and released as part of Final Design Package.

- Prior to the LANL Project proceeding with procurement of materials or components and beginning construction, a final Preliminary Documented Safety Analysis (PDSA) must be submitted, reviewed by LASO SABT, and approved as part of CD-3. Use DOE-STD-3009, DOE G 421.1-2, and DOE-STD-1104 for guidance.

Prior to startup

- A Documented Safety Analysis (DSA), updating information approved in the final PDSA, is completed, reviewed by LASO SABT, and approved prior to Operational Readiness Review. Completed and updated FDD and SDDs support information provided in FDSA. Use DOE-STD-3009, DOE G 421.1-2, and DOE-STD-1104 for guidance.

- Technical Safety Requirements prepared and approved by LASO SABT prior to Operational Readiness Review. Use DOE G 423.1-1 for guidance.

- Operational Readiness Review includes confirmation that safety controls identified in the approved FDSA and TSRs are in place and operable. Use DOE-STD-3006 for guidance.

APPENDIX H

Walk Down Checklist Guide

Walk down of the facility or process, is an important element of the SABT review of submitted authorization or safety basis document for NNSA approval. It is not intended to be a formal assessment but rather a simple visual verification that the documented descriptions of the facility or processes are accurate. Should a walk down find inconsistencies between the documented description and actual configuration, these findings are typically documented in some manner (i.e., an individual's personal logbook, memo to fie and/or review comments).

As a guide only, the following items (not intended to be all inclusive) should be checked:

- Process configurations (may not match process descriptions)
- Area designations (i.e., room or building numbers) and room description (e.g., two story versus one story high,)
- Posted MAR limits
- Form of MAR if possible
- Types of energy sources (e.g., electrical, thermal, chemical and mechanical)
- Containment features if any (including HVAC, HEPA filters etc.)
- Egress and access routes
- Fire Protection features
- Hazard warning labels (may identify hazards not addressed in safety basis documents)
- Out of service tags (may identify SSCs credited in safety basis, which are inoperable)
- Questionable work practices (e.g., high storage of MAR)
- General condition of facility and equipment (e.g., obvious degradation, deterioration or damage) including external such the LPS (e.g., fallen masks)
- Space occupation (i.e., full time or temporary)
- Leaks (i.e., wet spots or hissing air)
- Water marks (evidence of water leaks)
- Potential unsafe conditions (e.g., adjacent storage of incompatible chemicals) or other potential hazards (not identified in documentation)
- Activated warning lights (e.g., ignored process warning lights cannot be credited as controls)
- Separation distances (e.g., distance between MAR and other hazards)
- Area logbooks (could provide insight to operational problems not discussed in safety basis)
- Wall and floor penetrations or cracks
- Flaking paint or odors (could indicate a hostile environment)
- Potential safety features, ACs or SSCs (not identified in documentation)

ATTACHMENT 1 TO NNSA/LASO/SABT SAFETY BASIS REVIEW PROCEDURE AND OPERATIONS PLAN

Operation Support Tool 300-00-06F
Revision 1

LANL Review Plan for Nuclear Safety Analysis Documents

Los Alamos National Laboratory

Developed by

Facility and Waste Operations Division
Office of Authorization Basis

Prepared by: M. Kent Sasser, FWO-OAB	Signature	Date
Reviewed by: David J. Odland, FWO-OAB	Signature	Date:
Approved by: M. Kent Sasser, Office Leader Office of Authorization Basis	Signature:	Date:

HISTORY OF REVISIONS

Revision	Date	Summary
0	8/8/01	Original Issue
1	1/15/02	Revised to reflect improved review process (Table 1)

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LIST OF ACRONYMS AND ABBREVIATIONS

Term	Meaning
AA	accident analysis
AB	authorization basis
AC	administrative control
ADO	Assistant Director for Operations
ALARA	as low as reasonably achievable
BIO	basis for interim operations
CSE	criticality safety evaluation
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations
DBA	design based accident
DSA	documented safety analysis
EG	evaluation guide
FHA	fire hazard analysis
FMEA	failure mode and effect analysis
FSA	facility safety assessment
FSAR	final safety analysis report
FWO	Facility and Waste Operations (Division)
HA	hazard analysis
HAZOP	hazard and operability
HC	hazard category
HEPA	high efficiency particulate air
LAAO	Los Alamos Area Office
LANL	Los Alamos National Laboratory
LCO	limiting condition for operation
LCS	limiting control setting
LIR	Laboratory implementation requirement
MOI	maximum-exposed offsite individual
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NSM Rule	Nuclear Safety Management Rule, 10 CFR 830
OAB	Office of Authorization Basis
ODD	owning division director
OIC	organization for institutional coordination
OST	operation support tool
PHA	preliminary hazard analysis
P&ID	piping and instrument diagram
PM	program manager
PPE	personnel protection equipment
PrHA	process hazard analysis
Rev.	revision

SA	safety assessment
SAR	safety analysis report
SB	safety basis
SER	safety evaluation report
SME	subject matter expert
SR	surveillance requirement
SSC	system, structure, and component
STD	standard
TSR	technical safety requirement
USQ	unreviewed safety question

PURPOSE

The purpose of this Plan is to provide guidance for preparation as well as conduct of the internal Los Alamos National Laboratory (LANL) review of nuclear safety basis (SB) documents prepared under LIR 300-00-06, *Nuclear Facility Safety Authorization Basis*. The Plan also provides guidance on integrating external reviews (i.e., DOE) into the overall process. The formal, structured approach in this Plan will improve the quality of reviews and safety documents produced by LANL. Specific project plans may be used to establish the full scope for reviews.

APPLICABILITY

This Plan is to be followed by those persons performing a review of a SB document prepared in accordance with 10CFR830, Subpart B, "Safety Basis Requirements," DOE Order 5480.23, *Nuclear Safety Analysis Reports,* and DOE Order 5480.22, *Technical Safety Requirements* for a LANL nuclear facility. Nuclear facility is defined in 10CFR830 and LIR 300-00-06. Certain aspects of this Plan may be also useful for non-nuclear facility safety analysis (FSA) reviews under LIR-300-00-07 and are expected to be followed, as appropriate.

Because LANL is in the process of revising or updating the SB documents for many existing nuclear facilities, this Plan is particularly applicable to facility SB documents in the operating life cycle. SB documents developed for other facility life cycle phases might require a somewhat different review process and criteria. For example, a major new facility would require a preliminary hazard analysis at the conceptual stage, a preliminary documented safety analysis (DSA) at the Title I, or construction phase, and a final DSA prior to operations. The reviews would use a process and criteria that are similar to, but somewhat different than a review for an existing facility. The FWO-OAB should be consulted and a determination made as to the applicability of this Plan or an alternate approach.

Additionally, because of the different nature of the facilities, this Plan does not address the review of reactors using U.S. Nuclear Regulatory Commission Regulatory Guide 1.70 for the safety analysis, the deactivation or decommissioning of a facility, or the unique aspects of a nuclear explosives operation.

TECHNICAL BASIS

This Plan is based on the principles for a safety analysis report (SAR) review that are discussed in DOE-STD-1104-96, *Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports.* Although much of this standard is written for the DOE review process and not internal LANL reviews, the principles are applicable. Below are excerpts from DOE-STD-1104-96 stating applicable principles and how they are to be applied to LANL reviews:

- 10CFR830,Subpart B, endorses the use of DOE-STD-3009-94 as a safe harbor method for the SB for a DOE nonreactor nuclear facility. DOE-STD-1104-96 states, "DOE-STD-3009-94…provides approved guidance for meeting the requirements of DOE Order 5480.23."

  LANL endorses DOE-STD-3009-94 as the preferred standard for format and content of DSAs for nonreactor nuclear facilities. Therefore, reviews shall judge adequacy for compliance with the implementing guidance in DOE-STD-3009-94, as well as standards referenced in those documents and other applicable codes and standards. A graded approach

may be used to adjust the level of detail of the material in the SB document, as described in DOE-STD-3009-94.

- "Independent review of a SAR facilitates achieving defensible approval of that SAR."

  The internal LANL review is to be performed by personnel who have not contributed to preparation of the SB document. Reviewers shall have appropriate technical knowledge, training, and experience.

- "The objective is not to document a large number of issues but to contribute to improving the SAR to meet the mission established by DOE Order 5480.23 and the intent of amplifying guidance (i.e., to provide assurance that the SAR appropriately establishes the safety basis of the facility)."

  This principle states the fundamental objective of the review: to contribute to improving the SB to accurately reflect the facility SB as established by 10CFR830, DOE Order 5480.23 and amplifying guidance (i.e., DOE-STD-3009-94). The intent is not to see how many comments can be developed. Reviews are to be managed to ensure that this objective is understood and followed by all involved.

- "It is not expected that SAR reviews will be conducted completely separate from SAR preparation. This Standard encourages interface between the two processes to develop familiarity with the facility's SB, to respond to requests from the SAR preparer for early identification and resolution of potential issues, and to discern the scope of subsequent SAR review and approval documentation required."

  The Laboratory DSA review process includes formal reviews (and informal discussions) throughout the development effort. It is essential to identify the important issues early in the process. The review process must be disciplined to ensure that issues are identified early and are not raised at the very end of the process. One challenge commonly encountered is turnover of review personnel between phases of the review. The review should be managed to minimize turnover and mitigate the inefficiency introduced by replacement reviewers when turnover is unavoidable. New reviewers are not to have a license to go back to the very early review material and generate new issues.

- "DOE strives for an effective, streamlined SAR review and approval process while still achieving an acceptable level of safety assurance. This Standard advocates proper planning for a review and encourages an integrated review process where all parties with vested interest in a facility SB coordinate throughout the review and approval of a SAR."

  A streamlined and efficient internal review process is achieved by:
  (1) a qualified review team leader who ensures that the review team is provided access to the SB development team, facility operating personnel, and safety basis supporting documents;
  (2) review team limiting input to substantive issues and participating in resolving issues;

(3) facility operating organization supporting the review by providing necessary information and making a good faith effort to resolve review concerns;
(4) all involved working to complete their activities on schedule; and
(5) using a conflict resolution process designed to prevent delays caused by disagreements.

- "A significant issue identifies a problem or concern that affects the utility or validity of the SB documentation. 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/guidance on SARs."

  Reviewers are to be instructed to limit their essential comments to only substantive issues based on deviations from criteria in applicable requirements. Guidelines for comments are provided in this Plan. Review team leaders shall review all comments to ensure that the comments are technically accurate, collectively consistent and comply with these guidelines. Comments that do not meet these guidelines are to be deleted from the comment set.

- "The core of the review effort is assessing the hazard and accident analyses in the SAR because these analyses are the primary source of original material with which the remainder of the SAR is aligned."

  Laboratory internal reviews should emphasize the hazard and accident analyses including the appropriate identification of hazard controls based on these analyses.

- "Well before SAR submittal for approval, plans should be developed in coordination with the facility contractor where support of the contractor will be required (e.g., briefings on the SAR, facility walkthroughs, issue resolution)."

Laboratory SB reviews should be planned in advance to identify the review team and begin preparation prior to the start of the review. Reviewers should be provided the opportunity and allotted the time to become familiar with the subject facility and operations prior to beginning the review. Preparation should include facility tours, presentations by facility personnel, and review of facility documents.

PROCESS

Overall Description

DOE-STD-1104-96 encourages interface between the SB development and the review process to facilitate early identification and resolution of potential issues. Lack of reviewer interaction during the development process often leads to major issues raised by reviews conducted very late in the development process. Such issues can have major impact on cost, schedule, and facility operations. Therefore, early and continued interface between the review (DOE reviewers and LANL independent reviewers) and development teams is a key element. During this interaction the review team must maintain independence by not interjecting themselves directly into the development process.

The process outlined in this Plan involves several stages of review. To be accomplished efficiently, the entire process should be defined and scheduled at the beginning of the effort (i.e., 0% Scoping). The scope of each review should be in accordance with that shown in Figure 1 that displays the generally expected portions of the safety analysis to be developed and reviewed at each stage of the process.

Roles and Responsibilities

This section covers those roles and responsibilities specifically related to the review of the SB documentation. LIR 300-00-06 provides details for roles and responsibilities for nuclear facility SB, specifically for division and facility management.

Facility SB Project Manager (could be the Facility Manager)

The SB Project Manager (PM) has the following review-related responsibilities

- Provide a single point of contact for the SB review process
- Distribute documents for review.
- Coordinate the logistics of meetings with review teams.
- Provide facility tours and arrange for process walk-downs and interviews with facility personnel as needed for the review process.
- Provide facility training and necessary security guidance for reviewers.
- Ensure resolution of review comments in a technically defensible manner.
- Elevate to senior management issues that cannot be resolved with the review team(s).
- Develop and approve the SB project plan, if required, consistent with the LANL Master Schedule and sitewide SB guidance.

FWO-OAB

The Office of Authorization Basis has the following review-related responsibilities.

- Identify an independent review team leader and team for the SB effort.
- Coordinate and assist in the activities among the development team, facility staff, and the DOE and LANL review staffs as necessary.
- Update this document periodically to reflect lessons-learned
- Validate that all independent review comments have been incorporated in a technically defensible manner prior to submittal to DOE for approval.
- Concur with the SB project plan approved by the facility management.

Independent Review Team Leader

The LANL independent review team leader has the following responsibilities

- Manage the internal independent LANL review
- Identify and obtain qualified review team members, including replacements, as required.
- Coordinate site visits, facility walk-downs, review meetings, etc., with the SB PM.
- Ensure team members obtain proper training needed for site visits, walk-downs, etc.
- Consolidate reviewer comments. Ensure these comments are categorized properly, are technically accurate, and comply with the rules for comments to include screening out non-compliant comments. Submit comments to FWO-OAB for submittal to the SB PM.
- Participate in discussions of issues.

- Assess the acceptability of facility comment resolution proposals and final closeout of comments.
- Elevate comment disputes and review plan execution issues to the FWO-OAB and/or, owning division director (ODD) levels, as necessary, and include documentation of dissenting opinions.

Review Team Members

Review team members have the following responsibilities.

- Participate in facility tours, walk-downs, and interviews, as necessary.
- Obtain required training for facility access.
- Perform review as scheduled.
- Use this Plan and enclosed checklists and other documents as necessary to perform the review.
- Document comments and the basis thereof in accordance with this Plan.
- Assign a response code to each comment (Required or Suggested). Editorial comments may also be provided, but should not be the focus of the review.
- Ensure comments comply with the rules for comments.
- Participate in comment review sessions.
- Review proposed comment resolutions for adequacy and concur if appropriate.
- Review revised document for adequate incorporation of agreed upon resolution of comments.
- If unable to participate in review as planned, inform the review team leader immediately.

Safety Analysts/Development Team

Safety Analysts/Development Team members have the following review-related responsibilities.

- Assist the SB PM in the resolution of comments including documentation of Required comment resolutions, as a minimum.
- Participate, if necessary, in review sessions and comment resolution meetings.

DOE Review Organization

This list represents the LANL's understanding of the responsibilities that DOE has accepted, and is not intended to assign these responsibilities to DOE but to assist LANL personnel coordinate SB review activities with DOE. The DOE Los Alamos Area Office (LAAO) is currently responsible for conducting reviews of LANL SB documents for existing facilities. DOE LAAO reviews are governed by LAAO internal SB review procedures. The review authority for new projects is typically DOE Albuquerque, but should be designated in writing by DOE.

- Participate in the 0% Project Scoping meeting to provide input to the scope and schedule.
- Determine at the scoping meeting the level of participation of DOE in the review process, either fully independent reviews at the established 30%, 70%, 90% milestones, or participation in a facility-led detailed workshop presentation and discussion of methods and results at key stages.
- Submit comments that comply with the rules for comments.
- For any SB document reviewed, provide a single set of formal comments to the SB PM.

- Participate in joint comment review sessions and comment resolution meetings as necessary.
- Provide written interpretations of applicable Laboratory/DOE contractual commitments associated with DOE orders and standards, as requested.
- Develop and issue the safety evaluation report (SER).

Detailed Preparation and Review Description

This section outlines and describes the individual process steps. The Plan focuses on DSA Chapters 3, 4, and 5 which deal with the hazards and accident analyses (HA), the identification of safety-significant and safety-class structures, systems and components (safety SSCs), technical safety requirements (TSRs), and supporting technical analyses such as a fire hazard analysis (FHA) and seismic evaluation.

Develop the Project Plan and Schedule

The SB PM will prepare an SB project plan for development, review, and approval of the SB. The FWO-OAB has developed a simple project plan template that has been used successfully. The project plan establishes the scope of the SB document, applicable standards and methods, expectations, and required resources. The project plan should be coordinated with the FWO-OAB to ensure that the plan complies with Laboratory SB requirements and that adequate funding and resources are available. The project plan must also be consistent with LANL institutional Master Schedule and other LANL commitments to DOE. The project plan must also allow for all of the steps depicted in Figure 1 and described in Table 1. The division or facility management will approve the project plan with concurrence by the FWO-OAB.

Initial (0%) Scoping Meeting

Figure 1 indicates that a 0% scoping meeting is required and is hosted by the FM or SB PM. This milestone is extremely important in that the basic agreement is reached among the preparing organization (facility), the FWO-OAB, and the DOE approving authority. Typically the project plan will be discussed at this meeting. At the conclusion of the scoping meeting, changes may be made to the project plan as necessary. Anticipated technical issues are thoroughly discussed at the scoping meeting and a path forward is developed for resolution of these issues.

Appoint the Independent Review Team Leader and Team

Once a SB document development effort has been initiated, FWO-OAB will appoint an independent review team leader. The team leader should have extensive experience developing and reviewing SB for nuclear facilities. Additionally, the team leader should also have leadership ability and strong communication skills.

In addition to the team leader, the review team typically consists of several core team members and other technical personnel for specific areas of expertise (e.g., criticality, seismic, fire hazard analysis). Appendix A is a summary of general team member qualifications. The size of the core team will vary depending on the scope and complexity of the safety analysis. Augmenting the core team are other subject matter experts (SMEs) with diverse experience in safety and health and facility operations. Although these individuals

are not necessarily members of the core team, they collectively provide support, as needed, for a thorough assessment of the facility SB.

The important aspects of the team leader's job at this stage are: (1) assembling the appropriate team and (2) ensuring the team has completed training and facility familiarization prior to submittal of the draft documentation for review (typically the 30% submittal stage).

Prepare the DSA and Perform Reviews

The FM will ensure that a qualified team of analysts and facility experienced staff prepare the DSA. Reviews will be performed at several stages in the development process. Figure 1 and Table 1 depict and describe the various steps of preparation and review at the 30%, 70%, and 90% intermediate milestones. Table 1 should be used as a guide for expectations at each step of the process in order to achieve an 'approvable' DSA submittal to DOE.

In the past DOE conducted independent reviews at each of the same milestones as the LANL independent reviews at 30%, 70%, and 90%. This Plan does not automatically include a DOE review at these intermediate stages, but does provide for necessary interactions at key steps to provide a full briefing and detailed discussion of the methods and results at that stage. The described preparation guidance and independent reviews should result in an acceptable product submittal to DOE at the 100% stage. However, in some cases, discussions among the facility, the FWO-OAB, and the DOE (at the 0% Scoping meeting) may determine that a DOE review is desirable or necessary. It is recognized that DOE is not being asked to commit to acceptance of any decisions or conclusions prior to final submittal of the SB documentation and that any agreements reached are conditional on the submittal of technically defensible documentation for approval.

Section 5 to this Plan includes checklists to be used for performing SB document reviews. The criteria, based on DOE-STD-3009-94, are best used to focus the reviews on important issues and to check for completeness. If necessary, detailed review criteria can be developed and used by SMEs to conduct their assigned reviews. However, this detailed criteria used to guide the SME's review must be based on requirements and not reviewer preferences. See Section 4.4 for a discussion of rules for comments.

Reviews will be conducted and documented on a comment form to facilitate resolution. Appendix B specifies a format for documenting LANL review comments. Comments will be designated as Required or Suggested. Required comments must be resolved, but Suggested comments do not require resolution. The independent review team leader will consolidate all team comments and review for accuracy, compliance with comment rules, consistency, and categorization. Comments that do not comply with comment rules may be rewritten or may be screened and not submitted. This review of comments is an important responsibility for the review team leader and necessary to ensure an efficient review process. Team members who disagree with the actions of the review team leader will be provided the opportunity to submit a dissenting opinion to the review team leader. Dissenting opinions will be forwarded to the senior Laboratory manager responsible for approving the SB document for consideration.

The review team leader provides the final set of comments to FWO-OAB, to be forwarded to the SB PM. The three parties should meet to discuss these comments prior to finalization.

Conduct Review Meetings

A meeting involving the Laboratory independent review team, the SB PM and staff, and the SB development team is recommended for each review phase to discuss the comments. If DOE has conducted an independent review, the review meeting should include the DOE reviewers as well. The primary objectives of the meeting are to ensure that the comments are understood and to agree to a path forward for resolving them. Comments may be deleted or modified based on the review meeting. Meeting minutes will be taken to document agreements, requests, and open items.

The SB PM will distribute copies of each review package, e.g., 30% review documents, to the LANL independent review team (and DOE, as applicable) at least 30 days in advance of the review meeting. The OAB may request a shorter review period for the independent team, depending on the complexity and size of the material to be reviewed. After the independent review has been completed, the review team leader will provide the comments to FWO-OAB who will make them available to the SB PM in advance of the meeting.

Resolve Comments

The SB development team will resolve in writing all review comments designated as Required. See Appendix B for a recommended comment/resolution form. Resolutions will be documented and forwarded to FWO-OAB. Interaction between the independent review team and the facility staff or safety analysis document development team should be arranged, if necessary, to resolve comments.

FWO-OAB will distribute comment resolutions to the LANL (and DOE if appropriate) review teams. The LANL independent review team should verify that the proposed resolutions adequately address the comments. For interim reviews, proposed resolutions might simply be an agreement to add material. The review team will assess whether the added material is adequate during the next phase of the review. In such cases, the review team will verify adequate incorporation of comment resolutions by reviewing subsequent versions of the DSA.

Resolve Conflicts

Every attempt should be made to resolve review comments. The SB PM and independent review team leader should negotiate technical disagreements. Situations might occur, however, where a difference of technical opinion cannot be resolved. When such a situation arises, the SB PM should arrange a conflict resolution meeting with the next level managers in the preparing and reviewing organizations. The SB PM and the review team leader will present their position and the responsible manager will direct the path forward. A representative from FWO-OAB will attend to assist the resolution process and present the institutional position. The SB PM is responsible for coordinating the conflict resolution meeting and must bring such issues to closure expeditiously.

Figure 1. LANL AB Preparation and Review Process

Figure 1.
Figure 2.

