Corporate Process Requirement No: CPR400.1.1.38
Sponsor: Dori Ellis, 4000, Acting

Revision Date: June 26, 2007
Replaces Document Dated: March 13, 2006



# GN470101 – PREPARATION AND REVIEW OF DOCUMENTED SAFETY ANALYSES (DSAs) AND TECHNICAL SAFETY REQUIREMENTS (TSRs) TO MEET 10 CFR 830, SUBPART B

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GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

*Indicates a substantive change

Change History

- SF 2001-UDS, For Use When DOE-STD-3009-94 is Applicable (Excel File)
- SF 2001-SBA, DNFSB Safety Basis Adequacy Verification Criteria (Excel File)
- SF 2001-SAC, Specific Administrative Controls Review per DOE-STD-1186 (Excel File)

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# 1.0 APPLICABILITY

For purposes of this document, Members of the Workforce are:

- Sandia employees.
- Sandia subcontractors as specified in CPR4001.1/MN471001, *ES&H Manual*, Section 1B, "What Is the Scope."

For purposes of this document, DOE and NNSA are synonymous and includes DOE/NNSA/SSO, hereinafter referred to as SSO.

This document applies to Members of the Workforce who are involved in the preparation, review, approval, and implementation of safety basis documentation for nuclear facility operations at hazard category 1, 2, and 3 DOE nuclear facilities on Sandia-controlled premises.

There may be exceptions to meeting all requirements within this document. An exception could be a delay in compliance with a specific requirement until a supporting program is developed. Exceptions are agreed upon by all parties (e.g., Safety Basis Department [SBD], affected nuclear facility organization [NFO], SSO) concerned during the development of the document. These exceptions are noted in the sections in which they apply.

Requirements in this document are expected to be incorporated in all new DSAs and TSRs. Revisions to existing, approved, DSAs and TSRs will be evaluated against these requirements, and if necessary, a plan will be developed to update these documents to comply with the requirements of this procedure.

**Note:** Regulatory drivers are listed next to requirement sections throughout this document (e.g., R – 10CFR830). It is important to note that requirements are derived from the regulatory drivers and are not necessarily direct quotations. These are included to assist Members of the Workforce in identifying the root of the requirement to ensure compliance.

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# 2.0 PURPOSE

This document, in conjunction with CPR400.1.1/MN471001, *ES&H Manual*, Chapter 13, "Hazards Identification/Analysis and Risk Management" and CPR400.1.1.14/GN470080 , *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*, presents the nuclear safety management process for Sandia to meet the requirements of 10CFR830, *Nuclear Safety Management*, Subpart B, Safety Basis Requirements.

This document , in conjunction with CPR001.3.2, *Corporate Quality Assurance Program*, meets the requirements of 10CFR830 Subpart A, *Quality Assurance Requirements*.

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# 3.0 SCOPE

This document combines the following historical documents to place all nuclear safety basis documentation requirements in one source document:

- The previous version of this document, CPR400.1.1.38/GN47010, *Preparation and Review of Documented Safety Analysis (DSAs) to Meet 10 CFR 830, Subpart B.*
- CPR400.1.1.39/GN470102, *Preparation and Review of Technical Safety Requirements (TSRs) to Meet 10 CFR 830, Subpart B*.
- SBD Document, PLA 04-17, *Corporate Nuclear Safety Basis Plan*.
- SBD Document, PLA 04-19, *Safety Basis Adequacy Verification Criteria: Focused Topics for Nuclear Documented Safety Analysis*.

This new document provides:

- Information to assist in the preparation and review of documented safety analyses (DSAs) and technical safety requirements (TSRs) for hazard category 1, 2, or 3 DOE nuclear facilities as defined by DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports.*
- Roles and responsibilities for managers, preparers, reviewers, and users of DSAs and TSRs.
- A systematic methodology for both the preparation and review processes that is in compliance with 10 CFR 830, *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements," DOE G 421.1-2, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830,* and DOE G 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements.*
- A requirement to plan the document preparation cycle. This includes document reviews by the SBD and SSO at 30%, 60% and 90% (30/60/90) or 50% and 100% preparation points (see Table 7-1, "Minimum DSA/TSR Draft Content & Corresponding Deliverable Points"). Scheduling depends on complexity. These plans are approaches agreed upon by the NFO (NFO), SBD, and SSO. When the SBD is informed that the Safety Basis Documentation for a given facility is to be prepared, reviewed, or revised, the SBD in conjunction with the NFO and SSO determine what the review plan will be. For new facilities or major modifications, the plan is coordinated with the design and construction milestones. See Figure 7-2, "Safety Basis Documentation Requirements Integrated with Facilities Design and Construction Process."
- The submission of documents at the review points must be completely accurate for the information submitted.
- An outline to assist in determining whether or not the documents require review by the Sandia Legal or Contracts Office (see Figure 7-1. "Flowchart for Safety Basis Review Process").
- A description of the DSA and TSR document lifecycle.
- Training requirements and information.
- Record management and controlled document information for purposes of maintaining safety basis documentation.

Additional emphasis has been placed on defining the relationships and responsibilities between the SBD and the NFOs and how each of these groups interface with SSO.

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# 4.0 Background

Title 10 CFR 830, *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements," requires the contractor (i.e., Sandia) responsible for a hazard category 1, 2, or 3 DOE nuclear facility to establish, maintain, and perform work in

accordance with the safety basis developed for that facility. The safety basis is derived by analyzing the facility, the work to be performed, the associated hazards; and identifying the conditions, safe boundaries, and hazard controls necessary to protect Members of the Workforce (MOW), the public, and the environment from adverse consequences. The process whereby facility hazards are identified; hazard controls to prevent and mitigate potential accidents involving those hazards are proposed; and commitments are made for design, construction, operation, and disposition so as to ensure adequate safety at DOE nuclear facilities culminates into the creation of a DSA and TSRs. Performing work consistent with these safety basis documents provides reasonable assurance of adequate protection for MOW, the public, and the environment.

Approved DSA and TSR safety basis documents are a contract with SSO for Sandia to operate hazard category 1, 2, or 3 DOE nuclear facilities. The analyses and hazard controls outlined in these documents constitute the safety basis that Sandia and SSO utilize to establish that the nuclear facility can be operated safely. Performing work consistent with these safety basis documents provides reasonable assurance of adequate protection for MOW, the public, and the environment.

## *4.1 Relationship between DSAs and TSRs

### 4.1.1 DSA

The DSA is the safety analysis for a hazard category 1, 2, or 3 DOE nuclear facility. Title 10 CFR 830, *Nuclear Safety Management*, Section 204 requires that DSAs:

- Describe the facility and the work to be performed.
- Categorize the facility in accordance with DOE-STD-1027, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*.
- Evaluate all accident conditions that are presented by natural and manmade hazards.
- Derive the hazard controls, including technical safety requirements, to eliminate, limit, or mitigate identified hazards, and define the process for maintaining the hazard controls current at all times and controlling their use.
- Define the characteristics of the safety management programs necessary to ensure the safe operation of the facility, including a criticality safety program, where applicable.

### 4.1.2 TSRs

TSRs define the limits, controls, and related actions that establish specific parameters and requisite actions for the safe operation of nuclear facilities. As such, the role of TSRs is to define the performance requirements of safety structures, systems, and components (SSCs) and to identify the administrative controls ( ACs) (e.g., specific ACs [SACs] or safety management programs [SMPs]) that are used to ensure identification and implementation of safety basis controls, as credited in the DSA, for DOE nuclear facilities. TSRs confirm the ability of the DSA-credited SSCs and MOWs to perform their intended safety functions under normal, abnormal, and accident conditions. These requirements are identified through DSA hazard analyses of the activities to be performed and identification of the potential sources of safety issues. The development of TSRs benefit from safety analyses that identify and analyze a set of bounding accidents and take into account all unplanned potential releases of radioactivity. It is imperative that the TSRs are clearly written and that all actions and requirements provide enough detail to be effectively implemented.

Title 10 CFR 830, *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements," requires Sandia to develop TSRs and to operate a DOE nuclear facility in accordance with the provisions of DOE-approved TSRs. TSRs are derived for each DOE-owned, contactor-operated facility based on DSAs and any additional safety requirements established for the facility. TSRs must be prepared and submitted to DOE for approval prior to use or implementation.

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# 5.0 RESPONSIBILITIES

## 5.1 Nuclear Facility Organization (NFO) Management

Managers of hazard category 1, 2, or 3 DOE nuclear facilities are responsible for developing and implementing DSAs and TSRs, as required. As such, they are responsible for ensuring that:

- The requirements of this document are implemented when developing, revising, or submitting DSAs and TSRs.
- They are knowledgeable of the requirements outlined in CPR400.1.1/MN471001, *ES&H Manua*l, Chapter 13, ”Hazards Identification/Analysis and Risk Management.”
- Members of the Workforce who are involved in design, engineering, maintenance, inspection, operations, and assessments that support these nuclear facilities, to the extent they are responsible for safety basis activities, are:
    - Familiar with the requirements of Title 10 CFR 830, *Nuclear Safety Management*, Subpart B, Section 830.204, “Documented Safety Analysis,” and the guidance provided by DOE G 421.1-2, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet 10 CFR 830, Subpart B.*
    - Knowledgeable of the guidance provided by DOE G 421.1-2, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet 10 CFR 830, Subpart B*, and DOE G 423.1-1, *Implementation Guide for Developing Technical Safety Requirements.*
    - Able to identify activities that need to be addressed in the TSR process.
    - Knowledgeable and trained in the content of DOE-STD-1186-2004, *Specific Administrative Controls*.

      **Note:** Training requirements are addressed in Section 10, “Training and Qualification.”
- Activities that need to be included in the DSA /TSR process are identified.
- DSAs and TSRs are prepared for nuclear activities (see Attachment C, “Documented Safety Analysis (DSA) Content” and Attachment D, “Technical Safety Requirements (TSRs) Content”), including relevant supporting documentation (e. g., unreviewed safety question determinations [USQDs]) as outlined in Section 7.0, ”Preparing DSA/TSR Documentation.”

  **Note:** The USQ process is an integral part of the maintenance of a DSA. See CPR400.1.1.14/ GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*, for additional information and requirements.
- SSO approval is obtained prior to implementing changes when a positive USQD has been proposed or when any change to the TSRs occurs.
- Appropriate changes that result from the USQ process are incorporated into applicable safety basis documentation.
- Final drafts of DSAs are submitted for independent review in accordance with Section 7.5, “Maintaining Existing DSA/ TSR Documentation.”
- All independent reviewer remarks on draft DSAs have been resolved and forwarded to the SBD for final disposition and review prior to submitting documents to SSO for approval.
- Completed and in process DSAs are submitted to SSO for approval in accordance with Section 8.0, “Submitting DSAs/TSRs to SSO for Approval.”
- Changes are incorporated into DSAs that result from approved safety evaluation reports (SERs) as directed by SSO.

- Records are maintained in accordance with Section 12.0, "Records."
- The DSA implements the Integrated Safety Management System (ISMS) core functions “Analyze Hazards” and “Implement Controls.”
- Members of the Workforce are trained in accordance with Section 10 “Training and Qualification.”
- The implementation process of the DSA/TSRs is followed and whether or not the facility requires a Readiness Review in accordance with CPR400.1.1.21/GN470089, *Startup and Restart Process for SNL Moderate – and High–Hazard Nonnuclear, Accelerator, and Nuclear Activities* or an Implementation Validation Review (IVR) in accordance with Attachment G, “Implementation Validation Review (IVR) Process Plan for Nuclear Safety Basis Changes,” of this document by the affected NFO.
- Document control is implemented in accordance with Section 9.1, “Controlled Documents.”

NFO management personnel (e.g., department managers, facility managers, facility supervisors) are responsible for using DSAs/TSRs as the primary safety basis documents for their facilities.

## 5.2 Safety Basis Department (SBD)

The SBD is responsible for:

- Supporting the overall DSA/TSR process including preparation, review, implementation, and submittal to SSO, as required.
- Maintaining this document.
- Assisting nuclear organizations in the application of the DSA/TSR process, when requested.
- Providing a subject matter expert (SME) for the DSA/TSR process, when requested.
- Ensuring that independent reviewers of DSAs meet criteria contained in CPR400.1.1/MN471001, *ES&H Manual*, Attachment 13C-2, “Independent Reviewer Qualifications” and are appropriately independent, experienced, and knowledgeable.
- Ensuring the quality (technically and administratively) of the independent review.
- Evaluating all independent reviewer remarks and forwarding the remarks as completed checklists and comments (see Section 7.6.2, “Minimum Review Content”) to the appropriate managers for resolution.
- Reviewing the completed product (e.g., draft and final DSA and TSRs) prior to submission to SSO.
- Preparing, maintaining, and conducting associated training courses as identified in Section 10.
- Maintaining the corporate lessons learned database for the DSA/TSR process (lessons learned are identified and submitted after the issuance of an SER).

## 5.3 Preparers of DSA and TSR Documentation

Preparers of DSA and TSR documentation are responsible for:

- Meeting the criteria of Section 10, “Training and Qualification.”
- Obtaining cross-disciplinary input or specialist assistance, as needed, to prepare the documentation (e.g.,

calculations, plume studies).

- Retaining peer review results of supporting documentation.
- Being knowledgeable of the facility design and operational processes.
- Being knowledgeable of the DSA/TSR process as outlined in this document.
- Resolving all comments received during review and approval processes.
- Ensuring that the documentation is technically defensible.
- Preparing supporting documentation for retention by the facility.
- Submitting documentation to the following for internal review and approval:
    - Responsible facility managers.
    - SBD.

## 5.4 Independent Reviewers

Independent reviewers are responsible for:

- Meeting criteria contained in CPR400.1.1/MN471001, *ES&H Manual*, Attachment 13C-2, “Independent Reviewer Qualifications.”
- Being trained in accordance with Section 10, “Training and Qualification.”
- Being aware of the DSA/TSR process as outlined in this document.
- Performing independent reviews to ensure documentation is accurate and complete.
- Obtaining cross-disciplinary input or specialist assistance, as appropriate, when performing independent reviews.
- Ensuring that their independent review comments can be referenced and are technically defensible.
- Communicating any comments to the SBD using the appropriate checklists as required by the SBD.
- Concurring with comments submitted by the independent review team and comment resolutions, or preparing a minority report regarding resolutions of comments and forwarding the documentation to the SBD.

**Note:** By signing the comment resolutions or the review report, the independent reviewer signifies that the review was appropriately independent of the preparatory activities and has released the documentation for further processing in accordance with the requirements of this document.

## 5.5 Safety Committees

Safety committees (specifically the Nuclear Facilities Safety Committee [NFSC] and its subordinate groups, as appropriate and so designated) involved in the preparation, review, and approval of a DSA or TSRs are responsible for reviewing and making recommendations on the safety aspects of these documents as outlined in their charter.

Where utilized, safety committees (except the NFSC) are responsible for conducting a review before DSAs and TSRs are submitted to the SBD for the independent internal review (see Section 7.6, “Independent Internal Review”).

Members of the Workforce who are members of the NFSC shall participate in conflict resolution as called for in AP/6430 NFSC-01, *Charter for the Sandia Nuclear Facilities Safety Committee*. SBD shall be invited to send representation to safety committee meetings.

## 5.6 DSA/TSR Users

An approved DSA/TSR Safety Basis Document is a formal commitment with SSO. Facility management personnel (e.g., department managers, facility managers, facility supervisors) are responsible for using DSAs/TSRs as the primary safety basis documents for their facilities.

Facility operations personnel (e.g., reactor operators) are responsible for:

- Performing work that is **only** within the scope of the DSA and TSRs for that facility.
- Analyzing new work to ensure that it is within the scope of the DSA and TSRs for that facility.
- Alerting supervisory personnel when new work is outside of the scope of the DSA and TSRs for that facility.

**Note:** In any of these situations, the USQ process or a justification for continued operations (JCO) may be applicable. See CPR400.1.1.14/GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*, and Attachment C, "Documented Safety Analysis (DSA) Content," for additional information and requirements.

DSA/TSR users who are facility support staff personnel responsible for safety management programs (SMPs) shall evaluate proposed changes to the SMPs that are applicable to their responsibilities at the facility. This is performed to determine if the existing safety envelope specified in the DSA will be challenged.

## 5.7 Safety Programs Senior Manager (Department 10320)

The Safety Programs Senior Manager is responsible for approving exceptions that require senior management approval as outlined in this document.

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# 6.0 OVERVIEW OF THE DSA/TSR PROCESS

There are three different paths that DSAs and TSRs may follow as described in this document based upon the following:

- A new facility or a major modification.
- An annual update.
- A revision, as determined by facility management.

It is important to note that maintenance of the DSA and TSRs is an iterative process that takes place throughout the life of the facility. This section and sections 7.0, "Preparing DSA/TSR Documentation," and 8.0, "Submitting DSAs/TSRs to DOE for Approval," provide specific information about various activities, requirements for those activities that are followed during the phases, and various factors that can affect a facility (e.g., mission changes, major modifications).

## 6.1 Methodology for Classifying Facility Hazards

To determine the appropriate set of steps in the process to follow, initial categorization of the DOE nuclear facility and its hazards is done in accordance with DOE-STD-1027-92 using the Integrated Safety Management System (ISMS) Software. Figure 6-1 shows the entry conditions of the safety basis process for nuclear facilities (or activities).

