JUST IN TIME DSA – THE HANFORD NUCLEAR SAFETY BASIS STRATEGY

S.J. Olinger
U.S. Department of Energy, Richland Operations Office
P.O. Box 550, MSIN A5-54, Richland, WA 99352

A.R. Buhl
Fluor Hanford, Incorporated
P.O Box 1000, MSIN H8-20, Richland, WA 99352

ABSTRACT

The U.S. Department of Energy, Richland Operations Office (RL) is responsible for 30 hazard category 2 and 3 nuclear facilities that are operated by its prime contractors, Fluor Hanford Incorporated (FHI), Bechtel Hanford, Incorporated (BHI) and Pacific Northwest National Laboratory (PNNL). The publication of Title 10, Code of Federal Regulations, Part 830, Subpart B, *Safety Basis Requirements* (the Rule) in January 2001 imposed the requirement that the Documented Safety Analyses (DSA) for these facilities be reviewed against the requirements of the Rule. Those DSA that do not meet the requirements must either be upgraded to satisfy the Rule, or an exemption must be obtained. RL and its prime contractors have developed a Nuclear Safety Strategy that provides a comprehensive approach for supporting RL's efforts to meet its long term objectives for hazard category 2 and 3 facilities while also meeting the requirements of the Rule. This approach will result in a reduction of the total number of safety basis documents that must be developed and maintained to support the remaining mission and closure of the Hanford Site and ensure that the documentation that must be developed will support:

- Compliance with the Rule
- A "Just-In-Time" approach to development of Rule-compliant safety bases supported by temporary exemptions
- Consolidation of safety basis documents that support multiple facilities with a common mission (e.g. decontamination, decommissioning and demolition [DD&D], waste management, surveillance and maintenance).

This strategy provides a clear path to transition the safety bases for the various Hanford facilities from support of operation and stabilization missions through DD&D to accelerate closure. This "Just-In-Time" Strategy can also be tailored for other DOE Sites, creating the potential for large cost savings and schedule reductions throughout the DOE complex.

INTRODUCTION

As required by the Rule, RL reviewed the safety basis documents that the prime contractors submitted as Rule-compliant. This review established that only 5 of 30 hazard category 2 and 3 nuclear facilities for which RL is responsible have safety basis documentation that is compliant with the Rule. The remaining facilities have DOE-approved safety basis documentation that does not meet the requirements of the Rule. In many cases, the specific requirement in the Rule that posed the most difficulty was that the DSA for a facility be prepared using the specific methodology prescribed one of the prescribed so-called "safe harbor" standards applicable to that facility. In every case, however, the existing DSAs for these facilities adequately identified the hazards and corresponding controls required to ensure that the facility could continue to operate safely under its safety basis. The amount of valuable technical resources that would be required to prepare 25 new DSAs by April 2003 is prohibitive and threatens to delay critical risk reduction work.

Fourteen of the facilities whose safety bases were judged not to be Rule-compliant are in a Surveillance and Maintenance mode until it is practical to initiate DD&D efforts. Another eight of the facilities with non-Rule-compliant safety bases have long-term missions.

In response to this situation, RL has developed an implementation strategy that is focused on establishing Rule-compliant safety basis documents "Just-In-Time" to support a change in mission for many of the facilities. This strategy has been implemented in a comprehensive safety basis management plan that will enable DOE to meet its near-term objective of achieving Rule compliance in a cost effective fashion. This plan focuses initial efforts on the upgrading the safety bases for the eight facilities with long-term mission. These safety bases for these facilities will be available to meet the scheduled compliance date of April 2003. The safety bases for the balance of the facilities are addressed through exemption requests, consolidated DSAs, and Health and Safety Plans (HASP) to bridge the current activities in a compliant fashion until the facilities enter DD&D. The change in mission triggers the need for a Rule-compliant safety basis that addresses the new DD&D mission.

This paper describes this "Just-In-Time" strategy and the management plan that has evolved from it. In addition, this paper discusses the criteria documents that will be developed and issued to streamline DSA preparation. These include a Model DD&D DSA, a Model Surveillance & Maintenance HASP that meets the DOE Standard 1120 safe harbor, a Model Waste Management DSA, and the Hanford Safety Analysis and Risk Assessment Handbook (SARAH).