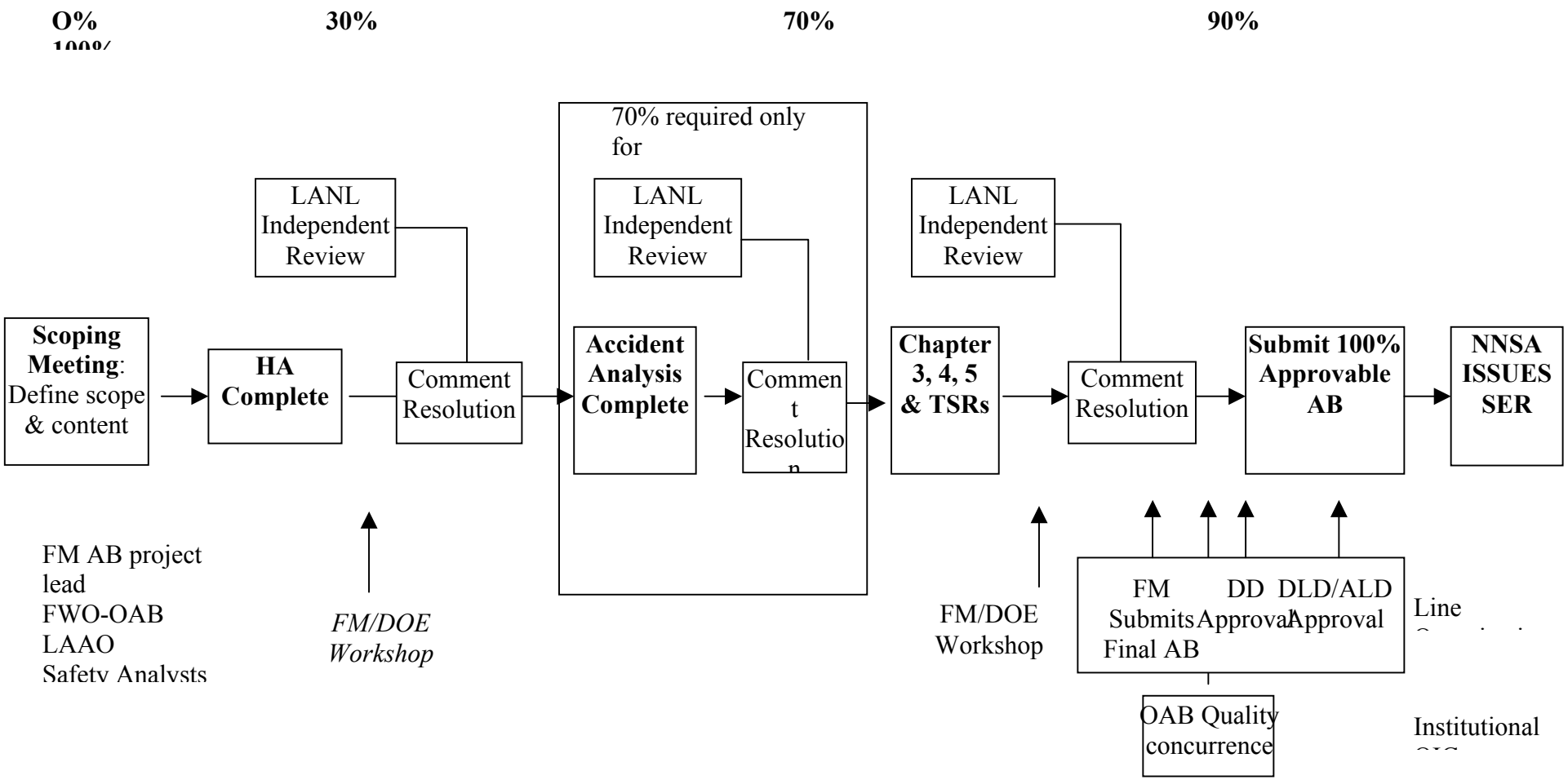

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
Scoping Meeting	*Meeting hosted by the DSA preparation organization with participation by DOE and the FWO-OAB to discuss:* • DSA scope, methodology, and schedule. • Technical issues and any path forward for resolution if necessary. • Identification of special supporting analyses required for the DSA. These support efforts may include a Fire Hazard Analysis, seismic evaluation, criticality safety evaluation (CSE), lightning protection, and so on. • Level of participation by DOE: full independent review at each of the 30%, 70%, and 90% stages, and/or, facility-led detailed workshop/presentation of methods and results, as described below. • Determine if LANL site guidance and handbooks are required to ensure consistency or if standardized information is available for use, e.g., - HA Handbook (OST 300-00-06A) - Accident Analysis Handbook (OST 300-00-06H) for atmospheric dispersion - Generic Chapter guidance (OST 300-00-06G). Discuss the adequacy of the current Master Schedule. The Master Schedule shall reflect the NNSA mechanism for review, either the NNSA/LANL workshop (2-3 days) with or without the fully independent review (30 days). At the conclusion of the meeting, the preparing organization shall issue minutes summarizing the agreements with outstanding issues and path forward.
Prepare 30% DSA	The DSA will be prepared at the following level for a 30% review: • Hazards analysis raw tables completed. • Chapters 1 and 2 in draft form. • Chapter 3 Sections on HA, defense in depth and worker safety in draft form. • Safety significant SSCs proposed. • Candidate accidents for accident analysis proposed. Note: The preparing organization should initiate the supporting technical analyses as early as possible, perhaps in parallel with the 30% work to ensure completion in a timely manner, e.g., FHA, seismic, CSE, lightning.
30% LANL	The independent review team will conduct a review of the 30% material.

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
Independent Review	The review will be performed in accordance with the rules for review comments (Section 4.4) utilizing the review criteria in Section 5.0. A comment resolution meeting shall be held as described in Section 4.3. **(30 day maximum)** Note: The preparing organization should work on the accident analysis concurrently with the 30% review and comment resolution. In most cases the majority of the accidents to be quantitatively analyzed are well known.
Detailed NNSA/LANL 30% Workshop, or Independent Review	After incorporation of the LANL 30% independent review comments is substantially complete, the facility shall prepare and conduct a thorough workshop for NNSA of the 30% documentation. This presentation shall consist of: • Facility walk down, • Presentation of methods and results, • Recommended safety significant controls based on the completed analysis, • Accidents selected for accident analysis, and • Discussion of major technical issues or problems that need resolution. These activities may take several days depending on the complexity of the facility/DSA. A summary of the LANL independent review comments and resulting changes will be presented. At this stage, it is important to gain agreement on as much of the analysis and results as possible. At the conclusion of this detailed presentation/review, the DSA preparing organization shall issue minutes summarizing the agreements reached along with any outstanding issues and path forward for resolution. Note that NNSA is not committing to final decisions or agreements. Any decisions or agreements are fully conditional on submittal of the technical defensible documentation. **Alternately**, if decided at the 0% Scoping Meeting NNSA will also conduct an independent review of the SB documentation in accordance with LAAO internal independent review procedures. **(30 day maximum).**
Prepare 70% DSA	The DSA will be prepared at the following level for a 70% review, only for hazard category 2 nuclear facilities: • Remainder of Chapter 3 sections drafted, including - Accident Analysis completed for review - Safety SSCs proposed (safety class, safety significant, defense in depth) - Functional requirements proposed. • Comments from 30% review addressed.

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
	Note: The facility should try to interact with the LANL independent review team as 30% comments are incorporated rather than waiting until submittal of the official 70% product. • Supporting analyses completed (FHA, seismic, CSE, etc). • Proposed LCOs and administrative controls.
70% LANL Independent Review	The independent review team will conduct a review of the 70% material. The review will be performed in accordance with the rules for review comments (Section 4.4) utilizing the review criteria in Section 5.0. A comment resolution meeting shall be held as described in Section 4.3. **(30 day maximum)**
Detailed NNSA/LANL 70% workshop	After incorporation of the LANL 70% independent review comments is substantially complete, the facility shall prepare and conduct a thorough review for NNSA. This shall consist of: • Review of 30% comment resolution issues, • Accident analysis results, • Final proposed safety SSCs and functional requirements and • Proposed LCOs and administrative controls. This review may take up to several days depending on the level of complexity of the facility and the DSA. A summary of the LANL independent review comments and resulting changes will be presented. At this stage, it is important to gain agreement on as much of the results as possible. There should be no substantial open technical issues at this conclusion of this workshop. At the conclusion of this detailed presentation/review, the DSA preparing organization shall issue minutes summarizing the agreements reached along with any outstanding issues and path forward for resolution. Note that DOE is not committing to final decisions or agreements. Any decisions or agreements are fully conditional on submittal of the technical defensible documentation to support the agreements. **Alternately**, if decided at the 0% Scoping meeting NNSA will conduct an independent review of the SB documentation in accordance with LAAO internal independent review procedures. **(30 day maximum).**
Prepare 90% DSA	The complete draft DSA will be prepared and available for a 90% review: • Chapter 3 in final form, • Chapters 4 and 5 in final draft form, • TSRs in final draft form,

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
	• Programmatic chapters in final draft, • All supporting technical analyses, and • Comments from 70% review addressed. Note: The facility should try to interact with the LANL independent review team as 70% comments are incorporated rather than waiting until submittal of the official 90% product.
90% LANL Independent Review	The independent review team will conduct a review of the 90% material. The review will be performed in accordance with the rules for review comments (Section 4.4) utilizing the review criteria in Section 5.0. A comment resolution meeting shall be held as described in Section 4.3. **(30 day maximum)**
Detailed NNSA/LANL 90% workshop	After incorporation of the LANL 90% independent review comments is substantially complete, the facility shall prepare and conduct a thorough review for NNSA. This review shall consist of a presentation and discussion of the final results of the AB and how technical issues, not previously discussed, were resolved. There should be no substantial open technical issues at the conclusion of this workshop. At the conclusion of this detailed presentation/review, the DSA preparing organization shall issue minutes summarizing the agreements reached along with any outstanding issues and path forward for resolution. Note that NNSA is not committing to final decisions or agreements. Any decisions or agreements are fully conditional on submittal of the technical defensible documentation. **Alternately**, if decided at the 0% Scoping Meeting NNSA will also conduct an independent review of the SB documentation in accordance with LAAO internal independent review procedures. **(30 day maximum).**
Complete 100% DSA	The final DSA will be prepared, including a full incorporation of all of the 90% comments and resolution of any technical issues identified through the independent reviews or NNSA discussions. If any open issues have not been discussed with NNSA, a meeting with NNSA shall be held prior to final submittal. A 100% submittal shall not be made with any unresolved technical issues.
Final QA checks (Facility/OAB)	Both the facility and the OAB shall accomplish a final check of the entire document. This final check will consist of a complete review for consistency as well as technical and editorial corrections and to validate that all prior comments have been addressed.
LANL Approvals	A short period of time is necessary to obtain approvals and concurrence by the required levels of LANL management.

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
Submittal to LAAO for Approval	If the above process has been followed in 'good faith' LANL should submit on a fully 'approvable' DSA to DOE for approval. See the definition of approvable in Section 5.3.
LAAO Final Review/SER Preparation	DOE LAAO will complete a final review of the submitted DSA.
LAAO issues SER	DOE LAAO will issue the SER, with any conditions of approval, to the facility.

Note

Should the DSA change substantially at any stage of the analysis for reasons other than responding to comments, the new material must be reviewed using the above process appropriate to the new material. For example, if a new PrHa is introduced, this material will be reviewed as if for a 30% review.

this section, consistency, and proper categorization. Review comments should comply with the following rules.

1. **Focus on significant deficiencies rather than marginal issues or minor discrepancies.** As stated in DOE-STD-1104-96, a significant deficiency identifies a problem or concern that affects the validity of the SB. 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 safety analysis; (2) technical errors that invalidate major conclusions relevant to the SB; or (3) failure to cover topical material required by DOE directives and guidance on SB documents. Do not focus on pet issues that are not central to the primary functions of the analysis.

2. **To the extent possible, comments should be based on a failure to adequately address a requirement in 10CFR830, Subpart B or DOE Order 5480.23 (per DOE-STD-3009-94 guidance) or other applicable requirement documents.** The comment should indicate how the deficient item does not comply with the applicable requirement or with DOE interpretations of applicable requirements.

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 commentor'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;" e.g., a clear path forward for resolution.

4. **Do not use the 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 safety analysis.

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.** If material is confusing such that it is not possible to evaluate adequacy, phrase a comment in terms of the material that is absent or that is not germane to the intended subject.

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 "Required" editorial comments.** Editorial errors and improvements identified by reviewers should be submitted as "Editorial" or even "Suggested" comments, to improve the presentation of the material, but these comments need not 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.

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. These comments will be dismissed summarily. Comments should stick to the facts and be geared toward improving and enhancing the document rather than worded in a negative tenor that displays "one upmanship." The review process should not be used to advance personal or organizational agendas.

11. **Comments should not address material that was previously reviewed.** Once material has been reviewed and commented on in an interim review, it should not be revisited in subsequent reviews unless it has been revised or other changes were made that affect the subject material. Reviewers are responsible for completing reviews of interim packages and should not consider later reviews an opportunity to "catch up." In addition, if reviewers are replaced, new reviewers should accept the conclusions of earlier reviews unless there are clear and significant deficiencies.

12. **Comment Assumptions.** The reviewer should not make technical assumptions in the comment that cannot be supported. For example, the reviewer should not assume that

'material melt' can occur when this is not clearly demonstrated by the physics of the process and/or material.

General: As stated before, the objective of the review is to contribute to the quality of the SB document in the spirit of ensuring that the hazards are identified and controls are in place to protect the public, workers, and the environment. The objective of the reviewer is not to see how many comments can be generated; effectiveness is not judged by the volume of the comments. A reviewer should be objective and should state when a quality product is judged to be acceptable just as he/she should be will to make comments on technical deficiencies and inadequacies.

REVIEW and APPROVAL CRITERIA

Introduction

Use of checklists is standard practice and the use of formal checklists is recommended for performing the LANL independent review. The checklists in this section are provided to help organize and focus SB document reviews. Their use is strongly recommended.

These checklists were developed from 10CFR830, Subpart B; DOE-STD-3009-94 (for the SAR chapters) and DOE Order 5480.22 (for the TSR sections). The checklists contain questions that cover the most essential elements of each chapter or section. The intent is to identify these most essential elements to assist in focusing reviews on the most important issues. A second advantage to using the checklists is that they can serve as a check on completeness.

Finally, using checklists provides a format and subject areas for documenting a summary of the results of the review as well as for documenting comments and the resolutions on the recommended comment/resolution form (see Appendix B).

The checklists in Section 5.2 contain general requirements particularly germane to SARs and TSRs (but not the programmatic chapters). Some material must be reviewed to more detailed or specific criteria to assess adequacy. These checklists can be tailored as necessary (i.e., items can be added, modified, or deleted) for a particular review effort.

Review Checklists

Following are checklists that cover Chapters 1 through 5 and especially focus on the HA and accident analysis (AA) and subsequent controls including the TSRs for a DSA, SAR, BIO, or other SB document prepared in accordance with the format and content guidance of DOE-STD-3009, and a full scope TSR prepared in accordance with DOE Order 5480.22 and per the guidance provided in DOE G 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements*, as an acceptable approach to implementing 10CFR830.205. In addition, Appendix C provides further guidance relative to the expected contents of the hazards/accident analyses.

Criteria for an Approvable DSA Submittal

At the 100% stage, the preparing organization shall submit to DOE a DSA that is approvable. For the purposes of determining acceptability, approvable should be defined based on the

principles for a SAR review that are discussed in DOE-STD-1104-96 (see also Section 3.0 Technical Bases, of this document). From DOE-STD-1104-96 comes the following excerpt:

> "A significant issue identifies a problem or concern that affects the utility or validity of the SB documentation. 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 SARs."

A DSA submittal shall be deemed 'unapprovable' if those types of significant issues described above exist following submittal.

Other major technical deficiencies could be:

- Missing TSRs for controls already selected as safety significant or safety class,
- Unworkable controls, i.e., TSRs written so poorly as to be ineffective or unachievable, and
- Deficient technical analysis, either in the HA or AA, e.g., missing accidents in the accident analysis or major hazards that are not analyzed.

SAR/TSR Review Checklist

Chapter 1, Site Characteristics[1]

Question	Yes	No	Comments
• Is the description of the location of the site, location of the facility within the site, its proximity to the public and to other facilities, and identification of the point where EGs are applied (i.e., location of MOI) clearly identified?			
• Is the description of population sheltering, population location and density, and other aspects of the surrounding area to the site that relate to assessment of the protection of the health and safety of the public clearly identified?			
• Is the description of the historical basis for site characteristics in meteorology, hydrology, geology, seismology, volcanology, and other natural phenomena to the extent needed for hazard and accident analyses provided?			
• Have design basis or evaluation basis natural phenomena criteria been identified based upon proven and accepted methods?			
• Have sources of external accidents, such as nearby airports, railroads, or utilities such as natural gas lines been clearly identified?			
• Have nearby facilities impacting, or impacted by, the facility under evaluation been identified?			
• Have site characteristic assumptions common to safety analysis that were used in prior environmental analyses and impact statements (if available), or of the need to revise and update such assumptions used in facility environmental impact statements been identified or revised?			

(1) To the extent that potential accident consequences are limited to the facility itself or its immediate vicinity (e.g., some Hazard Category 3 facilities, etc.), the "graded approach" allows for the emphasis of this chapter to be on onsite characteristics.

Chapter 2, Facility Description(1)

Question	Yes	No	Comments
• Does the facility overview include a clear discussion of facility inputs, outputs, mission, and history; including projected future uses if different?			
• Is a description of the facility structure and design basis or evaluation basis provided including construction details, materials, dimensions, and layouts to the extent sufficient to support the hazards and accident analyses?			
• Is a description of the facility process systems and constituent components, instrumentation, controls, operating parameters, and relationships of SSCs provided along with a summary of the types and quantities of hazardous materials?			
• Is a description of facility confinement systems provided?			
• Is a description of the facility safety support systems provided including the purpose and a general overview of each system?			
• Is a description of the facility utilities provided?			
• Is a description of facility auxiliary systems and support facilities provided?			

(1) Based on the significance of preventive and mitigative features (e.g., less features may be important for some Hazard Category 3 and even Hazard Category 2 facilities), the level of complexity in this chapter can vary as a means of implementing the "graded approach."

Hazard Identification (Ch. 3)

Question	Yes	No	Comments
• Is the hazard identification methodology presented with regard to how hazardous materials and energy sources were identified and inventoried including the use of referenced information if applicable?			

• Is a summary table provided that systematically identifies hazards by type, quantity, form, and location; including a brief summary of major accidents or hazardous situations that have actually occurred at the facility? [Note: if classification issues preclude such specification in the main document, a classified appendix must be provided.]			
• Do the hazards and quantities identified cover all operations described in Ch. 2, *Facility Description* including all modes of operation (startup, normal operation, shutdown, abnormal testing or maintenance configurations, etc.)?			
• Are the hazards and quantities identified consistent with statements and assumptions made in the hazard and accident analysis detailed throughout Ch. 3?			
• Are the quantities specified derived from credible bases (e.g., flowsheets, historical data, operational limits) in a reasonably conservative manner?			
• Is the hazard category assigned for the hazards identified consistent with the methodology of DOE-STD-1027-92, including segmentation if employed?			

Hazard Evaluation (Hazard Analysis) (Ch. 3) [(1)]

Question	Yes	No	Comments
• Is the hazard evaluation methodology (1) stated explicitly, (2) consistent with the analysis methods referenced in DOE-STD-3009-94, and (3) reasonably tailored to the type and complexity of operations examined?			
• Is the method consistent with the LANL HA Technology Handbook, matrices, format and content (see OST-300-00-06A)			
• Were facility operating personnel involved in the evaluation?			

• Was available information used for the analysis (e.g., procedures, process and equipment descriptions, flowcharts) consistent with that reasonably available from the facility?			

Hazard Evaluation continued (Hazard Analysis) (Ch. 3) [1]

• Where holes existed in available information, was supporting information generated (e.g., summary descriptions, drawings, and flowcharts) sufficient to provide basic understanding of significant operations, key parameters, and controls?			
• Is a complete set of hazard evaluation worksheets/tables available to inspect? [Note that completeness requires the following columns for each entry: a specific hazard; the accident type and cause; all associated preventive and mitigative controls; consequence and likelihood ranking estimates; and a field for comments or recommended action items.]			
• Do the cumulative hazard evaluation worksheets address every hazard identified in the hazard identification summary table as well as each operation/activity described in Ch. 2, *Facility Description*?			
• Do any of the required worksheet entry columns appear to have been treated superficially (i.e., vague hazard or causes, generic or incomplete control listing, no comments or recommended action items)?			
• Are the bases for consequence and likelihood binning at least qualitatively defined?			
• Is the scenario binning technique applied consistently throughout the evaluation? [Note that the binning must clearly distinguish the largest consequence events to identify unique and representative scenarios for accident selection. Dismissal of physically plausible internally initiated events due to risk or mitigated consequence criteria is inappropriate.]			
• Are there any additional significant aspects of facility operations known to the reviewer(s), or noted in facility walkthroughs, that the hazard evaluation fails to cover?			

(1) Consistent with the graded approach, the thoroughness of the hazard evaluation documentation should be commensurate with the facility hazard classification and taking into account both the magnitude of the hazards and the facility complexity. For example, the HA may only need to be sufficient to support a simple estimate of bounding consequences for HC 3 facilities.

Hazard Analysis Results (Ch. 3) [(1)]

Question	Yes	No	Comments
Planned Design and Operational Safety Improvements			
• Is there evidence, documented in the SAR or separately, that the HA generated action items and recommendations were assessed by facility and operations management?			
• Where issues require further study, a significant concern cannot be fully addressed at present, or major upgrades are planned, have appropriate interim operational control commitments been made?			

Defense in Depth/Worker Safety			
• Is the information captured in the hazard analysis adequately summarized & presented in an organized manner (from hazard source to outer layers of defense) such that it identifies those design and administrative features most important to achieving overall safety principles (defense in depth) and major principles of worker protection (worker safety) for a given facility or operation?			
• Is the identification of major controls in these sections consistent with those identified in the hazard evaluation worksheets?			
• Does the SAR documentation in these sections demonstrate a coherent thought process leading to the selection of safety significant SSC and TSR commitments; and does that process focus on (a) determining the items of defense in depth most important to avoiding uncontrolled releases of hazardous material, (b) those features most critical to avoiding worker fatalities or serious injuries, and (c) associated TSRs most appropriate to ensure these items and features are not seriously challenged and/or will likely maintain their functionality?			

• Based on the content of these two sections, are the set of safety SSC designations and associated TSR commitments considered adequate?			

Environmental Protection			
• Are all pathways for uncontrolled release of large amounts of hazardous materials to the environment identified?			
• Do the defense in depth measures identified provide reasonable and prudent prevention and mitigation for potential environmental releases?			

Hazard Analysis Results (Ch. 3)

Accident Selection			
• Is the accident selection consistent with the hazard evaluation, its definitions of defense in depth and worker safety, and the associated scenario binning?			
• Is the selection of internally initiated accidents for accident analysis based on consequence? [Note that dismissing such events based on low frequency or risk arguments related to controls is inappropriate.]			
• Is the selection of natural phenomena and externally initiated events in accordance with DOE standards? [Note that initiator frequency is used to define these events.]			
• Do the accidents selected cover all controls associated with unique and representative accidents that could exceed Evaluation Guidelines?			