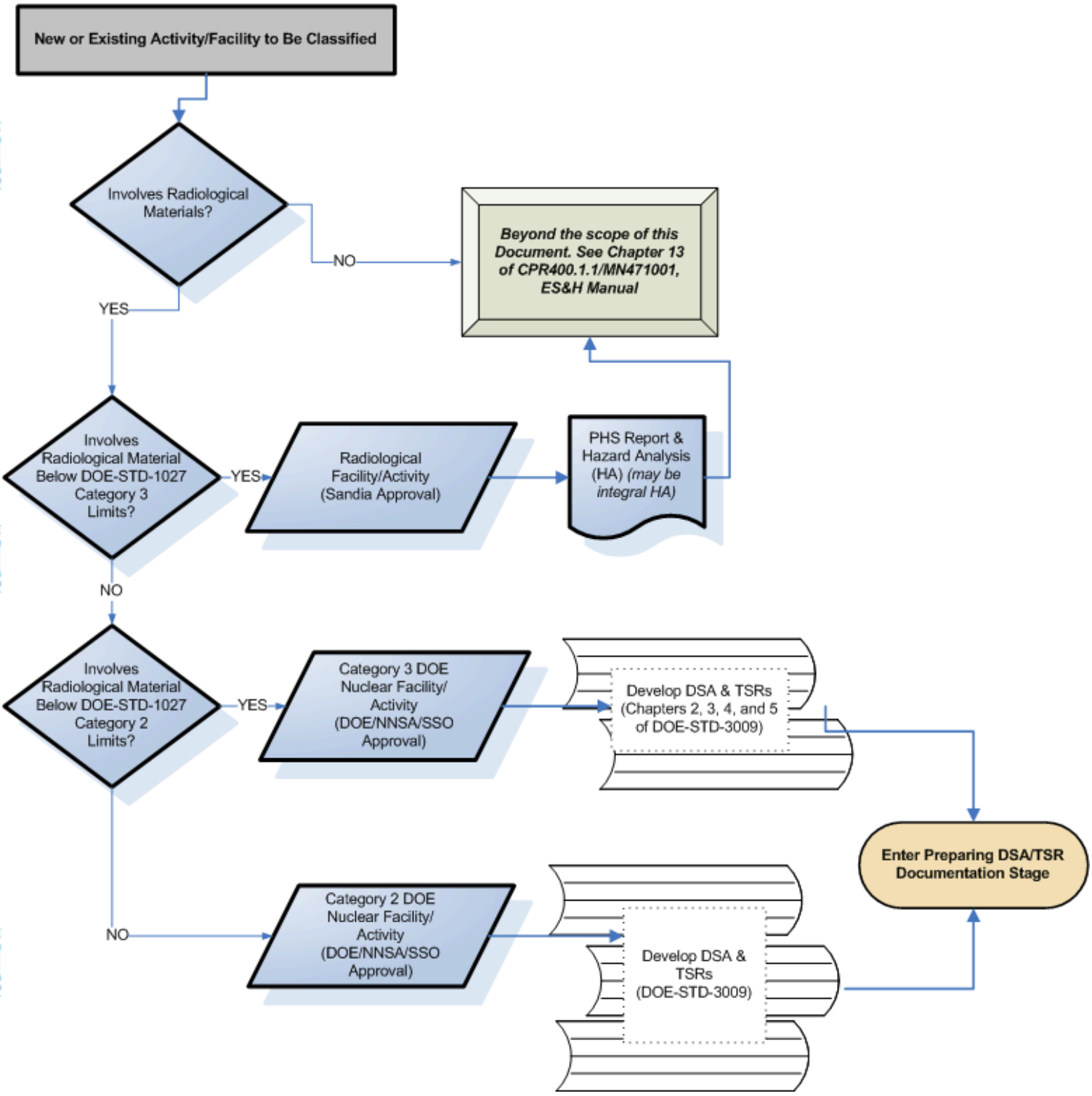


**Figure 6-1. Flowchart for the Safety Basis Process Involving Radioactive Material Hazards.**

As shown in Figure 6-1, category 2 and 3 DOE nuclear facilities require a SSO-approved DSA that complies with the requirements of 10 CFR 830, Subpart B. As explained in detail later in Attachment C, “DSA Content,” the DSA is required to describe the following elements:

- Identification and evaluation of hazards.

- Engineered and administrative controls.
- The contribution of those controls to risk reduction.
- Management programs to ensure that the controls are in use.

From a risk analysis, the function of some controls may be deemed critical to the safe operation of a facility. In such cases, the controls are documented in the TSRs. TSR content is described in Attachment D, “Technical Safety Requirements (TSRs) Content.”

For a hazard category 2 or 3 DOE nuclear facility that is already categorized, but requires a change to the final hazard categorization based on the results of the new hazard and accident analyses, approval by SSO is required for that change to the final hazard categorization. New facility safety basis documentation to reflect the new hazard categorization and any follow-on reviews shall be performed as specified in Section 9.2, “Implementation Assessment.”

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# *7.0 PREPARING DSA/TSR DOCUMENTATION

This section addresses activities that are performed with the exception of final submittal of documents to DOE for approval, which is addressed in Section 8, “Submitting DSAs/TSRs to DOE for Approval.” It includes activities such as planning, interfaces, and review cycles, etc. Contact the SBD for assistance with any of these activities. Below are the general requirements for this section.

## 7.1 Requirements

Nuclear facility managers of hazard category 1, 2, or 3 DOE nuclear facilities shall be responsible for ensuring that:

- SB documentation preparation, review, and update activities are coordinated, communicated, appropriately documented, and scheduled with the Corporate SBD and SSO before beginning these activities or shortly thereafter (e.g., see Section 7.2, “Planning,” and Figure 7.1, “Flowchart for the Safety Basis Review Process”).
- Any SB documentation concerning their facility has been appropriately reviewed by a derivative classifier (DC) prior to submitting the documentation to the SBD.
- Any changes to the operation are incorporated into the safety basis documents, as appropriate (see Section 7.5, “Maintaining Existing DSA/TSR Documentation,” Section 7.6, “Independent Internal Review,” and Attachment C, “Documented Safety Analysis [DSA] Content”).
- Final safety basis documents are completed and approved before beginning any required readiness review or implementation validation review.
- Preliminary DSAs (PDSAs) are prepared for all new nuclear facilities and major modifications to existing hazard category 1, 2, or 3 DOE nuclear facilities in accordance with the Safety Basis Documentation Process (see Attachment C and Section 7.3,” Preparing DSAs/TSRs in Support of New Facilities or Major Modifications.”)

Members of the Workforce who prepare DSAs and TSRs for hazard category 1, 2, or 3 DOE nuclear facilities shall do so in accordance with the following:

- Safe Harbor formats and methodologies specified in Attachment A, “Safe Harbor Methods Applicable to Various DOE Facilities.”

**Note:** Alternative methodologies may be proposed, but must be justified prior to use. To gain approval of an alternative methodology, the proposing organization must first submit the methodology to the SBD for internal Sandia review and

concurrence. A proposed alternative methodology would need to present a case that the alternative methodology is sufficiently rigorous to provide an equivalent level of safety in the alternative DSA and resulting controls. Upon internal approval, the NFO would then submit the methodology to SSO for review and approval.

- Hazard analysis techniques and methodologies in Attachment B, “Safety Analysis and Risk Assessment Handbook (SARAH).”
- DSA Content as described in Attachment C, “Documented Safety Analysis (DSA) Content.”
- TSR content as described in Attachment D, “Technical Safety Requirements (TSRs) Content.”

## *7.2 Planning

Planning is a critical step in the DSA/TSR process. The appropriate NFO shall prepare a planning document that incorporates SBD and SSO expectations and addresses the following:

- Scope of the SB development activity.
- Safe harbor or alternate document format.
- Standards to be employed.
- Analyses methodologies and reference data.
- Other facility specific issues.
- The review process and schedule.
- Clear ground rules for SSO staff participation in the Sandia document preparation and review processes.
- A schedule with milestones and definition of involvement in SSO activities and reviews, as appropriate.

**Note:** For example, if the expectation is that there will be a 30%, 60%, & 90% draft SB document submittals to be reviewed by all parties, then this needs to be communicated. If the expectation is that 50% and 100% draft SB document submittals will be reviewed, then that needs to be communicated and coordinated. Interim deliverables and reviews are based primarily on the expected complexity of the documents.

The following lessons have been learned from previous DSA/TSR planning and development efforts and should be implemented, as applicable:

- Initiate DOE/Sandia teaming at the beginning of development processes. Expectations need to be understood by all participants.
- Care should be taken in the selection of facility-level document preparation and review teams. Selection criteria should be developed that match the level of experience with the document in question.
- Members of the Workforce who are chosen for review teams should be available for the entire process to help produce a consistent review.

### 7.2.1 Formal Interface

This stage initiates interactions with NFO management, SSO, and SBD management to ensure that the DSA/TSR process begins with the right individuals being aware of the activities. While the applicable NFO maintains responsibility for the safety basis and safe facility operations, formal interactions between SSO and Sandia in regard to SB activities will be handled through the SBD. Informal discussions, consultations, and consensus among the SBD, the NFO, and SSO are

encouraged. Minutes of associated meetings and agreements from these formal interactions are transcribed and records maintained by the SBD with copies sent to the NFO.

### 7.2.2 Schedule and Milestones

To prepare for the SB documentation update or SB document preparation, SSO expectations that were determined during the initial planning stages are to be communicated and understood by those individuals that are involved in the process. This is done through preparation of a schedule, with milestones and deliverables.

Table 7-1 establishes the minimum content expected at the corresponding deliverable points. Deviations from this table must be documented and formally agreed to by the NFO, SBD, and SSO.

The preparing NFO is responsible for developing SB documentation and will select a qualified preparation team and prepare the SB draft document in recognition of the agreed upon SSO expectations. Informal interaction between the preparation team, SBD, and SSO staff is encouraged during preparation.

**Note:** The process utilized by the preparing NFO to review the documentation, such as the use of internal committees (to include expert consultants) does **not** satisfy the independent internal review as required by Section 7.6, “Independent Internal Review.”

**Table 7-1. Minimum DSA/TSR Draft Content & Corresponding Deliverable Points.**

| Deliverable points (30/60/90% submittals) | Deliverable points (50/100% submittals) | Minimum DSA/TSR Draft Content Required in submittal using DOE-STD-3009-CN2 methodology | Minimum DSA/TSR Draft Content Required in submittal using US NRC Regulatory Guide 1.70 methodology | NNSA/SSO Review |
|---|---|---|---|---|
| 30% | 50% | Chapter 1 | Chapters 1-10 | Review consists of base information, hazard identification, draft hazards analysis, and identification of safety SSCs from the HA. |
| | | Chapter 2 | Hazards Analysis Appendix or Tables | |
| | | Sections 3.1, 3.2, and 3.3 of Chapter 3 | Preliminary identification of safety significant controls selected from Hazards Analysis | |
| | | Hazards Analysis Appendix or Tables | | |
| | | Preliminary identification of safety significant controls selected from Hazards Analysis | | |
| 60% | | Section 3.4 of Chapter 3 (as required) | Chapter 15 | Review includes accident analysis, identification of safety class controls. Also includes descriptions of the safety functions, functional requirements, and preliminary TSR disposition of safety SSCs and administrative controls. |
| | | Chapter 4 | Chapter 16 | |
| | | Chapter 5 | Revised submittal incorporating essential NNSA/SSO comments from the previous review (if applicable) | |
| | | Revised submittal incorporating essential NNSA/SSO comments from the previous review (if applicable) | | |
| 90% | 100% | TSRs | TSRs | Review includes TSRs, and programmatic descriptive chapters. |
| | | Chapters 6-17 (as required) | Chapters 11-14 and Chapter 17 | |
| | | Executive Summary | Executive Summary | |
| | | Revised submittal incorporating essential NNSA/SSO comments from the previous review | Revised submittal incorporating essential NNSA/SSO comments from the previous review | |
| 100% | | Final DSA and TSR submittal incorporating essential NNSA/SSO comments from the previous review | Final DSA and TSR submittal incorporating essential NNSA/SSO comments from the previous review | 100% review confirms that prior comments are addressed in final submittal. |

### 7.2.3 SBD Support

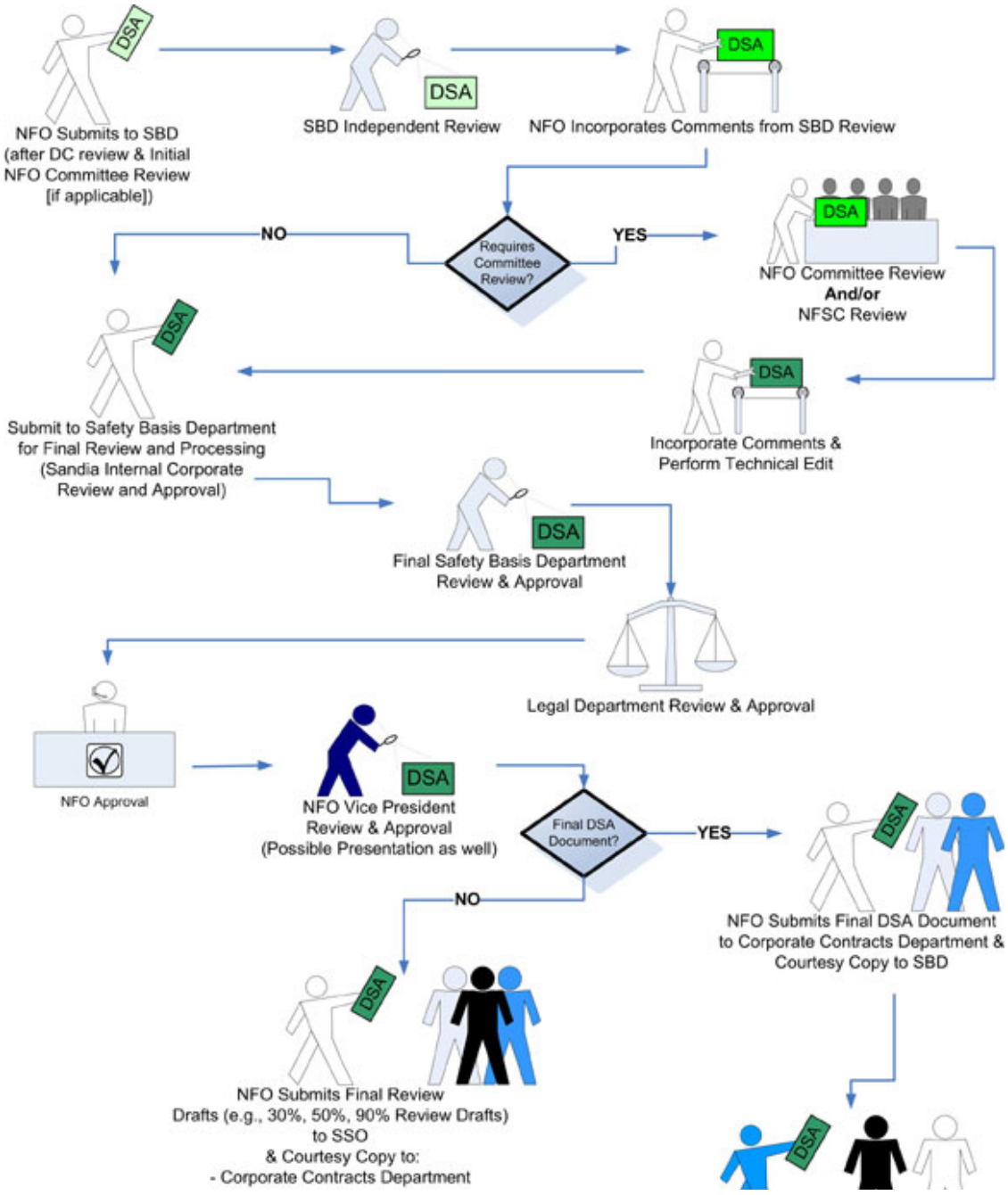
Some Sandia NFOs maintain their own SB organizations to assist in preparing a DSA or TSRs, while other NFOs rely on the SBD for assistance in document preparation activities. The SBD may provide safety analysts to support facility management in determining the hazard classification and residual risk, and in preparing the DSA and other SB documents

upon commitment of the NFO funding. The SBD shall negotiate an agreement with the applicable NFO as to the processes to be used in preparing SB documentation. This agreement will be concluded before SBD support activities begin.

### *7.2.4 Communication and Input During Reviews

Communication among facility personnel and the team assigned to safety basis preparation and review is a critical element in avoiding late discoveries of unanalyzed hazards and expensive safety retrofits during later stages (such as document reviews or even operational readiness review activities). Input from facility personnel is essential and can result in an overall net savings for the project. Early involvement of the SBD and SSO facility representative in the process of safety basis development is also important. The representative's attendance at team meetings and inclusion in technical discussions can speed SSO approval of the completed DSA. The possibility of new issues arising during the SSO review process is minimized when the representative remains involved from the outset.

The following flowchart depicts the steps that are followed for each DSA submittal to assist in understanding the communication and input lines, planning activities, and to improve consistency in the review process that is internal to Sandia:



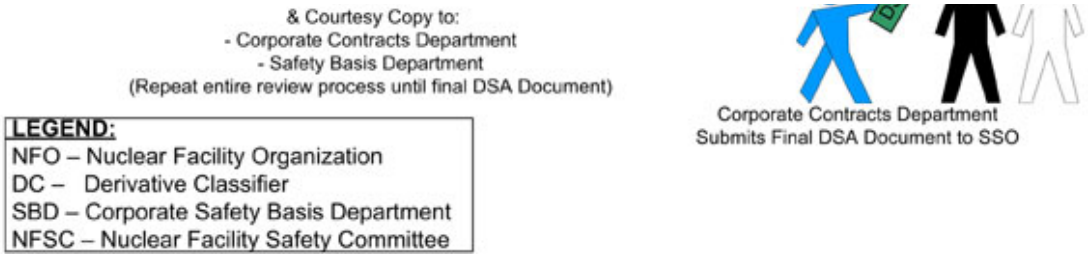



**Figure 7-1. Flowchart for the Safety Basis Review Process.**

When the SBD is informed that the safety basis documentation for a given facility is to be prepared, reviewed, or revised, the SBD determines (in conjunction with the NFO) what their internal review process will be. For new facilities, the process is coordinated with design and construction milestones. See Figure 7-2, "Safety Basis Documentation Requirements Integrated with Facilities Design and Construction Process." All safety basis documents shall be reviewed by the SBD prior to their submission to SSO. This includes all safety basis document revisions including those made to resolve SSO review comments. For updates and revisions, the process may include 30/60/90% reviews or 50/100% reviews, depending on complexity (See Table 7-1). All correspondence associated with the submittal of annual updates must be reviewed by the SBD prior to their submission to SSO.The documents may need to be reviewed by the Legal Office or the Contracts Office.

**Note:** As soon as a new nuclear activity project or nuclear facility moves past the conceptual stage, the program manager makes preparations and cost estimates to develop the preliminary safety basis documentation. As design of the operation changes, so should the safety basis. In this way, safety issues and their controls are developed as an integral part of the project design process.

The project team estimates the inventory of quantities and use of radioactive or toxic materials for the new activity. A preliminary hazard classification may then be assigned, giving some bound to the level of effort required for achieving the final safety basis.

A preliminary safety basis (i.e., a preliminary DSA [PDSA]) for new facilities requires approval by SSO before significant hardware funds are committed or construction begins. Changes to the project, as-built configurations, and new information concerning the operation are required to be incorporated, and the final safety basis documents are to be completed and approved before beginning any required readiness review.

### 7.2.5 Additional Planning Information

In-process reviews (e.g., 30%, 50%, 60%, or 90%) will be as complete and as accurate as possible at the point of submission. See Table 7-1, "Minimum DSA/TSR Draft Content & Corresponding Deliverable Points."

The proposed general time commitments for the various tasks associated with the review and submittal of a draft DSA and TSRs outlined in Figure 7-1, " Flowchart for the Safety Basis Review Process" are as follows:

**Note:** These times are not contiguous, cycle times. The time reflected refers to actual workdays. The time also reflects only one cycle of review and approval. If there are multiple reviews planned for drafts at various stages of the development of the DSA and/or TSRs, the cycle is repeated for each additional submittal.

