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States Government **Department of Energy**

Memorandum

Rocky Flats Field Office

DUE DATE
ACTION AUG 27 2002

SP:NRD:RGB:02-01304

DIST.	LTR	ENC
ARMSTRONG, M.	X	
BOGNAR, E.	X	
CIUCCI, J. A.	X	
COLALANCIA, M.	X	
DEGENHART, K.	X	
DEICHLER, C.	X	
DIETER, T. J.		
FERRERA, D.	X	
FERRI, M. S.		
GEIS, J. A.	X	
GERMAIN, A. L.		
GIACOMINI, J.		
HANSON, J. L.	X	
KIRAR, J.	X	
LINDSAY, D.		
LONG, J. W.		
MARTINEZ, L. A.	X	
MCLAUGHLIN, J.		
MILLER, G. M.	X	
MILLER, J. C.	X	
PARKER, A.M.	X	
POWERS, K.	X	
SHELTON, D.C.		
SNYDER, D.	X	
SPEARS, M. S.		
TRIGE, K.D.		
TUOR, N. R.	X	
VOORHEIS, G. M.		
Plappert, R.	X	
NAGEL, R.	X	

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Reviewed for Addressee Corres. Control RFP

9/3/02 BG
Date By

Ref. Ltr. # 02RF01052

DOE ORDER # 5480.23

Approval of Re-Categorization of Building 881 as a Radiological Facility

Alan M. Parker
President
and Chief Executive Officer
Kaiser-Hill Company, L.L.C.

Reference: Letter, Snyder to Bostic, 02-RF-01052, dtd August 22, 2002, Subject: Transmittal of the Facility Safety Analysis, Building 881 and Related Facilities, Revision 0; Request for Approval on the Re-Categorization to Radiological, DPS-013-02

The Department of Energy-Rocky Flats Field Office (DOE-RFFO) approves the re-categorization of Building 881 and related facilities from Hazard Category 3 nuclear facilities to *radiological* facilities as transmitted in the reference. The transmitted documentation indicates that the current radiological material inventories are less than half of the lower threshold limit for Hazard Category 3 designation. The documentation also indicates that the inventories of other non-radiological inventories are below thresholds of concern. Also, the DOE-RFFO agrees that the transmitted documentation satisfies the Building 881 authorization basis annual update requirement.

The DOE-RFFO understands that the facility commits to Rocky Flats Environmental Technology Site(Site) level implementation of the Site Safety Management Programs. It is also understood that the maintenance of the *radiological* categorization depends upon a prohibition on the receipt of any radioactive waste by the facilities in the Building 881 complex, other than the return of waste generated as part of dismantlement, decontamination, and demolition activities in the Building 881 complex. The DOE-RFFO also approves the removal of all Building 881 complex equipment from the Reportable Equipment List associated with the Occurrence Reporting Process Procedure, 1-D97-ADM-16.01. Should you have any questions, please contact Ron Bostic at extension 2109.

Eugene C Schmitt

Eugene C. Schmitt
Manager

M. Frei, EM-30, HQ
N. Larson, EM-33, HQ
S. Stadler, EH-2, HQ
D. Owen, DNFSB, RFFO
R. Goldsmith, AMSP, RFFO
J. Schneider, AMP, RFFO
R. Bostic, NRD, RFFO
E. Westbrook, FAD, RFFO
D. Synder, K-H
J. Geis, K-H

DOE F 1320.8

United States Government **Department of Energy**

memorandum

Rocky Flats Field Office

DATE: OCT 08 2002

REPLY TO ATTN OF: SP:NRD:RGB:02-01558

SUBJECT: Approval of Site Safety Analysis Report Appendix J Page Change PGC-RFP-03.0036-JNC

TO: Alan M. Parker
President and Chief Executive Officer
Kaiser-Hill Company, LLC

Reference: Streamlined Page Change, dtd October 4, 2002, PGC-RFP-03.0036-JNC, Clarify Waste Management Cell Siting Criteria

The Department of Energy, Rocky Flats Field Office, approves the referenced Site Safety Analysis Report Appendix J Page Change. The page change deals with specification of additional Waste Management Cell (WMC) siting criteria to preclude unanalyzed storage configurations and clarifies that WMC descriptions do not supersede WMC siting criteria. The specific siting criterion that was added precludes the interaction of WMC waste containers with other staged/stored waste containers, particularly in those cases where WMCs are located in close proximity to nuclear facilities. The subject page change does not result in an increase in risk and may actually reduce the likelihood of unanalyzed accidents with the potential for higher consequences than accidents currently evaluated in nuclear facility authorization basis documents and Appendix J. The subject page change is approved without technical direction. If you have any questions, please contact Ron Bostic at extension 2109.

for Eugene C. Schmitt
Manager

Attachment

cc w/Att:
M. Frei, EM-30, HQ
N. Larson, EM-33, HQ
S. Stadler, EH-2, HQ
D. Owen, DNFSB, RFFO
R. Goldsmith, AMSP, RFFO
R. Bostic, NRD, RFFO
E. Westbrook, FAD, RFFO
J. Geis, K-H

DEPARTMENT OF ENERGY-ROCKY FLATS FIELD OFFICE REVIEW OF SITE SAFETY ANALYSIS REPORT APPENDIX J PAGE CHANGE PGC-RFP-03.0036-JNC WASTE MANAGEMENT CELL SITING CRITERIA

Background:
The purpose of this Page Change Revision to Appendix J, *Safety Analysis Report for Outdoor Waste Management*, of the Site Safety Analysis Report (SSAR) is to clarify Waste Management Cell (WMC) siting criteria dealing with the potential for WMC-waste containers to be involved in a concurrent accident with other waste containers that are outside of the WMC. In particular, during preparation for implementation of a Building 707 WMC that is located immediately adjacent to the facility, the potential for accidents involving both WMC and facility waste containers was determined to exist. The Page Change is to be implemented prior to October 31, 2002.

Discussion:
The Page Change impacts Section 2.2, *Waste Management Cell (WMC) Descriptions*, and Section 3.1.2.9, *Waste Management*, of Appendix J of the SSAR. The changes clarify that the WMC descriptions do not supersede WMC siting criteria and that WMCs must be located in a manner to preclude analyzed accidents from impacting both WMC-managed waste containers and other staged/stored waste containers. These changes are proposed in order to support proper implementation of the WMCs across the Site.

DOE-RFFO Basis for Approval:
The safety analysis presented in Appendix J generally did not consider any interactions between WMCs and other nuclear facilities. One exception dealt with the seismic collapse of a nuclear facility wall onto waste containers stored in a WMC. However, there was no consideration given to accidents that would impact both WMC waste containers and other staged/stored waste containers. For example, there was no evaluation of WMC waste containers in close proximity to a nuclear facility dock where an analyzed fire can impact waste containers in the WMC and at the dock. The DOE-RFFO specified in the approval of Appendix J that it was the responsibility of the contractor to evaluate situations where accidents could involve both WMC waste containers and other waste containers in those cases where WMCs were located in close proximity to a nuclear facility.

During the conduct of this required evaluation for a Building 707 WMC located in close proximity to the facility, it was discovered that the WMC description in Appendix J did not preclude a potential interaction between the WMC and the facility dock waste containers. The Page Change adds a requirement that precludes that interaction and clarifies that the WMC descriptions do not supercede any requirements associated with the specified WMC siting criteria.

Since the Page Change actually further prohibits unanalyzed configurations, there is no risk increase associated with the proposed change. The Page Change actually reduces risk by reducing the likelihood of accidents with the potential to exceed currently analyzed consequences.

