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Document 51.1
Documented Safety Analysis Program Plan

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New document or new requirements

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Documented Safety Analysis Program Plan•

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List of Acronyms

AD	Associate Director
BIO	Basis for Interim Operations
DDO	Deputy Director for Operations
DOE	Department of Energy
DSA	Documented Safety Analysis
EG	Evaluation Guideline
ES&H	Environment, Safety, and Health
FDSA	Final Documented Safety Analysis
FHA	Fire Hazard Analysis
ISMS	Integrated Safety Management System
LLNL	Lawrence Livermore National Laboratory
NNSA/LSO	National Nuclear Security Administration's Livermore Site Office (NNSA/LSO)
PDSA	Preliminary Documented Safety Analysis
SER	Safety Evaluation Report
SIH	Standard Industrial Hazards
SSC	Structures, Systems, and Components
TSR	Technical Safety Requirements
USQ	Unreviewed Safety Question

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Documented Safety Analysis Program Plan

1.0 Introduction

LLNL's Integrated Safety Management System (ISMS) requires that the control of hazards be identified before conducting work. The safety basis development process formalizes the elements of the required identification and description of controls. This document provides the overarching plan for documenting the safety basis for Hazard Category 2 and 3 nuclear facilities and operations. The safety basis development process explained here indicates how the level of formality is related to the level of hazard through the *LLNL Graded Approach Procedure* (AB-003). The role of LLNL's programs, involvement of support organizations, and responsibilities of management are discussed.

