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1,2	/	Cog. Mgr. GC Mooers	[Signature]	R3-11	2/16/96	M Mahaffey	[Signature]	2/16/96	R3-85	1,2	/
1,2	/	QA DW Duncan	[Signature]	R3-86	2/16/96	CA Thompson	[Signature]	2/16/96	R3-85	1,2	/
1,2	/	Safety JW Osborne	[Signature]	X3-80	2-20-96						
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Spent Nuclear Fuel Project Safety Management Plan

L. J. Garvin
Westinghouse Hanford Company, Richland, WA 99352
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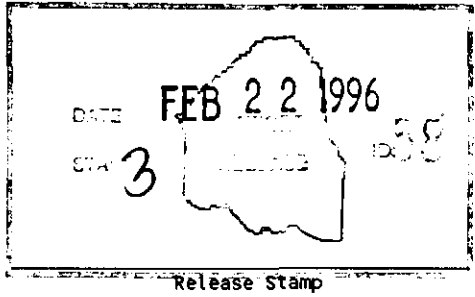
Abstract: The Spent Nuclear Fuel Project Safety Management Plan describes the new nuclear facility regulatory requirements basis for the SNF Project and establishes the plan to achieve compliance with this basis at the new SNF Project facilities.

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SPENT NUCLEAR FUEL PROJECT SAFETY MANAGEMENT PLAN

Spent Nuclear Fuel Project

February 1996

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and Waste Management

Westinghouse Hanford Company
P. O. Box 1970
Richland, Washington 99352

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ABBREVIATIONS AND ACRONYMS

CFR	Code of Federal Regulations
CSB	Canister Storage Building
CSER	Criticality Safety Evaluation Report
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
EH-O	Environmental Health and Safety - Independent Oversight (DOE-HQ)
EH-T	Environmental Health and Safety - Technical Support (DOE-HQ)
EM	Environmental Restoration and Waste Management (DOE)
HQ	Headquarters (DOE)
IRP	Independent Review Panel
ISFSI	Independent Spent Fuel Storage Installation
KH	ICF Kaiser Hanford
MCO	Multi-Canister Overpack
NRC	U.S Nuclear Regulatory Commission
PHA	Preliminary Hazards Assessment
PSE	Preliminary Safety Evaluation
QA	Quality Assurance
RI&PI	Regulatory Integration and Public Involvement (SNF Project)
RL	Richland Operations Office (DOE)
RL-QSH	Office of Quality, Safety, and Health (DOE-RL)
RRT	Regulatory Requirements Team
S/RID	Standards/Requirements Identification Document
SA&NE	Safety Analysis and Nuclear Engineering (WHC)
SAR	Safety Analysis Report
SARP	Safety Analysis Report for Packaging
SEAC	Safety and Environmental Advisory Council
SEMP	Systems Engineering Management Plan
SER	Safety Evaluation Report
SFD	Spent Nuclear Fuel Project Division
SMP	Safety Management Plan
SNF	Spent Nuclear Fuel
TSR	Technical Safety Requirements
USQ	Unreviewed Safety Question
WHC	Westinghouse Hanford Company

SPENT NUCLEAR FUEL PROJECT SAFETY MANAGEMENT PLAN

1.0 BACKGROUND AND INTRODUCTION

In October 1994, the Spent Nuclear Fuel Project (SNF Project) recommended a Path Forward (WHC 1994a) to address the urgent need to move approximately 2100 metric tons of deteriorated spent nuclear fuel from the K Basins to safe interim storage. Ongoing conceptual engineering evaluations continue to define and refine the Path Forward approach. The current technical approach is documented in the *Hanford Spent Nuclear Fuel Project Integrated Process Strategy for K Basins Fuel* (WHC 1995a; referred to in this document as the Integrated Process Strategy).

The Integrated Process Strategy summarizes the results of engineering and technology studies performed to evaluate various alternatives for removal, transport, and storage of the K Basins spent fuel and associated sludge. The strategy recommends moving the spent fuel away from the Columbia River (K Basins) into a Canister Storage Building (CSB) located in the 200 East area of the Hanford Site. At this stage, the CSB will be used exclusively for the storage of K Basins fuel, although future missions for the CSB may include storage of other spent nuclear fuel. The spent fuel will be removed from the K Basins, desludged and reracked, then drained and vacuum dried, and packaged in multi-canister overpacks (MCOs). The MCOs will then be transported to the CSB for interim storage. Some of the fuel may require further conditioning through a hot vacuum process Conditioning Facility prior to interim storage in the CSB. The Conditioning Facility may be incorporated as a process module within the CSB or may be constructed as a stand alone facility near the CSB.

The U.S. Department of Energy (DOE) is implementing an enhanced nuclear safety program for the SNF Project. The DOE has established a policy (DOE 1995) that requires the new SNF Project processes and facilities achieve "nuclear safety equivalency" to comparable U.S. Nuclear Regulatory Commission (NRC)-licensed facilities. Implementation of the policy requires that the SNF Project standards and requirements identification process be augmented to include evaluation of relevant NRC regulatory requirements. The inclusion of NRC regulatory requirements will impact both the design and construction of facilities and the development of safety analysis documentation for the SNF Project.

This Safety Management Plan (SMP) describes the new nuclear facility regulatory requirements basis for the SNF Project and establishes the plan to achieve compliance with this basis at the new SNF Project facilities. This will be accomplished by establishing an agreed methodology to obtain an authorization basis for each of the new SNF Project facilities. This SMP assigns responsibilities for the preparation, review, and approval of the safety analysis

documentation, and it integrates the safety analysis, safety documentation, and independent safety reviews with the design, construction, and startup activities.

The scope of this SMP includes the Vacuum Drying Facility, the CSB, and the hot vacuum process Conditioning Facility (collectively known as the "Path Forward" new facilities). The scope does not include modifications to the K Basin facilities required to support removal of the spent fuel. Also not included in the scope of this SMP are activities related to transportation of the spent fuel and sludge and receipt of the sludge at the Hanford 200 Area tank farms.

The safety analyses and independent review processes described in this SMP will ensure that activities associated with the plan for expedited removal of fuel from the K Basins can be managed without undue risk to the health and safety of workers, visitors, the public, and the environment. The nuclear safety documentation preparation, review, and approval processes described in this document are consistent with the approaches to nuclear safety regulatory compliance, safety analysis, and documentation established in the *K Basins SNF Project - Regulatory Policy* (DOE 1995) and *SNF Project Regulatory Strategy* (WHC 1995b).

2.0 DEFINITIONS

2.1 AUTHORIZATION BASIS

Those aspects of a facility design basis and operational requirements that are utilized by DOE to authorize operation of the facility.

2.2 MULTI-CANISTER OVERPACK

Multi-canister overpacks are sealed containers designed to contain, transport, and store spent nuclear fuel during transportation, stabilization, and interim storage.

2.3 PRELIMINARY SAFETY EVALUATION

A Preliminary Safety Evaluation (PSE) is performed and documented as part of the conceptual design to provide the initial safety basis for a facility.

2.4 SAFETY ANALYSIS REPORT

A Safety Analysis Report (SAR) describes and documents the safety basis of a nuclear facility to ensure that the facility can be designed, constructed, operated, shutdown, and decommissioned safely and in compliance with applicable laws and regulations. The SAR and Technical Safety Requirements are a portion of the authorization basis for a facility.

2.5 SAFETY BASIS

The safety basis is information related to the control of hazards at a facility (including design, engineering analyses, and administrative controls). DOE uses the safety basis to specify how activities at a facility will be safely conducted.

2.6 SAFETY EVALUATION REPORT

A Safety Evaluation Report (SER) is prepared by the Department of Energy to document the basis for their approval of the Safety Analysis Report.

2.7 UNREVIEWED SAFETY QUESTION EVALUATION

An Unreviewed Safety Question (USQ) evaluation is performed for facility changes and the identification of unforeseen events to screen for conditions that may be outside of the previously identified safety envelope. Conditions that exist outside of the safety envelope are evaluated for inclusion in the facility safety documentation.

2.8 TECHNICAL SAFETY REQUIREMENTS

Technical Safety Requirements (TSRs) are the requirements that define the conditions, safe boundaries, and the management or administrative controls necessary to ensure the safe operation of a nuclear facility.

3.0 NUCLEAR SAFETY REGULATORY REQUIREMENTS BASIS

Westinghouse Hanford Company is legally and contractually responsible for conducting the activities associated with the expedited removal of the K Basins fuel in a safe and environmentally sound manner. The SNF Project Regulatory Integration and Public Involvement (RI&PI) organization has been assigned the responsibility for implementing and ensuring compliance with the nuclear safety regulatory requirements that are applicable to the SNF Project facilities. The RI&PI management plans for ensuring regulatory compliance are described in the *Spent Nuclear Fuel Project Nuclear Safety Regulatory Program Plan* (WHC 1995c). The following sections describe the essential elements that comprise the regulatory requirements basis for the SNF Project Nuclear Safety Program.