(1) Consistent with the graded approach, the HA results in terms of number and complexity of features relevant to defense in depth and worker safety should be commensurate with the facility hazard classification. Additionally, accident selection and subsequent accident analyses are generally not required for HC3 facilities unless there is a serious potential for exceeding evaluation guidelines for a chemical release. For such facilities, usually only a summary is provided of the maximum consequences expected from an accident and a statement that these are well below evaluation guidelines.

Accident Analysis (Ch. 3)

Question	Yes	No	Comments
Analysis Methods			
• In each accident scenario, is a basis explicitly identified for all major parameter values (e.g., values for the five-factor formula defined in DOE-HDBK-3010-94)?			
• Is a basis explicitly identified for all major meteorological dispersion parameters?			
• Are the general principles or references used for accident modeling, including any computer codes used, identified with sufficient amplifying information to clarify the bases for input and calculation?			
Scenario Development			
• Is each scenario described in a clear, linear sequence (i.e., detailed step-by-step explanatory text linked to any fault/event trees used)?			
• Are the functions of preventive and mitigative features associated with each scenario clearly explained?			
• Is documentation needed to support scenario description (e.g., seismic damage) presented, either in detail or as summary of a cited reference?			
• Is each complete scenario consistent with the hazard analysis and the rest of the SAR, and does it accurately reflect the findings of separate studies referenced?			

Calculations			
• Are the parameters used for calculation (1) supported by technical references and/or reasonable experience from relevant and reliable sources, and (2) credible in the context of each overall scenario?			
• Considered as a sum total, do the parameters used give confidence of a reasonably conservative answer?			

• Is each final source term clearly specified?			
• For each scenario, are unmitigated consequences clearly identified and directly compared with Evaluation Guidelines to determine if a need for safety class SSC designation exists?			
Safety Class Assessment			
• Does each scenario whose unmitigated consequences exceed EGs document a coherent thought process for the selection of safety-class SSCs from a candidate pool, as well as any additional TSR commitments?			
• Does review of the basis for safety class designation indicate that all appropriate designations and associated TSR commitments have been made?			
Beyond Design Basis Accidents			
14. Has consideration been given to the need for an analysis of accidents beyond the design basis of the facility (see §830.204 and 3009 – section 3.4.3) for outside the SAR cost-benefit considerations if consequences exceeding Evaluation Guidelines are identified in the beyond DBA range; and are any such analyses sufficient to provide a perspective on potential facility vulnerabilities?			

Chapter 4, Safety Structures, Systems, and Components[(1)]

Question	Yes	No	Comments
• Is a summary table in the chapter that clearly provides: (1) identification of safety class, safety significant, and defense in depth SSCs; (2) bases for identifying safety SSCs (i.e., accident upon which the safety SSC is needed for); (3) safety functions; (4) functional requirements; (5) performance requirements; and (6) provisions for requiring TSR coverage?			

• For each safety SSC identified, is a clear and concise description of the safety function, including identification of specific accidents that the safety SSC impacts provided?			
• For each safety SSC identified, is a detailed description that specifies the basic principles by which it performs its safety function provided?			
• For each safety SSC identified, is a description of its boundaries and interface points with other SSCs relevant to its safety function discussed?			
• For each safety SSC identified, is a clear discussion of failure modes and those actions needed to prevent failure provided?			
• For each safety SSC identified, are functional requirements clearly and concisely provided (i.e., limited to those requirements necessary for the safety function)?			
• For each safety SSC identified, do the functional requirements specifically address the pertinent response parameters or non-ambient environmental stresses related to each specific accident that the SSC has a safety function?			
• For each safety SSC identified, are the performance requirements clearly based on accident parameters and concisely articulated?			
• For those cases where the design basis of the safety SSC is not known, has comparison against traditional design criteria (e.g., single failure) been performed?			
• For each safety SSC identified, have potential TSRs needed to ensure the safety function of the SSC been identified?			

(1) Application of the graded approach should result in Hazard Category 3 facilities typically not identifying any safety class SSCs and the number of safety significant SSCs will generally be less than that of higher category facilities (serious chemical hazards may provide exceptions to these expectations). Additionally, it is expected that the safety-class SSCs will require more formality in establishing both functional requirements and related performance criteria than safety-significant

Chapter 5, Derivation of Technical Safety Requirements

Question	Yes	No	Comments

Is the hazard classification of the facility defined? Is the content of this chapter commensurate with the hazard classification?			
• Are codes, standards, regulation, and DOE orders listed relevant specifically to establishing TSR controls, and LANL's work smart standards commitment?			
• Is the HA organized in such a way that it can be judged to be comprehensive? (Note: Determination of adequacy of HA is the primary responsibility of Ch. 3 reviewers. However, completeness of TSR coverage depends on HA, hence Ch. 5 reviewers should consult with Ch. 3 reviewers (if different reviewers reviewed Ch. 3) to assess the adequacy of HA as a basis for TSR development.)			
• Is HA tool used adequate with respect to complexity of process, activities in the facility, or facility history (e.g., new vs. existing)?			
• Does the HA identify consequences, likelihood, mitigators/preventers for determination of TSR controls?			
• Are all items in Ch.s 3 and 4 with respect to meeting Evaluation Guide, for public protection, worker protection, and defense-in-depth covered by TSR controls?			
• Are safety features not covered by TSR controls identified?			
• Do Facility Modes reflect the actual cycles of operations/ activities conducted in the facility? (If any Facility Modes are derived from accident scenarios, this derivation should be presented.)			
• Are Facility Modes established such a way that status of safety systems can be distinctively defined?			
• Are staffing level requirement or other administrative limits considered in Facility Modes?			
• If the facility contains several structural segments or multiple activities, are Facility Modes established to accommodate this situation?			

• The TSR controls are generally derived from preventive or mitigative features identified in HA. Is this derivation clearly shown?			
• What is the criterion for selecting SL, LCS, and LCO? Are any quantitative criteria such as on-site or off-site Evaluation Guides used? If so, are they described?			
• Are any controls that support front line safety systems identified and included as needed?			
• Are any assumptions or parameters used in HA or accident analysis identified for establishing SRs and operability?			
• Are any vendors' specifications identified for establishing SRs?			
• Do ACs include all administrative controls identified in HA?			
• Are ACs covering safety management program tailored for facility or activity specific situation?			
• Does the Design Features section identify passive design features with no TSR controls, and rationale?			
• Are all controls of other facilities and lab-wide infrastructure identified whose operations can impact this facility?			

TSRs – Sections 1 and 2[(1)]

Question	Yes	No	Comments
• Does Sec. 1 include a list defining terms used in the TSR document that require clarification of the intent of their use?			

• Are the definitions clear, and are they consistent with standard usage and with the intended use of the terms?			
• Does Sec. 1 define the operating modes of the facility clearly in terms of operational conditions? Is there an adequate explanation of the use and application of operating modes?			
• Are the operating modes generally consistent with the standard modes established in DOE Order 5480.22? If not, is the variation justified due to unique features of the facility or operations?			

• Does Sec. 1 include the standard use and application explanations for the following TSR devices:
  • Logical Connectors
  • Completion Time
  • Frequency Notation
  • Safety Limits
  • Limiting Control Settings
  • Limiting Conditions for Operation
  • Surveillance Requirements
 	
Note: Standard use and application explanations are specified in DOE Order 5480.22 and the Defense Programs *Document of Example Technical Safety Requirements, Volume 1: Examples*, November 1993. Explanations may include minor variations to account for unique facility conditions.			

• Are the safety limits included in Sec. 2 consistent with the hazard and accident analyses and any inferred safety limits established in the SAR? If no safety limits are required does Sec. 2 so state?			
• Do the safety limits describe as precisely as possible, the parameters being limited, state each limit in measurable terms, and indicate the applicability of each limit?			

• Are the actions required to be taken if a safety limit is exceeded described and do they maintain or otherwise achieve a safe stable state?			
• Is it stated that the facility must obtain DOE authorization to restart the facility following violation of a safety limit?			

(1) While references among all the checklist items for TSRs (including those that follow) include specific mention to DOE Orders 5480.21 and 5480.22, these same items are generally covered in DOE G 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements*. As an acceptable approach (including format and content) for implementing the provisions for TSRs defined in 10CFR830.205, it is recommended that this guide be used by the reviewer along with these checklist items to determine the acceptability of the TSR section of the safety analysis document.

TSRs – Section 3, LCOs

Question	Yes	No	Comments
• Do the LCOs identified in the TSR agree with those identified in Ch. 3 and 5?			
• Are the operability requirements for each of the SSCs covered by LCOs been clearly identified? Are they unambiguous, concise, so as to not lead to misinterpretation? (LCOs that simply state that the SSC has to be operable are not acceptable).			
• Is the mode applicability adequate for each of the LCOs?			
• Is the facility or activity applicability adequate for each of the LCOs?			
• Do the LCO conditions agree with each of the LCO requirements?			
• Are the remedial actions adequate for the conditions, that is do they become more conservative (safer condition) as they are implemented?			

• Does each of the remedial actions have completion times, and are they adequate to allow implementation and ensure safety?			
• Are there bases for each of the LCOs, the mode applicability, remedial actions, and their completion times?			
• Are these bases adequate to support the LCOs (they should not be a regurgitation of the LCOs themselves)?			

TSRs – Section 4, Surveillances

Questions	Yes	No	Comments
• Is there at least a one-to-one correspondence between LCOs requirements and SRs? That is, at least one SR per LCO requirement.			
• Are the SRs explicit enough to ensure the LCOs' requirements are met?			
• Does each of the SRs have a completion time?			
• Is each of the completion times adequate to ensure the operability of the safety SSC covered by the LCO?			
• Does the bases provide enough information to support the SRs and their completion times?			

TSRs – Section 5, Administrative Controls

Question	Yes	No	Comment
1. Is Conduct of Operations as implemented at the Laboratory included?			
2. Is there a commitment to the appropriate Quality Assurance program?			
3. Are minimum staffing requirements addressed? Are staffing requirements by mode or operation addressed (this should be covered if the analysis relies on staffing as a safety factor)? (Ref DOE Order 5480.22, Attachment 1, II.2.4.e.(3))			
4. Is there a specific commitment to personnel qualification and training? Does this commitment identify the program or requirement that will govern qualification and training? Is the commitment consistent with information found in the SAR, particularly Ch 12 and 14? (Ref DOE Order 5480.22, Attachment 1, II.2.4.g)			
5. Is a program for conduct of in-service inspection and testing committed to and is it consistent with the commitments in Ch 10? (Ref DOE Order 5480.22, Attach 1, II.2.4.d)			
6. Is there a commitment to configuration control? If the configuration control program is approved by DOE it may be included by reference (see Ch 17 for supporting commitments)? If the program is not approved by DOE, then the process must be described and committed to with reference to applicable standards. (Ref DOE Order 5480.22, Attachment I, II,2.4.d) Note: Configuration control for non-facility nuclear operations must be considered on a case-by-case condition.			
7. If criticality safety is applicable, is there a commitment to criticality safety including the physical and administrative controls essential for the program. Is the criticality control program briefly described. Is the description consistent with Ch 6 of the SAR? (Ref DOE Order 5480.22, 9.e.5)			
8. Are material inventory controls addressed in the administrative controls section. (Note: In some cases an LCO might cover some			

Question	Yes	No	Comment
aspects of this control.) Are all materials requiring control to satisfy basic accident assumptions, categorization limits, regulatory limits, etc., that are necessary to remain within the hazard category identified (typically fissile and radioactive, toxic, explosive, etc.). Do material controls identify where the limits apply (total facility, wing, operation, etc.? Do material limits address how the limits will be controlled?			
9. Does fire protection need to be addressed. Fire protection elements that are important to identified accident control should be included in an administrative control. Fire detection and suppression equipment may be included in the administrative control as an element of the overall fire protection program. LCOs may also exist for selected elements of the fire protection system. At LANL, many facilities rely upon a combustible loading program. If the combustibles loading program is credited as important in accident or hazard analyses, then the program should be committed to. The combustibles loading program should address loading limits (transitory and fixed) as well as the method used to maintain the limits. Commitment to the appropriate NFPA standards adopted by the Laboratory should be noted if critical to the safety function of the fire protection program and should be consistent with the discussions in the SAR.			
10. If the requirements of 29 CFR 119.119 are applicable, then the TSR administrative controls should contain a commitment to process safety management. The administrative control should identify how requirements are met and reference the program established to satisfy the requirements.			
11. Are radiological effluent control and ventilation filter testing addressed? These may be addressed through administrative controls if they are necessary for worker protection or are used to limit radiological materiel releases. If included, then the applicable programs, facility areas, mechanical systems, testing programs, sampling, monitoring systems, and standards should be identified or			

Question	Yes	No	Comment
referenced.			
12. Is radiological protection addressed? Radiological protection should be included if this program is credited as a significant protection element for the nuclear facility. Provide a list of the major elements associated with the program such as sampling, dosimeter, training, PPE, control areas and zones, etc. Reference applicable Laboratory LIRs and facility programs.			
13. Is emergency planning addressed? Emergency planning should be included in the administrative controls. Is there a specific commitment to an emergency plan and is this commitment consistent with the emergency planning SAR programmatic discussion?			
14. Are explosive gas or toxic substances monitoring programs addressed? If these programs are relied upon in the hazard or accident analysis, the programs should be committed to and referenced in the administrative controls. The discussion in the TSR should be consistent with the discussion of the same topics in the programmatic discussions in the SAR.			
15. Are facility radiation monitoring and storage tank radiation monitoring addressed? If these elements are important to the safe operation of the facility based on the hazards or accident analyses then an administrative control committing to these programs should be included. These may be included in the radiation protection program. The administrative control should include physical facility areas involved, radioactive substances monitored, monitoring equipment and their locations, applicable standards, and any associated limits. These discussions should be consistent with the description of radiation protection provided in the SAR.			
16. If environmental measurement and control is relied upon to protect the workers or the environment, then an administrative control committing to the program or processes should be included in the			

Question	Yes	No	Comment
TSR. If included, a brief description of the program, related equipment, monitored substances, and controls should be provided. Corresponding programmatic and facility descriptions in the SAR should be consistent.			
17. Other safety programs committed to in the SAR and relied upon for worker or public safety in the hazard and accident analysis should be included. Descriptions or programs, equipment, and controls should be consistent with the SAR.			
18. Are facility procedures addressed? The system that governs the production, review, control, use and revision of procedures, particularly those procedures required to implement the TSR, is required to be in the administrative control section of the TSR by DOE Order 5480.22, Section 9.e. (5). Does this description include how changes in the TSR are included in the procedures? Are specific procedure types identified that are managed under this control? Do these types encompass all the TSR commitments that would require a procedure? Are other documents referenced that detail how these commitments are met? Are the discussions consistent with corresponding discussions in the SAR?			
19. Is the USQ program as required by DOE Order 5480.21 committed to? Is the program summarized and is the detailed procedure or process for implementing the USQ process referenced? The commitment for the USQ program to be compliant with DOE Order 5480.21 or with applicable UC/DOE contract requirements, as appropriate, must be included.			
20. Is the contractor organization and management structure addressed? This is a requirement of DOE Order 5480.22, Section 9.e. (5). Does the description focus on the line authority, responsibility, and communications for the facility ranging from the operator on the floor to the person ultimately responsible for the facility and its operations? Are lines of authority, responsibility, and communication for critical support functions, if any, identified.			

Question	Yes	No	Comment
These should include fire protection, maintenance, emergency response, security, etc. If independent review groups oversee or audit facility operations, identify them and their organization and reporting chain. Reference LANL program documents as necessary.			
21. Is the safety review and audit process addressed? This is a requirement of DOE Order 5480.22, Section 9.e. (5). Does the discussion address the review of all safety items? Are those items requiring review identified? Do these items include proposed changes to TSRs and procedures, operational occurrences and Occurrence Reports, USQs, and quality control concerns? Identify any LANL organizations or committees that provide or support safety review. Identify any off-site groups that may provide safety review support. Identify external review group charters, LIR requirements, agreements, or other information that defines the role, scope, and methods used by these groups to provide safety review or support the audit process.			
22. Is there a commitment to and a description or reference to the facility document control system? Dose this control system support facility operation to the most current of important documents such as the TSR, SAR, operating procedures, facility drawings, manual, program descriptions, and other similar documents? (Ref Attach 1 DOE Order 5480.22, II,2.4.d)			
23. Are reporting requirements for TSR deviations included in the administrative controls? This is required by DOE Order 5480.22, 9.e. (5). A commitment to report deviations in accordance with the LANL occurrence reporting system and associated UC/DOE contract requirements should be included.			
24. Is there a description of the process for revising the TSRs? Does this description include required facility and LANL reviews and approvals? This disruption may be included in another section of the administrative controls dealing with facility and LANL organization and management.			

Question	Yes	No	Comment
25. Is recordkeeping addressed? This is required by DOE Order 5480.22, 9.e. (5). This section should describe the recordkeeping program, or if no formal program, then define how the function is accomplished. Does the discussion include the types of records that are kept, storage requirements, retention times, and retrieveability requirements?			
26. Unless the TSR consists of only Administrative Controls, is the OPERABILITY definition and implementing principles described? Do the implementing principles include at least the six principles listed in DOE Order 5480.22, Att. 1, Sec. II.2.4.h? This topic may be included in the Use and Application section instead of the Administrative Controls.			
27. Is the program to control the TSR basis described and committed to? Does this section describe how the program works, the management functions making decisions on basis changes, and the review process? This may be addressed elsewhere in the TSR such as document control. This topic is recommended by DOE Order 5480.22, Attach 1, II.2.4.i.			

TSRs – Appendix A, Bases

Question	Yes	No	Comments
• Are all technical bases presented in a clear, logical and concise manner that follows the format of the Attachment to DOE Order 5480.22?			
• Are all technical bases presented in a clear, logical and concise manner that facilitates the evaluation of unreviewed safety questions that may arise from investigating changes to operating parameters of safety controls or potential changes to the margin of safety?			
• For each TSR specified (e.g., SL, LCO, LCS), are the technical bases directly based upon specific sections (including references) the hazard or accident analyses contained within Ch. 3 of the SAR/BIO?			

• For each TSR specified (e.g., SL, LCO, LCS) that impacts the operation of a safety SSC, are the technical bases directly based upon safety function and system evaluations (including references) contained within Ch. 4 of the SAR/BIO?			
• For each TSR specified (e.g., SL, LCO, LCS), do the technical bases take into account assumptions or uncertainties that have potential impact to the hazard/accident analyses?			
• For each TSR specified (e.g., SL, LCO, LCS), are the technical bases for not considering specific operating modes provided?			
• For each action statement contained within a LCO, do the technical bases allow for the conclusion that the margin of safety has not been compromised?			
• For each action statement contained within a LCO, do the technical bases allow for the conclusion that the completion time for an action is acceptable?			
• For each action statement contained within a LCO where actions partially compensate for loss of a safety function, do the technical bases allow for the conclusion that the margin of safety has not been compromised?			

TSRs – Appendix B, Design Features

Question	Yes	No	Comments
• Is the information presented in a clear, logical and concise manner that follows the format of the Attachment to DOE Order 5480.22?			
1. Is a detailed description of each vital passive component, including functions, dimensions, design criteria, applicable codes and standards, materials used, in-service inspection required, manufacturer, and all details that must be considered prior to alteration, modification, or replacement discussed in a clear and concise manner?			

• Is the configuration and physical arrangement, for cases where it is a safety concern, discussed? Are details pertaining to the design provided (e.g., configuration or physical arrangement including dimensions) and the reasoning behind the design?			
• For cases where the safe operation of the facility is dependent on any component being constructed of a particular material, is the component and system identified, as well as the special material involved, any in-service inspections required of the material or component, and any special operational considerations such as maximum/minimum temperature, pressure, flow, or chemical concentration?			
• Are site characteristics such as the locations of public access roads, collocated facilities, facility area boundaries, site boundaries, nearest residence distances, etc., presented?			

REVIEW REPORT

Introduction

As a means of providing the review comments to the appropriate management and staff, it is expected that a Review Report will be written documenting, for record purposes, the specific comments as well as summaries of the review findings and pertinent information regarding the review process and review team. A Review Report is anticipated for each formal internal Laboratory review performed, covering each stage of the safety analysis preparation and review process (see Figure 1). The next section provides a recommended outline and brief description of content for these Review Reports. While any Review Report should be customized to meet specific needs or circumstances, it is suggested that the contents generally follow the recommendation herein, if practicable.

Recommended Review Report Outline and Content

1.0 Overview (Summary)

This should be an executive-level summary description of the review report covering the facility and % review stage for this Review Report, as well as appropriate high-level findings of the review. Only general statements are expected in this section of the report; however, they should adequately include both strong as well as weak points found in the safety analysis document. To the extent that specific chapters or sections of the safety analysis are worthy of mention, they should also be addressed in this section of the Review Report.

2.0 Reviewers

A list of the reviewers (names and organizations) and identification of the review team leader is covered in this section of the Review Report. A brief summary should be provided of their qualifications, at a minimum for the collective group, particularly as compared to Appendix A and to the scope of the review based on the nature of the facility activities and the % review stage.

3.0 Review Scope

A summary of the review scope is provided here. It should specifically address the % stage for this review, list the specific chapters and earlier comments/resolutions covered by this review, and indicate the checklists used to carry out the review. If there are any special or unusual topics addressed during this review, these should also be indicated in this section of the Review Report.

4.0 Checklist Summaries

A summary of the review findings for each chapter covered in this review is provided in this section of the Review Report. The recommended format for this summary includes, by chapter, (a) a summary statement or brief paragraph summarizing the adequacy (or weaknesses) of the contents for the entire chapter, and (b) the chapter checklist questions

with a summary conclusion for each question. It is intended that each conclusion denote whether the checklist question is or is not adequately addressed in the safety analysis document and a brief statement as to why the stated conclusion has been reached. In each case, the detailed comments (provided in section 5 of the Review Report) should support these summary conclusions. These summaries are intended to be brief and reference more detailed text, if necessary, in section 6 of the Review Report. If earlier comments/resolutions are covered in this review, a summary of any findings related to this topic should also be included.

The general purpose of this section is to provide management and other interested parties with a semi-detailed summary of the key findings of the review. This serves to provide an overall summary of the adequacies and weaknesses of the safety analysis document by chapter/issue and thus focus the comment resolution process on the appropriate portions of the safety analysis.

5.0 Detailed Comment/Resolution Forms

This section contains the detailed comment/resolution forms, preferably arranged by chapter, indicating the specific comments to be addressed. Classification of the comments must be indicated so that the appropriate level of resolution can be applied to the comments. Note that if editorial comments are included, it is not expected that specific resolutions need to be written or tracked for such comments.

6.0 Other Supporting Review Findings (optional, included only if necessary)

If separate analyses, calculations, or other pertinent information created by the review team and related to any of the checklist summaries or to the detailed comments is to be included as part of the review, this additional information should be provided here. Reference should be made as to which checklist summary question or detailed comment the additional information is being provided for. Any such information should be a constructive aid in the comment resolution process, and should be provided if it is deemed necessary to support the position taken by the comment.