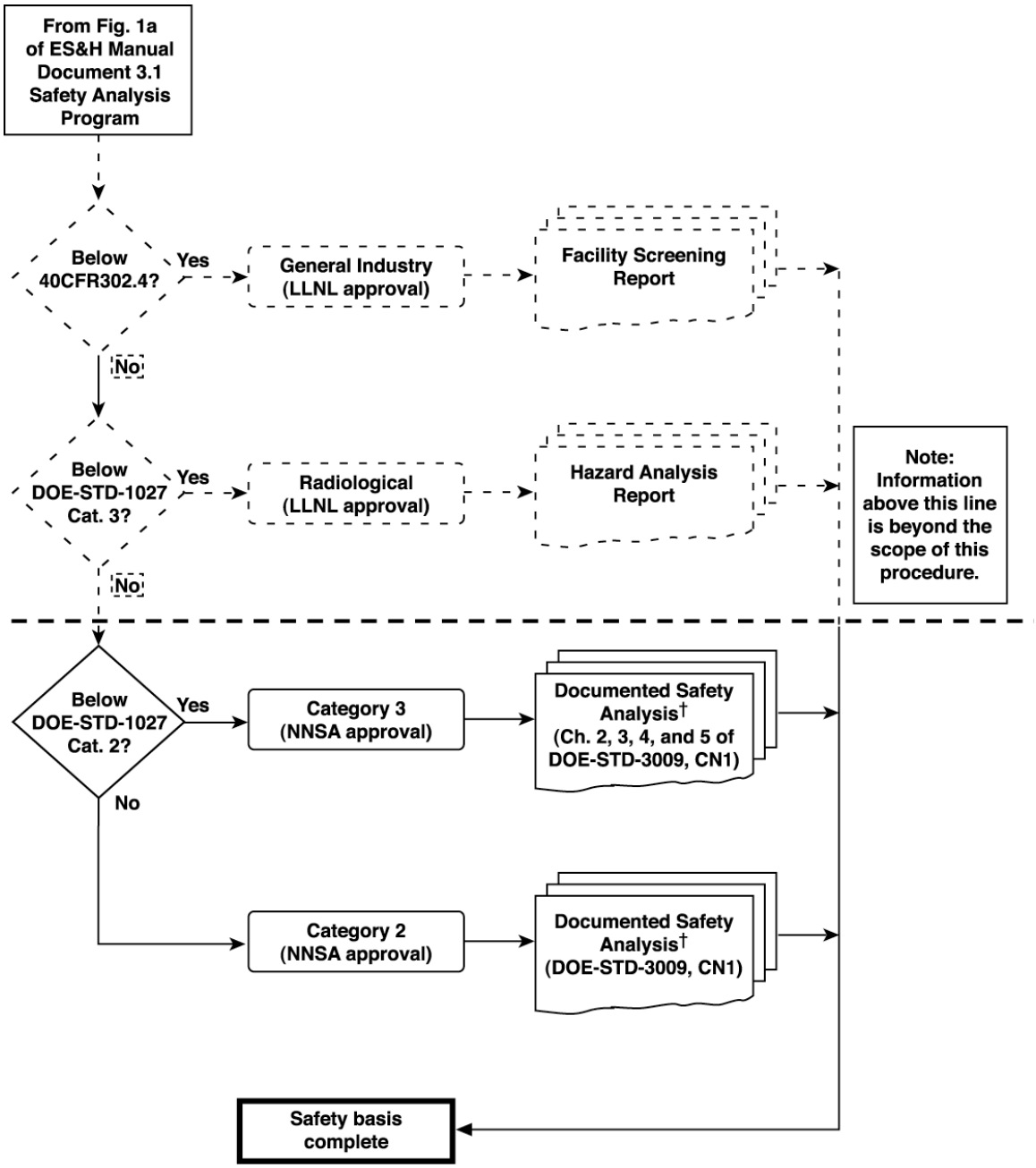
2.0 Applicability

This document, the *Documented Safety Analysis Program Plan*, is subsequently referred to as the "Plan" for simplicity. It applies to the preparation of safety basis documentation for Category 2 and 3 nuclear facilities or operations (such as on-site transportation), including LLNL-managed facilities at the Nevada Test Site. The Plan applies to everyone working on this documentation. Such individuals and organizations include—but are not limited to—safety analysts, nuclear facility personnel, and support organizations, such as the Hazards Control Department, Plant Engineering Department, Mechanical Engineering Department, Electrical Engineering Department, and subcontractors.

3.0 Methodology for Classifying Facility Hazards

Categorizing facilities and their hazards is done in accordance with DOE-STD-1027-92, Change Notice 1 (see Section 8.2 for this and other references). Figure 1 shows the overall safety basis process. Figure 2 summarizes the various programs that can be used when developing Documented Safety Analysis (DSA) chapters for Category 2 and 3 nuclear facilities.

A final hazard categorization that is modified based on the results of hazard and accident analyses is sometimes desirable or appropriate. Approval by the National Nuclear Security Administration's Livermore Site Office (NNSA/LSO) is required for final hazard categorization of facilities that were initially categorized as belonging to Categories 2 or 3.



† DSA developed per 10CFR 830 utilizing the Graded Approach Procedure and DOE-STD-3009, CN1 or other approved Safe Harbor method.

Figure 1. Flowchart for the safety basis process–radioactive materials hazards. *

* **This figure originates from Figure 1d, Document 3.1, "Safety Analysis Program," in the *ES&H Manual.* It is updated to reflect the process described in this Plan.**

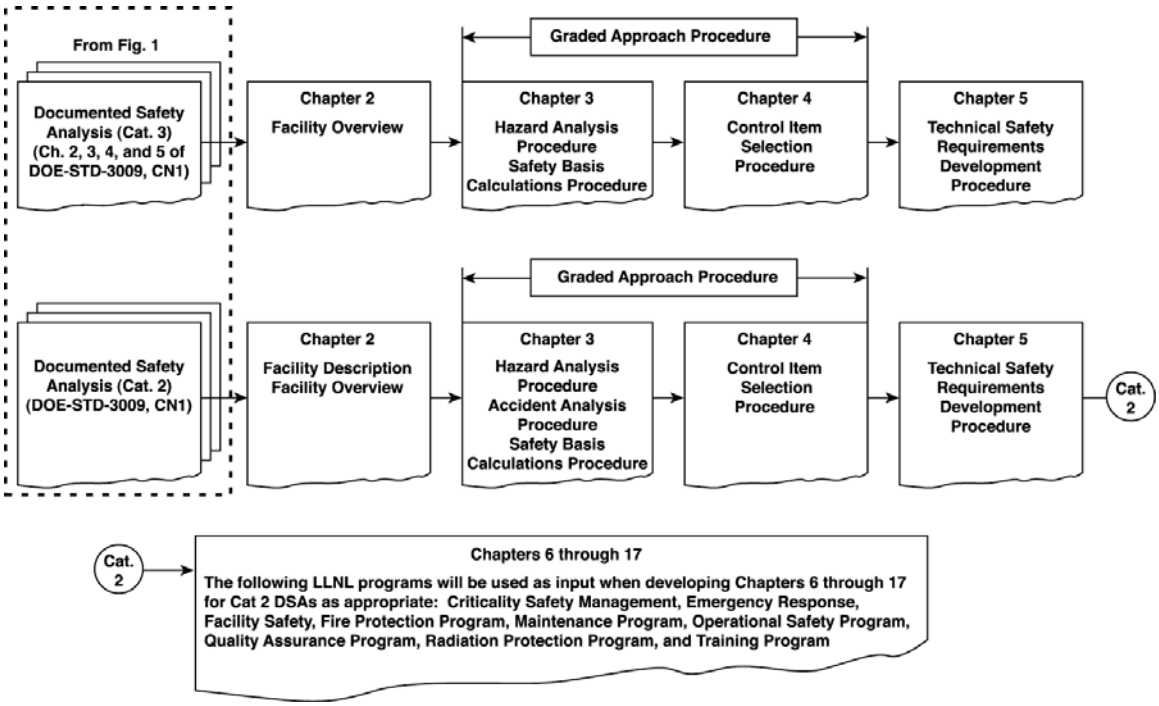


Figure 2. Flow diagram for Category 2 and 3 nuclear facilties.

4.0 Safety Basis Development Plan for Category 2 and 3 Nuclear Facilities

Category 2 and 3 nuclear facilities require a NNSA/LSO-approved DSA that complies with the requirements of 10 CFR 830, Subpart B (see Section 7.0 in this document). As explained in detail later in this section, 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 Technical Safety Requirements (TSRs).

4.1 Documented Safety Analysis for a New Facility

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

4.1.1 Preliminary Documented Safety Analysis for New Facilities

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 should be made on a facility-by-facility basis and in consultation with NNSA/LSO.