DISCUSSION

The Hanford mission includes stabilization of radioactive materials; packaging, storage and shipment of waste; and DD&D of facilities. These activities take place in numerous facilities that are spread over the 560 square mile Hanford Reservation. The Prime Contracts are generally structured to be performance based, which provides incentives for the contractors to perform work efficiently in order to free funding to accelerate clean up activities. The RL "Just-In-Time" DSA strategy provides a mechanism for obtaining Rule-compliant documents in a cost-effective, mission-sensitive fashion that maximizes the value to the government while protecting the public, worker and environment through a true partnering relationship with the contractors.

The primary objective of Hanford operations is to reduce the risk associated with the nuclear and other hazardous materials that remain in the numerous facilities on the site, many of which are several decades old. Thus, the RL safety basis strategy and management plan focus on minimizing the efforts that are applied to revising safety basis documents for facilities that have limited life (mission change expected shortly after document approval), or that have minimal hazards or limited access and activity. This approach permits more resources to be applied to risk reduction activities rather than administrative efforts. The safety basis documents for each facility will then be brought into compliance with the Rule on a schedule that supports the increased pace of activities required to initiate DD&D in that facility, or "Just In Time." The resulting DSAs will present hazard identification, accident analysis and control set development that are Rule-compliant to support the more hazardous DD&D activities. The basic elements of the strategy are shown pictorially in Figure 1 and briefly discussed below.

The RL safety basis management plan reduces the total number of safety basis documents that must be developed and maintained to support the remaining mission and closure of the Hanford Site. Facilities with similar missions and hazards are grouped together in various Master DSAs to support the application of consistent analysis approaches and control set development. The benefits of this strategy are reaped through the implementation process as well as during subsequent operations. The maintenance of safety basis documents throughout each facility's life is also streamlined.