The added siting criterion precludes the placement of WMC waste containers in configurations where accidents could impact the WMC waste containers and other staged/stored waste containers. The interaction between the WMC waste containers and other waste containers could be precluded by spacing or by the imposition of various types of barriers. The actual spacing requirements or barriers to be imposed to preclude interactions are not specified in the Page Change since they would vary depending on the actual configuration trying to be avoided. As such, it is the responsibility of the contractor to ensure that appropriate spacing or barriers are in place to meet the siting criterion associated with WMC and other waste container interactions.

As stated above, there is no risk increase associated with this proposed Page Change and the change actually reinforces the assumptions made in the safety analyses and clarifies the implementation requirements. The Page Change is approved.

DOE-RFFO Direction:
There is no DOE-RFFO technical direction associated with this Page Change.

Revised 09/02

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Rocky Flats Field Offi

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SP:NRD:DEF:02-01609

Approval of Documented Safety Analysis for 903 Drum Storage Area (IHSS 112) Remediation Project

Denny Ferrera, Vice President
Project Manager for Remediation, Industrial D&D, and Site Services
Kaiser-Hill Company, LLC

Reference: Letter, Snyder to Bostic, 02-RF-01991, dtd 09/11/02, subject: Transmittal of the Documented Safety Analysis (DSA) for 903 Drum Storage Area (IHSS 112) Remediation Project - DPS-026-02

The reference transmitted the final version of the 903 Pad Project Documented Safety Analysis (DSA) to the Department of Energy (DOE) Rocky Flats Field Office for approval. The attached Safety Evaluation Report (SER) provides the basis for approval, directed changes, implementation issues, and annual update issues. The SER shall be issued with the controlled copy distribution of the 903 Pad Project DSA. The 903 Pad Project DSA is approved with the DOE direction contained in the SER.

Should you have any questions, please contact me at extension 2025 or my point of contact on this matter, Ron Bostic, at extension 2109.

Eugene C Schmitt

Eugene C. Schmitt
Manager

DIST.	LTR	ENC
ARMSTRONG, M.	X	X
BOGNAR, E.	X	X
CIUCCI, J. A.	X	X
COLALANCIA, M.	X	X
DEGENHART, K.	X	X
DEICHLER, C.	X	X
DIETER, T. J.		
FERRERA, D.	X	X
FERRI, M. S.		
GEIS, J. A.	X	X
GERMAIN, A. L.		
GIACOMINI, J.	X	X
HANSON, J. L.	X	X
KIRAR, J.	X	X
LINDSAY, D.		
LONG, J. W.	X	X
MARTINEZ, L. A.	X	X
MILLER, G. M.	X	X
MILLER, J. C.	X	X
NAGEL, R. E.	X	X
PARKER, A.M.	X	X
POWERS, K.	X	X
SHELTON, D.C.		
SNYDER, D.	X	X
SPEARS, M. S.	X	X
TRICE, K.D.		
TUOR, N. R.	X	X
VOORHEIS, G. M.		
SWENSON, B	X	X
ITO, E.	X	X
Plappert, R.	X	X

COR. CONTROL	X	X
ADMN. RECORD		
PATS/130		

Reviewed for Addressee
Corres. Control RFP

10/22/02 bg
Date By

Ref. Ltr. #
02RF01991

DOE ORDER #
5480.23

Attachment

cc w/Att:
M. Frei, EM-30, HQ
N. Larson, EM-33, HQ
D. Owen, DNFSB, RFFO
J. Schneider, AMP, RFFO
R. Goldsmith, AMSP, RFFO
J. Legare, AMES, RFFO
R. Bostic, NRD, RFFO
A. Geis, K-H

Revision No: 0
Date: October 2002

SAFETY EVALUATION REPORT

For

Documented Safety Analysis
for
903 Drum Storage Area (IHSS 112) Remediation Project

REVISION 0, September 2002

Rocky Flats Environmental Technology Site
Kaiser Hill Company, L.L.C.

PREPARED BY:

DEPARTMENT OF ENERGY
ROCKY FLATS FIELD OFFICE

Prepared by: _____ 10/18/02
Ronald Bostic, Director, Nuclear Regulatory Division — Date

Approved by: Eugene C Schmitt 10/21/02
Eugene C. Schmitt, Manager, Rocky Flats Field Office — Date

Reviewed for Classification/UCNI:
By: Terry Foppe, Safety Analyst U/NU
Date: 10/18/02

TABLE OF CONTENTS

1.0 INTRODUCTION

This Safety Evaluation Report documents the Department of Energy (DOE) review and provides the rationale for the Rocky Flats Field Office (RFFO) approval of the *Documented Safety Analysis for 903 Drum Storage Area (IHSS 112) Remediation Project* (Revision 0, September 2002), (hereafter referred to as the 903 Pad or 903 Pad Project). This Documented Safety Analysis (DSA) is a new Authorization Basis (AB) document for the 903 Pad at the Rocky Flats Environmental Technology Site (RFETS or Site) based on the planned remediation activities involving a Hazard Category 3 Nuclear Facility.

The 903 Pad DSA was prepared to satisfy the requirements in 10 CFR 830, Subpart B, *Safety Basis Requirements* (Reference 1). The primary guidance documents used for preparation of the DSA include:

- DOE-STD-1027-92 *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports* (Reference 2),
- DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports* (Reference 3).

The DSA format and content is based on DOE-STD-3009 for development of a Safety Analysis Report (SAR) and derivation of Technical Safety Requirements (TSRs). The DSA Table 1 provides a cross reference of its 5-chapter format to the DOE-STD-3009 17-chapter format. The TSRs are also included in the DSA Chapter 5 rather than in a separate document.

10 CFR 830 Subpart B Appendix A Table 2 identifies a safe harbor method as a SAR or a Basis for Interim Operation (BIO) for a nuclear facility with a limited operational life such as the temporary waste storage activity involving the removed contaminated soils packaged in containers. For an environmental restoration (ER) activity not involving a permanent structure, it identifies the safe harbor method as DOE-STD-1120, *Integration of Environment, Safety and Health Into Facility Disposition Activities* (Reference 4), and 29 CFR 1910.120 or 1926.65 (OSHA HAZWOPER). The project complies with the 29 CFR OSHA requirements (see later discussion). DOE Standard 1120 identifies a minimum set of expectations for an ER nuclear facility AB that is less rigorous than preparing a SAR or BIO. This however, does not prohibit developing a SAR or BIO to meet the AB documentation, but rather proposes an alternative approach as a more cost-effective method (see discussion in DOE-STD-1120 Section 3.3.4 and Appendix G). Therefore, DOE-STD-3009-94 is considered an acceptable method to prepare a DSA for compliance with 10 CFR 830 Subpart B for a nuclear facility involving ER activities as well as the subsequent waste storage activities.

A "graded approach" was used to develop the 903 Pad DSA as permitted by DOE-STD-3009 and 10 CFR 830 Subpart B. The DSA Table 2 lists the elements of the 903 Pad Project DSA, as required by CFR Part 830 §830.204, *Documented Safety Analysis,* and application of the graded approach for each. The justification is appropriate for the complexities and hazards associated with the 903 Pad Project and its defined ER activity and waste storage mission. There are no complex processes or activities such as waste treatment, waste repackaging, or decontamination and decommissioning, associated with the 903 Pad Project.

The format and content of the 903 Pad DSA Safety Evaluation Report (SER) was prepared in accordance with the RFFO Desktop Procedure AME-ABD-01, *Nuclear Safety Oversight and Review Process for Authorization Basis Related Submittals* (Reference 5). The RFFO procedure is based on the guidance provided in DOE-STD-1104-96, *Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports* (Reference 6). The same DOE Standards listed above were also used by the RFFO Review Team to validate the hazard categorization and determine the information content of the DSA, along with other DOE Standards, DOE Handbooks, and technical references as discussed later. For each subsequent revision to the 903 Pad DSA if necessary, an addendum will be added to this SER to provide the basis for approval.