PDSAs for proposed Category 2 or 3 nuclear facilities are required to receive approval by NNSA/LSO, 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 FDSA is developed.

4.1.2 Final Documented Safety Analysis for a New Facility

Developing the FDSA for a new facility is essentially 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. For example, depending on the inventory, there may be no need for a criticality analysis. Information pertaining to the facility description is based on the document-controlled PDSA and changes to the new facility since the PDSA was approved.

4.2 Documented Safety Analysis for an Existing Facility

10 CFR 830, Subpart B, allows for the use of DOE-STD-3009-94, Change 1 as a "safe harbor" method for developing a DSA for a DOE nonreactor nuclear facility. Developing a DSA for an existing facility is based on a complete hazard analysis, considering the capability of design features, existing safety class and safety significant structures, systems, and components (SSCs), and additional engineering and administrative controls to adequately control the hazards. If SSCs are not capable of adequately controlling hazards, then the inventory, operations, or both shall be changed, or the SSCs may be modified.

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 impact the facility's existing safety basis. Document 51.3, "LLNL Unreviewed Safety Question (USQ)

Procedure," in the *ES&H Manual* shall be used to determine whether LLNL can approve the change(s) or if NNSA/LSO approval is required. Further details on the USQ process are discussed in Section 5.4, Maintaining Safety Basis Documentation, and covered in the Hazards Control course HS8042, *Unreviewed Safety Question.*

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 new.

4.3 Documented Safety Analysis for a Limited-Life Facility

10 CFR 830, Subpart B, allows two "safe harbor" methods for developing a DSA for a Limited-Life Facility, namely DOE-STD-3009-94, Chg. 2 or DOE-STD-3011-94. The trade-off is between using past operating experience for an existing facility that has a limited life, or using current analytical information for a facility that will be used for a short-term campaign and then reconfigured for a different program within a short time. The intent was that such DSAs would be used for a shorter time than fully developed DSAs. The level of detail in the submitted DSA depends on several factors, but the level is required to be justified in all cases. Factors include the adequacy of existing safety documentation (e.g., a compliant DSA has been substantially completed, or the existing safety documentation is basically compliant), the life cycle of the facility, the hazard classification of the facility, and—to a lesser extent—the degree of complexity of facility processes.

4.4 Documented Safety Analysis Development Process

The DSA development process consists of six phases, as explained in the following subsections. The following requirements apply only to Category 2 and 3 nuclear facilities or operations, and only when using DOE-STD-3009-94, Chg. 2 as the format and content guide. In contrast, when developing a DSA for a limited-life Category 2 or 3 nuclear facility, DOE-STD-3011-94 is used as the formatting guide, and the six-phase format would not necessarily apply. When developing a DSA using either guidance document, LLNL's graded approach is applied.

It is recommended that individuals who participate in the DSA development process take Hazards Control course HS8000, *Safety Basis Process*. This course or an equivalent is required for employees who conduct formal safety analyses for LLNL nuclear facilities, such as Safety Analysts, Nuclear Facility Managers, Deputy Nuclear Facility Managers, or Nuclear Facility Manager designees.

4.4.1 Phase I: Facility Description/Inputs and Hazardous Material Identification and Screening

Phase I 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.

Facility description/inputs include:

- Reference to all facility baseline documents used.
- Identification of hazards in a facility or associated with an operation.
- Information on facility chemical and radiological material that is not contained in existing documents.
- Facility-related assumptions made by analysts in performing the analysis.
- Results of facility walkdowns when that information is not contained in other documents (e.g., SSC data that do not exist in current configuration-controlled documents).

From the facility description/inputs, an identification of hazards is completed to develop organized hazardous-material inventories and energy-source inventories. The inventories are then screened. Screening serves principally to eliminate consideration of standard industrial hazards (SIHs), except where SIHs can serve as an initiator or exacerbator of an accident releasing radiological material. The resulting inventory is the DSA inventory to be used in all further analyses. Details for the screening and hazardous material inventory process are captured in the *LLNL Hazard Analysis Procedure* (AB-004).

A key input is the Fire Hazard Analysis (FHA) that is required by DOE Order 420.1, Facility Safety. The FHA is performed to identify requirements related to establishing fire zones and fire barriers and for establishing combustible loading limits. Although it is not a part of the DSA itself, the FHA plays a direct role in identifying fire hazards that need to be analyzed. If the FHA is not available during this phase of preparation, it should be identified as a need to be expedited. Phases II and III require the comparison of results from hazard and accident analyses against the FHA for consistency.

4.4.2 Phase II: Hazard Analysis

Phase II of DSA development is a hazard evaluation, the second step of hazard analysis [see *LLNL Hazard Analysis Procedure* (AB-004)] The hazard evaluation is a qualitative or semi-quantitative analysis that identifies all hazardous events to be evaluated in the DSA process.

Note: Employees who conduct formal safety analysis for LLNL nuclear facilities are required to take Hazards Control course HS8010, *Hazard Analysis*.