APPENDIX A
Qualifications for Reviewers of Safety Basis Documentation

Technical reviewers who are assigned as lead reviewer for any functional area of safety basis documents should meet the following general qualifications. More detailed qualification requirements may be specified in LANL requirements or guidance documents.

- Knowledge of general purpose, function, organization and content of SB documents as specified by:
  - 10CFR830-Subpart B, "Safety Basis Requirements,"
  - DOE Order 5480.23, *Nuclear Facility Safety Analysis Reports*,
  - DOE Order 5480.22, *Technical Safety Requirements,*
  - DOE-STD-3009-94, *Preparation Guide For U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*.
  - LIR 300-00-06, *Nuclear Facility Safety Authorization Basis*
  - Operational support tools referenced by LIR 300-00-06 applicable to DSA/TSR preparation.

- Previous experience in technical aspects of preparation or review of safety documents for DOE facilities or comparable commercial industry safety analysis documents.

APPENDIX B

Detailed Comment/Resolution Form

Facility:
Document Draft/Rev/Date:

Comment priority:
R = Required comment and must be resolved; S = Suggested comment and requires consideration; E= Editorial comment

#	Priority	Reviewer	Page/Line/ Other ref.	Comment	Response	Resolved	
						Yes	No

APPENDIX C
Additional Instructions for Hazard Analysis and Accident Analysis Checklists

DOE-STD-1104-96 identifies four general conclusions that should be met for approval of Ch. 3 of a SAR. These four conditions are listed below:

- The HA includes hazard identification that specifies or estimates the hazards relevant for SAR consideration in terms of type, quantity and form, and also includes properly performed facility hazard classification.

- The HA includes hazard evaluation that covers the activities for which approval is sought, is consistent in approach with established industrial methodologies, identifies preventive and mitigative features for the spectrum of accidents examined, and identifies dominant accident scenarios through ranking.

- The HA results are clearly characterized in terms of defense in depth, worker safety, and environmental protection. The logic behind assessing the results in terms of safety-significant SSCs and designation of TSRs is understandable and internally consistent.

- Subsequent accident analysis clearly substantiates the findings and delineations of hazard analysis for the subset of events examined and confirms their potential consequences. Events potentially exceeding evaluation guidelines need to clearly identify associated safety-class SSCs and basis of TSR derivations.

Review criteria to support these conclusions are provided in four checklists covering (1) hazard identification, (2) hazard evaluation, (3) hazard analysis results, and (4) accident analysis.

Hazard Identification Checklist

(1) The hazard identification methodology should be presented with regard to how hazardous materials and energy sources were identified and inventoried. Sources of information used as part of the methodology including the use of referenced information such as fire hazard analyses and occurrence reports, should be identified. As it is not the intent of the safety analysis to cover common industrial hazards, interfaces must be identified with other programs such as OSHA compliance or general industrial safety as a means of screening standard industrial hazards or other common insignificant hazards.

(2) The summary table of facility hazards must identify each hazard (e.g., plutonium 239, chlorine gas, thermal energy), its form (e.g., powder, liquid, solid), the type of hazard (e.g., radiological, toxicological, explosive), location, and quantity. With DOE's concurrence, however, a BIO may focus on the major hazards as opposed to the complete, systematic listing expected in a SAR. For large nuclear facilities with many hazardous materials in small quantities (e.g., facilities with numerous gloveboxes and storage vaults), it may also be impractical to identify every possible material location by individual stations. In such cases, locations and quantities of materials should be specified by room and operation, generically for

low quantity operations and specifically for major operations. Lists should provide enough detail that DOE reviewers knowledgeable about facility operations can understand the approximate material quantities foreseen in each major operation, can estimate the distribution of the materials within the building, and can concur with the material-at-risk quantities or energy estimations used in the accident analysis.

(3,4) The hazard identification should cover all the activities discussed in facility description, and no material should be listed in the hazard identification without some discussion of its associated activity in Ch. 2. In the same sense, the hazard and accident analyses and their associated text make assumptions about material quantities that should correlate with the hazard identification.

(5) Logic must be employed to specify quantities of hazardous material for energy sources. For example, assessments looking at specific operations will typically use flowsheet parameters or administrative limits to assign quantities. In some cases, nuclear criticality limits are used, although these may be excessively conservative depending on how the limits calculated correlate to actual operating practice. It would be inappropriate, however, to randomly mix-and-match flowsheet and criticality limit parameters. In all cases, there must be an identifiable reason why a given quantity was assumed. The net result should be a reasonably conservative estimate, keeping in mind that DOE-STD-3009-94 states that accident analyses should assume facilities are operating in a realistic state, not in a worst-case state of procedure violation or unknown material accumulation.

(6) DOE-STD-1027-92 was established to remove hazard classification as an issue of significant contention. A simple statement of exceeding the Category 3 or Category 2 thresholds is all that is typically necessary, especially for Hazard Category 2 facilities, most of which involve quantities of material making their classification obvious.

The standard also allows a facility to perform a final hazard categorization in order to make the case that its bounding accident potential does not exceed the bases of a given DOE-STD-1027-92 threshold. Where such cases are made, it is important to remember that the bounding potential must consider all the material in the facility. The location with the most material may not be susceptible to the worst airborne release fraction, and vice-versa. DOE-STD-1027-92 deals with this problem by assuming all the material in a facility was vulnerable and using facility average release fractions (i.e., neither the highest or lowest possible). For facilities with many curies and/or many different locations of material, attempts to identify a bounding accident potential that lowers hazard categorization should not stem from incomplete assessments open to challenge.

Hazard Evaluation Checklist

(1) The methodology section should clearly identify a generally accepted hazard analysis method (e.g., preliminary hazard analysis (PHA), hazard and operability (HAZOP) Study, failure modes and effects analysis (FMEA), "What If"/Checklist) or combination of methodologies used. Hazard analysis methods differ in their appropriateness for use depending on the types and

complexity of operations being examined. Checklists, PHAs or What If approaches are generally used on simpler or well-understood systems and operations. Where operations are routine and familiar, hazard analysis teams members can identify issues of concern from their own first-hand experience and knowledge. When a specific subject assumes sufficient complexity that a number of distinct sub-component failures need to be characterized, FMEAs and HAZOPs may be necessary. Selection of an appropriate method or methods for a hazard analysis, however, is a subjective decision. Other factors should also be considered, such as the previous experience of the team leader or the team itself. Judgements of appropriateness are often less a question of actual technique than of the attitude and effort put into use of a given technique.

(2) A hazard analysis should be performed by a team that includes members with first-hand experience of the actual facility's operation and design. The hazard analysis should not be performed entirely by outside personnel. If facility operators and engineers are not involved in the team, there is no basis for assuming the evaluation to be accurate.

(3, 4) A reasonable effort should be made to use accurate information available. It is recognized that most existing facilities will not have a complete collection of ideal documentation, but there is a minimum standard of information essential for an adequate hazard analysis. While a complete set of "as-built" information, or even P&IDs for every system is not required, a flowchart and process layout is generally necessary, as well as a basic understanding of materials of construction, piping connections, power supplies, etc.

(5, 6, 7) These criteria simply establish basic groundwork. If this material is not made available to the reviewer, there is a fundamental problem with either the product, the process, or both. The hazard evaluation worksheets must cover all operations and activities discussed in Ch. 2, Facility Description, as well as all hazards identified previously in Ch. 3. For each entry, the minimum set of information required is:

- The specific hazard(s) assessed (e.g., the radiological hazard of plutonium or the toxicological hazard of chlorine gas)
- The accident type (e.g., fire, explosion, or toxic spill) and cause
- Relevant preventive and mitigative controls for each scenario (e.g., hydrogen detector, interlocks, fire suppression system, alarms, specific operator actions)
- The consequence and likelihood binning parameters for each scenario; and
- As needed, recommended actions or items to examine further.

The most common error in hazard analysis is for the identification of preventive and mitigative features to be generic, with most just a partial listing of administrative features. That does not support integrated safety management, the principal purpose of requiring a hazard analysis. For

that same reason, it is also critical to see evidence that recommended action items have been made for both minor and major issues, and that some follow-up is occurring on these items. Detailed documentation to that effect need not be in the hazard analysis, but should be traceable to it.

(8, 9) The methodology is required to have a defined binning technique. The technique is defined for the analysis as the organization finds appropriate, and there is no one binning technique that is inherently better than another. The binning technique must include some measure of accident scenario frequency and impact/severity. In addition, it should define a prioritization level based on the both the frequency and impact/severity measures.

Binning criteria should be selected so that a small number of accident scenarios clearly emerge for further examination in accident analysis. That is, the general perspective provided by the binning process should make it obvious why the small subset of accidents examined in accident analysis was chosen. The binning system complicates and distorts the review process if it mixes medium and high consequence events, smears together different measures of consequence (i.e., public and worker, mitigated and unmitigated), or uses frequency as a means to dismiss internally initiated scenarios of high consequence. The latter fault immediately calls the whole accident analysis activity into question, while the other two require detailed reconstruction by reviewers familiar with the operations conducted in order to determine if the accident analysis has focused on an incomplete or incorrect set of bounding accidents. It should be kept in mind that the purpose of binning in DOE-STD-3009-94 is to provide a general risk perspective, not to prove some level of risk acceptance.

(10) No checklist can be used to prove completeness for the variety of operations evaluated in non-reactor nuclear facility SARs, and no hazard analysis team can guarantee that they have identified all possible hazardous scenarios. Evaluation of comprehensiveness requires practical knowledge of the operations assessed and informed judgement. The reviewer must, however, believe that a conscientious effort has been made to comprehensively evaluate hazards.

Hazard Analysis Results Checklist

(1, 2) These criteria do not relate solely to the SAR write-up itself. Appropriate integrated safety management will assess recommendations from the hazard analysis for closure, either by recognizing and justifying that the issue is not a problem, or by implementing administrative and design corrections. DOE desires to see a questioning process in place that leads to routine fixing of problems rather than an analysis whose purpose is to demonstrate there are no problems. Therefore, review must assess the hazard analysis process and its results to determine if meaningful feedback to operations has occurred for issues large and small.

Where commitments are made for major safety improvements, or significant concerns are currently unresolvable, reviewers should verify that interim safety or operational controls are in place. These interim controls allow facilities and operations to establish a safety basis while options for improvements are studied or engineering backfits are considered. That allowance

should not, however, become a vehicle to acknowledge deficiencies without any corresponding safety management commitments.

(3) The defense in depth definition based on the hazard analysis results is the fundamental focus of review. Defense in depth is a receptorless concept. It focuses on those aspects of design and operation that prevent major uncontrolled hazardous material releases independent of specific receptors. DOE SARs do not have the predefined understandings of functionality and what is significant that characterizes reactor SARs, and so the hazard analysis must be distilled into a basic definition of defense in depth as it practiced for an existing facility or planned for a new facility. This definition should include administrative features and programs as well as systems, structures, and components. Characteristics of an effective defense in depth discussion include: systematic organization of the presentation, typically by identifying layers of protection starting with the hazardous material and working outward; identification of important features in general terms as opposed to detailed design information; tying features to overall control principles, such as ventilation pressure differential zones of confinement; and an overall assessment of why the defense in depth for both specific hazards and overall operation are at least commensurate with general industry practice. It is important to remember that there is no generic number of layers required, and that such generic specificity cannot be expected for the wide variety of operations conducted in the DOE complex. The purpose of this section is to clearly define defense in depth so that the DOE and the facility operator have the requisite information needed to intelligently discuss the parameters of an appropriate authorization basis. A good rule of thumb for judgement is that a reviewer not familiar with the operation at a detail level should feel, after reading the facility description and defense in depth sections alone, that he/she understands the principal facility hazards and controls without progressing to any detailed examination of hazard or accident analyses.

The hazard analysis must also be distilled into a basic definition of worker safety as it practiced for an existing facility or planned for a new facility. Characteristics of an effective worker safety discussion include: systematic organization of the presentation, typically by identifying general features of protection and progressing to any unique issues of high consequence; basic prioritization of concerns; tying features to overall control principles, such as ALARA; and an overall assessment that explains how worker safety for both specific hazards and overall operation are at least commensurate with relevant industrial practices. The worker safety section is subordinate to the defense in depth section, as the latter provides overall facility definition from a receptorless perspective. If redundant information could belong in both sections, DOE-STD-3009-94 prefers it be placed in the defense in depth section and referenced in the worker safety section. For example, gloveboxes with associated ventilation and zone pressure differentials play an obvious and vital role in preventing worker exposures because they are fundamental in preventing uncontrolled material releases. For the purpose of defining facility safety, the latter function is broader and should already have been detailed in the defense in depth write-up.

(4) The hazard evaluation assessment sections of Ch. 3 must obviously be supported by the hazard evaluation itself. Otherwise, the process upon which DOE is depending for its conclusion

that facility operations are understood and controlled to the best of experienced ability has not been demonstrated.

(5) Beyond simply defining defense in depth and worker safety, the SAR must also identify what components are most significant, and therefore to be controlled under the increased oversight associated with safety significant SSC and TSR definition. It is important that the bases for designation are clearly explained, as this section in essence documents an agreement between DOE and the facility operator.

DOE-STD-3009-94 provides general guidance for defense in depth safety SSC selection: "To effectively use the graded-approach concept, focus on the most important aspects of defense in depth whose failure could result in the most adverse uncontrolled release of hazardous material." The standard further specifies three types of controls that are typically most significant: the outer or predominant means of mitigating uncontrolled releases of hazardous materials (e.g., ventilation system directing airflow to HEPA filtration); preventive features that preclude highly energetic events that essentially destroy any one layer of protection or threaten multiple layers (e.g., large explosions); and SSCs needed to insure the availability of the first two features." For worker safety, DOE-STD-3009-94 establishes a threshold of immediately life-threatening or potentially disabling, with the intent being that the threshold be subjective on a case-by-case basis. The restriction to immediately life-threatening potential removes latent health issues such as the carcinogenic potential associated with radiological exposure. That worker safety issue is not dismissed, but rather is handled through a radiation protection program whose focus and principle features are well-defined and subject to general agreement throughout the operational community.

The intent is for safety SSC designations to make sense. While SAR preparers may use any analytical algorithms they find helpful in selecting SSCs, the DOE is not required to accept such efforts as binding for its SAR review. For example, consider a SAR for an operation with many gloveboxes holding kilogram quantities of material that designates only that portion of the ventilation system serving the one operation examined as a surrogate bounding accident in accident analysis. Such a result is obviously the artifice of an analysis confusing surrogate representations with the real safety issues of the operation. A DOE reviewer can and should reject such a narrow designation in light of the requirement that results make sense. At the same time, it is also important that the reviewer not adopt a mindset designating anything with a safety function as safety significant. Safety SSC designation is intended for the most significant controls and it is not DOE's position that lack of safety SSC designation presumes the control has no reliability. Such an approach would be a violation of the precepts of integrated safety management, where any number of administrative programs are required to oversee all aspects of operation.

(6) If the SAR is to be found acceptable, reviewers must concur with a final version of this Ch. 3 section. Whatever iterations or additions may be made in review, DOE must ultimately conclude that the formal controls specified in the TSRs are adequate.

(7, 8) The review conclusion of interest is that facility management is not ignoring obvious design or operational practices associated with minimizing environmental insult. It is expected that a properly developed defense in depth section will have already defined controls that prevent unmitigated releases, so that documentation in this section is often a formality. This section should clarify that there are no large release potentials that could cause significant environmental damage for which normal industrial levels of protection are not already in place, or for which easily implemented design or operational changes could minimize the chances of that release occurring.

DOE-STD-3009-94 states that safety significant and TSR designation should not be made for purely environmental issues, as these are not direct safety issues. In the event that unique environmental release potential exists with potentially major consequences, these should be addressed on a case-by-case basis in the defense in depth write-up.

(9) The accident selection section should provide a clear bridge between the hazard analysis and the accident analysis. The latter is a follow-on activity whose defensibility, in terms of examining a small number of bounding accidents, derives from the comprehensive nature of the hazard analysis. If the work to this point has been documented correctly, it should not be difficult for the SAR preparer to identify and explain unique and representative bounding accident selection in terms of the parameters used to calculate source terms and doses.

The ranking bins used should present information so that major accident potentials are obviously discernable, with the associated write-up making the completeness of the subset obvious. If the rankings are unclear, or the SAR relies on complex sequences of decision trees to derive accident selection, the defensibility of the accident selection rests solely on the degree to which their expertise allows reviewers to reconstruct a link between the hazard and accident analyses.

(10, 11) As a major purpose of accident analysis is to identify a need for safety-class SSC designation, the selection process should not be skewed so as to miss accidents with the potential to exceed Evaluation Guidelines. Two major errors are generally responsible for improper accident selection: (1) risk selection that has co-mingled worker consequence with public consequences; and (2) using overall scenario frequency arguments to dismiss physically possible high-consequence internally initiated accidents that are unlikely precisely because they are prevented and mitigated by operational controls.

DOE has defined, based on hazard categorization, natural phenomena stresses that facilities should be assessed against. The typical natural phenomena of concern related to these criteria are seismic and wind, though site-specific phenomena can sometimes be a concern. DOE Order 420.1, *Facility Safety*, implements DOE-STD-1020-94, -1021-93, -1022-94, and -1023-95, which detail the probabilistic assessment criteria and its development. The reviewer should verify that appropriate stress levels are assumed in a SAR/BIO. External events (i.e., plane crashes) are assessed if their overall frequency is approximately 1E-6/yr (see DOE-STD-3014-96 for aircraft crash frequency calculations). The details of these events and any probabilistic calculations may be presented in the accident analysis as opposed to the hazard analysis, but the accident selection section should specify all accidents sent forward to accident analysis. For

other than internally initiated events, however, this may simply be a notation of g-level and windspeed, along with a statement of any external events dismissed due to low probability.

The reviewer should verify that selection of representative types of accidents does not exclude unique controls from consideration. For example, consider a facility with five explosion potentials in similar processes, where the same fundamental controls prevent site boundary consequences on the order of 1 rem, 5 rem, 10 rem, 30 rem, and 40 rem respectively. Suppose this same facility also has one unique type of process that could have an explosion with estimated consequences of 25 rem. If the 40-rem accident is examined as a representative accident, it will allow assessment and designation of safety class SSCs for controls associated with 30-rem operation as well. If however, the 25 rem operation is not examined as a unique accident because it is bounded by the 40 rem accident, controls potentially requiring some safety class SSC designation will be ignored.

Accident Analysis Checklist

(1, 2, 3) In terms of analytical methodology, the reviewer must be able to appreciate the bases for all key analytical assumptions in the consequence calculation. Unlike the hazard analysis, the accident analysis performs an explicit consequence documentation function. Accordingly, vague or incomplete identification of parameters defeats the purpose of analysis. The SAR reviewer should be able to independently calculate an accident source term from the information given. The reviewer is not required to document such efforts; his or her ability to do so is a direct reflection of the acceptability of the SAR documentation.

The reviewer must be able to identify the dose exposure location distance and the meteorological conditions assumed, so that results obtained can be checked against standard modeling estimates. Likewise, the use of phenomenological codes requires specifying both the code and the modeling inputs specifically enough that the appropriateness of that use can be assessed. Extensive details may be referenced to appendices or separate documents, provided these are available for review.

(4, 5) The criteria for scenario development are driven by the documentation function of accident analysis. Clarity is needed for the same reason it was in the defense in depth write-up in hazard analysis, namely that safety functions might be defined based on this information.

Many of the accidents analyzed for nonreactor nuclear facilities possess a generic quality. For example, fires are often postulated with no ability to define their progression in meaningful detail. This makes event trees relatively uninformative, allowing a number of questions and misunderstandings to arise as regards the specifics of progression in an actual facility or operation. A solid, written description minimizes such misunderstandings. It also clarifies the controls relevant to preventing and mitigating the accident in a facility specific context. This is important, since many SAR efforts have stumbled in making generic assumptions about SSCs such as fire suppression systems, whose capabilities and vulnerabilities vary between facilities.

(6, 7) In cases such as seismic events, a team of specialists will evaluate the base reference material to reach final concurrence on the definition of damage caused by the phenomena. The

Chapter 3 reviewer's initial job then becomes verifying that the accident description satisfies the concurrence reached, with the assistance of those specialists as needed, and determining that the accident description makes sense at a technical laymen's level.

The scenario development cannot presume conditions at odds with other portions of the SAR, most specifically the facility description, the hazard analysis, the definition of safety SSC requirements in Chapter 4, and any referenced studies. For example, the accidents presented in accident analysis should correlate directly to the selected outputs from hazard analysis. The accident sequences and their results presented should also be consistent with the assessments and definitions for defense in depth and worker safety developed in hazard analysis. If that is not case, which it has not been for multiple SAR submittals throughout the DOE complex, Chapter 3 is fundamentally flawed and requires significant revision.

(8) Having verified minimum requirements for consistency and documentation, the reviewer must now assess the actual calculations. This is typically a two-step process beginning with an assessment of the basis for a given number and concluding with an evaluation of its appropriateness in the overall scenario context. For phenomenology, the initial step might be to verify that a TNT equivalent or a heat of combustion conforms with standard references; for source term, one might examine material-at-risk against the hazard identification listing or a release fraction against references such as DOE-HDBK-3010-94. The second step requires determining whether the overall combination of numbers, and their underlying assumptions, is appropriate. For example, suppose a fire analysis assumed all the doors to a room were open to the atmosphere. If, in fact, the real room only opens to hallways, this can be a nonconservative assumption for the overall scenario in terms of heat lost. The reviewer should also consider whether assumptions made are too conservative, unless the stated purpose in the SAR is to demonstrate minimal problem under the most extreme conditions.

(9) The reviewer must conclude that the source term and dose estimates are a reasonably conservative approximation. That is not intended to mean that every parameter in the calculation is the worst value imaginable under any circumstance. SARs have been approved where review documentation acknowledges that some parameters in the five factor equation could be larger, the critical determination being the reviewers conclusion that the net result obtained was still conservative in terms of what would realistically be expected. Such a determination is inherently subjective due to the large uncertainties in accident modeling.

(10) SARs are sometimes written in a manner that obscures the unmitigated source term potential. The maximum airborne respirable source term for alpha-emitting radionuclides should always be clearly identified in the SAR write-up. It is the product of the material-at-risk, the damage ratio, the airborne release fraction, and the respirable fraction, without accounting for subsequent stages of filtration beyond the immediate point of source term generation.

For non-alpha emitters that may produce direct shine doses, a source term not accounting for respirable fractions should be specified. For hazardous materials, the release rate producing a given downwind concentration is the result typically reported.

(11) SARs are also sometimes written without specifying the maximum unmitigated consequence. That is the dose obtained from the maximum source term without intervening filtration. This value should be clearly specified and explicitly compared to the Evaluation Guideline.

(12) If the unmitigated consequences of an accident exceed the Evaluation Guideline, a need for safety class designation has been identified. All the preventive and mitigative controls associated with the accident progression form the candidate pool for safety class designation, and any additional TSR commitments deemed necessary.