2.0 SUMMARY CONCLUSION

The 903 Pad Project involves the remediation of approximately 13,000 cubic yards of contaminated material made up of approximately 6 inches of asphalt, 6 inches of stone fill material and 1 foot of native soil within a 3.4-acre area (approximately 375 feet by 395 feet). All material contaminated above the Tier 1 subsurface soil action levels for radionuclides, as specified in the Rocky Flats Cleanup Agreement will be removed. At the completion of the remediation activities, the project site will be restored to natural conditions. Major project activities include (1) placement, use, and movement of weather structures, (2) excavation of contaminated soils/materials, (3) in process characterization, (4) excavation verification sampling, (5) waste handling and staging/storage, (6) decontamination of equipment, (7) movement of equipment between weather structures, (8) on-site transportation of contaminated soils/materials, (9) refueling of diesel-fueled equipment, (10) excavation backfilling, and (11) site reclamation. Activities associated with the remediation/treatment of volatile organic compounds (VOCs) from excavated or non-excavated soils are beyond the scope of the DSA. The 903 Pad Project will also utilize the 904 Pad and the 891 Temporary Waste Storage Area as waste staging/storage areas prior to offsite shipment of the contaminated materials.

The 903 Pad Project is categorized as a Hazard Category 3 Nuclear Facility due to the amount of radioactive material that may be at risk to potential accidents and external events during the ER activity and subsequent storage of wastes in containers. The DSA evaluates the hazards/energy sources associated with the ER and waste storage activities and identifies the following three general types of accident scenarios that could yield a radiological release: (1) fire, (2) spill, and (3) explosion. Operational or internal events, natural phenomena events, and other external events such as a plane crash initiate these three general types of scenarios.

In developing the DSA, four risk classes of accident scenarios were defined: Risk Class I (Major), Risk Class II (Serious), Risk Class III (marginal), and Risk Class IV (negligible). The risk classes are based on the frequency of occurrence of the event and the consequences of the event as defined in Table 2-1. These risk classes and other hazards and accident analysis methods discussed in this section and in Section 5.2 were developed from DOE-STD-3009 supplemented by DOE guidance for preparation of a Preliminary Hazards Analysis (PHA) to develop a BIO as presented in DOE-STD-3011-94, *Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans*, (Reference 7).

Table 2-1: Risk Classes-Frequency versus Consequences

Consequence	Frequency Of Occurrence (per year)		
	Extremely Unlikely $<10^{-4}$	Unlikely 10^{-4} - 10^{-2}	Anticipated $>10^{-2}$
High	II	I	I
Moderate	III	II	I
Low	IV	III	III

Table 2-2 shows how *High*, *Moderate*, and *Low* is defined for radiological accident. These radiological consequences were established by modifying the DOE-STD-3011 BIO PHA suggested methodology by the AB development criteria from Reference 8, and the April 2002 revision to DOE-STD-3009 (Reference 3)[1]. Table 2-3 defines chemical accident consequence levels that were developed from the same documents.

Table 2-2: Radiological Accident Consequence Levels (50 year CEDE or TEDE)

Consequence	Public Dose (rem at 2200 m)	Collocated Worker Dose (rem at 100 m)	Immediate Worker Consequence
High	> 5	> 25	prompt death
Moderate	> 0.5	> 5	serious injury or significant radiological exposure
Low	< 0.5	< 5	< Moderate

Table 2-3: Chemical Accident Consequence Levels

Consequence	Public Exposure (2200 m)	Collocated Worker Exposure (at 100 m)	Immediate Worker Consequence
High	> ERPG-2**	> ERPG-3**	prompt death
Moderate	N/A*	N/A*	serious injury or significant chemical exposure
Low	≤ ERPG-2**	≤ ERPG-3**	< Moderate

* N/A means Not Applicable

** ERPG refers to the Emergency Response Planning Guidelines published by the American Industrial Hygiene Association. ERPG-2 and ERPG-3 define the air concentrations for each chemical corresponding to moderate and severe health effects, respectively, in humans exposed for greater than one hour.

Table 2-4 summarizes the additional guidance related to immediate worker consequences that are discussed in Section 5.2 of this SER.

[1] see later discussion in Section 5.2 for changes made to Tables 2-2 and 2-3.

TABLE 2-4. Qualitative Guidelines For Immediate Worker Consequences

Consequence Level	Qualitative Event Description
High (prompt death)	Criticalities Explosions causing moderate to large releases Fires causing large releases
Moderate (serious injury, or significant radiological or chemical exposure)	Fires causing moderate releases Explosions causing small releases Spills causing moderate to large releases
Low (<Moderate)	Any event causing minor contamination

An unmitigated analysis of each identified accident scenario was performed to determine the baseline frequency of an event and the associated consequences. For Risk Class I and II scenarios, safety features are credited to reduce the risk of the accident to a Risk Class III or IV, and then the safety features are developed into controls. In some cases, there may not be any feasible or cost-effective controls to reduce a Risk Class I or II event to Risk Class III or IV. These cases are identified as Risk Dominant Accident Scenarios; however, for the 903 Pad there are none.

In addition to the qualitative hazards evaluation of operational accident scenarios, natural phenomena and external events, two spill and two fire scenarios were further evaluated in the DSA Section 4.2 Accident Analysis. The bounding consequences to the public are 0.01 rem from the fire and 0.02 rem from the spill. The bounding consequences to the collocated worker at 100 m are 0.15 rem from the fire and 2.5 rem from the spill. RFFO concurs with the following safety analysis conclusion presented in the DSA Executive Summary:

> "Although categorized as a HC-3 Nuclear Facility, the hazards associated with the 903 Pad Project do not present adverse impacts to the collocated worker (CW), the public represented by the maximum [exposed] off-site individual (MOI), or the environment. Accident scenario results, discussed in Section 4.2, *Accident Analysis*, indicate that the accident scenarios postulated and analyzed for the project result in *low* radiological consequences to the CW and MOI without crediting mitigative controls. Additionally, all scenarios result in Risk Class III or less events without crediting preventive controls. No Safety SSCs have been identified/credited for the project. Immediate worker (IW) safety is assured through implementation of site-specific hazard controls and compliance with the Site Environmental Restoration (ER) HASP and Site Safety Management Programs (SMPs). The Site SMPs described in Section 3 provide the infrastructure to meet the requirements of the Integrated Safety Management (ISM) philosophy as it is applied to all work activities at the Site.
>
> The Technical Safety Requirements (TSRs) for the 903 Pad Project, included as Section 5, consist of administrative controls and a commitment to the Site SMPs.

Section 5, *Approval Basis;* of this SER addresses the significant issues that were identified by the Review Team and their resolutions. This resulted in a number of "red-lined" page changes to the

903 Pad DSA that are being directed as a condition for RFFO approval (see Appendix A technical direction).

The project will be conducted using appropriate soil disturbance permits; radiological works permits, As Low As Reasonably Achievable (ALARA) job reviews, and other Integrated Safety Management System job hazard analyses. A project-specific addendum to the *Environmental Restoration Program Health and Safety Plan for the Rocky Flats Environmental Technology Site (ER HASP)* (Reference 9) supports 903 Pad Project activities. The 903 Pad Project HASP addendum (Reference 10) covers all project activities including working with and around heavy equipment, radioactive contamination, and hazardous chemical contamination. These documents were prepared to meet the OSHA HAZWOPER requirements.