Hazard evaluation identifies events, initiators, and associated controls. It also estimates the frequency and consequence of identified events. Frequency and consequence estimates are

made for both the unmitigated and mitigated cases to assist in identifying potential safety class and safety significant SSCs, and key engineering and administrative controls. Based on the results of a hazard evaluation, candidate safety class and safety significant functions (SSCs and administrative) are forwarded to Phase IV, Safety SSC Development (for SSCs), and Phase V, Derivation of Technical Safety Requirements (for administrative controls).

4.4.3 Phase III: Accident Analysis

Phase III of DSA development is the performance of an accident analysis [see *LLNL Accident Analysis Procedure* (AB-005)]. A quantitative accident analysis is required for a Category 2 nuclear facility. Category 3 nuclear facilities perform a qualitative analysis as part of the hazard evaluation process. The accident analysis activity is a quantitative analysis that yields a formal scenario definition and numerical estimates of consequence for each of the small subset of accidents identified as control-limiting in the hazard analysis.

Based on comparison of the numerical results against an offsite Evaluation Guideline (EG) of 25 rem, a determination is made as to the need for safety class designation. Category 3 nuclear facilities do not possess sufficient radiological materials to challenge the offsite EG and, therefore, do not have safety-class SSCs. Candidate safety class functions (SSC and administrative) are forwarded to Phase IV, Safety SSC Development (for SSCs), and Phase V, Derivation of Technical Safety Requirements (for administrative controls).

4.4.4 Phase IV: Safety SSC Development

During Phase IV of DSA development, safety SSCs are selected from the pool of candidates forwarded from hazard and accident analysis [see *LLNL Control Item Selection Procedure* (AB-007)]. For those controls that are selected as safety class and safety significant, the following are defined:

- Safety functions.
- Functional requirements.
- Performance criteria.

4.4.5 Phase V: Derivation of Technical Safety Requirements

Phase V concludes the process of selecting controls with derivation of TSRs. Specific TSR coverage shall be provided for all safety SSCs and key administrative controls that perform a safety class or safety significant function. The derivation includes both controls specifically credited and implicit controls that are critical to scenario definition. The controls are defined in terms of TSR Limiting Conditions for Operation and TSR Administrative Controls. The Administrative Controls section is augmented, as necessary, with major safety management programs. The format and content is dictated by *LLNL TSR Development Procedure* (AB-008).

Note: Individuals who develop, write, and review TSRs are required to take Hazards Control course HS8030, "Control Item Selection and Development of TSRs."

4.4.6 Phase VI: Formal Documentation

Phase VI is the actual preparation of DSA and TSR documents, along with preservation and updates of relevant references. The *LLNL Graded Approach Procedure* (AB-003) has its most direct effect in Phase VI. Keep in mind that the previous phases (Phases I through V) are not completely distinct. Developing base information and TSRs, performing hazard and accident analyses, and selecting safety SSCs are iterative processes. That is, information obtained or decisions made may require reassessing the results of a previous phase. Documenting all phases in a written DSA and associated TSR document represents the final iteration.

The following list is a sample of the kind of information that could be found in each DSA chapter. When applying the graded approach, however, some of the information may not be required for a particular DSA.

- **Chapter 1, Site Description**. This chapter describes site characteristics necessary for understanding the facility environs important to the safety basis. It is principally derived from the site-wide Environmental Impact Statement and Environmental Impact Report.
- **Chapter 2, Facility Description**. This chapter provides an overview of the facility, its inputs, and outputs. Included are mission and history, structure and design basis, process systems and components, instrumentation, controls, operating parameters, and relationship of SSCs.
- **Chapter 3, Hazard Analysis and Accident Analysis**. This chapter summarizes the results of the hazard analysis and accident analysis (see Sections 4.4.2 and 4.4.3).
- **Chapter 4, Safety Class and Safety Significant Controls**. The content of this chapter is from Phase IV (see Section 4.4.4). It lists the safety characteristic information of selected SSCs that will be used later in developing TSRs and other facility procedures.
- **Chapter 5, Derivation of Technical Safety Requirements**. This chapter develops administrative controls and operating limits (see Section 4.4.5). The full impact of selecting each control is identified. If a given impact is determined to be unacceptable to facility operations, a change in control selection may be required. Therefore, it is important early in the control selection process to involve facility personnel and to identify the impacts of selecting specific controls.
- **Chapter 6, Prevention of Inadvertent Criticality**. Information for this chapter is from the criticality analysis, if required by the graded approach.