3.1 REGULATORY POLICY

The *K Basins Spent Nuclear Fuel Project - Regulatory Policy* (DOE 1995; referred to in this document as the Regulatory Policy) establishes DOE's policy regarding nuclear safety regulatory requirements for the design and construction of new facilities for the SNF Project. The policy was developed to implement an enhanced nuclear safety program for the SNF Project based on the following objectives (DOE 1995):

- To achieve a set of requirements that are technically defensible and cost-effective.
- To achieve in the design and construction of new SNF Project facilities, a level of nuclear safety comparable to that of NRC-licensed commercial facilities.
- To enhance public understanding and confidence in the safety of the new facilities by following an enhanced regulatory strategy.

The policy defines general terms, identifies key roles and responsibilities, and outlines the overall approach to be followed in implementing NRC nuclear safety equivalency for the SNF Project. Implementation of the Regulatory Policy has resulted in comparative evaluations of the NRC regulations against DOE's requirements, to determine additional NRC regulatory requirements that apply to the SNF Project. The results of these evaluations are described further in Section 3.4.

To facilitate accelerated facility authorization schedules, the Regulatory Policy established a Regulatory Requirements Team (RRT) comprised of DOE Headquarters (HQ), DOE Richland Operations Office (RL), WHC, and vendor personnel. The RRT was established to review and approve the safety basis of the SNF Project's new facilities. They will assist the contractor with the task of evaluating NRC regulations and guidance to determine any supplemental requirements that should be applied to the new SNF Project facilities.

The Regulatory Policy also established an independent review process to ensure that the requirements selected as the basis for the new SNF Project facilities provide an acceptable level of worker safety, public health and safety, and protection of the environment. The process utilizes reviews by both DOE's Environmental Health and Safety (EH) staff and an Independent Review Panel (IRP). The IRP is comprised of nationally recognized technical experts, not associated with the Project, who will provide high-level external oversight of the requirements selection process. The IRP is an advisory panel that reports directly to the Manager, DOE-RL.

3.2 REGULATORY STRATEGY

The *Spent Nuclear Fuel Project Regulatory Strategy* document (WHC 1995b) provides further detail of how DOE's policy for NRC nuclear safety equivalency will be incorporated into the safety basis of SNF Project facilities through appropriate design and safety analysis documentation. The Regulatory Strategy establishes a strategy to identify the applicable regulatory requirements and selects an approach for performing appropriate safety analyses, preparing safety documentation, and obtaining the necessary approvals and authorizations for new SNF Project facilities. The document was developed early in the project to obtain agreement with DOE on an approach that would satisfy the intent of the Regulatory Policy.

3.3 REGULATORY REQUIREMENTS

The DOE has implemented a program in conformance with the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 90-2 (Conway 1990). The objectives of this program are to identify the specific safety related standards and requirements that apply to the operation of defense nuclear facilities and to determine the extent to which the standards have been implemented to ensure the protection of public health and safety at these facilities. The standards and requirements identified under this program are collected in a series of documents known as the Standards/Requirements Identification Documents (S/RIDs).

The DOE has also applied the Systems Engineering methodology to the Hanford site in response to DNFSB Recommendations 92-4 and 94-1 (Conway 1992 and 1994). Systems Engineering is being implemented at the Hanford site based on this guidance and DOE Order 4700.1, *Project Management System*. Systems engineering is a formal discipline that systematically defines and controls the mission, functions and requirements, and the design baselines for new programs and projects at the Hanford site. The systems engineering process for the SNF Project is defined in *Spent Nuclear Fuel Project Systems Engineering Management Plan* (SEMP) (WHC 1995d). The systems engineering process provides a methodology to identify and incorporate the requirements for a program and/or project, including the applicable laws, regulations, DOE Orders, and national standards. The SNF Project uses the systems engineering approach to select the set of requirements to be included in a facility S/RID.

Nuclear safety regulatory requirements (including those extracted from the NRC nuclear safety equivalency process) will be selected, reviewed, and approved according to the process shown conceptually in Figure 1. Nuclear safety requirements identified through this process will be incorporated via implementation of the systems engineering approach into the regulatory requirements basis of each SNF Project new facility. The RRT will facilitate the review and approval process.

3.4 NRC NUCLEAR SAFETY EQUIVALENCY

For the DOE's Regulatory Policy, NRC nuclear safety equivalency was defined as (DOE 1995):

- Technical requirements that meet the nuclear safety objectives of the NRC regulations for fuel treatment and storage facilities. These include requirements regarding radiation exposure limits, safety analysis, design and construction.
- Administrative requirements that meet the objectives of the major elements of the NRC licensing process. These include formally documented design and safety analyses, independent technical review, and the opportunity for public involvement.

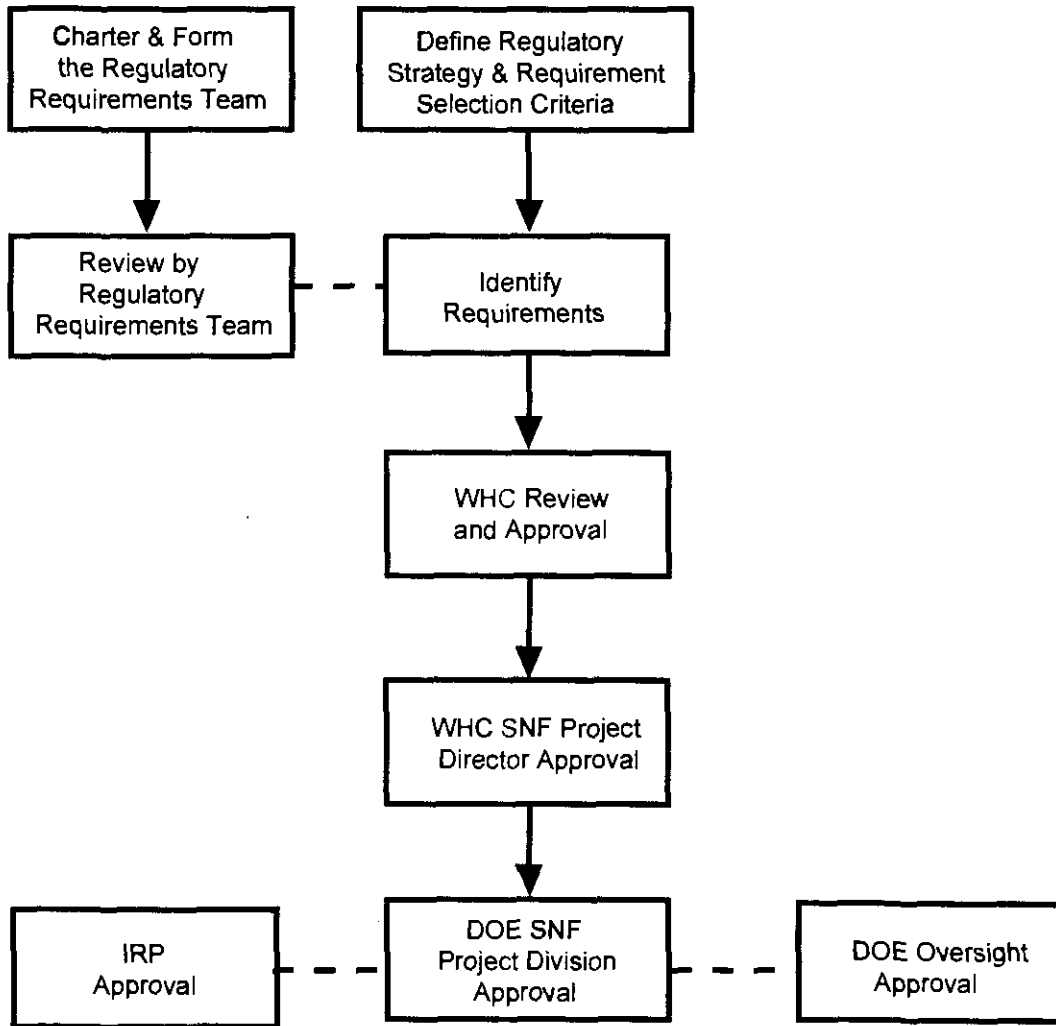
Technical requirements, in the context of the Regulatory Policy, are the design and construction measures (as opposed to pre-operational or operational measures) that are mandated by the NRC regulations. In addition, the Regulatory Policy specifically excludes those requirements that address environmental, Occupational Safety and Health Administration, chemical accident safety, and other non-nuclear safety issues.

Further, NRC guidance that provides an acceptable means for implementing the regulations was defined as optional rather than mandatory in the Regulatory Policy. However, NRC guidance that may be directly relevant to SNF Project activities [e.g., NRC Regulatory Guide 3.60, *Design of an Independent Spent Fuel Storage Installation (Dry Storage)*] was reviewed, and additional criteria believed necessary to achieve nuclear safety equivalency were evaluated for incorporation as a prudent step in implementing the Regulatory Policy's objectives.