Implementation of the DSA is expected within a relatively short time due to the advanced stage of the project that has already procured equipment and is in the process of constructing the temporary weather tents. RFFO has reviewed the implementation schedule and costs and concurs with Kaiser Hill Company, L.L.C. that the costs are within the current contract scope. In order to maximize the benefit of an authorization basis compliant with 10 CFR 830, full implementation should occur within 30 days of DOE approval of the DSA. An appropriate Implementation Validation Review (IVR) is planned to verify full implementation and compliance with the requirements specified in this DSA.

The RFFO concludes that the 903 Pad DSA and supporting documentation adequately defines and documents the hazards of the ER and waste storage activities and identifies the necessary safety features and controls to safely accomplish the mission. The safety features and controls adequately reduce the risk to the public, the workers (collocated workers and in-facility or immediate workers), and the environment consistent with the direction provided by Reference 8, and are acceptable to the DOE RFFO. This conclusion is based on Section 5, *Approval Basis*, of this SER. The DSA meets the requirements of 10 CFR 830 Subpart B.

The Review Team recommends DOE approval of Revision 0 of the 903 Pad DSA.

3.0 REVIEW PROCESS

The 903 Pad Project was characterized, using DOE-STD-1027-92 (Reference 2) methodology, as a Hazard Category 3 (HC3) Nuclear Facility. The RFFO has been delegated approval authority for a Documented Safety Analysis for Hazard Category 2 and 3 nuclear facilities (Reference 11).

A Preliminary DSA was not prepared for the 903 Pad Project. This is consistent with the DOE expectation stated in 10 CFR 830 Subpart B Appendix A Section F.6 for activities that do not involve significant construction such as ER activities.

The 903 Pad DSA approved by the Kaiser Hill Company, L.L.C. was received by RFFO for review in September 2002 (Reference 12). The DSA review lasted approximately one month.

The composition of the RFFO FSAR Review Team consisted of personnel from the Nuclear Regulatory Division, supported by Subject Matter Experts from other safety disciplines, and the 903 Pad Facility Representative. The team members were assigned specific areas based on their expertise. The primary team members and the area they concentrated their review on are as follows:

- Terry Foppe – Team lead and overall DSA and supporting safety documentation review,
- Norma Castaneda – DSA authorized activities as authorized and funded by the RFFO Environment & Stewardship,
- Gary Dreith – DSA authorized activities, hazard identification, SMP descriptions, TSRs, and supporting safety documentation from a DOE Facility Representative perspective,
- Robert Williams – DSA authorized activities, Fire Protection Program description, Fire Hazards Analysis (FHA), DSA fire hazards and accident scenarios and consistency with FHA, and identified fire protection controls in the FHA and DSA,
- Robert Wilson – DSA authorized activities, Criticality Safety Program description, and criticality incredibility evaluation.

The Review Team members conducted independent technical reviews of the DSA, providing the Team Leader with formal written comments as appropriate. The comments were then consolidated, reviewed for consistency among the Team as well as with previously approved DSAs, and provided to the Contractor. Comments generated during the review were tracked to closure, including validation of closure by the comment originator where possible. After resolution of review comments, red-lined page changes to the DSA were provided by the contractor and are attached to this SER (see Appendix A technical direction). The Team Leader maintained the RFFO comments, comment resolutions, and validation documentation. Significant issues identified during the review are discussed/dispositioned in Section 5, *Approval Basis*, of this report.

4.0 DESCRIPTION OF FACILITY AND OPERATIONS

Section 2.0 Summary Conclusion of this SER provides the description of 903 Pad Project ER activities including subsequent storage of waste containers until they can be shipped offsite. This section provides additional information about the project.

The 903 Pad is located south of Central Avenue in the southeast corner of the 900 area. The 903 Pad was originally used for the storage of drums containing radiologically-contaminated liquids (*e.g.*, hydraulic fluids, lathe coolant, solvents, oils, etc.) from 1958 to 1967. The drums were exposed to the environment and began to deteriorate over time. An estimated 5,000 gallons of contaminated liquid leaked at the location. The drums were removed from the 903 Pad in 1968. Following the removal of the drums some of the radiologically-contaminated material was removed. In 1969 a layer of clean stone fill material was placed over the area and capped with an asphalt cover. This was done to prevent further spreading of contamination. Wind and rain (stormwater erosion) spread contaminated soils to the east and southeast of the 903 Pad, creating the "903 Lip Area."

The 903 Pad Project has the potential to generate several waste types including sanitary waste, Low Level Waste (LLW)/Low Level Mixed Waste (LLMW), Transuranic (TRU)/Transuranic

Mixed (TRM), and orphan waste. Orphan waste is defined as LLMW greater than 10 nCi/gram that has no clear disposal path due to treatment, storage and disposal (TSD) site Waste Acceptance Criteria (WAC).

The 903 Pad Project remediation activities will be performed within temporary weather structures (tent), which allow work to continue during inclement weather. The structures provide a protected environment for excavating and managing the contaminated materials as well as protection from high winds and precipitation events common at the Site between October and April that could cause additional releases and further contamination of the environment. The weather structures include negative ventilation systems with high efficiency particulate air (HEPA) filtration and electric power provided by gasoline/diesel generators.

Department of Transportation (DOT) certified Industrial Package 1 (IP-1) bulk material intermodal containers with lids or equivalent type containers will be used to package the contaminated soils and materials from the 903 Pad. The approximate capacity of each intermodal container is 25 cubic yards (yd^3) or 60,000 pounds of material. The containers are certified for shipment by flatbed truck, intermodal chassis or roll-off truck, or rail flatcar. A crane, sidelifter, forklift, roll-off truck or container handler can load them onto the truck for offsite shipping.

All material removed (asphalt, stone fill, and soil) will be packaged in intermodal containers or other approved containers. LLW and LLMW with radioactivity levels less than 10 nCi/g have approved receiver sites and will be shipped offsite for treatment (if needed) and/or disposal. TRU/TRM and orphan waste may be blended down for radiological purposes to attain LLW/LLMW levels that can also be shipped offsite for treatment and/or disposal at approved receiver sites. Orphan waste may also be stored on-site until an approved receiver site is identified.

After the loading is complete, the filled intermodal container will be closed while still in the weather structure and, using a diesel-fueled forklift, will be moved out of the structure for relocation to the intermodal container staging/storage area (i.e., 904 Pad Area and 891 Temporary Waste Storage Area). Upon receipt and approval of verification samples from each container, offsite shipment will take place directly from the 904 Pad or the 891 Temporary Waste Storage Area. Any required repackaging would be performed inside the currently active weather structure.

Both during and at the completion of excavation activities in the active remediation weather structure, in-process radiological surveys will be conducted inside the structure. At the discretion of Site Radiological Engineering personnel and in accordance with approved procedures, decontamination of the weather structure will be conducted. If the weather structure is not found to be contaminated above Radiological Engineering acceptable levels, it will be relocated to the next excavation site. At the conclusion of the 903 Pad Project, the weather structures will be sampled, radiologically scanned, and decontaminated as necessary prior to release for conditional/unrestricted use.

Upon completion of remediation activities in the active weather structure and receipt of all confirmation sampling data with no results above the RFCA Tier 1 action levels for radionuclides, backfill will be placed in the excavation to the previous elevation of the asphalt. Clean backfill material will be hauled to the 903 Pad from an offsite source. Backfill material will be dumped in the backfill stockpile area. Backfill material will be moved from the stockpile to the weather structure being backfilled by a front-end loader. The front-end loader will place, level, and compact the backfill material. Upon completion of all remediation and backfill activities at the 903 Pad, the weather structures will be dismantled and the area will be filled with 5 inches of topsoil and revegetated with an appropriate seed mixture.

