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Marilyn S. Bange

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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POC:

Marilyn S. Bange
ES&H Planning Department
Sandia National Laboratories
P. O. Box 5800
MS0794
Albuquerque, New Mexico 87185

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SAFETY BASIS MANUAL

This document implements the requirements of Corporate Procedure ESH100.2.SB.1, *Establish the Safety Basis of Operations*.

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Owner: Jaime L. Moya, 600
Subject Matter Expert: Jeffrey Marr; CA Counterpart: Dorrance McLean
Contributors: Mark Wong, Al Bendure, Marc Williams
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List of Acronyms

Acronym	Definition
AA	authorization agreement
ARR	accelerator readiness review
ASE	accelerator safety envelope
BIO	Basis for Interim Operations
CAP	Capital Asset Project
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DSA	documented safety analysis
ES&H	environment, safety, and health
GFE	government-furnished equipment
HA	hazards analysis
HARP	Hazard Aggregation Rollup Process
HC	hazard category
IFSB	industrial facilities safety basis
IP	implementation plan
ISMS	Integrated Safety Management System
IVR	implementation validation review
JCO	Justification for Continued Operation
LR	low-hazard readiness review
M&O	management and operating
MOC	management of change
MSA	management self-assessment
NFO	nuclear facility organization
NFSB	nuclear facility safety basis
NNSA	National Nuclear Security Administration
NRC	Nuclear Regulatory Commission
OP	operating procedure
ORR	operational readiness review
OSHA	Occupational Safety and Health Administration
PDSA	preliminary documented safety analysis
PHS	Primary Hazard Screening
PISA	Potentially Inadequate Safety Analysis
PSM	Process Safety Management
PSR	pre-startup safety review

Acronym	Definition
RA	readiness assessment
RR	readiness review
SA	safety assessment
SAD	safety assessment document
SBS	Safety Basis Supplement
SC	safety class
SER	Safety Evaluation Report
SHA	stand-alone hazards analysis
SIH	standard industrial hazard
SNL	Sandia National Laboratories
SR	standard industrial hazard review
SS	safety significant
SSC	structure, system, or component
TPC	Total Project Cost
TSR	technical safety requirement
TWD	technical work document
USI	Unreviewed Safety Issue
USQ	Unreviewed Safety Question
USQD	Unreviewed Safety Question Determination

Chapter 1. Introduction

Subject Matter Expert: Jeffrey W. Marr; CA Counterpart: N/A
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1.1 Safety Basis Process

National Technology & Engineering Solutions of Sandia, LLC, manages the facilities and infrastructure of Sandia National Laboratories (SNL) on behalf of the U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA). Activities in support of the SNL mission take place at primary facilities located in Albuquerque, New Mexico, and Livermore, California, as well as at supporting facilities located in Nevada, Hawaii, Alaska, Texas, and Washington, D.C.

As required by the Management and Operating (M&O) Contract (DE-NA0003525) and DOE orders, standards, and guidance, the M&O contractor maintain a safety basis process, which helps to identify and evaluate hazards related to facilities, operations, and activities at both Sandia-controlled premises (i.e., onsite) and non-Sandia-controlled premises (i.e., offsite) to adequately protect workers, the public, and the environment.

This manual describes the SNL safety basis process, which is managed by the Environment, Safety, and Health (ES&H) Planning Department. Safety basis personnel ensure that a centralized and consistent process is implemented for safety basis development, documentation, and evaluation.

1.2 Scope and Applicability

The *Safety Basis Manual* identifies the processes and methods used to develop safety basis documentation that is prepared and implemented to help ensure that work is performed safely. This safety basis process applies to both industrial facility operations (industrial facilities safety basis [IFSB]) and nuclear facility operations (nuclear facilities safety basis [NFSB]).

1.3 Responsibilities

This manual applies to all SNL organizations, all management elements, all SNL sites, and all Members of Workforce. Managers are responsible for evaluating the hazards, controls, and potential risks associated with their facilities, operations, and activities and establishing the appropriate safety basis.

1.4 Organization of This Manual

Chapter 1, "Introduction," and Chapter 2, "Safety Basis Planning and Implementation," provide an overview of the safety basis process used to identify hazards and derive the hazard classification for a facility, operation, or activity. The hazard classification determines what additional processes, actions, training, and safety documentation are needed to establish the safety basis for the facility, operation, or activity. References are provided in Chapter 8.

Chapters 3 through 7 provide information on the safety basis process and requirements for each hazard classification:

- Chapter 3, Business occupancy (office)
- Chapter 3, Standard industrial hazard (SIH)
- Chapter 4, Low-hazard industrial operations
- Chapter 5, Moderate-hazard industrial operations
- Chapter 5, High-hazard industrial operations
- Chapter 6, Nuclear facility
- Chapter 7, Accelerator

The sections within chapters 3 through 7 describe the following aspects of the safety basis process: providing safety basis documentation, verifying controls, determining readiness, managing change, performing periodic assessments and applying lessons learned, training and qualifying safety basis documentation reviewers, keeping records, and implementing quality assurance.

Note: All operations, projects, and activities of a facility must adhere to the requirements for the assigned hazard classification to keep the facility from becoming a higher hazard classification (e.g., HC-3).

1.4.1 Providing Safety Basis Documentation

SNL and DOE/NNSA Sandia Field Office (SFO) personnel use safety basis documentation (e.g., PHSs and hazard analyses [HAs]) to determine whether the risks associated with a facility, operation, or activity are acceptable and work can be authorized. Once approved, the safety basis documentation for any facility, operation, or activity represents the acceptance of associated risk.

A graded approach commensurate with the identified hazards is used to determine the appropriate safety basis documentation. The safety basis documentation for a facility, operation, or activity helps to determine the range of conditions under which safe operations are adequately controlled.

1.4.1.1 Approval Authority for Safety Basis Documentation

The process for providing safety basis documentation typically includes planning, development, and independent review and document approval. Depending on the potential worker, onsite, or public consequences documented in the PHS system, DOE/NNSA/SFO may delegate or retain authorization authority for approving safety basis documentation.

For facilities and activities where DOE/NNSA has delegated authorization authority to SNL management, safety basis documentation is managed as follows:

- Line organizations prepare safety basis documentation and submit it to ES&H Planning personnel
- ES&H Planning personnel review the safety basis documentation for concurrence
- Line organization management approves the safety basis documentation

For facilities and activities where DOE/NNSA has retained authorization authority, as with high-hazard industrial facilities, accelerators regulated under DOE O 420.2C, *Safety of Accelerator Facilities*, and HC-1, HC-2, and HC-3 DOE nuclear facilities regulated under 10 CFR 830, *Nuclear Safety Management*, safety basis documentation is managed as follows:

- Line organizations prepare safety basis documentation and submit it to ES&H Planning personnel
- ES&H Planning personnel review the safety basis documentation for concurrence
- Line organization management approves the safety basis documentation for submittal to DOE/NNSA
- DOE/NNSA reviews the safety basis documentation for approval

1.4.2 Implementing and Verifying Controls

Safety basis documentation identifies the actions and controls needed to mitigate identified hazards and safely operate the facility or activity. The responsible line management incorporates these actions and controls into the appropriate operating processes, procedures, safety management programs, and training and then verifies that they are implemented. Administrative controls are implemented into technical work documents (TWDs) and operating procedures and via implementation plans.

1.4.2.1 Implementation Validation Review

In addition, an implementation validation review (IVR) may be required (see Appendix SB-04, "Implementation Validation Review") to ensure that controls identified in a new or substantively revised safety basis document are implemented.

1.4.3 Determining Readiness

The safety basis process includes a documented review of the line organization's readiness either to startup new or existing facilities, operations, or activities or to restart existing facilities, operations, or activities that have been shut down. The readiness review (RR) process is a disciplined, systematic, documented, and performance-based examination of personnel, processes and procedures, facilities, equipment, management control systems, and safety management programs. The RR ensures the readiness of the facility, operation, or activity, as well as personnel, to operate within the bounds of acceptable risk, as described in the appropriate safety basis documentation and in compliance with applicable ES&H requirements.

1.4.3.1 Management Self-Assessment

A management self-assessment (MSA) may be required. An MSA is a formal process by which management evaluates its own procedures and personnel for the readiness to safely startup or restart facilities, operations, or activities (see Tool SB-02-T, "Management Self-Assessment [MSA]"). An MSA precedes an RR, which independently verifies that a facility, operation, or activity is ready to be started or restarted.

1.4.3.2 Approval Authority for Determining Readiness

Depending on the potential worker, onsite, or public consequences document in the PHS system, DOE/NNSA may delegate or retain authorization authority for approving work to proceed.

1.4.4 Managing Change

Managing change for facilities, operations, and activities includes managing changes to the facility and equipment (hardware), changes to existing processes (procedures), and the potential for new operations and activities. The required safety basis documentation must be kept current as a result of changes to validate the existing hazard classification and to ensure that the controls identified to mitigate hazards in facilities, operations, and activities continue to provide adequate protection to the workers, the public, and the environment. Depending on the hazard classification level, a formal management of change process (e.g., an MOC, a USI, or a USQ) may be required to keep the safety basis current and to ensure the appropriate approval authority approves implementation of proposed changes.

1.4.5 Performing Periodic Assessments and Applying Lessons Learned

Periodic assessments of safety basis documentation and controls ensure that work continues to be safe and in compliance with corporate and federal requirements. The assessments also provide an opportunity to identify and correct problems as well as to improve work processes. Managers will identify findings, observations, noteworthy practices, and lessons learned.

1.4.6 Training and Qualifying Safety Basis Documentation Preparers, Reviewers, and Approvers

Members of the Workforce who prepare, review, and approve safety basis documentation will be trained and qualified to do so.

1.4.7 Keeping Records

Managers are responsible for ensuring that records generated when identifying and assessing hazards are maintained in accordance with the Sandia Records Retention and Disposition Schedule. Records must be legible, authenticated, and maintained in a manner that prevents damage, loss, or deterioration.

Official records associated with the safety basis process may include, but are not limited to the following:

- PHS document
- HA or stand-alone hazards analysis (SHA)

- Readiness review documents (e.g., MSA plan, implementation plan, MSA report)
- Hazard identification walk-throughs
- Safety assessment documents
- Documented safety analyses
- Readiness review final report

1.4.8 Implementing Quality Assurance

This manual addresses Corporate Quality Assurance Program requirements as outlined in CG100.6, *Ensure Quality Outcomes*.

All Members of the Workforce are responsible for operating safely, securely, efficiently, and in compliance with applicable requirements. Managers at all levels are responsible for ensuring that all work is planned and controlled in a safe manner as defined in the safety basis documentation based on the nature of the work and associated risks.

1.5 Integrated Safety Management Flowdown

As part of the commitment to worker safety established in DOE P 450.4A, *Integrated Safety Management Policy*, the DOE/NNSA requires that safety be integrated into management and work practices. The DOE/NNSA provides further guidance for integrating safety into work practices in DOE G 450.4-1C, *Integrated Safety Management System Guide*.

The five core ISMS functions are as follows: define the scope of work, analyze the hazards, control the hazards, perform work, and provide feedback and continuous improvement.

SNL Members of the Workforce implement DOE/NNSA policy, guidance, and requirements for safety management systems through the Sandia Management System, of which ISMS is an integral part. The ISMS process helps to incorporate the five safety management functions into all activities. The SNL ISMS systematically integrates safety into both management and work practices so that work is accomplished while protecting the worker, the public, and the environment.

In support of ISMS, the PHS identifies hazards and captures work controls for the hazards; a hazards analysis (HA) further analyzes hazards.

Chapter 2. Safety Basis Planning and Implementation

Subject Matter Expert: Jeffrey W. Marr; CA Counterpart: N/A
Contributors: Mark Wong
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2.1 Safety Basis Process Overview

The safety basis process for facilities, operations, and activities consists of four sequential steps. Prior to the initiation of any work, Members of the Workforce must:

- Complete the appropriate safety basis documentation and receive the appropriate approval and authorization
- Complete the appropriate readiness review, as needed
- Receive approval from the appropriate authorization authority for work to proceed

The appropriate safety basis documentation and readiness review reflect a graded approach commensurate with the identified hazards, controls, and potential risk.

Managers are responsible for ensuring that the following actions are taken prior to the start or restart of any work (operations, projects, activities, etc.):

- The scope of operations has been defined
- The Primary Hazard Screening (PHS) has been completed
- The required level of safety basis documentation has been developed commensurate with the assigned hazard classification, which may include a stand-alone hazards analysis for facilities-level hazards
- Hazards that involve highly hazardous chemicals or flammable liquids or gases exceeding the OSHA PSM standards have been evaluated for compliance with OSHA 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*
- Hazards have been controlled to minimize potentially adverse consequences and/or the likelihood of adverse consequences to a level where the identified risks are acceptable
- The readiness review has been completed, as needed

2.2 Primary Hazard Screening

The Primary Hazard Screening (PHS) software is used to classify facilities, operations, and activities based on hazard impact. This classification, as described in Section 2.3, determines any additional actions and documentation required to meet safety basis requirements. In addition, PHS defines operating limits and a safety envelope, including authorized types and quantities of radiological materials.

The PHS is also used to identify and analyze hazards in order to provide information to be used when planning work and implementing controls. Through an interactive question and answer process, the PHS assists in the identification of hazards, identifies requirements, and facilitates involvement of ES&H Planning Department Personnel, as needed.

The PHS document must be completed and approved prior to performing any work. The PHS document must be updated when activities change such that they exceed the operating envelope defined by the PHS; this includes PHS answers and material types and quantities. At a minimum, PHSs shall be updated yearly to assure that PHSs reflect current operations and that current requirements are identified.

Note: New radionuclides and increases in quantity need to be updated in the PHS radionuclides table.

The procedure for completing and managing PHS documents is provided in Appendix SB-01, "Preparation, Maintenance, and Review of Primary Hazard Screenings (PHSs)."

2.3 Classification and Authorization Process

Based on the answers provided to the PHS questions, the PHS module identifies the hazards and then categorizes each facility, operation, or activity as one of the following types:

- Industrial facility
  - Business occupancy
  - Standard
  - Low-hazard
  - Moderate-hazard
  - High-hazard
- Accelerator facility
- Nuclear facility
  - Hazard category (HC) 1
  - HC-2
  - HC-3

  Note: A facility categorized as less than HC-3 is treated as an industrial facility. In such a case, Subpart A of 10 CFR 830 applies. For an HC-1, HC-2, or HC-3 facility, both Subpart A and Subpart B of 10 CFR 830 apply.

Figure 2-1 illustrates the decision logic used to determine facility classifications. Appendix SB-07, "Required Documentation and Authorization Authority by Hazard Classification," lists the SNL assurance basis and authorization authority for each hazard classification.

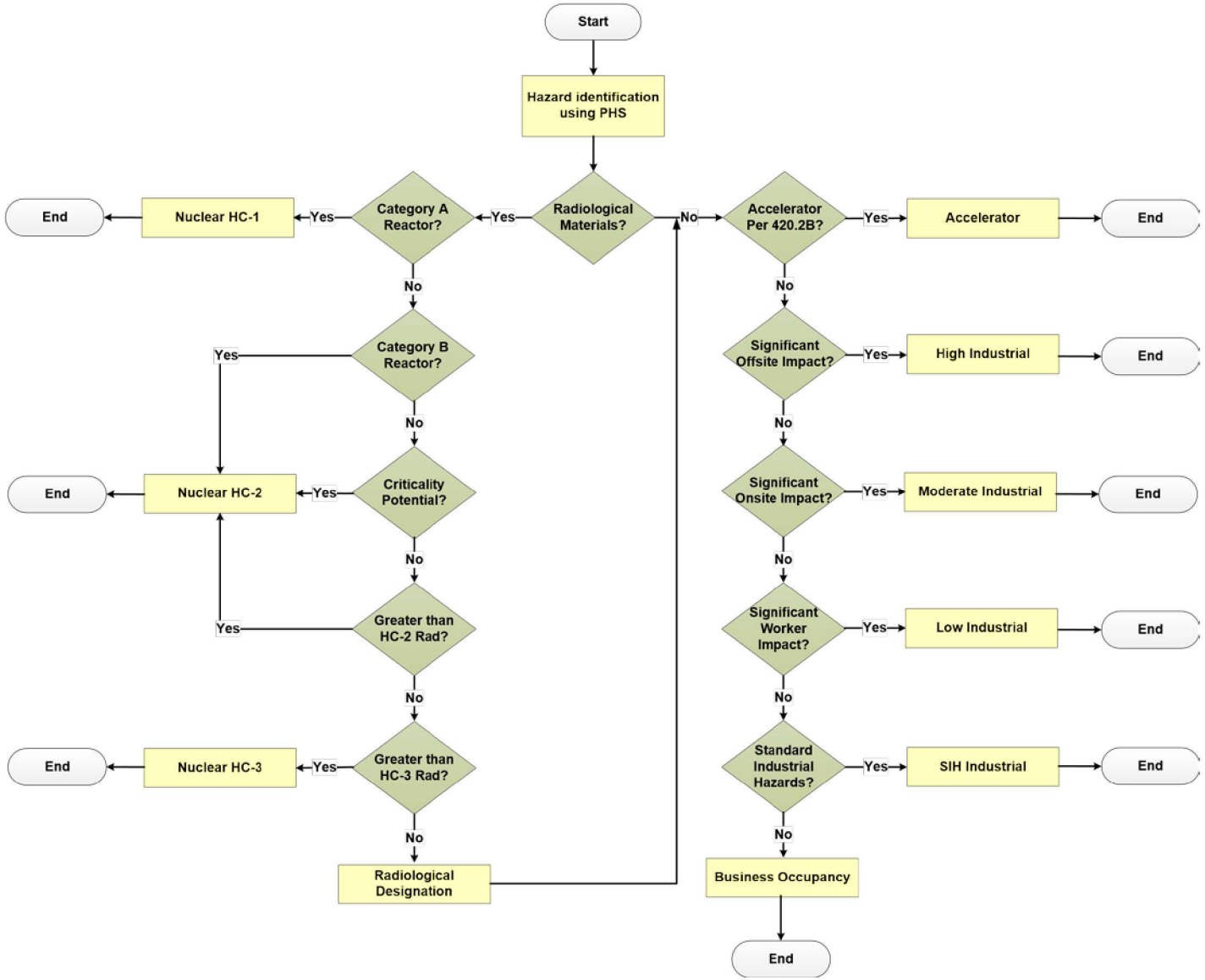

Figure 2-1. Facility classification process (safety basis documentation, readiness review process, and approval authority)

2.3.1 Radiological Designation

An additional "radiological" designation is given to those industrial facilities that have radiological material or radiological-generating devices below the DOE nuclear facility thresholds for HC-3.

2.3.2 Highly Hazardous Material

Facilities with operations that involve highly hazardous chemicals, flammable liquids, or gases exceeding OSHA PSM standards may have additional requirements, including a process hazard analysis.

Note: SNL does not have any facilities that are classified as high-hazard industrial.

2.4 Safety Basis Documentation Based on Hazard Classification

A graded approach commensurate with the identified hazards is used to determine the appropriate safety basis documentation and readiness review. Table 2-1 provides a matrix of the facility hazard classification, safety basis documentation, readiness review process, and approval authority for each hazard classification. Appendix RR-01, "Determining Required Readiness Review Type," provides more detail on the required readiness review for each hazard classification.

Table 2-1. Safety basis documentation, readiness review process, and approval authority by facility hazard classification

Facility Hazard Classification	Safety Basis Documentation		Readiness Review Process		Approval Authority	
	PHS	Other	SNL	DOE	SNL	DOE
Business occupancy	✓	—	• Memo	—	Line manager	—
Standard industrial hazard	✓	—	• SR	—	Line Manager	—
Industrial (low)	✓	• PHS • HA/SHA	• LR	—	Line manager	—
Industrial (moderate)	✓	• SA	• RA	—	Director	—
Industrial (high)	✓	• SA	• RA	• RA	—	✓
Accelerator	✓	• SAD/ASE	• ARR	• ARR	*Note 1*	*Note 2*
Nuclear (HC-1, HC-2, or HC-3)	✓	• DSA/TSR • BIO/JCO • DSA supplement	• ORR/RA	• ORR/RA	—	✓

Note 1. SNL management is the approval authority for the SAD for accelerator facilities.
Note 2. DOE/NNSA is the approval authority for the ASE for accelerator facilities, and the authorization authority for accelerator facilities.

ASE = accelerator safety envelope
BIO = Basis for Interim Operations
JCO = Justification for Continued Operation
RA = readiness assessment
SA = safety assessment
TSR = technical safety requirement

2.5 Hazard Analysis Process

The purpose of an HA is to evaluate potential hazards, identify the associated risk, and determine the available controls. Managers are responsible for ensuring that the control set for the identified hazards is incorporated into operating processes, procedures, and training.

Note: The hazards identification and the hazards evaluation combine to create the hazards analysis (HI + HE = HA).

2.5.1 Hazards Analysis, Stand-alone Hazards Analysis, and Safety Assessment

For SNL operations, the HA requirement in the PHS may be completed by using the HA module within the PHS software or by using an already-completed and up to date SHA and completing the relevant documentation. The HA module in the PHS uses a modified event analysis method to document the analysis and mitigation of hazards. An SHA shall be completed using the process identified in Appendix IF-01, "IFSB Development of SB Documents."

Note: An HA performed as an SHA, an SA (for moderate-hazard and high-hazard industrial operations), or a DSA (for nuclear operations) in lieu of using the HA module must be referenced in the PHS notes about the HA and listed in the supporting documents table.

An SHA may be required to verify and document the following:

- Low-hazard classification with hazards requiring controls to keep a facility or operation from a higher hazard classification.
- Potential impacts from SNL operations to receptors located in non-Sandia-controlled areas
- Final nuclear facility hazard categorization

Final nuclear facility hazard categorization shall be completed using the DOE-STD-1027-92 methodology and the threshold values from the supplemental guidance in NNSA SD G-1027 Admin Change 1, *Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1*." The PHS will document the final hazard categorization.

The manager should consult with ES&H Planning for guidance on planning and developing an SHA.

2.5.2 Accelerator Safety Envelope

The ASE is the set of controls, derived from the SAD, that is required for accelerator facilities regulated under DOE O 420.2C, *Safety of Accelerator Facilities*. The ASE may be contained within the SAD or may be developed separately as a stand-alone document for control reference purposes. The ASE is prepared and submitted to DOE/NNSA/SFO for approval.

2.5.3 Controls

When determining the controls to mitigate and prevent hazards, managers and Members of the Workforce are responsible for the following:

- Eliminate hazards or reduce risk through design.
- Use the following hierarchy for mitigating hazards:
  - Passive engineering controls
  - Active engineering controls
  - Administrative controls
  - Personal protective equipment
- Implement interim protective measures, pending the completion of actions to implement the final abatement (mitigation) of hazards.

For nuclear facilities, technical safety requirements (TSRs) define the limits, controls, and related actions that establish the specific parameters and requisite actions for safe operation. TSRs document the rules that apply to TSR implementation and change control, document the institutional safety programs applicable to the facility, define the implementing details for the controls derived from the documented safety analysis, and document the basis for the controls to assist in control implementation and change control. TSRs are prepared and submitted to DOE/NNSA/SFO for approval.

2.6 Hazard Aggregation Rollup Process for Facilities

Because of the complexity of the operations, both technically and organizationally, facility hazards may be analyzed in multiple PHS documents. The HARP provides an analysis of the interaction and aggregation of hazards that exceed the HARP criteria listed in SB-03-T. For a facility with multiple PHS documents and at least one of the PHS documents is greater than or equal to a low-hazard facility classification, the HARP criteria is used to determine when the HARP is necessary.

The HARP process is a query of the PHS module for a given facility that lists the PHS for the criteria hazards (e.g., radiological, chemical, biological, and/or explosives). The HARP is performed by Department 4132 analysts and is used to conclude whether an SHA is necessary to confirm the low hazard facility classification. Department 4132 staff will contact the responsible facility management if an SHA is necessary.

Appendix SB-02, “Hazard Aggregation Rollup Process (HARP),” provides additional detail for the HARP process.

Chapter 3. Business Occupancy (Office) and Standard Industrial Hazard (SIH) Classification

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This chapter of the *Safety Basis Manual* is applicable to facilities, operations, and activities that have been classified as business occupancy (office) or standard industrial hazard (SIH) following completion of the PHS. The chapter provides a formal and consistent methodology for developing and maintaining the appropriate safety basis documentation and processes.

3.1 Providing Safety Basis Documentation

For business occupancy (office) or SIH facilities, operations, and activities, the required safety basis documentation is an approved PHS. Managers must complete the PHS module and then ensure that the PHS document is approved (Table 2-1)

Business occupancy and SIH facilities do *not* require completion of an HA (i.e., using the PHS HA module); however, managers may elect to complete an HA. In addition, managers have the discretion to complete an SHA for standard industrial hazards.

3.1.1 Approval Authority for Safety Basis Documentation

SNL management has approval authority for safety basis documentation for both business occupancy and SIH facilities, operations, and activities (Table 2-1).

For facilities, operations, and activities where DOE/NNSA has delegated authorization authority to SNL management, safety basis documentation is managed as follows:

- Line organizations prepare the PHS and submit it to ES&H Planning personnel
- ES&H Planning personnel review the PHS for concurrence
- Line organization management approves the PHS

3.2 Implementing and Verifying Controls

For business occupancy (office) and SIH facilities, operations, and activities, hazards and their controls are described in the PHS document. Managers are expected to comply with all action statements identified in the PHS and verify that all identified controls are implemented.

3.3 Determining Readiness

Prior to the initial startup and occupancy of the space or the subsequent restart of a business occupancy (office) facility, operation, or activity, the manager is to perform and document a walk-through of the space to ensure that ES&H requirements have been met.

In addition, the manager of a business occupancy facility or activity may elect to complete an SR in accordance with Appendix RR-02, "Standard Industrial Hazard and Low-Hazard Readiness Review."

For any SIH facility, operation, or activity, the manager is responsible for ensuring that an SR is performed in accordance with Appendix RR-02, "Standard Industrial Hazard and Low-Hazard Readiness Reviews."

3.3.1 Approval Authority for Determining Readiness

SNL management has approval authority for the readiness review process for both business occupancy and SIH facilities, operations, and activities (Table 2-1).

3.4 Managing Change

For business occupancy (office) and SIH facilities, operations, and activities, the PHS (see Section 2.2) shall be reviewed and updated annually. In addition, the PHS must be updated and approved when changes are made—as a result of changes to requirements or to the scope of work—that would alter any of the answers to the questions in the PHS. Changes to the PHS may lead to subsequent changes to PHS-generated action items, such as warning messages and training requirements. The documentation (e.g., training plans and TWDs) used to administer these controls will also need to be updated.

An additional RR may need to be completed to reflect new requirements.

3.5 Performing Periodic Assessments and Applying Lessons Learned

For business occupancy (office) and SIH facilities, operations, and activities, managers are responsible for performing periodic assessments of their procedures and controls. These assessments help managers do the following:

- Identify, communicate, and correct performance or compliance issues
- Observe, assess, and improve work processes
- Identify findings, observations, noteworthy practices, and lessons learned

In addition, it is a best practice to perform periodic walk-throughs of the area to ensure compliance with applicable ES&H requirements.