Consistent with the Regulatory Policy, a comprehensive evaluation of Title 10, Code of Federal Regulations (CFR), Parts 0-199, and potentially relevant NRC guidance (including NRC Regulatory Guides, NRC NUREG and SECY documents, Standard Review Plans, Inspection and

Figure 1

Process for Review and Approval of SNF Project
Nuclear Safety Regulatory Requirements



—————> Flow
- - - - - Concurrency

Enforcement Notices and Bulletins) was conducted and compared with the applicable DOE requirements. The results of the evaluation are documented in three reports:

- WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward, Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities* (WHC 1995e);
- WHC-SD-SNF-DB-003, *Spent Nuclear Fuel Project Path Forward, Additional NRC Requirements* (WHC 1995f); and
- WHC-SD-SNF-DB-005, *Multi-Canister Overpack, Additional NRC Requirements* (WHC 1995g).

The first report documents the detail of the equivalency review and identifies “Actions for Consideration” that may be necessary to demonstrate nuclear safety equivalency. The second report presents the SNF Project's position on each “Action for Consideration” identified in the first report and transforms those items identified for implementation into a requirements format. The third report is similar to the second, but specifically considers equivalency as it pertains to the MCOs. The requirements identified for implementation will augment the safety standards and requirements identified through the S/RIDs process.

Relative to the content of the CSB SAR, the *Spent Nuclear Fuel Project Path Forward, Additional NRC Requirements* (WHC 1995f) contains the following requirement:

“Include in the SNF Project Path Forward Safety Management Plan the requirement to provide for the CSB SAR the information called for in Section 72.24 and Regulatory Guide 3.48 that is not required in DOE 5480.23 and DOE-STD-3009-94 and that is unique to spent nuclear fuel storage.”

The two NRC documents referred to in this requirement are the following:

- 10 CFR 72, *Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, Section 72.24, Contents of Application: Technical Information*; and
- Regulatory Guide 3.48, *Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Dry Storage)*.

The information required by NRC Regulatory Guide 3.48 and Section 72.24 that relates to radiation exposure limits, safety analysis, and design and construction that is unique to the storage of spent nuclear fuel is presented in *Annotated Outline for the Canister Storage Building Final Safety Analysis Report* (WHC 1995h). This reference lists, by DOE-STD-3009-94 format (DOE 1994), the additional items that must be added to the CSB SAR to implement this equivalency item.

4.0 SAFETY ANALYSIS

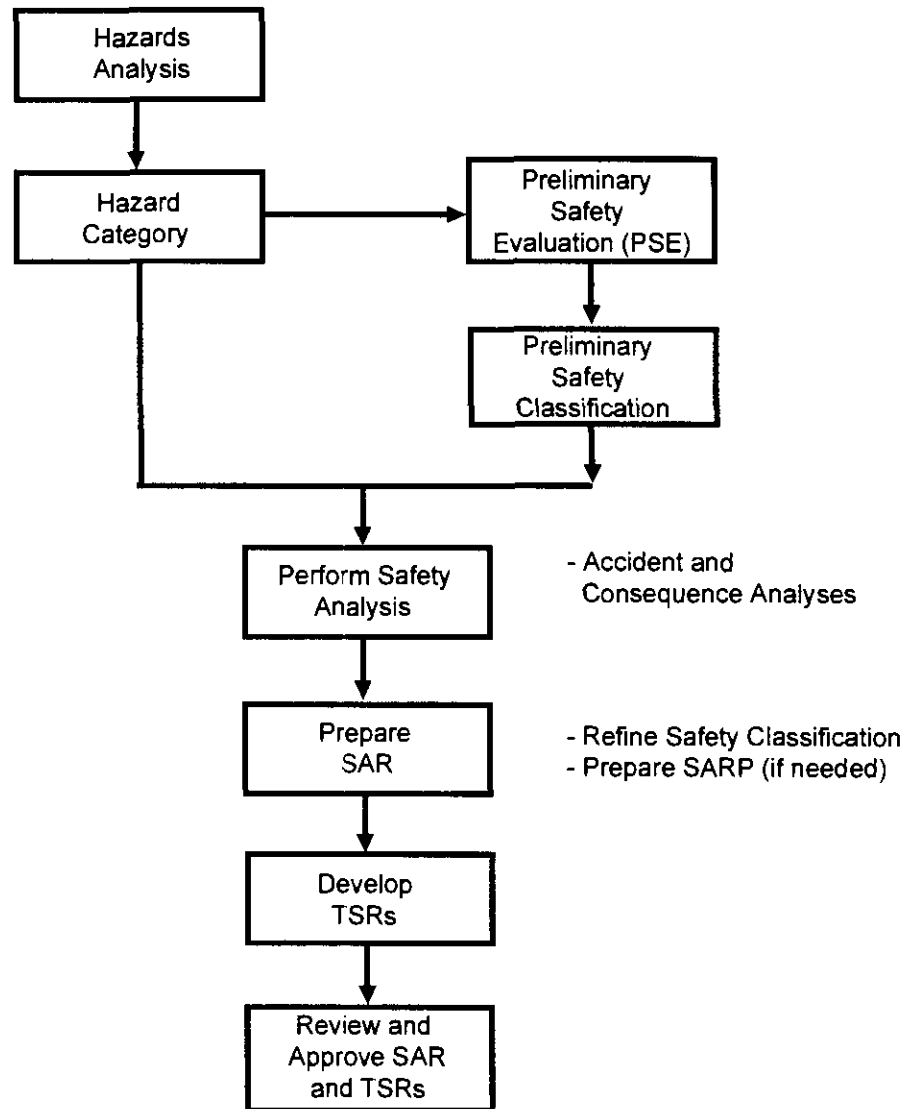
This section presents the safety analysis and documentation approach for the SNF Project new facilities. The detailed plans and schedules for preparation, review, and approval of safety analyses are included in the Appendix.

4.1 SAFETY ANALYSIS PROCESS

Figure 2 illustrates the safety analysis and documentation process that will be required for the SNF Project Path Forward facilities, following the requirements established in DOE Order 5480.23, *Nuclear Safety Analysis Reports*. The major steps in the process are discussed briefly below:

- **Hazards Analysis** - Early in the conceptual design phase, a hazards analysis is performed to identify potential hazardous conditions and postulated accident scenarios in accordance with the methodology specified in DOE-STD-1027-92, *Hazards Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports* (DOE 1992). The hazards analysis identifies hazards associated with facility operations and documents potential failures and upsets that could cause a hazardous condition. The hazards identification process considers the impact of equipment failure or malfunction, loss of energy sources, natural phenomena, and facility operation.
- **Hazard Categorization** - The hazard categorization of a facility is initially based on the inventory of radioactive material present in the facility in accordance with the guidance provided in DOE-STD-1027-92. The initial facility hazard category is included in the PSE. Based on the hazard category determination, a graded approach is developed for the analysis used for the safety evaluation. A final hazard categorization is performed during the advanced Conceptual Design based on material form, dispersibility, and interactions with available energy sources.
- **Preliminary Safety Evaluation** - A preliminary safety evaluation is performed utilizing input from the hazards analysis. The PSE is a part of the Conceptual Design of a project or facility. The PSE identifies measures that must be incorporated into the design to reduce the impact of the identified hazards.

Figure 2
Safety Analysis Process
for SNF Project Facilities



- **Safety Classification** - The hazards analysis and safety evaluation activities provide input for the safety classification of systems, structures, and components. Equipment that must perform a function to reduce the impacts of identified hazards are important to safety and are classified as safety equipment.
- **Accident Analysis** - Events identified by the hazards analysis as having potential onsite and offsite consequences are further developed into accident scenarios. Accident scenario development includes a determination of the accident frequencies. After scenarios are defined and radiological and/or toxicological source terms are developed, consequence analysis is performed to quantify the impact to the public, onsite worker, and environment.
- **Criticality Safety Evaluation** - The criticality safety of equipment and operations involving fissionable material for normal and credible abnormal conditions are evaluated in the criticality safety evaluation. The evaluation confirms that the equipment design and/or administrative controls meet or exceed the margin of safety required by DOE Order 5480.24, *Nuclear Criticality Safety*.
- **Safety Analysis Report** - The SAR documents the safety related design basis and the safety analysis for a nuclear facility to ensure that the facility can be operated, maintained, shut down, and decommissioned safely and in compliance with the applicable laws and regulations.
- **Technical Safety Requirements** - The TSRs define the conditions, boundaries, and the management or administrative controls that must be maintained to ensure the safe operation of a nuclear facility. The TSRs are developed in accordance with DOE Order 5480.22, *Technical Safety Requirements*, and are based on the operational limits identified in the SAR. The final TSRs are contained in a separate document issued and approved by DOE before facility operations begin.
- **Safety Analysis Report for Packaging (SARP)** - The SARP documents separately the safety analysis for transportation and packaging activities in accordance with the requirements of DOE Order 5480.3, *Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Wastes*. The SARP describes the packaging, defines the payload, and documents the results of analysis performed to demonstrate that the package design meets safety requirements. The accident consequences identified in the SARP must be considered in the facility SAR if the package is used in proximity to the facility.