5.0 APPROVAL BASIS

The 903 Pad DSA satisfies the requirements of 10 CFR 830 to develop a Documented Safety Analysis and TSRs. The level of detail and scope of the 903 Pad DSA meets the 10 CFR 830, "safe harbor" method of DOE-STD-3009. Upon DOE approval and full implementation, the 903 Pad DSA will become the Authorization Basis for the 903 Pad Project.

DOE-STD-1104 (Reference 6) defines five approval bases for assessing the adequacy of a new AB document. The five approval bases are presented below, along with an assessment of the adequacy of the 903 Pad DSA in meeting the requirements stated in each approval basis. A summary of the 903 Pad DSA information dealing with each approval basis topic is also presented.

5.1 Adequacy of Base Information

The criteria for accepting the adequacy of the base information is that it provides sufficient information to allow assessment of the other approval bases that rely on this information. Base information contained in a DSA generally deals with technical information about facility and system configuration, current and past operation, and historical events of significance. The following seven criteria from DOE-STD-1104 were utilized in assessing the adequacy of the base information contained in the 903 DSA:

1) The facility mission(s) and scope of operations for which safety basis approval is being sought are clearly stated and reflected in the type and scope of operations analyzed in the SAR.
2) The descriptions of the facility, operations, and primary structures, systems, and components (SSCs) that are important to safety provide a knowledgeable reviewer sufficient background material to understand the major elements of the safety analysis.
3) The status of the existing authorization basis is adequately identified to establish the current set of authorization basis documents, including specific versions and levels of approval.
4) Correlation is established between actual facility arrangements and operations with those stated in the SAR (i.e., the basic descriptions provided are fundamentally up-to-date and correct).
5) The facility contractor development and approval processes demonstrate sufficient commitment to establish the facility safety basis.

6) A description of the facility's life-cycle stage, mission(s), and operation(s) is presented, including explanation of the impact on the facility safety basis.
7) Clear basis for and provisions of exemptions, consent agreements, and open issues are presented.

Base information found in the 903 Pad DSA consists of technical information contained in the Executive Summary, Introduction (Chapter 1), Project Characterization and Description (Chapter 2), Safety Analysis (Chapter 4), and to a lesser extent, descriptive information in other chapters. Supporting analysis is provided in the Site Preliminary Hazards Analysis (PHA) (Reference 13).

The mission of 903 Pad Project is to accomplish environmental restoration activities for the 903 Pad to excavate contaminated soil and its overburden/cap until the Tier 1 cleanup criteria in the Rocky Flats Cleanup Agreement are achieved, replace the overburden and restore the area with native grasses, temporarily store the contaminated soils in intermodal containers, and then ship the material offsite. The 903 Pad activities are explicitly discussed in the Executive Summary and Chapters 1 (Introduction) and 2 (Project Characterization and Description) of the DSA. The mission of 903 Pad and associated activities, which are summarized in Section 4 of this SER, are adequately defined within the DSA. The operations and activities defined and analyzed in the DSA are consistent with the stated missions and are also consistent with the Site's closure mission. The activities describe what are authorized in the facility and contain enough detail to support the hazard identification process summarized in Chapter 4 of the DSA.

Chapter 2, Project Characterization and Description, of the DSA provides adequate descriptions of the construction and material handling equipment and weather structure (SSCs). The DSA adequately justifies that there are no Safety Class or Safety Significant SSCs for the 903 Pad. However, there are systems that provide functions important to safety. Examples of these systems include the confinement function of the weather structure (tent), the ventilation system with high efficiency particulate air (HEPA) filtration, routine radiation monitoring for airborne releases outside the tent, and portable fire protection equipment and fire water supply from the Site domestic water distribution system (along with Fire Department response). While none of the above system safety functions warranted elevation to Safety Significant status, they do provide additional defense-in-depth for various facility events. The effect of these systems on any specific accident is qualitatively judged to reduce either the probability or consequence of potential events to facility workers. These systems are operated and maintained in accordance with Site SMP requirements. The level of safety provided is less than that offered by an engineered system operated and maintained as specified by TSR controls, but still provides a substantial increase in safety. See later discussion in Sections 5.2 and 5.3 regarding reliance on these safety systems.

The *Facility Safety Analysis for Environmental Restoration Projects* contained in the Site SAR (Reference 14) categorizes the 903 Pad as a *radiological* facility while the site is in a *static* condition (*i.e.*, no Pad/soil disturbance). In a static condition there is a lack of initiators/energy sources available that could cause a radiological release impacting the collocated worker or public, represented as the MOI. In other words, the radioactive material is considered unreleasable unless disturbed. There is no previous nuclear authorization basis for the proposed 903 Pad Project activities. Therefore, the 903 Pad DSA relied on the postulated hazards and Site

experience with waste facilities and the Site PHA, as well as the hazards analysis performed for the ER HASP Addendum, for development of this Hazard Category 3 DSA.

During the DSA review process, the Review Team members held discussions with the DSA development team and project personnel as necessary to clarify the DSA or supporting documentation. These reviews of the submitted DSA and supporting documentation supplemented by follow-on discussions provided team members with a familiarity level of the project scope and the ability to verify the accuracy of the information contained in the DSA. The correlation between actual facility arrangements and operations and those described in the DSA were deemed adequate. In response to review comments, a few clarifications were made to the FHA descriptions of the fire protection features and to the DSA (see Appendix A technical direction).

The adequacy/inadequacy of the process to develop an AB is not necessarily reflective of the adequacy and quality of the product (i.e., the 903 Pad DSA). It is however, reflective of the efficiency of producing a quality document and an acceptable DSA for 903 Pad. The contractor's support for a nuclear safety program is indicative of a commitment to establish and implement an AB.

The Site SAR does not identify any exemptions applicable to the 903 Pad other than exemptions generally applicable to SMP implementation. The DSA states that there are no facility-specific exemptions and that no differences exist between the DSA and Site SAR SMP discussions. During the DOE review of the exemption database maintained by the RFFO Nuclear Regulatory Division, there were no exemptions applicable to 903 Pad. Consent agreements are not addressed in the 903 Pad DSA. In general, these are addressed at the Safety Management Program level (e.g., consent agreements with the State of Colorado would be captured in the Waste Management and Environmental Protection Program).

Conclusion: All base information is included and accurately presented. The facility's mission and scope of operations are clearly identified and consistent with those considered in the hazard and accident analyses. The RFFO concurs with the adequacy of the base information. This criterion is met.

5.2 Adequacy of Hazard and Accident Analyses

The hazard analyses and accident analyses contained in the DSA are the foundation upon which the remaining bases (i.e., Safety SSCs, TSRs, and programmatic controls) rely. The primary objective of reviewing this portion of the DSA is to ensure it contains sufficient information, with appropriate references to supporting details, to allow DOE to determine that the risk of described operations is warranted and of acceptable consequence. The following five criteria from DOE-STD-1104 were used to evaluate the adequacy of the hazard and accident analyses presented in the 903 Pad DSA.

1) The hazard analysis includes hazard identification that specifies or estimates the hazards relevant for DSA consideration in terms of type, quantity, and form, and also includes properly performed facility hazard classification.
2) The hazard analysis includes hazard evaluation that covers the activities for which approval is sought, is consistent in approach with established industrial

methodologies, identifies preventive and mitigative features for the spectrum of events examined, and identifies dominant accident scenarios through ranking.