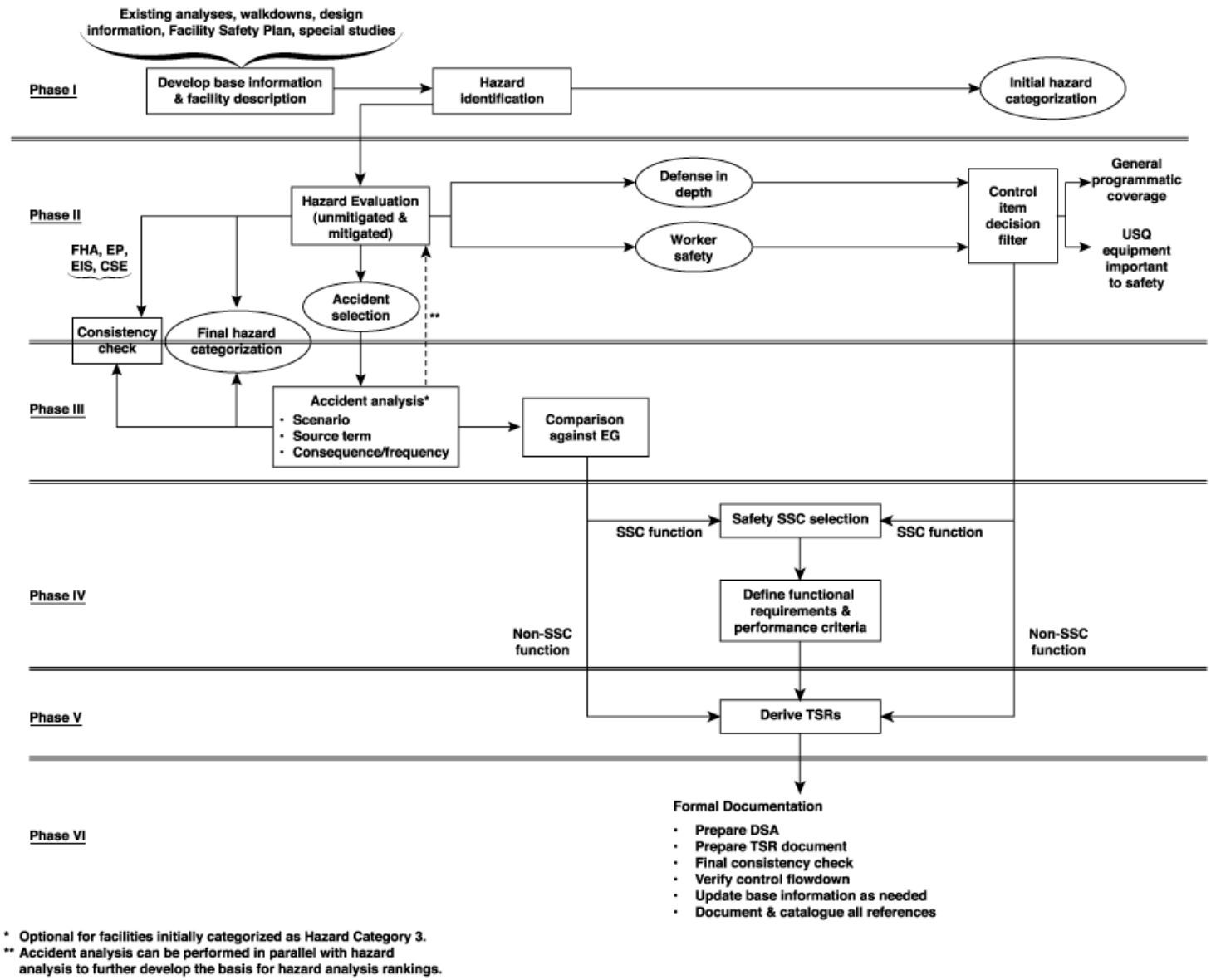
- **Chapter 13, Human Factors**. This chapter describes how the human factors program supports a facility's safety envelope. Content is presented in the form of a human-machine interface analysis.
- **Chapters 7–12 and 14–17**. These chapters provide information about the facility's safety management programs, including training and quality assurance.

On completion of the DSA and TSR document, four reviews should be performed. The first covers internal and external consistency with documents such as Environmental Impact Statements, Emergency Planning Assessments, and Fire Hazard Analyses. The second examines the clarity of control flow down from hazard analysis through accident analysis and control selection to the derivation of TSRs. The third review ensures that base information is updated as necessary to conform to the final DSA and TSR documents. The fourth review verifies that all references, calculations, and analyses are in final form and are properly identified.

4.5 Documented Safety Analysis Process Flow

Figure 3 is a diagram summarizing the flow of the DSA process. It shows the idealized feed-forward process regardless of a facility's life cycle. Not all processes are required in every cycle. As new information becomes available, feedback to the appropriate points in the process should occur.

Table 1 elaborates on the information in Figure 3. Remember that when following the graded approach, not every phase of the process is required for every document.



* Optional for facilities initially categorized as Hazard Category 3.
** Accident analysis can be performed in parallel with hazard analysis to further develop the basis for hazard analysis rankings.

Figure 3. Safety analysis development process.

Notes:

1. **PDSAs and associated analyses begin in preliminary design and are completed during final design. FDSA development occurs after final design.**
2. **The project FHA is typically performed during conceptual design.**
3. **Criticality analysis is typically done in preliminary form during conceptual design and is finalized during final design.**
4. **Preliminary documentation of safety class and safety significant SSCs, and administrative controls may be done during the conceptual design phase.**

Table 1. DSA development activities.