DOE Order 5480.23 and its implementing standards provide guidance in using a “graded approach” to safety analysis and safety analysis reports. The primary objective of using a graded approach to the safety analysis process is to select and apply an analysis technique that provides sufficient detail to assess each postulated accident or failure, the resulting consequences, and

means of prevention and mitigation. The level of effort, sophistication of the analysis, and the level of detail of the SARs are graded with the following considerations:

- the magnitude of the hazard being addressed,
- the complexity of the facility and the safety systems,
- the stage of the facility life cycle, and
- the programmatic mission of the facility.

4.2 SAR PREPARATION, REVIEW, AND APPROVAL

The following sections provide further detail of how safety analysis documentation will be prepared for each of the new SNF Project Path Forward facilities, consistent with the *Spent Nuclear Fuel Project Regulatory Strategy* (WHC 1995b).

4.2.1 K Basin Modifications and Fuel Retrieval

Several modifications to the existing facilities at the K Basins will be required to accommodate retrieval and packaging of the spent fuel and sludge. These modifications will be integral to existing facilities at the K Basins. Modifications to the design and operation of the K Basins will be evaluated for impacts to the existing safety authorization basis, as documented in the *K Basins Safety Analysis Report* (WHC 1995i) and *Operations Safety Requirements 100KE and 100KW Fuel Storage Basins* (WHC 1992). This SMP does not apply to the safety management of K Basin modifications or preparations for fuel retrieval and packaging.

4.2.2 Vacuum Drying Facility

The Integrated Process Strategy recommends conditioning the fuel through a Vacuum Drying Facility, following removal of the fuel from the K Basins and prior to its shipment to the CSB in the 200 Area. Equipment and facilities for performing vacuum drying will either be located within the existing K Basins facilities or in a facility that remains within the 100 area.

The Vacuum Drying Facility is considered to be an element of the fuel treatment process described in DOE's Regulatory Policy. Therefore, the Vacuum Drying Facility is required to demonstrate a level of nuclear safety equivalent to that of comparable NRC-licensed facilities. The safety evaluation of the Vacuum Drying Facility will either be included as a revision to the existing K Basins SAR or developed as a stand alone single SAR similar to that planned for the

CSB, depending upon where the facility is sited. By either means, the safety evaluation of the Vacuum Drying Facility will be augmented with the appropriate NRC equivalence criteria.

4.2.3 MCOs

MCO containers will be used for the packaging, shipping, staging, fuel conditioning, and interim dry storage functions. The safety basis of the MCOs will be evaluated and documented in an MCO Topical/Design Report. The scope of the safety documentation will include the design, manufacture, and testing associated with the production and use functions of the MCOs. The CSB, Vacuum Drying Facility, and Conditioning Facility SARs; the on-site SARP; and the K Basins modification documentation will reference the MCO Topical/Design Report, as necessary. Accident analyses involving the MCOs will be included in these documents rather than in the MCO Topical/Design Report. In accordance with the SNF Project Regulatory Policy, the technical requirements applied to fuel overpacks used in an NRC-licensed spent nuclear fuel storage facility will be evaluated and applied as appropriate to the MCOs, to ensure nuclear safety equivalency with NRC regulations.

4.2.4 Transportation

Fuel and sludge will be shipped by rail or motorized conveyance from the K Basins to the CSB in the 200 Area. The safety of on-site shipment of the K Basins fuel and sludge will be evaluated and documented in a Safety Analysis Report for Packaging, which will address the transportation safety requirements of DOE Order 5480.3. The review and approval process for transportation and packaging activities (i.e., the Packaging Design Criteria and the SARP) is documented separately in the report *Spent Nuclear Fuel Project Safety Analysis Report for Packaging Approval Plan* (WHC 1995j).

4.2.5 CSB and Conditioning Facility

The CSB will provide interim storage of the K Basins fuel following vacuum drying and fuel conditioning. Some of the fuel may require further conditioning in a Conditioning Facility, following shipment to the CSB and prior to interim storage, to remove chemically bound water and uranium hydride. The Conditioning Facility will process the fuel using a hot vacuum conditioning process to effectively prepare the fuel for interim storage in the CSB. The hot vacuum Conditioning Facility will either be incorporated into the CSB facility or constructed as a stand alone facility co-located with the CSB. Consistent with the SNF Project Regulatory Policy, the CSB and Conditioning Facility are required to demonstrate nuclear safety equivalency to comparable NRC-licensed facilities.

Safety analysis documentation for the CSB will be developed using a single SAR approach, meeting the format and content guidelines of DOE-STD-3009-94 and complying with the requirements of DOE Order 5480.23.¹ If the Conditioning Facility is incorporated into the design of the CSB, safety analysis of the hot vacuum conditioning will be incorporated as a revision to the CSB SAR. If the Conditioning Facility is constructed as a stand alone facility, a single SAR will be prepared that is similar to the that planned for the CSB.

The SNF Project plans to develop safety analysis documentation for the CSB and Conditioning Facility using a phased document preparation and review approach as allowed by the direction provided in DOE Order 5480.23.² The objective of the phased approach will be to obtain early review by the DOE staff and early resolution of the DOE comments on the draft SAR chapters/technical evaluations as they are prepared. The project anticipates that by obtaining DOE involvement as early as practical in the review of the SAR, the final SAR review and approval will avoid unnecessary delays in support of the project's need to expedite operation of these facilities.

The single SAR phased review process for the CSB and Conditioning Facility allows authorization of construction prior to the final SAR approval. The PSE and Environmental Impact Statement (EIS) will provide the safety and environmental basis required to restart construction of the CSB. This "fast track" approach is necessary to support the aggressive schedule goals established for the SNF Project. The SARs will be completed, updated to reflect the design and construction results, and used as the safety documentation basis for DOE's authorization of facility operation.

Table 1 includes a listing of the required SAR chapters from DOE-STD-3009-94. The SAR documentation phases will be developed for the CSB and Conditioning Facility to represent a logical tie to the progress of the each facility's design and construction activities. For example, the SAR chapters describing site characteristics, results of the hazards and accident analyses, and the safety structures, systems and components can be developed early in the design phase of the facility. Also, programmatic plans can be described initially for the SAR chapters dealing with subjects such as criticality prevention, radiation protection, and hazardous material protection. As the design of the facility progresses, the SAR chapters describing details of the facility and its structures, systems, and components can then be prepared.

This approach differs somewhat from the "staged" approach discussed in the interim guidance provided in Attachment 1 to DOE Order 5480.23, which is described more as a

¹ DOE Order 5480.23 allows (with DOE approval) the preparation of a single SAR for facilities, in lieu of preparing separate preliminary and final SARs. The SNF Project obtained DOE direction to implement the single SAR approach in the memorandum entitled, *Approval of K Basins Spent Nuclear Fuel Action Plan* (Lytle 1995).

² DOE Order 5480.23, Paragraph 9.a.(3) allows (with DOE approval) the SARs to be prepared and submitted in stages. The SNF Project obtained DOE direction to implement staged SARs in the memorandum entitled, *Approval of K Basins Spent Nuclear Fuel Action Plan* (Lytle 1995).

progression of the facility's operating phases. The SNF Project plans the SAR preparation phases within a single operating scenario. For the CSB, the operating scenario is the staging and interim storage of the K Basins spent nuclear fuel.

The SAR development phases are intended to coincide with the progress of the facility design and construction activities. Any phased SAR review steps that are undertaken between the construction release and the operating authorization are not intended to represent DOE hold points or restraints on completion of the SAR preparation, design, or construction activities. The phased review and comment steps planned for the SNF Project SARs are intended to obtain maximum DOE reviewer involvement as early and as effectively as practical; thus minimizing the potential for last minute delays prior to the facility operation authorization.

Figure 3 depicts the general phased preparation and review process that will be utilized for the CSB and Conditioning Facility SARs. The SNF Project RI&PI organization is responsible for coordinating the preparation, facilitating the reviews, and obtaining the required approvals for the safety analysis documentation. The WHC Safety Analysis and Nuclear Engineering (SA&NE) department will be delegated the responsibility for conducting the safety analysis activities and preparing the safety documentation.

The preparation process will include a formal peer review process. As part of the peer review process, in addition to the independent peer reviews, the cognizant technical reviewers will be assigned the responsibility for documentation that falls within their discipline and will provide their review prior to forwarding those sections to the WHC functional reviewers and others as depicted in Figure 3.

Table 1. SAR Chapters from DOE-STD-3009-94.

Chapter	Content Description	Chapter	Content Description
0.0	Executive Summary	9.0	Radioactive and Hazardous Waste Management
1.0	Site Characteristics	10.0	Initial Testing, In Service Surveillance, and Maintenance
2.0	Facility Description	11.0	Operational Safety
3.0	Hazard and Accident Analysis	12.0	Procedures and Training
4.0	Safety Structures, Systems, and Components	13.0	Human Factors
5.0	Derivation of Technical Safety Requirements	14.0	Quality Assurance
6.0	Prevention of Inadvertent Criticality	15.0	Emergency Preparedness Program
7.0	Radiation Protection	16.0	Provisions for Decontamination and Decommissioning
8.0	Hazardous Material Protection	17.0	Management, Organization, and Institutional Safety Provisions

The phased SAR documentation will receive reviews by the appropriate WHC functional disciplines. Review comments received at the WHC functional level review and higher will be formally dispositioned using Review Comment Record forms or equivalent documentation. Following the WHC functional review, the phased SAR documents will be forwarded to the Safety and Environmental Advisory Council (SEAC) for review. Following receipt of the comments from the SEAC review, the phased SAR documentation will be sent to DOE for preliminary review and approval. During the phased SAR preparation process, the cognizant technical reviewers will assist the SNF Project RI&PI organization in coordinating the reviews and comment resolution of each chapter/technical evaluation to which they are assigned responsibility.