3) The analysis, identifies assumptions made in characterizing the response of controls for the set of dominant accident scenarios, and justifies the adequacy of existing controls or identifies specific commitments directed at further reducing facility risk, i.e., describes the administrative controls, compensatory measures or restrictions on interim operations implemented as a result of identified vulnerabilities.
4) The hazard analysis results are clearly characterized in terms of defense in depth, worker safety, and environmental protection and the logic behind assessing the results in terms of Safety Significant SSCs and designation of TSRs is understandable and internally consistent.
5) Subsequent accident analysis clearly substantiates the findings and delineations of hazard analysis for the subset of events examined, confirms their potential consequences, and for events potentially exceeding evaluation guidelines there is a clear identification of associated Safety Class SSCs and basis of TSR derivations.

This criterion deals with the following portions of the 903 Pad DSA: (1) Executive Summary, (2) Chapter 2 (Project Characterization and Description), (3) Section 1.4 (Project Hazard Categorization), and (4) Chapter 4 (Safety Analysis). The *Safety Analysis for Waste Management Activities* (WMA NSTR) (Reference 15) and the Site Preliminary Hazards Analysis (PHA) (Reference 13) are being relied upon to meet this approval basis. Other supporting hazards assessments developed per the Integrated Safety Management System (e.g., HASP, Fire Hazards Analysis, ALARA Job Review, etc.) as discussed in this section are also being relied upon to meet this approval basis.

Chapter 2 (Project Characterization and Description) presents recent characterization data which indicates that there are approximately 8 grams of ^{234}U, 2,900 grams of ^{235}U, 429,000 grams of ^{238}U, 367 grams of $^{239/240}Pu$, and 2 grams of ^{241}Am. Characterization data obtained at 25 boring locations across the 903 Pad were used to develop estimates of the radionuclide inventory associated with material to be removed; these estimates are summarized, by location and radionuclide in the DSA Table 3 (903 Pad Project Radionuclide Inventory Summary). These inventories were developed under the assumption that contaminant concentration levels measured at each borehole are representative of the entire soil volume to be removed for that section. A red-lined page change is attached to this SER to clarify that although the Table 3 listed volumes only add up to approximately 20% of the total volume to be removed, the remainder volume is included in the overall total estimate of radionuclides quoted above (see Appendix A technical direction). This remainder includes the less concentrated contamination in soils and the asphalt/gravel overburden.

The americium value quoted above (2 g Am), and used in the bounding accident scenarios evaluated in Chapter 4 Safety Analysis (1.18 g Am), represent approximately 80% and 40%, respectively, more Am than expected for 72-yr "aged" weapons grade (WG) Pu (per SARAH, Reference 16). The footnote to the DSA Table 3 explains that the Am should be a result of

normal ingrowth from Pu and that the contamination was primarily in hydraulic fluids, lathe coolant, solvents, oils, etc. These sources are not expected to result in Am at quantities greater than normal WG Pu ingrowth (i.e., Am extraction processes did not result in waste fluids that would have been stored on the 903 Pad in the 1960s). This higher-than-expected concentration of Am is most likely a result of the sampling process (e.g., sampling measurement errors) and extrapolation to a large volume of soil. The Am values are consistent with Am amounts found during previous RFETS environmental sampling activities. The bounding accident analysis is based on 270 g aged WG Pu which underestimates the dose consequences by approximately 15%; however, due to the above considerations, RFFO concurred that sufficient conservatism was included in the DSA consequence calculations.

Chemical contamination was also identified and evaluated. Examples of VOC contamination include carbon tetrachloride, tetrachloroethene, trichloroethene, and 1,2-cis dichloroethylene (1,2-DCE). No chemical consequences from releases were calculated for comparison to Emergency Response Planning Guidelines (as listed in Table 2-3 of this SER) because quantities do not exceed the threshold screening criteria. These hazards can be adequately controlled via reliance on the Site SMPs.

Facility hazard categorization information is found in the Executive Summary of the DSA, Section 1.4 (Project Hazard Categorization), and Section 4.5 (Final Hazard Categorization). The 903 Pad Remediation Project Facility Hazard Categorization is Hazard Category 3 (HC-3) in accordance with DOE-STD-1027-92. This categorization is based on (1) the inventory of radioactive material present in the Pad and underlying fill and soils, and (2) the planned remediation of the site which potentially results in a material-at-risk (MAR) greater than HC-3 levels specified in DOE-STD-1027-92. The RFFO review team concurs with this final hazard categorization.

While historical information and recent sampling results have not indicated the presence of any materials other than the asphalt, stone, and soil content, should any unanticipated material be encountered it will be segregated, sampled, and packaged appropriately. If the unknown material presents an "unanticipated hazard or condition," project activities will pause to assess the potential hazard or condition per the ER HASP (References 9 and 10) and other project procedures. The DSA acknowledges that unanalyzed hazards and conditions or any modification to project activities or work that fall outside the bounds of this safety analysis need to be assessed through the Unreviewed Safety Question Determination (USQD) process and approval by the DOE if it involves a positive USQ.

An unmitigated Hazards Analysis as defined by DOE-STD-3009 is not readily apparent for the 903 DSA. This would include hazard identification (including characterization such as descriptions of hazards, quantities, form, location, etc.) and hazard evaluation (which include an unmitigated assessment of potential accident scenarios, frequencies, consequences, risks, identification of available or feasible preventive and mitigative controls, and determination whether any of those controls are needed for worker safety or defense in depth for all receptors per the Safety Significant SSC definition). Most of this information is missing from the Chapter 4 Safety Analysis.

Based on a review of the Site PHA and the project hazards, the DSA Table 5 (903 Pad Project Hazards) identifies potential hazards that need to be further evaluated and those that were screened out as standard industrial hazards. The DSA does not provide the hazards descriptions and instead referred to the WMA NSTR for the hazards identification and characterization discussion. This approach provides for a generic identification of hazards, but does not identify specific details of the generalized hazard categories to identify types, quantity, form, location, etc. An example is that a propane hazard is qualitatively evaluated in the Section 4.2 Accident Analysis but was not identified in the Section 4.1 Hazard Identification and Evaluation section. This was corrected by a red-lined page change attached to this SER (see Appendix A technical direction) by adding additional qualifiers to the general hazard types. Instead of referring to the WMA NSTR, the red-lined page change now refers to SMP hazards assessments as discussed later in this section. The RFFO concludes that the hazards identification results based on the DSA and these SMP hazards assessments are considered adequate for the selection of representative accidents that are further evaluated qualitatively and quantitatively in the DSA.

The DSA Section 4.2 Accident Analysis includes the identification of potential accident scenarios based on natural and man-made hazards and events that are further evaluated from an accident perspective. This Section 4.2 Accident Analysis is considered by RFFO as part of the DOE-STD-3009 Hazards Analysis that requires evaluation of unmitigated accident scenarios, rather than the DOE-STD-3009 Accident Analysis that may or may not be required for a HC-3 DSA (i.e., the Standard says that the unmitigated Hazards Analysis may be adequate for certain HC-3 nuclear facilities). The accident analysis includes a qualitative evaluation of explosions, criticalities, natural phenomena (earthquakes, high winds, tornadoes, lightning, heavy rain, flooding, heavy snows, and freezing), and external events (aircraft crash, vehicle impact, and range fire), and a quantitative evaluation of spills and fires, each with two bounding accident scenarios. This approach is considered an adequate "graded analysis" for this HC-3 activity.

For the spills and fires, a comparison was made to the Evaluation Guidelines to identify Safety SSCs and to establish TSRs or Administrative Controls that would reduce risks to Risk Class III or IV, or reduce public consequences to less than 5 rem (Reference 8). Each scenario identifies the activities that are linked with the scenario, details the accident scenario, establishes the accident frequency, defines the material-at-risk, performs a consequence and risk evaluation, and establishes the credited or defense in depth control set to protect the public and collocated worker. In all cases, there were no controls specifically credited to reduce the public or collocated worker accident risk. All of the evaluated events were Risk Class III or IV *unmitigated*.