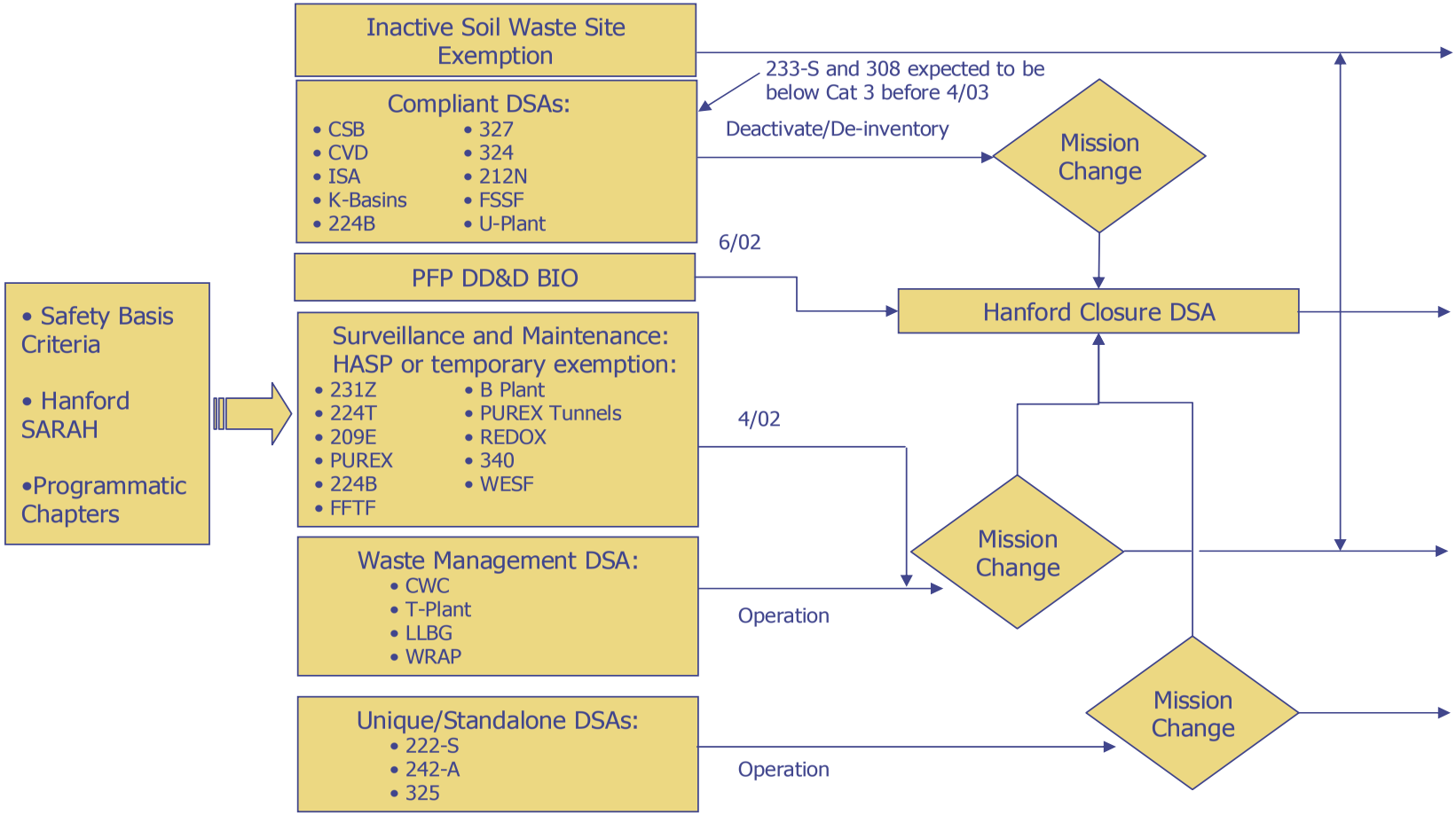

Fig. 1 RL Just-In-Time DSA Strategy To Support Accelerated Closure

As noted above, the safety basis management plan calls for the development of several model documents. These include a Model DD&D DSA, a Model Waste Management DSA, and a Model Surveillance & Maintenance HASP that meets the DOE Standard 1120 safe harbor for facilities that currently have a surveillance and maintenance mission and for inactive structures and waste sites that currently have no safety basis documentation. Each of these documents is described further in Appendices to this paper. In addition, the management plan calls for the development of several supporting documents that include a clear statement of RL's expectations for acceptable safety bases (Safety Basis Criteria) and the Hanford SARAH that establishes standardized analysis approaches. It is expected that use of these two documents in the preparation of DSAs will result in a streamlined approval process.

An early product of this strategy is a model DD&D DSA in the format of a Basis for Interim Operation (BIO) document. This model DD&D BIO will be developed to support immediate DD&D activities at the Plutonium Finishing Plant (PFP) (for additional discussion, see Appendix 1). The strategy starts with PFP because of its early planned DD&D activities, and because of the tremendous opportunities to reduce Hanford Site operating costs by early DD&D of PFP. Also, because of the relative maturity of DD&D planning at PFP, a safety basis can be developed without substantial delay to complete DD&D planning, which has largely not been completed for other Hanford facilities. Further, the PFP facility contain a wide variety of hazards and types of buildings within its boundaries, including a small canyon/hot cell, which enables this pilot to produce a broad template to be applied across the Hanford site. This DD&D BIO will be based on the Decommissioning Safety Basis documents that have been developed and approved for use at Rocky Flats. Other facilities will then be rolled under the model as each approach the start of DD&D activities.

The Waste Management Master DSA will form the safety basis for solid waste management facilities that have common hazard sets and in which similar activities are performed. Activities performed at these facilities include receiving, repackaging, storing and shipping containerized waste. This DSA will be based on the Rocky Flats Generic Waste Safety Analysis Report (SAR) that has been approved the DOE Rocky Flats Field Office (DOE-RFFO). Development of this DSA is discussed further in Appendix 2.

The safety basis for inactive facilities, both above ground and below ground, that are currently in a surveillance and maintenance mode will be based on a Surveillance & Maintenance HASP where such a document is established as a safe harbor in the Rule. Routine operations are not being performed in these facilities, and they have only limited energy sources present in them to disperse materials. Hazards present in these facilities would primarily threaten workers in the facility. Controls established by safety management programs are most appropriate to prevent accidents and protect the worker. These types of controls can easily be implemented through a HASP. The Model Surveillance & Maintenance HASP is discussed further in Appendix 3.

Exemptions will be sought for the remaining facilities that are currently isolated and inactive for which a HASP prepared to the requirements of DOE Standard 1120 does not represent a safe harbor. Hazards in these facilities are typically not well characterized, but the facilities are in a stable and secure condition and represent a reasonable risk until undergoing a mission change.

In addition, the Hanford SARAH will be compiled by including analysis developed by preparing the DSAs described above. The Hanford SARAH document will provide basic information and methodology that can be used to expedite the development of compliant safety basis documents. Review and approval of documents that apply approved SARAH methodologies is expected to be more predictable and require minimal regulatory review time. The SARAH document is discussed further in Appendix 4.