Each chapter contained in a phased SAR submittal will receive preliminary approval by the DOE-RL SNF Project Division (SFD), once all questions and review comments are resolved. SFD approval of the CSB programmatic SAR chapters should carry over to subsequent SARs developed for other SNF Project facilities, with the exception of specially identified facility-specific modifications, which will be subject to additional DOE review and approval. This will aid in expediting the development of the SNF Project safety documentation by limiting the amount of re-reviews necessary for subsequent SARs (e.g., Vacuum Drying Facility and Conditioning Facility).

Once all of the chapters are completed, the final SAR will be reviewed by the preparer organization and by the SNF Project organization to ensure it is complete and ready. Figure 4 depicts the review and approval process that is planned for the final CSB and Conditioning Facility SARs. Following preparation and peer review, the SAR will receive a functional review within WHC in accordance with the requirements defined in WHC-CM-3-5, Document Control and Records Management Manual, Section 12.7, "Approval of Environmental, Safety, and Quality Affecting Documents," (WHC 1994b). The functional review involves a multi-disciplined review by responsible project staff, appropriate technical experts, and independent oversight organizations within WHC to validate the technical adequacy of the document.

Both the phased and final SAR reviews will be iterative processes, wherein reviewers may request more information or may submit questions or comments for resolution. Review meetings will be held with the reviewers to resolve difficult issues as required. The SAR will be updated as appropriate until the final review and approval. Upon completion of the functional reviews, the final SAR will be approved by the SNF Project Director and then forwarded to DOE-RL for approval. The DOE-RL SFD will then review and approve the safety documentation. The SFD staff will obtain the necessary internal DOE reviews. DOE will document their review in a Safety Evaluation Report. Following SFD approval, the SAR will be forwarded to the Manager, DOE-RL, for final approval per direction of DOE-HQ (Grumbly 1994).

Figure 3
Phased SAR Preparation
and Review Process

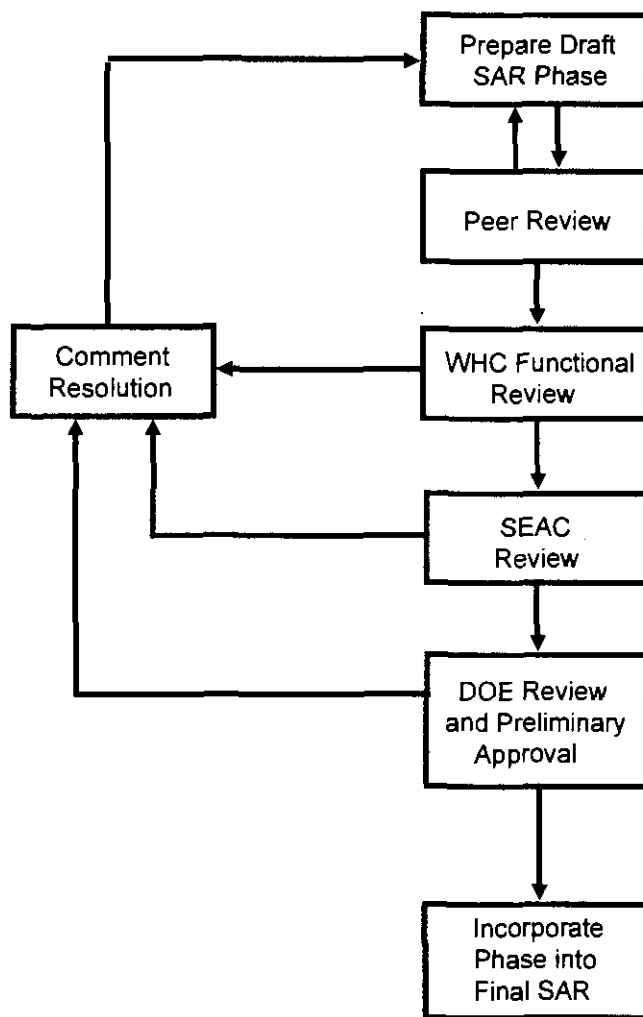
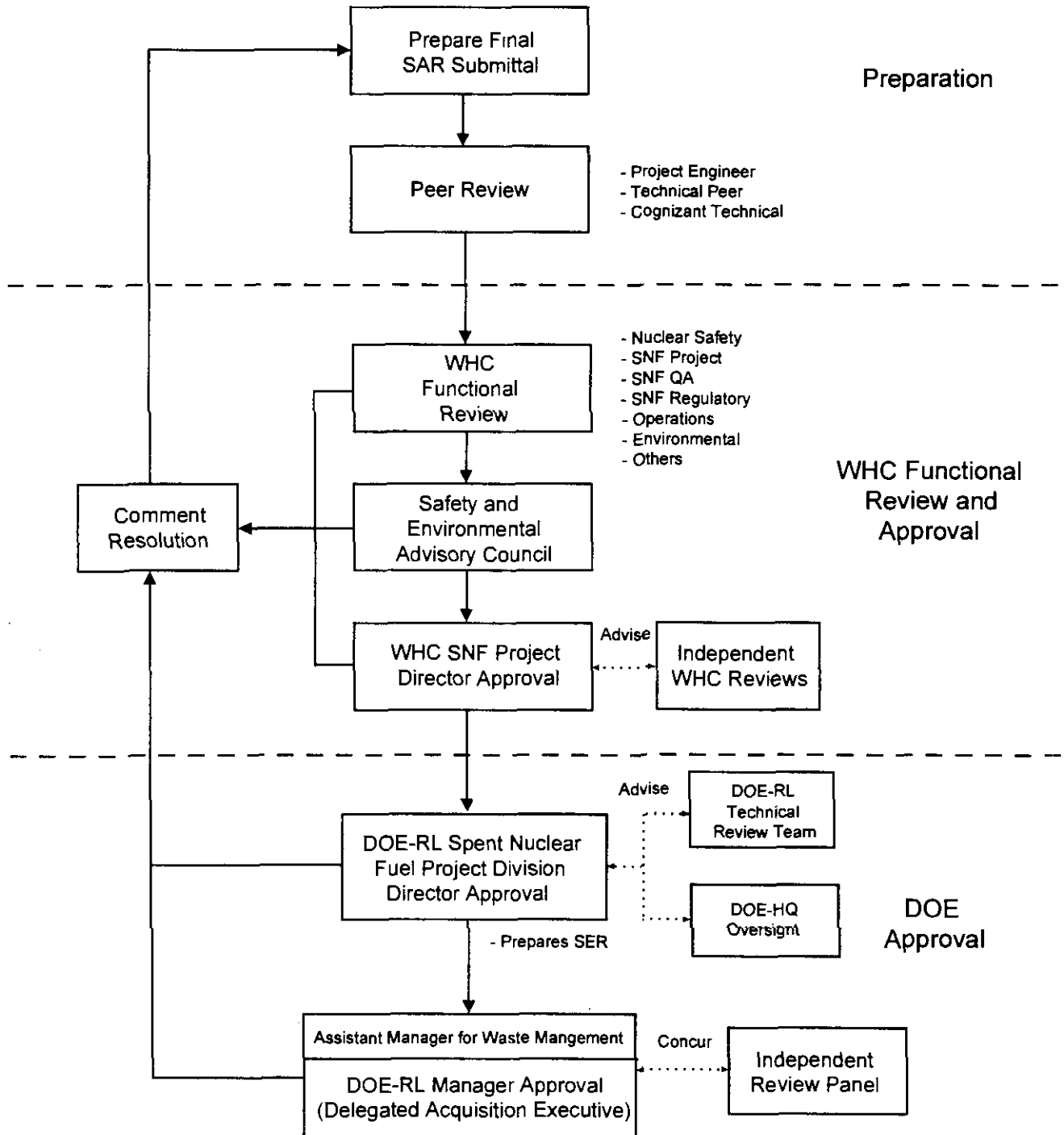


Figure 4
Final SAR Review
and Approval Process



While review of the SARs by the DNFSB is not required, the SNF Project recognizes that the DNFSB has an interest in the expedited removal of the K Basins fuel to safer storage conditions. Consequently, routine briefings of the DNFSB staff on progress, including the results of the safety analyses and evaluation is planned as part of the normal SNF Project activities. This on-going effort to keep the DNFSB informed will provide a means to identify and resolve DNFSB comments and concerns relative to project safety issues.