Managers must use lessons learned information as an aid in planning and performing work safely in accordance with CG100.6.15, *Identify Operating Experience, and Share Lessons Learned.*

3.6 Training and Qualifying Safety Basis Documentation Preparers, Reviewers, and Approvers

For business occupancy (office) and SIH facilities, operations, and activities, safety basis documentation consists of a PHS. Members of the Workforce preparing, reviewing, and approving PHS documents will be expected to take ISMS100, *PHS Software Training.* Preparers of the PHS shall be knowledgeable about the facility, operation, or activity and the associated hazards.

Members of the Workforce who prepare, review, and approve HAs will be expected to take HAZ500, *Hazard Analysis Overview Training*.

Note: The PHS document identifies hazards associated with the facility, operation, or activity and also identifies corporate-required training for those hazards. Managers may elect to have Members of the Workforce take additional training based on the output of the PHS and/or corporate ES&H policy area requirements.

3.7 Keeping Records

Managers shall ensure that records generated during the performance of hazard identification activities, hazard analyses, and readiness reviews are maintained in accordance with the Sandia Records Retention and Disposition Schedule. Records must be legible, authenticated, and maintained in a manner that prevents damage, loss, or deterioration.

Official records associated with this process may include but are not limited to the following:

- PHS document
- HA or SHA
- Hazard identification walk-throughs
- RR final reports

3.8 Implementing Quality Assurance

For business occupancy (office) and SIH facilities, operations, and activities, Members of the Workforce are expected to:

- Follow the ISMS framework for managing ES&H activities
- Perform all work per the procedures and controls specified by management
- Report problems, concerns, or suggestions for improvement to work procedures

Managers at all levels who oversee business occupancy and SIH facilities, operations, and activities are responsible for ensuring that all work is planned and controlled in a safe manner as defined in the PHS document based on the nature of the work and the associated risks.

Specifically, quality assurance for business occupancy and SIH facilities, operations, and activities must address the following:

- Ensure the accuracy and completeness of safety basis information (e.g., hazards identification, material inventory, and reference material)
- Ensure the accuracy and completeness of safety basis documentation (e.g., PHS)
- Ensure that all hazards are appropriately identified, understood, and controlled
- Document the peer review for completeness and accuracy; confirm approval of any quantitative calculations and/or analyses

Additionally, if the nature of the work defines the facility, operation, or activity as "radiological," then additional requirements apply as outlined in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, Subpart A, *Quality Assurance Requirements*.

Chapter 4. Low-Hazard Industrial Facility Classification

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This chapter of the *Safety Basis Manual* is applicable to facilities, operations, and activities that have been classified as low-hazard via the PHS or other safety basis assessments. The chapter provides a formal and consistent methodology for developing and maintaining the appropriate safety basis documentation and processes.

4.1 Providing Safety Basis Documentation

For low-hazard industrial facilities, operations, and activities, managers must complete the PHS module and then ensure that the PHS document is approved (Table 2-1).

Managers are also responsible for completing the HA section of the PHS or an SHA for all the low hazards identified in the PHS and then ensuring that the documentation is approved. The HA identifies the hazards and the controls necessary to mitigate or prevent the impacts of the hazards. This set of controls represents the safety envelope for a facility, operation, or activity.

Note: Any SHA should be noted in the HA module in the PHS, and the SHA should be listed in the supporting documents table.

Managers of low-hazard industrial facilities, operations, and activities that involve highly hazardous chemicals, flammable liquids, or gases exceeding OSHA PSM standards shall ensure that the 14 elements of PSM are completed for compliance with the requirements in OSHA 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*, as defined in Appendix SB-03, "Process Safety Management (PSM) Standards."

For facilities, operations, and activities where DOE/NNSA has delegated authorization authority to SNL management, safety basis documentation is managed as follows:

- Line organizations prepare safety basis documentation and submit it to ES&H Planning personnel
- ES&H Planning personnel review the safety basis documentation for concurrence
- Line organization management approves the final safety basis documentation

4.1.1 Approval Authority for Safety Basis Documentation

SNL management has approval authority for the safety basis documentation for low-hazard facilities, operations, and activities (Table 2-1).

4.2 Implementing and Verifying Controls

For low-hazard industrial facilities, operations, and activities, hazards and their controls are described in the PHS document and in either HA or SHA documentation. Managers are expected to comply with all action statements identified in the PHS and HA/SHA and verify that all identified controls are implemented.

4.2.1 Implementation Validation Review

Managers may elect to perform an IVR. The IVR process is defined in Appendix SB-04, "Implementation Validation Review."

4.3 Determining Readiness

Prior to the initial startup or subsequent restart of any low-hazard industrial facility, operation, or activity, the manager is expected to perform an MSA, as defined in Appendix SB-05, "Management Self-Assessment," and complete an LR in accordance with Appendix RR-02, "Standard Industrial Hazard and Low-Hazard Readiness Review."

4.3.1 Approval Authority for Determining Readiness

SNL management has approval authority for the readiness review process for low-hazard industrial facilities, operations, and activities (Table 2-1).

4.4 Managing Change

For low-hazard industrial facilities, the PHS (see Section 2.2) shall be reviewed and updated annually. In addition, the PHS and HA must be updated and approved when changes are made—as a result of changes to requirements or to the scope of work—that would alter any of the answers to the questions in the PHS. Changes to the PHS may lead to subsequent changes to PHS-generated action items, warning messages, and training documents. The documentation (e.g., training plans and TWDs) used to administer these controls will also need to be updated.

An LR may need to be completed to reflect new requirements.

For facilities with a stand-alone HA (SHA), a management of change (MOC) process shall be adopted as part of the safety envelope.

4.5 Performing Periodic Assessments and Applying Lessons Learned

For low-hazard industrial facilities, operations, and activities, managers are responsible for performing periodic assessments of facility procedures and controls. These assessments help managers do the following:

- Identify, communicate, and correct performance or compliance issues
- Observe, assess, and improve work processes
- Identify findings, observations, noteworthy practices, and lessons learned

In addition, it is a best practice to perform periodic walk-throughs of the area to ensure compliance with applicable ES&H requirements.

Managers must use lessons learned information as an aid in planning and performing work safely in accordance with CG100.6.15, *Identify Operating Experience, and Share Lessons Learned*.

4.6 Training and Qualifying Safety Basis Documentation Preparers, Reviewers, and Approvers

For low-hazard industrial facilities, operations, and activities, safety basis documentation consists of a PHS and an HA. Members of the Workforce preparing, reviewing, and approving PHS will be expected to take ISMS100, *PHS Software Training*. Preparers of the PHS shall be knowledgeable about the facility, operation, or activity and the associated hazards.

Members of the Workforce who prepare, review, and approve HA documents will be expected to take HAZ500, *Hazard Analysis Overview Training*.

Note: The PHS document identifies hazards associated with the facility, operation, or activity and also identifies corporate-required training for those hazards. Managers may elect to have Members of the Workforce take additional training based on the output of the PHS and/or corporate ES&H policy area requirements.

4.7 Keeping Records

Managers shall ensure that records generated during the performance of hazard identification activities, hazard analyses, and readiness reviews are maintained in accordance with the Sandia Records Retention and Disposition Schedule. Records must be legible, authenticated, and maintained in a manner that prevents damage, loss, or deterioration.

Official records associated with this process may include but are not limited to the following:

- PHS document
- HA or SHA
- Hazard identification walk-throughs
- RR final reports
- Readiness review final reports

4.8 Implementing Quality Assurance

For low-hazard industrial facilities, operations, and activities, Members of the Workforce are expected to:

- Follow the ISMS framework for managing ES&H activities
- Perform all work per the procedures and controls specified by management
- Report problems, concerns, or suggestions for improvement to work procedures

Managers at all levels who oversee low-hazard industrial facilities, operations, and activities are responsible for ensuring that all work is planned and controlled in a safe manner as defined in the PHS, HA, and SHA documents based on the nature of the work and the associated risks.

Specifically, quality assurance for low-hazard industrial facilities, operations, and activities must address the following:

- Ensure the accuracy and completeness of safety basis information (e.g., hazards identification, material inventory, and reference material)
- Ensure the accuracy and completeness of safety basis documentation (e.g., PHS, HA, and SHA)
- Ensure that all hazards are appropriately identified, understood, and controlled
- Document the peer review for completeness and accuracy; confirm approval of any quantitative calculations and/or analyses

If the nature of the work defines the facility, operations, or activities as "radiological," additional requirements apply as outlined in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, Subpart A, *Quality Assurance Requirements*.

Chapter 5. Moderate-Hazard and High-Hazard Industrial Facilities

Subject Matter Expert: Marc Williams; SNL/CA Counterpart: N/A
MN471017, Issue G
Revision Date: October 12, 2017
Review Date: February 15, 2020

This chapter of the *Safety Basis Manual* is applicable to industrial facilities, operations, and activities that have been classified as moderate-hazard or high-hazard following completion of the PHS or other safety basis assessments. The chapter provides a formal and consistent methodology for developing and maintaining the appropriate safety basis documentation and processes.

Line managers of moderate-hazard or high-hazard industrial facilities, operations, or activities shall comply with this chapter to ensure compliance with 10 CFR 851, *Worker Safety and Health Program*, as implemented through PG470246, *10 CFR 851 Worker Safety and Health Program (WSHP)*.

Requests for exceptions to the safety basis process outlined in this chapter shall be submitted in writing to the ES&H Planning Department manager. These requests shall be processed in accordance with the requirements of CG100.1.7, *Request an Exception to a Corporate Policy System Document.* Consequences for violating Corporate Policy System rules will be determined in the same manner as other disciplinary actions.

5.1 Providing Safety Basis Documentation

For moderate-hazard and high-hazard industrial facilities, operations, and activities, managers must complete the PHS module and then ensure that the PHS document is approved (Table 2-1).

In addition, managers must complete an SA. The SA analyzes the identified hazards, and safety controls that comprise the safety envelope in detail so potential onsite and offsite impacts may be mitigated or eliminated.

5.1.1 Approval Authority for Safety Basis Documentation

SNL management has been delegated approval authority for the safety basis documentation for moderate-hazard industrial facilities, operations, and activities. DOE has approval authority for the safety basis documentation for high-hazard industrial facilities, operations, and activities (Table 2-1).

For moderate-hazard facilities, operations, and activities where DOE/NNSA has delegated authorization authority to SNL management, safety basis documentation is managed as follows:

- Line organizations work with ES&H Planning personnel to plan and develop the safety basis documentation
- Sandi line organizations submit the safety basis documentation to ES&H Planning personnel
- ES&H Planning personnel review the safety basis documentation for concurrence
- Line organization management approves the final safety basis documentation

5.1.2 Safety Assessment Document Process

As outlined in Figure 5-1, a systematic process is followed for developing and maintaining an SA. Key programmatic elements are as follows:

- Perform the SA and prepare the accompanying document
- Provide an independent review and concurrence for the SA
- Complete the SA document approval process
- Maintain the SA document via the MOC process
- Review the SA requirements annually and update as needed

Work outside the controls established for the hazards identified in the SA document and PHS, without additional revision and approvals, is not permitted.

The process for developing an SA document is illustrated in Figure 5-2. This includes a development plan, document development, an internal peer review, and independent review by ES&H Planning personnel. Appendix IF-01, "IFSB Development of SB Documents," describes the process for developing IFSB documents.

Figure 5-3 outlines the independent review process for an SA document. Appendix IF-02, "IFSB Independent Review Process," describes the steps for reviewing an SA document.

The process for approving an SA document is illustrated in Figure 5-4. Appendix IF-03, "IFSB Document Approval Process," discusses the steps for approving an SA document.

The purpose of the annual review is to update, as necessary, the SA document. This ensures that the SA document includes the latest information and reflects current facility, operation, or activity configuration. Appendix IF-04, "IFSB Annual Update Process," provides the steps for completing an annual review and updating an SA document.

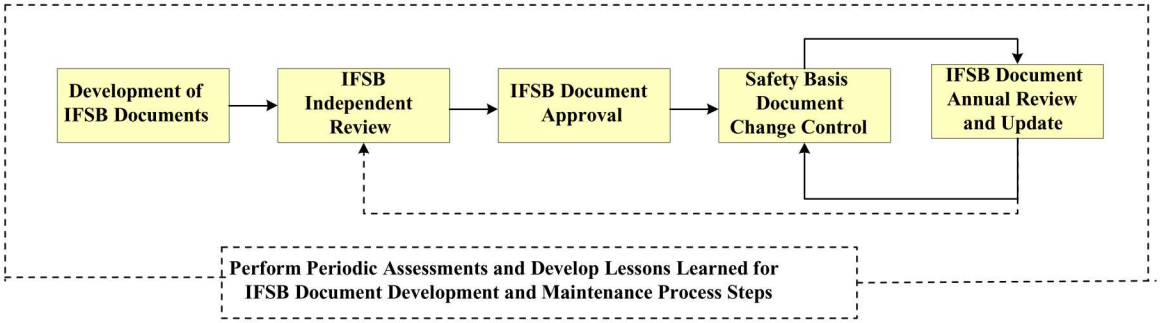

Figure 5-1. Safety basis document development and maintenance process overview

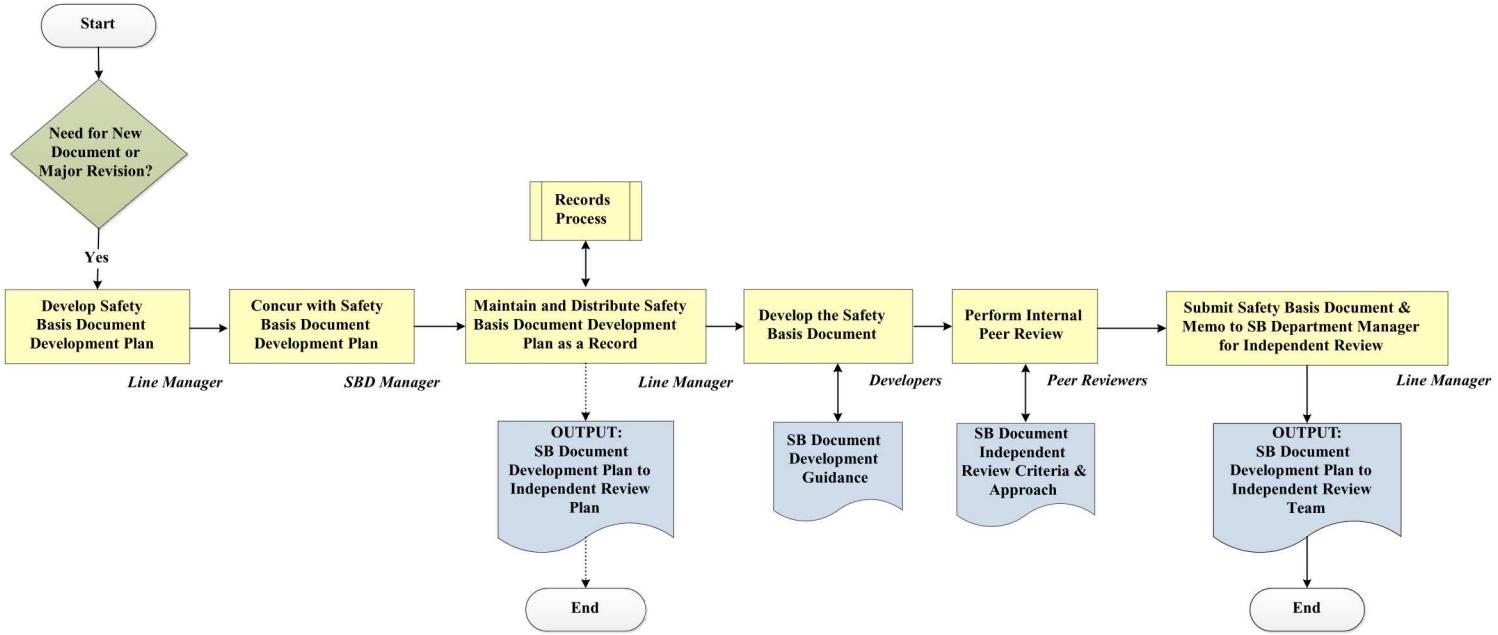

Figure 5-2. SA document development process

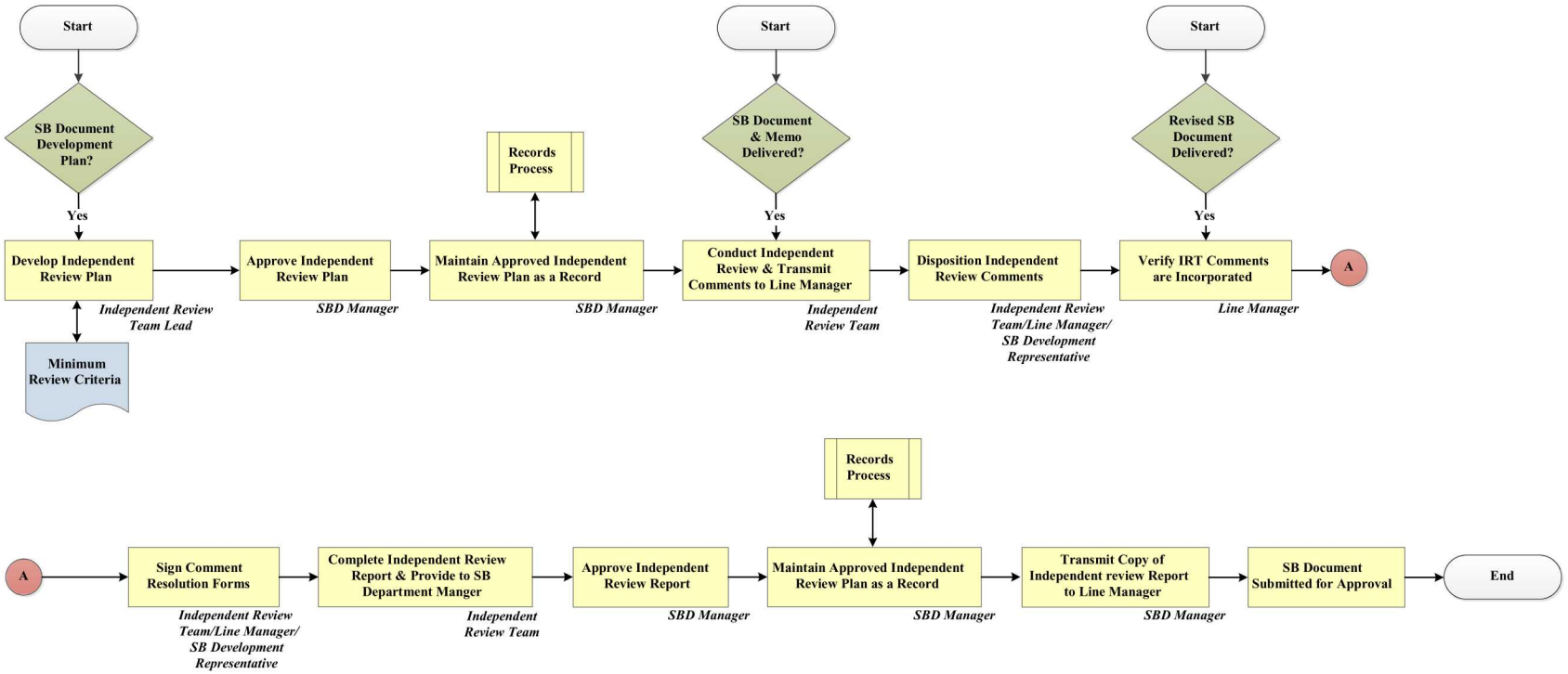

Figure 5-3. SA document independent review process

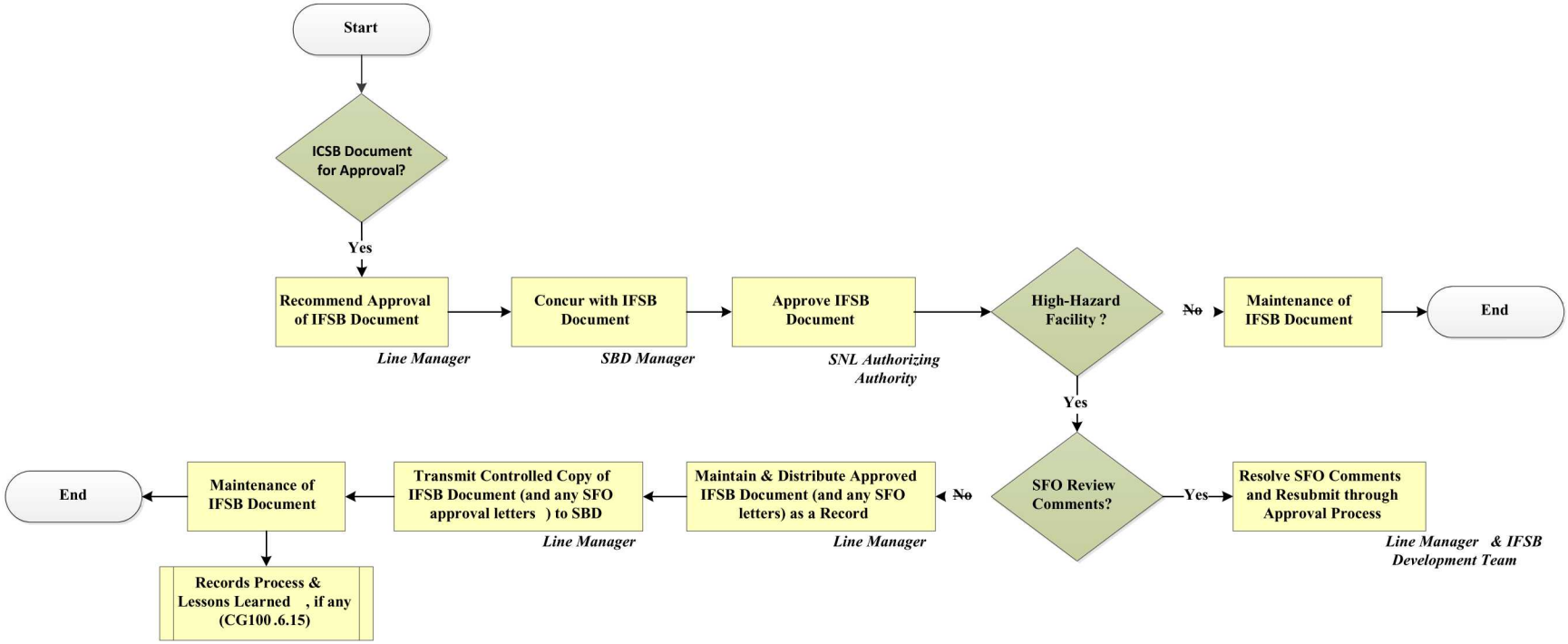

Figure 5-4. SA document approval process

5.2 Implementing and Verifying Controls

For moderate-hazard and high-hazard industrial facilities, operations, and activities, hazards and their controls are identified in the PHS and SA documents. Managers are expected to comply with all action statements identified in the PHS and SA documents and verify that all identified controls are implemented.

5.2.1 Implementation Validation Review

The manager or designee for a moderate-hazard or high-hazard facility, operation, or activity should perform an IVR when changes are made to the SA document. The IVR is intended to help personnel validate adequate implementation of SA document changes prior to operating under a new or revised safety envelope.

An IVR may also be used to ensure that operational readiness has been effectively established following:

- Extended outages
- Preparations for modifications to safety structures, systems, or components (SSCs) (this includes providing relevant operational information to personnel performing the modifications)
- Modifications to safety SSCs
- Process changes that do not lead to the need for an RR (an IVR may be used as preparation for a RR)

Appendix SB-04, "Implementation Validation Review," describes the steps for conducting an IVR, and Tool SB-01-T, "Implementation Validation Review (IVR) Checklist," is used to document an IVR.

5.3 Determining Readiness

The startup and restart process for moderate-hazard and high-hazard facilities, operations, and activities is based on PG470252, *Integrated Safety Management System (ISMS) Description*, and ESH100.1.WPC.1, *Plan and Control Work*. The applicable process is determined by the hazard classification.

Prior to the initial startup or subsequent restart of a moderate-hazard or high-hazard facility, operation, or activity, the manager is expected to perform and document a walk-through of the space before occupancy to ensure that ES&H requirements have been met.

In addition, the manager is responsible for ensuring that an RR is performed in accordance with Appendix RR-03, "Startup and Restart Procedure for Moderate and Accelerator Facilities/Activities." The line organization that owns the operation shall prepare for the readiness review process, including implementing controls. ES&H Planning personnel will complete the readiness review independently when it has been determined that operations are ready.

Operational readiness is required prior to commencement of a moderate-hazard or high-hazard operation or activity and must be completed before a readiness review (RR) is conducted. The process of achieving operational readiness verifies the following:

- The operation or activity can be operated safely within the boundaries of the authorization basis for the safety envelope
- The operation or activity is physically ready to start up
- The operation or activity meets approved design requirements
- Personnel are trained and qualified to perform the operation or activity
- The operation or activity will be performed in compliance with safety management program requirements
- Necessary infrastructure controls are in place and operational

The MSA and IVR are the primary tools used for achieving operational readiness.

5.3.1 Management Self-Assessment

Managers are responsible for completing a formal MSA prior to the independent RR for the start or restart of a new moderate-hazard industrial facility, operation, or activity. Appendix SB-05, "Management Self-Assessment," describes how to establish operational readiness and define the expectations, including deliverables and associated objective evidence, necessary to demonstrate satisfactory achievement of operational readiness. Completion of the MSA using Tool SB-02-T, "Management Self-Assessment (MSA)," provides an acceptable format.

5.3.2 Approval Authority for Determining Readiness

SNL management has approval authority for the readiness review process for moderate-hazard industrial facilities, operations, and activities. DOE has approval authority for the readiness review process for high-hazard industrial facilities, operations, and activities (Table 2-1).

5.4 Authorization Agreement for High-Hazard Industrial Facilities

An authorization agreement (AA) is required for high-hazard industrial facilities. It is the documented agreement between DOE/NNSA/SFO and SNL to conduct high-hazard operations and incorporates the results of a DOE review of SNL management's proposed authorization basis for a defined scope of work. The AA contains specific terms and conditions under which SNL is authorized to perform the work. Any changes to these terms and conditions require DOE approval. Specifically, the AA is a tool for documenting the following:

- DOE assurance, through evaluation of SNL management's proposed authorization basis, that work can be conducted safely
- DOE authorization to perform work, subject to the specific terms and conditions
- SNL management's commitment to conduct work in accordance with DOE's specific terms and conditions (including applicable requirements)

Note: Requirements and guidance for developing an AA are documented in Appendix SB-08, "Authorization Agreements."

5.5 Managing Change

For moderate-hazard or high-hazard industrial facilities, operations, and activities, the PHS (see Section 2.2) shall be reviewed and updated annually. In addition, the PHS must be updated and approved when changes are made—as a result of changes to requirements or to the scope of work—that would alter any of the answers to the questions in the PHS. Changes to the PHS may lead to subsequent changes in PHS-generated action items, such as warning messages and training requirements. The documentation (e.g., training plans and TWDs) used to administer these controls will also need to be updated.

The SA document is controlled through a formal management of change (MOC) process, which includes appropriate review and approval of any proposed changes to the document.