A subset of those controls should be selected, with a basis that makes common sense. The approval of that basis represents an agreement between DOE and the facility operator as to a specific focus of regulatory oversight. The same basic considerations noted for selecting safety significant apply here as well. In all but the most unique of operations, It is also presumed that assuming functionality of those controls designated safety class will result in an accident sequence with doses well below the EG.

(13) If the SAR is to be found acceptable, reviewers must concur with a final version of this Chapter 3 section. Whatever iterations or additions may be made in review, DOE must ultimately conclude that the formal controls specified in the TSRs are adequate.

(14) Both 10CFR830 §830.204 and DOE-STD-3009-94, Section 3.4.3 address the consideration of the need to perform beyond design basis accident analyses. This is not done to provide assurance of public health and safety; but instead to potentially perform cost benefit analyses (outside of the SAR) to further address any facility vulnerabilities that lead to consequences exceeding the EG in the beyond DBA range. Any analyses performed are not expected to be done at the same level of detail as the DBAs and beyond DBA analyses are not performed for external events.

ATTACHMENT 1 TO NNSA/LASO/SABT SAFETY BASIS REVIEW PROCEDURE AND OPERATIONS PLAN

Operation Support Tool 300-00-06F
Revision 1

LANL Review Plan for Nuclear Safety Analysis Documents

Los Alamos National Laboratory

Developed by

Facility and Waste Operations Division
Office of Authorization Basis

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HISTORY OF REVISIONS

Revision	Date	Summary
0	8/8/01	Original Issue
1	1/15/02	Revised to reflect improved review process (Table 1)

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LIST OF ACRONYMS AND ABBREVIATIONS

Term	Meaning
AA	accident analysis
AB	authorization basis
AC	administrative control
ADO	Assistant Director for Operations
ALARA	as low as reasonably achievable
BIO	basis for interim operations
CSE	criticality safety evaluation
CFR	*Code of Federal Regulations*
DOE	U.S. Department of Energy
DOE/AL	DOE Albuquerque Operations
DBA	design based accident
DSA	documented safety analysis
EG	evaluation guide
FHA	fire hazard analysis
FMEA	failure mode and effect analysis
FSA	facility safety assessment
FSAR	final safety analysis report
FWO	Facility and Waste Operations (Division)
HA	hazard analysis
HAZOP	hazard and operability
HC	hazard category
HEPA	high efficiency particulate air
LAAO	Los Alamos Area Office
LANL	Los Alamos National Laboratory
LCO	limiting condition for operation
LCS	limiting control setting
LIR	Laboratory implementation requirement
MOI	maximum-exposed offsite individual
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NSM Rule	Nuclear Safety Management Rule, 10 CFR 830
OAB	Office of Authorization Basis
ODD	owning division director
OIC	organization for institutional coordination
OST	operation support tool
PHA	preliminary hazard analysis
P&ID	piping and instrument diagram
PM	program manager
PPE	personnel protection equipment
PrHA	process hazard analysis
Rev.	revision
SA	safety assessment
SAR	safety analysis report
SB	safety basis
SER	safety evaluation report
SME	subject matter expert
SR	surveillance requirement
SSC	system, structure, and component
STD	standard
TSR	technical safety requirement
USQ	unreviewed safety question

1 PURPOSE

The purpose of this Plan is to provide guidance for preparation as well as conduct of the internal Los Alamos National Laboratory (LANL) review of nuclear safety basis (SB) documents prepared under LIR 300-00-06, *Nuclear Facility Safety Authorization Basis*. The Plan also provides guidance on integrating external reviews (i.e., DOE) into the overall process. The formal, structured approach in this Plan will improve the quality of reviews and safety documents produced by LANL. Specific project plans may be used to establish the full scope for reviews.

2 APPLICABILITY

This Plan is to be followed by those persons performing a review of a SB document prepared in accordance with 10CFR830, Subpart B, "Safety Basis Requirements," DOE Order 5480.23, *Nuclear Safety Analysis Reports,* and DOE Order 5480.22, *Technical Safety Requirements* for a LANL nuclear facility. Nuclear facility is defined in 10CFR830 and LIR 300-00-06. Certain aspects of this Plan may be also useful for non-nuclear facility safety analysis (FSA) reviews under LIR-300-00-07 and are expected to be followed, as appropriate.

Because LANL is in the process of revising or updating the SB documents for many existing nuclear facilities, this Plan is particularly applicable to facility SB documents in the operating life cycle. SB documents developed for other facility life cycle phases might require a somewhat different review process and criteria. For example, a major new facility would require a preliminary hazard analysis at the conceptual stage, a preliminary documented safety analysis (DSA) at the Title I, or construction phase, and a final DSA prior to operations. The reviews would use a process and criteria that are similar to, but somewhat different than a review for an existing facility. The FWO-OAB should be consulted and a determination made as to the applicability of this Plan or an alternate approach.

Additionally, because of the different nature of the facilities, this Plan does not address the review of reactors using U.S. Nuclear Regulatory Commission Regulatory Guide 1.70 for the safety analysis, the deactivation or decommissioning of a facility, or the unique aspects of a nuclear explosives operation.

3 TECHNICAL BASIS

This Plan is based on the principles for a safety analysis report (SAR) review that are discussed in DOE-STD-1104-96, *Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports.* Although much of this standard is written for the DOE review process and not internal LANL reviews, the principles are applicable. Below are excerpts from DOE-STD-1104-96 stating applicable principles and how they are to be applied to LANL reviews:

- 10CFR830,Subpart B, endorses the use of DOE-STD-3009-94 as a safe harbor method for the SB for a DOE nonreactor nuclear facility. DOE-STD-1104-96 states, "DOE-STD-3009-94…provides approved guidance for meeting the requirements of DOE Order 5480.23."

  LANL endorses DOE-STD-3009-94 as the preferred standard for format and content of DSAs for nonreactor nuclear facilities. Therefore, reviews shall judge adequacy for compliance with the implementing guidance in DOE-STD-3009-94, as well as standards referenced in those documents and other applicable codes and standards. A graded approach may be used to adjust the level of detail of the material in the SB document, as described in DOE-STD-3009-94.

- "Independent review of a SAR facilitates achieving defensible approval of that SAR."

The internal LANL review is to be performed by personnel who have not contributed to preparation of the SB document. Reviewers shall have appropriate technical knowledge, training, and experience.

- "The objective is not to document a large number of issues but to contribute to improving the SAR to meet the mission established by DOE Order 5480.23 and the intent of amplifying guidance (i.e., to provide assurance that the SAR appropriately establishes the safety basis of the facility)."

  This principle states the fundamental objective of the review: to contribute to improving the SB to accurately reflect the facility SB as established by 10CFR830, DOE Order 5480.23 and amplifying guidance (i.e., DOE-STD-3009-94). The intent is not to see how many comments can be developed. Reviews are to be managed to ensure that this objective is understood and followed by all involved.

- "It is not expected that SAR reviews will be conducted completely separate from SAR preparation. This Standard encourages interface between the two processes to develop familiarity with the facility's SB, to respond to requests from the SAR preparer for early identification and resolution of potential issues, and to discern the scope of subsequent SAR review and approval documentation required."

  The Laboratory DSA review process includes formal reviews (and informal discussions) throughout the development effort. It is essential to identify the important issues early in the process. The review process must be disciplined to ensure that issues are identified early and are not raised at the very end of the process. One challenge commonly encountered is turnover of review personnel between phases of the review. The review should be managed to minimize turnover and mitigate the inefficiency introduced by replacement reviewers when turnover is unavoidable. New reviewers are not to have a license to go back to the very early review material and generate new issues.

- "DOE strives for an effective, streamlined SAR review and approval process while still achieving an acceptable level of safety assurance. This Standard advocates proper planning for a review and encourages an integrated review process where all parties with vested interest in a facility SB coordinate throughout the review and approval of a SAR."

  A streamlined and efficient internal review process is achieved by:
  (1) a qualified review team leader who ensures that the review team is provided access to the SB development team, facility operating personnel, and safety basis supporting documents;
  (2) review team limiting input to substantive issues and participating in resolving issues;
  (3) facility operating organization supporting the review by providing necessary information and making a good faith effort to resolve review concerns;
  (4) all involved working to complete their activities on schedule; and
  (5) using a conflict resolution process designed to prevent delays caused by disagreements.

- "A significant issue identifies a problem or concern that affects the utility or validity of the SB documentation. 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/guidance on SARs."

  Reviewers are to be instructed to limit their essential comments to only substantive issues based on deviations from criteria in applicable requirements. Guidelines for comments are provided in this Plan. Review team leaders shall review all comments to ensure that the comments are technically

accurate, collectively consistent and comply with these guidelines. Comments that do not meet these guidelines are to be deleted from the comment set.

- "The core of the review effort is assessing the hazard and accident analyses in the SAR because these analyses are the primary source of original material with which the remainder of the SAR is aligned."

  Laboratory internal reviews should emphasize the hazard and accident analyses including the appropriate identification of hazard controls based on these analyses.

- "Well before SAR submittal for approval, plans should be developed in coordination with the facility contractor where support of the contractor will be required (e.g., briefings on the SAR, facility walkthroughs, issue resolution)."

Laboratory SB reviews should be planned in advance to identify the review team and begin preparation prior to the start of the review. Reviewers should be provided the opportunity and allotted the time to become familiar with the subject facility and operations prior to beginning the review. Preparation should include facility tours, presentations by facility personnel, and review of facility documents.

4 PROCESS

4.1 Overall Description

DOE-STD-1104-96 encourages interface between the SB development and the review process to facilitate early identification and resolution of potential issues. Lack of reviewer interaction during the development process often leads to major issues raised by reviews conducted very late in the development process. Such issues can have major impact on cost, schedule, and facility operations. Therefore, early and continued interface between the review (DOE reviewers and LANL independent reviewers) and development teams is a key element. During this interaction the review team must maintain independence by not interjecting themselves directly into the development process.

The process outlined in this Plan involves several stages of review. To be accomplished efficiently, the entire process should be defined and scheduled at the beginning of the effort (i.e., 0% Scoping). The scope of each review should be in accordance with that shown in Figure 1 that displays the generally expected portions of the safety analysis to be developed and reviewed at each stage of the process.

4.2 Roles and Responsibilities

This section covers those roles and responsibilities specifically related to the review of the SB documentation. LIR 300-00-06 provides details for roles and responsibilities for nuclear facility SB, specifically for division and facility management.

4.2.1 Facility SB Project Manager (could be the Facility Manager)

The SB Project Manager (PM) has the following review-related responsibilities

- Provide a single point of contact for the SB review process
- Distribute documents for review.
- Coordinate the logistics of meetings with review teams.
- Provide facility tours and arrange for process walk-downs and interviews with facility personnel as needed for the review process.
- Provide facility training and necessary security guidance for reviewers.
- Ensure resolution of review comments in a technically defensible manner.
- Elevate to senior management issues that cannot be resolved with the review team(s).

- Develop and approve the SB project plan, if required, consistent with the LANL Master Schedule and sitewide SB guidance.

4.2.2 FWO-OAB

The Office of Authorization Basis has the following review-related responsibilities.

- Identify an independent review team leader and team for the SB effort.
- Coordinate and assist in the activities among the development team, facility staff, and the DOE and LANL review staffs as necessary.
- Update this document periodically to reflect lessons-learned
- Validate that all independent review comments have been incorporated in a technically defensible manner prior to submittal to DOE for approval.
- Concur with the SB project plan approved by the facility management.

4.2.3 Independent Review Team Leader

The LANL independent review team leader has the following responsibilities

- Manage the internal independent LANL review
- Identify and obtain qualified review team members, including replacements, as required.
- Coordinate site visits, facility walk-downs, review meetings, etc., with the SB PM.
- Ensure team members obtain proper training needed for site visits, walk-downs, etc.
- Consolidate reviewer comments. Ensure these comments are categorized properly, are technically accurate, and comply with the rules for comments to include screening out non-compliant comments. Submit comments to FWO-OAB for submittal to the SB PM.
- Participate in discussions of issues.
- Assess the acceptability of facility comment resolution proposals and final closeout of comments.
- Elevate comment disputes and review plan execution issues to the FWO-OAB and/or, owning division director (ODD) levels, as necessary, and include documentation of dissenting opinions.

4.2.4 Review Team Members

Review team members have the following responsibilities.

- Participate in facility tours, walk-downs, and interviews, as necessary.
- Obtain required training for facility access.
- Perform review as scheduled.
- Use this Plan and enclosed checklists and other documents as necessary to perform the review.
- Document comments and the basis thereof in accordance with this Plan.
- Assign a response code to each comment (Required or Suggested). Editorial comments may also be provided, but should not be the focus of the review.
- Ensure comments comply with the rules for comments.
- Participate in comment review sessions.
- Review proposed comment resolutions for adequacy and concur if appropriate.
- Review revised document for adequate incorporation of agreed upon resolution of comments.
- If unable to participate in review as planned, inform the review team leader immediately.

4.2.5 Safety Analysts/Development Team

Safety Analysts/Development Team members have the following review-related responsibilities.

- Assist the SB PM in the resolution of comments including documentation of Required comment resolutions, as a minimum.
- Participate, if necessary, in review sessions and comment resolution meetings.

4.2.6 DOE Review Organization

This list represents the LANL's understanding of the responsibilities that DOE has accepted, and is not intended to assign these responsibilities to DOE but to assist LANL personnel coordinate SB review activities with DOE. The DOE Los Alamos Area Office (LAAO) is currently responsible for conducting reviews of LANL SB documents for existing facilities. DOE LAAO reviews are governed by LAAO internal SB review procedures. The review authority for new projects is typically DOE Albuquerque, but should be designated in writing by DOE.

- Participate in the 0% Project Scoping meeting to provide input to the scope and schedule.
- Determine at the scoping meeting the level of participation of DOE in the review process, either fully independent reviews at the established 30%, 70%, 90% milestones, or participation in a facility-led detailed workshop presentation and discussion of methods and results at key stages.
- Submit comments that comply with the rules for comments.
- For any SB document reviewed, provide a single set of formal comments to the SB PM.
- Participate in joint comment review sessions and comment resolution meetings as necessary.
- Provide written interpretations of applicable Laboratory/DOE contractual commitments associated with DOE orders and standards, as requested.
- Develop and issue the safety evaluation report (SER).

4.3 Detailed Preparation and Review Description

This section outlines and describes the individual process steps. The Plan focuses on DSA Chapters 3, 4, and 5 which deal with the hazards and accident analyses (HA), the identification of safety-significant and safety-class structures, systems and components (safety SSCs), technical safety requirements (TSRs), and supporting technical analyses such as a fire hazard analysis (FHA) and seismic evaluation.

4.3.1 Develop the Project Plan and Schedule

The SB PM will prepare an SB project plan for development, review, and approval of the SB. The FWO-OAB has developed a simple project plan template that has been used successfully. The project plan establishes the scope of the SB document, applicable standards and methods, expectations, and required resources. The project plan should be coordinated with the FWO-OAB to ensure that the plan complies with Laboratory SB requirements and that adequate funding and resources are available. The project plan must also be consistent with LANL institutional Master Schedule and other LANL commitments to DOE. The project plan must also allow for all of the steps depicted in Figure 1 and described in Table 1. The division or facility management will approve the project plan with concurrence by the FWO-OAB.

4.3.2 Initial (0%) Scoping Meeting

Figure 1 indicates that a 0% scoping meeting is required and is hosted by the FM or SB PM. This milestone is extremely important in that the basic agreement is reached among the preparing organization (facility), the FWO-OAB, and the DOE approving authority. Typically the project plan will be discussed at this meeting. At the conclusion of the scoping meeting, changes may be made to the project plan as necessary. Anticipated technical issues are thoroughly discussed at the scoping meeting and a path forward is developed for resolution of these issues.

4.3.3 Appoint the Independent Review Team Leader and Team

Once a SB document development effort has been initiated, FWO-OAB will appoint an independent review team leader. The team leader should have extensive experience developing and reviewing SB for nuclear facilities. Additionally, the team leader should also have leadership ability and strong communication skills.

In addition to the team leader, the review team typically consists of several core team members and other technical personnel for specific areas of expertise (e.g., criticality, seismic, fire hazard analysis). Appendix A is a summary of general team member qualifications. The size of the core team will vary depending on the scope and complexity of the safety analysis. Augmenting the core team are other subject matter experts (SMEs) with diverse experience in safety and health and facility operations. Although these individuals are not necessarily members of the core team, they collectively provide support, as needed, for a thorough assessment of the facility SB.

The important aspects of the team leader's job at this stage are: (1) assembling the appropriate team and (2) ensuring the team has completed training and facility familiarization prior to submittal of the draft documentation for review (typically the 30% submittal stage).

4.3.4 Prepare the DSA and Perform Reviews

The FM will ensure that a qualified team of analysts and facility experienced staff prepare the DSA. Reviews will be performed at several stages in the development process. Figure 1 and Table 1 depict and describe the various steps of preparation and review at the 30%, 70%, and 90% intermediate milestones. Table 1 should be used as a guide for expectations at each step of the process in order to achieve an 'approvable' DSA submittal to DOE.

In the past DOE conducted independent reviews at each of the same milestones as the LANL independent reviews at 30%, 70%, and 90%. This Plan does not automatically include a DOE review at these intermediate stages, but does provide for necessary interactions at key steps to provide a full briefing and detailed discussion of the methods and results at that stage. The described preparation guidance and independent reviews should result in an acceptable product submittal to DOE at the 100% stage. However, in some cases, discussions among the facility, the FWO-OAB, and the DOE (at the 0% Scoping meeting) may determine that a DOE review is desirable or necessary. It is recognized that DOE is not being asked to commit to acceptance of any decisions or conclusions prior to final submittal of the SB documentation and that any agreements reached are conditional on the submittal of technically defensible documentation for approval.

Section 5 to this Plan includes checklists to be used for performing SB document reviews. The criteria, based on DOE-STD-3009-94, are best used to focus the reviews on important issues and to check for completeness. If necessary, detailed review criteria can be developed and used by SMEs to conduct their assigned reviews. However, this detailed criteria used to guide the SME's review must be based on requirements and not reviewer preferences. See Section 4.4 for a discussion of rules for comments.

Reviews will be conducted and documented on a comment form to facilitate resolution. Appendix B specifies a format for documenting LANL review comments. Comments will be designated as Required or Suggested. Required comments must be resolved, but Suggested comments do not require resolution. The independent review team leader will consolidate all team comments and review for accuracy, compliance with comment rules, consistency, and categorization. Comments that do not comply with comment rules may be rewritten or may be screened and not submitted. This review of comments is an important responsibility for the review team leader and necessary to ensure an efficient review process. Team members who disagree with the actions of the review team leader will be provided the opportunity to submit a dissenting opinion to the review team leader. Dissenting opinions will be forwarded to the senior Laboratory manager responsible for approving the SB document for consideration.

The review team leader provides the final set of comments to FWO-OAB, to be forwarded to the SB PM. The three parties should meet to discuss these comments prior to finalization.

4.3.5 Conduct Review Meetings

A meeting involving the Laboratory independent review team, the SB PM and staff, and the SB development team is recommended for each review phase to discuss the comments. If DOE has conducted an independent review, the review meeting should include the DOE reviewers as well. The primary objectives of the meeting are to ensure that the comments are understood and to agree to a path forward for resolving them. Comments may be deleted or modified based on the review meeting. Meeting minutes will be taken to document agreements, requests, and open items.

The SB PM will distribute copies of each review package, e.g., 30% review documents, to the LANL independent review team (and DOE, as applicable) at least 30 days in advance of the review meeting. The OAB may request a shorter review period for the independent team, depending on the complexity and size of the material to be reviewed. After the independent review has been completed, the review team leader will provide the comments to FWO-OAB who will make them available to the SB PM in advance of the meeting.

4.3.6 Resolve Comments

The SB development team will resolve in writing all review comments designated as Required. See Appendix B for a recommended comment/resolution form. Resolutions will be documented and forwarded to FWO-OAB. Interaction between the independent review team and the facility staff or safety analysis document development team should be arranged, if necessary, to resolve comments.

FWO-OAB will distribute comment resolutions to the LANL (and DOE if appropriate) review teams. The LANL independent review team should verify that the proposed resolutions adequately address the comments. For interim reviews, proposed resolutions might simply be an agreement to add material. The review team will assess whether the added material is adequate during the next phase of the review. In such cases, the review team will verify adequate incorporation of comment resolutions by reviewing subsequent versions of the DSA.

4.3.7 Resolve Conflicts

Every attempt should be made to resolve review comments. The SB PM and independent review team leader should negotiate technical disagreements. Situations might occur, however, where a difference of technical opinion cannot be resolved. When such a situation arises, the SB PM should arrange a conflict resolution meeting with the next level managers in the preparing and reviewing organizations. The SB PM and the review team leader will present their position and the responsible manager will direct the path forward. A representative from FWO-OAB will attend to assist the resolution process and present the institutional position. The SB PM is responsible for coordinating the conflict resolution meeting and must bring such issues to closure expeditiously.