The 903 DSA Chapter 4 Safety Analysis adequately evaluates potential accidents and derivation of TSRs to protect the public and collocated worker. However, it does not provide an adequate Hazards Analysis as required by DOE-STD-3009 for two reasons (1) it is deficient regarding the lack of a hazards evaluation of accident scenarios for the immediate worker, and (2) it does not provide for the comprehensive identification of all available or feasible controls to prevent or mitigate accidents that could affect the immediate worker, collocated worker, or the public. This issue is common to all nuclear facility DSAs recently approved at the Site and was resolved by each DSA incorporating the Site PHA results and making a determination whether additional TSR controls would be warranted.

The Site PHA provides the hazard evaluation for the immediate worker within the facility and additional identification of defense-in-depth controls for the immediate worker, collocated worker, and public. The Site PHA supports the development of the AB documents for Hazard Category 2 and 3 nuclear facilities at the Site. This document summarizes hazard identification from a site-wide perspective for all nuclear facilities, including decommissioning activities and waste handling, storage, and shipping activities, although it was not specific to ER activities. The Site PHA also documents unmitigated hazards analyses and identifies the suite of engineered and administrative controls available to prevent accident scenarios or mitigate accident consequences for the immediate worker, collocated worker and the public. This Site PHA focused on the identification of controls to protect all receptors based on a qualitative assessment of frequencies, consequences, and risks. From this suite of controls, a decision on whether any should be designated as a Safety Significant SSC or need TSRs to protect the immediate worker, collocated worker, or public can be made. The Site PHA leaves the decision on whether any of the available controls needs elevation to Safety Significant status to the individual authorization basis documents (e.g., the 903 DSA).

Although the Site PHA did not specifically evaluate ER activities such as construction-type activities (e.g., excavating, loading of large waste containers), other activities such as material movements of closed waste containers and temporary staging/storage were evaluated in the Site PHA and also in the WMA NSTR. Therefore, the 903 DSA should rely on both the Site PHA and the WMA NSTR hazards evaluation/unmitigated accident analysis and make the Safety Significant determination based on the spectrum of accidents to protect the immediate worker or that provide defense in depth for all receptors. This has been corrected in a red-lined page change attached to this SER (see Appendix A technical direction).

In addition to the above, the DSA should rely on some of the SMP required hazards assessments performed per the Integrated Safety Management System to fulfill the DOE-STD-3009 Hazards Analysis requirements. This approach is consistent with DOE-STD-1120 (Reference 4) that is also identified as a safe harbor method for compliance with 10 CFR 830 Subpart B. These hazards assessments coupled with the DSA Section 4.2 accident analysis, Section 4.6 Derivation of TSRs, and the Chapter 5 TSRs would meet the 10 CFR 830 Subpart B requirements. These include the following:

- *Environmental Restoration Program Health and Safety Plan for the Rocky Flats Environmental Technology Site* (Reference 9)
- *Health and Safety Plan Addendum for Remediation of IHSS Group 900-11 – 903 Pad* (Reference 10)
- *Fire Hazards Analysis, 903 Drum Storage Area (IHSS 112) Remediation Project* (Reference 17)
- "ALARA Job Review for ER Remediation at 903 Pad (IHSS 112)" (Reference 18)
- "Field Implementation Plan Addendum for 903 Pad Drum Storage Area Remediation Project (IHSS 112)" (Reference 19)

These hazards analysis identify and specify safety-related equipment and specific administrative control requirements to safely perform the ER activity. The following paragraphs include examples that assure that hazards and preventive/mitigative controls have been appropriately evaluated.

- The 903 Pad Project-specific addendum to the ER HASP adequately addresses immediate worker hazards associated with project activities. The addendum includes a hazard evaluation that addresses (1) radiological and chemical hazards, (2) the degree of potential exposure to workers, (3) description of other hazards beside radiological or chemical, (4) hazard controls, and (5) unanticipated hazards or conditions. Based on the hazard evaluation, PPE is prescribed based on the activity(ies) being performed. Finally, minimum training requirements are specified for project workers as well as emergency procedures in the event of a fire, explosion, or personnel illness/injury.
- The ER HASP addendum also identifies other Job Hazards Analyses (JHAs) or other SMP hazards assessments that specify controls. For example, the Occupational Safety and Industrial Hygiene Program has specified that self-contained breathing apparatus or airline respirator with escape provisions be used inside the weather structure to address hazardous chemical constituents, as well as other industrial safety personal protective equipment. Other personal protective equipment for the immediate workers will also be specified based on radiological contamination levels and postings as determined by the Radiological Protection Program.
- The ER HASP Addendum also outlines the personal exposure and environmental monitoring (air and water) that will be conducted for baseline surveys, and during excavation, material handling, and stockpiling activities. Full-time Radiation Control Technician coverage is required for all operations at the 903 Pad per the ALARA Job Review. Decontamination and radiological surveying of excavation equipment and personnel will be performed to procedures outlined in the HASP and applicable Radiological Work Permits.
- The ALARA Job Review requires that the negative ventilation and HEPA filtration system for the tent be operational or to suspend ER work activities. This includes airflow testing with equipment and personnel access doors closed and open, and efficiency testing of the HEPAs.
- The Fire Protection Program SMP has established controls to prevent or mitigate potential fires and explosions. No storage of flammable or combustible liquids will be allowed within the temporary weather structures. Diesel fuel will be allowed within the structures only in the tanks of the diesel-fueled equipment working within the tent. Refueling operations will be conducted in accordance with the requirements of NFPA 30A, *Automotive and Marine Service Station Code*, using a diesel tanker parked outside the tent with a service hose extending within the tent to a specified equipment fueling area. Fueling operations will be conducted with none of the equipment operating, and only at the beginning of an operating shift or when equipment to be fueled has been idle for at least two hours, which will ensure that elevated engine temperatures do not pose an ignition source. Equipment will be grounded to ensure that static electricity does not pose an ignition source. A Fire Safety Officer with hands-on fire extinguisher training will be present during all fueling operations. Any release of diesel fuel will be immediately remediated. Fire hydrants are located in the immediate vicinity, and project emergency

response procedures include notification to the Rocky Flats Fire Department for prompt fire fighting of potential fires.

Based on the 903 accident analysis, the 903 DSA concluded that no Safety Significant SSCs are needed to protect the public or collocated worker. RFFO concurs with this conclusion based on the accident analysis, and considering the above SMP hazards assessments, concurs with the DSA Section 4.4 that there are no Safety Significant SSCs required to protect the immediate workers. However, see Section 5.3 of this SER for a further discussion of Safety SSCs. Reliance on the Site PHA to identify all available controls to prevent and mitigate accidents for all receptors has also been corrected in a red-lined page change attached to this SER (see Appendix A technical direction).

The following discussion summarizes the methodology, assumptions, and significant issues identified during review of the DSA Chapter 4. The accident analysis approach is generally based on the *Safety Analysis and Risk Assessment Handbook* SARAH (Reference 16).

Assumptions are embedded throughout the analyses and calculations. Major assumptions relative to the accident categories are detailed in each scenario description. Any key assumptions made that were questioned during the review were resolved during the comment resolution phase.