Appendix IF-05, "IFSB Management of Change Process," documents the MOC process, as illustrated in Figure 5-5. A qualified MOC reviewer will screen each MOC. For MOCs resulting in a negative MOC determination, the line manager will approve and sign the MOC. For MOCs resulting in a positive MOC determination, the ES&H Planning Department manager will review, approve, and sign the MOC for concurrence, and then the line manager will approve and sign the MOC.

5.6 Performing Periodic Assessments and Applying Lessons Learned

For moderate-hazard and high-hazard industrial facilities, operations, and activities, managers are responsible for performing assessments as follows:

- Perform periodic assessments of procedures and controls
  - Identify, communicate, and correct performance or compliance issues
  - Observe, assess, and improve work processes
  - Identify findings, observations, noteworthy practices, and lessons learned
- Sample MOC screens and documents periodically

In addition, it is a best practice to perform periodic walk-throughs of the area to ensure compliance with applicable ES&H requirements.

Managers must use lessons learned information as an aid in planning and performing work safely in accordance with CG100.6.15, *Identify Operating Experience, and Share Lessons Learned.*

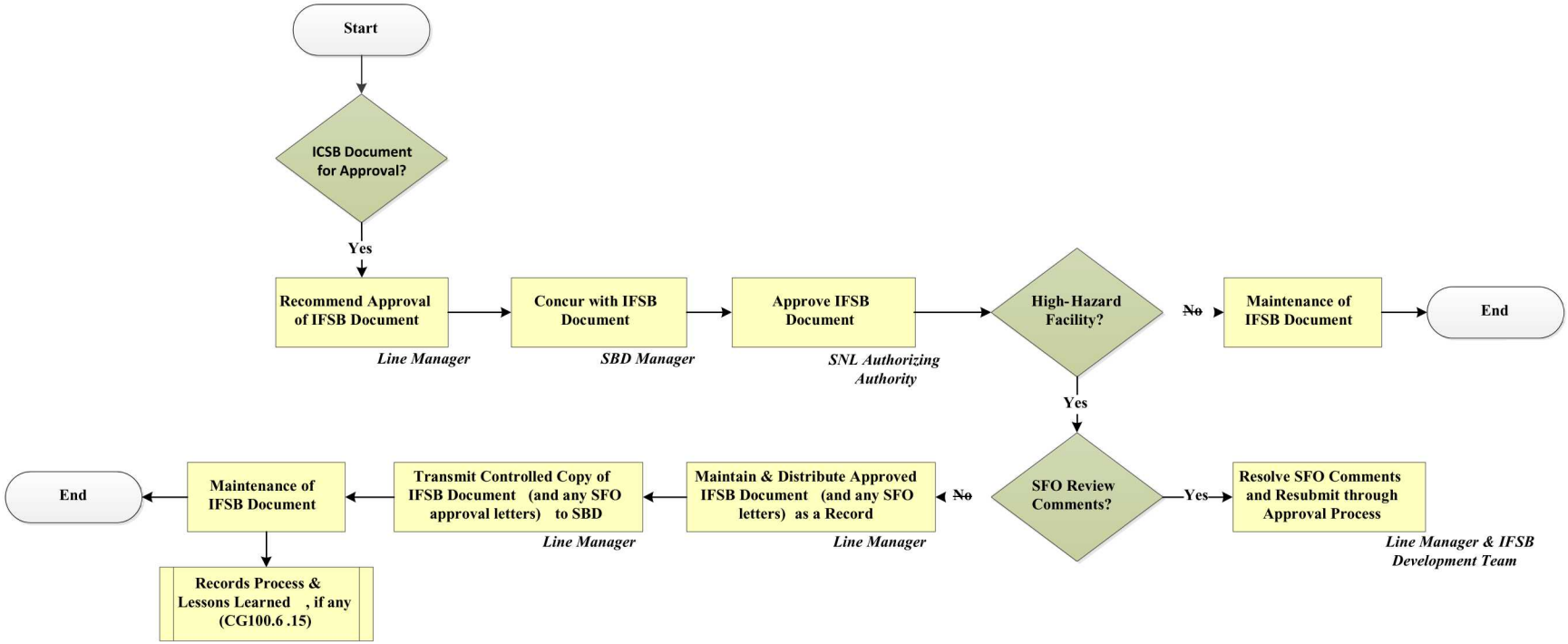

Figure 5-5. MOC process for a SA document

Note: The MOC process may be called an Unreviewed Safety Issue (USI) process, a safety envelope change management, or an Unreviewed Safety Question (USQ) process.

5.7 Training and Qualifying Safety Basis Documentation Preparers, Reviewers, and Approvers

For moderate-hazard and high-hazard industrial facilities, operations, and activities, safety basis documentation consists of a PHS and an SA. Members of the Workforce preparing, reviewing, and approving the PHS will be expected to take ISMS100, *PHS Software Training*. Preparers of the PHS shall be knowledgeable of the facility, operation, or activity and with the associated hazards.

Members of the Workforce responsible for preparing, reviewing, and approve the SA will be expected to take HAZ500, *Hazard Analysis Overview Training*.

Note: The PHS document identifies hazards associated with the facility, operation, or activity and also identifies corporate-required training for those hazards. Managers may elect to have Members of the Workforce take additional training based on the output of the PHS and/or corporate ES&H policy area requirements.

5.8 Keeping Records

Managers shall ensure that records generated during the performance of hazard identification activities, hazard analyses, and readiness reviews are maintained in accordance with the Sandia Records Retention and Disposition Schedule. Records must be legible, authenticated, and maintained in a manner that prevents damage, loss, or deterioration.

Official records associated with this process may include but are not limited to the following:

- PHS document
- SA or SHA
- Hazard identification walk-throughs
- Independent review plans and reports
- IVR documentation, report, and checklists
- MOC forms
- MSA reports
- RR final reports

5.9 Implementing Quality Assurance

For moderate-hazard or high-hazard industrial facilities, operations, and activities, Members of the Workforce are expected to:

- Follow the ISMS framework for managing ES&H activities
- Perform all work per the procedures and controls specified by management
- Report problems, concerns, or suggestions for improvement to work procedures

Managers at all levels who oversee moderate-hazard or high-hazard facilities, operations, and activities are responsible for ensuring that all work is planned and controlled in a safe manner as defined in the PHS document and the SA document, based on the nature of the work and the associated risks.

Specifically, quality assurance for moderate-hazard and high-hazard industrial facilities, operations, and activities must address the following:

- Ensure the accuracy and completeness of safety basis information (e.g., hazards identification, material inventory, and reference material)
- Ensure the accuracy and completeness of safety basis documentation (e.g., PHS and SA)
- Ensure that all hazards are appropriately identified, understood, and controlled
- Document the peer review for completeness and accuracy; confirm approval of any quantitative calculations and/or analyses

If qualifying quantities of highly hazardous chemicals or fuels are present, 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*, also applies.

If the nature of the work defines the facility, operation, or activity as "radiological," then additional requirements apply as outlined in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, Subpart A, *Quality Assurance Requirements*.

5.10 References

5.10.1 Requirement Drivers

DE-NA0003525*, Management and Operating Contract between National Technology & Engineering Solutions of Sandia, LLC, and DOE*:

- Section H, "Special Contract Requirements," H-8, "Sandia National Laboratories Management System"
- Section I, "Contract Clauses," "DEAR 970.5204-2 Laws, Regulations, and DOE Directives (Dec 2000) (Class Deviation)"
- Section I, "Contract Clauses," "DEAR 970.5215-3 Conditional Payment of Fee, Profit, and Other Incentives—Facility Management Contracts (Aug 2009) Alternate II (Aug 2009) (NNSA Class Deviation of Oct 2011) (NNSA Class Deviation May 2016)"
- Section J, Appendix B, "Statement of Work," Section 2.7, "Integrated Safety Management, Integrated Safeguards and Security Management, Environmental Management System, and Quality Assurance Systems"

DOE O 414.1D*, Quality Assurance.*

DOE O 420.1C Chg 1, *Facility Safety*.

DOE P 450.4A, *Integrated Safety Management Policy*.

SNL, Corporate Procedure ESH100.2.SB.1, *Establish the Safety Basis of Operations*.

SNL, PG470252, *Integrated Safety Management System Description.*

SNL, PG470246, *10 CFR 851 Worker Safety and Health Program (WSHP)*.

5.10.2 Additional Drivers

10 CFR 820, *Procedural Rules for DOE Nuclear Activities*.

10 CFR 830, *Nuclear Safety Management*, Subpart A, "Quality Assurance Requirements."

10 CFR 851, *Worker Safety and Health Program*.

29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*.

40 CFR 68, *Chemical Accident Prevention Provisions.*

Chapter 6. Nuclear Facilities Classification

Subject Matter Expert: Jeffrey Marr; CA Counterpart: N/A
Contributors: William Schwinkendorf, Keith Voss
MN471017, Issue H
Revision Date: October 12, 2017
Review Date: February 15, 2020

This chapter of the *Safety Basis Manual* applies to nuclear facilities, and the operations and activities that occur in them, which have been classified as hazard category (HC 1, HC-2, or HC-3) DOE nuclear facilities following completion of the PHS or other safety basis documentation. This chapter provides a formal and consistent methodology for developing and maintaining the appropriate safety basis documentation and processes. Appendix NF-01, "Nuclear Facility Hazard Categorization," provides the guidance and logic for categorizing nuclear facilities.

Title 10 CFR 830, *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements," requires the M&O contractor responsible for an HC1, HC2, or HC 3 DOE nuclear facility to establish, maintain, and perform work in accordance with the approved safety basis developed for that facility.

Managers who plan to develop or modify operations or activities that would result in an HC-1, HC-2, or HC-3 nuclear facility classification shall consult the ES&H Planning Department for assistance during the early planning stages of the safety basis process.

6.1 Providing Safety Basis Documentation

6.1.1 Nuclear Facility Safety Basis Planning Documents

6.1.1.1 Nuclear Facility Safety Basis Strategy Document

Because developing and revising NFSB documents requires substantial resources, an extended time line, and coordination with multiple diverse organizations, all affected parties need to create and agree to a planning strategy. This strategy is documented in a nuclear safety basis strategy document.

The purpose of the nuclear safety basis strategy document is to document agreement by all affected parties with the following:

- The reason for a new or revised nuclear safety basis document
- The scope of the document or change
- The safe harbor approach to be used for document development or change
- Roles and responsibilities of the affected parties
- Modifications or deviations to the review and approval process
- The document development milestone and schedule and key assumptions these are based on

Appendix NF-02, "Nuclear Safety Basis Strategy Document," provides a template for the content of a Nuclear Safety Basis Strategy document.

Note 1: Revisions to NFSB documents that have a fixed regulatory time line and require a quick turnaround time to DOE/NNSA, such as page changes associated with a Potentially Inadequate Safety Analysis (PISA) or a positive Unreviewed Safety Question Determination (USQD), must follow the requirements in Appendix NF-02. A new Nuclear Safety Basis Strategy document is not required.

Note 2: Annual updates that consist of (1) editorial changes or changes resulting from negative USQDs that do not have the potential to change any technical aspect of the nuclear safety basis document or (2) conclusions reached also do not require a new Nuclear Safety Basis Strategy document. However, these changes must be verified as editorial or as having no technical aspect via consultation with ES&H Planning personnel, and letter notification must be provided to the ES&H Planning Department and to DOE/NNSA/SFO identifying the schedule for submitting the annual update with the list of negative USQDs.

6.1.1.2 Startup Notification Report

A Startup Notification Report (see GN470109, Section 3.6) shall be submitted to DOE/NNSA/SFO on a quarterly basis, and shall identify HC-1, HC-2, and HC-3 DOE nuclear facilities, operations, or activities anticipated to start or restart within the next 12 months.

The purpose of the Startup Notification Report is to provide formal notification to DOE/NNSA regarding:

- Startup or restart of nuclear facilities, operations, or activities for which an ORR or an RA is anticipated
- Possible differences of opinion as to whether an RR is required

6.1.2 Nuclear Safety Basis Documentation

Title 10 CFR 830, *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements," requires the M&O contractor responsible for an HC-1, HC-2, or HC-3 DOE nuclear facility, operation, or activity to establish, maintain, and perform work in accordance with the approved safety basis. The approved safety basis is a contract with DOE/NNSA/SFO for SNL Members of the Workforce to operate HC-1, HC-2, or HC-3 DOE nuclear facilities. The analyses and hazard controls outlined in these documents constitute the safety basis that SNL and DOE/NNSA personnel use to establish that the nuclear facility can be operated safely with respect to workers, the public, and the environment.

For nuclear facilities, operations, and activities, managers must complete the PHS module and then ensure that the PHS document is approved (Table 2-1).

Managers shall complete the required safety basis documentation. The required safety basis documentation depends on factors such as facility and life cycle. Nuclear safety basis documentation includes the following:

- Safety analyses
  - JCO for temporary unplanned conditions
  - BIO for limited-life operations
  - Safety basis supplements for limited-scope changes to existing operations
  - DSAs for reactors
  - DSAs for nuclear onsite transportation activities
  - DSAs for all other HC1, HC2, or HC3 DOE nuclear facilities, operations, or activities
- TSRs
- USQDs
- Any referenced correspondence, reports, studies, and calculations that DOE/NNSA uses as the basis for approval for a nuclear facility, operation, or activity

The following appendices provide generic information that can be used to support development of nuclear facility safety basis documentation:

- Appendix NF-03, "Developing a NFSB Hazard Analysis"
- Appendix NF-04, "Integrating NFSB Hazard Analysis Activities"
- Appendix NF-05, "NF Accident Analysis"
- Appendix NF-06, "NF Dispersion Analysis"
- Appendix NF-07, "NF Control Selection"

The contractor shall update the safety basis documentation to keep it current and to reflect changes in the facility, the work, and the hazards as they are analyzed in the DSA. The contractor shall incorporate any changes, conditions, or hazard controls directed by DOE into the safety basis documentation, and then annually submit to DOE either the updated DSA for approval or a letter stating that there have been no changes in the DSA since the prior submission.

6.1.2.1 Preliminary Documented Safety Analysis

A PDSA is prepared prior to construction of a new HC-1, HC-2, or HC-3 DOE nuclear facility or major modification to an existing nuclear facility.

PDSAs for new facilities or major modifications serve as the principal safety basis for the DOE/NNSA/SFO decision to authorize design, procurement, construction, and preoperational testing. PDSAs provide design input separate from and in addition to the Life Safety Codes. The essential characteristic of a PDSA is that all activities described in the document are identified as preliminary. During construction, the DSA is developed based on the facility as it is to be built and as it will be operated, including a final description of needed safety management programs.

Analyses in the PDSA are based on conceptual or preliminary design and do not warrant fine-tuning at this stage of operation, project, or activity 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 well understood. For other operations, projects, or activities, where accidents may be unique or have special considerations that challenge the evaluation guideline for the public, it may be best to fully develop accident analyses to ensure that hazards can be controlled adequately. The decision is made on a facility-by-facility basis and in consultation with DOE/NNSA/SFO.

PDSAs for proposed HC2 or HC3 DOE nuclear facilities are required to receive either approval by DOE/NNSA/SFO or a waiver per 10 CFR 830, *Nuclear Safety Management*, §206(b) prior to procuring materials or components or before beginning construction (approval is requested via a pre-procurement letter). The PDSA may be updated, as necessary, until the final DSA is developed.

PDSAs are approved by DOE/NNSA/SFO before SNL Members of the Workforce can procure materials or components or begin construction. DOE/NNSA/SFO may authorize SNL management to perform limited procurement and construction activities without approval of a PDSA if it determines that the activities are not detrimental to the public, the worker, or the environment and are in the best interests of DOE/NNSA. Authorization of limited activities does not supersede DOE/NNSA review of the PDSA.

PDSAs should follow the format and content in DOE-STD-1189-2008, *Integration of Safety into the Design Process*. In addition, they should follow the applicable safe harbor format to the maximum extent possible; the PDSA can then be converted more easily to a DSA when the design is finalized.

Note: DOE-STD-1189-2008 has significant documentation requirements for new construction and major modifications that may precede the development of the PDSA.

6.1.2.2 Nonreactor Nuclear Facility Documented Safety Analysis

Title 10 CFR 830 identifies DOE-STD-3009-94, Change Notice No. 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analyses*, as the safe harbor for most nonreactor nuclear facilities. Appendix NF-08, "Nonreactor Nuclear DSA," outlines the process for developing a nonreactor nuclear DSA.

Note: A DSA for new construction is based on "as-built" and "as proposed to operate" basis compared to a typical DOE-STD-3009-94 "as-built, as-operated" basis.

6.1.2.3 Nuclear Reactor Facility Documented Safety Analysis

Per DOE-STD-1027-92, all reactor facilities are categorized as HC1 or HC2. Category A reactors (power-generating reactors) are categorized as HC1. Category B reactors (research reactors) are categorized as HC.

Nuclear Regulatory Commission (NRC) Regulatory Guide 1.70, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*, is identified as the safe harbor (identified in Appendix A to Subpart B of 10 CFR Part 830) for nuclear reactor facilities. At SNL, nuclear reactor DSAs are developed using a hybrid of NRC and DOE/NNSA methodologies. The NRC methodology is consistent with decades of NRC experience with power and non-power reactors.

The DOE/NNSA methodology is consistent with DOE-STD-3009-94 and is used for worker safety, hazard categorization, and safety classification of controls.

For requirements and guidance on developing a nuclear reactor DSA, see Appendix NF-09, "Nuclear Reactor DSA."

6.1.2.4 Nuclear Onsite Transportation Documented Safety Analysis

A DSA is required for onsite transfer of nuclear material that deviates from Department of Transportation regulations for hazardous materials. DOE O 460.1C, *Packaging and Transportation Safety*, is the safe harbor for preparing a safety analysis report for packaging and onsite transportation. Alternately, DOE G 460.1-1, *Implementation Guide for Use with DOE O 460.1A, Packaging and Transportation Safety,* is identified as the safe harbor for most onsite nuclear transportation DSAs. For requirements and guidance on developing a DSA for onsite transportation activities, see Appendix NF-10, "Nuclear DSA for Onsite Transportation Activities."

6.1.2.5 Decommissioning a Nuclear Facility Documented Safety Analysis

Title 10 CFR 830 identifies DOE-STD-1120-2005, *Integration of Environment, Safety, and Health into Facility Disposition Activities*, volumes 1 and 2, as the safe harbor for decommissioning a nuclear facility. SNL management currently has no plans to decommission a nuclear facility.

6.1.2.6 Approval Authority for Safety Basis Documentation

DOE has approval authority for the safety basis documentation for all HC-1, HC-2, and HC-3 DOE nuclear facilities, operations, and activities (Table 2-1). Currently, there are no HC-1 nuclear facilities at SNL.

For these nuclear facilities, operations, and activities where DOE/NNSA has retained authorization authority, safety basis documentation is managed as follows:

- Line organizations prepare safety basis documentation and submit it to ES&H Planning personnel
- ES&H Planning personnel review the safety basis documentation for concurrence
- Line organization management approves the safety basis documentation for submittal to DOE/NNSA/SFO
- DOE/NNSA reviews the safety basis documentation for approval

6.1.3 Nuclear Facilities Safety Basis Document Process

The safety basis for a nuclear facility, operation, or activity is derived by analyzing the facility, the work to be performed, and the associated hazards and then identifying the conditions, safe boundaries, and hazard controls necessary to protect workers, the public, and the environment from adverse consequences.

The DSA development process includes the identification of hazards; assignment of controls to prevent and mitigate potential accidents; and a description of commitments for design, construction, operation, and disposition of the facility and controls. The process of completing a DSA and the corresponding control set (e.g., TSRs) ensures adequate safety at DOE nuclear facilities with respect to workers, the public, and the environment.

Title 10 CFR 830, *Nuclear Safety Management*, Subpart B requires that a DSA for a nuclear facility do the following:

- Describe the facility and the work to be performed.
- Categorize the facility in accordance with DOE-STD-1027-92, *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 man-made hazards.
- Derive the hazard controls, including technical safety requirements, to eliminate, limit, or mitigate identified hazards, and define the process for keeping 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, operation, or activity, including a criticality safety program, where applicable.

Supplemental Guidance NNSA SD G 1027 Admin Change 1, *Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1*, was released on May 13, 2014, to provide a consistent approach and to facilitate the use of updated dosimetry and release fractions when categorizing a nuclear facility. Categorization of nuclear facilities will be performed in accordance with DOE STD 1027-92 and NNSA SD G 1027 as described in Appendix NF-01, "Nuclear Facility Hazard Categorization."

Figure 6-1 outlines the process used to determine the type of planning and safety basis documentation required for a nuclear facility, operation, and activity.

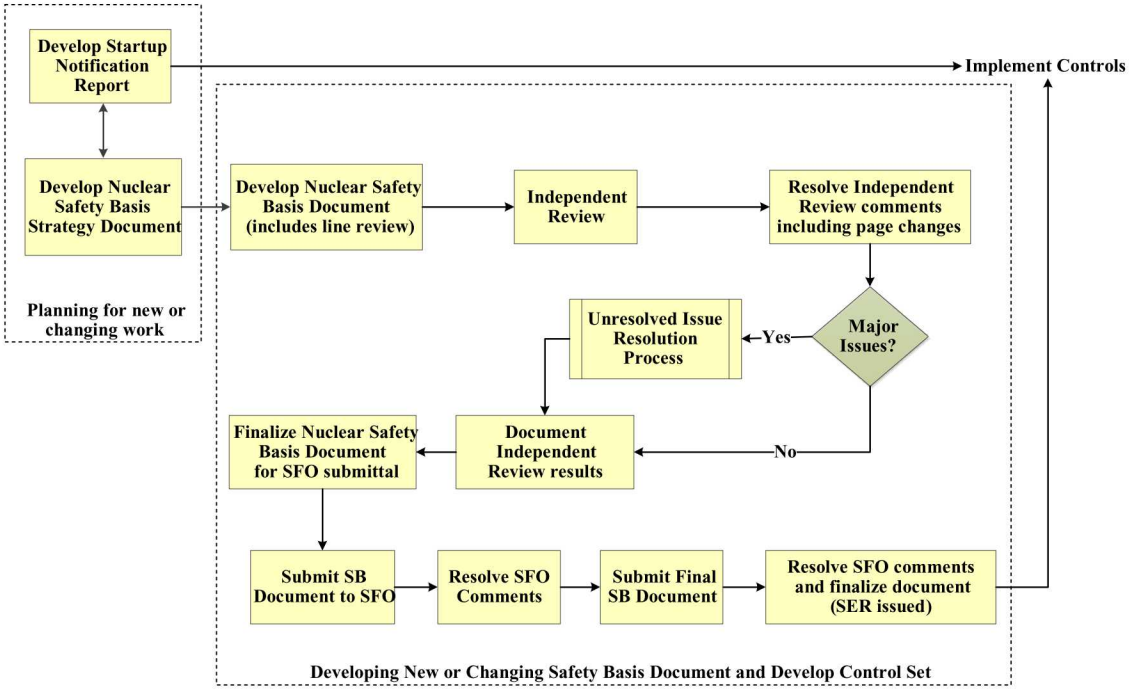

Figure 6-1. Nuclear safety basis document development process

The DSA achieves the following objectives:

- Systematically identifies significant facility- and activity-related hazards, hazardous materials, and energy sources by type, quantity, form, and location
- Ensures that the spectrum of hazard scenarios or accidents, which may occur as a result of facility operations or external initiators, is identified, understood, assessed, and documented
- Describes potential consequences to the public, the worker, and the collocated worker, and an estimate of the likelihood of occurrence for initiating events, hazard scenarios, and unmitigated and mitigated consequences and risk
- Identifies and derives potential controls that (1) prevent the occurrence of the scenario or accident or (2) mitigate its consequences such that they do not challenge evaluation guidelines to the public or create the potential for death or serious injury to the worker or collocated worker
- Identifies assumptions that need to be protected by controls
- Validates the appropriate facility hazard categorization
- Provides a basis for the selection of unique and bounding accident scenarios if accident analysis is required
- Identifies specific administrative controls and safety management programs relied upon to protect the public, collocated worker, or worker

6.1.3.1 Process Requirements

This manual implements requirements from the following sources for nuclear facilities:

- 10 CFR 830, *Nuclear Safety Management*
- American Institute of Chemical Engineers (AIChE), *Guidelines for Hazard Evaluation Procedures*, Center for Chemical Process Safety (CCPS)
- DOE O 231.1B Admin Chg 1, *Environment, Safety and Health Reporting*
- DOE O 414.1D, *Quality Assurance*
- DOE O 420.1C Chg 1, *Facility Safety*
- DOE O 425.1D Admin Chg 1, *Verification of Readiness to Start Up or Restart Nuclear Facilities*
- DOE O 460.1C, *Packaging and Transportation Safety*
- DOE O 461.1B, *Packaging and Transportation for Offsite Shipment of Materials of National Security Interest*
- DOE O 461.2, *Onsite Packaging and Transfer of Materials of National Security Interest*
- DOE O 471.1B, *Identification and Protection of Unclassified Controlled Nuclear Information*
- Office of Kirtland Site Operations (OKSO), Procedure OKSO-4205, *Authorization Basis Review and Approval*
- SNL, DE-NA0003525, *Management and Operating Contract between National Technology & Engineering Solutions of Sandia, LLC, and DOE*:

  - As incorporated in Section I, *Contract Clauses*, Clause I-19
- SNL, ESH100.2.SB.1, *Establish the Safety Basis of Operations*
- SNL, ESH100.2.SB.2, *Nuclear Criticality Safety Program*
- SNL, ESH100.2.SB.3, *Implement the Unreviewed Safety Question Process for Nuclear Facilities*
- SNL, ESH100.2.SB.4, *Implement the Startup and Restart Process for Nuclear Facilities, Activities, and Operations*
- SNL, GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*

6.1.4 Limited-Term Nuclear Facility Safety Basis Documentation

6.1.4.1 Justification for Continued Operations

Situations may arise in which it is necessary to depart from using the approved safety basis for nuclear facilities, operations, or activities for short periods of time to account for unexpected conditions. Any such departure from the approved safety basis must be the subject of careful consideration since it is likely to involve an increased risk to the facility, operation, or activity.

DOE/NNSA has approved the use of the JCO process to accommodate the continuation of facility operations, research, or production when specified requirements cannot be met. In general, a JCO can serve as a valuable tool for temporarily amending the approved safety basis to address emergent conditions. Because JCOs represent a need to depart from the safety basis, it is important that the process for their preparation, review, and approval be of a quality commensurate with that for the process used to develop and approve the original safety basis to ensure the safe and reliable operation of defense nuclear facilities.

For requirements and guidance on developing a JCO, see Appendix NF-11, “Details on Developing a NF Justification for Continued Operations.”

Note: JCOs cannot be used for planned events or activities.

6.1.4.2 Basis for Interim Operations

A BIO is an acceptable form of a DSA for a nuclear facility, operation, or activity with a limited operational life; the deactivation of a nuclear facility; or the transition surveillance and maintenance of a nuclear facility. The approved methodology for preparing a BIO is contained in DOE-STD-3011-2002, *Guidance for Preparation of Basis for Interim Operation (BIO) Documents*.

For requirements and guidance on developing a BIO, see Appendix NF-12, “Developing a Basis for Interim Operations.”