Figure 1. LANL AB Preparation and Review Process

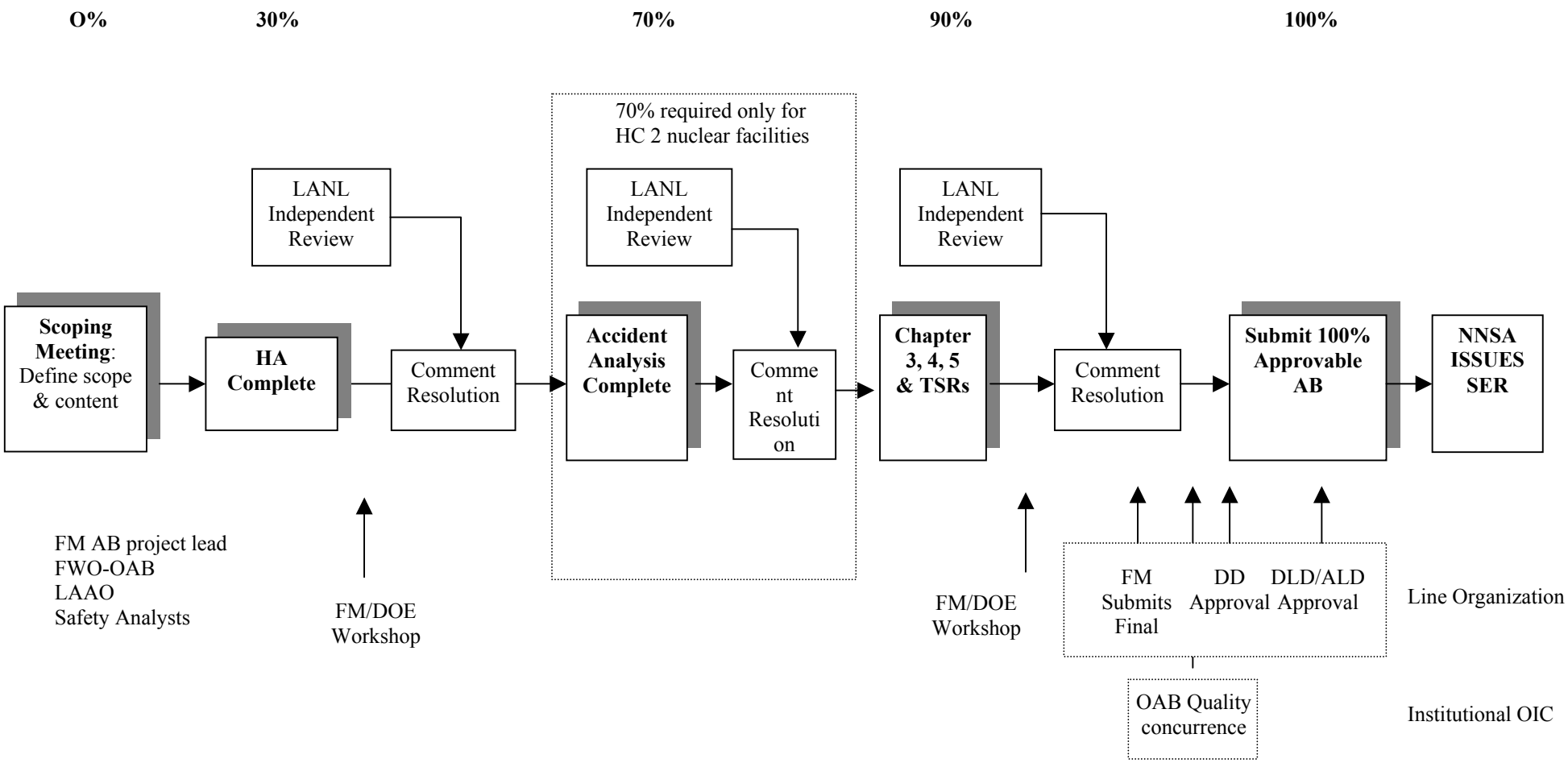

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
Scoping Meeting	Meeting hosted by the DSA preparation organization with participation by DOE and the FWO-OAB to discuss: • DSA scope, methodology, and schedule. • Technical issues and any path forward for resolution if necessary. • Identification of special supporting analyses required for the DSA. These support efforts may include a Fire Hazard Analysis, seismic evaluation, criticality safety evaluation (CSE), lightning protection, and so on. • Level of participation by DOE: full independent review at each of the 30%, 70%, and 90% stages, and/or, facility-led detailed workshop/presentation of methods and results, as described below. • Determine if LANL site guidance and handbooks are required to ensure consistency or if standardized information is available for use, e.g., - HA Handbook (OST 300-00-06A) - Accident Analysis Handbook (OST 300-00-06H) for atmospheric dispersion - Generic Chapter guidance (OST 300-00-06G). Discuss the adequacy of the current Master Schedule. The Master Schedule shall reflect the NNSA mechanism for review, either the NNSA/LANL workshop (2-3 days) with or without the fully independent review (30 days). At the conclusion of the meeting, the preparing organization shall issue minutes summarizing the agreements with outstanding issues and path forward.
Prepare 30% DSA	The DSA will be prepared at the following level for a 30% review: • Hazards analysis raw tables completed. • Chapters 1 and 2 in draft form. • Chapter 3 Sections on HA, defense in depth and worker safety in draft form. • Safety significant SSCs proposed. • Candidate accidents for accident analysis proposed. Note: The preparing organization should initiate the supporting technical analyses as early as possible, perhaps in parallel with the 30% work to ensure completion in a timely manner, e.g., FHA, seismic, CSE, lightning.
30% LANL Independent Review	The independent review team will conduct a review of the 30% material. The review will be performed in accordance with the rules for review comments (Section 4.4) utilizing the review criteria in Section 5.0. A comment resolution meeting shall be held as described in Section 4.3. **(30 day maximum)** Note: The preparing organization should work on the accident analysis concurrently with the 30% review and comment resolution. In most cases the majority of the accidents to be quantitatively analyzed are well known.
Detailed NNSA/LANL	After incorporation of the LANL 30% independent review comments is substantially complete, the facility shall prepare and conduct a thorough workshop

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
30% Workshop, or Independent Review	for NNSA of the 30% documentation. This presentation shall consist of: • Facility walk down, • Presentation of methods and results, • Recommended safety significant controls based on the completed analysis, • Accidents selected for accident analysis, and • Discussion of major technical issues or problems that need resolution. These activities may take several days depending on the complexity of the facility/DSA. A summary of the LANL independent review comments and resulting changes will be presented. At this stage, it is important to gain agreement on as much of the analysis and results as possible. At the conclusion of this detailed presentation/review, the DSA preparing organization shall issue minutes summarizing the agreements reached along with any outstanding issues and path forward for resolution. Note that NNSA is not committing to final decisions or agreements. Any decisions or agreements are fully conditional on submittal of the technical defensible documentation. **Alternately**, if decided at the 0% Scoping Meeting NNSA will also conduct an independent review of the SB documentation in accordance with LAAO internal independent review procedures. **(30 day maximum).**
Prepare 70% DSA	The DSA will be prepared at the following level for a 70% review, only for hazard category 2 nuclear facilities: • Remainder of Chapter 3 sections drafted, including - Accident Analysis completed for review - Safety SSCs proposed (safety class, safety significant, defense in depth) - Functional requirements proposed. • Comments from 30% review addressed. Note: The facility should try to interact with the LANL independent review team as 30% comments are incorporated rather than waiting until submittal of the official 70% product. • Supporting analyses completed (FHA, seismic, CSE, etc). • Proposed LCOs and administrative controls.
70% LANL Independent Review	The independent review team will conduct a review of the 70% material. The review will be performed in accordance with the rules for review comments (Section 4.4) utilizing the review criteria in Section 5.0. A comment resolution meeting shall be held as described in Section 4.3. **(30 day maximum)**
Detailed NNSA/LANL 70% workshop	After incorporation of the LANL 70% independent review comments is substantially complete, the facility shall prepare and conduct a thorough review for NNSA. This shall consist of: • Review of 30% comment resolution issues, • Accident analysis results,

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
	• Final proposed safety SSCs and functional requirements and • Proposed LCOs and administrative controls. This review may take up to several days depending on the level of complexity of the facility and the DSA. A summary of the LANL independent review comments and resulting changes will be presented. At this stage, it is important to gain agreement on as much of the results as possible. There should be no substantial open technical issues at this conclusion of this workshop. At the conclusion of this detailed presentation/review, the DSA preparing organization shall issue minutes summarizing the agreements reached along with any outstanding issues and path forward for resolution. Note that DOE is not committing to final decisions or agreements. Any decisions or agreements are fully conditional on submittal of the technical defensible documentation to support the agreements. **Alternately**, if decided at the 0% Scoping meeting NNSA will conduct an independent review of the SB documentation in accordance with LAAO internal independent review procedures. **(30 day maximum).**
Prepare 90% DSA	The complete draft DSA will be prepared and available for a 90% review: • Chapter 3 in final form, • Chapters 4 and 5 in final draft form, • TSRs in final draft form, • Programmatic chapters in final draft, • All supporting technical analyses, and • Comments from 70% review addressed. Note: The facility should try to interact with the LANL independent review team as 70% comments are incorporated rather than waiting until submittal of the official 90% product.
90% LANL Independent Review	The independent review team will conduct a review of the 90% material. The review will be performed in accordance with the rules for review comments (Section 4.4) utilizing the review criteria in Section 5.0. A comment resolution meeting shall be held as described in Section 4.3. **(30 day maximum)**
Detailed NNSA/LANL 90% workshop	After incorporation of the LANL 90% independent review comments is substantially complete, the facility shall prepare and conduct a thorough review for NNSA. This review shall consist of a presentation and discussion of the final results of the AB and how technical issues, not previously discussed, were resolved. There should be no substantial open technical issues at the conclusion of this workshop. At the conclusion of this detailed presentation/review, the DSA preparing organization shall issue minutes summarizing the agreements reached along with any outstanding issues and path forward for resolution. Note that NNSA is not committing to final decisions or agreements. Any decisions or agreements are fully conditional on submittal of the technical defensible documentation.

Table 1. Stages of SAR Development and Review

Activity	Description of Activity
	Alternately, if decided at the 0% Scoping Meeting NNSA will also conduct an independent review of the SB documentation in accordance with LAAO internal independent review procedures. **(30 day maximum).**
Complete 100% DSA	The final DSA will be prepared, including a full incorporation of all of the 90% comments and resolution of any technical issues identified through the independent reviews or NNSA discussions. If any open issues have not been discussed with NNSA, a meeting with NNSA shall be held prior to final submittal. A 100% submittal shall not be made with any unresolved technical issues.
Final QA checks (Facility/OAB)	Both the facility and the OAB shall accomplish a final check of the entire document. This final check will consist of a complete review for consistency as well as technical and editorial corrections and to validate that all prior comments have been addressed.
LANL Approvals	A short period of time is necessary to obtain approvals and concurrence by the required levels of LANL management.
Submittal to LAAO for Approval	If the above process has been followed in 'good faith' LANL should submit on a fully 'approvable' DSA to DOE for approval. See the definition of approvable in Section 5.3.
LAAO Final Review/SER Preparation	DOE LAAO will complete a final review of the submitted DSA.
LAAO issues SER	DOE LAAO will issue the SER, with any conditions of approval, to the facility.

Note

Should the DSA change substantially at any stage of the analysis for reasons other than responding to comments, the new material must be reviewed using the above process appropriate to the new material. For example, if a new PrHa is introduced, this material will be reviewed as if for a 30% review.

4.4 Rules for Review Comments

This section provides basic rules for independent review of SB documents. All comments are to be reviewed by the review team leader (or designated senior member of the team). The purpose of the team leader review is to ensure technical accuracy, compliance with the rules provided in this section, consistency, and proper categorization. Review comments should comply with the following rules.

1. **Focus on significant deficiencies rather than marginal issues or minor discrepancies.** As stated in DOE-STD-1104-96, a significant deficiency identifies a problem or concern that affects the validity of the SB. 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 safety analysis; (2) technical errors that invalidate major conclusions relevant to the SB; or (3) failure to cover topical material required by DOE directives and guidance on SB documents. Do not focus on pet issues that are not central to the primary functions of the analysis.

2. **To the extent possible, comments should be based on a failure to adequately address a requirement in 10CFR830, Subpart B or DOE Order 5480.23 (per DOE-STD-3009-94 guidance) or other applicable requirement documents.** The comment should indicate how the deficient item does not comply with the applicable requirement or with DOE interpretations of applicable requirements.

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 commentor'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;" e.g., a clear path forward for resolution.

4. **Do not use the 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 safety analysis.

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.** If material is confusing such that it is not possible to evaluate adequacy, phrase a comment in terms of the material that is absent or that is not germane to the intended subject.

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 "Required" editorial comments.** Editorial errors and improvements identified by reviewers should be submitted as "Editorial" or even "Suggested" comments, to improve the presentation of the material, but these comments need not 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.

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. These comments will be dismissed summarily. Comments should stick to the facts and be geared toward improving and enhancing the document rather than worded in a negative tenor that displays "one upmanship." The review process should not be used to advance personal or organizational agendas.

11. **Comments should not address material that was previously reviewed.** Once material has been reviewed and commented on in an interim review, it should not be revisited in subsequent reviews unless it has been revised or other changes were made that affect the subject material. Reviewers are responsible for completing reviews of interim packages and should not consider later reviews an

opportunity to "catch up." In addition, if reviewers are replaced, new reviewers should accept the conclusions of earlier reviews unless there are clear and significant deficiencies.

12. **Comment Assumptions.** The reviewer should not make technical assumptions in the comment that cannot be supported. For example, the reviewer should not assume that 'material melt' can occur when this is not clearly demonstrated by the physics of the process and/or material.

General: As stated before, the objective of the review is to contribute to the quality of the SB document in the spirit of ensuring that the hazards are identified and controls are in place to protect the public, workers, and the environment. The objective of the reviewer is not to see how many comments can be generated; effectiveness is not judged by the volume of the comments. A reviewer should be objective and should state when a quality product is judged to be acceptable just as he/she should be will to make comments on technical deficiencies and inadequacies.

5 REVIEW and APPROVAL CRITERIA

5.1 Introduction

Use of checklists is standard practice and the use of formal checklists is recommended for performing the LANL independent review. The checklists in this section are provided to help organize and focus SB document reviews. Their use is strongly recommended.

These checklists were developed from 10CFR830, Subpart B; DOE-STD-3009-94 (for the SAR chapters) and DOE Order 5480.22 (for the TSR sections). The checklists contain questions that cover the most essential elements of each chapter or section. The intent is to identify these most essential elements to assist in focusing reviews on the most important issues. A second advantage to using the checklists is that they can serve as a check on completeness.

Finally, using checklists provides a format and subject areas for documenting a summary of the results of the review as well as for documenting comments and the resolutions on the recommended comment/resolution form (see Appendix B).

The checklists in Section 5.2 contain general requirements particularly germane to SARs and TSRs (but not the programmatic chapters). Some material must be reviewed to more detailed or specific criteria to assess adequacy. These checklists can be tailored as necessary (i.e., items can be added, modified, or deleted) for a particular review effort.

5.2 Review Checklists

Following are checklists that cover Chapters 1 through 5 and especially focus on the HA and accident analysis (AA) and subsequent controls including the TSRs for a DSA, SAR, BIO, or other SB document prepared in accordance with the format and content guidance of DOE-STD-3009, and a full scope TSR prepared in accordance with DOE Order 5480.22 and per the guidance provided in DOE G 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements*, as an acceptable approach to implementing 10CFR830.205. In addition, Appendix C provides further guidance relative to the expected contents of the hazards/accident analyses.

5.3 Criteria for an Approvable DSA Submittal

At the 100% stage, the preparing organization shall submit to DOE a DSA that is approvable. For the purposes of determining acceptability, approvable should be defined based on the principles for a SAR

review that are discussed in DOE-STD-1104-96 (see also Section 3.0 Technical Bases, of this document). From DOE-STD-1104-96 comes the following excerpt:

> "A significant issue identifies a problem or concern that affects the utility or validity of the SB documentation. 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 SARs."

A DSA submittal shall be deemed 'unapprovable' if those types of significant issues described above exist following submittal.

Other major technical deficiencies could be:

- Missing TSRs for controls already selected as safety significant or safety class,
- Unworkable controls, i.e., TSRs written so poorly as to be ineffective or unachievable, and
- Deficient technical analysis, either in the HA or AA, e.g., missing accidents in the accident analysis or major hazards that are not analyzed.

SAR/TSR Review Checklist

Chapter 1, Site Characteristics(1)

Question	Yes	No	Comments
1. Is the description of the location of the site, location of the facility within the site, its proximity to the public and to other facilities, and identification of the point where EGs are applied (i.e., location of MOI) clearly identified?			
2. Is the description of population sheltering, population location and density, and other aspects of the surrounding area to the site that relate to assessment of the protection of the health and safety of the public clearly identified?			
3. Is the description of the historical basis for site characteristics in meteorology, hydrology, geology, seismology, volcanology, and other natural phenomena to the extent needed for hazard and accident analyses provided?			
4. Have design basis or evaluation basis natural phenomena criteria been identified based upon proven and accepted methods?			
5. Have sources of external accidents, such as nearby airports, railroads, or utilities such as natural gas lines been clearly identified?			
6. Have nearby facilities impacting, or impacted by, the facility under evaluation been identified?			
7. Have site characteristic assumptions common to safety analysis that were used in prior environmental analyses and impact statements (if available), or of the need to revise and update such assumptions used in facility environmental impact statements been identified or revised?			

(1) To the extent that potential accident consequences are limited to the facility itself or its immediate vicinity (e.g., some Hazard Category 3 facilities, etc.), the "graded approach" allows for the emphasis of this chapter to be on onsite characteristics.

Chapter 2, Facility Description(1)

Question	Yes	No	Comments
1. Does the facility overview include a clear discussion of facility inputs, outputs, mission, and history; including projected future uses if different?			

2. Is a description of the facility structure and design basis or evaluation basis provided including construction details, materials, dimensions, and layouts to the extent sufficient to support the hazards and accident analyses?			
3. Is a description of the facility process systems and constituent components, instrumentation, controls, operating parameters, and relationships of SSCs provided along with a summary of the types and quantities of hazardous materials?			
4. Is a description of facility confinement systems provided?			
5. Is a description of the facility safety support systems provided including the purpose and a general overview of each system?			
6. Is a description of the facility utilities provided?			
7. Is a description of facility auxiliary systems and support facilities provided?			

(1) Based on the significance of preventive and mitigative features (e.g., less features may be important for some Hazard Category 3 and even Hazard Category 2 facilities), the level of complexity in this chapter can vary as a means of implementing the "graded approach."

Hazard Identification (Ch. 3)

Question	Yes	No	Comments
1. Is the hazard identification methodology presented with regard to how hazardous materials and energy sources were identified and inventoried including the use of referenced information if applicable?			
2. Is a summary table provided that systematically identifies hazards by type, quantity, form, and location; including a brief summary of major accidents or hazardous situations that have actually occurred at the facility? [Note: if classification issues preclude such specification in the main document, a classified appendix must be provided.]			
3. Do the hazards and quantities identified cover all operations described in Ch. 2, *Facility Description* including all modes of operation (startup, normal operation, shutdown, abnormal testing or maintenance configurations, etc.)?			
4. Are the hazards and quantities identified consistent with statements and assumptions made in the hazard and accident analysis detailed throughout Ch. 3?			
5. Are the quantities specified derived from credible bases (e.g., flowsheets, historical data, operational limits) in a reasonably conservative manner?			

6. Is the hazard category assigned for the hazards identified consistent with the methodology of DOE-STD-1027-92, including segmentation if employed?			

Hazard Evaluation (Hazard Analysis) (Ch. 3) [(1)]

Question	Yes	No	Comments
1. Is the hazard evaluation methodology (1) stated explicitly, (2) consistent with the analysis methods referenced in DOE-STD-3009-94, and (3) reasonably tailored to the type and complexity of operations examined?			
2. Is the method consistent with the LANL HA Technology Handbook, matrices, format and content (see OST-300-00-06A)			
3. Were facility operating personnel involved in the evaluation?			
4. Was available information used for the analysis (e.g., procedures, process and equipment descriptions, flowcharts) consistent with that reasonably available from the facility?			

Hazard Evaluation continued (Hazard Analysis) (Ch. 3) [(1]

5. Where holes existed in available information, was supporting information generated (e.g., summary descriptions, drawings, and flowcharts) sufficient to provide basic understanding of significant operations, key parameters, and controls?			
6. Is a complete set of hazard evaluation worksheets/tables available to inspect? [Note that completeness requires the following columns for each entry: a specific hazard; the accident type and cause; all associated preventive and mitigative controls; consequence and likelihood ranking estimates; and a field for comments or recommended action items.]			
7. Do the cumulative hazard evaluation worksheets address every hazard identified in the hazard identification summary table as well as each operation/activity described in Ch. 2, *Facility Description*?			
8. Do any of the required worksheet entry columns appear to have been treated superficially (i.e., vague hazard or causes, generic or incomplete control listing, no comments or recommended action items)?			
9. Are the bases for consequence and likelihood binning at least qualitatively defined?			

10. Is the scenario binning technique applied consistently throughout the evaluation? [Note that the binning must clearly distinguish the largest consequence events to identify unique and representative scenarios for accident selection. Dismissal of physically plausible internally initiated events due to risk or mitigated consequence criteria is inappropriate.]			
11. Are there any additional significant aspects of facility operations known to the reviewer(s), or noted in facility walkthroughs, that the hazard evaluation fails to cover?			

(1) Consistent with the graded approach, the thoroughness of the hazard evaluation documentation should be commensurate with the facility hazard classification and taking into account both the magnitude of the hazards and the facility complexity. For example, the HA may only need to be sufficient to support a simple estimate of bounding consequences for HC 3 facilities.

Hazard Analysis Results (Ch. 3) [(1)]

Question	Yes	No	Comments
Planned Design and Operational Safety Improvements			
1. Is there evidence, documented in the SAR or separately, that the HA generated action items and recommendations were assessed by facility and operations management?			
2. Where issues require further study, a significant concern cannot be fully addressed at present, or major upgrades are planned, have appropriate interim operational control commitments been made?			

Defense in Depth/Worker Safety			
3. Is the information captured in the hazard analysis adequately summarized & presented in an organized manner (from hazard source to outer layers of defense) such that it identifies those design and administrative features most important to achieving overall safety principles (defense in depth) and major principles of worker protection (worker safety) for a given facility or operation?			
4. Is the identification of major controls in these sections consistent with those identified in the hazard evaluation worksheets?			
5. Does the SAR documentation in these sections demonstrate a coherent thought process leading to the selection of safety significant SSC and TSR commitments; and does that process focus on (a) determining the items of defense in depth most important to avoiding uncontrolled releases of hazardous material, (b) those features most critical to avoiding worker fatalities or serious injuries, and (c) associated TSRs most appropriate to ensure these items and features are not seriously challenged and/or will likely maintain their functionality?			

6. Based on the content of these two sections, are the set of safety SSC designations and associated TSR commitments considered adequate?			

Environmental Protection			
7. Are all pathways for uncontrolled release of large amounts of hazardous materials to the environment identified?			
8. Do the defense in depth measures identified provide reasonable and prudent prevention and mitigation for potential environmental releases?			

Hazard Analysis Results (Ch. 3)

Accident Selection			
9. Is the accident selection consistent with the hazard evaluation, its definitions of defense in depth and worker safety, and the associated scenario binning?			
10. Is the selection of internally initiated accidents for accident analysis based on consequence? [Note that dismissing such events based on low frequency or risk arguments related to controls is inappropriate.]			
11. Is the selection of natural phenomena and externally initiated events in accordance with DOE standards? [Note that initiator frequency is used to define these events.]			
12. Do the accidents selected cover all controls associated with unique and representative accidents that could exceed Evaluation Guidelines?			

(1) Consistent with the graded approach, the HA results in terms of number and complexity of features relevant to defense in depth and worker safety should be commensurate with the facility hazard classification. Additionally, accident selection and subsequent accident analyses are generally not required for HC3 facilities unless there is a serious potential for exceeding evaluation guidelines for a chemical release. For such facilities, usually only a summary is provided of the maximum consequences expected from an accident and a statement that these are well below evaluation guidelines.

Accident Analysis (Ch. 3)

Question	Yes	No	Comments
Analysis Methods			
1. In each accident scenario, is a basis explicitly identified for all major parameter values (e.g., values for the five-factor formula defined in DOE-HDBK-3010-94)?			

2. Is a basis explicitly identified for all major meteorological dispersion parameters?			
3. Are the general principles or references used for accident modeling, including any computer codes used, identified with sufficient amplifying information to clarify the bases for input and calculation?			
Scenario Development			
4. Is each scenario described in a clear, linear sequence (i.e., detailed step-by-step explanatory text linked to any fault/event trees used)?			
5. Are the functions of preventive and mitigative features associated with each scenario clearly explained?			
6. Is documentation needed to support scenario description (e.g., seismic damage) presented, either in detail or as summary of a cited reference?			
7. Is each complete scenario consistent with the hazard analysis and the rest of the SAR, and does it accurately reflect the findings of separate studies referenced?			