Phase	Description of Activity
Phase I-1	**Facility Description/Inputs**
	Document the facility baseline information that is used in all safety basis development activities. Information includes hazards, hazardous material inventory, hazardous energy sources, SSCs, and facility operations.
Phase I–2	**Hazards Identification and Screening**
	Identify the hazards, and screen common hazards from the safety basis inventory. Screen those hazards that are SIHs for which national consensus codes or standards already define and regulate appropriate practices without the need for special analysis. Such hazards should remain in the information base because they may contribute to the severity of scenarios involving the release of hazardous materials.
Phase I-3	**Initial Hazard Categorization**
	Assign an initial hazard categorization using only the radiological mass threshold tables in DOE-STD-1027-92, Chg. 1 Appendix A. As part of initial hazard categorization, define any facility segmentation used.
Phase II–1	**Hazard Evaluation (Unmitigated and Mitigated)**
	Identify systematically all known hazards, activities, and hazardous events within and near a facility. Specify (1) initiators associated with each event, (2) controls associated with each event, and (3) the consequence and frequency bins for each event.
Phase II–2	**Hazard Evaluation Results**
	Develop definitions of defense-in-depth and worker safety to serve as a basis for safety significant designation and TSR derivation. Accident selection is explained to arrive at a small subset of control-limiting accidents that forward to accident analysis.
Phase II–3	**Safety SSC Function Decision Filter**
	Understand that most controls identified in the hazard analysis will not fulfill a safety significant function, whether as SSCs or as administrative controls. Per DOE-STD-3009-94, Chg. 2, such controls default to generic coverage within the overall safety management programs defined as TSR Administrative Controls. The DSA process also identifies a portion of these controls as important to safety to assist in implementing the USQ determination process mandated by 10 CFR 830. Any controls not considered to fulfill a safety significant function fall into one of these two categories of TSR Administrative Controls or Controls Important to Safety. Forward controls ultimately selected as fulfilling a safety significant function to Phase IV, Safety SSC Development (for SSCs), or Phase V, Derivation of TSRs (for administrative).
Phase III–1	**Accident Analysis**
	Formally develop the progression and consequences of accidents forwarded from hazard analysis. The process can sometimes require development of separate studies, such as seismic effects or fire risk analysis. Note the dotted line in Figure 3 from Accident Analysis to Hazard Evaluation. The concept is that analysts may, at their discretion, perform all or portions of the accident analysis in tandem with the hazard analysis. Some analysts prefer such an approach for consistency, rather than checking the results of both analyses against one another after the fact.

Table 1. DSA development activities. (cont'd)

Activity No.	Activity Description
Phase III–2	**Accident Analysis Results**
	Provide for each accident: (1) a formal definition of the accident sequence, (2) calculation of source terms, (3) calculation of receptor consequences, and (4) frequency calculations to the degree needed.
Phase III–3	**Comparison Against EG**
	Determine whether calculated receptor doses and exposures associated with analyzed accident scenarios involving releases of radiological material challenge the EG. The EG is used to determine if safety class designation and controls are required for an event. LLNL also uses an offsite EG to determine if safety significant designation is required for chemical releases because safety class designation is not used for chemical hazards. Safety significant designation of SSCs can also occur as a result of worker protection evaluation or as a significant contributor to defense in depth.
Phase II-4 **Phase III-4**	**Final Hazard Categorization**
	If a change to the initial hazard categorization is proposed, the basis for that change is derived from the results of hazard and accident analyses.
Phase II-5 **Phase III-5**	**Consistency Check**
	Compare hazard and accident analyses against one another to ensure that no incompatible assumptions exist. They are both also compared against other onsite analyses, such as Fire Hazard Analyses, Emergency Planning Assessments, Environmental Impact Statements, and Criticality Safety Evaluations. Subject matter experts in these areas are consulted during the consistency check. The DSA development may trigger one or more additional analyses in particular subject areas. In some cases, the DSA may need to be revised based on more restrictive (or bounding analysis) guidance provided by these documents.
Phase IV–1	**Safety SSC Selection**
	Formally define which SSCs are selected as Safety Class and Safety Significant SSCs.
Phase IV–2	**SSC Evaluation and Qualification**
	Evaluate the SSCs selected as Safety Class and Safety Significant SSCs. The evaluation is used to demonstrate that the SSCs are qualified to provide their required safety functions with a reliability and availability adequate to support the hazard and accident analyses.
Phase V-1	**Derivation of TSRs**
	Provide specific TSR coverage for each safety SSC and any administrative controls performing a safety class or safety significant function. Include both explicit functions and key defining assumptions implicit in scenarios of concern.

Table 1. DSA development activities. (cont'd)

Activity No.	Activity Description
Phase VI-1	**Formal Documentation**
	Use information from the analytical process to create a written DSA with an accompanying TSR document. The results of each preceding phase should be complete enough to facilitate integration in the final product, rather than continued definition. It is critical to reconcile any revisions to information determined, as necessary, and to ensure that all references are documented in final form. Important inputs for programmatic Chapters 6 through 17 include: Chapter 6—Documented basis that criticality is not credible for Hazard Category 3 facilities. Chapters 7–12 and 14–17—General program features tailored to the specifics of the operation being assessed. Chapter 13—Human factors review of safety SSCs.

5.0 Management of Safety Basis

5.1 Scheduling Safety Basis Development

As soon as a new nuclear activity project or nuclear facility moves past the conceptual stage, the program manager should make 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) is required to be approved by NNSA/LSO 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.