6.1.4.3 Safety Basis Supplement

Situations may arise when a planned activity of limited duration or scope cannot be performed within the bounds of an approved nuclear safety basis. The Safety Basis Supplement (SBS) is a document with which SNL management may request that DOE/NNSA review and approve a temporary modification of a nuclear facility safety basis and accompanying TSRs, thus allowing SNL personnel to execute planned activities that are beyond those currently approved in a nuclear safety basis. The SBS process offers an alternative to the requirement of processing a traditional revision to an approved nuclear safety basis for a limited duration or a limited-scope activity. The benefit of the SBS process is to allow a short-term or limited-scope change to be implemented without creating extensive changes to the nuclear safety basis that would have to be undone after the short-term activity is concluded.

For requirements and guidance on developing a Safety Basis Supplement, see Appendix NF-13, "Guidance on Developing a Safety Basis Supplement."

6.1.5 Controls for Nuclear Facilities (Technical Safety Requirements)

TSRs define the limits, controls, and related actions that establish specific parameters and requisite actions for the safe operation of nuclear facilities and activities. TSRs document the rules that apply to TSR implementation and change control, document the institutional safety programs applicable to the facility, develop the implementing details for the controls derived from the safety analysis, and document the basis for the controls to assist in control implementation and change control.

Title 10 CFR 830, *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements," requires SNL Members of the Workforce to develop TSRs and to operate a DOE nuclear facility in accordance with the provisions of DOE/NNSA-approved TSRs. TSRs are derived for each DOE-owned, contactor-operated facility, operation, or activity based on DSAs and any additional safety requirements established for the facility. TSRs are prepared and then submitted to DOE/NNSA/SFO for approval prior to use or implementation. Appendix NF-07, "NF Control Selection," and Appendix NF-14, "Development of Technical Safety Requirements (TSRs)," identify details on control selection and development of TSRs.

6.1.6 Other Documents Used to Establish the Approved Safety Basis for a Nuclear Facility

Any correspondence, reports, studies, and calculations referenced in the DSA, TSRs, or SERs and used as a basis for approval of a nuclear facility, operation, or activity are formally documented and maintained. Technical software used to generate these reports, studies, and calculations meet software quality assurance requirements and, to the extent possible, previously approved software (i.e., toolbox codes) should be used to generate technical results.

Note: This is not intended to require that commercial software meet software quality assurance requirements unless the software is being used in a technical capacity. For example, a word processing program would be considered nontechnical. An Excel spreadsheet used as the sole means of calculating total material at risk would be considered technical software.

Appendix NF-15, "Nuclear Safety Basis Calculations," provides details for safety analyses and calculations used as a basis for approval of a nuclear facility, operation, or activity.

6.1.7 Nuclear Facility Safety Basis Review and Approval Process

Prior to submittal of a nuclear safety basis document for independent review, a peer review is performed to determine whether the safety basis document accurately reflects the facility, operation, or activity and whether the controls generated are capable of being implemented. Figure 6-2, "Review and Approval Process," presents the review and approval process.

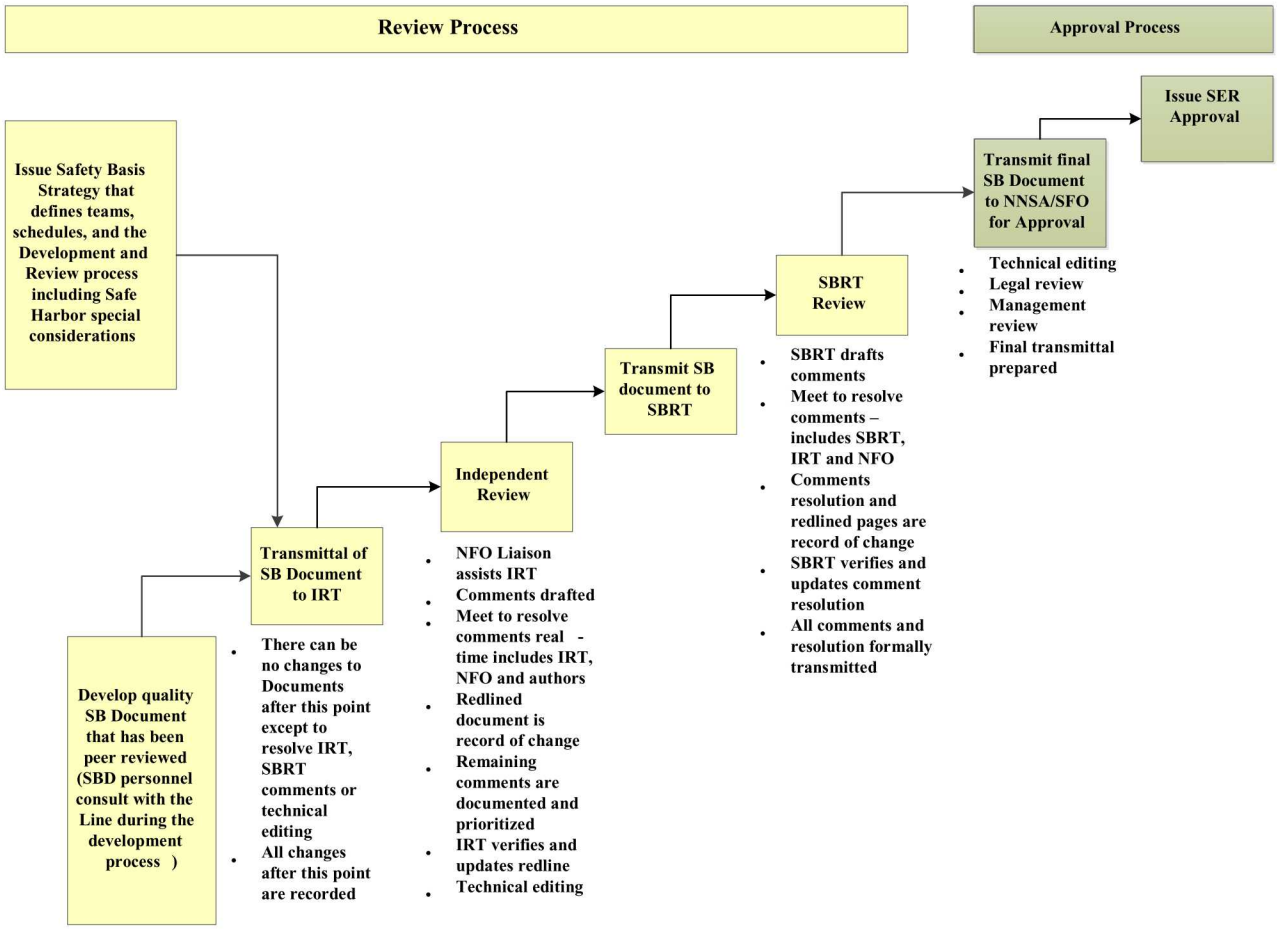

Figure 6-2. Review and approval process

An independent review is performed to determine whether the documents meet corporate and regulatory requirements and expectations. The DOE/NNSA SER documents the results of the DOE/NNSA review. Appendix NF-16, "Review and Approval Process for Nuclear Safety Basis Documents," provides details on the review and approval process for NFSB documents generated by SNL Members of the Workforce. USQDs are covered in a separate section.

6.1.7.1 Safety Evaluation Reports

DOE/NNSA issues an SER to approve the nuclear safety basis documents (DSA and TSRs) for a nuclear facility. The SER provides the DOE/NNSA review of the DSA, review of the TSRs, and basis for the conditions of approval. DOE-STD-1104-2009, *Review and Approval of Nuclear*

Safety Basis Documents (Documented Safety Analysis and Technical Safety Requirements), outlines the requirements for SER development. The SER is an integral part of a facility's safety basis.

6.1.8 Unreviewed Safety Question Process

For a nuclear facility, operation, or activity, proposed changes, tests, and experiments need to be evaluated against the safety basis prior to implementation. The Unreviewed Safety Question process is used to evaluate the proposed changes.

The USQ process allows Members of the Workforce to make physical and procedural changes to HC1, HC2, or HC3 DOE nuclear facilities, operations, and activities and to conduct tests and experiments without prior DOE/NNSA approval if the proposed change can be accommodated within the existing safety basis. In addition, the USQ process is applied to situations where new information leads to a new evaluation of the safety basis documentation for the facility, operation, or activity.

The USQ process does **not** determine whether a change is safe and is **not** a substitute for safety analysis. Safety of the change is determined separately and prior to entering the USQ process via an appropriate safety analysis.

GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*, implements the USQ process at SNL.

6.2 Implementing and Verifying Controls

For nuclear facilities, operations, and activities, hazards and their controls are described in the PHS, the DSA, and any associated TSRs. Managers shall ensure that controls are implemented.

6.2.1 Implementation Validation Review

The manager for a nuclear facility, operation, or activity is responsible for ensuring that an IVR is performed when changes are made to the DSA and any other safety basis documentation. The IVR is intended to help the senior manager or designee validate adequate implementation of safety basis documentation prior to operating under the new or revised safety basis.

An IVR may also be used to ensure that operational readiness has been effectively established following:

- Extended outages
- Modifications to safety SSCs
- Preparations for modifications to SSCs (including providing relevant operational information to personnel performing the modifications)
- Process changes that do not adversely affect operations to the level of requiring an RR.
- As preparation for a RR

Appendix SB-04, "Implementation Validation Review," describes the steps for conducting an IVR.

6.3 Determining Readiness

Prior to the initial start and subsequent restart of any HC-1, HC-2, or HC-3 nuclear facility, operation, or activity, the manager should perform and document a walk-through of the space before occupancy to ensure that ES&H requirements have been met. In addition, the manager is responsible for ensuring that an ORR or RA is performed in accordance with GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations*.

The startup and restart process for nuclear facilities, operations, and activities complies with the requirements of DOE O 425.1D Admin Chg 1, *Verification of Readiness to Start Up or Restart Nuclear Facilities*, and the guidance of DOE-STD-3006-2010, *Planning and Conducting Readiness Reviews*, and DOE-HDBK-3012-2003, *Guide to Good Practices for Operational Readiness Reviews (ORR), Team Leader's Guide*.

Operational readiness is required prior to commencement of a nuclear operation or activity and must be accomplished whether or not an RR is required. Operational readiness is a precursor to performing a readiness review that verifies that a facility, operation, or activity is ready to start or restart, in accordance with the requirements of DOE O 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*. The activity scope must be well defined and understood to ensure all required readiness actions are developed and accomplished. The scope must define the physical and administrative boundaries of the subject activity.

The process of achieving operational readiness determines the following:

- The operation or activity is safe to start or restart and can be operated safely within the boundaries of the authorization basis.
- The operation or activity is physically ready for start or restart.
- The operation or activity meets approved design requirements.
- Personnel are trained and qualified to perform, maintain, and support the operation or activity.
- The operation or activity will be performed in compliance with safety management program requirements.
- The necessary infrastructure and controls are in place and operational.

The MSA and IVR are the primary tools used for achieving operational readiness.

6.3.1 Management Self-Assessment

The line organization is responsible for conducting a formal MSA prior to RR of a nuclear facility, operation, or activity. The MSA plan includes the checklists, evaluation criteria, review methodology, qualification requirements for team members, reporting expectations, and established prerequisites.

Appendix SB-05, "Management Self-Assessment," describes how to conduct an MSA. Tool SB-02-T, "Management Self-Assessment (MSA)," provides a template for the MSA report and instructions on what should be included in each section of the report.

6.3.2 Approval Authority for Determining Readiness

DOE has approval authority for the readiness review process for all HC-1, HC-2, and HC-3 DOE nuclear facilities, operations, and activities (Table 2-1). Currently, there are no HC-1 nuclear facilities at SNL.

6.4 Authorization Agreements

An AA is required for HC-1 or HC-2 nuclear facilities, operations, and activities. An AA is a documented agreement between DOE/NNSA/SFO and SNL management to conduct nuclear operations and incorporates the results of a DOE review of the SNL proposed authorization basis for a defined scope of work. The AA contains specific terms and conditions under which SNL management is authorized to perform the work. Any changes to these terms and conditions require DOE/NNSA/SFO approval. Ultimately, the AA is the vehicle for documenting the following:

- DOE assurance, through evaluation of the SNL authorization basis, that work can be conducted safely
- DOE authorization to perform the completion of specific work activities, subject to the specific terms and conditions
- SNL management's commitment to complete the specified work activities in accordance with the specific terms and conditions, which include applicable requirements

Note: For requirements and guidance on developing an AA, see Appendix SB-08, "Authorization Agreements."

6.5 Managing Change

For nuclear facilities, operations, and activities, the PHS (see Section 2.2) shall be reviewed and updated annually. In addition, the PHS must be updated and approved when changes are made—as a result of changes to requirements or to the scope of work—that would alter any of the answers to the questions in the PHS. Changes to the PHS may lead to subsequent changes to PHS-generated action items, such as warning messages and training requirements. The documentation (e.g., training plans and TWDs) used to administer these controls will also need to be updated.

Managers shall ensure that the controls defined by the safety basis documentation are maintained through a formal configuration management process. Nuclear facilities implement an USQ Process. In the USQ process, managers ensure that the safety basis documentation is managed as a controlled document with appropriate reviews and approvals prior to making changes to the document. When evaluating changes, in addition to the questions provided in the USQ process, the following questions should be considered:

- Does the change have the potential to change the hazard categorization of the facility?
- Does the change add new dimensions or complexity to the hazard or accident analysis?
- Does the change affect the basic assumptions used in the safety basis documents?

- Does the change affect the basic physical characteristics of the facility (even if the change is considered an upgrade)?

Figure 6-3 provides a flow chart of the nuclear facility change control process. The three types of changes to safety basis documents include the following:

- Major revisions and modifications (per 10 CFR 830, a modification to a DOE nuclear facility that is completed on or after April 9, 2001, that substantially changes the existing safety basis for the facility) are processed in accordance with Section 6.1, "Safety Basis Documentation"
- Require DOE/NNSA approval of the change package
- Can be submitted as part of the annual update process.

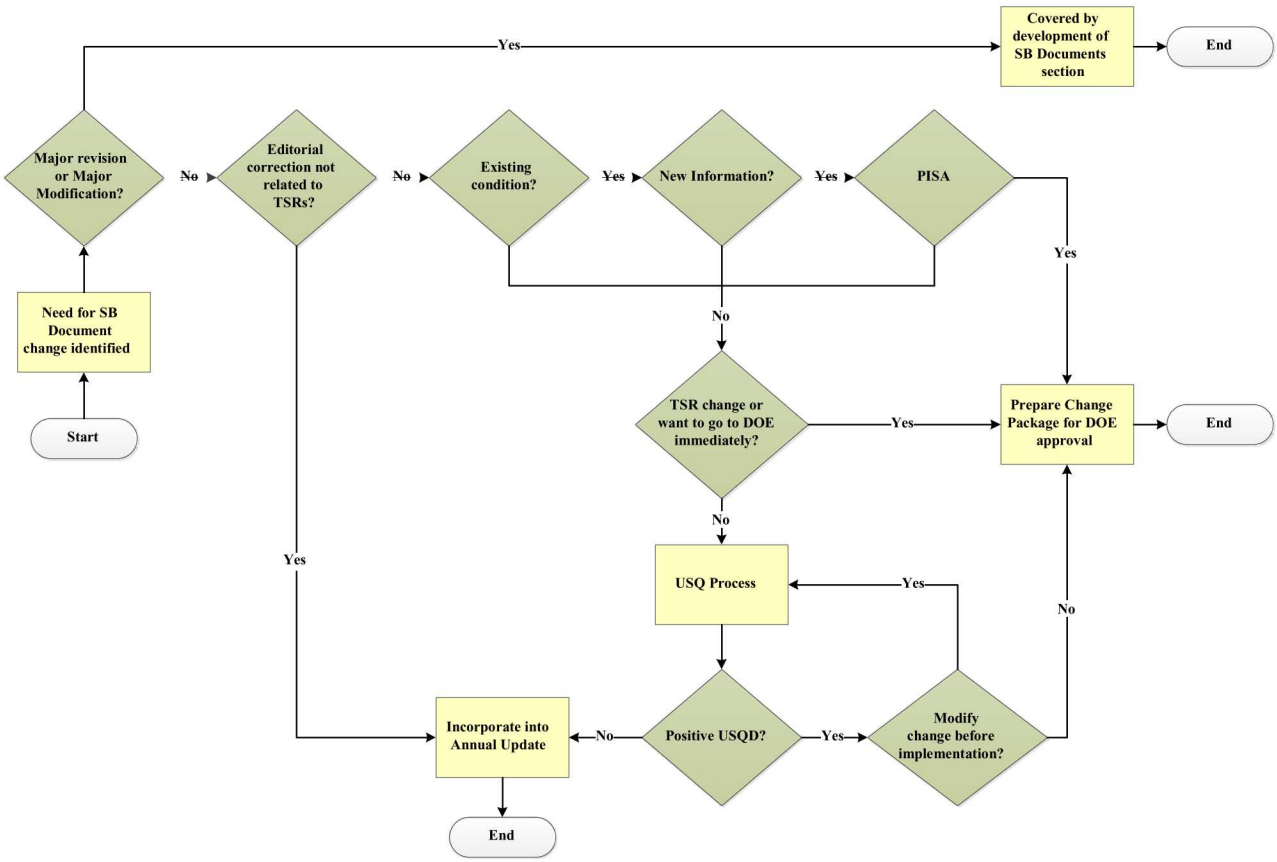

Figure 6-3. Change Process for Nuclear Safety Basis Documents

6.5.1 Major Revisions and Modifications

DOE-STD-1189-2008,*Integration of Safety into the Design Process*, defines a major modification, and Appendix NF-19, "Major Modification Determination Procedure," outlines the process for determining whether a physical modification to an SNL HC-1, HC-2, or HC-3 nuclear facility is considered a major modification. Five criteria, specified in Appendix NF-19, are used to determine whether a modification can be considered to be simple and therefore processed and documented using the USQ process, the normal change control process, and/or a work control process. If any of the simple modification criteria cannot be met, then a major modification evaluation shall be completed.

Table 6-1, "Major modification evaluation criteria," summarizes the criteria from DOE-STD-1189-2008 for determining whether a modification is a major modification. An integrated evaluation should be performed based on the collective set of answers to the evaluation criteria. In performing this evaluation, the focus should be on the nature of the modification and its impact on the existing facility safety basis. If the physical modification to the facility is determined to be a major modification, then the associated PDSA is required, as described in Section 6.1, "Providing Nuclear Safety Basis Documentation."

Table 6-1. Major modification evaluation criteria

Criterion Number	Evaluation Criteria	Discussion
1	Add a new building or facility with a material inventory HC-3 limit or increase the HC of an existing facility?	A new building may be a structure within an existing facility segment. That structure may or may not have direct process ties to the remainder of the segment/process. The requirements of DOE-STD-1027-92 and NNSA SD G 1027 are used to evaluate HC impacts.
2	Change the footprint of an existing HC-1, -2 or -3 facility with the potential to adversely affect any safety class (SC) or safety significant (SS) safety function or associated SSC?	A change in the footprint of an existing facility requires the identification and evaluation of any potential adverse impacts on SC or SS safety functions or associated SSC (e.g., structural qualification, evacuation egress path, fire suppression spray pattern) or safety analysis assumptions. Changes that may involve adverse impacts require careful attention to maintaining adherence to applicable engineering standards and nuclear safety design criteria.
3	Change an existing process or add a new process resulting in the need for a safety basis change requiring DOE approval?	A change to an existing process may negatively affect the efficacy of an approved set of hazard controls for a given event or accident. Likewise, potential safety concerns associated with a new process may not be adequately addressed by the existing approved control sets. In this case, it is assumed that the existing analyses addressed the hazards associated with the new or revised process, but the specified control set(s) may no longer be valid. The evaluation of any new hazards introduced by the revised or new process should be addressed via Criterion 6.
4	Utilize new technology or government furnished equipment (GFE) not currently in use or not previously formally reviewed /approved by DOE for the affected facility?	This assessment should include consideration of the impact that the use of new technology (including technology scale- up issues) or GFE may have on the ability to specify the applicable nuclear safety design criteria with a high degree of certainty in the early stages of the project. GFE may have a technical baseline that is not directly and fully supportive of the project functional and performance requirements. An example would be employing a new technology for removal of certain nuclides from a waste stream.

Criterion Number	Evaluation Criteria	Discussion
5	Create the need for new or revised safety SSCs?	Consideration should be given to the relative complexity of the controls and the ease with which the controls can be implemented. The use of a complicated multi-channel SC seismically qualified instrumented system to provide multiple interlock and alarm functions would typically pose a higher risk to the project than the use of a SS passive design feature. The degree of design and regulatory uncertainty should be addressed for this criterion for the development, review, and approval of new or revised safety analysis and attendant controls (e.g., presence of multiple regulatory/technical agencies on a single project).
6	Involve a hazard not previously evaluated in the DSA?	Hazards can include the introduction of an accident or failure mode of a different type from that previously analyzed in addition to radiological or toxicological hazards. The need to address a new hazard early in the design process may lead to some degree of uncertainty related to the proper specification of applicable nuclear safety design criteria. In such cases, this uncertainty should be addressed within this evaluation.
7	Involves a CAP with a TPC of $10M or greater?	The facility modification process described in DOE-STD-1189-2008 includes a determination of whether the modification applies to DOE O 413.3B. If a physical modification involves a CAP with a TPC greater than or equal to $50M, DOE Order 413.3B is fully applicable to the modification, including development of a Safety Design Strategy and safety documentation. If a physical modification involves a CAP with a TPC of $10M or greater, some elements of Order 413.3 apply to the modification.

CAP = Capital Asset Project
GFE = government-furnished equipment
SC = safety class
SS = safety significant
TPC = Total Project Cost

6.5.2 Changes in Safety Basis Requiring DOE/NNSA Approvals

The following changes require that a change package be submitted for DOE/NNSA approval in advance of the annual update:

- Any changes to the TSRs,
- Positive USQDs,
- Potentially Inadequate Safety Analysis (PISA), and
- Any other changes determined by the nuclear facility organization (NFO) to need DOE/NNSA approval.

The process for making changes requiring DOE/NNSA approval to the safety basis is detailed in Appendix NF-18, “Maintenance of Nuclear Safety Basis.”

6.5.2.1 New Information Process

When new information is discovered that has the potential to affect safety basis documentation for nuclear facilities, operations, or activities, the New Information Process provides a quick qualitative evaluation of the information in order to determine whether the PISA Process is required. For detailed steps of the New Information Process, refer to GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*.

6.5.2.2 Potentially Inadequate Safety Analysis (PISA) Process

The PISA Process evaluates situations where it is discovered that the existing configuration or operation of the facility may be different from that described in the safety basis or that supporting analyses may be different, inadequate, or invalid.

Note: The PISA Process **does not** apply to the process of upgrading DSA in response to new requirements or to the use of new or different analytical tools during the upgrade process. However, the PISA Process does apply when there is reason to believe that the current safety analysis might be in error or otherwise inadequate.

For detailed steps of the PISA Process, refer to GN470080, *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities*.

6.5.2.3 Changes to TSRs or Involving Positive USQDs

Changes to the TSRs and changes involving a positive USQD always require DOE/NNSA/SFO approval prior to implementation. If a proposed and unimplemented change is determined to affect the TSRs or involve a Positive USQD, the NFO may consider whether the change can be modified so that the change is with the current TSR and therefore, DOE/NNSA/SFO approval is not necessary. If not, the change must be submitted to DOE/NNSA/SFO for approval before implementation.

6.5.3 Annual Updates

SNL is required to review the need for DSA revisions at least annually. At a minimum, necessary revisions to the DSA include changes implemented at the facility six months prior to the submission of the annual update to DOE/NNSA. SNL is also required to review the need for TSR revisions at least annually. If no changes to the DSA/TSR are required, a letter to DOE/NNSA must be submitted notifying them of this result.

All negative USQDs that result from the USQ Process for a given annual cycle are reviewed and incorporated in the DSA for the previous year as part of the annual update to the DSA. In addition, minor editorial corrections and updates to regulatory or other references may be incorporated at this time. Editorial changes or changes that result from negative USQDs and do not have the potential to change any technical aspect of the document or conclusions reached may be deferred to the next annual update. These deferred changes will be documented in the review report and shall not be delayed beyond the next annual update. Along with the annual update, a summary report containing a listing and description of the USQDs prepared during the year shall be completed. This USQD summary report is sent to DOE/NNSA/SFO for review.

The annual update submission date to DOE/NNSA is 12 months from the date of the original DOE/NNSA SER, referred to as the "born on" date, and reoccurs every 12 months thereafter. The ES&H Planning Department maintains the official born on dates for all of the SNL nuclear DSAs. The process for completing the annual update process is detailed in Appendix NF-17, "Nuclear Safety Basis Annual Update Preparation and Submittal."

6.5.4 Recategorization of a Nuclear Facility

A nuclear facility, subject to 10 CFR 830, Subpart B, can be recategorized as an industrial facility through several means including:

1. Segmentation in accordance with DOE-STD-1027,
2. Decreased radiological material inventories and/or changes in material forms to below NNSA SD G 1027 Admin Change 1 threshold values for a Hazard Category 3 nuclear facility, or
3. A combination of methods 1 and 2.

The facility can then be subjected to one of several outcomes;

1. Continue the present mission at lower hazardous material levels,
2. Re-mission the facility to another purpose(s), or
3. Decontaminate and demolish the facility.

Contact the ES&H Planning Department for assistance in developing a transition plan and process when recategorization is being considered.

6.6 Performing Periodic Assessments and Applying Lessons Learned

For nuclear facilities, operations, and activities, managers are responsible for performing periodic assessments of their procedures and controls. These assessments help managers do the following:

- Identify, communicate, and correct performance or compliance issues
- Observe, assess, and improve work processes
- Identify findings, observations, noteworthy practices, and lessons learned

In addition, it is a best practice to perform periodic walk-throughs of the area to ensure compliance with ES&H requirements.

Managers must use lessons learned information as an aid in planning and performing work safely in accordance with CG100.6.15, *Identify Operating Experience, and Share Lessons Learned*.

ES&H Planning personnel periodically review nuclear facility implementation of the USQ Process(es), including USQ screens and USQDs.

6.7 Training and Qualifying Safety Basis Documentation Preparers, Reviewers, and Approvers

For nuclear facilities, operations, and activities, safety basis documentation consists of the PHS, the DSA, and any associated TSRs. Members of the Workforce preparing, reviewing, and approving the PHS will be expected to take ISMS100, *PHS Software Training.* Preparers of the PHS shall be knowledgeable of the facility, operation, or activity and with the associated hazards.

Members of the Workforce who prepare, review, and approve DSAs and TSRs will be expected to take, HAZ500, *Hazard Analysis Overview Training*, and USQ100, *USQ Initial Training: Implementing the USQ Review Process*.

Members of the Workforce supporting MSAs, IVRs, and RRs shall be trained and knowledgeable of the operations and RR process.

An ES&H Planning nuclear safety analyst shall, through education, training, and experience, be qualified to both develop and review safety basis documents that support the safe operation of SNL nuclear facilities. Performance of the development function is under the auspices of the nuclear facility manager, and the facility-specific Training Implementation Matrix (TIM).

6.8 Keeping Records

Managers shall ensure that records generated during the performance of hazard identification activities, hazard analyses, and readiness reviews are maintained in accordance with Sandia Records Retention and Disposition Schedule. Records must be legible, authenticated, and maintained in a manner that prevents damage, loss, or deterioration.