Calculations			
8. Are the parameters used for calculation (1) supported by technical references and/or reasonable experience from relevant and reliable sources, and (2) credible in the context of each overall scenario?			
9. Considered as a sum total, do the parameters used give confidence of a reasonably conservative answer?			
10. Is each final source term clearly specified?			
11. For each scenario, are unmitigated consequences clearly identified and directly compared with Evaluation Guidelines to determine if a need for safety class SSC designation exists?			

Safety Class Assessment			
12. Does each scenario whose unmitigated consequences exceed EGs document a coherent thought process for the selection of safety-class SSCs from a candidate pool, as well as any additional TSR commitments?			
13. Does review of the basis for safety class designation indicate that all appropriate designations and associated TSR commitments have been made?			
Beyond Design Basis Accidents			
14. Has consideration been given to the need for an analysis of accidents beyond the design basis of the facility (see §830.204 and 3009 – section 3.4.3) for outside the SAR cost-benefit considerations if consequences exceeding Evaluation Guidelines are identified in the beyond DBA range; and are any such analyses sufficient to provide a perspective on potential facility vulnerabilities?			

Chapter 4, Safety Structures, Systems, and Components[(1)]

Question	Yes	No	Comments
1. Is a summary table in the chapter that clearly provides: (1) identification of safety class, safety significant, and defense in depth SSCs; (2) bases for identifying safety SSCs (i.e., accident upon which the safety SSC is needed for); (3) safety functions; (4) functional requirements; (5) performance requirements; and (6) provisions for requiring TSR coverage?			
2. For each safety SSC identified, is a clear and concise description of the safety function, including identification of specific accidents that the safety SSC impacts provided?			
3. For each safety SSC identified, is a detailed description that specifies the basic principles by which it performs its safety function provided?			
4. For each safety SSC identified, is a description of its boundaries and interface points with other SSCs relevant to its safety function discussed?			
5. For each safety SSC identified, is a clear discussion of failure modes and those actions needed to prevent failure provided?			
6. For each safety SSC identified, are functional requirements clearly and concisely provided (i.e., limited to those requirements necessary for the safety function)?			

7. For each safety SSC identified, do the functional requirements specifically address the pertinent response parameters or non-ambient environmental stresses related to each specific accident that the SSC has a safety function?			
8. For each safety SSC identified, are the performance requirements clearly based on accident parameters and concisely articulated?			
9. For those cases where the design basis of the safety SSC is not known, has comparison against traditional design criteria (e.g., single failure) been performed?			
10. For each safety SSC identified, have potential TSRs needed to ensure the safety function of the SSC been identified?			

(1) Application of the graded approach should result in Hazard Category 3 facilities typically not identifying any safety class SSCs and the number of safety significant SSCs will generally be less than that of higher category facilities (serious chemical hazards may provide exceptions to these expectations). Additionally, it is expected that the safety-class SSCs will require more formality in establishing both functional requirements and related performance criteria than safety-significant

Chapter 5, Derivation of Technical Safety Requirements

Question	Yes	No	Comments
Is the hazard classification of the facility defined? Is the content of this chapter commensurate with the hazard classification?			
1. Are codes, standards, regulation, and DOE orders listed relevant specifically to establishing TSR controls, and LANL's work smart standards commitment?			
2. Is the HA organized in such a way that it can be judged to be comprehensive? (Note: Determination of adequacy of HA is the primary responsibility of Ch. 3 reviewers. However, completeness of TSR coverage depends on HA, hence Ch. 5 reviewers should consult with Ch. 3 reviewers (if different reviewers reviewed Ch. 3) to assess the adequacy of HA as a basis for TSR development.)			
3. Is HA tool used adequate with respect to complexity of process, activities in the facility, or facility history (e.g., new vs. existing)?			
4. Does the HA identify consequences, likelihood, mitigators/preventers for determination of TSR controls?			
5. Are all items in Ch.s 3 and 4 with respect to meeting Evaluation Guide, for public protection, worker protection, and defense-in-depth covered by TSR controls?			
6. Are safety features not covered by TSR controls identified?			

7. Do Facility Modes reflect the actual cycles of operations/ activities conducted in the facility? (If any Facility Modes are derived from accident scenarios, this derivation should be presented.)			
8. Are Facility Modes established such a way that status of safety systems can be distinctively defined?			
9. Are staffing level requirement or other administrative limits considered in Facility Modes?			
10. If the facility contains several structural segments or multiple activities, are Facility Modes established to accommodate this situation?			
11. The TSR controls are generally derived from preventive or mitigative features identified in HA. Is this derivation clearly shown?			
12. What is the criterion for selecting SL, LCS, and LCO? Are any quantitative criteria such as on-site or off-site Evaluation Guides used? If so, are they described?			
13. Are any controls that support front line safety systems identified and included as needed?			
14. Are any assumptions or parameters used in HA or accident analysis identified for establishing SRs and operability?			
15. Are any vendors' specifications identified for establishing SRs?			
16. Do ACs include all administrative controls identified in HA?			
17. Are ACs covering safety management program tailored for facility or activity specific situation?			

18. Does the Design Features section identify passive design features with no TSR controls, and rationale?			
19. Are all controls of other facilities and lab-wide infrastructure identified whose operations can impact this facility?			

TSRs – Sections 1 and 2[1]

Question	Yes	No	Comments
1. Does Sec. 1 include a list defining terms used in the TSR document that require clarification of the intent of their use?			
2. Are the definitions clear, and are they consistent with standard usage and with the intended use of the terms?			
3. Does Sec. 1 define the operating modes of the facility clearly in terms of operational conditions? Is there an adequate explanation of the use and application of operating modes?			
4. Are the operating modes generally consistent with the standard modes established in DOE Order 5480.22? If not, is the variation justified due to unique features of the facility or operations?			
5. Does Sec. 1 include the standard use and application explanations for the following TSR devices: • Logical Connectors • Completion Time • Frequency Notation • Safety Limits • Limiting Control Settings • Limiting Conditions for Operation • Surveillance Requirements Note: Standard use and application explanations are specified in DOE Order 5480.22 and the Defense Programs *Document of Example Technical Safety Requirements, Volume 1: Examples*, November 1993. Explanations may include minor variations to account for unique facility conditions.			

6. Are the safety limits included in Sec. 2 consistent with the hazard and accident analyses and any inferred safety limits established in the SAR? If no safety limits are required does Sec. 2 so state?			
7. Do the safety limits describe as precisely as possible, the parameters being limited, state each limit in measurable terms, and indicate the applicability of each limit?			
8. Are the actions required to be taken if a safety limit is exceeded described and do they maintain or otherwise achieve a safe stable state?			
9. Is it stated that the facility must obtain DOE authorization to restart the facility following violation of a safety limit?			

(1) While references among all the checklist items for TSRs (including those that follow) include specific mention to DOE Orders 5480.21 and 5480.22, these same items are generally covered in DOE G 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements*. As an acceptable approach (including format and content) for implementing the provisions for TSRs defined in 10CFR830.205, it is recommended that this guide be used by the reviewer along with these checklist items to determine the acceptability of the TSR section of the safety analysis document.

TSRs – Section 3, LCOs

Question	Yes	No	Comments
1. Do the LCOs identified in the TSR agree with those identified in Ch. 3 and 5?			
2. Are the operability requirements for each of the SSCs covered by LCOs been clearly identified? Are they unambiguous, concise, so as to not lead to misinterpretation? (LCOs that simply state that the SSC has to be operable are not acceptable).			
3. Is the mode applicability adequate for each of the LCOs?			
4. Is the facility or activity applicability adequate for each of the LCOs?			
5. Do the LCO conditions agree with each of the LCO requirements?			

6. Are the remedial actions adequate for the conditions, that is do they become more conservative (safer condition) as they are implemented?			
7. Does each of the remedial actions have completion times, and are they adequate to allow implementation and ensure safety?			
8. Are there bases for each of the LCOs, the mode applicability, remedial actions, and their completion times?			
9. Are these bases adequate to support the LCOs (they should not be a regurgitation of the LCOs themselves)?			

TSRs – Section 4, Surveillances

Questions	Yes	No	Comments
1. Is there at least a one-to-one correspondence between LCOs requirements and SRs? That is, at least one SR per LCO requirement.			
2. Are the SRs explicit enough to ensure the LCOs' requirements are met?			
3. Does each of the SRs have a completion time?			
4. Is each of the completion times adequate to ensure the operability of the safety SSC covered by the LCO?			
5. Does the bases provide enough information to support the SRs and their completion times?			

TSRs – Section 5, Administrative Controls

Question	Yes	No	Comment
1. Is Conduct of Operations as implemented at the Laboratory included?			
2. Is there a commitment to the appropriate Quality Assurance program?			
3. Are minimum staffing requirements addressed? Are staffing requirements by mode or operation addressed (this should be covered if the analysis relies on staffing as a safety factor)? (Ref DOE Order 5480.22, Attachment 1, II.2.4.e.(3))			
4. Is there a specific commitment to personnel qualification and training? Does this commitment identify the program or requirement that will govern qualification and training? Is the commitment consistent with information found in the SAR, particularly Ch 12 and 14? (Ref DOE Order 5480.22, Attachment 1, II.2.4.g)			
5. Is a program for conduct of in-service inspection and testing committed to and is it consistent with the commitments in Ch 10? (Ref DOE Order 5480.22, Attach 1, II.2.4.d)			
6. Is there a commitment to configuration control? If the configuration control program is approved by DOE it may be included by reference (see Ch 17 for supporting commitments)? If the program is not approved by DOE, then the process must be described and committed to with reference to applicable standards. (Ref DOE Order 5480.22, Attachment I, II,2.4.d) Note: Configuration control for non-facility nuclear operations must be considered on a case-by-case condition.			
7. If criticality safety is applicable, is there a commitment to criticality safety including the physical and administrative controls essential for the program. Is the criticality control program briefly described. Is the description consistent with Ch 6 of the SAR? (Ref DOE Order 5480.22, 9.e.5)			
8. Are material inventory controls addressed in the administrative controls section. (Note: In some cases an LCO might cover some aspects of this control.) Are all materials requiring control to satisfy basic accident assumptions, categorization limits, regulatory limits, etc., that are necessary to remain within the hazard category identified (typically fissile and radioactive, toxic, explosive, etc.). Do material controls identify where the limits apply (total facility, wing, operation, etc.? Do material limits address how the limits will be controlled?			
9. Does fire protection need to be addressed. Fire protection elements that are important to identified accident control should be included in an administrative control. Fire detection and suppression equipment may be included in the administrative control as an element of the overall fire protection program. LCOs may also exist for selected elements of the fire protection system. At LANL, many			

Question	Yes	No	Comment
facilities rely upon a combustible loading program. If the combustibles loading program is credited as important in accident or hazard analyses, then the program should be committed to. The combustibles loading program should address loading limits (transitory and fixed) as well as the method used to maintain the limits. Commitment to the appropriate NFPA standards adopted by the Laboratory should be noted if critical to the safety function of the fire protection program and should be consistent with the discussions in the SAR.			
10. If the requirements of 29 CFR 119.119 are applicable, then the TSR administrative controls should contain a commitment to process safety management. The administrative control should identify how requirements are met and reference the program established to satisfy the requirements.			
11. Are radiological effluent control and ventilation filter testing addressed? These may be addressed through administrative controls if they are necessary for worker protection or are used to limit radiological materiel releases. If included, then the applicable programs, facility areas, mechanical systems, testing programs, sampling, monitoring systems, and standards should be identified or referenced.			
12. Is radiological protection addressed? Radiological protection should be included if this program is credited as a significant protection element for the nuclear facility. Provide a list of the major elements associated with the program such as sampling, dosimeter, training, PPE, control areas and zones, etc. Reference applicable Laboratory LIRs and facility programs.			
13. Is emergency planning addressed? Emergency planning should be included in the administrative controls. Is there a specific commitment to an emergency plan and is this commitment consistent with the emergency planning SAR programmatic discussion?			
14. Are explosive gas or toxic substances monitoring programs addressed? If these programs are relied upon in the hazard or accident analysis, the programs should be committed to and referenced in the administrative controls. The discussion in the TSR should be consistent with the discussion of the same topics in the programmatic discussions in the SAR.			
15. Are facility radiation monitoring and storage tank radiation monitoring addressed? If these elements are important to the safe operation of the facility based on the hazards or accident analyses then an administrative control committing to these programs should be included. These may be included in the radiation protection program. The administrative control should include physical facility areas involved, radioactive substances monitored, monitoring equipment and their locations, applicable standards, and any associated limits. These discussions should be consistent with the description of radiation protection provided in the SAR.			

Question	Yes	No	Comment
16. If environmental measurement and control is relied upon to protect the workers or the environment, then an administrative control committing to the program or processes should be included in the TSR. If included, a brief description of the program, related equipment, monitored substances, and controls should be provided. Corresponding programmatic and facility descriptions in the SAR should be consistent.			
17. Other safety programs committed to in the SAR and relied upon for worker or public safety in the hazard and accident analysis should be included. Descriptions or programs, equipment, and controls should be consistent with the SAR.			
18. Are facility procedures addressed? The system that governs the production, review, control, use and revision of procedures, particularly those procedures required to implement the TSR, is required to be in the administrative control section of the TSR by DOE Order 5480.22, Section 9.e. (5). Does this description include how changes in the TSR are included in the procedures? Are specific procedure types identified that are managed under this control? Do these types encompass all the TSR commitments that would require a procedure? Are other documents referenced that detail how these commitments are met? Are the discussions consistent with corresponding discussions in the SAR?			
19. Is the USQ program as required by DOE Order 5480.21 committed to? Is the program summarized and is the detailed procedure or process for implementing the USQ process referenced? The commitment for the USQ program to be compliant with DOE Order 5480.21 or with applicable UC/DOE contract requirements, as appropriate, must be included.			
20. Is the contractor organization and management structure addressed? This is a requirement of DOE Order 5480.22, Section 9.e. (5). Does the description focus on the line authority, responsibility, and communications for the facility ranging from the operator on the floor to the person ultimately responsible for the facility and its operations? Are lines of authority, responsibility, and communication for critical support functions, if any, identified. These should include fire protection, maintenance, emergency response, security, etc. If independent review groups oversee or audit facility operations, identify them and their organization and reporting chain. Reference LANL program documents as necessary.			
21. Is the safety review and audit process addressed? This is a requirement of DOE Order 5480.22, Section 9.e. (5). Does the discussion address the review of all safety items? Are those items requiring review identified? Do these items include proposed changes to TSRs and procedures, operational occurrences and Occurrence Reports, USQs, and quality control concerns? Identify any LANL organizations or committees that provide or support safety review. Identify any off-site groups that			

Question	Yes	No	Comment
may provide safety review support. Identify external review group charters, LIR requirements, agreements, or other information that defines the role, scope, and methods used by these groups to provide safety review or support the audit process.			
22. Is there a commitment to and a description or reference to the facility document control system? Dose this control system support facility operation to the most current of important documents such as the TSR, SAR, operating procedures, facility drawings, manual, program descriptions, and other similar documents? (Ref Attach 1 DOE Order 5480.22, II,2.4.d)			
23. Are reporting requirements for TSR deviations included in the administrative controls? This is required by DOE Order 5480.22, 9.e. (5). A commitment to report deviations in accordance with the LANL occurrence reporting system and associated UC/DOE contract requirements should be included.			
24. Is there a description of the process for revising the TSRs? Does this description include required facility and LANL reviews and approvals? This disruption may be included in another section of the administrative controls dealing with facility and LANL organization and management.			
25. Is recordkeeping addressed? This is required by DOE Order 5480.22, 9.e. (5). This section should describe the recordkeeping program, or if no formal program, then define how the function is accomplished. Does the discussion include the types of records that are kept, storage requirements, retention times, and retrieveability requirements?			
26. Unless the TSR consists of only Administrative Controls, is the OPERABILITY definition and implementing principles described? Do the implementing principles include at least the six principles listed in DOE Order 5480.22, Att. 1, Sec. II.2.4.h? This topic may be included in the Use and Application section instead of the Administrative Controls.			
27. Is the program to control the TSR basis described and committed to? Does this section describe how the program works, the management functions making decisions on basis changes, and the review process? This may be addressed elsewhere in the TSR such as document control. This topic is recommended by DOE Order 5480.22, Attach 1, II.2.4.i.			

TSRs – Appendix A, Bases

Question	Yes	No	Comments
1. Are all technical bases presented in a clear, logical and concise manner that follows the format of the Attachment to DOE Order 5480.22?			

2. Are all technical bases presented in a clear, logical and concise manner that facilitates the evaluation of unreviewed safety questions that may arise from investigating changes to operating parameters of safety controls or potential changes to the margin of safety?			
3. For each TSR specified (e.g., SL, LCO, LCS), are the technical bases directly based upon specific sections (including references) the hazard or accident analyses contained within Ch. 3 of the SAR/BIO?			
4. For each TSR specified (e.g., SL, LCO, LCS) that impacts the operation of a safety SSC, are the technical bases directly based upon safety function and system evaluations (including references) contained within Ch. 4 of the SAR/BIO?			
5. For each TSR specified (e.g., SL, LCO, LCS), do the technical bases take into account assumptions or uncertainties that have potential impact to the hazard/accident analyses?			
6. For each TSR specified (e.g., SL, LCO, LCS), are the technical bases for not considering specific operating modes provided?			
7. For each action statement contained within a LCO, do the technical bases allow for the conclusion that the margin of safety has not been compromised?			
8. For each action statement contained within a LCO, do the technical bases allow for the conclusion that the completion time for an action is acceptable?			
9. For each action statement contained within a LCO where actions partially compensate for loss of a safety function, do the technical bases allow for the conclusion that the margin of safety has not been compromised?			

TSRs – Appendix B, Design Features

Question	Yes	No	Comments
1. Is the information presented in a clear, logical and concise manner that follows the format of the Attachment to DOE Order 5480.22?			

2. Is a detailed description of each vital passive component, including functions, dimensions, design criteria, applicable codes and standards, materials used, in-service inspection required, manufacturer, and all details that must be considered prior to alteration, modification, or replacement discussed in a clear and concise manner?			
3. Is the configuration and physical arrangement, for cases where it is a safety concern, discussed? Are details pertaining to the design provided (e.g., configuration or physical arrangement including dimensions) and the reasoning behind the design?			
4. For cases where the safe operation of the facility is dependent on any component being constructed of a particular material, is the component and system identified, as well as the special material involved, any in-service inspections required of the material or component, and any special operational considerations such as maximum/minimum temperature, pressure, flow, or chemical concentration?			
5. Are site characteristics such as the locations of public access roads, collocated facilities, facility area boundaries, site boundaries, nearest residence distances, etc., presented?			

6 REVIEW REPORT

6.1 Introduction

As a means of providing the review comments to the appropriate management and staff, it is expected that a Review Report will be written documenting, for record purposes, the specific comments as well as summaries of the review findings and pertinent information regarding the review process and review team. A Review Report is anticipated for each formal internal Laboratory review performed, covering each stage of the safety analysis preparation and review process (see Figure 1). The next section provides a recommended outline and brief description of content for these Review Reports. While any Review Report should be customized to meet specific needs or circumstances, it is suggested that the contents generally follow the recommendation herein, if practicable.

6.2 Recommended Review Report Outline and Content

1.0 Overview (Summary)

This should be an executive-level summary description of the review report covering the facility and % review stage for this Review Report, as well as appropriate high-level findings of the review. Only general statements are expected in this section of the report; however, they should adequately include both strong as well as weak points found in the safety analysis document. To the extent that specific chapters or sections of the safety analysis are worthy of mention, they should also be addressed in this section of the Review Report.

2.0 Reviewers

A list of the reviewers (names and organizations) and identification of the review team leader is covered in this section of the Review Report. A brief summary should be provided of their qualifications, at a minimum for the collective group, particularly as compared to Appendix A and to the scope of the review based on the nature of the facility activities and the % review stage.

3.0 Review Scope

A summary of the review scope is provided here. It should specifically address the % stage for this review, list the specific chapters and earlier comments/resolutions covered by this review, and indicate the checklists used to carry out the review. If there are any special or unusual topics addressed during this review, these should also be indicated in this section of the Review Report.

4.0 Checklist Summaries

A summary of the review findings for each chapter covered in this review is provided in this section of the Review Report. The recommended format for this summary includes, by chapter, (a) a summary statement or brief paragraph summarizing the adequacy (or weaknesses) of the contents for the entire chapter, and (b) the chapter checklist questions with a summary conclusion for each question. It is intended that each conclusion denote whether the checklist question is or is not adequately addressed in the safety analysis document and a brief statement as to why the stated conclusion has been reached. In each case, the detailed comments (provided in section 5 of the Review Report) should support these summary conclusions. These summaries are intended to be brief and reference more detailed text, if necessary, in section 6 of the Review Report. If

earlier comments/resolutions are covered in this review, a summary of any findings related to this topic should also be included.

The general purpose of this section is to provide management and other interested parties with a semi-detailed summary of the key findings of the review. This serves to provide an overall summary of the adequacies and weaknesses of the safety analysis document by chapter/issue and thus focus the comment resolution process on the appropriate portions of the safety analysis.

5.0 Detailed Comment/Resolution Forms

This section contains the detailed comment/resolution forms, preferably arranged by chapter, indicating the specific comments to be addressed. Classification of the comments must be indicated so that the appropriate level of resolution can be applied to the comments. Note that if editorial comments are included, it is not expected that specific resolutions need to be written or tracked for such comments.

6.0 Other Supporting Review Findings (optional, included only if necessary)

If separate analyses, calculations, or other pertinent information created by the review team and related to any of the checklist summaries or to the detailed comments is to be included as part of the review, this additional information should be provided here. Reference should be made as to which checklist summary question or detailed comment the additional information is being provided for. Any such information should be a constructive aid in the comment resolution process, and should be provided if it is deemed necessary to support the position taken by the comment.

APPENDIX A
Qualifications for Reviewers of Safety Basis Documentation

Technical reviewers who are assigned as lead reviewer for any functional area of safety basis documents should meet the following general qualifications. More detailed qualification requirements may be specified in LANL requirements or guidance documents.

- Knowledge of general purpose, function, organization and content of SB documents as specified by:
  - 10CFR830-Subpart B, "Safety Basis Requirements,"
  - DOE Order 5480.23, *Nuclear Facility Safety Analysis Reports*,
  - DOE Order 5480.22, *Technical Safety Requirements,*
  - DOE-STD-3009-94, *Preparation Guide For U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*.
  - LIR 300-00-06, *Nuclear Facility Safety Authorization Basis*
  - Operational support tools referenced by LIR 300-00-06 applicable to DSA/TSR preparation.

- Previous experience in technical aspects of preparation or review of safety documents for DOE facilities or comparable commercial industry safety analysis documents.