4.3 SAFETY ANALYSIS INTERFACE WITH THE DESIGN PROCESS

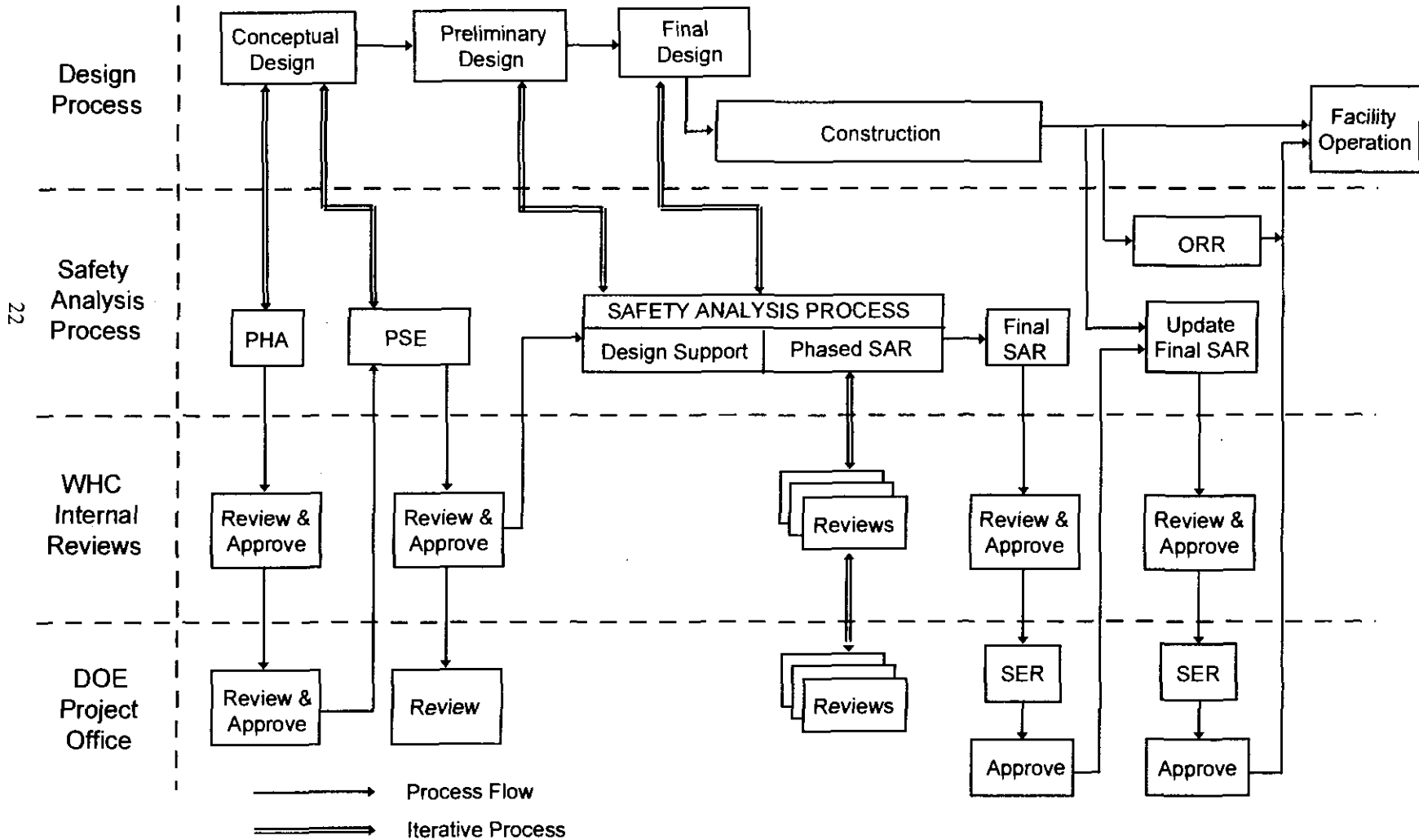
Continuous interaction between the safety analysis and design activities will ensure that the SNF Project designs and safety analyses are integrated. This interaction will also ensure that issues identified through the safety analysis process are addressed in the design. Figure 5 illustrates the interactions between the design and safety analysis processes for the SNF Project facilities.

The design of the SNF Project Path Forward new facilities will be developed in three phases. The first phase is the Conceptual Design. Conceptual Design activities include the preparation of a Preliminary Hazards Assessment (PHA), the hazards categorization of the proposed facilities, and the Preliminary Safety Evaluation.

The Preliminary Design is the second of the three design development phases. Depending on the complexity of the design and technological uncertainties, the Preliminary Design phase may require proof testing to validate certain design approaches. As the Preliminary Design progresses continuous interaction occurs between design and safety analysis personnel. Preliminary safety analyses are performed as required to support design alternative evaluations. As designs and safety analyses are completed, they are subjected to an on-going review and feedback process by the design teams, the safety analysis personnel, and the independent safety reviewers during the Preliminary Design phase.

Figure 5

SNF Project Safety Analysis and Design Interface



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The last design phase is the Detailed Design. Activities included are the resolution and incorporation of the design review comments, incorporation of the test results, and completion of the detailed design outputs. As the design phase progresses into Detailed Design, preparation of the SAR is initiated. Design modifications required by the SAR review and comment resolution process are also included in this phase.

Design documents are reviewed and approved through a process defined by specifications and vendor contractual provisions. WHC design activities are controlled under the provisions of WHC-CM-6-1, *Standard Engineering Practices Manual* (WHC 1995k), the *SNF Project - Project Management Plan* (WHC 1995l), and the *SNF Project Configuration Management Plan* (WHC 1995m). Design reviews will be performed at several stages during the course of design development (e.g., at the 30% and 90% completion stages). Outputs from the design reviews are the intermediate deliverables required to support SAR preparation. The design documents require WHC review and approval per contractual provisions and the WHC design/configuration control manuals.

4.4 CONSTRUCTION INTERFACES WITH SAFETY ANALYSIS

Following completion of the design activities, at DOE's direction, the construction phase will begin. Design changes that occur during construction will be evaluated for consistency with the project safety basis. The SAR will be updated to reflect design changes and construction results as these efforts progress. Near completion of the construction phase and following approval of the SAR, the readiness for operation will be assessed in accordance with DOE Order 5480.31, *Startup and Restart of Nuclear Facilities*. Approval of the SAR, issuance of the TSRs, and completion of the readiness review activities will provide the safety documentation basis for DOE authorization to begin operations.

For the CSB, the safety analysis process includes a revision to the original PSE prepared for the facility when it was included as part of the Hanford Waste Vitrification Project. The original PSE was a bounding evaluation performed without specific design details. The SNF Project plans to revise the original PSE to include the scope of the SNF Project and specific design information relative to the storage of K Basins spent nuclear fuel.

4.5 PUBLIC INVOLVEMENT

Public involvement in the SNF Project safety analysis activities will be in accordance with the SNF Project Public Involvement Plan (WHC 1995n). Early and frequent public involvement in the SNF Project planning and implementation activities is planned. Public meetings will be scheduled to brief interested public and stakeholders on the status of the safety documentation and project plans.

4.6 SAFETY DOCUMENT REVISION PROCESS

Once the SAR documentation has been approved, changes shall be processed in accordance with the requirements of WHC-CM-6-1, *Standard Engineering Practices Manual* (WHC 1995i). Changes to the facility or its operating bases that may have an impact on the safety bases of the facility will require a USQ evaluation as directed by DOE 5480.21, *Unreviewed Safety Questions*, and implemented through WHC-CM-1-3, *Management Requirements and Procedures*, MRP 5.12, "Identifying and Resolving Unreviewed Safety Questions," (WHC 1993). The SAR shall be reviewed annually and updated as necessary pursuant to the requirements of DOE 5480.23. Changes to the SAR that are processed in accordance with the WHC-CM-6-1 manual (including USQ evaluations, amendments to TSRs, and other significant changes) shall be accumulated and considered as an addendum to the SAR until the information is incorporated into the SAR as part of the next annual update.

5.0 ORGANIZATIONAL RESPONSIBILITIES AND INTERFACES

The SNF Project will be responsible for preparing and issuing the safety documentation. This effort will be supported by the WHC SA&NE department, which will help ensure a consistent approach and scope to the various SNF Project safety analysis activities and document preparations. The roles and responsibilities of various organizations involved with the preparation, review, and approval of the SNF Project safety analysis documentation are summarized below.

DOE-RL

The Manager of DOE-RL has been delegated Acquisition Executive authority for the Hanford K-Basins SNF Project subject to the restrictions outlined in a memo from the Assistant Secretary for Environmental Management to the Secretary of Energy (Grumbly 1995).

DOE-RL Spent Nuclear Fuel Project Division

The DOE Spent Nuclear Fuel Project Division (SFD) is responsible for the overall management, administration, performance, and operations and maintenance activities for the SNF Project. The SFD will ensure that the required levels of quality, safety, and environmental compliance are achieved with the established technical, cost, and schedule baselines. The SFD will approve the hazards categorization of the major facilities, participate in the Regulatory Requirement Team effort to establish safety requirements, provide project validation and funding authorization, provide construction authorization, and approve facility operating authorizations. Table 2 identifies the DOE responsibilities for review and oversight consistent with DOE's Regulatory Policy (DOE 1995). Required DOE approvals of SNF Project safety documentation is indicated in Table 3.