Official records associated with this process may include but are not limited to the following:

- Safety analyses
  - JCO for temporary unplanned conditions
  - BIO for limited-life operations
  - Safety basis supplements for limited-scope changes to existing operations
  - DSAs for reactors
  - DSAs for nuclear onsite transportation activities
  - DSAs for all other HC-1, HC-2, or HC-3 DOE nuclear facilities, operations, or activities
- TSRs
- USQDs
- Safety Evaluation Reports (SERs)
- Any referenced correspondence, reports, studies, and calculations that DOE/NNSA uses as the basis for approval for a nuclear facility, operation, or activity

Note: Records may include completed checklists, readiness review final reports, or a record of completion of the readiness review.

Note: Additional record requirements for HC-1, HC-2, and HC-3 DOE nuclear facilities/activities startup and restart processes are described in GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations.*

6.9 Implementing Quality Assurance

The primary purpose of the Corporate Quality Assurance Program is to meet the requirements established in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, *Nuclear Safety Management*, Subpart A, "Quality Assurance Requirements," for a quality program and to support the implementation of Corporate Policy: CG100, *Corporate Governance Policy.* Quality assurance applies to Members of the Workforce for which SNL has ES&H responsibility.

For nuclear facilities, Members of the Workforce are expected to:

- Follow the ISMS framework for managing ES&H activities
- Perform all work per the procedures and controls specified by management
- Report problems, concerns, or suggestions for improvement to work procedures

Managers at all levels who oversee nuclear facilities, operations, and activities are responsible for ensuring that all work is planned and controlled in a safe manner as defined in the PHS, PDSA, DSA, and TSRs based on the nature of the work and the associated risks.

Specifically, quality assurance for nuclear facilities, operations, and activities must address the following:

- Ensure the accuracy and completeness of safety basis information (e.g., hazards identification, material inventory, and reference material)
- Ensure the accuracy and completeness of safety basis documentation (e.g., PHS, PDSA, DSA, and TSRs)
- Ensure that all hazards are appropriately identified, understood, and controlled
- Document the peer review for completeness and accuracy; confirm approval of any quantitative calculations and/or analyses

Chapter 7. Accelerator Facilities

Subject Matter Expert: Holly Chamberlain; SNL/CA Counterpart: N/A
MN471017, Issue G
Revision Date: October 12, 2017
Review Date: February 15, 2020

This chapter of the *Safety Basis Manual* is applicable to industrial facilities, operations, and activities that have been classified as accelerators following completion of the PHS or other safety basis assessments. This chapter provides a formal and consistent methodology for developing and maintaining the appropriate safety basis documentation and processes. Appendix IF-06, "IFSB Accelerator Classification," provides the guidance and logic for classifying accelerator facilities, operations, and activities.

Line managers of industrial accelerator facilities, operations, or activities must comply with this chapter to ensure compliance with DOE O 420.2C, *Safety of Accelerator Facilities*, and 10 CFR 851, *Worker Safety and Health Program*, as implemented through PG470246, *10 CFR 851 Worker Safety and Health Program (WSHP)*.

Managers who plan to develop or modify operations or activities that would result in a facility being newly classified as an accelerator facility should consult the ES&H Planning Department for assistance.

7.1 Safety Basis Documentation

For accelerator facilities, operations, and activities, managers must complete the PHS module and then ensure that the PHS document is approved (Table 2-1).

In addition, managers must complete a SAD. The SAD discusses the identified hazards, hazard analysis, and safety controls in detail so potential onsite and offsite impacts may be mitigated or eliminated as required by DOE O 420.2C, *Safety of Accelerator Facilities*.

7.1.1 Approval Authority for Safety Basis Documentation

SNL management has approval authority for the safety basis documentation for accelerator facilities, operations, and activities (Table 2-1). Note: DOE/NNSA is the approval authority for the ASE for accelerator facilities.

For facilities, operations, and activities where DOE/NNSA has retained authorization authority, safety basis documentation is managed as follows:

- Line organizations prepare safety basis documentation and submit it to ES&H Planning personnel
- ES&H Planning personnel review the safety basis documentation for concurrence

- Line organization management approves the safety basis documentation for to DOE/NNSA
- DOE/NNSA reviews the safety basis documentation for approval

7.1.1.1 Safety Assessment Document Process

As outlined in Figure 7-1, "SB Document Process Overview," a systematic process is followed for developing and maintaining an SAD. Key programmatic elements are as follows:

- Prepare the SAD
- Provide an independent review and concurrence for the SAD
- Complete the SAD approval process
- Maintain the SAD via the USI process
- Review the SAD annually and update as needed

Work outside the controls established for the hazards identified in the SAD or additional safety basis document without additional revision and approvals, is not permitted.

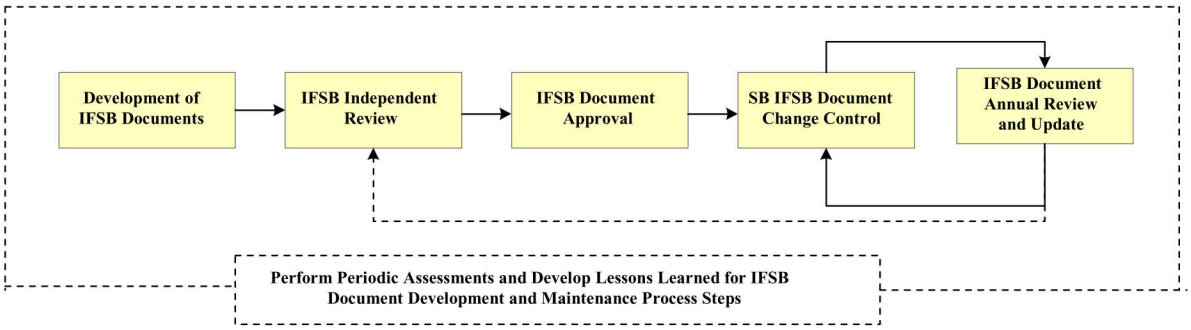

Figure 7-1. SAD development and maintenance process

The process for developing an SAD is illustrated in Figure 7-2, "Development of IFSB Documents." The process includes a development plan, document development, an internal peer review, and independent review by ES&H Planning personnel. Appendix IF-01, "IFSB Development of IFSB Documents," provides the requirements and process for completing the steps necessary for developing IFSB Documents.

Figure 7-3, "SB Document Independent Review Process," outlines the independent review process for an SAD. Appendix IF-02, "IFSB Independent Review Process," describes the steps for developing an SAD.

The process for approving an SAD is illustrated in Figure 7-4, "SB Document Approval Process for Accelerators." Appendix IF-03, "IFSB Document Approval Process," discusses the steps for approving an SAD.

The purpose of the annual review is to update, as necessary, the SAD. This ensures that the SAD includes the latest information and reflects current facility, operation, or activity configuration. Appendix IF-04, "IFSB Annual Update Process," provides the steps for completing an annual review and updating an SAD.

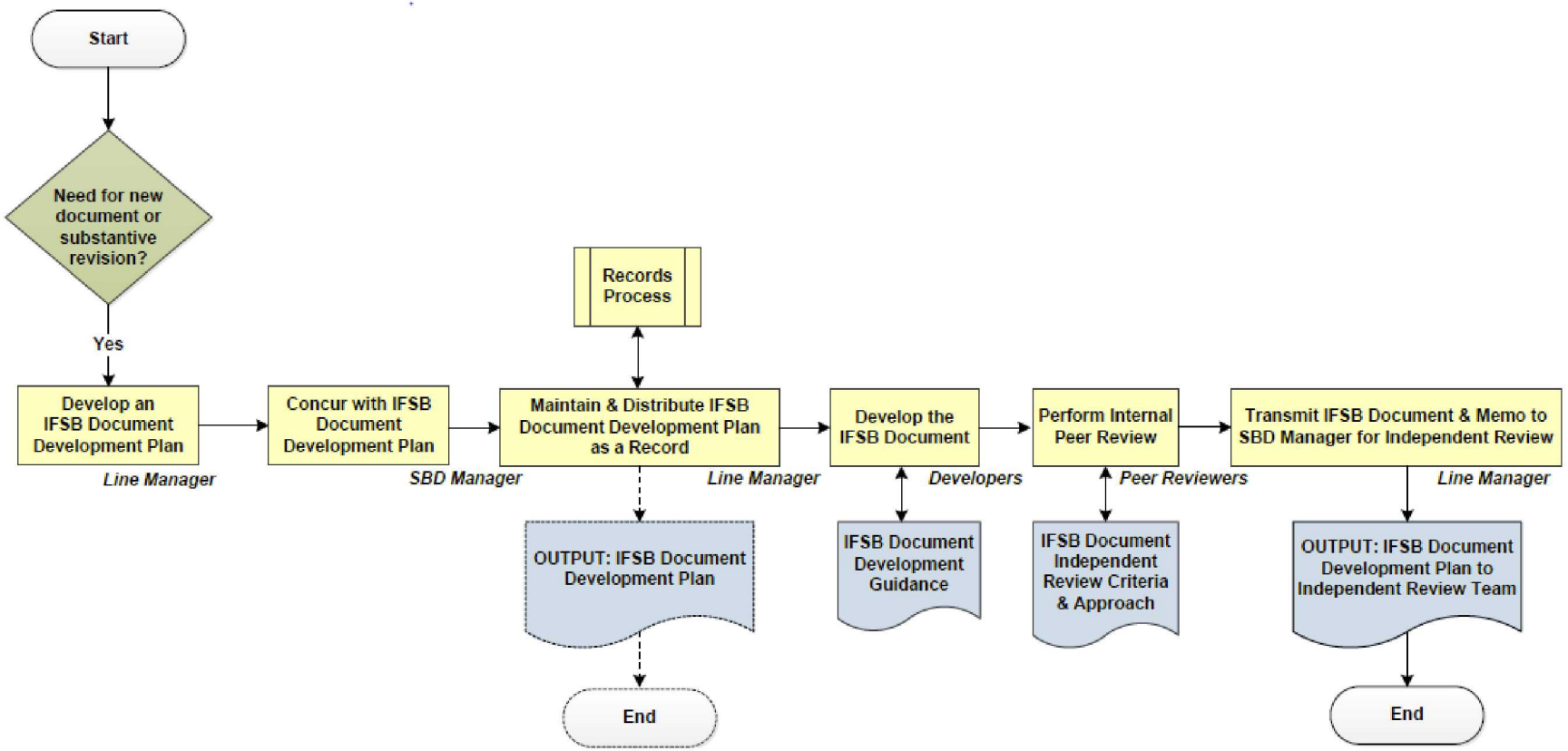

Figure 7-2. SAD development process

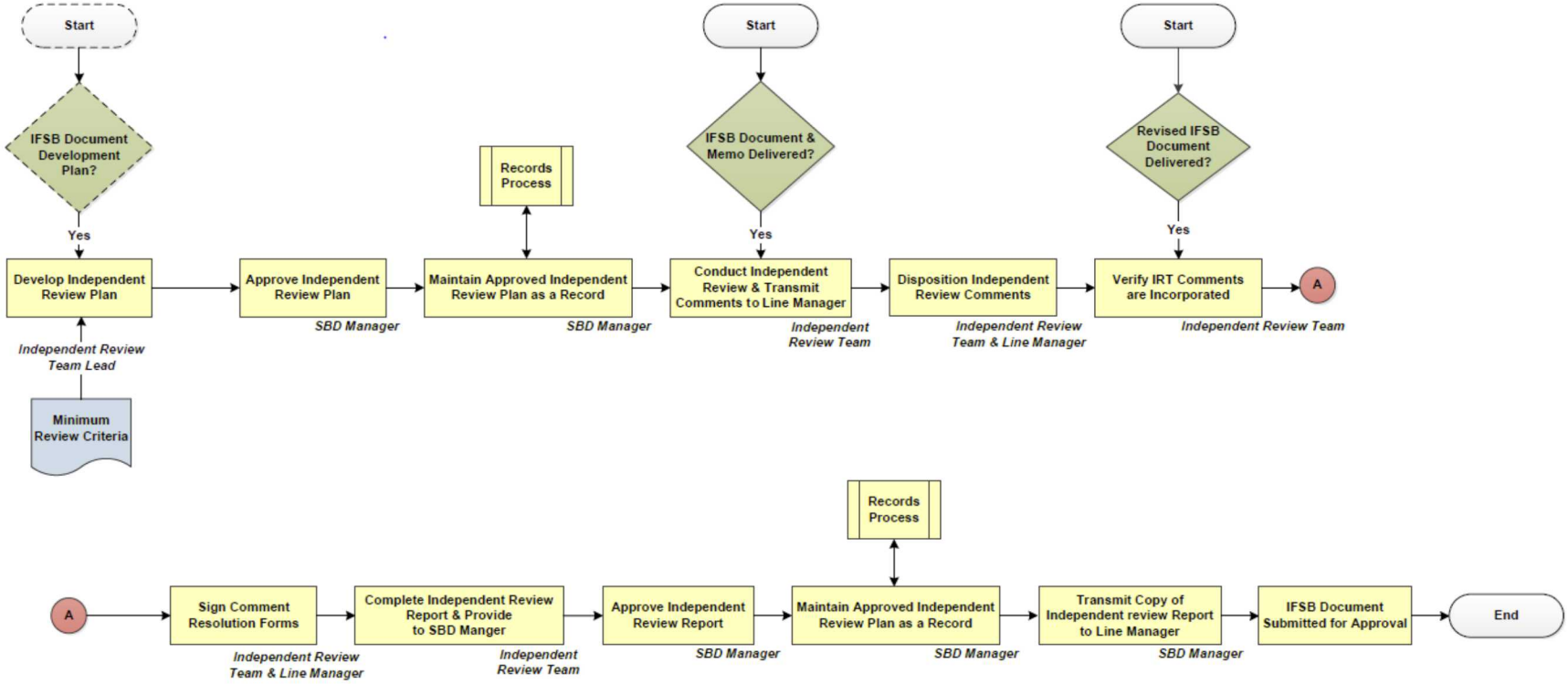

Figure 7-3. SAD independent review process

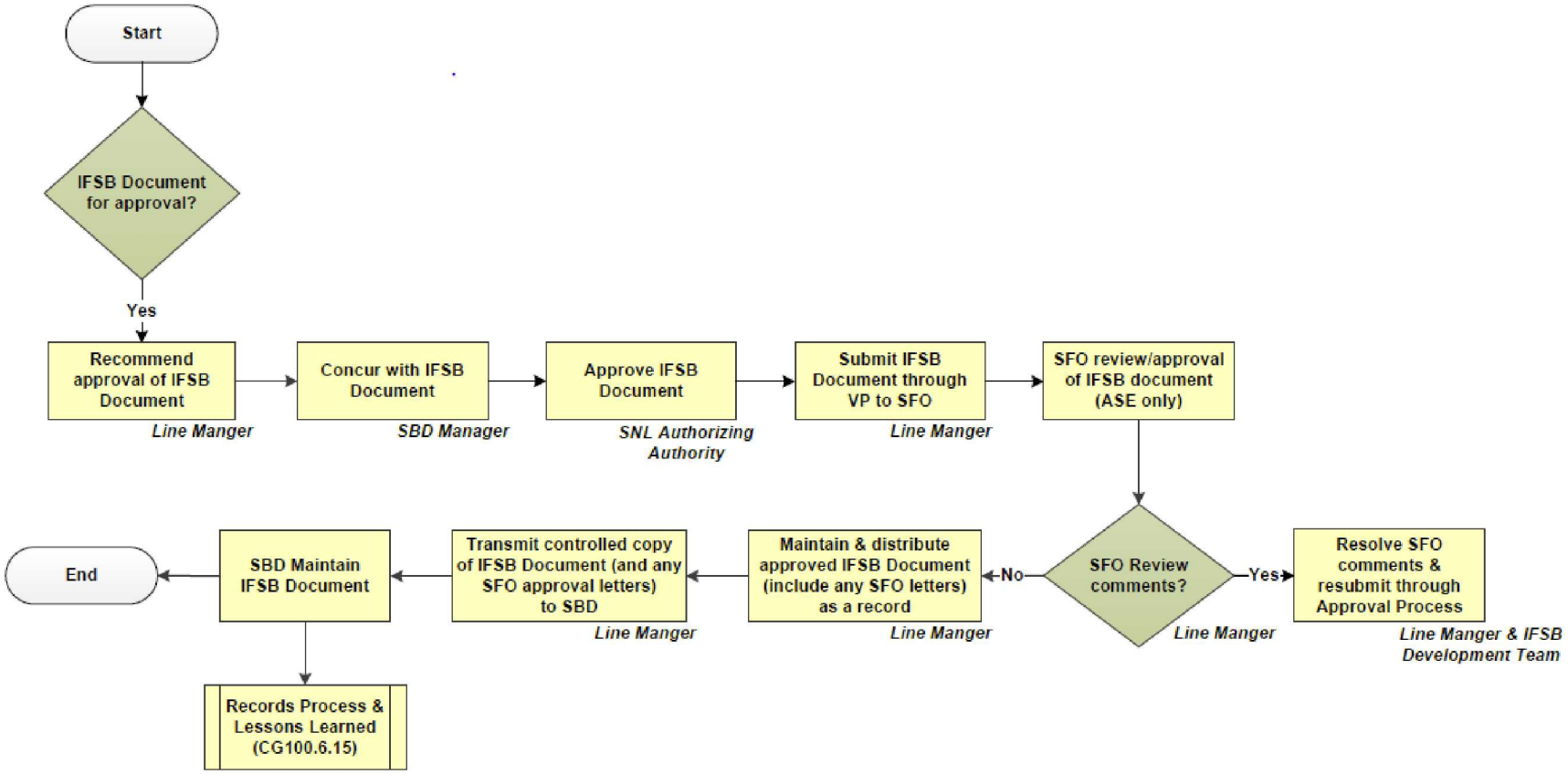

Figure 7-4. SAD approval process

7.1.2 Accelerator Safety Envelope

The ASE is defined as a set of verifiable physical and administrative credited controls that specify the bounding conditions for safe operation and address the accelerator facility hazards and risks. A documented ASE must define the physical and administrative bounding conditions and controls for safe operations based on the safety analysis documented in the SAD.

The ASE must be submitted to DOE/NNSA/SFO for approval and may be submitted as a separate document from the SAD.

An activity expected to exceed the bounding conditions of the ASE requires DOE/NNSA/SFO approval. Any activity violating the ASE must be terminated immediately and the facility, operation, or activity placed in a safe and stable configuration. Any activity that is shut down by DOE must not recommence until DOE approves the activity.

7.2 Implementing and Verifying Controls

For accelerator facilities, operations, and activities, hazards and their controls are described in the PHS, the SAD, and the ASE. Managers must comply with all action statements identified in the PHS, SAD, and ASE and verify that all identified controls are implemented.

7.2.1 Implementation Validation Review (IVR)

The manager or designee for an accelerator facility, operation, or activity is responsible for ensuring that an IVR is performed when changes are made to the SAD. The IVR is intended to help personnel validate adequate implementation of SAD changes prior to operating under a new or revised safety envelope.

An IVR may also be used to ensure operational readiness has been effectively established following:

- Temporary suspension of operations
- New or significantly different experimental operations
- Preparations for modifications to safety SSCs (this includes providing relevant operational information to personnel performing the modifications)
- Modifications to safety SSCs
- Process changes that do not lead to the need for an ARR (an IVR may be used as preparation for an ARR)

Appendix SB-04, “Implementation Validation Review,” describes the steps for conducting an IVR, and Tool SB-01-T, “Implementation Validation Review (IVR) Checklist,” is used to document an IVR.

7.3 Determining Readiness

The startup and restart process for accelerator facilities, operations, and activities is based on PG470252, *Integrated Safety Management System (ISMS) Description*, and ESH100.1.WPC.1, *Plan and Control Work.*

Prior to the initial start or subsequent restart of an accelerator facility, operation, or activity, the manager should perform and document a walk-through of the space before occupancy to ensure that ES&H requirements have been met. In addition, the manager is responsible for ensuring that an ARR is performed in accordance with Appendix RR-03, "Startup and Restart Procedure for Moderate and Accelerator Facilities/Activities."

Operational readiness is required prior to commencement of an ARR. The scope of the activity must define the physical and administrative boundaries to ensure that all required readiness actions are completed. The process of achieving operational readiness establishes the following:

- The operation or activity can be operated safely within the boundaries of the authorization basis for the safety envelope
- The operation or activity is physically ready to restart
- The operation or activity meets approved design requirements
- Personnel are trained and qualified to perform the operation or activity
- The operation or activity will be operated in compliance with safety management program requirements
- Necessary infrastructure controls are in place and operational

The MSA and IVR are the primary tools used for achieving operational readiness.

7.3.1 Management Self-Assessment

Managers are responsible for completing a formal MSA prior to an ARR for the start or restart of an accelerator facility, operation, or activity. Appendix SB-05, "Management Self-Assessment," describes how to establish operational readiness and defines the expectations, deliverables, and associated objective evidence necessary to demonstrate satisfactory achievement of operational readiness. Completion of the MSA using Tool SB-02-T, "Management Self-Assessment (MSA)," provides an acceptable format for documenting MSA results.

7.3.2 Approval Authority for Determining Readiness

DOE has approval authority for the readiness review process for accelerator facilities, operations, and activities (Table 2-1).

7.4 Managing Change

For accelerator facilities, operations, and activities, the PHS (see Section 2.2) shall be reviewed and updated annually. In addition, the PHS must be updated and approved when changes are made—as a result of changes to requirements or to the scope of work—that would alter any of the answers to the questions in the PHS. Changes to the PHS may lead to subsequent changes to PHS-generated action items, such as warning messages and training requirements. The documentation (e.g., training plans and TWDs) used to administer these controls will also need to be updated.

The SAD is controlled through a USI, a formal MOC process, which includes appropriate reviews and approvals prior to making changes to the document.

Appendix IF-07, "IFSB Unreviewed Safety Issues (USI) Process," documents the process for completing a USI, as illustrated in Figure 7-5. A qualified USI reviewer will screen the USI documents. For USI documents with a negative USI determination, the line manager must approve and sign the determination. For USI documents with a positive USI determination, the ES&H Planning Department manager must concur, and both the line manager and DOE/NNSA/SFO must approve and sign the determination.

7.5 Performing Periodic Assessments and Applying Lessons Learned

For accelerator facilities, operations, and activities, managers are responsible for performing assessments as follows:

- Review procedures and controls periodically
  - Identify, communicate, and correct performance or compliance issues
  - Observe, assess, and improve work processes
  - Identify findings, observations, noteworthy practices, and lessons learned
- Sample accelerator USI screens and documents for completeness and quality

In addition, it is a best practice to perform periodic walk-throughs of the area to ensure that ES&H requirements are implemented.

Managers must use lessons learned information as an aid in planning and performing work safely in accordance with CG100.6.15, *Identify Operating Experience, and Share Lessons Learned.*

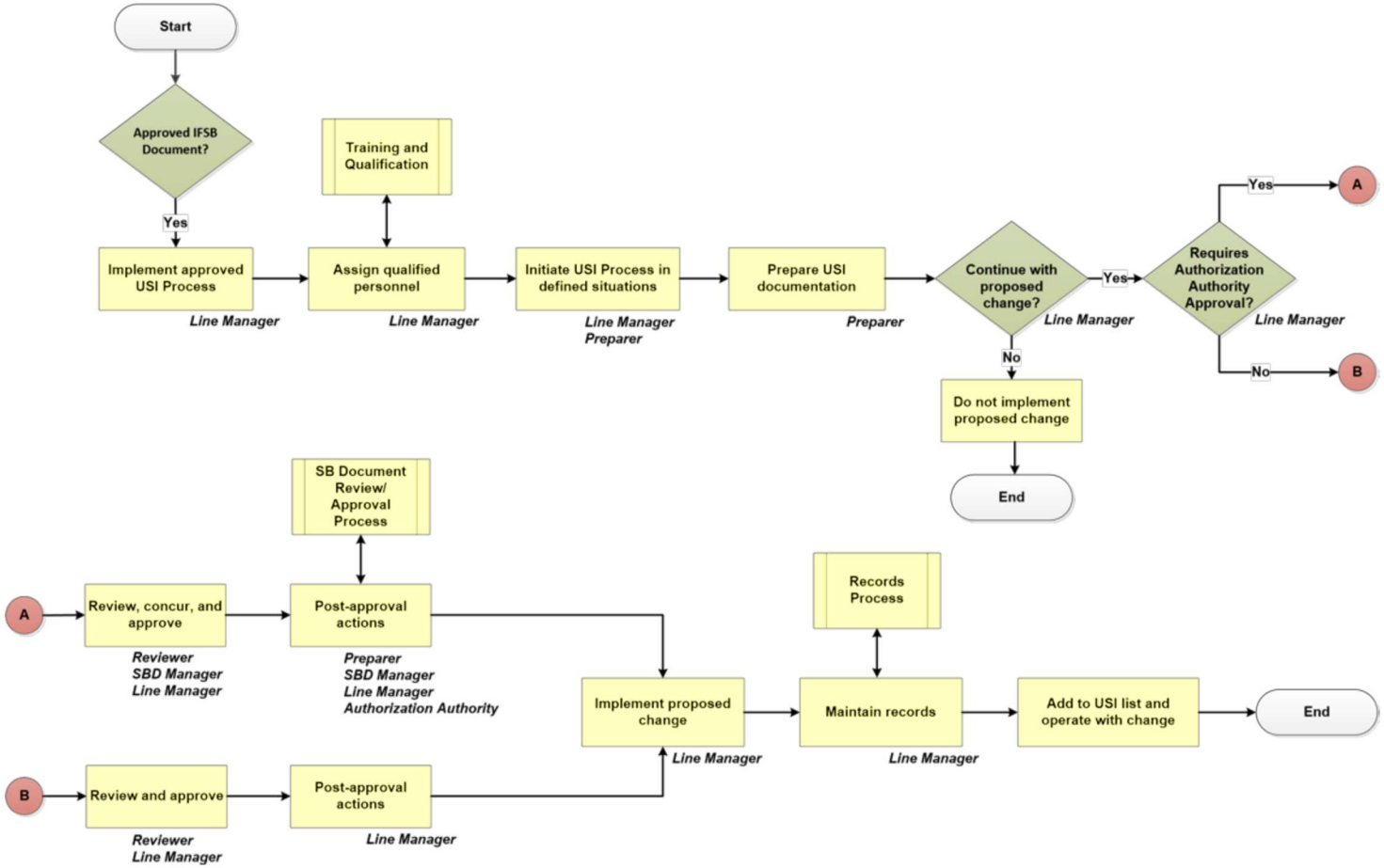

Figure 7-5. USI review process

7.6 Training and Qualifying Safety Basis Documentation Preparers, Reviewers, and Approvers

For accelerator facilities, operations, and activities, safety basis documentation consists of the PHS and the SAD. Members of the Workforce preparing, reviewing, and approving the PHS will be expected to take ISMS100, *PHS Software Training*. Preparers of the PHS shall be knowledgeable of the facility, operation, or activity and with the associated hazards.

Members of the Workforce who prepare, review, and create the SAD will be expected to take HAZ500, *Hazard Analysis Overview Training*.