1. Interface with SSO – (5 days).
2. Defining SSO and Safety Basis Expectations – (5 days).
3. Preparing NFO submits to SBD after Derivative Classifier review, and initial committee review per current committee charter (milestone - 0 days).
4. SBD conducts independent internal review (10 days).
5. Preparing NFO incorporates comments as appropriate from independent internal review (10 days).

6. Preparing NFO submits for safety committee review (if applicable, for example NFSC review) (milestone - 0 days).
7. Review from committee(s) (15 days).
8. Preparing NFO reviews and incorporates committee review comments (if applicable) and does technical editing (10 days).
9. Preparing NFO provides to SBD for final processing (milestone - 0 days).
10. Preparing NFO management review (5 days).
11. SBD final review (10 days).
12. Legal Review and Vice President's Review (5 days).
13. Preparing NFO makes copies of records (2 days).
14. Preparing NFO submits to SSO (milestone – 0 days).
15. Receive SSO approval to continue in process (estimate 30 days).
16. If this is the final DSA, Sandia implements controls and satisfies conditions of approval (20+ days).
17. If this is the final DSA, Sandia receives final SSO approval to operate after appropriate readiness reviews (milestone – 0 days).

## 7.3 Preparing DSAs/TSRs in Support of New Facilities or Major Modifications

The preparation of a new DSA (including PDSA) is task phased in coordination with the Facilities Department Project Management Plan. This joint planning activity is as shown in Figure 7.2, below. The safety basis requirements are shown as outputs associated with the phases of design and construction. The process sets appropriate expectations for safety analysis products and meets the requirements of DOE Orders 420.1B, 413.1A, and 433.1.

**Note:** Figure 7.2 is an input/output diagram. For ease of use, each phase (e.g., construction design phase, CD-0) feeds into the next as an input, including the products that are represented as outputs.

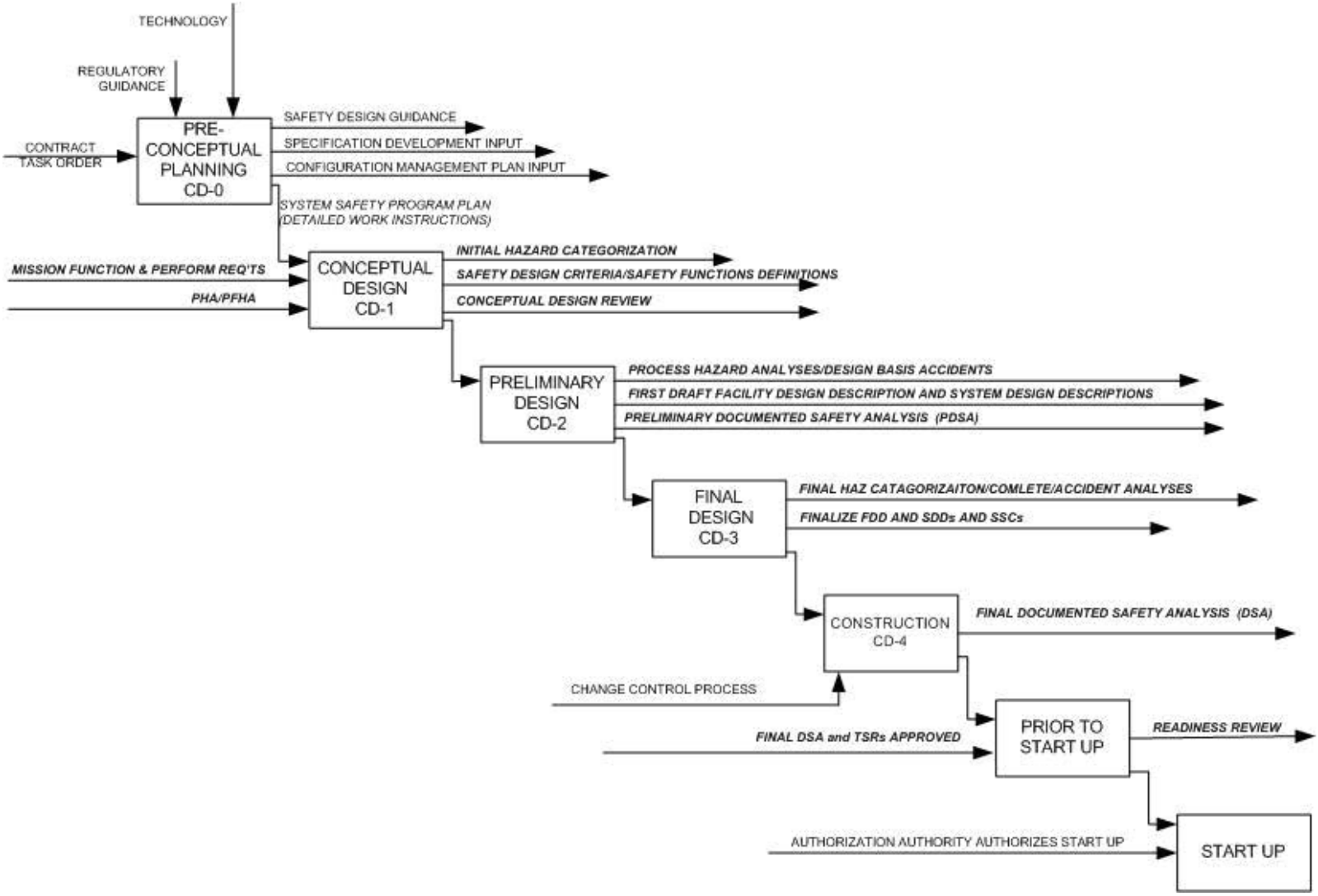



**Figure 7.2. Safety Basis Documentation Requirements Integrated with Facilities Design and Construction Process.**

The development of a DSA for a new facility usually includes a Preliminary Documented Safety Analysis (PDSA) as an output of the design phase, and a Final DSA prior to authorizing operation. The two documents are described in subsequent sections.

The PDSA and its updates serve to inform DOE as to how DOE nuclear safety design criteria are addressed in the design. The PDSA is approved prior to procurement and construction activities. The PDSA eventually evolves into the DSA. A well-developed PDSA helps ensure that safety is designed-in instead of added-on.

When a facility becomes operational and the final DSA has been approved by DOE, the governing safety basis document is the DSA. DSAs and their associated TSRs come under an annual DOE review and approval cycle as described in this document.

A major modification to nuclear facilities is defined by the Facilities Department and is managed by the Facilities Department in the same manner as a new facility.

### 7.3.1 Requirements

Managers of new hazard category 1, 2, or 3 DOE nuclear facilities shall be responsible for ensuring that:

- PDSAs are prepared for all new facilities in accordance with the Safety Basis Documentation Process (see Attachment C).

- DOE approval is obtained for:
    - Nuclear safety design criteria to be used in preparing the PDSAs, except when a contractor uses the design criteria in DOE O 420.1B, *Facility Safety.*
    - PDSAs, before procuring materials or components or beginning construction, provided that DOE may authorize limited procurement and construction activities without approval of PDSAs, if DOE determines that the activities are **not** detrimental to public health and safety and are in the best interests of DOE.
- Members of the Workforce who prepare PDSAs for new facilities participate during early stage reviews of the design criteria document that will be prepared by the Sandia facilities organization responsible for the project.

**Note:** See DOE G 421.1-2, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of CFR 830,* Section 4.1.1, "Preliminary Documented Safety Analysis (PDSA)," for information about achieving consistency between the content of PDSAs and design criteria documents.

### 7.3.2 Preliminary DSAs (PDSAs)

PDSAs for new facilities serve as the principal safety basis for the DOE decision to authorize design, procurement, construction, and pre-operational testing.

Members of the Workforce who prepare PDSAs seek to provide input separate from and in addition to the Life Safety Codes. For example, persons who interface with the architectural-engineers (A-Es) - departmental or Sandia Facilities staff, as appropriate - ensure that A-Es are directed to consider adjacencies and external influences when siting and designing systems and support equipment within locations designated for the facility, and that this is reflected in their design bases. The degree to which clear and detailed design bases are available at incremental stages of the design process will either hinder or assist the adequacy, schedule, and costs of the DSA.

A primary function of the design criteria document is to serve as the scope of work for the A-E Firm contracted to design the facility. As such, it is important that Members of the Workforce provide input to these requirements (criteria) and document them for the PDSA. This is especially important when the proposed nuclear facility involves the use or storage of hazardous materials, in addition to hazard category 3 radioactive materials. In these situations, it is essential that the A-E be required to provide a detailed design basis with each design submittal that provides the relevant calculations and assumptions needed to explain how the design meets Sandia's stated requirements and complies with the relevant codes and stated safety objectives. It is equally important that Members of the Workforce accept responsibility for facilitating the A-E's understanding of safety-relevant regulatory requirements (e.g., DOE O 420.1B, *Facility Safety*) beyond the model building codes and fire codes.

During construction, the final DSA is developed. It is based upon the facility as built and as it will be operated, and finalizes the description of needed safety management programs.

The essential characteristic of a PDSA is that all activities described in the document are identified as "preliminary." Analyses are based on conceptual or preliminary design, and they do not warrant fine-tuning at this stage of project development. For some facilities, the decision could be made to perform only a hazard analysis to support the selection of controls. Such an approach can be used when the offsite consequences of accidents are such that few surprises are expected. For other projects, where accidents may be unique or have special considerations, it may be best to fully develop accident analyses to ensure that hazards can be adequately controlled. The decision is made on a facility-by-facility basis and in consultation with SSO.

PDSAs for proposed Category 2 or 3 nuclear facilities are required to receive approval by SSO, or a waiver per 10 CFR 830, Section 206(b), prior to procuring materials or components, or before beginning construction. The PDSA may be updated, as necessary, until the final DSA is developed.

### 7.3.3 Final DSA for New Facilities or Major Modifications

Developing the final DSA for a new facility is the same as developing a DSA for an existing facility. The graded approach is applied in both cases. Some activities, however, may not apply to a new facility. Information pertaining to the facility description is based on the document-controlled PDSA and changes to the new facility since the PDSA was approved.

The initial phase of DSA development establishes the facility and operations description and inputs that will be analyzed. Included is the listing of chemical and radiological inventory that will be in the facility, identification of facility SSCs, and facility operations to be considered. Revisions to existing DSAs use the previous version as the baseline and incorporate any new information relevant to update the analysis.

## 7.4 Preparing a DSA for a Limited-Life Facility

### 7.4.1 Guidance

10 CFR 830, Subpart B, allows two "safe harbor" methods for developing a DSA for a Limited-Life Facility DOE-STD-3009-94, with Change Notice 3, Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports, and DOE-STD-3011-2002, *Guidance for Preparation of Basis for Interim Operation (BIO) Documents*.

The terms “nuclear facility with a limited operational life” is defined in Table 3 of Appendix A of 10 CFR 830 Subpart B. These activities are interpreted to be interim operations, since the expected normal lifetime for these activities is ideally anticipated to be the short (i.e., less than 5 years for limited operational life) interim transitional period immediately prior to, during, or after deactivation. An abbreviated and graded approach to development of a safety basis is allowed; however, the expectation exists that the completeness of the analysis will be sufficient so that even though a limited operational life is envisioned, significant hazards will be identified and appropriate controls implemented accordingly. It is also important to recognize and anticipate that the ideal may not be realized. That is, especially in the case of transition surveillance and maintenance, the time interval that a facility may be in that mode may extend many years beyond “short.” When this may be the case, special attention must be paid to hazards that may develop over an extended period of time. For example, the importance of consideration of natural phenomenon hazards is increased as the time spent in a particular mode (limited operational life, transitions surveillance and maintenance, or deactivation) is extended. The primary rationale for utilizing the BIO approach is that the short (i.e., normally less than 5 years) remaining operational life of the facility does not justify the increased time and cost required to develop a DSA fully utilizing the DOE-STD-3009 methodology. See Attachment C, “DSA Content,” for additional information.

## *7.5 Maintaining Existing DSA/TSR Documentation

### *7.5.1 Requirements

Managers of hazard category 1, 2, or 3 DOE nuclear facilities shall be responsible for ensuring that:

- DSAs are reviewed:
    - Annually.
    - As part of the USQ process, prior to changes to the facilities or activities described in DSAs.
- Reviews and verifications are performed and documented to ensure that the information is current and accurate, as follows:
    - Hazards are reviewed and any changes identified.
    - Changes are documented in a revised hazard analysis.
    - Hazard controls are modified as necessary and documented.
    - Accident analyses are revised to reflect changes in accident scenarios (i.e., dispersion analysis).

- Material release fractions are defended.
- Other relevant information that may have an effect on the operation of the facility is documented and evaluated.
- New information and lessons learned from other DOE and commercial facilities are incorporated, as appropriate.
- All negative USQ determinations (USQDs) for a given annual cycle are reviewed and incorporated, as appropriate, in the DSA for the past year's activity (see CPR400.1.1.14/GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*).
- A tracking process is established to identify the USQDs that have been completed and how tracked items are incorporated into updated DSAs.

- DSAs are updated based on the above information.
- DSAs are edited for consistency to ensure agreement in the level of detail, systems descriptions, and assumptions of analysis throughout.
- All draft DSAs and PDSAs (including annual updates) are forwarded to the SBD for independent technical and administrative review by knowledgeable Members of the Workforce who are not involved in the development of the DSA.
- Reviewers have access to plans and design criteria applicable to the new or current facilities and construction.
- Revised DSAs are forwarded to SSO for approval in accordance with facility procedures. Courtesy copies of the DSAs are forwarded to the SBD.
- If there are no changes, a letter to that effect is forwarded to SSO with a courtesy copy to the SBD.
- All previous conditions of approval from SERs have been incorporated into updated DSAs, as applicable.
- Disposition of each SER comment and condition is documented.
- DOE technical direction is addressed in the DSA update and is documented, as appropriate.

Members of the Workforce who prepare or review DSAs shall be aware of the information contained in this document and the following documents:

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

DOE Procedure OKSO-4205, *Authorization Basis Review and Approval.*

DOE-STD-1186-2004, *Specific Administrative Controls.*

CPR400.1.1/MN471001, *ES&H Manual*, Chapter 13, ” Hazards Identification/Analysis and Risk Management.”

### *7.5.2 Annual Review and Update

Nuclear facilities are required to update their DSAs and TSRs annually. Changes in federal regulations such as DOE nuclear safety rules do not, by themselves, require immediate document review and update. Such changes are administrative and are incorporated in the DSA through the annual update process. The annual review due date (to be submitted to SSO) will be 12 months from the date of the SSO Safety Evaluation Report (SER) and will reoccur every 12 months thereafter.

**Note:** The annual review due date does **NOT** change based upon a SER addendum (normally issued following an annual update).

Changes are often necessary, sometimes physically to a facility safety class or safety significant structure or system, and other times to an operation, that may directly or indirectly affect the facility's existing safety basis. These are handled through the USQ process outlined in CPR400.1.1.14/GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*. All negative USQDs that result from the USQ process for a given annual cycle are reviewed and incorporated, as appropriate, in the DSA for the past year's activity as part of the annual review and update.

A revision is defined as a document that is reviewed and changed either during the annual review or at a time other than the required annual review. This may be for a number of reasons such as a positive USQD that, in the opinion of management, cannot wait until the annual review.

### 7.5.3 Revisions and Upgrades of Facility Categorization

Revisions and upgrades to the DSA of a Category 2 or 3 nuclear facility are outside the USQ process. In this case, DSA changes are prepared as if the facility were a new facility, with one exception – a PDSA is not required. However, new facility safety basis documentation to reflect the new hazard categorization and any follow-on reviews shall be performed as specified in Section 9.2, “Implementation Assessment.”

## 7.6 Independent Internal Review

After the SB Documentation has been prepared and is ready to be reviewed by the SBD at each preparation stage (e.g., 30%, 60%, 90% drafts, or final document), the draft document is submitted by the Sandia NFO to the SBD to perform and coordinate the independent internal review.

The SBD performs an independent review of the transmitted SB document to ensure consistency, proper use of SBD processes, other appropriate requirements are met, and conformance to SSO expectations. For subsequent submittals (e.g., a 60% draft that follows a 30% draft that has already been reviewed), the review will be limited to only those changes that have been made since the previous submittal. Comments that have remained open since the previous submittal may be noted as closed or open.

To ensure independence, due diligence is maintained to ensure that conflicts of interest, real or perceived, amongst SB document authors, contributors, and reviewers and participants in various types of Readiness Reviews do not exist. Accordingly, the goal is to provide four different, independent, technically qualified groups of people involved in SB documentation preparation and review activities. These are as follows:

- Those who participate in the preparation of the SB documentation that will be sent for review.
- Those who participate in the in-process reviews of DSA documentation.
- Those who participate in the review of the final DSA submittal.
- Those who participate in readiness review activities.

To ensure the consistency of review between the in-process and final reviews of the DSA documentation, the SBD Manager will appoint a senior technical advisor to the final DSA submittal independent review team. The senior technical advisor must have been a member of the in-process DSA documentation independent internal review team and have an overall understanding of the rationale used in conducting the in-process review including all comments generated and respective comment resolution.

Exceptions to this policy shall be approved by the SBD Manager, the applicable NFO manager, and the Safety Programs Senior Manager.

Participation in the NFSC, subordinate safety committee meetings, or informal discussions does **not** constitute the internal

independent review of SB documentation. For information on the different types of reviews or assessments, see Section 9.2, “Implementation Assessment.”

### 7.6.1 Requirements

When performing a review of hazard category 1, 2, or 3 DOE nuclear facility, independent reviewers shall:

- Determine if the appropriate safe harbor method (see Attachment A, “Safe Harbor Methods Applicable to Various DOE Facilities”) is being used or if a DOE-approved alternative method is being used.
- Determine if the level of detail is sufficient to assess the hazards posed by the facility or operation.
- Determine if the analyses and risk assessments appropriately reflect standardized criteria as outlined in Attachment B, “Safety Analysis and Risk Assessment Handbook (SARAH),” or identify an approved alternative methodology that is being used.
- Assess if the information included adequately defines the safety basis, controls, and commitments (including designs, engineering analyses, and administrative controls).
- Review adequacy of calculations, assumptions, analysis, design features and TSR controls.
- Ensure that the facility can be operated, maintained, and shut down safely.
- Ensure that the facility is in compliance with applicable laws, regulations, codes, standards, and corporate requirements relevant to the intended operation.
- Complete the following forms:
    - Hazard Categorization Requirements per DOE-STD-1027-92 (SF 2001-HCR)
    - Independent Reviewer Checklist (IRC)

      **And,** as appropriate, one of the following:
    - For Use When DOE-STD-3009-94 is Applicable (SF 2001-UDS)
    - DNFSB Safety Basis Adequacy Verification Criteria (SF 2001-SBA)
    - Specific Administrative Controls Review per DOE-STD-1186 (SF 2001-SAC)

The review team leader shall ensure that:

- All comments received from team members are consolidated and peer reviewed prior to finalizing the comments.
- Comments are resolved appropriately in conjunction with NFO management.
- Finalized comments are sent to the SBD prior to presenting the finalized comments to the Sandia NFO.
- Finalized comments are presented to the NFOs.