The Hazards Control Department may provide safety analysts to support facility management in determining the hazard classification and residual risk, and in preparing the DSA and other safety basis documents.

Communication among facility personnel and the team assigned to safety basis and report preparation is a critical element to avoiding late discovery of unanalyzed hazards and expensive

safety retrofits. Input of facility personnel is essential and can result in net savings for the project. Early involvement of the NNSA/LSO facility representative in the process of safety basis development is important. The representative's attendance at team meetings and inclusion in technical discussions can speed approval of the completed DSA. The possibility of new issues arising during the NNSA/LSO review process is minimized when the representative remains involved from the outset.

5.2 Reviewing and Approving Safety Basis Documents

The ES&H Team leader and facility manager review the DSA and its associated TSR. Subsequently, the Authorization Basis (AB) Section Leader, or other designated individual, shall perform an Institutional Concurrence review per AB-013 on the DSA and TSR for the Deputy Director for Operations (DDO). The DSA and TSR are then sent to the facility AD for approval. The internal review and approval process is critical to success of the safety basis program. The process ensures consistency in format, consistency in technical approach, and incorporation of appropriate safety controls.

The facility AD submits the DSA and TSR to NNSA/LSO for review and comment.[1] When all comments are resolved, NNSA/LSO issues a Safety Evaluation Report (SER) for the DSA and TSR. The SER provides the NNSA/LSO approval mechanism for the DSA and TSR and cites any additional controls or operating restrictions imposed by NNSA/LSO. The facility manager should negotiate with NNSA/LSO on the effective date for implementation of the DSA and TSR as part of the SER.

If the document submitted to NNSA/LSO is a PDSA, then the operation to be approved is the construction of a nuclear facility. If it is an FDSA, then the operation is the experimental or production activity for which the facility was designed and built.

A readiness review shall be performed before operations can begin in a new facility, and in some cases, before new operations can begin in an existing facility. Document 51.4, "Startup and Restart of Nuclear Facilities," in the *ES&H Manual* should be used to determine start and restart requirements for Category 2 and Category 3 nuclear facilities or activities.

In some circumstances, facilities may operate under a safety basis document called a Basis for Interim Operations (BIO). A BIO is an NNSA/LSO-approved safety basis document for a limited-life Category 2 or 3 nuclear facility.

[1] **For the preparation and review of nuclear safety basis documents requiring the approval of the National Nuclear Security Administration (NNSA) Livermore Site Office (LSO), a formalized process defines the interactions between LLNL and NNSA/LSO. (Refer to the letter from Michael Hooper, NNSA-OAK to Dr. Michael Anastasio, LLNL, June 5, 2002). This process specifies a number of review meetings between LLNL and NNSA/LSO to be conducted during the preparation of the document. The process for the NNSA/LSO review, comment preparation, and comment resolution is also formalized.**

5.3 Implementing the Required Controls Documented in the Safety Basis

Safety basis documents describe the hazards and controls associated with facility operations. Controls for unique hazards, or hazards associated with activities not commonly performed by the public, are included in the appropriate safety documents for each facility through Facility Safety Plans, Integration Work Sheets, Integration Work Sheets/Safety Plans for the facility activities, or in facility-specific procedures. These documents will need to be reviewed and revised, as necessary, for consistency to implement new TSR controls.

5.4 Maintaining Safety Basis Documentation

Nuclear facilities are required to update their DSAs and TSRs annually. Changes in federal regulations—such as DOE nuclear safety rules, or UC Contract 48 requirements applicable to the facility—do not initiate document change reviews. The reason is that NNSA/LSO approves such changes for implementation as part of the regulatory or contract change process. Such changes are administrative and are incorporated in the DSA through the annual update process.

Changes initiated by the discovery of potential deficiencies in a DSA or a planned change in operation are evaluated using the methods described in Document 41.2, "Configuration Management Program Description," in the *ES&H Manual*, which includes change control and leads to consideration of potential unreviewed safety questions in accord with Document 51.3. The USQ process is triggered by any of the following:

- Temporary or permanent change in the facility as described in the existing documented safety analysis.
- Temporary or permanent change in procedures described in the existing documented safety analysis.
- Test or experiment not described in the existing documented safety analysis.
- Potential inadequacy of the documented safety analysis because the analysis potentially may not be bounding or may be otherwise inadequate.

The result of a USQ determination is either a positive or a negative finding. A negative finding is a conclusion that the existing safety basis adequately bounds the change or issue being reviewed, and can be approved by LLNL. A positive finding is a conclusion that the existing safety basis may not adequately bound the change or issue being reviewed. NNSA/LSO approval is then required to implement the change. NNSA/LSO is notified and approves ultimate disposition for potentially inadequate safety analyses. USQ determinations are performed in accordance with Document 51.3.

Note: Employees who conduct formal safety analysis for LLNL nuclear facilities and employees who formally prepare, review, or approve USQ documents are required to take course HS8042, *Unreviewed Safety Question.*

Changes to TSRs, or other changes to the safety basis such as amendments to the DSA, do not enter the USQ process, since NNSA/LSO approval is required.