Note: The PHS document identifies hazards associated with the facility, operation, or activity and also identifies corporate-required training for those hazards. Managers may elect to have Members of the Workforce take additional training based on the output of the PHS and/or corporate ES&H policy area requirements.

7.7 Keeping Records

Managers shall ensure that records generated during the performance of hazard identification activities, hazard analyses, and readiness reviews are maintained in accordance with the Sandia Records Retention and Disposition Schedule." Records must be legible, authenticated, and maintained in a manner that prevents damage, loss, or deterioration.

Official records associated with this process include but are not limited to the following:

- PHS documentation
- ARR final reports
- ASE approval
- Hazard identification walk-throughs
- Independent review plans and reports
- IVR documentation/reports and checklists
- USI Forms
- MSA reports
- SADs

7.8 Implementing Quality Assurance

For accelerator facilities, operations, and activities, managers are responsible for ensuring implementation of the quality assurance requirements in DOE O 420.2C, *Safety of Accelerator Facilities*.

Managers at all levels who oversee accelerator facilities, operations, and activities are responsible for ensuring that all work is planned and controlled in a safe manner as defined in the PHS document and SAD based on the nature of the work and the associated risks.

Specifically, quality assurance for accelerator facilities, operations, and activities must address the following:

- Ensure the accuracy and completeness of safety basis information (e.g., hazards identification, material inventory, and reference material)
- Ensure the accuracy and completeness of safety basis documentation (e.g., PHS and SAD)
- Ensure that all hazards are appropriately identified, understood, and controlled
- Document the peer review for completeness and accuracy; confirm approval of any quantitative calculations and/or analyses

7.9 References

7.9.1 Requirement Drivers

DE-NA0003525*, Management and Operating Contract between National Technology & Engineering Solutions of Sandia, LLC, and DOE*:

- Section H, "Special Contract Requirements," H-8, "Sandia National Laboratories Laboratory Management System."
- Section I, "Contract Clauses," "DEAR 970.5204-2 Laws, Regulations, and DOE Directives (Dec 2000) (Class Deviation)"
- Section I, "Contract Clauses," "DEAR 970.5215-3 Conditional Payment of Fee, Profit, and Other Incentives (Aug 2009) Alternate II (Aug 2009) (NNSA Class Deviation Oct 2011) (NNSA Class Deviation May 2016)"
- Section J, Appendix B, Statement of Work," Section 2.7: "Integrated Safety Management, Integrated Safeguards and Security Management, Environmental Management System, and Quality Assurance Systems."

DOE O 414.1D, *Quality Assurance.*

DOE O 420.1C Chg 1, *Facility Safety*.

DOE O 420.2C, *Safety of Accelerator Facilities*.

SNL, Corporate Procedure ESH100.2.SB.1, *Establish the Safety Basis of Operations*.

SNL, PG470252, *Integrated Safety Management System Description.*

SNL, PG470246, *10 CFR 851 Worker Safety and Health Program (WSHP)*.

7.9.2 Additional Drivers

10 CFR 820, *Procedural Rules for DOE Nuclear Activities.*

10 CFR 830, *Nuclear Safety Management*, Subpart A, "Quality Assurance Requirements."

10 CFR 851, *Worker Safety and Health Program*.

29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*.

40 CFR 68, *Chemical Accident Prevention Provisions*.

DOE P 450.4A, *Integrated Safety Management Policy*.

Chapter 8. References

Subject Matter Expert: Jeffrey Marr; CA Counterpart: N/A
MN471017, Issue F
Revision Date: October 12, 2017
Review Date: March 1, 2013

8.1 Requirement Drivers

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

DOE O 413.3B Chg 2 (PgChg), *Program and Project Management for the Acquisition of Capital Assets*.

DOE O 414.1D, *Quality Assurance*.

DOE O 420.1C Chg 1, *Facility Safety*.

DOE O 420.2C, *Safety of Accelerator Facilities*.

DOE O 422.1 Admin Chg 2, *Conduct of Operations*.

DOE O 425.1D Admin Chg 1, *Verification of Readiness to Start Up or Restart Nuclear Facilities*.

DOE O 226.1B, *Implementation of Department of Energy Oversight Policy*.

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

DOE O 461.1C, *Packaging and Transportation for Offsite Shipment of Materials of National Security Interest*.

DOE O 461.2, *Onsite Packaging and Transfer of Materials of National Security Interest*.

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

DOE O 5480.30 Chg 1, *Nuclear Reactor Safety Design Criteria*.

8.2 Additional Drivers

10 CFR 820, *Procedural Rules for DOE Nuclear Activities*.

10 CFR 830, *Nuclear Safety Management*.

10 CFR 851, *Worker Safety and Health Program*.

29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*.

40 CFR 68, *Chemical Accident Prevention Provisions*.

40 CFR 302.4, *Designation, Reportable Quantities, and Notification*, Appendix B, "Radionuclides."

DOE G 420.1-1A, *Nonreactor Nuclear Safety Design Guide for Use with DOE O 420.1C, Facility Safety*.

DOE G 420.2-1A, *Accelerator Facility Safety Implementation Guide for DOE O 420.2C, Safety of Accelerator Facilities*.

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

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

DOE G 450.4-1C, *Integrated Safety Management System Guide*.

DOE P 420.1, *Department of Energy Nuclear Safety Policy*.

DOE P 450.4A, *Integrated Safety Management Policy*.

DOE-HDBK-1100-2004, *Chemical Process Hazards Analysis*.

DOE-HDBK-1101-2004, *Process Safety Management for Highly Hazardous Chemicals*.

DOE-HDBK-3012-2003, *Guide to Good Practices for Operational Readiness Reviews (ORR), Team Leader's Guide*.

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

DOE-STD-1104-2014, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*.

DOE-STD-1120-2016, *Preparation of Documented Safety Analysis for Decommissioning and Environmental Restoration Activities*.

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

DOE-STD-1189-2008, *Integration of Safety into the Design Process*.

DOE-STD-3006-2010, *Planning and Conducting Readiness Reviews*.

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

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

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

SNL, AOP 95-45, *Review and Approval of Regulatory Deliverables*.

SNL, DE-NA0003525, *Management and Operating Contract between National Technology & Engineering Solutions of Sandia, LLC, and DOE*:

- Section H, "Special Contract Requirements," H-8, "Sandia National Laboratories Management System."
- Section I, "Contract Clauses," I-19, "DEAR 970.5204-2 Laws, Regulations, and DOE Directives (Dec. 2000) (Class Deviation)."
- Section I, "Contract Clauses," I-21, "DEAR 970.5215-3 Conditional Payment of Fee, Profit, and Other Incentives—Facility Management Contracts (Aug 2009) Alternate II (Aug 2009) (NNSA Class Deviation Oct 2011) (NNSA Class Deviation May 2016."

- Section J, Appendix A, "Statement of Work," Section 2.7, "Integrated Safety Management, Integrated Safeguards and Security Management, Environmental Management System, and Quality Assurance Systems."

SNL, ESH100, *Environment Safety & Health*.

SNL, ESH100.3.3, *Implement Conduct of Operations*.

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

SNL, GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations*.

SNL, HR100.2.1, *Identify and Complete Sandia-Required Training for all Members of the Workforce*.

SNL, IM100.2, *Manage and Protect Information.*

SNL, PG470246, *10 CFR 851 Worker Safety and Health Program (WSHP).*

SNL, PG470252, *Integrated Safety Management System Description.*

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

SNL, Sandia Records Retention and Disposition Schedule.

- SA-140-202-000, "Safety Assessments Records."
- SA-140-205-000, "Primary Hazard Screening Records."

8.3 Related Drivers

American Industrial Hygiene Association (AIHA), *Emergency Response Planning Guidelines (ERPGs)/Workplace Environmental Exposure Levels (WEELs) Handbook.*

American Institute of Chemical Engineers (AIChE), *Chemical Process Safety of the American Institute of Chemical Engineers*, 1992.

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

DOE, *ERPGs and TEELs for Chemicals of Concern*, WSMS-SAE-02-0171.

NIOSH, NIOSH Pocket Guide to Chemical Hazards, National Institute for Occupational Safety and Health.

NNSA/DOE Readiness Review Training, March 2011 revision.

NNSA Sandia Site Office (NNSA/SSO), Memorandum Subject: Safety Basis for Nonnuclear Facilities, 9/2005.

NNSA Sandia Site Office (NNSA/SSO) Procedure 1302.01, *Startup and Restart of Sandia National Laboratories Nuclear Facilities/Activities*.

NRC Regulatory Guide 1.70, *Standard Format and Content of the Safety Analysis Reports for Nuclear Power Plants*, Nuclear Regulatory Commission.

Change History

October 12, 2017
Administrative Changes

Updated center and corporate information following transition:

- Changed manual owner from Michael W. Hazen, 4000, to Jaime L. Moya, 600.
- Changed any reference of "Sandia Corporation" (or Sandia) to Sandia National Laboratories (or SNL).
- **C**hanged language to reflect new M&O contract.
- Update references and hyperlinks to M&O contract.

Changed Appendix NF-01

- Clarified that facilities below HC- 3 are referred to as radiological facilities and maintained the term "radiological" throughout rather than "industrial < HC-3."
- Clarified that safety basis documentation for HC-2 or -3 facilities is submitted to DOE/NNSA/SFO for approval, and documentation for radiological facilities is submitted to the SNL Safety Basis Approval Authority for approval.

Updated SMEs:

- Manual: changed contributor from Timothy Stirrup to Marc Williams
- Chapter 1: deleted Tim Stirrup as a contributor
- Chapter 2: changed SME from Timothy Stirrup to Jeffrey Marr
- Chapter 3: changed SME from Timothy Stirrup to Marc Williams
- Chapter 4: changed SME from Timothy Stirrup to Marc Williams
- Chapter 5: changed SME from Timothy Stirrup to Marc Williams; deleted Kelsey Curran as a contributor
- Chapter 7: changed SME from Timothy Stirrup to Holly Chamberlain; deleted Kelsey Curran as a contributor
- Chapter 8: changed SME from Timothy Stirrup to Jeffrey Marr
- Appendices IF-01, IF-02, IF-03, IF-04, IF-05, IF-06, and (F-07: changed SME from Timothy Stirrup to Marc Williams; deleted Kelsey Curran as a contributor
- Appendix RR-03: changed SME from Timothy Stirrup to Al Bendure; deleted Kelsey Curran as a contributor
- Appendices SB-01 and SB-02: deleted Timothy Stirrup as a contributor
- Appendix SB-03: changed SME from Timothy Stirrup to John Myers; deleted John Myers as a contributor
- Appendix SB-05: changed SME from Timothy Stirrup to Al Bendure; deleted Al Bendure and Kelsey Curran as contributors
- Appendix SB-07: changed SME rom Timothy Stirrup to Jeffrey Marr; deleted Jeffrey Marr as a contributor
- Appendix SB-08: deleted Timothy Stirrup as a contributor

February 15, 2017
Substantive Changes

Added

- Added a List of Appendices.
- Added a List of Tools.

Changed

- Appendix NF-04, Appendix NF-05, Appendix NF-08, Appendix NF-09, Appendix NF-10, Appendix NF-12, Appendix NF-16, and Appendix NF-18: changed **from** "Jeffery Marr" **to** "Jeffrey Marr.
- Section 6.1.2.1, Appendix IF-01, Appendix NF-02, Appendix NF-03, Appendix SB-01, and Appendix SB-03: changed **from** "project" **to** "operations, projects, and activities" in:.
- Appendix SB-04: changed **from** "facilities, projects, and activities" **to** "facilities, operations, and activities."
- Section 1.4.4, "Managing Change": changed **from:** "The controls identified to mitigate hazards in facilities, operations, and activities must be kept current. Appropriate documentation should be updated and approved when requirements or the scope of work changes. Depending on the hazard classification, some controls need to be reviewed on a regular basis (e.g., annually)."
- **to:** "Managing change for facilities, operations, and activities includes managing changes to the facility and equipment (hardware), changes to existing processes (procedures), and the potential for new operations and activities. The required safety basis documentation must be kept current as a result of changes to validate the existing hazard classification and to ensure that the controls identified to mitigate hazards in facilities, operations, and activities continue to provide adequate protection to the workers, the public, and the environment. Depending on the hazard classification level, a formal management of change process (e.g., an MOC, a USI, or a USQ) may be required to keep the safety basis current and to ensure the appropriate approval authority approves implementation of proposed changes."
- Section 2.6, "Hazard Aggregation Rollup Process for Facilities": changed **from:** "Because of the complexity, both technically and organizationally, of the various operations performed within a given facility, multiple PHS documents may be needed to analyze operations within a facility. The HARP evaluates the hazards of the facility as a whole to determine whether additional safety basis documentation is required.

  Though the HARP identifies hazards at the facility level, not all facilities will use the HARP. Appendix SB-02, "Hazard Aggregation Rollup Process (HARP)," provides the criteria used to determine whether the HARP is needed for a facility, provides guidance for executing the various actions, and provides methodologies and tools for performing the HARP.

  The HARP is used to determine when an SHA is necessary to support the documentation of a low hazard facility classification. A facility-level SHA will:

  - Create a list of hazards for the facility
  - Identify hazards and emergency actions that extend beyond the scope of individual PHSs
  - Provide a list of collocated radiological, chemical, biological, and explosives hazards in the facility
  - Ensure that facility infrastructure items (e.g., natural gas flammable storage) are included in the hazards analysis
  - Analyzes the hazards that could be posed by the interactions or aggregations of hazards
  - Identify the controls necessary to address the hazards that are created when hazards"

to: "Because of the complexity of the operations, both technically and organizationally, facility hazards may be analyzed in multiple PHS documents. The HARP provides an analysis of the interaction and aggregation of hazards that exceed the HARP criteria listed in SB-03-T. For a facility with multiple PHS documents and at least one of the PHS documents is greater than or equal to a low-hazard facility classification, the HARP criteria is used to determine when the HARP is necessary.

The HARP process is a query of the PHS module for a given facility that lists the PHS for the criteria hazards (e.g., radiological, chemical, biological, and/or explosives). The HARP is performed by Department 4132 analysts and is used to conclude whether an SHA is necessary to confirm the low hazard facility classification. Department 4132 staff will contact the responsible facility management if an SHA is necessary.

Appendix SB-02, "Hazard Aggregation Rollup Process (HARP)," provides additional detail for the HARP process."

- Section 3.3, "Determining Readiness": changed **from:** "Prior to the initial startup or subsequent restart of a business occupancy (office) facility, operation, or activity, the manager is expected to perform and document a walk-through of the space before occupancy to ensure that ES&H requirements have been met."

  to: "Prior to the initial startup and occupancy of the space or the subsequent restart of a business occupancy (office) facility, operation, or activity, the manager is to perform and document a walk-through of the space to ensure that ES&H requirements have been met."

- Sections 3.4, 4.4, 5.5, 6.5, and 7.4, "Managing Change": changed from: "For . . . facilities, operations, and activities, the PHS (see Section 2.2) **should** be reviewed annually."

  to: "For . . . facilities, operations, and activities, the PHS (see Section 2.22.2) **shall** be reviewed **and updated** annually."

- Sections 3.5, 4.5, 5.6, 6.6, and 7.5, "Performing Periodic Assessments and Applying Lessons Learned": changed **from** "In addition, it is a best practice to perform periodic walk-throughs of the area to ensure that ES&H requirements are implemented."

  to: "In addition, it is a best practice to perform periodic walk-throughs of the area to ensure compliance with applicable ES&H requirements."

- Sections 3.8, 4.8, 5.9, 6.9, and 7.8, "Implementing Quality Assurance:" changed **from:** "Specifically, quality assurance for . . . facilities, operations, and activities **should** address the following,"

  to: "Specifically, quality assurance for . . . facilities, operations, and activities **must** address the following."

- Sections 3.8, 4.8, 5.9, 6.9, and 7.8, "Implementing Quality Assurance:" changed **from:** "Document the peer review for completeness and accuracy; confirm approval of quantitative calculations and/or analyses,"

  to: "Document the peer review for completeness and accuracy; confirm approval of any quantitative calculations and/or analyses."

Added

- Section 1.4, "Organization of This Manual": "**Note:** All operations, projects, and activities of a facility must adhere to the requirements for the assigned hazard classification to keep the facility from becoming a higher hazard classification (e.g., HC-3)."

Deleted

- Section 2.3, "Classification and Authorization Process": under "industrial facility" bulleted list, deleted additional "industrial facility" description for terms

October 3, 2016
Substantive Changes

* Indicates a substantive change

* Chapter 6, "Nuclear Facilities Classification"

- Contributors
  - Added Keith Voss
- Section 6.5.1. "Major Modifications and Revisions"
  - Added language to define major modifications per DOE-STD-1189-2008, *Integration of Safety into the Design Process*, and included a reference to the new Appendix NF-19, "Major Modification Determination Procedure."
  - Updated Table 6-1 by adding Criterion 7, "Involves a Capital Asset Project with a Total Project Cost of $10M or greater?"

Appendices

- *Added Appendix NF-19, "Major Modification Determination Procedure" to clearly describe the process used to determine whether a physical modification to an SNL Hazard Category (HC) 1, HC-2, or HC-3 nuclear facility is considered a major modification per DOE-STD-1189-2008, *Integration of Safety into the Design Process*.

Added

- Added a List of Acronyms.
- Added specific information regarding safety basis documentation and training and qualifications in chapters 3 through 7 per Table 2-1.
- Added subheads as needed to help users find information.

Throughout

- Reorganized information for consistency within the subsections.
- Reorganized information to group general information together in the appropriate subsections in the introductory chapters (Chapter 1, "Introduction," and Chapter 2, "Safety Basis Planning and Implementation").
- Reorganized information to include specific information within the subsections in chapters 3 through 7 (business occupancy and standard industrial, low hazard, moderate hazard and high hazard, nuclear, and accelerator facilities, respectively).
- Updated all hyperlinks.

Changed SMEs

- Manual: changed SME from Timothy Stirrup to Jeffrey Marr; changed contributors from Steve Coffing, Mark Wong, and John Hobbs to Timothy Stirrup, Mark Wong, and Al Bendure
- Chapter 1: deleted Steve Coffing as a contributor
- Chapter 2: deleted Steve Coffing as a contributor
- Chapter 3: changed SME from Michael Greutman to Timothy Stirrup; deleted Timothy Stirrup and Steve Coffing as contributors
- Chapter 4: deleted Steve Coffing as a contributor
- Chapter 5: deleted Lynn McCurry as a contributor
- Chapter 6: deleted Steve Coffing as a contributor; added Keith Voss as a contributor

- Chapter 7: deleted Lynn McCurry as a contributor
- Chapter 8: deleted Steve Coffing as a contributor
- Appendix IF-01: deleted Lynn McCurry as a contributor
- Appendix IF-02: deleted Lynn McCurry as a contributor
- Appendix IF-03: deleted Lynn McCurry as a contributor
- Appendix IF-04: deleted Lynn McCurry as a contributor
- Appendix IF-05: deleted Lynn McCurry as a contributor
- Appendix IF-06: deleted Lynn McCurry as a contributor
- Appendix NF-01: deleted Steve Coffing as a contributor
- Appendix NF-02: deleted Steve Coffing as a contributor; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-03: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing as a contributor; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-04: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-05: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-06: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-07: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-08: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-09: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-10: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-11: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-12: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-13: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-14: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors

- Appendix NF-15: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-16: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-17: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-18: deleted Steve Coffing and Timothy Stirrup as contributors; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix NF-19: new appendix, SME is Jeffrey Marr; contributors are William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer
- Appendix RR-01: changed SME from Michael Greutman to Al Bendure; deleted John Hobbs as a contributor; added Daniel Osetek as a contributor
- Appendix RR-02: changed SME from Michael Greutman to Al Bendure; deleted Steve Coffing and Timothy Stirrup as contributors; added Daniel Osetek as a contributor
- Appendix RR-03: deleted John Hobbs as a contributor; added Kelsey Curran as a contributor
- Appendix RR-04: deleted John Hobbs as a contributor; added Daniel Osetek as a contributor
- Appendix RR-05: changed SME from Michael Greutman to Al Bendure; deleted John Hobbs as a contributor; added Daniel Osetek as a contributor
- Appendix SB-01: deleted Chris Hall as a contributor; added Jessica Costanzo as a contributor
- Appendix SB-02: deleted Chris Hall as a contributor; added Jessica Costanzo as a contributor
- Appendix SB-03: changed SME from Michael Greutman to Timothy Stirrup; deleted Steve Coffing and Timothy Stirrup as contributors; added John Myers and Al Bendure as contributors
- Appendix SB-04: changed SME from Michael Greutman to Jeffrey Marr; deleted John Hobbs as a contributor; added William Schwinkendorf, Keith Voss, John Myers, and Pamela James-Lipponer as contributors
- Appendix SB-05: deleted John Hobbs as a contributor; added William Schwinkendorf, John Myers, Kelsey Curran, Al, Bendure and Dan Osetek as contributors
- Appendix SB-06: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing and Timothy Stirrup as contributors; added Phillip Zele as a contributor
- Appendix SB-07: deleted Steve Coffing as a contributor; added Jeffrey Marr and Phillip Zele as a contributor
- Appendix SB-08: changed SME from Michael Greutman to Jeffrey Marr; deleted Steve Coffing as a contributor

May 25, 2016

* Indicates a substantive change

Note: Starting with Issue E, the Table of Contents and any chapter, appendix, form, or tool - Issue letter and Revision Date was changed, if substantive changes were completed. For any chapter, appendix, form, or tool not substantively changed, the Issue letter and Revision Date remains unchanged. Additionally, administrative

changes will be documented using this same method and the Change History will continue to include specifics (i.e. substantive and administrative) for any and all changes.

General Summary

- **Replaced:** Michael R. Greutman with Timothy S. Stirrup as Subject Matter Expert in substantively changed chapters and appendices.
- **Replaced:** Michael R. Greutman with Jeffrey W. Marr as Subject Matter Expert in substantively changed chapters and appendices.
- **Replaced:** Michael R. Greutman with Albert O. Bendure as Subject Matter Expert in substantively changed chapters and appendices.
- **Updated:** All Chapter figures to improve resolution for posting and printing. No other changes were made to the figures.
- **Updated:** Sandia Site Office (SSO) **to** Sandia Field Office (SFO), as applicable in substantively changed chapters and appendices.
- **Converted:** TOC and Change History from HTML to PDF.
- Substantive changes have been completed for MN471017, *Safety Basis Manual* to implement the specifics of Supplemental Guidance: NA-1 SD G 1027, "Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1. The affected documents are:
  - Chapter 2.0, "Safety Basis Planning & Implementation."
  - Chapter 4.0, "Low Hazard Industrial Facility Classification."
  - Chapter 6.0, "Nuclear Facilities Classification."
  - Appendix SB-07, "Required Documentation and Authorization Authority by Hazard Classification."
  - Appendix NF-01, "Nuclear Hazard Categorization." **Note:** Implementation of this supplemental guidance was directed by the National Nuclear Security Administration/Sandia Field Office (NNSA/SFO) on December 18, 2012 (i.e., NNSA/SFO letter, Wright/Sena to Eanes, dtd 12/18/2012, subject: Performance Direction to Implement NA-1 SD G 1027, Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1).
- * Substantive changes have been completed to address AIS record 8788 -- Result of the NA-SN Independent Assessment of Sandia Corporation Safety Basis Department, Safety Basis Program. The affected documents are:
  - Appendix NF-02, "Nuclear Safety Basis Strategy Document."
  - Appendix NF-05, "NF Accident Analysis."
  - Appendix NF-08, "Nonreactor Nuclear DSA."
  - Appendix NF-09, "Nuclear Reactor DSA."
  - Appendix NF-10, "Nuclear DSA for Onsite Transportation Activities."
  - Appendix NF-12, "Developing a NF Basis for Interim Operations."
  - Appendix NF-14, "Development of Technical Safety Requirements (TSRs)."

- Appendix NF-16, “Review and Approval Process for Nuclear Safety Basis
- Documents Generated By Sandia.”
- Appendix NF-17, “Nuclear Safety Basis Annual Update Preparation and Submittal.”
- Appendix NF-18, “Maintenance of Nuclear Safety Basis.”

- Administrative changes have been completed to address the corporate directive update DOE O 420.1B, Chg.1 with DOE O 420.1C. The affected documents are:
  - Appendix IF-02, “IFSB Independent Review Process.”
  - Appendix IF-03, “IFSB SB Document Approval Process.”
  - Appendix IF-04, “IFSB Annual Update Process.”
  - Appendix IF-05, “IFSB Management of Change Process.”
  - Appendix NF-04, “Integrating NFSB Hazard Analysis Activities.
- Administrative changes have been completed to update “Minimum Core Requirements,” **to** “Readiness Core Requirements.” The affected documents are:
  - Appendix RR-03, “Startup and Restart Procedure for Moderate and
  - Accelerator Facilities/Activities.”
  - Appendix RR-05, “Minimum Core Requirements.”
  - Appendix SB-05, “Management Self-Assessment.”
  - Tool RR-03-T, “Plan of Action (POA) Format.”

Chapter 2.0, “Safety Basis Planning and Implementation”

- Section 2.1, “Process Overview”
  - ***Added:** “Scope of operations is defined and corresponding hazards are evaluated in the ISMS primary hazards screening (PHS) software, as described in Section 2.2, "Primary Hazards Screening,” to the list of manager responsibilities prior to start of any work at SNL facilities, operations, projects, activities.”
  - ***Deleted:** “Hazards are identified and evaluated in the ISMS primary hazards screening (PHS) software as described in Section 2.2, "Primary Hazards Screening" including defining the scope of operations in a given PHS” from the list of manager responsibilities prior to start of any work at SNL facilities, operations, projects, activities, etc.”
  - ***Changed:** Manager responsibility prior to start of any work at SNL facilities, operations, projects, activities **from** “Hazards are analyzed using the ISMS hazards analysis (HA) software a stand-alone HA, or a safety basis document as described in Section 2.4, ‘Hazards Analysis (HA).’” **to** “Hazards are analyzed using the ISMS hazards analysis (HA) software and/or a safety basis document, as described in Section 2.4, ‘Hazards Analysis (HA).’ "
  - ***Changed:** Manager responsibility prior to start of any work at SNL facilities, operations, projects, activities, etc. **from** “Facility-level hazards are evaluated in through the ISMS Hazard Aggregation Rollup Process (HARP) software as described in Section 2.5, "Hazard Aggregation Rollup Process (HARP)" **to** “Facility-level hazards are evaluated through the ISMS Hazard Aggregation Rollup Process (HARP) module within the PHS software and/or a safety basis document, as described in Section 2.5, "Hazard Aggregation Rollup Process (HARP)."