SNF Project

The SNF Project will consist of an integrated team comprised of WHC and ICF Kaiser Hanford (KH) personnel and will be responsible for establishing and implementing the technical integration and project management for the SNF Project. The WHC/ICF KH project team will also be responsible for ensuring that matrix support for quality assurance (QA), safety oversight and integration, procurement, project control, technical integration, regulatory compliance, startup, and operations is coordinated with the efforts of all project participants. The SNF Project is the organization responsible for the preparation and final approval (within WHC) of the SNF Project safety documentation.

Table 2. SNF Project Safety Documentation Task Responsibility Matrix.

Regulatory Program Task	Responsibility							Vehicle
	WHC	RRT ¹	DOE					
			RL	SFD	EM	EH	IRP	
DOE's Regulatory Policy			A	C	C	C		Action Memorandum
Regulatory Requirements	P	R	A	C	C	O	C	Requirements identification process. Regulatory Requirements Document, approved and controlled.
Prepare and Issue SAR and TSRs	P			R, I				SAR/TSR transmittal
SAR Technical Review	R	R	R ²	R		R ³	R	Report documenting review process, findings, and resolution
SAR Approval	A ⁴		A	C			C	Approval Memorandum
Operational Readiness Review and Authorization to Operate	S		AO	C		C		Action Memorandum based on Readiness Review
Public and Interested Group Review	S			D				SNF Project Division Communication Strategy
Inspection and Enforcement	S		S	S		D		Inspection Plan

P = Prepare I = Issue
 R = Review AO = Authorize Operation
 A = Approve S = Support
 C = Concur D = Direct
 O = Oversight

- ¹ The Regulatory Requirements Team is comprised of DOE-HQ, DOE-RL, WHC and other vendor personnel, as needed, who are familiar with the NRC and DOE regulatory requirements.
- ² The DOE-RL technical review team will be convened by RL's Office of Quality, Safety, and Health (RL-QSH) and will include technical specialists in the field of facility nuclear safety, from EH-T and other organizations as appropriate. DOE's review of the SAR and TSRs will be documented in a formal Safety Evaluation Report (SER).
- ³ Refers to EH-O, which provides independent oversight for EH.
- ⁴ Approve for submittal to DOE.

Table 3. SNF Project Safety Documentation Approval Matrix.

Approvals	Hazard Categorization	PSE	MCO Topical Report	SAR ¹
Peer Reviewer	✓	✓	✓	✓
SNF Project - Cognizant Technical Reviewer	✓	✓	✓	✓
SNF Project - Engineering Manager			✓	✓
SNF Project - Project Manager			✓	✓
SNF Project - QA Manager	✓	✓	✓	✓
SNF Project - Regulatory Integration and Public Involvement	✓	✓	✓	✓
WHC Independent Safety	✓	✓	✓	✓
WHC Safety and Environmental Advisory Council (SEAC)				✓
SNF Project - Director	✓	✓	✓	✓
DOE-RL SFD Director	✓			✓

¹ Single SAR applicable to the CSB, Vacuum Drying Facility, and hot vacuum Conditioning Facility.

SNF Project Organizations

The SNF Project line organizations control the scope, budget, and schedule for planned SNF Project facilities and activities. These organizations have overall responsibility for the design, engineering, and integration of the facilities, systems, and equipment evaluated in the SARs and supporting documents. The required WHC reviews and approvals for the safety analysis documentation for the SNF Project facilities are identified in matrix form in Table 3 and is consistent with the requirements of WHC-CM-3-5, Chapter 12.7 (WHC 1994b).

SNF Project Regulatory Integration and Public Involvement

The SNF Project Regulatory Integration and Public Involvement organization is responsible for providing overall coordination and integration of the SNF Project regulatory matters, including both the nuclear safety and environmental regulations. The organization is the lead for the SNF Project interfaces with the state of Washington, DOE, and other Federal organizations on regulatory and compliance matters. The RI&PI organization is responsible for coordinating the preparation of safety analysis documents for the SNF Project Path Forward new facilities.

WHC Independent Safety

The WHC Independent Safety Group will provide matrixed support to the SNF Project to ensure that the safety requirements established in the statutory regulations and DOE and industry codes, standards, and requirements are fully implemented in the design and safety documentation of the new facilities.

WHC Safety Analysis and Nuclear Engineering

The WHC SA&NE department provides integrated support to the RI&PI for the design reviews, safety analysis, and safety documentation of SNF Project facilities. The SA&NE department's involvement will ensure a consistent approach and scope to the safety analysis activities and document preparations.

Regulatory Requirements Team

The Regulatory Requirements Team, comprised of personnel from WHC, DOE-HQ, DOE-RL, and consultants, will assist the SNF Project in the development of the regulatory requirements. The RRT will report directly to the Director of the SFD of DOE-RL. Other

specific responsibilities of the RRT include: review and approval of the requirements, review of the new facility SARs, and input to the preparation of the DOE safety evaluation reports.

Independent Review Panel

An Independent Review Panel has been established to provide advice and high level oversight of the implementation of the DOE's Regulatory Policy (DOE 1995). The IRP reports to the Office of the Manager of DOE-RL. Specific responsibilities of the IRP include: overview of the requirements selection process, review of the safety analysis documentation, and verification that the Project's facilities meet DOE's Policy for nuclear safety equivalency. The IRP will also provide concurrence with the safety basis for final approval to operate the SNF Project facilities.

SNF Project Applied Technology Program Office

The SNF Project Applied Technology Program Office identifies technical issues for the SNF Project and develops and executes the appropriate plans for closure of these issues. The studies and analyses for the resolution of technical issues support the safety basis for the SNF Project.

Design and Fabrication Subcontractor

The SNF Project's acquisition plan provides guidance on the use of subcontractors for the engineering, design, and fabrication of the Project's facilities and systems. The plan identifies that WHC will perform limited design work to support the preparation of the procurement specifications for the various facilities and will provide overall integration of the project activities. The subcontractor(s) will perform the detailed engineering design activities and construction effort for the SNF Project facilities. The subcontractor(s) will be responsible for developing designs to meet all applicable safety criteria. Their responsibilities will include the performance of design analyses and assessments in support of the design and safety analysis activities, and preparation of portions of the safety documentation.

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APPENDIX A

**SAFETY ANALYSIS REPORT
PREPARATION PLANS AND SCHEDULES**

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1.0 VACUUM DRYING FACILITY A-1

2.0 CANISTER STORAGE BUILDING A-1

3.0 CONDITIONING FACILITY A-7

1.0 VACUUM DRYING FACILITY

(To be completed later)

2.0 CANISTER STORAGE BUILDING

The SNF Project plans to develop a single SAR for the Canister Storage Building (CSB) that combines the preliminary and final SAR development steps as allowed by DOE Order 5480.23. The single SAR will be developed in nine distinct phases that represent a logical tie to the progress of the facility design and construction activities. Other safety documents that will accompany preparation of the SAR documentation include updates to the Preliminary Safety Evaluation (PSE) and the Fire Hazards Analysis (FHA), preparation of an evaluation of CSB Natural Phenomena Hazards, preparation of the Criticality Safety Evaluation Report, and preparation of the Technical Safety Requirements document. The single SAR will be prepared following the content and format guidelines of DOE-STD-3009-94, supplemented with the applicable requirements of 10 CFR, Part 72.24, and NRC Regulatory Guide 3.48, to demonstrate NRC equivalency. The phases, including SAR chapters and other documentation that will be included in each phase, are presented in Table 2-1.