The review team leader shall review all dispositioned essential comments for technical accuracy and for supportability by Corporate or regulatory requirements.

The NFO shall:

- Appropriately incorporate and disposition all essential review comments that were provided by the independent review team and return the revised SB document and dispositioned comments to the review team leader.
- Resolve all SB comments prior to submitting documents to SSO (see note below).
- Forward the results of the independent internal review to SSO as part of the DSA/TSR submittal package.
- The SBD shall ensure that the comment and its resolution are initialed in writing by both the review team member who wrote the comment, if possible, and the preparing Sandia NFO representative responsible for determining resolution to indicate that both the reviewer and the preparing NFO are aware of each other's actions and that the review team agrees with the actions required for resolution.

**Note:** Any issues identified by the independent review are presented to the preparing NFO and resolved prior to submittal of the document to SSO for review as outlined in Section 7.6.3, “Comments and Resolution of Comments.”

### 7.6.2 Minimum Review Content

**Note:** Members of the Workforce involved in the preparation, review, or approval of DSAs and TSRs should see Attachment E, “DSA/TSR Verification Criteria” for additional information and guidance on the minimum review content that will be covered during an independent internal review.

The scope of the independent review varies with the stage of development. For initial submittals, the entire document is reviewed against the applicable criteria. For all subsequent submittals of the document, the review is limited to changes from the previous submittal. Information that has not changed is not considered to be within the scope of the subsequent review; however, any comments that were open from the previous review can be characterized as closed or can remain open.

Review of documents whose only changes are to incorporate SSO comments will be limited to the verification of proper incorporation of the comments. Sandia NFO comment responses will reflect the official Sandia position.

Independent reviewers determine and assess the following as applicable during this stage:

- If the appropriate safe harbor method (see Attachment A, “Safe Harbor Methods Applicable to Various DOE Facilities”) is being used or if a DOE-approved alternative method is being used.
- If the level of detail is sufficient to assess the hazards posed by the facility or operation.
- If the analyses and risk assessments appropriately reflect standardized criteria as outlined in Attachment B, “Safety Analysis and Risk Assessment Handbook (SARAH),” or identifies an approved alternative methodology that is being used.
- Whether or not the information included adequately defines the safety basis, controls, and commitments (including designs, engineering analyses, and administrative controls).
- Verify calculations, assumptions, analyses, design features, and TSR controls have been accounted for and adequately support the conclusions drawn in the DSA.
- If the facility can be operated, maintained, and shut down safely.
- If the facility is in compliance with applicable laws, regulations, codes, standards, and corporate requirements relevant to the intended operation.
- Review the previous DSA/TSRs, as appropriate, and determine that the revised document meets the intent of changes.

Independent reviewers use defined criteria in conducting their reviews to assess these abovementioned items as determined by the review team leader and document their results using the following forms:

- Hazard Categorization Requirements per DOE-STD-1027-92 (SF 2001-HCR)
- Independent Reviewer Checklist (SF 2001-IRC)

**And,** as appropriate, one of the following:

- For Use When DOE-STD-3009-94 is Applicable (SF 2001-UDS)
- DNFSB Safety Basis Adequacy Verification Criteria (SF 2001-SBA)
- Specific Administrative Controls Review per DOE-STD-1186 (SF 2001-SAC)

**Note:** If reviewers are not familiar with reading and interpreting as-built plans, seek assistance from Sandia facilities personnel or other Members of the Workforce assigned to the project that have knowledge relevant to each subject area (e. g., mechanical, structural, fire protection).

### 7.6.3 Comments and Resolution of Comments

The independent review team leader consolidates comments and submits a report to the SBD manager for review. The report outlines the results of the independent review. It may include discussion of resolution of conflicts and minority reports, which are discussed later on in this section. Upon satisfactory review of the report by the SBD manager, the report is forwarded to the NFO manager.

Independent reviewers shall submit comments in the following format:

- Identify the location in the document that the comment addresses (e.g., page, paragraph, section).
- Identify type of comment as either essential or editorial. For essential-type comments, the appropriate independent internal review team member will identify a subcategory classification as follows:
    - Regulatory requirement or affects TSRs/controls (e.g., affects public safety, worker safety, or defense-in-depth; rule requirement not addressed).
    - Standard/guide requirement or affects analysis (e.g., incorrect safety information; omission of information for evaluation of safety basis; inadequate analysis methods).
    - Value added/completeness or affects bases (e.g., clarification of information to evaluate the safety basis; safety management programs not discussed adequately).
- Issue/Comment: Provide enough information to clearly identify the basis of the comment to the safety basis writer. The comment should not ask a question. Consolidate comments for the common issues but do not combine different issues into one comment.
- Action: Provide an action with each comment. The action should provide a suggested resolution to the issue/ comment.

The review team leader consolidates all comments and reviews them against applicable Federal and Corporate requirements. The team will perform a peer review of the comments. Comments will be reviewed with the SBD manager before being provided to the NFO. After this review, the SBD manager will present the review to the facility manager by means of a Departmental memorandum. The NFO then incorporates and dispositions the review comments that were provided and returns the dispositioned comments and the revised SB document to the team leader.

To the extent practicable, all independent review team comments shall be incorporated prior to submittal to SSO. However, if the nature of a comment and its resolution cannot be made within the time agreed to between the NFO manager and the SBD manager, then this must be stated in the NFO's response/resolution box in the essential comments form. This is applicable during all in-process review, but not the final review.

Responses to each essential comment are required. The comment and its resolution will be initialed in writing by both the review team member who wrote the comment (if possible) and the preparing NFO representative responsible for determining resolution. This indicates that both the reviewer and the preparing NFO are aware of each other's actions and that the review team member agrees with the actions required for resolution.

The review team leader reviews the dispositioned comments. If satisfactorily dispositioned and addressed accordingly in the revised SB document, the team leader recommends to the SBD manager (with copy to the NFO) that the revised SB document is ready to submit to SSO, as appropriate (see Section 8.0, “Submitting DSAs/TSRs to DOE for Approval”). If the comments are not satisfactorily dispositioned and addressed in the revised SB document, the review team leader sends a list of the comments that are outstanding to the SBD Manager that must be resolved prior to submitting SB documentation to SSO. The SB document shall not to continue on in this process until resolution is reached. Coordination between the review team leader, the SBD manager, and the NFO manager should be performed to accomplish resolution at this stage.

The fundamental principles of the comment resolution process are to ensure that each comment is fully evaluated; that the NFO, and the SBD agree on the comment resolution; and that the proposed resolution is discussed with SSO to ensure that Sandia understands the nature of the comment and the expected resolution, and that SSO is satisfied with Sandia's approach to resolving the comment.

The document preparer is responsible for resolving comments. The process contains the following steps.

1. Identifying conflicting comments.
2. Conflict resolution meetings.
3. If appropriate, identifying causes of unresolvable comments.
4. Unresolvable comments with NFOs within the Nuclear Facilities & Applied Technologies Department (01380) are to be forwarded to the Nuclear Facility Safety Committee (NFSC) for resolution in accordance with that organization's Charter. Unresolvable comments with NFOs within the Infrastructure Operations and Business Management Division (10000) are to be forwarded to the Division Vice President.

## 7.7 Incorporating the Unreviewed Safety Question (USQ) Process Results in DSAs

The result of a USQ determination is either a positive or a negative finding. See CPR400.1.1.14/GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities,* (in "Related Documents") for additional information.

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# 8.0 SUBMITTING DSAs/TSRs TO DOE FOR APPROVAL

## 8.1 Requirements

Managers of hazard category 1, 2, or 3 DOE nuclear facilities shall be responsible for ensuring that:

- PDSAs and DSAs are submitted to DOE for approval.

**Note:** It is strongly suggested that DOE representatives be informed throughout the planning and preparation processes to ensure the formal approval process progresses smoothly (or without major disagreements).

- All conditions of approval noted in previous SERs have been incorporated into the DSA and that the disposition of each comment and condition is documented.
- Internal independent review comments and resolution will be submitted to SSO as part of the DSA/TSRs document package.
- Pending issuance of an SER in which DOE approves the safety basis for an existing DOE nuclear facility:
  - Continue to perform work in accordance with the current safety basis for the facility in effect on October 10, 2000, or as approved by DOE at a later date.
  - Maintain the existing safety basis so it remains consistent with its associated requirements.

SB Document submittal to SSO will be by the Sandia NFO with courtesy copies to the SBD. The NFO is responsible for meeting the requirements of AOP 95-45, *Review and Approval of Regulatory Deliverables,* which includes a review and approval by the Legal Department, as appropriate, and a review and approval by the NFO's Vice President.

## 8.2 SSO Review and Safety Evaluation Report (SER) Comments

Upon satisfactory completion of the review process and receipt of the final draft of the complete SB document, SSO will prepare a Safety Evaluation Report (SER). The SER may indicate any Conditions of Approval (CoA) for start of or continued operation. SSO will issue the SER to the Sandia NFO, which in turn will transmit copies of the document and agreements to the SBD.

**Note:** The SER is primarily a DOE management document that provides approval authority, the basis for the extent and detail of the review, and the basis for any conditions of approval. As such, the SER is also part of the safety basis envelope that is reviewed and implemented prior to startup or restart of any nuclear activities.

As necessary, the NFO shall prepare responses to SSO comments. Informal interaction between SSO staff, the NFO SB staff, and the SBD staff is encouraged to facilitate understanding of comment and socialize the proposed resolution.

NFO management must review and approve the proposed resolution prior to formally transmitting the comment resolution to the SBD. The NFO may require committee or outside consultant review prior to approval for transmission to the SBD.

Upon concurrence of the SBD manager, the NFO manager submits the resolution comments to SSO and a lessons learned should be performed by the SBD.

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# 9.0 IMPLEMENTATION OF DSAs/TSRs

Upon receipt of the SER, the NFO negotiates with SSO to define the exact nature and schedule of any required activities (e. g., training, procedures, and document revision) and assessments with an implementation schedule for the SB. In cooperation with NFO management and SBD management, and in consultation with SSO, as required, a TSR implementation plan will be developed, including corporate programs upon which proper execution of TSRs depends (e.g., radiological controls, fire protection, vehicle maintenance).

Upon completion of the assessment and satisfaction implementation of any pre-operational conditions generated by the assessment, SSO issues an approval to operate to the NFO, which will notify the SBD of approval to operate. The approval will be documented and maintained by the NFO.

## 9.1 Controlled Documents

After approval, SB documents are to become controlled documents. It is the owning organization's responsibility to

accomplish this.

- Sandia Web FileShare will be used as the repository of the master document.
- SBD will be one of the metagroups on Web FileShare.
- Controlled hard copies may be produced to accomplish work (e.g., TSRs).

## 9.2 Implementation Assessment

To complete implementation, NFO management will perform an assessment to ensure complete and proper implementation, and notify SBD management upon satisfactory implementation of the SB documents. Several actions are possible as outlined in this section.

### 9.2.1 Implementation Validation Review (IVR)

If TSRs have been changed, it may be appropriate to verify that controls and Safety Management Programs (SMPs) are being properly implemented. An IVR can be used to accomplish this (see Attachment G, "Implementation Validation Review (IVR) Process Plan for Nuclear Safety Basis Changes").

### 9.2.2 Readiness Review

For a new facility or after a major modification a Readiness Review may be appropriate. See CPR400.1.1/MN471001, *ES&H Manual*, Section 13D, "Readiness Review Process - Planning, Review, and Approval," for additional information.

# 10.0 TRAINING AND QUALIFICATION

## 10.1 Requirements

Below are minimum requirements and recommendations:

| Work Activity or Role | Minimum Requirements for Qualification* | Recommended |
|---|---|---|
| Preparers of DSA and TSR Documentation (e.g., safety analysts) | SAC100, SAC300, HAZ500, OUO100, USQ100, IVR, SARAH, Applicable On-the-Job Training (OJT) (facility's processes)** | SAC200 |
| Managers responsible for nuclear facilities | SAC200, USQ100 | SAC100, SAC300, IVR, SARAH |
| Independent Reviewers | SAC100, SAC300, HAZ500, OUO100, USQ100, IVR, SARAH, Applicable OJT (facility's processes)** | |

* Where appropriate, exceptions may be granted or equivalent expertise may be accepted in place of these requirements upon approval by the cognizant manager and shall be formally documented.

**Applicable OJT includes training that provides familiarity with the nuclear facility and its operations, as appropriate, to perform current work functions. OJT will be planned, performed, and documented in accordance with the CPR001.3.3, *Formality of Operations Manual*.

## 10.2 Guidance

Managers should consider the following as sources of training or sources to enhance individual qualifications:

- Attendance at workshops.

- Related experience.
- Being mentored by more experienced Members of the Workforce.
- Formal presentations of work to small group seminars.

Managers should consider the following when selecting a team to develop or maintain DSAs/TSRs:

- Members should have complementary skill sets (e.g., maintenance, design engineering, hazard and accident analysis, operations, technical writing).
- Adequate hazard identification and accident analysis are critical to successful development of a DSA. As such, at least one team member should have prior experience in these areas.
- Detailed operational experience coupled with in-depth design knowledge of all facility systems is vital for team success.

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# 11.0 QUALITY ASSURANCE

## 11.1 Requirements

Managers of hazard category 1, 2, or 3 DOE nuclear facilities shall be responsible for ensuring that PDSAs, DSAs, TSRs, and related documents meet the quality assurance requirements in CPR001.3.2, *Corporate Quality Assurance Program*.

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# 12.0 RECORDS

## 12.1 Requirements

Managers of hazard category 1, 2, or 3 DOE nuclear facilities shall be responsible for ensuring that PDSAs, DSAs, TSRs, and related documents are:

- Maintained as controlled documents.
- Controlled in accordance CPR400.2.20, *Management of Information throughout Its Life Cycle* and AOP 95-12, *Technical Work Document Processing System.*
- Retained by organizations in accordance with their *Records Retention and Disposition Schedule*, for as long as the associated facilities are hazard category 1, 2, or 3 DOE nuclear facilities.
- Transferred to incoming DOE contractor personnel in the event there is a change in the Management and Operating (M&O) contractor.

SSB documentation preparation, review, and approval activities are to be conducted in a formal manner with records maintained to provide appropriate evidence of the comments received and their resolution. Records of comments and resolutions, including situations wherein there are multiple exchanges of comments and proposed resolutions for the same issue, shall be maintained by the SBD. Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO.

All official records related to SB activities maintained by the SBD will be retained in accordance with CPR 400.2.20,

*Management of Information Throughout Its Life Cycle*, Section 3.6, "Records Retention and Disposition Schedule and Processes."

Deliverables required from the various SB activities and signed official report copies are kept in the SBD organizational files and electronic copies of the following shall be forwarded to the appropriate NFO management. Official records may include, but are not limited to:

- Correspondence related to evaluation results.
- Review summaries.
- Status reports from the various subject areas.
- Cost impact estimates, as appropriate.
- Meeting minutes, if the meeting was conducted for the purpose of evaluation.
- Essential comments, as appropriate.
- Final ORR or RA reports, as applicable.

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# 13.0 REFERENCES

## 13.1 Requirements Source Documents

10 CFR 830, *Nuclear Safety Management.*

DOE O 414.1C, *Quality Assurance.*

DOE O 420.1B, *Facility Safety.*

SNL, CPR400.2.20, *Management of Information Throughout Its Life Cycle.*

## 13.2 Implementing Documents

DOE G 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide for Use With DOE O 420.1, Facility Safety.*

DOE G 420.1-2, *Guide for the Mitigation of Natural Phenomena Hazards for DOE Nuclear Facilities and Nonnuclear Facilities.*

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

DOE G 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements.*

DOE O 460.1B, *Packaging and Transportation Safety.*

DOE O 471.1A, *Identification and Protection of Unclassified Controlled Nuclear Information.*

DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23,*

*Nuclear Safety Analysis Reports.*

DOE-STD-1104-96, *Review and Approval of Nuclear Facility Safety Basis Documents (Documented Safety Analyses and Technical Safety Requirements).*

DOE-STD-1120-2005, *Volumes 1 & 2, Integration of Environment, Safety, and Health into Facility Disposition Activities.*

DOE-STD-1186-2004, *Specific Administrative Controls.*

DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*.

DOE-STD-3011-2002, *Guidance for Preparation of Basis for Interim Operation (BIO) Documents*.

SNL, CPR400.1.1/MN471001, *ES&H Manual.*

SNL, CPR400.1.1.14/GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*.

## 13.3 Related Documents

American Institute of Chemical Engineers (AIChE), Center for Chemical Process Safety, *Guidelines for Hazard Evaluation Procedures.*

DOE O 200.1, *Information Management Program.*

DOE O 231.1A, Chg. 1, *Environment, Safety, and Health Reporting.*

DOE O 251.1B, *Departmental Directives Program.*

DOE O 425.1C, *Startup and Restart of Nuclear Facilities.*

DOE O 471.1A, *Identification and Protection of Unclassified Controlled Nuclear Information.*

Office of Kirtland Site Operations (OKSO), Procedure OKSO-4205, *Authorization Basis Review and Approval.*

SNL, CPR400.1.1.11/GN470072, *Nuclear Criticality Safety.*

SNL, SAND95-0320, *Qualitative Methods for Assessing Risk.*

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Back to Supplements

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# CHANGE HISTORY

## GN470101, *Preparation and Review of Documented Safety Analyses (DSAs) and Technical Safety Requirements (TSRs) to Meet 10 CFR 830, Subpart B*

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### June 26, 2007

**Note:** An asterisk (*) indicates a substantive change.

- Under topic, “1.0 Applicability,”:
  - **Update:** Paragraph that states,” Requirements in this document are expected to be incorporated in the next annual review of the DSA and TSRs. However, the DSA and TSRs are not expected to be revised for the sole purpose of complying with the format requirements outlined in this document” **to** “Requirements in this document are expected to be incorporated in all new DSAs and TSRs. Revisions to existing, approved, DSAs and TSRs will be evaluated against these requirements, and if necessary, a plan will be developed to upgrade those documents to comply with the requirements of this procedure.
- Under topic, “4.0 Background, subtopic 4.1.2 TSRs”:
  - **Add:** To the first paragraph of the section, “It is imperative that the TSRs are clearly written and that all actions and requirements provide enough detail to be effectively implemented.”
- Under topic, “5.0 Responsibilities, subtopic 5.2 Safety Basis Department”:
  - **Clarify:** The responsibility for the Safety Basis Department to maintain the corporate lessons learned database for the DSA/TSR process by adding the following text: “lessons learned are identified and submitted after the issuance of an SER.”
- Under topic, “7.0 Preparing DSA/TSR Documentation, subtopic 7.2.4 Communication and Input During Reviews”:
  - ***Add:** To the third paragraph of the section, “All safety basis documents

shall be reviewed by the SBD prior to their submission to SSO. This includes all safety basis document revisions including those made to resolve SSO review comments."