- Section 2.2, “Primary Hazard Screening (PHS)”
  - ***Added:** “Hazardous material operation limits/envelope” to list of aspects required to document, using the PHS software. Section 2.3.3, “Low-Hazard Industrial Facilities.”
  - ***Changed:** First paragraph **from** “For low-hazard industrial operations, managers shall ensure a PHS document is approved. For low-hazard industrial operations, managers shall ensure that the integral HA section of the PHS is completed or that a stand-alone HA is prepared, as described in Section 2.4, "Hazards Analysis." The results of the standalone HA should be noted in the PHS HA." **to** “For low-hazard industrial operations, managers shall ensure that the PHS document is approved. For low-hazard industrial operations, managers shall ensure that the integral HA section of the PHS is completed, or that a stand-alone HA (SHA) is prepared, as described in Section 2.4, "Hazards Analysis (HA)."
- Section 2.3.3, “Low-Hazard Industrial Facilities”
  - ***Changed:** First paragraph **from** “For low-hazard industrial operations, managers shall ensure a PHS document is approved. For low-hazard industrial operations, managers shall ensure that the integral HA section of the PHS is completed or that a stand-alone HA is prepared, as described in Section 2.4, "Hazards Analysis." The results of the standalone HA should be noted in the PHS HA." **to** “For low-hazard industrial operations, managers shall ensure that the PHS document is approved. For low-hazard industrial operations, managers shall ensure that the integral HA section of the PHS is completed, or that a stand-alone HA (SHA) is prepared, as described in Section 2.4, "Hazards Analysis (HA)." A reference to the SHA should be noted in the PHS HA and listed in the supporting documents table. As determined by the Safety Basis Department, an SHA may be required to confirm the hazard classification for select facilities. The requirement to complete an SHA will be documented by the PHS software. The manager shall consult with the Safety Basis Department for guidance regarding the development of the SHA.” A reference to the SHA should be noted in the PHS HA and listed in the supporting documents table. As determined by the Safety Basis Department, an SHA may be required to confirm the hazard classification for select facilities. The requirement to complete an SHA will be documented by the PHS software. The manager shall consult with the Safety Basis Department for guidance regarding the development of the SHA.”
- Section 2.3.4, “Moderate- or High-Hazard Industrial Facilities”
  - ***Changed:** First paragraph **from** “For moderate- or high-hazard industrial operations, managers shall ensure that a PHS document is completed. The integral HA section of the PHS is required unless the hazards are covered under a separate document such as a safety assessment (SA) or stand-alone HA. The results of the SA or stand-alone Ha should be noted in the PHS HA. The results of the PHS HA may be used to support the development of the required safety basis document. Managers who plan to develop or modify operations that result in a moderate- or high-hazard industrial facility classification shall consult the Safety Basis Department for assistance.” **to** “For moderate- or high-hazard industrial operations, managers shall ensure that a PHS document is completed. The integral HA section of the PHS is required, unless the hazards are addressed with a separate safety basis document. A reference to the HA completed as part of the safety basis document should be noted in the PHS HA and listed in the supporting documents table. The results of the PHS HA may be used to support the development of the required safety basis document (i.e., Safety Assessment [SA]). Managers who plan to develop or to modify operations that result in a moderate- or high-hazard industrial facility classification shall consult the Safety Basis Department for assistance.”
- Section 2.3.5, “Accelerator Facilities”
  - ***Changed:** First paragraph **from** “For accelerator facilities regulated under DOE O 420.2C, Safety of Accelerator Facilities, managers shall ensure that a PHS document is completed. The integral HA section of the PHS is required unless the hazards are addressed in the SAD. The

results of the SAD should be noted in the PHS HA. The results of the PHS HA may be used to support the development of the required safety basis documentation." **to** "For accelerator facilities regulated under DOE O 420.2C, Safety of Accelerator Facilities, managers shall ensure that a PHS document is completed. The integral HA section of the PHS is required, unless the hazards are addressed in the Safety Assessment Document (SAD). A reference to the SAD should be noted in the PHS HA and listed in the supporting documents table. The results of the PHS HA may be used to support the development of the required safety basis documentation."

- Section 2.3.6, "Nuclear Facilities"
  - ***Changed:** First paragraph **from** "For hazard category 1, 2, or 3 DOE nuclear facility operations, managers shall ensure that a PHS document is completed. The results of the DSA should be noted in the PHS HA. Managers may require that the integral HA section of the PHS be completed. The results of the PHS HA may be used to support the development of the required safety basis documentation." **to** "For hazard category 1, 2, or 3 DOE nuclear facility operations, managers shall ensure that a PHS document is completed. The results of the Documented Safety Analysis (DSA) should be noted in the PHS HA. Managers may require that the integral HA section of the PHS be completed. The results of the PHS HA may be used to support the development of the required safety basis documentation. The safety basis documentation shall be completed in accordance with 10 CFR 830, Subpart B."
  - ***Deleted:** Paragraph from section –"Chapter 6, "Nuclear Facilities Classification" safety basis requirements only apply to hazard category 1, 2, and 3 nuclear facilities. For facilities with radiological material below the DOE nuclear facility hazard category 3 thresholds, the safety basis requirements are determined by the industrial facility classification where the radiological activities take place. The PHS associated with these facilities includes an additional "radiological" designation. Radiological facilities are exempted from the requirements of 10 CFR 830 Subpart B, but are required to:
    - Have administrative controls in place to ensure minimum values are not exceeded, and
    - Meet additional requirements as outlined in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, Subpart A, *Quality Assurance Requirements."*
  - ***Added:** Specifics for radiological facilities – "For facilities with radiological material below the DOE nuclear facility hazard category 3 thresholds, the safety basis requirements are determined by the classification of the industrial facility where the radiological activities take place. The PHS associated with these facilities includes an additional "radiological" designation.

    For radiological facilities or operations, managers shall ensure that the integral HA section of the PHS is completed, or that an SHA is prepared, as described in Section 2.4, "Hazards Analysis (HA)." A reference to the SHA should be noted in the PHS HA and listed in the supporting documents table. As determined by the Safety Basis Department, an SHA may be required to confirm the hazard classification for select facilities. The requirement to complete an SHA shall be documented using the PHS software. The manager shall consult with the Safety Basis Department for guidance on the development of the SHA.

    Radiological facility managers are responsible for ensuring that all radioactive materials within their facility are accounted for using a real-time or bounding inventory. The radioactive material inventory contained in the PHS shall be bounding. Radiological facilities are exempt from the requirements of 10 CFR 830 Subpart B, but are required to:
    - Have administrative controls in place to ensure that Hazard Category 3 threshold values are not exceeded, and
    - Meet additional requirements, as outlined in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, Subpart A, *Quality Assurance Requirements."*

- Section 2.4, “Hazards Analysis (HA)”
  - ***Changed:** Second paragraph in section **from** “For SNL operations, an HA can be completed using the integral ISMS software PHS HA module, completed as a stand-alone HA, or completed as part of a safety basis documentation (safety assessment [SA], safety analysis document [SAD], documented safety analysis [DSA]). The PHS HA module uses a modified event analysis method to document the analysis and mitigation of hazards.” **to** “For SNL operations, an HA can be completed using the integral PHS HA module within the ISMS software and/or completed as part of the safety basis documentation (i.e., stand-alone HA [SHA], safety assessment [SA], safety analysis document [SAD], or documented safety analysis [DSA]). The PHS HA module uses a modified event analysis method to document the analysis and mitigation of hazards. An SHA shall be completed using the process identified in Appendix IF-01, “IFSB Development of SB Documents,” following a graded approach, as agreed to by the line organization and the Safety Basis Department.”
  - ***Added:** Section note – “**Note:** An HA completed as a safety basis document in lieu of the integral PHS HA must be referenced in the PHS HA notes and listed in the supporting documents table.”
  - ***Added:** Specifics to section for using a Stand-Alone Hazards Analysis
    - (SHA) – “An SHA may be required to verify and document the following:
    - Low hazard classification with hazards requiring controls to keep a facility or operation from a higher hazard classification.
    - Potential impacts from Sandia operations to receptors located in non-Sandia controlled areas.
    - Final nuclear facility hazard categorization.”
  - ***Added:** Specifics to section for final categorization – “Final nuclear facility hazard categorization shall be completed using the DOE STD1027-92 methodology and threshold values from DOE NA-1 Supplemental Directive (SD) Guide (G) 1027, *Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*.”
  - ***Changed:** Section specific **from** “The manager may consult with the Safety Basis Department for guidance on the planning and development of a stand-alone HA.” **to** “The manager shall consult with the Safety Basis Department for guidance regarding the planning and development of an SHA.”
  - ***Changed:** Section specifics **from** “Managers of low-hazard operations with a low-hazard PHS must ensure completion of a PHS-generated HA prior to the start or restart of work. Managers of low-hazard operations may choose to develop a stand-alone HA to evaluate hazards and develop controls for the activity. A standalone HA must be at least as rigorous as the PHS HA.” **to** “Managers of low-hazard operations with a low-hazard PHS must ensure the completion of a PHS-generated HA and/or SHA prior to the start or restart of work. Managers of low-hazard operations may choose to develop an SHA to evaluate the adequate control of hazards, and/or an SHA may be required to verify hazard classification.”
- Section 2.5, “Hazard Aggregation Rollup Process(HARP)”
  - ***Changed:** First paragraph in section **from** “Because of the complexity of their operations both technically and organizationally, facilities may be analyzed in multiple PHS documents. The SNL ISMS software also provides a hazards aggregation module that combines hazards at the facility level. The purpose of the HARP process is to determine the hazard categorization for the facility and to evaluate the hazards of the facility as a whole.” **to** “Because of the complexity of the operations, both technically and organizationally, facilities may be analyzed in multiple PHS

documents. The purpose of the HARP process is to determine the facility classification and to evaluate the hazards of the facility as a whole. The HARP may be used to determine if an SHA is required."

- Section 2.6, "Process Safety Management (PSM)"
  - ***Changed:** Second paragraph **from** "Because of the complexity of their operations both technically and organizationally, facilities may be analyzed in multiple PHS documents. The SNL ISMS software also provides a hazards aggregation module that combines hazards at the facility level. The purpose of the HARP process is to determine the hazard categorization for the facility and to evaluate the hazards of the facility as a whole." **to** "Because of the complexity of the operations, both technically and organizationally; facilities may be analyzed in multiple PHS documents. The purpose of the HARP process is to determine the facility classification and to evaluate the hazards of the facility as a whole. The HARP may be used to determine if an SHA is required."
- Section 2.7, "Process Safety Management (PSM)"
- ***Changed:** Second paragraph **from** "Stand-alone HAs identify the controls necessary to reduce the potential consequences or frequency of potential consequences of the analyzed hazards. SAs are developed for moderate- or high-hazard industrial operations and include the controls derived and documented in a safety envelope. Stand-alone HAs and SAs identify a set of controls as the *safety envelope*. High-hazard SAs are prepared and submitted to DOE/NNSA for approval." **to** "SHAs and SAs identify the controls necessary to reduce the potential consequences, or frequency of potential consequences, of the analyzed hazards. SHAs and SAs identify a set of controls as the *safety envelope*. SHAs are developed to document the facility classification of low-hazard industrial facilities and/or SAs are developed for moderate- or high-hazard industrial operations, and include the controls derived and documented in a safety envelope. High-hazard SAs are prepared and submitted to DOE/NNSA for approval."

Chapter 4, "Low-Hazard Industrial Facility Classification"

- Section 4.1, "Safety Basis Documentation"
  - **Changed:** Section note **from** "The results of the stand-alone HA should be noted in the PHS HA." **to** "A reference to the SHA should be noted in the PHS HA, and the document should be listed in the supporting documents table."
- Section 4.2, "Verification of Controls"
  - ***Changed:** Second paragraph in section **from** "The verification of the control implementation process establishes the requirements and actions required to demonstrate and validate the readiness to startup/restart a facility or the implementation of changed controls in an operating facility. For low-hazard facilities and activities, managers shall complete a low-hazard review of the required actions and controls from the PHS/HA. In addition, managers may elect to use a management self-assessment (MSA) or implementation validation review (IVR). The MSA process is defined in Appendix SB-05, "Management Self-Assessment (MSA) Process" the IVR process is defined in Appendix SB-04, "Implementation Validation Review." **to** "Verification of the control implementation process establishes the requirements and actions required to demonstrate the readiness to start/restart a facility or to demonstrate the implementation of changed controls in an operating facility. For low-hazard facilities and activities, managers shall complete a low-hazard review of the required actions and controls from the PHS/HA. In addition, managers may elect to use a management self-assessment (MSA) or implementation validation review (IVR). The MSA process is defined in Appendix SB-05, "Management Self-Assessment (MSA) Process." The IVR process is defined in Appendix SB-04, 'Implementation Validation Review.' "

- Section 4.4, "IFSB Change Control"
  - ***Changed:** Second paragraph **from** "The PHS shall be updated at least annually. In addition, the PHS shall be updated and approved when changes are made to the operation that would involve altering any of the answers to the electronic version of the PHS questions. Changes to the PHS may identify subsequent changes to the PHS generated action items, warning messages, and training requirements. An LR may need to be completed to reflect the new requirements." **to** "The PHS shall be updated at least annually. In addition, the PHS shall be updated and approved when changes are made to the operation that would involve altering any of the answers to the electronic version of the PHS questions. Changes to the PHS may require conforming changes to the PHS-generated actions, warning messages, and training requirements. An LR may need to be completed to reflect the new requirements."
- ***Added:** Third paragraph to section – "For facilities with a stand-alone HA (SHA), a management of change (MOC) process shall be adopted as part of the safety envelope."
- Section 4.8, "Quality Assurance"
  - ***Changed:** Second paragraph **from** "Managers at all levels are responsible for ensuring that all work is planned and controlled in a manner that implements the elements of the safety basis as defined in the applicable PHS, HARP, and stand-alone HA, based on the nature of the work and associated risks and that their MOW have and maintain the requisite qualifications. Managers are required to identify and implement quality requirements applicable to their operations." **to** "Managers at all levels are responsible for ensuring that all work is planned and controlled in a manner that implements the elements of the safety basis as defined in the applicable PHS, HARP, and stand-alone HA (SHA). Managers at all levels are responsible for ensuring that all hazards and associated risks are controlled Managers at all levels are responsible for ensuring that all of their MOW are trained and qualified. Managers at all levels are also responsible for ensuring that all quality requirements applicable to their operations are identified and implemented."
  - ***Changed:** Third paragraph **from** "Specifically, if the nature of the work defines the activities, operations, or facility as radiological, additional requirements apply as outlined in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, Subpart A, *Quality Assurance Requirements*. Also, if the facility has qualifying amounts of highly hazardous chemicals or fuels, the quality assurance requirements of 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*, also applies." **to** "If the nature of the work defines the activities, operations, or facility as "radiological," additional requirements apply, as outlined in DOE O 414.1D, *Quality Assurance*, and 10 CFR 830, Subpart A, *Quality Assurance Requirements*. If the facility has threshold quantities of highly hazardous chemicals or fuels, the quality assurance requirements of 29 CFR 1910.119, *Process Safety Management of Highly Hazardous Chemicals*, also apply."

Appendix SB-07 – "Nuclear Hazard Categorization"

- ***Added:** Stand-Alone Hazard Analysis to the Low-Level Industrial classification, Sandia Assurance Basis.

Appendix NF-01 – "Nuclear Hazard Categorization"

- **Updated:** Reference to; "NA-1 SD G 1027, Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE *Order 5480.23, Nuclear Safety Analysis Reports, throughout entire document.*"
- Section 1.2, "Scope"
  - ***Changed:** First paragraph **from** "This process must be used for activities or facilities which involve radioactive material. These activities or facilities shall be categorized as nuclear Hazard Category-1, -2, or -3 or nuclear facilities below Hazard Category-3 (i.e., a radiological facility) through the Primary Hazard Screening (PHS) process and covers:" **to** "This process shall be used

for activities or facilities that involve radioactive material. These activities or facilities shall be categorized as nuclear Hazard Category-1, -2, or -3 or nuclear facilities below Hazard Category-3 (i.e., a radiological facility) through the Primary Hazard Screening (PHS) process and covers."

- Section 1.3, "Applicability"
  - ***Changed:** First paragraph **from** "The process described in this appendix is applicable to activities or facilities controlled by Sandia and involve radioactive material." **to** "The process described in this appendix applies to Members of the Workforce who support activities or facilities controlled by Sandia National Laboratories (SNL) and involve radioactive material."
- Section 1.4, "Background"
  - ***Added:** Specifics regarding implementation of Supplemental Guidance:

    NA-1 SD G 1027 – "On December 18, 2012, the Department of Energy (DOE) National Nuclear Security Administration (NNSA) Sandia Field Office (SFO) issued a letter of direction, *Performance Direction to Implement NA-1 SD G 1027*, to implement NA-1 SD G 1027. Per the letter of direction, implementation plan ES&H-PLN-13-01, Implementation Plan for NA-1 SD G 1027, Guidance on Using Release Fraction and Modern Dosimetric Information

    Consistently with DOE-STD–1027–92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, was developed, to address the implementation conditions for hazard categorization purposes contained therein."
- Section 1.5, "Requirements"
  - ***Added:** "NA-1 SD G 1027, Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports" to the list of requirements in this section.
- Section 3.1.2, "Passive Design Features"
  - ***Changed**: Third paragraph **from** "Passive design features credited for hazard categorization must be robust i.e., not easily defeated. These passive design features must be able to survive all credible failure mechanisms (i.e., NPH, external events, operational upsets) to be credited for the purposes of hazard categorization. Examples of easily defeated controls include active engineered systems, administrative programs or procedures, and passive design features that can be inadvertently altered so as to defeat their safety function." **to** "Passive design features credited for hazard categorization must be robust (i.e., not easily defeated). Examples of easily defeated controls include active engineered systems, administrative programs or procedures, and passive design features that can be inadvertently altered so as to defeat their safety function."
- Section 3.2, "Categorization Methodology"
  - ***Changed:** Third paragraph **from** "The initial hazard categorization is used as screening criteria to assist in determining the level of rigor necessary for the hazards/safety analysis used in the final hazard categorization. This initial screening effort is a simple screening step using the PHS process with the most conservative threshold values and does not involve detailed computations. The consideration of material form, location, dispersibility and interaction with available energy sources called for in final hazard categorization is not applicable to this phase." **to** "The initial hazard categorization is used as screening criteria for new facilities or major modifications to assist with determining the level of rigor necessary for the hazards/safety analysis used for the final hazard categorization. This initial screening effort uses the PHS process with the most conservative threshold values and does not involve detailed computations. The consideration of material form, location, dispersibility, and interaction with available energy sources required for final hazard categorization is not applicable to initial screening."
  - ***Changed:** Figure 3.1, "PHS Categorization Process" (see official version for specifics).

- ***Changed:** Fifth paragraph **from** "Category A reactors are, by definition, categorized as nuclear Hazard Category-1. Category B reactors by definition are categorized as nuclear Hazard Category-2. Since the type of these facilities define their hazard categorization, no further validation of initial hazard categorization is needed, but the hazard categorization shall be documented in the facility's DSA." **to** "Type A reactors are, by definition, categorized as nuclear Hazard Category-1. Type B reactors, by definition, are categorized as nuclear Hazard Category-2. Because the reactor type defines the facility hazard categorization, no further validation of initial hazard categorization is required. The defined hazard categorization shall be documented in the facility's DSA."
- ***Changed:** Sixth paragraph **from** "Initial categorization of a facility can also be based on whether a sufficient quantity of fissile material is present in a form that could support a critical configuration under normal or credible abnormal scenarios other than the introduction of additional fissile material. If the potential for criticality exists the facility is Hazard Category2. For simplicity, if only a single fissile isotope (e.g., 233U, 235U, or 239Pu) in an aqueous solution is to be used in the facility, then the value provided for that isotope in the triple-asterisk footnote to DOE-STD-102792, Table A.1, is used for assignment of initial facility categorization. These threshold values are the minimum theoretical mass necessary for a nuclear criticality to occur with moderation and reflection. Other fissionable nuclides are considered on a case-by case-basis." **to** "Initial categorization of a facility can also be based on whether a sufficient quantity of fissile material is present in a form that could support a critical configuration under normal or credible abnormal scenarios other than the introduction of additional fissile material. If the potential for criticality exists, the facility is a Hazard Category-2. Refer to ESH100.2.SB.2, *Ensure Nuclear Criticality Safety*, for procedures for determining the potential for criticality and the threshold limits for fissile inventories. These threshold values are the minimum theoretical mass necessary for a nuclear criticality to occur with moderation and reflection. Other fissionable nuclides are considered on a case-by case-basis."

- Section 3.2.1, "Sum of Radionuclide Threshold Fractions Methodology"
  - ***Changed:** The steps for performing summation **From:***

    1. For initial categorization, the quantity of each radioactive isotope is calculated as a fraction of its associated Hazard Category-3 threshold value as presented in Table A.1 of DOE-STD-1027-92 or Table1 of Attachment 2, NA-1 SD G 1027.

    2. The isotopic fractions are summed

    3. If the sum of fractions less than unity, the facility is initially categorized as Less-Than Hazard Category-3 Nuclear Facility (i.e., Radiological Facility).

    4. If the sum is equal to unity, the facility is initially categorized as Hazard Category-3.

    5. If the Hazard Category-3 sum of fractions exceeds unity, calculate the quantity of each radioactive isotope as a fraction of its most conservative associated Hazard Category-2 threshold values presented in Table A.1 of DOESTD-1027-92 or Table 1 of Attachment 2, NA-1 SD G 1027. 6. If the sum of fractions equals or exceeds unity, the facility is initially categorized as Hazard Category-2. If the sum is less than unity, the facility is initially categorized as Hazard Category-3.

    To:

    1. For initial categorization, the quantity of each radioactive isotope is calculated as a fraction of its most conservative associated Hazard Category-3 threshold value as presented in DOE-STD-1027-92, Table A.1, "Thresholds for Radionuclides" or NA-1 SD G 1027, Attachment 2, "Hazard Categorization Tables," Table 1, "Revised Thresholds for Radionuclides."

    2. The isotopic fractions are summed.

3. If the sum of fractions is less than unity, the facility is initially categorized as a Less-Than Hazard Category-3 nuclear facility (i.e., Radiological Facility).

4. If the sum of fractions is equal to unity, the facility is initially categorized as a Hazard Category-3 nuclear facility.

5. If the Hazard Category-3 sum of fractions exceeds unity, calculate the quantity of each radioactive isotope as a fraction of its most conservative associated Hazard Category-2 threshold values presented in DOE-STD-102792, Table A.1, "Thresholds for Radionuclides" or NA-1 SD G 1027, Attachment 2, "Hazard Categorization Tables," Table 1, "Revised Thresholds for Radionuclides."

6. If the sum of fractions equals or exceeds unity, the facility is initially categorized as a Hazard Category-2 nuclear facility. 7. If the sum of fractions is less than unity, the facility is initially categorized as a Hazard Category-3 nuclear facility.

- Section 3.2.3.2, "Department of Transportation Type-B Shipping Containers"
  - ***Changed:** Bullet five **from** "The Type-B container must be able to withstand the full range of credible operational accident scenarios for the activity or facility." **to** "The Type-B container must be able to withstand the full range of unmitigated and credible operational accident scenarios for the activity or facility."
- Section 3.2.5, "Final Hazard Categorization"
  - ***Changed:** Sixth paragraph in section **from** "For cases where the final hazard categorization is adjusted, or in situations where scenarios exist involving release mechanisms (e.g., explosives activities, dynamic experiments) that could result in a greater radiological release than assumed in the updated thresholds, the technical justification for the hazard categorization must be documented." **to** "For cases where the final hazard categorization is adjusted, or in situations where scenarios exist involving release mechanisms (e.g., explosives activities, dynamic experiments) that could result in a greater radiological release than assumed in the updated thresholds, the technical justification for the hazard categorization must be documented. The Safety Basis Department will determine the level of rigor required for the hazard analysis."
- Section 5.0, "References"
  - **Added:** Subsections –
    - 5.1, "Requirement Drivers."
    - 5.2, "Additional Drivers."
  - ***Added:** Requirement Driver –
    - DOE-O-425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities.*
  - ***Added:** Additional Drivers –
    - 10 CFR 30, *Rules of General Applicability to Domestic Licensing of Byproduct Material*.
    - 10 CFR 40.13, *Unimportant Quantities of Source Material*.
    - 10 CFR 71.75, *Qualification of Special Form Radioactive Material*.
    - 40 CFR 302.4, *Designation of Hazardous Substances*.
    - 49 CFR 173.469, *Tests for Special Form Class 7 (Radioactive) Materials*.
    - ANSI N43.6-2007, *Sealed Radioactive Sources – Classification*.
    - DOE-G-441.1-1C, Chg. 1, *Radiation Protection Programs Guide for Use with Title 10, Code of Federal Regulations, Part 835, Occupational Radiation Protection*.
    - DOE-HDBK-3010-94, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*.

- DOE-STD-3009-94, Change Notice 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.
- ES&H-PLN-13-01, *Implementation Plan for NA-1 SD G 1027, Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1*.
- ICRP 68, Dose Coefficients for Intakes of Radionuclides by Workers. ICRP Publication 68. Ann. ICRP 24 (4).
- ICRP 72, Age-dependent Doses to the Members of the Public from Intake of Radionuclides - Part 5 Compilation of Ingestion and Inhalation Coefficients. ICRP Publication 72. Ann. ICRP 26 (1).
- SNL, ESH100.2.SB.2, *Ensure Nuclear Criticality Safety*.
- SNL, MN471017, *Safety Basis Manual.*

- ***Deleted:** References –
  - Memorandum from Patty Wagner, National Nuclear Security Administration, Sandia Site Office, to C. Paul Robinson, Sandia National Laboratories, "NNSA/SSO Position on Site Boundary for Sandia National Laboratories (SNL) Nuclear Facilities," January 21, 2005.
  - NUREG-1140 Draft Report for Comment, A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees, U.S. Nuclear Regulatory Commission (June 1985).
  - NUREG-1140 Final Report, A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees, U.S. Nuclear Regulatory Commission (January 1988).
  - Technical Background Document to Support Final Rulemaking Pursuant to Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act: Radionuclides, A Report to the Emergency Response Division, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, ICF Incorporated and C-E Environmental, EPA Contract 68-033452, February 1989.

Appendix NF-02, "Nuclear Safety Basis Strategy Document"

- Section 3.1, "Development and Maintenance"
  - ***Added:** "The suggested content of the safety basis strategy is provided in Tool NF-01-T, 'Content of Nuclear Safety Basis Strategy Document,' " to paragraph one.
- Section 3.3, "Communication Requirements During Reviews"
  - ***Deleted:** "Minutes of associated meetings and agreements from these formal interactions are transcribed and maintained by the SBD with copies sent to the NFO," from second paragraph.

Appendix NF-05, "NF Accident Analysis"

- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
  - ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from fourth paragraph.

Appendix NF-08, "Nonreactor Nuclear DSA"

- Section 4.0, "Records"

- ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
- ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from fourth paragraph.

Appendix NF-09, "Nuclear Reactor DSA"

- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
  - ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from fourth paragraph.

Appendix NF-10, "Nuclear DSA for Onsite Transportation Activities"

- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
  - ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from fourth paragraph.

Appendix NF-12, "Developing a NF Basis for Interim Operations"

- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.

Appendix NF-14, "Development of Technical Safety Requirements (TSRs)"

- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
  - ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from fourth paragraph.

Appendix NF-16, "Review and Approval Process for Nuclear Safety Basis Documents Generated by Sandia"

- Section, "3.4, Independent Review"
  - ***Deleted:** "In addition, meeting minutes will be recorded that will describe the agreed upon resolution," fro paragraph three.
- Section, "3.6, SBRT Review"
  - ***Deleted:** "Meeting minutes will be recorded that document the discussion held, any proposed resolutions, and if agreement on resolutions was reached," from first paragraph.
- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
  - ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from fourth paragraph.