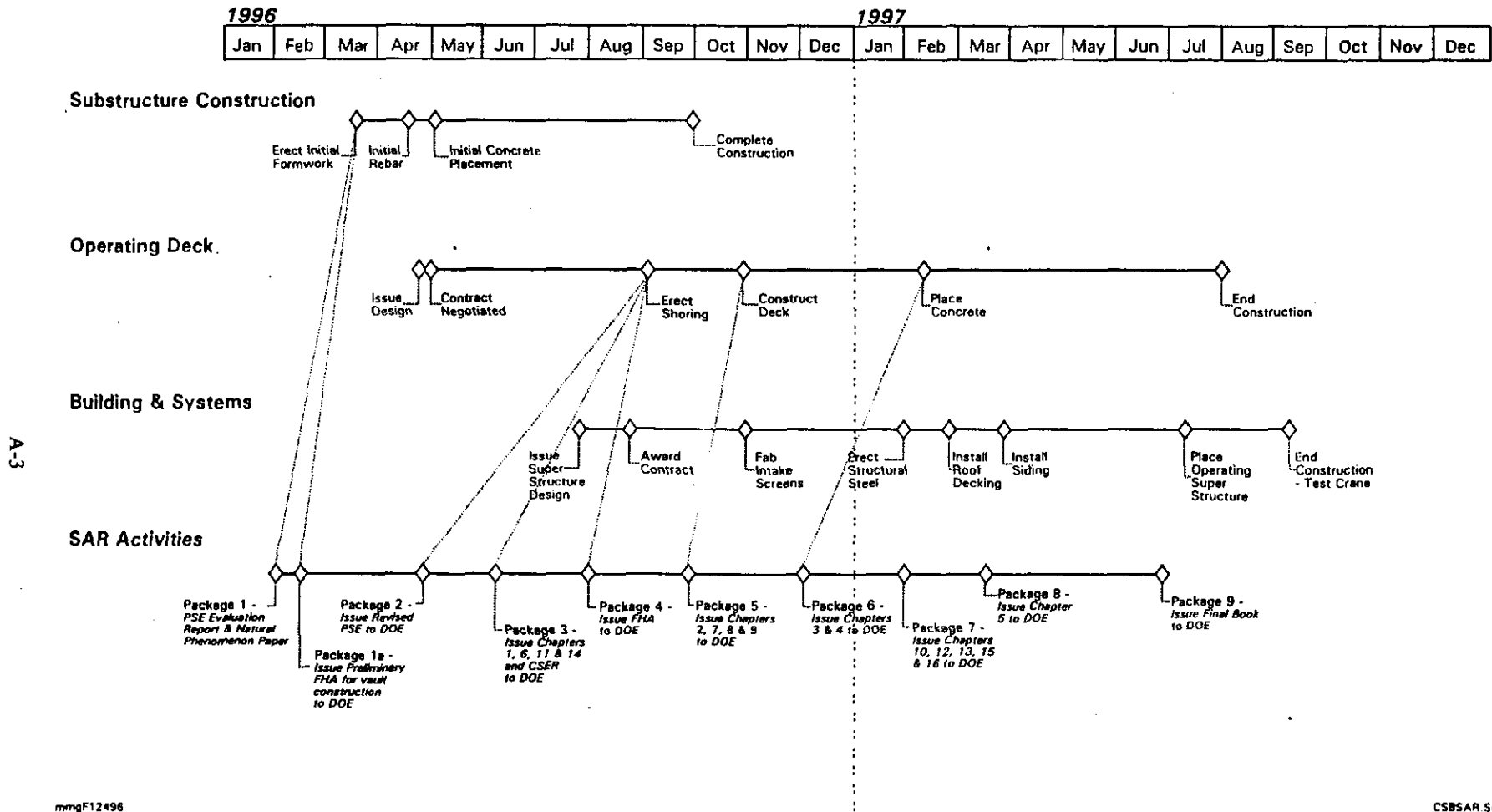
Figure 2-1 includes a diagrammatic schedule of the phased SAR activities planned for the CSB. The major elements in the CSB design and construction phases are included to illustrate their relationship to the phased SAR process. Relationships are indicated with tie lines from the construction activity to the SAR phase. Figure 2-2 presents a more detailed schedule of phased preparation, review, and approval plans for the CSB SAR and related documentation. These schedules are "living documents" that will continually be updated and as such, will not be updated in this plan following its approval and release. The current schedule for these activities will then be found in the latest SNF Project schedules.

Phase I of the CSB SAR preparation includes an evaluation of the PSE completed in August 1995, the preparation of a Natural Phenomena Hazards evaluation, and an initial FHA. Preparation of these documents will support the restart of the CSB substructure construction. Phases II, III, IV and V include elements of the SAR that will support above grade construction of the CSB. These phases are targeted for completion prior to the start of the CSB operating deck construction. Phase VI includes SAR chapters that summarize the results of hazards and accident analyses and identify safety structures, systems, and components. These chapters are targeted for completion prior to placement of concrete for the CSB operating deck. Phases VII and VIII are completed late in the design and construction stages of the facility as they contain SAR chapters relevant to the preparation for facility operation. Phase IX is the compilation of all SAR chapters and relevant documents developed from the completion of previous phases for final SAR document review and approval.

Table 2-1. CSB Phased SAR Approach.

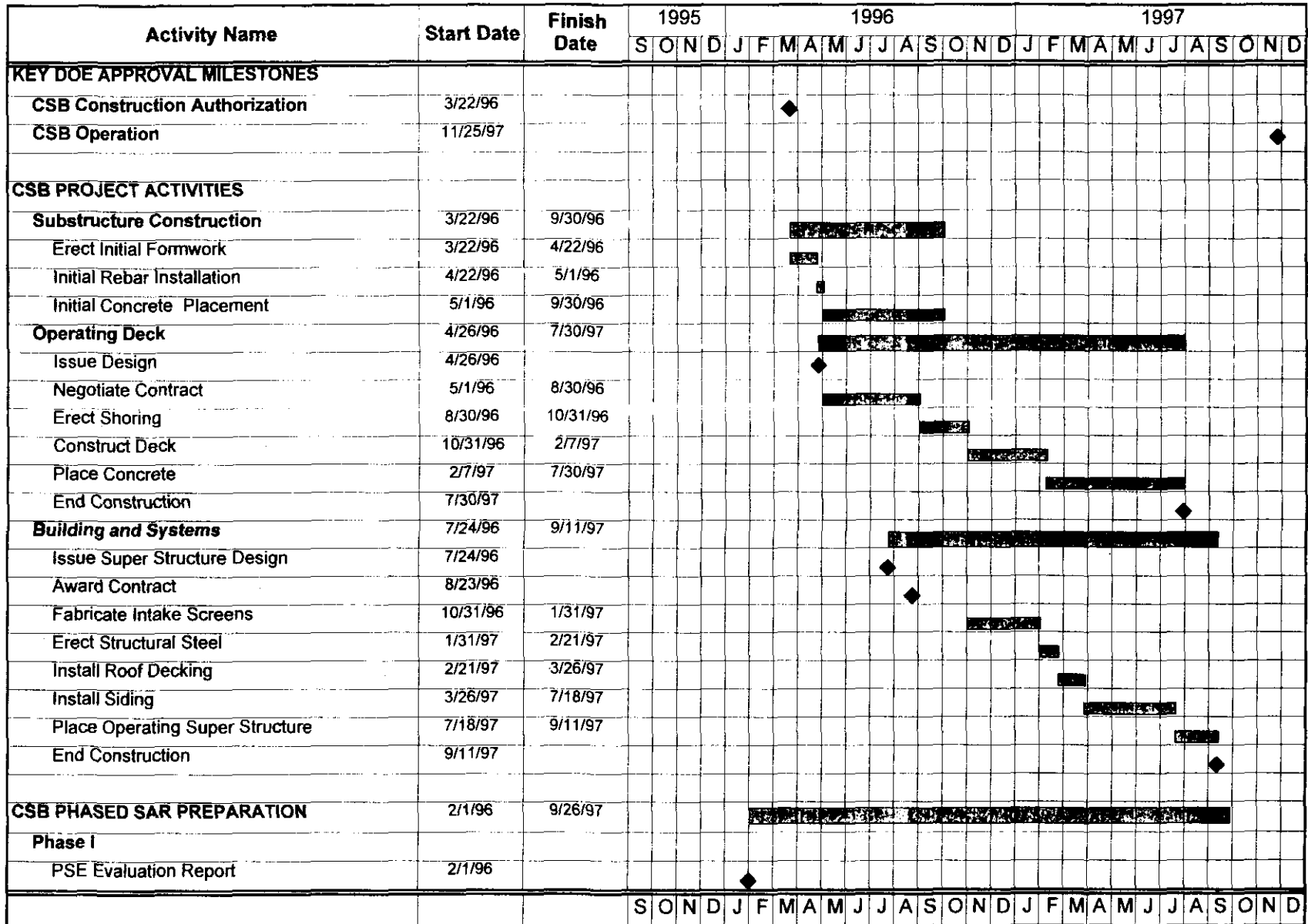
Phases	Contents
I	PSE Evaluation Report Natural Phenomena Paper Phase I Fire Hazards Analysis (FHA)
II	Revised PSE
III	1.0 - Site Characteristics 6.0 - Prevention of Inadvertent Criticality 11.0 - Operational Safety 14.0 - Quality Assurance Criticality Safety Evaluation Report (CSER)
IV	FHA
V	2.0 - Facility Description 7.0 - Radiation Protection 8.0 - Hazardous Material Protection 9.0 - Radioactive and Hazardous Waste Management
VI	3.0 - Hazards and Accident Analysis 4.0 - Safety Structures, Systems, and Components
VII	10.0 - Initial Testing, In Service Surveillance, and Maintenance 12.0 - Procedures and Training 13.0 - Human Factors 15.0 - Emergency Preparedness Program 16.0 - Provisions for Decontamination and Decommissioning
VIII	5.0 - Derivation of Technical Safety Requirements (TSRs) 17.0 - Management, Organization, and Institutional Safety Provisions Executive Summary TSR Document
IX	Final SAR Package Approval

Figure 2-1 Diagrammatic Schedule of CSB SAR Activities.



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Figure 2-2 CSB Phased SAR Preparation, Review, and Approval Schedule (3 sheets).



A-4

3.0 CONDITIONING FACILITY

(To be completed later)

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