Completion of implementation of this strategy will result in Rule-compliant DSAs for all active facilities for which RL is responsible.

APPENDIX 1. STRATEGY FOR THE DD&D DSA

Introduction

PFP is comprised of multiple buildings. The current mission includes stabilization of radioactive materials and supporting laboratory analysis, NDA, shipping, receiving and storage activities. Several buildings and areas are no longer used for operations. An exemption request under the Rule has been submitted to permit delay of issuance of Rule-compliant document until the end of DNFSB 2001 stabilization activities. The expected completion is June 2004.

The DOE/RL has determined that the current PFP safety basis is adequate to support continued performance of authorized activities until a Rule-compliant DSA is developed and approved. Detailed characterization, inventory removal and decontamination activities are approved under the current safety basis and will continued through DSA development. Non-intrusive removal of inactive process equipment (i.e. unbolting or mechanical disassembly) is also approved under the current safety basis. These activities do not introduce unanalyzed hazards, challenge controls or require control set changes. No confinement boundaries will be breached except for normal bag out operations required to remove equipment and material from operating glovebox systems.

Early cleanout and DD&D activities are expected to be initiated 2002 to 2003 timeframe. Activities that introduce new hazards, increase likelihood of previously analyzed accident, or necessitate additional controls, including demolition and deconstruction require a new rule-compliant safety basis.

Proposed Strategy

A criteria document that details the format and content of the PFP DD&D BIO will be developed. This document will be based on the Rocky Flats Decommissioning BIO and will have DOE approval prior to being used to start DSA development.

The descriptions of activities and the hazards associated with them will be organized such that it will be clear when a particular activity has been completed and the associated hazards eliminated. To the extent possible, control strategies that address these hazards will be written in a functional form to provide flexibility in the systems and measures that can be used to implement the controls. An example of this approach would be to impose only a negative pressure requirement on a confinement ventilation system without mention of any specific equipment alignment or operability requirements. The controls will be self-eliminating as triggered by completion of certain activities and removal of certain hazards. All interface facilities will be identified and addressed in this DSA.

The description of Safety Management Programs (SMP) in the BIO will be based on Hanford site-level SMP descriptions. The BIO will document specific commitments to these SMPs upon which the PFP DD&D BIO rests.

The safety analysis team will use the analysis of DD&D activities contained in the Rocky Flats Decommissioning BIO to the extent practicable. It is recognized that facility and location differences must be addressed, but methodologies will be directly applied where possible. The Rocky Flats document has been approved as a Rule-compliant DSA and was developed using Rocky Flats SARAH guidelines, accepted by DOE. Direct application of these methodologies should facilitate expedited approval of the PFP DD&D BIO.

Using the above as a basis, PFP will start development of the BIO. The intent is to proceed in a modular fashion such that a safety basis for activities similar to those completed at Rocky Flats will be provided first. This will be followed by additional analysis and authorization necessary to support the broader range of DD&D activities at the Hanford Site.

APPENDIX 2 STRATEGY FOR WASTE MANAGEMENT MASTER SAR

Introduction

Waste Management activities being conducted in the Waste Receiving and Processing Facility (WRAP), the Central Waste Complex, the Low Level Burial Grounds, and T-Plant are similar in nature. These facilities all support receiving, storage and shipment of containerized waste. The hazards presented by these activities are consistent and can be easily grouped for analysis. Consolidation of Waste Management safety analyses will streamline waste management activities, reduce the cost and effort required to maintain the DSA, as well as improving efficiencies in implementation and maintenance of operating procedures and training.

Proposed Strategy

The safety analysis team will use the analysis contained in the Rocky Flats Waste Facility Nuclear Safety Technical Report to develop unmitigated accident scenarios. It is recognized that facility and location differences must be addressed, but methodologies will be directly applied where appropriate if new analysis is required. The Rocky Flats documents have been approved as Rule-compliant DSAs and were developed using Rocky Flats SARAH guidelines, accepted by DOE. Direct application of these methodologies should facilitate expedited approval of the Waste Management Master DSA.

Much of the analysis has been completed to support and meet formerly approved criteria established by RL for bounding and representative accidents. This analysis will be augmented by presenting the unmitigated analysis to provide DOE with an understanding of each facility's risk and significance of selected controls. As distinct from the DD&D mission, waste management is a stable, long-term mission. Therefore, it will not be necessary to develop progressive accidents to support removal of controls. The control set will be reviewed qualitatively to consider if additional controls would prevent smaller accidents from developing into the bounding scenarios included in the safety analysis.