Appendix NF-17, "Nuclear Safety Basis Annual Update Preparation and Submittal"

- Section 1.4, "Background"

- ***Added:** Clarification verbiage; "However, nonessential changes consisting of editorial changes, or changes resulting from negative USQDs, which do not have the potential to change any technical aspect of the document or conclusions reached, may be deferred to the next annual update. These deferred changes will be documented in the review report and shall not be delayed beyond the next annual update," to second paragraph.

- Section 3.4, "Preparation of Annual Update"
  - ***Deleted:** "Minutes of associated meetings and agreements from these formal interactions are transcribed and records maintained by the SBD with copies sent to the NFO," from second paragraph.
- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
  - ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from fourth paragraph.

Appendix NF-18, "Maintenance of Nuclear Safety Basis"

- Section 3.1, "Planning for Nuclear Safety Basis Document Changes that Require DOE/NNSA Approval"
  - ***Deleted:** "Minutes of associated meetings and agreements from these formal interactions are transcribed and records maintained by the SBD with copies sent to the NFO," from second paragraph.
- Section 4.0, "Records"
  - ***Deleted:** "Copies of minutes from formal meetings and agreements maintained by the SBD shall be sent to the NFO," from second paragraph.
  - ***Deleted:** "Formal meeting minutes, if the meeting was conducted for the purpose of evaluation," from second paragraph.

March 1, 2013

* Indicates a substantive change

General Summary

Substantive changes have been made to MN471017, Safety Basis Manual as the result of SNL implementation of DOE Order 420.20, *Safety of Accelerator Facilities* (updated 07/2011). As part of the Sandia Field Office (SFO) approved implementation plan, the commitment is to update MN471017, *Safety Basis Manual* with the exemptions listed in the updated Order. Specifics include:

- ***Completed:** The Corporate Policy System/ES&H Supplement Required Review Checklist, which documents completion of the three-year review of Corporate Requirements.
- ***Updated**: Drivers and references throughout all Chapters and Industrial Facility Appendices to reflect changes to DE-AC04-94AL85000*, Management and Operating Contract Between Sandia Corporation and DOE,* Part III, Section J, Appendix G, "List of Applicable Directives and Policy Letters."
- **Updated:** Chapter and Appendix contributors.
- **Updated:** References to Sandia Site Office (SSO) to Sandia Field Office (SFO) throughout all Chapters and Industrial Facility Appendices.

- **Converted**: All Chapter and Appendix files from HTML to PDF format.
- **Added:** Page numbers to all Chapters and Industrial Facility Appendices. Table of Contents
- ***Renamed:** Chapter 7, References to Accelerator Facilities."
- ***Relocated:** Chapter 7, References to Chapter 8, References."
- ***Added**: Appendix IF-06, "IFSB Accelerator Classification."

Chapter 3, "Business Occupancy (Office) and Standard Industrial Hazard (SIH) Classification"

- ***Deleted:** Reference to CG100.5.3, Determine Need for Project, Facility, or Organization QA Program Document. This document is cancelled.

Chapter4, "Low Hazard Industrial Facility Classification"

- ***Deleted:** Reference to CG100.5.3, Determine Need for Project, Facility, or Organization QA Program Document. This document is cancelled.

Chapter 5, "Moderate- and High- Hazard Industrial Facilities"

- ***Moved**: Accelerator requirements from Chapter 5, "Moderate/High-Hazard Industrial Facilities and Accelerator Facilities, to Chapter 7, References.
- ***Changed**: Greater than 75% of this Chapter so it should be read in its entirety.
- **Renamed**: Chapter 5, "Moderate/High-Hazard Industrial Facilities and Accelerator Facilities," to Moderate- and High-Hazard Industrial Facilities."

Chapter 6, "Nuclear Facilities Classification"

- ***Deleted:** Reference to CG100.5.3, Determine Need for Project, Facility, or Organization QA Program Document. This document is cancelled.

Chapter 7, "Accelerator Facilities"

- ***Renamed:** Chapter 7, "References" to "Accelerator Facilities."
- ***Relocated:** Chapter 7, "References," to Chapter 8, "References."
- **Updated:** Figure 7-1, "IFSB Document Process Overview," 7-2, "Development of IFSB Documents," 7-3, "IFSB Document Independent Review Process," 7-4, "IFSB Document Approval Process," and 7-5, "IFSB USI Process."
- ***Deleted:** Reference to CG100.5.3, Determine Need for Project, Facility, or Organization QA Program Document. This document is cancelled.
- **Changed:** Title of Section 7.9.1 from "Requirement Source Documents" to "Requirement Drivers."
- **Changed:** Title of Section 7.9.2 from "Implementing Documents" to "Additional Drivers."

Chapter 8, "References"

- ***Relocated:** Chapter 7, "References," to Chapter 8, "References."
- **Changed:** Title of Section 8.1 from "Requirement Source Documents" **to** "Requirement Drivers."
- **Changed:** Title of Section 8.2 from "Implementing Documents" to "Additional Drivers."
- **Changed:** Title of Section 8.3 from "Related Documents" to "Related Drivers."

April 23, 2012

* Indicates a substantive change

General Summary

*Substantive changes have been made to MN471017, Safety Basis Manual as the result of SNL implementation of DOE O 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*. Content associated with the readiness process for Hazard Category 1, 2, and 3 nuclear facilities has been largely relocated from MN471017 to a new stand-alone supplement: GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations*. DOE O 425.1D requires concurrence of GN470109 from the Sandia Site Office (SSO). Industrial Facility readiness process procedures in MN471017 have been updated as needed to reflect removal of the nuclear process, and to update shared processes based on the changes to DOE O 425.1D.

Hyperlinks, Subject Matter Experts, Contacts, and Points of Contact were updated throughout the documents listed below.

Drivers and references were updated to reflect changes to DE-AC04-94AL85000*, Management and Operating Contract Between Sandia Corporation and DOE,* Part III, Section J, Appendix G, "List of Applicable Directives and Policy Letters." **Safety Basis Manual Chapter Document Changes:**

Table of Contents

- **Changed:** Subject Matter Expert from Caren Wenner to Michael Greutman.
- ***Changed:** Title of Readiness Review Appendix RR-04 from "Startup and Restart Procedure for Nuclear Facilities/Activities" to "Reserved for Future Use." Content of this appendix has been relocated to GN470109 and substantively revised.
- ***Changed:** Title of Readiness Review Tool RR-04T from "Startup/Restart Notification Report (SNR) Instructions and Format" to "Reserved for Future Use." Content of this tool has been relocated to GN470109 and substantively revised.
- ***Added:** Form SF 2001-CRA, "Checklist Readiness Assessment" to the forms listing.
- ***Added:** Entries 5.4, "Authorization Agreements" and 6.4, "Authorization Agreements" and renumbered other entries to reflect actual contents of Chapters 5.0 and 6.0 as the result of a previous revision.
- **Changed:** Title of Chapter 6.0, "Nuclear Facilities Classification," Section 6.5, from "IFSB Change Control" to "NFSB Change Control" to reflect actual section title.
- **Changed:** Title of Safety Basis Appendix SB-02 from "Required Documentation by Hazard Classification" to "Hazard Aggregation Rollup Process (HARP)" to reflect actual appendix title.

Chapter 2, "Safety Basis Planning and Implementation"

- **Changed:** Subject Matter Expert from Caren Wenner to Michael Greutman.
- Table 2-1, Levels of Safety Basis Documentation and Approval, and Section 2.3.5, Accelerator Facilities:
  - **Clarified:** Language describing approval authorities for safety basis documentation and authorization authority for accelerator facilities.
- Section 2.2, "Primary Hazards Screening (PHS)"
  - ***Added:** "Radiological materials operating limits/envelope" to the list of ISMS process aspects documented using PHS software.

- Section 2.3.5, "Accelerator Facilities"
  - ***Deleted:** The penultimate sentence in the first paragraph, as it was not applicable to accelerator facilities.
- Section 2.3.6, "Nuclear Facilities"
  - ***Replaced:** Reference to Appendix RR-04 with reference to GN470109 for implementation of the nuclear readiness process.
  - ***Added:** Clarifying verbiage to safety basis requirements associated with below nuclear hazard category 3 radiological facilities.
- Section 2.7, "Control of Hazards"
  - ***Added:** Content previously contained in MN471001, *Environment Safety and Health Manual*, Section 13A, "Hazards Identification and Classification Process" to clarify identification and implementation of the 10 CFR 851.22(b) hazard controls hierarchy of controls.

Chapter 6, "Nuclear Facilities Classification"

- **Replaced:** References to DOE O 425.1C and DOE-STD-3006-2000 with references to DOE O 425.1D and DOE-STD-3006-2010 throughout.
- ***Deleted:** Reference to Appendix RR-04. This content has been relocated to GN470109 and substantively revised.
- Section 6.3, "Determining Readiness"
  - ***Replaced:** Reference to Appendix RR-04 with reference to GN470109 for implementation of the nuclear readiness process.
- Section 6.4, "Authorization Agreements (AA)"
  - ***Added:** "Category 2 nuclear facility" to the description defining the facilities for which an AA is required.
- Section 6.8, "Keeping Records"
  - ***Replaced:** Reference to Appendix RR-04 with reference to GN470109 for implementation of the nuclear readiness process.

Chapter 7, "References"

- **Replaced:** References to DOE O 425.1C and DOE-STD-3006-2000 with references to DOE O 425.1D and DOE-STD-3006-2010.
- **Added:** New reference to GN470109.
- **Changed:** Document number for Technical Work Document Processing System from AOP 95-12 to AOP 94-12.
- **Replaced:** Reference to CPR400.1.2, Integrated Safety Management System (ISMS) Description with reference to PG470252, Integrated Safety Management System (ISMS) Description.
- **Changed:** Title for prime contract clause H.3 from "Contractor Assurance" to "Integrated Laboratory Management System."
- **Updated:** References to align with DE-AC04-94AL85000*, Management and Operating Contract Between Sandia Corporation and DOE,* Part III, Section J, Appendix G, “List of Applicable Directives and Policy Letters.”
- **Added:** For completeness, Sandia Site Office (SSO) correspondence that established safety basis requirements for non-nuclear facilities:

- Memorandum, Patty Wagner to John Stichman, Subj: Safety Basis Requirements for Non-nuclear Facilities, dated September 20, 2005
- Letter, Patty Wagner to John Stichman, Subj: Revision to the Sandia Site Office (SSO) Letter Regarding Safety Basis for Non-Nuclear Facilities, dated September 2, 2008

Appendix RR-01, "Determining Required Readiness Review Type"

- Footnoted
  - **Replaced:** Reference to Appendix RR-04 with reference to GN470109 for implementation of the nuclear readiness process.

Appendix RR-03, "Startup and Restart Procedure for Moderate and Accelerator Facilities/Activities"

- **Changed:** Subject Matter Expert from Caren Wenner to Michael Greutman.
- ***Added:** New section - 3.2, "Checklist Readiness Assessment."
- Section 1.2, "Scope"
  - ***Revised:** Statements for four of the five core functions to be consistent with revisions to PG470252, *Integrated Safety Management System (ISMS) Description*.
- Section 4.1, "Plan of Action (POA) Development"
  - ***Added:** Element to POA content to address proposed performance demonstrations.
- Section 4.6.2, "Issue Classification Guidance"
  - ***Replaced:** Definitions of finding, prestart finding, and post-start finding with new definitions to be consistent with changes to the SNL nuclear facility readiness process.
  - ***Added:** Requirements to address disposition of findings below the readiness review finding significance threshold.
- Section 6.1, "Requirements"
  - ***Added:** A training requirement for Team Leaders of Checklist Readiness Assessments (RAs) to complete DOE Readiness Review Team Leader or equivalent training, to ensure consistent implementation of the Checklist RA process across the site.
- Section 8.3, "Related Documents"
  - **Replaced:** References to DOE 5480.19 Ch 2, Conduct of Operations Requirements for DOE Facilities and DOE-STD-3006-2000, Planning and Conduct of Operational Readiness Reviews with references to DOE O 422.1, Conduct of Operations and DOE-STD-3006-2010, Planning and Conducting Readiness Reviews.

Tool RR-03-T, "Plan of Action (POA) Format"

- ***Revised:** Tool to be consistent with Appendix RR-03, “Startup and Restart Procedure for Moderate and Accelerator Facilities/Activities,” to recognize the use of checklist readiness assessments, and to tailor content for applicability to industrial and accelerator facilities.
- ***Changed:** Applicability of this tool to include accelerator/industrial facilities. Requirements for nuclear facilities have been relocated to GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations* and substantively revised.

Appendix RR-04, "Startup and Restart Procedure for Nuclear Facilities/Activities"

- ***Relocated:** The content of this appendix to GN470109, Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations and substantively revised.

Tool RR-04-T, “Startup/Restart Notification Report (SNR) Instructions and Format”

- ***Relocated:** The content of this tool to GN470109 and substantively revised.

Appendix RR-05, “Minimum Core Requirements”

- **Changed:** Subject Matter Expert from Caren Wenner to Michael Greutman.
- **Changed:** Contributor from Stacey Medina to John Hobbs.
- **Replaced:** Reference to DOE O 425.1C with reference to DOE O 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*.
- ***Changed:** Statements of core requirements to be consistent with DOE O 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*.
- ***Added**: Paragraph that refers to guidance for implementation of Core Requirements 11 and 13, contained in GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations*, Appendix 5, "Expectations for Core Requirements (CRs)."
- ***Revised:** Appendix to tailor content for applicability to industrial and accelerator facilities.

Appendix RR-06, "Findings Classification Guidelines"

- **Changed:** Subject Matter Expert from Caren Wenner to Michael Greutman.
- **Changed:** Contributor from Stacey Medina to John Hobbs.
- ***Updated:** Content to be consistent with GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations*, Appendix 7 and changes to RR-03, "Startup and Restart Procedure for Moderate and Accelerator Facilities/Activities" with regard to definitions of findings and determination of finding significance.
- ***Changed:** Applicability of this tool to include accelerator/industrial facilities. Requirements for nuclear facilities have been relocated to GN470109 and substantively revised.

Tool RR-06-T, "Implementation Plan (IP) Format"

- ***Updated:** Content to be consistent with GN470109, Appendix 6 and changes to RR-03 with regard to Implementation Plan preparation.
- ***Changed:** Applicability of this tool to include accelerator/industrial facilities. Requirements for nuclear facilities have been relocated to GN470109, *Implementing the Startup and Restart Process for Nuclear Facilities, Activities, and Operations*, and substantively revised.
- ***Revised:** Tool to tailor content for applicability to industrial and accelerator facilities.

Tool SB-02-T, "Management Self-Assessment (MSA)"

- Section 2, "Assessment Approach, Purpose and Scope"
  - ***Replaced:** Reference to Appendix RR-04 with reference to GN470109 for implementation of the nuclear readiness process.

Appendix SB-03, "Process Safety Management (PSM) Standards"

- Table of Contents
- ***Corrected:** The referenced tool to RR-05-T, "Process Safety Management (PSM) Review Format and Checklist."

Appendix SB-04, "Implementation Validation Review"

- **Changed:** Subject Matter Expert from Caren Wenner to Michael Greutman.
- **Added:** Contributor - John Hobbs.

- ***Changed:** Title of section 3 in body of Appendix SB-04 from "Training" to "Overview" as listed in table of contents for Appendix SB-04.
- Table of Contents
  - **Corrected:** The title of Tool SB-01-T, "Implementation Validation Review (IVR) Checklist."
- Section 3, "Overview"
  - ***Replaced:** Reference to Appendix RR-04 with reference to GN470109 for implementation of the nuclear readiness process.
  - ***Deleted:** Last paragraph of Section 3 and Figure 1 to provide clarity.
- Section 5.1, "Administrative Preparations Prior to Performing the IVR"
  - ***Replaced:** Reference to Appendix RR-04 with reference to GN470109 for implementation of the nuclear readiness process.
  - ***Deleted:** Reference to Figure 1, since it referred to the figure deleted from Section 3.
  - **Renumbered:** "Figure 2" to "Figure 1" in the sentence following Table 1.
  - ***Changed:** Legend for "Process Flowchart for IVRs" to read: "Figure 1. Process Flowchart for IVRs."

Appendix SB-05, "Management Self-Assessment"

- **Changed:** Subject Matter Expert from Caren Wenner to Michael Greutman.
- **Added:** Contributor - John Hobbs.
- Section 2.0, "Requirements"
  - ***Replaced:** Reference to DOE O 425.1C with reference to DOE O 425.1D.
  - ***Replaced:** Reference to Appendix RR-04, Section 4.3 with reference to GN470109, Section 3.7 for implementation management self-assessment of the nuclear readiness process.
- Section 4.0, "MSA Process"
  - ***Replaced:** Reference to Appendix RR-04, Section 4.3 with reference to GN470109, Section 3.7, “Plan of Action,” for implementation of management self-assessment for the nuclear readiness process.
- Section 6.0, "References"
  - ***Replaced:** References to DOE O 425.1C and DOE-STD-3006-2000 with references to DOE O 425.1D and DOE-STD-3006-2010, respectively.
  - ***Added:** Reference to GN470109, for implementation of the nuclear readiness process.

January 11, 2011
Administrative Changes Only

Chapter 6, “Nuclear Facilities Classification”

- Section 6.7, “Training and Qualification”
  - **Add:** Clarification language to the end of the section, "A Safety Basis Department Nuclear Safety Analyst shall, through education, training, and experience, be qualified to both develop and review safety basis documents that support the safe operation of Sandia nuclear facilities.

Performance of the development function is under the auspices of the nuclear facility manager, and the facility-specific Training Implementation Matrix (TIM)."

- **Update:** Figure 6-2. This figure was illegible so it was recreated to ensure legibility. It also includes the clarification language, "(SBD personnel will consult with the Line during the development process)."

  Note: this addition and figure change is in response to corrective action, LESA-CA 10189-MF2-IA1.

March 11, 2010
Administrative Changes Only

Appendix IF-04, "IFSB Annual Update Process"

- Section 3.0 Annual Update Process:
  - Corrected: All instances in this section of, "SB Manual" with "SB Document."

January 29, 2010

* Indicates a sub**stantive change**

Chapter 5, "Moderate/High Hazard Industrial Facilities and Accelerator Facilities"

- ***Changed:** Section 5.0, "Moderate/High Hazard Industrial Facilities and Accelerator Facilities," Section 5.1.5, "IFSB Annual Review and Update of IFSB Document," and Section 5.5, IFSB Change Control" requirements.
- **Renamed:** Section 5.4, to "Authorization Agreements" as the result of the GN470099, "*Authorization Agreements (AAs) for Category 1 or 2 Nuclear Facilities or High-Hazard Nonnuclear Facilities"* cancellation and renumbered all remaining sections accordingly.
- ***Moved:** GN470099, "Authorization Agreements (AAs) for Category 1 or 2 Nuclear Facilities or High-Hazard Nonnuclear Facilities" requirements to Section 5.4, "Authorization Agreements."
- **Updated:** References and links to reflect the Policy Transformation changes.

Appendix IF-04, "IFSB Annual Update Process"

- ***Added:** new requirements to Section 3.0, "Annual Update Process."
- ***Changed:** Section 3.1, "Perform Annual Review;" Section 3.2, "Perform Annual Update;" and Section 3.3, "Prepare Documentation of No Update Required" requirements.
- **Updated:** References and links to reflect the Policy Transformation changes.

Appendix IF-05, "IFSB Management of Change Process"

- ***Changed:** Section 3.1, "Implement MOC Process," Section 3.2, "Prepare MOC Process," and Section 3.3, "Review, Concur, and Approve MOC Documentation" requirements.
- **Updated:** References and links to reflect the Policy Transformation changes.

Tool-IF-03-T, Management of Change Process"

- **Changed:** Section 1.2, "Scope" and Section 3.0, "Procedure" guidance. **Nuclear Facility Document Changes:**
- Change: SME from Anthony Cappucci to Michael Greutman on all NF documents (chapters and appendicies).

Chapter 6, “Nuclear Facilities Classification”

- **Renamed:** Section 6.4, to "Authorization Agreements (AAs)" as the result of the GN470099, "Authorization Agreements (AAs) for Category 1 or 2 Nuclear Facilities or High-Hazard Nonnuclear Facilities" cancellation and renumbered all remaining sections accordingly.
- ***Moved:** GN470099, "Authorization Agreements (AAs) for Category 1 or 2 Nuclear Facilities or High-Hazard Nonnuclear Facilities" requirements to Section 6.4, "Authorization Agreements (AAs)."
- **Changed:** Title of Section 6.5 from "IFSB Change Control" to "NFSB Change Control.
- **Updated**: References and links to reflect the Policy Transformation changes (titles and URL destinations).

Appendix NF-03, “Developing a NFSB Hazard Analysis”

- **Updated:** References and links to reflect the Policy Transformation changes (titles and URL destinations).

Appendix NF-06, “NF Dispersion Analysis”

- **Updated:** References and links to reflect the Policy Transformation changes (titles and URL destinations).

Tool-NF-19-T, “Suggested Hazard Categorization Review Checklist”

- **Changed**: step 3 guidance.

Readiness Review Document Changes:

- ***Added:** two Readiness Review Process Tools:
  - RR-06-T - Implementation Plan (IP) Format
  - RR-07-T - RR Final Report Format

Appendix RR-04, “Startup and Restart Procedure for Nuclear Facilities/Activities”

- ***Changed:** Nuclear Facility Organization (NFO) Management Responsibilities.
- ***Changed:** Safety Basis Department (SBD) Manager Responsibilities.
- **Updated:** Table 1, Summary of Nuclear Facility Startup/Restart Readiness Review Requirements.
- ***Changed:** Section 4.1.2, "SNR Process" requirements.
- ***Changed:** Section 4.2, "Plan of Action (POA) Development" requirements.
- ***Changed:** Section 4.6, "Certification of Readiness" requirements.
- ***Changed:** Section 4.7, "Sandia Readiness Review" requirements.
- ***Changed:** Section 4.12, "Declare Readiness to Startup or Restart Operations" requirements.
- ***Changed:** Section 6.0, "Training and Qualification" requirements.
- ***Changed:** Section 7.0, "Records" requirements."
- ***Changed:** Section 8.1, "Requirements Source Documents."
- **Updated:** References and links to reflect the Policy Transformation changes (titles and URL destinations).

Safety Basis Document Changes:

- ***Added:** Safety Basis Process Tool: ○ SB-05-T – Format and Content for Authorization Agreements.
- ***Added:** Safety Basis Process Appendix: ○ SB-08 – Authorization Agreements.

Chapter 1, "Overview of Safety Basis Process"

- **Updated:** Safety Basis Process Summary.
- **Updated**: References and links to reflect the Policy Transformation changes (titles and URL destinations).

Chapter 2, "Safety Basis Planning and Implementation"

- **Updated:** References and links to reflect the Policy Transformation changes (titles and URL destinations).

Appendix SB-03, "Process Safety Management (PSM) Standards"

- ***Changed:** Table 1, "Process Safety Management Standard Elements" project requirements.

October 13, 2009

This document is no longer a CPR. This document implements the requirements of Corporate Procedure **ESH100.2.SB.1**, ***Establish the Safety Basis of Operations***.

September 30, 2008

General Summary

CPR400.1.1.41/MN471017, *Safety Basis Manual,* replaces *ES&H Manual* Sections, supplements, and Safety Basis Level 3 documents. This new CPR represents a reformatting and combining of requirements, guidance, and information.

ALL current requirements from each individual document listed below have been incorporated into the appropriate sections of the Safety Basis (SB) Manual. The SB Manual provides the requirements, procedures, and tools for line organizations to implement safety basis requirements for facilities, operations, and activities classified as Business Occupancy, Standard Industrial Hazard, Low-Hazard Industrial Facility, Moderate-Hazard Industrial Facility, and Nuclear Facility Category 1, 2 or 3.

The SB Manual is separated into sections based on facility classification. Users should first employ the PHS/HARP modules to classify each facility/activity and then use the applicable section of the SB Manual to determine the appropriate requirements. Each SB Manual section redirects the user to the applicable process/procedure in the appendices and implementing tools.

CPR400.1.1.41/MN471017, *Safety Basis Manual* replaces:

- **CPR400.1.1/MN471001,** *ES&H Manual*: ○ Section 13A, "Hazards Identification and Classification Process," Issue F.
  - Section 13B, "Hazards Analysis Process," Issue G.
  - Section 13C, "Authorization Basis Process," Issue J.
  - Section 13D, "Readiness Review Process – Planning, Review, and Approval," Issue C.
- **CPR400.1.1.20/GN47088**, Safety Basis Document Process for Accelerators, Moderate-, and High-Hazard Industrial Facilities, Issue D
- **CPR400.1.1.21/GN47089**, Startup and Restart Process for Sandia Nuclear Facilities/Activities, Issue G
- **CPR400.1.1.38/GN470101**, Preparation and Review of Documented Safety Analyses (DSAs) and Technical Safety Requirements (TSRs) to Meet 10 CFR 830, Subpart B, Issue D.

- **PLA 05-20,** "Implementation Validation Review (IVR) Process Plan for Nuclear Safety Basis Changes."
- **PLA 06-01,** "Safety analysis and Risk Assessment Handbook (SARAH)." SB Manual Specifics:
- **Chapter 1,** "Overview of Safety Basis Process," requirements incorporated from *ES&H Manual,* Section 13A.
- **Chapter 2,** "Safety Basis Planning and Implementation." with corresponding appendices and tools; requirements incorporated from *ES&H Manual*, Sections 13A, 13B, 13C, and 13D.
- **Chapter 3,** "Business Occupancy (Office) and Standard Industrial Hazard Facility Classification," with corresponding appendices and tools; requirements incorporated from *ES&H Manual*, Sections 13A, 13B, 13C, and 13D.
- **Chapter 4,** "Low Hazard Industrial Facility Classification," with corresponding appendices and tools; requirements incorporated from *ES&H Manual*, Sections 13A, 13B, 13C, and 13D.
- **Chapter 5,** "Moderate,/High Hazard Industrial Facilities and Accelerator Facilities," with corresponding appendices and tools; requirements incorporated from *ES&H Manua*l, Sections 13A, 13B, 13C, and 13D; GN470088; and PLA 05-20.
- **Chapter 6,** "Nuclear Facilities Classification," with corresponding appendices and tools; requirements incorporated from *ES&H Manual*, Sections 13A, 13B, 13C, and 13D; GN470089; GN470101; PLA 05-20; and PLA 06-01.
- **Chapter 7,** "References," incorporated from *ES&H Manual*, Sections 13A, 13B, 13C, and 13D; GN470089; GN470101; PLA 05-20; and PLA 06-01.

New Requirements:

- **Added:** Section 5.3, Determining Readiness; new IVR/MSA requirements for Industrial Facility classification.
- **Added:** Section 6.1, NF Safety Basis Documentation; incorporating new requirements from DOE-STD-1189 for PDSA and major modification; new requirement for safety basis strategy document.
- **Added:** Section 6.4, NF SB Change Control; new requirement that USQ summary report accompanies the annual update.
- **Added:** Appendix NF-5, Accident Analysis; Adds requirements associated with the use of recent DOE guidance on use of ICRP 68/72.
- **Added:** Appendix NF-16, Nuclear Safety Basis Calculations; new appendix with new requirements.