- ❍ ***Add:** "All correspondence associated with the submittal of annual updates must be reviewed by the SBD prior to their submission to SSO."

- Under topic, "7.5 Maintaining Existing DSA/TSR Documentation, subtopic 7.5.1 Requirements":

- ❍ ***Add:** "Annual updates" to the requirement for managers of hazard category 1, 2, or 3 DOE nuclear facilities to ensure that all draft DSAs and PDSAs are forwarded to the SBD for independent technical and administrative review by knowledgeable Members of the Workforce who are not involved in the development of the DSA.

- Under topic, "7.5 Maintaining Existing DSA/TSR Documentation, subtopic 7.5.2 Annual Review and Update":

- ❍ ***Add:** To the first paragraph of the section, "The annual review due date (to be submitted to SSO) will be 12 months from the date of the SSO Safety Evaluation Report (SER) and will reoccur every 12 months thereafter," and the following note:

**Note:** The annual review due date does **NOT** change based upon a SER addendum (normally issued following an annual update).

Under topic, "7.6 Independent Internal Review":

- ❍ **Add:** To the second paragraph of the section, "For subsequent submittals (e. g., a 60% draft that follows a 30% draft that has already been reviewed), the review will be limited to only those changes that have been made since the previous submittal. Comments that have remained open since the previous submittal may be noted as closed or open."

- Under topic, "7.6 Independent Internal Review, subtopic 7.6.2 Minimum Review Content":

- ❍ **Add:** The following opening paragraphs to the section:

"The scope of the independent review varies with the stage of development. For initial submittals, the entire document is reviewed against the applicable criteria. For all subsequent submittals of the document, the review is limited to changes from the previous submittal. Information that has not changed is not considered to be within the scope of the subsequent review; however, any comments that were open from the previous review can be characterized as closed or can remain open.

Review of documents whose only changes are to incorporate SSO comments will be limited to the verification of proper incorporation of the comments. Sandia NFO comment responses will reflect the official Sandia position."

- Under topic, "8.0 Submitting DSAs/TSRs to DOE For Approval, subtopic 8.2 SSO Review and Safety Evaluation Report (SER) Comments":
  - **Add:** "A lessons learned should be performed by the SBD," to the last paragraph in the section to support the responsibility for the Safety Basis Department, documented in section 5.2.

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**Administrative Changes Only**
**December 1, 2006**

This document was administratively revised to:

- **Change:** The review date to reflect the completion of the self-assessment and not the completion of the changes made as the result of the self-assessment. The official record of the completed self-assessment is maintained by the 10313 IMT group.

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**March 13, 2006**

**Note:** An asterisk (*) indicates a substantive change

- This document has been altered by greater than 75% and should be read in its entirety.

- **Add:** A review date to the header to indicate that an ES&H Manual Self Assessment (SA) checklist was completed on this supplement.

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**November 16, 2005**

**Clarification:** Added the following clarification to the change history on April 5, 2006:

> **Note**: The following changes, although substantive, are being made without formal review from the ES&H Manual Committee and the General Reviewers, at the request of Tom Hunter via the "ESH CPR Steering Team Checklist Responses."
>
> This note was inadvertently left out of the original publication of this change history.

**End Clarification**

(*Indicates a substantive change)

This document was revised to:

- Under topic, “3.0 Responsibilities”:
  - ***Add:** under subtopic “3.1 Senior Managers/Managers,” responsibility for senior managers with hazard category 1, 2, or 3 DOE nuclear facilities within their group to ensure that their managers and DSA users meet the requirements of sections 3.1 and 3.5 of GN470101, respectively.
  - ***Add:** under subtopic “3.5 DSA Users,” senior managers as part of the facility management personnel responsible for the requirements documented in the subtopic.

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**Administrative Changes Only**

## June 29, 2005

This document was administratively revised to:

**Change:** Executive Policy Sponsor from Les Shephard to Frank Figueroa

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## June 10, 2003

This is the initial issue of a new document that provides:

- Information to assist in the preparation and review of preliminary documented safety analyses (PDSAs) and documented safety analyses (DSAs) that are applicable to facilities that are classified as hazard category 1, 2, or 3 DOE nuclear facilities in accordance with DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*.

- A systematic methodology for both the preparation and review processes that is in compliance with 10 CFR 830, *Nuclear Safety Management, Subpart B*, "Safety Basis Requirements."

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*GN470101 - Preparation and Review of Documented Safety Analyses (DSAs) and Technical Safety Requirements (TSRs) to Meet 10 CFR 830, Subpart B*

# ATTACHMENT A – SAFE HARBOR METHODS APPLICABLE TO VARIOUS DOE FACILITIES

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007; (supersedes Self-Assessment dated June 5, 2005)

**Note:** The following table is a partial copy of 10 CFR 830, Subpart B, Appendix A, Table 2. These are the acceptable safe harbor methods currently used in Sandia SB Documentation. Alternative methodologies may be proposed, but must be justified prior to use. To gain approval of an alternative methodology, the proposing organization must first submit the methodology to the SBD for internal Sandia review and concurrence. A proposed alternative methodology would need to present a case that the alternative methodology is sufficiently rigorous to provide an equivalent level of safety in the alternative DSA and resulting controls.

| The contractor responsible for: | May prepare its documented safety analyses by: |
|---|---|
| (1) A DOE reactor | Using the method in U.S. Nuclear Regulatory Commission Regulatory Guide 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*, or successor document. |
| (2) A DOE nonreactor nuclear facility | Using the method in DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, or successor document. |
| (5) The decommissioning of a DOE nuclear facility | 1. Using the method in DOE-STD-1120-2005, Volumes 1 & 2, *Integration of Environment, Safety, and Health into Facility Disposition Activities,* or successor document;<br>2. Using the provisions in 29 CFR 1910.120 (or 29 CFR 1926.65 for construction activities) for developing safety and health programs, work plans, health and safety plans (HASPs), and emergency response plans to address public safety, as well as worker safety; and<br>3. Deriving hazard controls based on the safety and health programs, the work plans, the HASPs, and the emergency response plans. |

| | |
|---|---|
| (8) A hazard category 3 DOE nonreactor nuclear facility | Using the methods in Chapters 2, 3, 4, and 5 of DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, or successor document to address in a simplified fashion:<br>1. The basic description of the facility/activity and its operations, including safety class structure, system, or component (SSC).<br>2. A qualitative hazards analysis.<br>3. The hazard controls (consisting primarily of inventory limits and safety management programs) and their bases. |
| (9) Transportation activities | 1. Preparing a Safety Analysis Report for Packaging in accordance with DOE-O-460.1A, *Packaging and Transportation Safety*, or successor document<br>OR<br>2. Preparing a Transportation Safety document in accordance with DOE-G-460.1-1, *Implementation Guide for Use with DOE O 460.1A, Packaging and Transportation Safety*, June 5, 1997, or successor document. |

Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# ATTACHMENT B – SAFETY ANALYSIS AND RISK ASSESSMENT HANDBOOK (SARAH)

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

**Note:** The SARAH is maintained as a Level 3 document by the Safety Basis Department and is identified as PLA 06-01.

Back to Supplements

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*GN470101 - Preparation and Review of Documented Safety Analyses (DSAs) and Technical Safety Requirements (TSRs) to Meet 10 CFR 830, Subpart B*

# ATTACHMENT C – DOCUMENTED SAFETY ANALYSIS (DSA) CONTENT

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

A DSA shall take one of the following forms as described in the appendices below:

Appendix C-1 – Documented Safety Analysis (DSA) Content for Nuclear Reactor Facilities.

Appendix C-2 – Documented Safety Analysis (DSA) Content for Nuclear Nonreactor Facilities.

Appendix C-3 – Documented Safety Analysis (DSA) Content for Onsite Transportation Activities (in Accordance with DOE Order 460.1.).

Appendix C-4 – Content for Basis of Interim Operations (BIOs) (to be prepared in Lieu of a DSA).

Appendix C-5 – Content for Justification for Continued Operation (JCO) (to be prepared as a limited scope addition to a DSA to address a positive USQD).

## SAFETY ANALYSES FOR NEW FACILITIES OR MAJOR MODIFICATIONS

In addition, for new hazard category 1, 2, and 3 nuclear facilities and major modifications to such facilities that could substantially change the approved facility safety analysis, the following elements shall be addressed as part of the DSA in addition to the items outlined in the appendices listed in the "Introduction" above.

**Note:** This section does **not** impose requirements on existing facilities, except for major modifications to those facilities, but it can be used as a standard for comparison when judging the adequacy of existing facilities. This section also does **not** apply to nuclear deactivation or decontamination and decommissioning activities at end-of-facility-life if the safety analysis demonstrates that adequate protection is provided consistent with the requirements of 10 CFR Part 830 through alternate means and it is not cost beneficial to apply the provisions of this chapter for the limited remaining life of the activity.

- Safety analyses include:
    - The identity and functions of safety class and safety significant structures, systems, and components (SSCs).
    - The significance to safety of functions performed by safety class and safety significant SSCs.
- Safety analyses address:
    - Hazards inherent to the facility and its activities.
    - Natural phenomena hazards (NPH).
    - External man-induced hazards (factors such as proximity to airports, pipelines, hazardous traffic on roads or waterways, and adjacent facilities).

Safety analyses shall be performed as early as practical in conceptual or preliminary design processes to ensure that required safety SSCs are specified in the final design.

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Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# APPENDIX C-1 – DOCUMENTED SAFETY ANALYSIS (DSA) CONTENT FOR NUCLEAR REACTOR FACILITIES

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

## 1.0 INTRODUCTION

The content of Sandia nuclear reactor facility DSAs developed by NFO are consistent with safe harbor methods NRC Regulatory Guide 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants,* and DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analysis.* In addition, other industry documents were reviewed and used to expand and clarify description chapters.

The graded approach as defined by 10 CFR 830 and expanded on in DOE-STD-3009 is used for developing DSAs for research reactor facilities. SSO has approved the approach taken by NFO SB personnel, which is to apply chapters of NRC Reg. Guide 1.70 to the furthest extent possible, and blend in the applicable chapters of DOE-STD-3009 where appropriate to obtain a robust DSA. Chapters of NRC Reg. Guide 1.70 that do not apply to research reactor facilities are not included in the DSA. To obtain an acceptable level of detail for research reactor DSAs, it is necessary to include applicable chapters from DOE-STD-3009, even though it is not written for reactor facilities. There is one additional chapter, which is not covered in either of the two main requirement documents NRC Reg. Guide 1.70 or DOE-STD-3009, which NFO SB personnel saw

appropriate to include; and that is Chapter 10, “Experiment Facilities.” NUREG 1537, *Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors* was used for guidance on the contents for this additional chapter.

The requirement document that each chapter follows is identified in parenthetical text next to each chapter heading. The required format should be followed to the greatest extent practical. Additional information may be required for certain chapters of the DSA as identified by NFO, SBD, or SSO.

Existing supporting documentation shall be referenced in applicable chapters listed below. 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.

---

# 2.0 EXECUTIVE SUMMARY

The DSA Executive Summary shall provide an overview of the facility safety basis and present information sufficient to establish a top-level understanding of the facility, its operations, and the results of the safety analysis. It summarizes the facility safety basis as documented in detail in the remainder of the DSA. Expected products of this summary, as applicable based on the graded approach, include:

- Summary of the facility background and mission.
- Overview of the facility including locations and boundaries.
- Description of the facility hazard category.
- Summary of the results of the facility safety analysis including operational hazards analyzed, design basis accidents (DBAs), and significant preventive and mitigative features.
- Summary of the acceptability of the facility safety basis.
- Guide to the structure and content of the DSA (i.e., “road map”).

When applicable, the following may be included in the executive summary chapter: List

of Acronyms and Abbreviations, List of Definitions, and Metric Conversions.

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# 3.0 INTRODUCTION AND GENERAL DESCRIPTION OF PLANT

This chapter of the DSA shall present an introduction to the report and a general description of the plant. This chapter should enable the reader to obtain a basic understanding of the overall facility without having to refer to the subsequent chapters. Review of the detailed chapters that follow can then be accomplished with better perspective and with recognition of the relative safety importance of each individual item to the overall plant design.

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# 4.0 SITE CHARACTERISTICS

This chapter of the DSA shall provide a description of site characteristics necessary for understanding the facility environs important to the safety basis. Information is provided to support and clarify assumptions used in the hazard and accident analyses to identify and analyze potential external and natural event accident initiators and accident consequences external to the facility. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the location of the site, location of the facility within the site, its proximity to the pubic and to other facilities, and identification of the point where the Evaluation Guideline is applied.
- Specification 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.
- Determination of the historical basis for site characteristics in meteorology, hydrology, geology, seismology, volcanology, and other natural events to the extent needed for hazard and accident analysis.
- Identification of design basis natural events.

- Identification of sources of external accidents, such as nearby airports, railroads, or utilities such as natural gas lines.

- Identification of nearby facilities impacting, or impacted by, the facility under evaluation.

- Validation of site characteristic assumptions common to safety analysis that were used in prior environmental analyses and impact statements, or of the need to revise and updated such assumptions used in facility environmental impact statements.

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# 5.0 GENERAL DESIGN CRITERIA

This chapter of the DSA shall identify, describe, and discuss the principal architectural and engineering design of those structures, components, equipment, and systems that are important to safety. Expected products of this chapter, as applicable based on the graded approach, include:

- Conformance with DOE general design criteria.

- Seismic and other natural phenomena classification of structures, components, and systems as outlined in Attachment 2, Contractor Requirements Document, Chapter IV, “Natural Phenomena Hazards Mitigation” of DOE O 420.2B, *Facility Safety.*

- Wind and tornado design criteria.

- Water level (flood) design criteria.

- Missile protection criteria.

- Protections against dynamic effects associated with the postulated rupture of piping

- Seismic design criteria.

- Design of Category I (PC-2) structures.

- Mechanical Systems and components.
- Seismic qualification of seismic category I instrumentation and electrical equipment
- Environmental design of mechanical and electrical equipment.

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# 6.0 REACTOR

This chapter of the DSA shall provide an evaluation and supporting information to establish the capability of the reactor to perform its safety functions throughout its design lifetime under all normal operational modes, including both transient and steady state, and accident conditions. This chapter should also include information to support the analyses presented in Chapter 17, “Hazard and Accident Analysis.” Expected products of this chapter, as applicable based on the graded approach, include:

- Reactor summary description.
- Fuel system design.
- The design bases for the nuclear design of the fuel and reactivity control systems.
- Thermal and hydraulic design bases.
- A description of all materials present in the reactor.
- Functional design of reactivity control systems.

---

# 7.0 REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

This chapter of the DSA shall provide information regarding the reactor coolant system, and any systems connected to it.

Evaluations, together with the necessary supporting material, should be submitted to show that the reactor coolant system is adequate to accomplish its intended objective and to maintain its integrity under conditions imposed by all foreseeable reactor behavior, either normal or accident conditions.

Existing supporting documentation is to be referenced. 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.

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# 8.0 ENGINEERED SAFETY FEATURES

This chapter of the DSA shall describe the engineered safety features (e.g., safety structures, systems, and components [SSCs]) that are provided to mitigate the consequence of postulated accidents in spite of the fact that these accidents are very unlikely. Information on these features should be of sufficient detail to permit an adequate evaluation of their performance capability. Expected products of this chapter, as applicable based on the graded approach, include:

- Descriptions of the experience, tests at simulated accident conditions, or conservative extrapolations from existing knowledge that supports the concept selection upon which the operation of the feature is based.
- Considerations of component reliability, system interdependency, redundancy, diversity, and separation of components or portions of systems, etc., associated with ensuring that the feature will accomplish its intended purpose and will function for the period required.
- Provisions for test, inspection, and surveillance to ensure that the feature will be dependable and effective upon demand.
- Evidence that the material used will withstand the postulated accident environment, including radiation levels, and that radiolytic decomposition products that may occur will not interfere with it or other engineered safety features.

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# 9.0 INSTRUMENTATION AND CONTROLS

The reactor instrumentation senses the various reactor parameters and transmits appropriate signals to the regulating systems during normal operation, and to the reactor trip and engineered-safety-feature systems during abnormal and accident conditions. The information provided in this chapter of the DSA shall emphasize those instruments and associated equipment that constitute the protection system (as defined in IEEE Std. 279-1971, *Criteria for Protection Systems for Nuclear Power Generating Stations*). The analysis of regulating systems and instrumentation should be provided, particularly considerations of regulating system-induced transients, which if not terminated in a timely manner, could result in fuel damage, radiation release, or other public hazards.

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# 10.0 ELECTRICAL SYSTEMS

The electric power system is the source of power for the main and auxiliary reactor systems during normal operation and for the protection systems and engineered safety features during abnormal and accident conditions. The information in this chapter of the DSA shall be directed toward establishing the functional adequacy of the safety-related electric power systems and ensuring that these systems have adequate redundancy, independence, and testability in conformance with current criteria.

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# 11.0 AUXILIARY SYSTEMS

This chapter of the DSA shall provide information regarding the auxiliary systems employed at the facility. Those systems that are essential for the safe shutdown of the reactor or the protection of the heath and safety of the public should be identified. Expected products of this chapter, as applicable based on the graded approach, include:

- The description of each system.
- The design bases for the system and for critical components.
- A safety evaluation demonstrating how the system satisfies the design bases.
- The testing and inspection to be performed to verify system capability and reliability.

- The required instrumentation and controls.

There may be aspects of the auxiliary systems that have little or no relationship to protection of the public against exposure to radiation. In such cases, enough information should be provided to allow understanding of the auxiliary system design and function with emphasis on those aspects of design and operation that might affect the reactor and its safety features or contribute to the control of radioactivity.

The capability of the system to function without compromising the safe operation of the plant under both normal operating or transient situation should be clearly shown by the information provided, i.e., a failure analysis.

Seismic design classifications should be stated with reference to detailed information provided in Chapter 3, “Introduction and General Description of Plant” where appropriate. Radiological considerations associated with operation of each system under normal and accident conditions, where applicable, should be summarized and reference made to detailed information in Chapters 12, ”Experiment Facilities,” or 13, "Radioactive and Hazardous Waste Management,” as appropriate.

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# 12.0 EXPERIMENT FACILITIES

This chapter of the DSA shall describe and discuss the experimental facilities, their intended use, and the experimental program. Contents should include a description of the proposed experimental program and the safety analyses for each portion of the facilities experimental configuration. The design, construction, and placement of the experimental aspects of the facility should be analyzed for inherent safety questions that exist apart from the experiments accommodated therein.