Using the above as a basis, the Waste Management Master DSA will be developed to meet DOE standards and requirements. Other facilities will be considered for inclusion in the Waste Management Master DSA once the document is developed.

APPENDIX 3 STRATEGY FOR THE SURVEILLANCE AND MAINTENANCE HASP

Introduction

The 200 Area at the Hanford site contains a number of former production and research facilities that are currently inactive. These inactive facilities include the 209-E Facility, Critical Mass Laboratory, 224-T, Transuranic Storage and Assay Facility, 231-Z, Metallurgical Research Facility, and B-Plant. The current mission at these facilities consists of surveillance and maintenance and limited deactivation. In these facilities, material inventories and radioactive contamination levels have been reduced substantially and energy sources have been largely isolated. Only limited access is permitted, and minimal activities are being conducted in them. Each of these facilities has a DOE approved safety basis that is not Rule-compliant. The safety basis documents for these facilities were developed based on a variety of approaches and formats.

In addition, numerous inactive underground waste sites and other inactive facilities are scattered across the Hanford site. These inactive underground waste sites and other facilities generally do not have a DOE-approved safety basis.

Proposed Strategy

A template will be developed for the Rule-compliant HASP. Inactive facilities, both above ground and below ground that are currently in a surveillance and maintenance mode represent limited risk to the public and environment. Routine operations are not being performed in these facilities, and they have only limited energy sources available to disperse materials, beyond natural phenomena. The primary hazard presented by these facilities is to the workers who intermittently occupy them. Controls established by safety management programs are most appropriate to prevent inadvertent access and to prevent initiation of activities that could lead to accidents. Safety management programs are focused on the worker and provide controls specific to the planned activities, tailored for the hazards present. These controls are well suited for inclusion in a HASP.

An exemption request will be prepared for facilities that have no remaining operational mission, are in long-term surveillance and maintenance, and where Rule-compliance with existing safety basis documentation is not practical. These include the REDOX, PUREX and the PUREX Tunnels facilities. The radiological inventories (mostly in the form of fixed contamination) are sufficiently large in these facilities that they would not meet the requirements for being covered by a HASP. At the same time, their current DOE-approved safety bases are adequate to assure that they can be maintained safely in their current surveillance and maintenance mode.

As each of the facilities and inactive waste sites approaches the start of an active DD&D phase, a "Just-In-Time" DSA appropriate to that mission will be developed and implemented. To the extent possible, the PFP DD&D DSA will form the basis for the DSA for above-ground facilities such as 209-E Facility, Critical Mass Laboratory, 224-T, Transuranic Storage and Assay Facility, 231-Z, Metallurgical Research Facility, B-Plant, REDOX, PUREX and the PUREX Tunnels.

APPENDIX 4 STRATEGY FOR THE HANFORD SARAH

The Hanford SARAH will document a range of basic information and methodologies used to develop safety basis documentation for hazard category 2, and 3 DOE nuclear facilities that are Rule-compliant. The Hanford SARAH is specifically intended to support the development of Hanford facility safety basis documentation consistent with DOE-STD-3009-94, Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports, Change Notice 1, and DOE-STD-3011-94, Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans, Appendix A, Guidance for the Preparation and Submittal of Basis for Interim Operation (BIO) for DOE Nonreactor Nuclear Facilities.

The Hanford SARAH will not establish additional requirements. RL will establish its expectations that constitute requirements for contractors through a supplemental Contractor Requirements Document that will be provided to its contractors. The following criteria have been identified as potential elements of this requirements document:

- Performance of unmitigated accident analysis
- Control selection criteria (e.g., fire protection system, ventilation system, etc.)
- Expectations for types and depth of hazard/accident analysis for Cat 2/Cat 3 facilities
- Expectation for controls for Cat 2/Cat 3 facilities

- Need for hazard profile (high, medium, low) for Cat 2/Cat 3/BIO
- Dose consequence Evaluation Guidelines
- Agreement on how SARAH is expected to be used

SARAH will provide guidance for selecting control sets. Elements that will be addressed include applicability of "modes" in terms of hazards and activities. Expectations for application of LCOs vs. administrative controls will also be provided.

SARAH will discuss the use of release fractions based on a simplified approach that uses conservative values from the 3010 Handbook. SARAH will also establish distances for radiological consequence calculation.