APPENDIX B

Detailed Comment/Resolution Form

Facility:
Document Draft/Rev/Date:

Comment priority:
R = Required comment and must be resolved; S = Suggested comment and requires consideration; E= Editorial comment

#	Priority	Reviewer	Page/Line/ Other ref.	Comment	Response	Resolved	
						Yes	No

APPENDIX C
Additional Instructions for Hazard Analysis and Accident Analysis Checklists

DOE-STD-1104-96 identifies four general conclusions that should be met for approval of Ch. 3 of a SAR. These four conditions are listed below:

- The HA includes hazard identification that specifies or estimates the hazards relevant for SAR consideration in terms of type, quantity and form, and also includes properly performed facility hazard classification.

- The HA includes hazard evaluation that covers the activities for which approval is sought, is consistent in approach with established industrial methodologies, identifies preventive and mitigative features for the spectrum of accidents examined, and identifies dominant accident scenarios through ranking.

- The HA results are clearly characterized in terms of defense in depth, worker safety, and environmental protection. The logic behind assessing the results in terms of safety-significant SSCs and designation of TSRs is understandable and internally consistent.

- Subsequent accident analysis clearly substantiates the findings and delineations of hazard analysis for the subset of events examined and confirms their potential consequences. Events potentially exceeding evaluation guidelines need to clearly identify associated safety-class SSCs and basis of TSR derivations.

Review criteria to support these conclusions are provided in four checklists covering (1) hazard identification, (2) hazard evaluation, (3) hazard analysis results, and (4) accident analysis.

Hazard Identification Checklist

(1) The hazard identification methodology should be presented with regard to how hazardous materials and energy sources were identified and inventoried. Sources of information used as part of the methodology including the use of referenced information such as fire hazard analyses and occurrence reports, should be identified. As it is not the intent of the safety analysis to cover common industrial hazards, interfaces must be identified with other programs such as OSHA compliance or general industrial safety as a means of screening standard industrial hazards or other common insignificant hazards.

(2) The summary table of facility hazards must identify each hazard (e.g., plutonium 239, chlorine gas, thermal energy), its form (e.g., powder, liquid, solid), the type of hazard (e.g., radiological, toxicological, explosive), location, and quantity. With DOE's concurrence, however, a BIO may focus on the major hazards as opposed to the complete, systematic listing expected in a SAR. For large nuclear facilities with many hazardous materials in small quantities (e.g., facilities with numerous gloveboxes and storage vaults), it may also be impractical to identify every possible material location by individual stations. In such cases, locations and quantities of materials should be specified by room and operation, generically for low quantity operations and specifically for major operations. Lists should provide enough detail that DOE reviewers knowledgeable about facility operations can understand the approximate material quantities foreseen in each major operation, can estimate the distribution of the materials within the building, and can concur with the material-at-risk quantities or energy estimations used in the accident analysis.

(3,4) The hazard identification should cover all the activities discussed in facility description, and no material should be listed in the hazard identification without some discussion of its associated activity in Ch. 2. In the same sense, the hazard and accident analyses and their associated text make assumptions about material quantities that should correlate with the hazard identification.

(5) Logic must be employed to specify quantities of hazardous material for energy sources. For example, assessments looking at specific operations will typically use flowsheet parameters or administrative limits to assign quantities. In some cases, nuclear criticality limits are used, although these may be excessively conservative depending on how the limits calculated correlate to actual operating practice. It would be inappropriate, however, to randomly mix-and-match flowsheet and criticality limit parameters. In all cases, there must be an identifiable

reason why a given quantity was assumed. The net result should be a reasonably conservative estimate, keeping in mind that DOE-STD-3009-94 states that accident analyses should assume facilities are operating in a realistic state, not in a worst-case state of procedure violation or unknown material accumulation.

(6) DOE-STD-1027-92 was established to remove hazard classification as an issue of significant contention. A simple statement of exceeding the Category 3 or Category 2 thresholds is all that is typically necessary, especially for Hazard Category 2 facilities, most of which involve quantities of material making their classification obvious.

The standard also allows a facility to perform a final hazard categorization in order to make the case that its bounding accident potential does not exceed the bases of a given DOE-STD-1027-92 threshold. Where such cases are made, it is important to remember that the bounding potential must consider all the material in the facility. The location with the most material may not be susceptible to the worst airborne release fraction, and vice-versa. DOE-STD-1027-92 deals with this problem by assuming all the material in a facility was vulnerable and using facility average release fractions (i.e., neither the highest or lowest possible). For facilities with many curies and/or many different locations of material, attempts to identify a bounding accident potential that lowers hazard categorization should not stem from incomplete assessments open to challenge.

Hazard Evaluation Checklist

(1) The methodology section should clearly identify a generally accepted hazard analysis method (e.g., preliminary hazard analysis (PHA), hazard and operability (HAZOP) Study, failure modes and effects analysis (FMEA), "What If"/Checklist) or combination of methodologies used. Hazard analysis methods differ in their appropriateness for use depending on the types and complexity of operations being examined. Checklists, PHAs or What If approaches are generally used on simpler or well-understood systems and operations. Where operations are routine and familiar, hazard analysis teams members can identify issues of concern from their own first-hand experience and knowledge. When a specific subject assumes sufficient complexity that a number of distinct sub-component failures need to be characterized, FMEAs and HAZOPs may be necessary. Selection of an appropriate method or methods for a hazard analysis, however, is a subjective decision. Other factors should also be considered, such as the previous experience of the team leader or the team itself. Judgements of appropriateness are often less a question of actual technique than of the attitude and effort put into use of a given technique.

(2) A hazard analysis should be performed by a team that includes members with first-hand experience of the actual facility's operation and design. The hazard analysis should not be performed entirely by outside personnel. If facility operators and engineers are not involved in the team, there is no basis for assuming the evaluation to be accurate.

(3, 4) A reasonable effort should be made to use accurate information available. It is recognized that most existing facilities will not have a complete collection of ideal documentation, but there is a minimum standard of information essential for an adequate hazard analysis. While a complete set of "as-built" information, or even P&IDs for every system is not required, a flowchart and process layout is generally necessary, as well as a basic understanding of materials of construction, piping connections, power supplies, etc.

(5, 6, 7) These criteria simply establish basic groundwork. If this material is not made available to the reviewer, there is a fundamental problem with either the product, the process, or both. The hazard evaluation worksheets must cover all operations and activities discussed in Ch. 2, Facility Description, as well as all hazards identified previously in Ch. 3. For each entry, the minimum set of information required is:

- The specific hazard(s) assessed (e.g., the radiological hazard of plutonium or the toxicological hazard of chlorine gas)
- The accident type (e.g., fire, explosion, or toxic spill) and cause
- Relevant preventive and mitigative controls for each scenario (e.g., hydrogen detector, interlocks, fire suppression system, alarms, specific operator actions)

- The consequence and likelihood binning parameters for each scenario; and
- As needed, recommended actions or items to examine further.

The most common error in hazard analysis is for the identification of preventive and mitigative features to be generic, with most just a partial listing of administrative features. That does not support integrated safety management, the principal purpose of requiring a hazard analysis. For that same reason, it is also critical to see evidence that recommended action items have been made for both minor and major issues, and that some follow-up is occurring on these items. Detailed documentation to that effect need not be in the hazard analysis, but should be traceable to it.

(8, 9) The methodology is required to have a defined binning technique. The technique is defined for the analysis as the organization finds appropriate, and there is no one binning technique that is inherently better than another. The binning technique must include some measure of accident scenario frequency and impact/severity. In addition, it should define a prioritization level based on the both the frequency and impact/severity measures.

Binning criteria should be selected so that a small number of accident scenarios clearly emerge for further examination in accident analysis. That is, the general perspective provided by the binning process should make it obvious why the small subset of accidents examined in accident analysis was chosen. The binning system complicates and distorts the review process if it mixes medium and high consequence events, smears together different measures of consequence (i.e., public and worker, mitigated and unmitigated), or uses frequency as a means to dismiss internally initiated scenarios of high consequence. The latter fault immediately calls the whole accident analysis activity into question, while the other two require detailed reconstruction by reviewers familiar with the operations conducted in order to determine if the accident analysis has focused on an incomplete or incorrect set of bounding accidents. It should be kept in mind that the purpose of binning in DOE-STD-3009-94 is to provide a general risk perspective, not to prove some level of risk acceptance.

(10) No checklist can be used to prove completeness for the variety of operations evaluated in non-reactor nuclear facility SARs, and no hazard analysis team can guarantee that they have identified all possible hazardous scenarios. Evaluation of comprehensiveness requires practical knowledge of the operations assessed and informed judgement. The reviewer must, however, believe that a conscientious effort has been made to comprehensively evaluate hazards.

Hazard Analysis Results Checklist

(1, 2) These criteria do not relate solely to the SAR write-up itself. Appropriate integrated safety management will assess recommendations from the hazard analysis for closure, either by recognizing and justifying that the issue is not a problem, or by implementing administrative and design corrections. DOE desires to see a questioning process in place that leads to routine fixing of problems rather than an analysis whose purpose is to demonstrate there are no problems. Therefore, review must assess the hazard analysis process and its results to determine if meaningful feedback to operations has occurred for issues large and small.

Where commitments are made for major safety improvements, or significant concerns are currently unresolvable, reviewers should verify that interim safety or operational controls are in place. These interim controls allow facilities and operations to establish a safety basis while options for improvements are studied or engineering backfits are considered. That allowance should not, however, become a vehicle to acknowledge deficiencies without any corresponding safety management commitments.

(3) The defense in depth definition based on the hazard analysis results is the fundamental focus of review. Defense in depth is a receptorless concept. It focuses on those aspects of design and operation that prevent major uncontrolled hazardous material releases independent of specific receptors. DOE SARs do not have the predefined understandings of functionality and what is significant that characterizes reactor SARs, and so the hazard analysis must be distilled into a basic definition of defense in depth as it practiced for an existing facility or planned for a new facility. This definition should include administrative features and programs as well as systems, structures, and components. Characteristics of an effective defense in depth discussion include: systematic organization of the presentation, typically by identifying layers of protection starting with the hazardous material and working outward;

identification of important features in general terms as opposed to detailed design information; tying features to overall control principles, such as ventilation pressure differential zones of confinement; and an overall assessment of why the defense in depth for both specific hazards and overall operation are at least commensurate with general industry practice. It is important to remember that there is no generic number of layers required, and that such generic specificity cannot be expected for the wide variety of operations conducted in the DOE complex. The purpose of this section is to clearly define defense in depth so that the DOE and the facility operator have the requisite information needed to intelligently discuss the parameters of an appropriate authorization basis. A good rule of thumb for judgement is that a reviewer not familiar with the operation at a detail level should feel, after reading the facility description and defense in depth sections alone, that he/she understands the principal facility hazards and controls without progressing to any detailed examination of hazard or accident analyses.

The hazard analysis must also be distilled into a basic definition of worker safety as it practiced for an existing facility or planned for a new facility. Characteristics of an effective worker safety discussion include: systematic organization of the presentation, typically by identifying general features of protection and progressing to any unique issues of high consequence; basic prioritization of concerns; tying features to overall control principles, such as ALARA; and an overall assessment that explains how worker safety for both specific hazards and overall operation are at least commensurate with relevant industrial practices. The worker safety section is subordinate to the defense in depth section, as the latter provides overall facility definition from a receptorless perspective. If redundant information could belong in both sections, DOE-STD-3009-94 prefers it be placed in the defense in depth section and referenced in the worker safety section. For example, gloveboxes with associated ventilation and zone pressure differentials play an obvious and vital role in preventing worker exposures because they are fundamental in preventing uncontrolled material releases. For the purpose of defining facility safety, the latter function is broader and should already have been detailed in the defense in depth write-up.

(4) The hazard evaluation assessment sections of Ch. 3 must obviously be supported by the hazard evaluation itself. Otherwise, the process upon which DOE is depending for its conclusion that facility operations are understood and controlled to the best of experienced ability has not been demonstrated.

(5) Beyond simply defining defense in depth and worker safety, the SAR must also identify what components are most significant, and therefore to be controlled under the increased oversight associated with safety significant SSC and TSR definition. It is important that the bases for designation are clearly explained, as this section in essence documents an agreement between DOE and the facility operator.

DOE-STD-3009-94 provides general guidance for defense in depth safety SSC selection: "To effectively use the graded-approach concept, focus on the most important aspects of defense in depth whose failure could result in the most adverse uncontrolled release of hazardous material." The standard further specifies three types of controls that are typically most significant: the outer or predominant means of mitigating uncontrolled releases of hazardous materials (e.g., ventilation system directing airflow to HEPA filtration); preventive features that preclude highly energetic events that essentially destroy any one layer of protection or threaten multiple layers (e.g., large explosions); and SSCs needed to insure the availability of the first two features." For worker safety, DOE-STD-3009-94 establishes a threshold of immediately life-threatening or potentially disabling, with the intent being that the threshold be subjective on a case-by-case basis. The restriction to immediately life-threatening potential removes latent health issues such as the carcinogenic potential associated with radiological exposure. That worker safety issue is not dismissed, but rather is handled through a radiation protection program whose focus and principle features are well-defined and subject to general agreement throughout the operational community.

The intent is for safety SSC designations to make sense. While SAR preparers may use any analytical algorithms they find helpful in selecting SSCs, the DOE is not required to accept such efforts as binding for its SAR review. For example, consider a SAR for an operation with many gloveboxes holding kilogram quantities of material that designates only that portion of the ventilation system serving the one operation examined as a surrogate bounding accident in accident analysis. Such a result is obviously the artifice of an analysis confusing surrogate representations with the real safety issues of the operation. A DOE reviewer can and should reject such a narrow designation in light of the requirement that results make sense. At the same time, it is also important that the reviewer not adopt a mindset designating anything with a safety function as safety significant. Safety SSC designation is intended for the most significant controls and it is not DOE's position that lack of safety SSC designation presumes the control has no reliability. Such an approach would be a violation of the precepts of

integrated safety management, where any number of administrative programs are required to oversee all aspects of operation.

(6) If the SAR is to be found acceptable, reviewers must concur with a final version of this Ch. 3 section. Whatever iterations or additions may be made in review, DOE must ultimately conclude that the formal controls specified in the TSRs are adequate.

(7, 8) The review conclusion of interest is that facility management is not ignoring obvious design or operational practices associated with minimizing environmental insult. It is expected that a properly developed defense in depth section will have already defined controls that prevent unmitigated releases, so that documentation in this section is often a formality. This section should clarify that there are no large release potentials that could cause significant environmental damage for which normal industrial levels of protection are not already in place, or for which easily implemented design or operational changes could minimize the chances of that release occurring.

DOE-STD-3009-94 states that safety significant and TSR designation should not be made for purely environmental issues, as these are not direct safety issues. In the event that unique environmental release potential exists with potentially major consequences, these should be addressed on a case-by-case basis in the defense in depth write-up.

(9) The accident selection section should provide a clear bridge between the hazard analysis and the accident analysis. The latter is a follow-on activity whose defensibility, in terms of examining a small number of bounding accidents, derives from the comprehensive nature of the hazard analysis. If the work to this point has been documented correctly, it should not be difficult for the SAR preparer to identify and explain unique and representative bounding accident selection in terms of the parameters used to calculate source terms and doses.

The ranking bins used should present information so that major accident potentials are obviously discernable, with the associated write-up making the completeness of the subset obvious. If the rankings are unclear, or the SAR relies on complex sequences of decision trees to derive accident selection, the defensibility of the accident selection rests solely on the degree to which their expertise allows reviewers to reconstruct a link between the hazard and accident analyses.

(10, 11) As a major purpose of accident analysis is to identify a need for safety-class SSC designation, the selection process should not be skewed so as to miss accidents with the potential to exceed Evaluation Guidelines. Two major errors are generally responsible for improper accident selection: (1) risk selection that has co-mingled worker consequence with public consequences; and (2) using overall scenario frequency arguments to dismiss physically possible high-consequence internally initiated accidents that are unlikely precisely because they are prevented and mitigated by operational controls.

DOE has defined, based on hazard categorization, natural phenomena stresses that facilities should be assessed against. The typical natural phenomena of concern related to these criteria are seismic and wind, though site-specific phenomena can sometimes be a concern. DOE Order 420.1, *Facility Safety*, implements DOE-STD-1020-94, -1021-93, -1022-94, and -1023-95, which detail the probabilistic assessment criteria and its development. The reviewer should verify that appropriate stress levels are assumed in a SAR/BIO. External events (i.e., plane crashes) are assessed if their overall frequency is approximately 1E-6/yr (see DOE-STD-3014-96 for aircraft crash frequency calculations). The details of these events and any probabilistic calculations may be presented in the accident analysis as opposed to the hazard analysis, but the accident selection section should specify all accidents sent forward to accident analysis. For other than internally initiated events, however, this may simply be a notation of g-level and windspeed, along with a statement of any external events dismissed due to low probability.

The reviewer should verify that selection of representative types of accidents does not exclude unique controls from consideration. For example, consider a facility with five explosion potentials in similar processes, where the same fundamental controls prevent site boundary consequences on the order of 1 rem, 5 rem, 10 rem, 30 rem, and 40 rem respectively. Suppose this same facility also has one unique type of process that could have an explosion with estimated consequences of 25 rem. If the 40-rem accident is examined as a representative accident, it will allow assessment and designation of safety class SSCs for controls associated with 30-rem operation as well. If however, the 25 rem operation is not examined as a unique accident because it is bounded by the 40 rem accident, controls potentially requiring some safety class SSC designation will be ignored.

Accident Analysis Checklist

(1, 2, 3) In terms of analytical methodology, the reviewer must be able to appreciate the bases for all key analytical assumptions in the consequence calculation. Unlike the hazard analysis, the accident analysis performs an explicit consequence documentation function. Accordingly, vague or incomplete identification of parameters defeats the purpose of analysis. The SAR reviewer should be able to independently calculate an accident source term from the information given. The reviewer is not required to document such efforts; his or her ability to do so is a direct reflection of the acceptability of the SAR documentation.

The reviewer must be able to identify the dose exposure location distance and the meteorological conditions assumed, so that results obtained can be checked against standard modeling estimates. Likewise, the use of phenomenological codes requires specifying both the code and the modeling inputs specifically enough that the appropriateness of that use can be assessed. Extensive details may be referenced to appendices or separate documents, provided these are available for review.

(4, 5) The criteria for scenario development are driven by the documentation function of accident analysis. Clarity is needed for the same reason it was in the defense in depth write-up in hazard analysis, namely that safety functions might be defined based on this information.

Many of the accidents analyzed for nonreactor nuclear facilities possess a generic quality. For example, fires are often postulated with no ability to define their progression in meaningful detail. This makes event trees relatively uninformative, allowing a number of questions and misunderstandings to arise as regards the specifics of progression in an actual facility or operation. A solid, written description minimizes such misunderstandings. It also clarifies the controls relevant to preventing and mitigating the accident in a facility specific context. This is important, since many SAR efforts have stumbled in making generic assumptions about SSCs such as fire suppression systems, whose capabilities and vulnerabilities vary between facilities.

(6, 7) In cases such as seismic events, a team of specialists will evaluate the base reference material to reach final concurrence on the definition of damage caused by the phenomena. The Chapter 3 reviewer's initial job then becomes verifying that the accident description satisfies the concurrence reached, with the assistance of those specialists as needed, and determining that the accident description makes sense at a technical laymen's level.

The scenario development cannot presume conditions at odds with other portions of the SAR, most specifically the facility description, the hazard analysis, the definition of safety SSC requirements in Chapter 4, and any referenced studies. For example, the accidents presented in accident analysis should correlate directly to the selected outputs from hazard analysis. The accident sequences and their results presented should also be consistent with the assessments and definitions for defense in depth and worker safety developed in hazard analysis. If that is not case, which it has not been for multiple SAR submittals throughout the DOE complex, Chapter 3 is fundamentally flawed and requires significant revision.

(8) Having verified minimum requirements for consistency and documentation, the reviewer must now assess the actual calculations. This is typically a two-step process beginning with an assessment of the basis for a given number and concluding with an evaluation of its appropriateness in the overall scenario context. For phenomenology, the initial step might be to verify that a TNT equivalent or a heat of combustion conforms with standard references; for source term, one might examine material-at-risk against the hazard identification listing or a release fraction against references such as DOE-HDBK-3010-94. The second step requires determining whether the overall combination of numbers, and their underlying assumptions, is appropriate. For example, suppose a fire analysis assumed all the doors to a room were open to the atmosphere. If, in fact, the real room only opens to hallways, this can be a nonconservative assumption for the overall scenario in terms of heat lost. The reviewer should also consider whether assumptions made are too conservative, unless the stated purpose in the SAR is to demonstrate minimal problem under the most extreme conditions.

(9) The reviewer must conclude that the source term and dose estimates are a reasonably conservative approximation. That is not intended to mean that every parameter in the calculation is the worst value imaginable under any circumstance. SARs have been approved where review documentation acknowledges that some

parameters in the five factor equation could be larger, the critical determination being the reviewers conclusion that the net result obtained was still conservative in terms of what would realistically be expected. Such a determination is inherently subjective due to the large uncertainties in accident modeling.

(10) SARs are sometimes written in a manner that obscures the unmitigated source term potential. The maximum airborne respirable source term for alpha-emitting radionuclides should always be clearly identified in the SAR write-up. It is the product of the material-at-risk, the damage ratio, the airborne release fraction, and the respirable fraction, without accounting for subsequent stages of filtration beyond the immediate point of source term generation.

For non-alpha emitters that may produce direct shine doses, a source term not accounting for respirable fractions should be specified. For hazardous materials, the release rate producing a given downwind concentration is the result typically reported.

(11) SARs are also sometimes written without specifying the maximum unmitigated consequence. That is the dose obtained from the maximum source term without intervening filtration. This value should be clearly specified and explicitly compared to the Evaluation Guideline.

(12) If the unmitigated consequences of an accident exceed the Evaluation Guideline, a need for safety class designation has been identified. All the preventive and mitigative controls associated with the accident progression form the candidate pool for safety class designation, and any additional TSR commitments deemed necessary.

A subset of those controls should be selected, with a basis that makes common sense. The approval of that basis represents an agreement between DOE and the facility operator as to a specific focus of regulatory oversight. The same basic considerations noted for selecting safety significant apply here as well. In all but the most unique of operations, It is also presumed that assuming functionality of those controls designated safety class will result in an accident sequence with doses well below the EG.

(13) If the SAR is to be found acceptable, reviewers must concur with a final version of this Chapter 3 section. Whatever iterations or additions may be made in review, DOE must ultimately conclude that the formal controls specified in the TSRs are adequate.

(14) Both 10CFR830 §830.204 and DOE-STD-3009-94, Section 3.4.3 address the consideration of the need to perform beyond design basis accident analyses. This is not done to provide assurance of public health and safety; but instead to potentially perform cost benefit analyses (outside of the SAR) to further address any facility vulnerabilities that lead to consequences exceeding the EG in the beyond DBA range. Any analyses performed are not expected to be done at the same level of detail as the DBAs and beyond DBA analyses are not performed for external events.