Utility, integrity, longevity, versatility, diversity, and safety should be considered for the experimental facilities in the same manner they are considered for the reactor core and its operational components and systems. Therefore, the safety analyses of the reactor facility should include the experimental facilities and their interactions with the reactor components and systems. If changes in reactor operating characteristics are considered, potential interactions between the core and the experimental facilities should be analyzed.

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# 13.0 RADIOACTIVE AND HAZARDOUS WASTE MANAGEMENT

This chapter of the DSA shall provide the essential characteristics of the radioactive and hazardous waste management program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the overall radioactive and hazardous waste management program and organization.
- Description of the site-specific radioactive, mixed, and hazardous material waste management policy, objectives, and philosophy.
- Identification of hazardous waste streams, including types, sources, and quantities.
- Description of the waste management process, and waste treatment and disposal systems, including design and administrative controls.

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# 14.0 RADIATION PROTECTION

This chapter of the DSA shall provide the essential characteristics of the radiation protection program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program.

This chapter summarizes provisions for radiation protection. Summaries focus on radiation protection based on facility hazards to provide a basic understanding of the scope of the radiation protection program. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the overall radiation protection program and organization.

- Description of the radiological As Low As Reasonably Achievable (ALARA) policy and program.
- Description of radiation exposure to control including administrative limits, radiological practices, dosimetry, and respiratory protection.
- Identification of radiological monitoring to protect workers, the public, and the environment.
- Discussion of radiological protection instrumentation.
- Description of the plans and procedures for maintaining records of radiation sources, released, and occupational exposures.

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# 15.0 CONDUCT OF OPERATIONS

This chapter of the DSA shall provide information relating to the preparations and plans for operation of the plant. Its purpose is to provide assurance that a staff of adequate size and technical competence will be established and maintained, and that adequate operating plans to protect the public health and safety will be followed. Expected products of this chapter, as applicable based on the graded approach, include:

- Organization and responsibility.
- Training.
- Emergency planning.
- Review and audit.
- Plant procedures.
- Industrial Safety.

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# 16.0 INITIAL TESTING, IN-SERVICE

# SURVEILLANCE, AND MAINTENANCE

This chapter of the DSA shall provide the essential characteristics of the surveillance, testing, and maintenance program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is **not** intended to be the vehicle for review and approval of the program. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the facility initial testing program.
- Description of the facility in-service surveillance program.
- Description of the planned, predictive, preventive, and corrective facility maintenance program.

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# 17.0 HAZARD AND ACCIDENT ANALYSIS

This chapter of the DSA shall provide information that will satisfy the requirements of 10 CFR 830 to evaluate normal, abnormal, and accident conditions, including consideration of natural and man-made external events, identification of energy sources or process that might contribute to the generation or uncontrolled release of radioactive and other hazardous materials, and consideration of the need for analysis of accidents which may be beyond the design basis of the facility.

Hazard analysis considers the complete spectrum of accidents that may occur due to facility operations; analyzes potential accident consequences to the public and workers; estimates likelihood of occurrence; identifies and assesses associated preventive and mitigative features; identifies safety-significant SSCs; and identifies a selected subset of accidents, designated DBAs, to be formally defined in accident analysis. Subsequent accident analysis evaluates these DBAs for comparison with Evaluation Guideline. This chapter should cover the topics of hazard identification, facility hazard categorization, hazard evaluation, and accident analysis. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the methodology for and approach to hazard and accident analyses.
- Identification of hazardous materials and energy sources present by type, quantity,

form, and location.

- Facility hazard categorization, including segmentation in accordance with DOE-STD-1027.

- Identification in the hazard analysis of the spectrum of potential accidents at the facility in terms of largely qualitative consequence and frequency estimates. The summary of this activity will also include:

    - Identification of planned design and operational safety improvements.

    - Summary of defense in depth, including identification of safety-significant SSCs, specific administrative controls (SACs) and other items needing TSR coverage in accordance with 10 CFR 830.

    - Summary of the significant worker safety features, including identification of safety-significant SSCs and any relevant programs to be covered under TSR and administrative controls.

    - Summary of design and operational features that reduce the potential for large material releases to the environment.

    - Identification of the limited set of unique and representative accidents (i.e., DBAs) to be assessed further in accident analysis.

- Accident analysis of DBAs identified in the hazard analysis. The summary of this activity will include for each accident analyzed, the following:

    - Estimation of source term and consequence.

    - Documentation of the rationale for binning frequency of occurrence in a broad range in hazard analysis.

    - Documentation of accident assumptions and identification of safety-class SSCs based on the Evaluation Guideline.

For a detailed discussion about how to apply the graded approach for this chapter, refer to DOE-STD-3009.

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# 18.0 DERIVATION OF TECHNICAL SAFETY REQUIREMENTS (TSRs)

This chapter of the DSA shall provide information necessary to support the safety basis requirements for the derivation of hazard controls in 10 CFR 830.

This chapter builds upon the control functions determined to be essential in Chapter 17, “Hazard and Accident Analyses” to derive TSRs. This chapter is meant to support and provide the information necessary for the separate TSR document required by 10 CFR 830.205. Derivation of TSRs consists of summaries and references to pertinent chapters of the DSA in which design (i.e., SSCs) and administrative features (i.e., non-SSCs) are needed to prevent or mitigate the consequences of accidents. Design and administrative features addressed include ones which: (1) provide significant defense in depth; (2) provide for significant worker safety; or (3) provide for the protection of the public. Expected products of this chapter, as applicable based on the graded approach, include:

- Information with sufficient basis from which to derive, appropriate, any of the following TSR parameters for individual TSRs:
    - Safety Limits (SLs).
    - Limiting Control Settings (LCSs).
    - Limiting Conditions for Operation (LCOs).
    - Surveillance Requirements (SRs).
    - SACs.
- Information with sufficient basis from which to derive TSR administrative controls for specific control features or to specify programs necessary to perform institutional safety functions.
- Identification of passive design features addressed in the DSA.
- Identification of TSRs from other facilities that affect the facility’s safety basis.

For a detailed discussion about how to apply the graded approach for this chapter, refer

to DOE-STD-3009-94, Change Notice No. 3, *DOE Standard Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

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# 19.0 QUALITY ASSURANCE

This chapter of the DSA shall provide the essential characteristics of the quality assurance program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program to ensure compliance with 10 CFR 830 Subpart A, “Quality Assurance Requirements.” Expected products of this chapter, as applicable based on the graded approach, include:

- Description of quality assurance program and organization.
- Description of document control and records management.
- Description of the quality assurance process ensuring that performed safety related work meets requirements.

APPENDIX 15A Hazard Analysis Results

When applicable, the following will be included: List of Figures, List of Tables.

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Back to Supplements

Bonnie J. Shapiro, bshapir@sandia.gov
Bob Goetsch, rsgoets@sandia.gov

*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# APPENDIX C-2 – DOCUMENTED SAFETY ANALYSIS (DSA) CONTENT FOR NUCLEAR NONREACTOR FACILITIES

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

## 1.0 INTRODUCTION

The content of non-reactor facility DSAs developed by NFO are consistent with requirements document DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses.*

The requirement document that each chapter follows is identified next to each chapter heading. The required format should be followed to the greatest extent practical. Additional information may be required for certain chapters of the DSA as identified by the SBD or review officials. The additional information should be included in the DSA where it is appropriate and agreed upon by the DSA review committee.

Existing supporting documentation shall be referenced in the applicable chapters listed below. 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.

# 2.0 EXECUTIVE SUMMARY

The DSA Executive Summary shall provide an overview of the facility safety basis and present information sufficient to establish a top-level understanding of the facility, its operations, and the results of the safety analysis. It summarizes the facility safety basis as documented in detail in the remainder of the DSA. Expected products of this summary, as applicable based on the graded approach, include:

- Summary of the facility background and mission.
- Overview of the facility including locations and boundaries.
- Description of the facility hazard category.
- Summary of the results of the facility safety analysis including operational hazards analyzed, DBAs, and significant preventive and mitigative features.
- Summary of the acceptability of the facility safety basis.
- Guide to the structure and content of the DSA (i.e., “road map”).

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# 3.0 SITE CHARACTERISTICS

This chapter of the DSA shall provide a description of site characteristics necessary for understanding the facility environs important to the safety basis. Information is provided to support and clarify assumptions used in the hazard and accident analyses to identify and analyze potential external and natural event accident initiators and accident consequences external to the facility. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the location of the site, location of the facility within the site, its proximity to the pubic and to other facilities, and identification of the point where the Evaluation Guideline is applied.
- Specification 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.

- Determination of the historical basis for site characteristics in meteorology, hydrology, geology, seismology, volcanology, and other natural events to the extent needed for hazard and accident analysis.
- Identification of design basis natural events.
- Identification of sources of external accidents, such as nearby airports, railroads, or utilities such as natural gas lines.
- Identification of nearby facilities impacting, or impacted by, the facility under evaluation.
- Validation of site characteristic assumptions common to safety analysis that were used in prior environmental analyses and impact statements, or of the need to revise and updated such assumptions used in facility environmental impact statements.

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# 4.0 FACILITY DESCRIPTION

This chapter of the DSA shall provide descriptions of the facility and processes to support assumptions used in the hazard and accident analyses. These descriptions focus on all major facility features necessary to understand the hazard analysis and accident analysis, not just safety structures, systems, and components (SSCs). Expected products of this chapter, as applicable based on the graded approach, include:

- Overview of the facility, its inputs and its outputs, including mission and history.
- Description of the facility structure and design basis.
- Description of the facility process systems and constituent components, instrumentation, controls, operating parameters, and relationships of SSCs.
- Description of confinement systems.
- Description of the facility safety support systems.
- Description of the facility utilities.

- Description of facility auxiliary systems and support systems.

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# 5 .0 HAZARD AND ACCIDENT ANALYSIS

This chapter of the DSA shall provide information that will satisfy the requirements of 10 CFR 830 to evaluate normal, abnormal, and accident conditions, including consideration of natural and man-made external events, identification of energy sources or process that might contribute to the generation or uncontrolled release of radioactive and other hazardous materials, and consideration of the need for analysis of accidents which may be beyond the design basis of the facility.

Hazard analysis considers the complete spectrum of accidents that may occur due to facility operations; analyzes potential accident consequences to the public and workers; estimates likelihood of occurrence; identifies and assesses associated preventive and mitigative features; identifies safety-significant structures, systems, and components (SSCs); and identifies a selected subset of accidents, designated DBAs, to be formally defined in accident analysis. Subsequent accident analysis evaluates these DBAs for comparison with Evaluation Guideline. This chapter should cover the topics of hazard identification, facility hazard categorization, hazard evaluation, and accident analysis. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the methodology for and approach to hazard and accident analyses.
- Identification of hazardous materials and energy sources present by type, quantity, form, and location.
- Facility hazard categorization, including segmentation in accordance with DOE-STD-1027.
- Identification in the hazard analysis of the spectrum of potential accidents at the facility in terms of largely qualitative consequence and frequency estimates. The summary of this activity will also include:
    - Identification of planned design and operational safety improvements .
    - Summary of defense in depth, including identification of safety-significant

SSCs, Specific Administrative Controls (SACs), and other items needing TSR coverage in accordance with 10 CFR 830.

- Summary of the significant worker safety features, including identification of safety-significant SSCs and any relevant programs to be covered under TSR and administrative controls.

- Summary of design and operational features that reduce the potential for large material releases to the environment.

- Identification of the limited set of unique and representative accidents (i.e., DBAs) to be assessed further in accident analysis.

- Accident analysis of DBAs identified in the hazard analysis. The summary of this activity will include for each accident analyzed, the following:

  - Estimation of source term and consequence.

  - Documentation of the rationale for binning frequency of occurrence in a broad range in hazard analysis (detailed probability calculation snot required).

  - Documentation of accident assumptions and identification of safety-class SSCs based on the Evaluation Guideline.

For a detailed discussion about how to apply the graded approach for this chapter, refer to DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*.

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# 6.0 SAFETY STRUCTURES, SYSTEMS, AND COMPONENTS (SSCs)

This chapter of the DSA shall provide details on those facility structures, systems, and components that are necessary for the facility to protect the public, provide defense in depth, or contribute to worker safety as outlined in Attachment 2, Contractor Requirements Document, of DOE O 420.2B, *Facility Safety.* Descriptions are provided of the attributes (i.e., functional requirements and performance criteria) required to support

the safety functions identified in the hazard and accident analyses and to support subsequent derivation of TSRs. Expected products of this chapter, as applicable based on the graded approach, include:

- Descriptions of safety SSCs, including safety functions.
- Identification of support systems safety SSCs depend upon to carry out safety functions.
- Identification of the functional requirements necessary for the safety SSCs to perform their safety functions, and the general conditions caused by postulated accidents under which the safety SSCs must operate.
- Identification of the performance criteria necessary to provide reasonable assurance that the functional requirements will be met.
- Identification of assumptions needing TSR coverage.
- SACs.

Maximum advantage should be taken of pertinent existing safety analyses and design information (i.e., requirements and their bases) that are immediately available or can be retrieved through reasonable efforts.

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# 7.0 DERIVATION OF TECHNICAL SAFETY REQUIREMENTS

This chapter of the DSA shall provide information necessary to support the safety basis requirements for the derivation of hazard controls in 10 CFR 830.

This chapter builds upon the control functions determined to be essential in Chapter 5, "Hazard and Accident Analyses," and Chapter 6, "Safety Structures, Systems, and Components (SSCs)," to derive TSRs. This chapter is meant to support and provide the information necessary for the separate TSR document required by 10 CFR 830.205. Derivation of TSRs consists of summaries and references to pertinent sections of the DSA in which design (i.e., SSCs) and administrative features (i.e., non-SSCs) are needed to prevent or mitigate the consequences of accidents. Design and administrative

features addressed include ones which: (1) provide significant defense in depth; (2) provide for significant worker safety; or (3) provide for the protection of the public. Expected products of this chapter, as applicable based on the graded approach, include:

- Information with sufficient basis from which to derive, appropriate, any of the following TSR parameters for individual TSRs:
  - Safety Limits (SLs).
  - Limiting Control Settings (LCSs).
  - Limiting Conditions for Operation (LCOs).
  - Surveillance Requirements (SRs).
- Information with sufficient basis from which to derive TSR administrative controls for specific control features or to specify programs necessary to perform institutional safety functions.
- Identification of passive design features addressed in the DSA.
- Identification of TSRs from other facilities that affect the facility's safety basis.

For a detailed discussion about how to apply the graded approach for this chapter, refer to DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*.

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# 8.0 PREVENTION OF INADVERTENT CRITICALITY

This chapter of the DSA shall provide information that will support the development of a safety basis in compliance with the provisions of 10 CFR 830.204(b)(6) regarding the definition of criticality safety program. If this information is available in a site-wide criticality safety program description, and it complies with the Rule requirements, then it can be included by reference and summarized in this chapter. Expected products of this chapter, as applicable based on the graded approach, include:

- Definition of a criticality safety program that (1) ensures that operations with fissionable material remain subcritical under all normal and credible abnormal conditions, (2) identifies applicable nuclear criticality safety standards, and (3) describes how the program meets applicable nuclear criticality standards.

- Description of the basis and analytical approach the facility uses for deriving operational criticality limits.

- Summary of design and administrative controls used by the criticality safety program.

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# 9.0 RADIATION PROTECTION

This chapter of the DSA shall provide the essential characteristics of the radiation protection program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program.

This chapter summarizes provisions for radiation protection. Summaries focus on radiation protection based on facility hazards to provide a basic understanding of the scope of the radiation protection program. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the overall radiation protection program and organization.

- Description of the radiological As Low As Reasonably Achievable (ALARA) policy and program.

- Description of radiation exposure to control including administrative limits, radiological practices, dosimetry, and respiratory protection.

- Identification of radiological monitoring to protect workers, the public, and the environment.

- Discussion of radiological protection instrumentation.

- Description of the plans and procedures for maintaining records of radiation

sources, released, and occupational exposures.

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# 10.0 HAZARDOUS MATERIAL PROTECTION

This chapter of the DSA shall describe the essential characteristics of the hazardous material protection program as it relates to safety and to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the overall hazardous material protection program and organization.
- Description of the hazardous material ALARA policy and program.
- Description of hazardous material exposure control including identification of hazardous material, administrative limits, occupational medical programs, and respiratory protection.
- Identification of hazardous material monitoring to protect workers, the public, and the environment.
- Discussion of hazardous material protection instrumentation.
- Description of the plans and procedures for maintaining hazardous material records, hazard communications, and occupational exposures.

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# 11.0 RADIOACTIVE AND HAZARDOUS WASTE MANAGEMENT

This chapter of the DSA shall provide the essential characteristics of the radioactive and hazardous waste management program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the overall radioactive and hazardous waste management program and organization.
- Description of the site-specific radioactive, mixed, and hazardous material waste management policy, objectives, and philosophy.
- Identification of hazardous waste streams, including types, sources, and quantities.
- Description of the waste management process, and waste treatment and disposal systems, including design and administrative controls.

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# 12.0 INITIAL TESTING, IN-SERVICE SURVEILLANCE, AND MAINTENANCE

This chapter of the DSA shall provide the essential characteristics of the surveillance, testing, and maintenance program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the facility initial testing program.
- Description of the facility in-service surveillance program.
- Description of the planned, predictive, preventive, and corrective facility maintenance program.

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# 13.0 OPERATIONAL SAFETY

This chapter of the DSA shall provide the essential characteristics of the operational safety and fire protection programs as they relate to facility safety to the extent that they will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the programs. Expected products of this chapter, as

applicable based on the graded approach, include:

- Identification of the aspects of conduct of operations directly applicable to the facility.
- Integrated summary of the main features of the facility Conduct of Operations program.
- Description of facility fire protection program.

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# 14.0 PROCEDURES AND TRAINING

This chapter of the DSA shall provide the essential characteristics of the procedures and training programs as they relate to facility safety to the extent that they will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the programs. Expected products of this chapter, as applicable based on the graded approach, include:

- Summary of the overall facility procedures and training programs.
- Description of the processes by which the form and content of procedures and training materials are developed, verified and validated for normal, abnormal, and emergency operations; surveillance testing and maintenance.
- Summary of the processes for maintaining written procedures, training materials, and training records.
- Summary of the process for modifying procedures and training materials.
- Summary of the methods used to feed back operations experience, new analyses, other DSA changes, etc., to the procedures and training programs.
- Description of the mechanisms to identify and correct technical or human factors deficiencies.