6.0 Responsibilities

6.1 Lawrence Livermore National Laboratory

In accordance with established Work Smart Standards, LLNL is responsible for developing and internally approving the safety basis for Category 2 and 3 nuclear facilities. However, NNSA/LSO retains final approval authority for those safety bases.

6.2 Deputy Director for Operations

The DDO signs (or delegates authority to sign) DSAs in concurrence with the facility AD responsible for the safety basis. The DDO may delegate this concurrence authority and in that case shall have signed letters of delegation to qualified individuals.

6.3 Nuclear Facility Associate Director

A nuclear facility AD or designee is responsible for ensuring that operations in a facility are performed safely and for developing, implementing, and maintaining the safety basis documentation for each facility. The facility AD is specifically responsible for:

- Operating the nuclear facility and activities in accordance with the approved safety basis documents, including approved TSR, for all modes of operations including shutdown.
- Developing and maintaining safety basis documentation, including analyses or studies on which the final facility categorization depends, in accordance with 10 CFR 830 Subpart A and Subpart B.
- Notifying NNSA/LSO, as required, if the existing safety basis does not reflect current operations.
- Obtaining proper authorization of changes to the safety basis and proper approval of safety basis documents in accordance with this Plan.
- Funding the safety basis development effort for the AD's facilities.
- Approving the safety basis for the facility, accepting findings concerning risk, and ensuring that the required hazard controls are implemented.
- Obtaining NNSA/LSO approval for DSAs.

- Conducting annual updates of DSAs in accordance with this Plan.
- Assuring that copies of all completed safety basis documents (including DSAs, TSRs, NNSA/LSO SERs, NNSA/LSO approval letters, and positive USQs) are transmitted to the Hazards Control Department, Authorization Basis Section, for inclusion in a central library.

6.4 Hazards Control Department, Authorization Basis Section

The Hazards Control Department provides institutional review, advice, and support, when requested, to Laboratory programs and facilities by:

- Explaining rules, UC Contract 48 requirements, including 10 CFR 830, Subpart B, and the *ES&H Manual* as they apply to the safety basis of specific operations at the Laboratory.
- Reviewing programmatic and facility documents for compliance with safety analysis and contract requirements.
- Supplying safety analysts to develop and maintain facility safety basis documentation.
- Preparing and maintaining Authorization Basis procedures.

6.4.1 Reviewers for Authorization Basis Section

Reviewers are responsible for:

- Reviewing the safety basis document in accordance with this Plan.
- Identifying comments for resolution, and approving their resolution.
- Maintaining a level of independence from the development process of the safety basis document being reviewed.

6.5 Nuclear Facility Manager

The Facility Manager is responsible for ensuring that facility safety basis documents are developed, approved, implemented, and maintained according to this Plan. The Facility Manager:

- Ensures that a team consisting of program personnel and safety analysts reviews the facility DSA annually.
- Assigns safety analysts to update the DSA.
- Assigns internal facility reviewers.

- Concurs on the updated DSA.
- Submits the DSA to the facility AD for signature and transmittal to NNSA/LSO for review and approval.

7.0 Work Smart Standards

10 CFR 830, *Nuclear Safety Management*, including *Subpart A, Quality Assurance Requirements* (830.120-830.122), and *Subpart B, Safety Basis Requirements* (830.200-830.207), January 10, 2001.

DOE O 420.1A, “Facility Safety,” excluding § 4.1.3, ANSI/ANS 8.9, ANSI 8.10 and ANSI/ANS 8.17.

8.0 Resources for More Information

8.1 Contacts

The following contacts at LLNL can provide information or assistance when documenting the safety basis for Category 2 and 3 nuclear facilities and operations:

- Directorate Assurance Manager
- Facility Manager
- ES&H Team leader
- Authorization Basis Section Leader

Hazards Control Department personnel can be reached through the ES&H Contact List.

8.2 Other Sources

Document 51.3, "LLNL Unreviewed Safety Question (USQ) Procedure," in the *ES&H Manual.*

DOE-STD-1027-92, Chg. 1, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23 Nuclear Safety Analysis Report*," §§ 2,3,4 and Attachment 1 (except for the requirement for Certificates of Compliance for type B containers), September 1997.

DOE-STD-3009-94, Chg. 2, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analysis Reports*, April 2002.

DOE-STD-3011-94, U.S. Department of Energy, *Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans*, November 1994.

AB-003, "Graded Approach Implementation Procedure for Documented Safety Analyses for LLNL Nuclear Hazard Category 2 and 3 Facilities."

AB-004, "Hazard Analysis Procedure for Hazard Category 2 and 3 Nuclear Facilities."

AB-005, "LLNL Accident Analysis Procedure."

AB-007, "Control Item Selection Procedure for Hazard Category 2 and 3 Nuclear Facilities."

AB-008, "LLNL Technical Safety Requirements Development Procedure."

AB-013, "Procedure for the Institutional Review and Concurrence of Safety Basis Documents for LLNL Category 2 and 3 Nuclear Facilities."

Letter from Michael Hooper, NNSA-OAK, to Dr. Michael Anastasio, LLNL, *Agreement for Safety Basis Development and Review Process* (DOC. #AMNSNST:010134), June 5, 2002.