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# 15.0 HUMAN FACTORS

This chapter of the DSA shall provide the essential characteristics of the quality assurance program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program to ensure compliance with 10 CFR 830 Subpart A, "Quality Assurance Requirements." Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the human-factors process for systematically inquiring into the importance of human factors in facility safety.
- Description of human-machine interfaces with safety-significant SSCs and safety-class SSCs that are important to safety.
- Description of the systematic inquiry into the optimization human-machine interfaces with safety-significant SSCs and safety-class SSCs to enhance human performance.

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# 16.0 QUALITY ASSURANCE

This chapter of the DSA shall provide the essential characteristics of the quality assurance program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program to ensure compliance with 10 CFR 830 Subpart A, "Quality Assurance Requirements." Expected products of this chapter, as applicable based on the graded approach, include:

- Description of quality assurance program and organization.
- Description of document control and records management.
- Description of the quality assurance process ensuring that performed safety related work meets requirements.

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# 17.0 EMERGENCY PREPAREDNESS

This chapter of the DSA shall provide the essential characteristics of the emergency preparedness program as it relates to facility safety to the extent that it will satisfy the requirements of 10 CFR 830. This chapter is not intended to be the vehicle for review and approval of the program. Expected products of this chapter, as applicable based on the graded approach, include:

- Identification of the scope of the facility Emergency Preparedness Plan (EPP) (i.e., spectrum of emergencies encompassed).
- Description of the philosophy, objectives, organization, and emergency response of facility emergency preparedness.

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# 18.0 PROVISIONS FOR DECONTAMINATION AND DECOMMISSIONING (D&D)

This chapter of the DSA shall provide information that will satisfy the requirements of 10 CFR 830 to define the characteristics of the provisions for decontamination and decommissioning necessary to ensure safe operation of the facility. Design of significant modifications to an existing facility must consider provisions for D&D. This chapter also contains guidance on the description of the conceptual D&D plan for existing facilities. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of design features incorporated in major modifications of an existing facility to facilitate future D&D of the facility.
- Description of operational considerations to facilitate future D&D.
- Description of conceptual D&D plan.

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# 19.0 MANAGEMENT, ORGANIZATION, AND INSTITUTIONAL SAFETY PROVISIONS

This chapter of the DSA shall provide information that will satisfy the requirements of 10 CFR 830 to define the management, organization and institutional safety provisions necessary to ensure safe operation of the facility. This chapter also enumerates the requirements used to develop the safety management programs, includes descriptions of the responsibilities of and relationships between the non-operating organizations having a safety function and their interfaces with the line operating organizations, and presents sufficient information on the safety management policies and programs to demonstrate that the facility operations are embedded in a safety conscious environment. Expected products of this chapter, as applicable based on the graded approach, include:

- Description of the overall structure of the organizations and personnel with responsibilities for facility safety and interfaces between those organizations.
- Description of the programs that promote safety consciousness and morale including safety culture, performance assessment, configuration and document control, occurrence reporting, and staffing and qualification.

Existing supporting documentation is to be referenced. 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.

When applicable, the following will be included: List of Figures, List of Tables.

Appendices (i.e., List of Acronyms and Abbreviations, List of Definitions, and Metric Conversions).

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Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# APPENDIX C-3 – DOCUMENTED SAFETY ANALYSIS (DSA) CONTENT FOR ONSITE TRANSPORTATION ACTIVITIES

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

Format and content for a transportation safety document (TSD) per DOE-G-460.1-1

| | |
|---|---|
| Chapter 1 | Purpose, Scope, and Applicability |
| Chapter 2 | Definitions and Acronyms |
| Chapter 3 | Site Description |
| Chapter 4 | Organizational Responsibilities |
| Chapter 5 | External Regulations |
| Chapter 6 | Site-Specific Standards, Procedures, and Instructions |
| Chapter 7 | Safety Assessment Methodology (control description, pedigree, and derivation) |
| Chapter 8 | Routine Transfers |
| Chapter 9 | Non-Routine Transfers (including a section on how to use the existing SNL USQ procedure with the TSD) |
| Chapter 10 | Personnel Qualifications and Training |
| Chapter 11 | Documentation and Record Keeping |
| Chapter 12 | Incident Reporting and Emergency Response |
| Chapter 13 | Transport Vehicle Operations |
| | |

**10CFR 830/TSD Crosswalk**

| Requirements | TSD Location |
|---|---|
| Facility description (including the design of the safety SSCs) and a description of the work to be performed | Chapter 1<br><br>Chapter 3<br><br>Chapter 8 |
| Systematic identification of all hazards (natural and man-made) associated with the facility/ activity. | Chapter 7 |
| Evaluation of normal, abnormal, and accident conditions including consideration of natural and man-made external events, identification of energy sources or processes that might contribute to the generation of an uncontrolled release of radioactive or other hazardous materials, and consideration of the need for analysis of accidents which may be beyond the design basis of the facility/activity. | Chapter 7 |
| Derivation of the hazard controls necessary to ensure adequate protection of the public, the workers, and the environment. Demonstration of the adequacy of these controls to eliminate, limit, or mitigate the identified hazards, and definition of the process for maintaining these controls. | Chapter 7 |
| Definition of the characteristics of the safety management programs necessary to ensure the safe operation of the facility/activity. | Chapter 4<br><br>Chapter 6<br><br>Chapter 9<br><br>Chapter 10<br><br>Chapter 11<br><br>Chapter 12<br><br>Chapter 13<br><br>(Optional Chapter 14 to discuss SMPs not covered in the above) |

| | |
|---|---|
| Development of TSRs that are derived from the TSD. | In the TSR document |

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Back to Supplements

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Bob Goetsch, rsgoets@sandia.gov

*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# APPENDIX C-4 – CONTENT FOR BASIS OF INTERIM OPERATIONS (BIOs)

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

The following describes the content of a Basis for Interim Operation (BIO). Guidance on BIOs is provided in DOE-STD-3011-2002, *Guidance for Preparation of Basis for Interim Operation (BIO) Documents*. This guidance follows the Nuclear Safety Rule, 10 CFR 830, which specifies the BIO as a safe harbor method for the following types of nuclear facilities:

- A nuclear facility with a limited operational life.
- The deactivation of a nuclear facility.
- The transition surveillance and maintenance of a nuclear facility.

In general, DOE-STD-3011-2002 calls for BIOs to contain the following chapters as specified for DSAs in DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U. S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*:

- Executive Summary.
- Chapter 1, Site Characteristics.
- Chapter 2, Facility Description.

- Chapter 3, Hazard and Accident Analysis.
- Chapter 4, Safety Structures, Systems, and Components.
- Chapter 5, Derivation of Technical Safety Requirements.
- Chapter 6, Prevention of Inadvertent Criticality.

For guidance on the recommended baseline content of each of these chapters, refer to DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*, and also to Appendix C-2, "Documented Safety Analysis (DSA) Content for Nuclear Nonreactor Facilities."

The format, content, and guidance of DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses* should be used to organize the BIO information to the following extent:

- Full formatting of each chapter down to the lowest subsection descriptions in DOE-STD-3009 is **NOT** required (although all applicable topics should be addressed, consistent with the graded approach).
- Hazard and accident analysis guidance in Chapter 3 of DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses* should be used when supplemental information must be developed. Generally, qualitative hazards analyses should be developed. Under the Graded Approach subsection of this format, a short description of the graded approach selected and the rationale for this selection should be presented.
- Consistent with the Rule, hazard controls identified in BIO Chapter 3 that are safety structures, systems, and components (Safety SSCs) should be evaluated for classification as safety class or safety significant SSCs according to the definition of those terms in the Rule and the guidance in DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*. This evaluation should be presented in BIO Chapter 4.
- The Rule (10 CFR 830.205) requires Technical Safety Requirements. These are derived from the BIO. Information useful to link the BIO to the TSR document should be presented in BIO Chapter 5. Such information may include the

following:

- The bases for safety limits, limiting control settings, limiting conditions of operation, and surveillance requirements.
- A listing of TSR design features and their rationales.
- The bases for safety management programs, as derived from hazard analyses, and including any facility-specific characteristics of these programs that are necessary. A listing of these programs, with references to sitewide programs and any facility-specific characteristics, should be presented in summary table form.

- If criticality hazards exist, a criticality safety program must be described in BIO Chapter 6. This description shall show how the program:
  - Ensures that operations with fissionable material remains subcritical under all normal and credible abnormal conditions;
  - Identifies applicable nuclear criticality standards; and
  - Describes how the program meets these applicable nuclear criticality standards.

Additional details and clarifications relevant to each of the three types of nuclear facilities for which a BIO is appropriate are provided below.

BIO for a Nuclear Facility with a Limited Operational Life

DOE G 421.1-2, *Implementation Guide for Use in Developing Documented Safety Analyses to Meet Subpart B of 10 CFR 830* defines a limited-life facility as a facility with an approved deactivation plan calling for cessation of operation within a stated period (i. e., 5 years or less). The deactivation plan should include required funding actions and a change control process to ensure continued relevancy.

For limited-life facilities, maximum advantage should be taken of pertinent existing safety analyses and design information (i.e., requirements and their bases) that are immediately available, or can be obtained through reasonable efforts. Sources of existing information may include the following:

- Current SAR and supporting documentation.
- Process Hazards Analyses (PrHAs).
- Fire Hazards Analyses (FHAs).
- Explosive Safety Analyses.
- Health and Safety Plans (HASPs).
- Environmental Impact Statements (EISs).

When existing information is not current and correct, cannot be verified, or does not exist, supplemental information must be developed to incorporate into the BIO. The approach taken to develop this supplemental information should be pragmatic. Since the facility has a limited-life expectancy, time-consuming approaches should be avoided. Analysis should generally be qualitative, but thorough. When adequate information is not available to fully support the BIO, conservative compensatory approaches to ensuring adequate safety should be considered, and, if adopted, the rationale for safety adequacy should be presented. The maximum use of the graded approach philosophy, consistent with a responsible fulfillment of the Rule requirements, should be used.

As an alternative for a limited-life facility, when a BIO exists for the facility already that meets the format of section A.7 of Appendix A of DOE-STD-3011-94, *Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans*, this BIO may be retained, with a crosswalk to the DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses* format and content as described above. Note that existing BIOs produced under the previous version of the Standard must be compliant with the Rule. Specifically:

- If the existing BIO is not fully compliant with DOE-STD-3011-94, and it is desired not to upgrade the BIO to current Rule requirements, then a Rule exemption should be prepared and submitted to SSO.
- The existing BIO must address worker safety by hazard analysis and identification of appropriate safety controls to be considered in compliance with both DOE-STD-3011-94 and the Rule.
- The existing BIO must be able to support the development of a Rule-compliant TSR document. (Note that the requirement for a separate TSR document was not

addressed in DOE-STD-3011-94; instead, the safety controls were integral to the BIO).

- The existing BIO must fully satisfy the requirements of 10 CFR 830, parts 202 and 204. Specifically, the existing BIO must include:
    - Facility categorization according to DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*.
    - A description of the facility, including the work to be performed.
    - A systematic identification of hazards associated with the facility.
    - Evaluation of normal, abnormal, and accident conditions (including potential natural phenomena hazards that might be associated with long-term status of the facility) that might be associated with the generation or release of radioactive or other hazardous materials, including consideration of the need for analysis of beyond design basis accidents.
    - Derivation and classification of hazard controls necessary to protect workers, the public, and the environment.
    - Definition of the characteristics of safety management programs necessary to ensure safe operation, including criticality safety when criticality hazards exist.

## BIO for the Deactivation of a Nuclear Facility

Deactivation refers to the process of placing a facility in a stable and known condition and the removal of readily removable hazardous and radioactive materials. Deactivation activities include the removal of energy sources, draining and/or de-energizing non-essential systems, removal of stored radioactive and hazardous materials, and related actions. Deactivation should be a short-term process, measured in months or at most a few years.

Hazardous material information reflecting the end of facility operations can support a preliminary hazard categorization, which would normally be the same as was assigned during facility operations. Facility description can also be taken from existing information.

However, the work to be performed during deactivation is new. Before BIO content beyond preliminary categorization and facility description can be developed, a deactivation plan that describes the sequence of steps and how they will be performed must be formulated. This deactivation plan must be in sufficient detail such that the hazards associated with the deactivation process can be identified, an evaluation of normal, abnormal, and accident conditions can be performed, and hazard controls can be identified and classified.

The deactivation plan should show remaining hazardous material inventory at the end of each step in the plan. At some point, the facility may fall below the Hazard Category 3 nuclear facility threshold. Provisions for verification should be included in the plan at this point, because subpart B requirements of the Rule would no longer apply, and the appropriate contractual provisions for a radiological facility would need to be implemented.

Identification of hazards, evaluation of normal, abnormal, and accident conditions, and derivation of hazard controls will be a function of the step in the deactivation plan. Special attention should be given to steps that are conducted in parallel, which raises the possibility of interactions between these parallel steps.

The identification and classification of hazard controls will also be a function of the step in the deactivation plan. Usually, the original facility safety SSCs that supported operations will all be appropriate controls at the beginning of the deactivation process. However, as hazardous materials are removed, the accident scenarios for which they were originally designated for prevention or mitigation may no longer be possible, and thus the controls may be removed. The deactivation plan, supported by a hazards analysis, should provide identification of the point in the deactivation process at which specific existing controls may be removed (and other controls may be necessary), and the criteria that must be satisfied before each control is removed. In this way, DOE approves the BIO with the criteria for removing controls, and further DOE reviews and approvals (other than possibly verifying that the criteria have been met) are not required.

For nuclear facilities undergoing deactivation, the format of the BIO may be different than a DOE-STD-3009 DSA. For example, it may add clarity if, beyond the facility and deactivation plan description provided in BIO Chapter 2, the balance of BIO information is organized by major step or activity in the deactivation plan. That is, for each major activity, the hazards are identified and analyzed, and hazard controls including safety management programs are described and classified.

Similarly, the resultant TSRs may be constructed as a function of major step in the

deactivation plan. That is, each major step can be defined as an operational mode, and the controls specified as appropriate to each mode.

**BIO for Transition Surveillance and Maintenance of a Nuclear Facility**

Transition surveillance and maintenance means activities conducted when a facility is not operating, and not during deactivation, decontamination, and decommissioning activities. Ideally, deactivation would precede transition surveillance and maintenance, but often this is not the case. That is, mission-related operations may have been terminated and the facility placed into a surveillance and maintenance mode, possibly with the expectation of resuming operations at a later date, and without the removal of hazardous materials.

During this phase, surveillance and maintenance are the primary activities being conducted at the facility. These activities are necessary for satisfactory containment of hazardous materials and the protection of workers, the public, and the environment. Surveillance and maintenance activities include providing periodic inspections and maintenance of structures, systems, and components necessary for the satisfactory containment of contamination and for protection of workers, the public, and the environment. Maintenance of a facility in a stable and known condition includes actions to prevent the alteration of chemical makeup (e.g., chemical changes to material in storage tanks leading to the creation of explosive mixtures), physical state, and/or configuration of a hazardous substance or radioactive material. It also includes actions taken with regard to physical SSCs such as roofs and ventilation systems.

The BIO developed for transition surveillance and maintenance of a nuclear facility should make maximum use of pertinent existing safety basis documentation for the facility. However, the DSA that existed for the operational mission of the facility is not appropriate for transition surveillance and maintenance because the safety concerns will be different.

The BIO should also make use of, and be coordinated with, the facility Surveillance and Maintenance Plan developed in accordance with DOE G 430.1-2, *Implementation Guide for Surveillance and Maintenance during Facility Transition and Disposition*.

The BIO for transition surveillance and maintenance of a nuclear facility should include consideration of the following:

- Hazards associated with the facility that exist because of the presence of hazardous materials.

- Hazards associated with the conduct of surveillance and maintenance activities.
- Hazards associated with the alteration in chemical makeup, physical state, and/or configuration of a hazardous material, or the degradation of the physical state of the facility and its equipment over time.
- Natural phenomena hazards and their impact on the remaining life of the facility.
- The potentially long period of time the facility may remain in this transition surveillance and maintenance mode.

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Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# APPENDIX C-5 – CONTENT FOR JUSTIFICATION FOR CONTINUED OPERATION (JCO)

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

The purpose of a Justification for Continued Operation (JCO) is to provide a means to obtain DOE approval of operations of a facility on a temporary basis when current requirements cannot be fully met. In effect, a JCO is a request for approval to operate temporarily beyond the current safety basis. In some cases, the JCO process may be used in conjunction with the USQ process, although this does not have to always be the case. For example, a discrepancy might be discovered between the physical configuration of the facility and the facility's accident analysis, which is determined to involve a USQ. In such a case, the corrective actions could involve hardware modifications, which may take several months to design, procure, and install. In order to permit continued operations in the interim, a JCO might be prepared and submitted to DOE for approval.

JCOs must demonstrate the risk associated with the facility or operation during the requested period of authorization. JCOs must also have a defined period of authorization, with an expiration date or periodic review period specified.

JCOs should be prepared in a technical report format, and should contain the following sections:

- Section 1, Purpose - Briefly state and summarize the JCO purpose and content.

- Section 2, Statement of Problem - Discuss the following:
    - Background - Provide background information to allow a full understanding of the nature and evolution of the problem.
    - Justification of Need - State the reason for writing the JCO and requesting DOE approval for the interim operations.
- Section 3, Status of Facility - Describe the current status of the facility, including hazardous material inventory, as well as pertinent facility SSCs and administrative programs and procedures that may be relevant to authorizing continued operations under the JCO.
- Section 4, Risk of Continued Operation - Discuss the following:
    - Safety Basis Impacts - Identify the affected safety basis documents with specific reference to the sections that are impacted, and a summary of those impacted sections.
    - Risk Assessment - Discuss the probability of potential adverse events, and the credible consequences of those events based on a current (and adequate) understanding of the issues. In most cases, a thorough qualitative analysis, as presented in a hazard analysis, is an appropriate level of detail.
- Section 5, Compensatory Measures and Corrective Actions - Specify the actions and controls needed, as based on the risk assessment. These should be characterized as preventive (minimizing the probability of the potential event) or mitigative (minimizing the consequences of the potential event). A schedule for implementing the corrective actions should also be provided, particularly in the case of multiple or complex actions.
- Section 6, Expiration - Specify an expiration date for the JCO based on one or more of the following:
    - A specific USQ/analysis completion time line for resolving the issue that prompted the JCO.
    - A corrective action being implemented to resolve the issue.
    - A safety basis control being instituted.

- A commitment to provide a more complete analysis.
- A final safety evaluation receiving DOE approval (this may take the form of a revised DSA)
- A specified periodic review interval, at which time the JCO is reviewed, revised as necessary, and resubmitted for approval.

JCOs should only be used to request interim DOE approval of operations until a more formal DSA, consistent with the requirements of 10 CFR 830, can be put into place. JCOs should not be used, for example, to authorize operations of a limited-life facility, deactivation, or transition surveillance and maintenance. In these cases, a BIO should be developed.

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Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# ATTACHMENT D – TECHNICAL SAFETY REQUIREMENTS (TSRs) CONTENT

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GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

The content of TSRs developed by the NFO are consistent with the guidance in DOE G 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements.*

When applicable, the following will be included prior to Section 1, “Use and Application”: List of Tables, List of Figures, Acronyms/Abbreviations, and an Introduction.

1. Use and Application – This section should contain basic information and instructions for using and applying the TSR. Definitions of terms used throughout the TSR should be included in this section, along with operational modes for reactor and non-reactor facilities, and frequency notation used in the surveillances and elsewhere.

2. Safety Limits – This section should provide the limits on important process variables. Safety Limits (SLs) should be based on and specified in terms of TSR violations as a result of exceeding an SL, operational mode applicability for each SL, and a description of actions to be taken in the event an SL is not met.

3. Limiting Control Settings, Limiting Conditions for Operation, Specific Administrative Controls, and Surveillance Requirements – This section should contain the limiting control settings and the limiting conditions for operation, as well as mode applicability, action statements, and surveillance requirements for each requirement.

4. Administrative Controls – This section should impose administrative requirements necessary to control operation of the facility such that the TSRs are satisfied.

5. Design Features – This section should list the passive design features that, if altered or modified, would have a significant effect on the safe operation of the facility.

6. Appendix A. Bases for Technical Safety Requirements – This appendix should provide rationale for the selection of the safety limits, operating limits, and associated mode applicability, action statements, and surveillance requirements.

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Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# ATTACHMENT E – DSA/TSR VERIFICATION CRITERIA

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
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GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

# 1.0 INTRODUCTION

This Attachment describes the process for reviewing and verifying safety basis (SB) documents for nuclear facility operations in accordance with 10 CFR 830, *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements" and related DOE standards.

## 1.1 General Safety Basis Adequacy Verification Criteria

To assist Sandia NFOs in verifying for themselves that their documentation is adequate, before an independent review has been performed, the following criteria should be compared against their draft SB documents.

The following is not an exhaustive set of criteria designed to assure complete Integrated Safety Management System (ISMS) core function execution or to complete DOE requirements compliance. Instead, it is a focused set of criteria developed with the themes of proper DSA development. Incorporating and adhering to the following criteria would produce the foundation of a robust SB. A thorough evaluation of the Sandia nuclear SB against the following criteria is a credible approach to assessing SB documents and will provide important insight into evaluating risk of continued operations.

**Table 1. SB Adequacy Verification Criteria.**

| SB Adequacy Verification Criteria - Major Element (Part) | Sub-Element | Item |
|---|---|---|
| **A** | **Adequacy of Hazards Identification – ISMS Core Function 2** | |
| | 1. | Is the hazard identification method documented in the DSA or in a referenced retrievable citation? |

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| | 2. | Is the method consistent with DOE guidance and requirements or, otherwise specifically approved by DOE as a noted exception? |
| | 3. | Is the hazards identification checklist or other format for the range of hazards considered consistent with standard nuclear and chemical industry tools? |
| | 4. | Are all potential energy sources identified? (e.g., natural gas lines) |
| | 5. | Are the hazards presented by adjacent DOE facilities identified? |
| | 6. | Are the hazards presented by nearby non-DOE facilities identified? |
| | 7. | Are all natural phenomenon hazards addressed, including seismic hazards? |
| | 8. | Are transportation hazards addressed? (e.g., airplanes, airports, helicopters, trucks, cars, rail lines) |
| | 9. | Is there a safeguards and security hazards analysis? |
| | 10. | Is there a fire protection analysis (FPA) and does the DSA hazards identification capture all hazards identified in the FPA? |
| | 11. | Are all modes of facility operation and all phases of facility life, as defined in the DSA, covered by the scope of the hazards identification section? |
| | 12. | Are potential combinations of hazards or possible synergistic effects of hazards identified? |
| | 13. | Are hazards identified that relate to the trained facility worker? Are routine industrial hazards handed off to the Industrial Safety Program? Are routine radiological hazards handed off to the Radiological Protection Program? |
| | 14. | Are hazards identified that relate to co-located workers in very close proximity to or within the facility, particularly those who may not be trained on or familiar with the facility? |
| | 15. | Are hazards identified that relate to the co-located workers on the site or members of the transient public who may not be expected to be trained but are within DOE protective control? |
| | 16. | Are hazards identified that relate to members of the public who are not expected to be trained and who are not within DOE protective control? |
| | 17. | Is the full range of potential materials at risk identified? Forms, quantities, toxicological, radiological? Are realistic materials at risk values used, consistent with facility's operations, for hazards identification? |
| | 18. | Has the hazard categorization been determined per the methods of DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports?* |
| | 19. | Is the justification sufficient in all cases where an identified hazard is not advanced to accident scenario development? Are all identified hazards dispositioned? (i.e., dismissed as incredible, dismissed as below any threshold of concern, channeled to the health and safety plan, channeled to the Radiological Control Program, advanced to accident scenario development, etc.) |
| | 20. | Are realistic and lowest possible material-at-risk (MAR) values used, consistent with facility's operations, for hazards identification? |
| | 21. | Are unique and possible experimental hazards identified? |
| **B** | **Adequacy of Hazards Analysis - ISMS Core Function 2** | |
| | 1. | Are the accident analysis methods documented in the DSA or in a referenced retrievable citation? |
| | 2. | Are the methods consistent with DOE guidance and requirements or, otherwise specifically approved by DOE as a noted exception? |

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| | 3. | Does accident scenario development fully envelop the range of identified hazards? |
| | 4. | Does the accident analysis process begin with fully unmitigated scenarios and consequence determination? |
| | 5. | Are the MAR assumptions fully bounding, without any dependence on implied controls? Do the MAR assumptions consider accumulation of materials and deposits of contamination over time? |
| | 6. | Are dependencies for actions taken at other facilities and/or by entities not under direct control by the facility implied by the bounding assumptions for MAR? |
| | 7. | Are combinations of events considered in bounding accident scenario development? Is the logic supporting the dismissal of combination events rigorous? |
| | 8. | Are process histories and test data sources for MAR fully documented and defensible? |
| | 9. | Are accident scenarios formulated such that controls derived from analysis results fully address the subordinate hazards bounded by that scenario? |
| | 10. | Are assumptions for release fractions and material transport supported by accepted research, testing, model-development or facility-specific data? |
| | 11. | Are there any dependencies of MAR, release fractions and material transport assumptions on facility or process characteristics or configurations? (i.e., facility structural behavior during a seismic event, position of heavy equipment such as cranes, etc.) If so, have these been captured, as appropriate? |
| | 12. | Are accident frequency determinations well documented and supported by data, as appropriate? Are probabilistic arguments, if used, fully documented? Are all dependencies of frequency determinations and probabilistic arguments on design features, process characteristics, administrative programs, etc. fully identified? |
| | 13. | Is the possibility of accidents affecting multiple facilities (e.g., a plane crash) considered in the formulation of bounding scenarios? |
| | 14. | Is the analysis sufficient to defend the effectiveness of accident prevention features and strategies? |
| | 15. | Are the receptor locations for the co-located worker and members of the public consistent with approved DOE methods? Do all such assumptions properly consider what is within DOE control and what is not (e.g., ability to train persons at risk, ability to isolate or evacuate persons at risk)? |
| | 16. | Are all accident analysis assumptions captured, presented and documented in a manner that lends itself to complete identification of dependencies on design features, process characteristics, administrative programs, alarms and other mitigation systems? |
| | 17. | Are all accident analysis assumptions documented such that a robust unreviewed safety question (USQ) process can be executed to effectively evaluate the contractor's authority to make facility modifications, process modifications and administrative changes? |
| | 18. | Is the possibility of accidents affecting multiple facilities (e.g., a plane crash) considered in the formulation of bounding scenarios? |

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| | 19. | Are analysis assumptions consistent with the fire protection analysis (FPA), the health and safety plan, and CPR400.1.1.32/MN471016, Radiological Protection Procedures Manual? And, are these assumptions clearly documented so that USQ evaluations for changes to these plans/documents will not unknowingly invalidate the DSA accident analyses? |
| | 20. | Is the site boundary exposure analysis consistent with DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance With DOE Order 5480.23, Nuclear Safety Analysis Reports?* Is the absolute minimum MAR used to permit the site boundary to be as close as possible to the facility? |
| **C** | **Adequacy of Controls Development & Implementation – ISMS Core Function 3** | |
| | 1. | Is every accident analysis assumption related to facility configuration, process characteristics, material inventory, administrative processes, accident prevention, and accident mitigation dispositioned into a/an:<br>• Design Feature.<br>• Safety system functional requirement and performance criterion.<br>• TSR limit.<br>• TSR surveillance requirement.<br>• TSR response or recovery action.<br>• TSR specific administrative controls.<br>• Element of a safety management program.<br>• Instrument calibration and test plan.<br>• Interface agreement with another facility.<br>• Any other items, as appropriate. |
| | 2. | Does every control strategy listed in C-1 above provide the expected protection of its associated SB accident scenario, and all of the hazards subordinate to the safety basis accident scenario? |
| | 3. | Does the DSA text unambiguously document the connection between the accident scenarios and the derived control strategies? |
| | 4. | Do the TSR Bases unambiguously document the connection between the DSA accident scenarios and the derived TSRs? |
| | 5. | Is the control derivation documentation in the DSA and the TSR Bases consistent? |
| | 6. | Are the safety classifications for credited systems, structures, and components (SSCs) assigned commensurate with the level of consequence to the affected receptors, consistent with DOE standard practice? |

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| | 7. | Are the design classifications for credited SSCs assigned commensurate with level of hazard (e.g., seismic performance category)? |
| | 8. | Are defense-in-depth items clearly delineated in the DSA and do the DSA and/or safety evaluation report (SER) clearly specify the authority of the Contractor to change or delete these items? |
| | 9. | Are all controls and credited response actions compatible with requirements and response actions associated with other site facilities? |
| | 10. | Have controls and credited response actions been tested to ensure they perform as designed? |
| | 11. | Are all TSR controls unambiguously clear? Are all response and recovery actions complete and unambiguously clear? Are any approval requirements clearly documented? |
| | 12. | Does the DSA or the TSRs create additional tools or administrative processes to evaluate change, above and beyond the USQ process (e.g., campaign specific process plans)? If so, is the tool fully consistent with the DOE requirements for the USQ process? Are approval requirements unambiguously clear and consistent with DOE requirements? |
| | 13. | Have experimental applications and testing envelopes been adequately developed to properly implement the USQ process? |
| | 14. | For material requiring special security, have appropriate controls been evaluated and implemented as related to safety? |
| | 15. | Have TSRs been developed with appropriate specificity when program elements are credited as being necessary for safety (e.g., specific Radiation Protection Program requirements, specific Facilities Management and Operations Center (FMOC) maintenance requirements)? |
| | 16. | Does the facility use a consistent and approved methodology to assign the risk consequences based on the expected hazard to the worker, co-located worker, and the public? |
| **D** | **Adequacy of Feedback & Continuous Improvement – ISMS Core Function 5** | |
| | 1. | Is there a record of internal review of the DSA submitted for DOE approval? Are the qualifications of the reviewers documented? Are all review comments dispositioned? |
| | 2. | For significant oversights or technical errors discovered during internal review, was the cause determined and remedied? |
| | 3. | Did the internal review team include representation from the operations organization charged with implementing and operating within the SB controls? |
| | 4. | Are there any outstanding corrective actions or other action items where remedies to noted shortcomings of the SB are still in progress? |
| | 5. | If you answered “yes” to D-4 above, is there an interim risk analysis and are there any compensatory measures? |
| | 6. | Are consistent specific administrative controls implemented where appropriate amongst all facilities? Are similar procedural requirements implemented (e.g., combustible load requirements, on-site transportation requirements, etc)? |
| | 7. | Are records available or incorporated into the SB to describe how analytical decisions were made? |
| | 8. | Are peer reviews conducted and documented for analytical calculations and decisions? |

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| | 9. | As part of the SB review, were lessons learned from past documentation revisions/updates reviewed? |
| | 10. | Were all safety evaluation review courses of actions, USQ determinations (USQDs), and previous SB related comments incorporated into this revision/ update? |

---

Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# ATTACHMENT F – SPECIFIC ADMINISTRATIVE CONTROLS (SACs) REVIEW PER DOE-STD-1186

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GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

# 1.0 INTRODUCTION

This Attachment describes the process, in checklist form, for preparing, reviewing, and assessing Specific Administrative Controls (SACs) against guidelines in DOE-STD-1186-2004, *Specific Administrative Controls*.

## 1.1 Identification of Specific Administrative Controls

- Those Administrative Controls (ACs) identified in the Documented Safety Analysis (DSA) that meet the following Specific Administrative Control (SAC) criteria (as specified in DOE-STD-1186 Section 2.1) are identified as SACs in the DSA and the Technical Safety Requirements (TSRs):
    - The AC is identified in the DSA as a control needed to prevent or mitigate an accident scenario, and
    - The AC has a safety function that would be safety significant or safety class if the function were provided by structures, systems, and components (SSCs).

## 1.2 Documentation of Specific Administrative Controls

- The following SAC identification and documentation is provided in the DSA (per DOE-STD-1186 Section 2.2):
    - Reason (including the technical basis) for designating the control as an SAC and its preventative or mitigative safety function.
    - Description of how the SAC is to be implemented (i.e., important procedural features including interfaces with sensors).
    - Pertinent aspects of the SAC that relate directly to the safety function, such as personnel qualifications required and time available to perform associated tasks.
    - Evaluation of the SAC that demonstrates its capability to perform the expected safety function.

## 1.3 Implementation of Specific Administrative Controls

- SACs are implemented as Limiting Conditions for Operations (LCOs) or as Specific Directive Action ACs (DOE-STD-1186, Section 2.3).
- SACs implemented as LCOs follow the guidance for LCOs listed in DOE G 423.1-1, including, but are not limited to (DOE-STD-1186, Section 4.2):
    - Specification for Limiting Conditions for Operations (DOE G 423.1-1, Section 4.10.1.3).
    - Action Statements (DOE G 423.101, Section 4.10.2).
    - Operability (DOE G 423.1-1, Section 4.10.3).
    - Surveillance Requirements (DOE G 423.1-1, Section 4.10.6).
    - Violation of Technical Safety Requirements (DOE G 423.1-1, Section 4.11).
    - Bases (DOE G 423.1-1, Section 4.11).

- Specific Directive Action ACs meet the following criteria:
    - Contained in a special section within the AC section of the TSRs (DOE-STD-1186, Section 4.2).
    - Clearly describe the Critical Safety Function of the SAC (DOE-STD-1186, Section 6, Example 2).
    - Specify the control or limit (DOE-STD-1186, Section 6, Example 2).
    - Provide a basis for the control (DOE-STD-1186, Section 6, Example 2).
    - Have provisions in operations and/or maintenance procedures for periodic verification of the control or limit (DOE-STD-1186, Section 2.2).
- The following TSR Sections have been revised to address SACs:
    - Definitions (DOE-STD-1186, Section 4.5).
    - Use and Application (DOE-STD-1186, Section 4.4).
- SACs are initially and periodically verified to ensure the capability for performing the specified safety function (DOE-STD-1186, Section 2.2, “Verification”).
- Operator actions required by SACs have been validated to ensure that the operators have sufficient indicators or alarms, time, and equipment to perform their required actions (DOE-STD-1186, Section 2.2, “Validation”).
- Formulation of SACs includes evaluation of the following factors when establishing time necessary to complete required actions (DOE-STD-1186, Section 2.2, “Validation”):
    - Adequate description of the task in facility procedures.
    - Level of difficulty of the task.
    - Design of the equipment and feedback (e.g., alarms).
    - Time available to complete a task or recover from an error.

- Stress levels induced by the external environment (e.g., noise, heat, light, and protective clothing worn).

## 1.4 Specific Administrative Control Violation – Reporting and Failure Analysis

- Violation Reporting and Failure Analysis for SACs are addressed in the TSR Use and Application Section (DOE-STD-1186, Section 5.0).

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Back to Supplements

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*GN470101 - Preparation and Review Of Documented Safety Analyses (DSAs) And Technical Safety Requirements (TSRs) To Meet 10 CFR 830, Subpart B*

# ATTACHMENT G – IMPLEMENTATION VALIDATION REVIEW (IVR) PROCESS PLAN FOR NUCLEAR SAFETY BASIS CHANGES

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

**Note:** The IVR is maintained as a Level 3 document by the Safety Basis Department and is identified as PLA 05-20.

Back to Supplements

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# ATTACHMENT A – SAFE HARBOR METHODS APPLICABLE TO VARIOUS DOE FACILITIES

Subject Matter Expert: Bonnie Shapiro; CA Counterpart: N/A
Contributors: Stephen Coffing, Warner Talso, Michael Black, Stacey Durham, Jim Dahl
GN470101, Issue D
Revision Date: June 26, 2007; Replaces Document Dated: March 13, 2006
Review Date: June 11, 2007 (supersedes Self-Assessment dated June 5, 2005)

**Note:** The following table is a partial copy of 10 CFR 830, Subpart B, Appendix A, Table 2.

| The contractor responsible for: | May prepare its documented safety analyses by: |
|---|---|
| (1) A DOE reactor | Using the method in U.S. Nuclear Regulatory Commission Regulatory Guide 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*, or successor document. |
| (2) A DOE nonreactor nuclear facility | Using the method in DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports* , or successor document. |
| (5) The decommissioning of a DOE nuclear facility | 1. Using the method in DOE-STD-1120-2005, Volumes 1 & 2, *Integration of Environment, Safety, and Health into Facility Disposition Activities,* or successor document;<br>2. Using the provisions in 29 CFR 1910.120 (or 29 CFR 1926.65 for construction activities) for developing safety and health programs, work plans, health and safety plans (HASPs), and emergency response plans to address public safety, as well as worker safety; and<br>3. Deriving hazard controls based on the safety and health programs, the work plans, the HASPs, and the emergency response plans. |
| (8) A hazard category 3 DOE nonreactor nuclear facility | Using the methods in Chapters 2, 3, 4, and 5 of DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, or successor document to address in a simplified fashion:<br>1. The basic description of the facility/activity and its operations, including safety class structure, system, or component (SSC)<br>2. A qualitative hazards analysis;<br>3. The hazard controls (consisting primarily of inventory limits and safety management programs) and their bases |

| | |
|---|---|
| (9) Transportation activities | 1. Preparing a Safety Analysis Report for Packaging in accordance with DOE-O-460.1A, *Packaging and Transportation Safety*, or successor document<br><br>OR<br><br>2. Preparing a Transportation Safety document in accordance with DOE-G-460.1-1, *Implementation Guide for Use with DOE O 460.1A, Packaging and Transportation Safety*, June 5, 1997, or successor document. |

Back to Supplements

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