For the four bounding accidents, quantitative dose consequences were calculated using the Radiological Dose Template (RADIDOSE version 1.4.3 spreadsheet) that has been previously reviewed and agreed to by the RFFO in Reference 20 and is currently in use. The RADIDOSE default airborne release fractions (ARFs) and respirable fractions (RFs) are based on *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities,* DOE-STD-3010 (Reference 21) with some modifications agreed upon for RFETS AB documents. The 50-year Committed Effective Dose Equivalent (rem CEDE) is calculated using conservative assumptions for material-at-risk (MAR), damage ratio (DR), release fractions, leak path factor, 95 percentile-equivalent weather condition, dose conversions for material types, and breathing rates. ICRP 68 dose conversion factors were used consistent with the commitment #8 of Reference 8 and are conservatively modeled as Moderate (Class W) solubility. A heavy activity breathing rate is assumed for the MOI and collocated worker dose estimate. Radiological consequences are based on 100 m for the collocated worker and 2200 m for the Maximum Offsite Individual (MOI). The form of radioactive material from an accident analysis perspective is conservatively assumed to be powder (finely divided material within the fill material and soils).

Frequency Assumptions: In general, operational accidents should be assigned an *Anticipated* frequency (i.e., incidents that commonly occur in the lifetime of a facility per DOE-STD-3009) when preventive administrative controls or active engineered safety features are not credited for the unmitigated hazards analysis or unmitigated accident analysis. The two spill scenarios and the small fire assumed an *Anticipated* frequency. However, the major fuel pool fire was assumed to be *Unlikely* (i.e., "not anticipated to occur in the lifetime of the facility" per DOE-STD-3009) without crediting preventive controls. No technical basis was provided to justify this assumption. Instead, the scenario qualitatively argues that it is due to the lesser likelihood of

involving all the plutonium assumed in the most highly concentrated 6 inch depth to be excavated. Based on discussions with the DSA Development Team, the explanation is that while a large fuel spill such as the 200 gallons postulated in the Fire Hazards Analysis may be associated with an *Anticipated* fire, the consequences would be much less than evaluated in the DSA large fire scenario because much less than the 6 inch depth would be heated and contribute to plutonium resuspension prior to the pool fire burning out. For this particular scenario, RFFO concurred with the additional explanation.

Explosions: It is not expected that the use of flammable gases (*i.e.,* acetylene, propane, etc.) will be required during 903 Pad Project activities. The P904 propane tank farm is currently located within the defined 891 Temporary Waste Storage Area southwest of the 903 Pad and approximately 100 feet directly south of the 904 Pad. A requirement to remove the tanks from service and empty them prior to the commencement of remediation activities is documented in the 903 Drum Storage Area FHA – this should be verified during the IVR (see Appendix B technical direction). A vapor cloud explosion (VCE) could occur at the 903 Pad Project due to high-energy impact that causes the contents of a propane tank located elsewhere on the Site to be spilled and migrate towards the 903 Pad Project area. The arrangement of staged/stored waste containers on the 903 Pad, the 904 Pad, or the 891 Temporary Storage Area could create a flame obstruction configuration that could lead to a deflagration event if ignition of the gas cloud occurs. It has been determined that a VCE occurring within an array of stored waste containers would not breach metal waste containers.

Criticalities: Nuclear criticality events are considered incredible during all ER and waste management activities per a criticality safety evaluation (Reference 22). Therefore, criticality events were not evaluated further in the DSA. The primary basis for criticality incredibility is the low concentration of fissile materials in the contaminated soils/materials being excavated, handled, and stored. Because there are no credible criticality scenarios associated with the 903 Pad Project, there are no controls required to support the incredibility analysis and a project-specific criticality safety program is not warranted. The Site level criticality safety program and conduct of operations infrastructure will ensure that (1) no new operation is introduced to the 903 Pad Project that would result in the addition of fissile material, and (2) an extraction process to remove fissile constituents will not be performed. RFFO concurs with this conclusion.

NPH and External Events: All events were determined to be bounded by the spill and fire accidents discussed earlier. No additional TSR controls were identified. The ER HASP addresses potential high-wind events and defines action levels for further evaluation and/or termination of ER activities. The temporary weather structure is also provided to mitigate weather conditions that could cause significant resuspension of contamination.

Cold Weather Hazards: The DSA does not identify or evaluate cold weather from the perspective that temporary heating may be needed for worker comport inside the tents. Per the ER HASP, the 903 Pad Project currently plans that Building T891C and vehicles will be adequate to eliminate the immediate worker hazards associated with cold/heat stress. If this assumption is not adequate, a proposed modification to the project could be evaluated per the USQD process and determined to be a negative USQ and not require DOE approval of the change. RFFO is uncomfortable with this approach if this change would involve the introduction

of additional flammable gases that could cause an explosion hazard, therefore, RFFO is providing technical direction that any future negative USQD of this type of change be submitted to DOE for review prior to implementation (see Appendix A technical direction).

Worker Safety: Worker safety is addressed in Section 4.4 of the DSA. Chapter 3 of the DSA covers the SMPs whose construct is to establish disciplined methods of conducting business and operations. Implementation of these programs result in an infrastructure that ensures work is performed safely. Therefore, worker safety is an integral part of these institutional processes.

Table 7 (Radiological Dose Consequence bin Thresholds) of the DSA presented the qualitative criteria used to assess consequences to all receptors. These *High* and *Moderate* consequence criteria did not accurately reflect the April 2002 Change Notice 2 to DOE-STD-3009 regarding immediate worker consequences. The contractor associated the new criterion of "significant radiological or chemical exposures" with the previous criteria of causing prompt fatalities or serious injuries. This is incorrect in that the revision to the standard provides for a new more conservative estimate of consequences that may not meet the previous serious injury or prompt fatality criteria. It is a level that could result in a very large radiological dose or chemical exposure, but may or may not be significant enough to cause an acute effect in terms of physical injury, occupational illness, or immediate health effects. Tables 2-2 and 2-3 as presented in Section 2 of this SER correct the 903 DSA Table 7, which has been included as a red-lined page change in the Attachment to this SER. (see Appendix A technical direction)

Tables 2-2 and 2-3 were developed for the Rocky Flats AB Development criteria (Reference 8) by merging the guidance from DOE-STD-3009 and DOE-STD-3011 that was initially generated for the 1997 Building 371/374 BIO. The DOE-STD-3009 approach is really "go/no-go" criterion, i.e., if the consequences of the accidents meet the qualitative definition, then the DSA Hazards Analysis (not Accident Analysis) should evaluate the need for Safety Significant SSCs (and TSR ACs). The DOE-STD-3011 approach provided the correlation of the initial DOE-STD-3009 criteria to the *High* and *Moderate* consequence levels. The Change Notice 2 to DOE-STD-3009 more appropriately fits into the *Moderate* bin, as reflected in the revision summarized in Tables 2-2 and 2-3.

Since there is no further guidance provided in DOE-STD-3009, what constitutes a "significant exposure" will need to be determined on a scenario-specific basis, based on RFFO and Kaiser-Hill negotiations. RFFO believes that the guidance provided in the Site PHA, the Building 371/374 BIO (Reference 23), and the Building 707 BIO (Reference 24) should be applied as a starting point for the unmitigated hazards (or accident) analysis for the immediate workers. It provides correlation of potential accident scenarios based on the *High/Moderate/Low* consequence levels as presented in Tables 2-2 and 2-3. For the mitigated immediate worker consequence assessment, evacuation or other mitigative controls can be credited to reduce the consequence level to *Low* for most scenarios that provide for notification of the event (e.g., alarms or obvious awareness that an accident occurred such as a fire), but not all scenarios (e.g., those that could delay evacuation such as a room explosion or significant seismic event). Technical direction is being provided by RFFO to apply this approach for future DSAs or Page Changes (see Appendix A technical direction). The following approach for immediate worker

consequence assessments has been extracted from the three referenced DSAs and should be used as guidance for all future DSAs (see Appendix A and C technical direction):

> Because risk is the product of the *frequency of occurrence* of an accident scenario of concern and its *consequences*, these two parameters must be estimated before the resultant risk can be evaluated. In evaluating the risk associated with the postulated accident scenarios, the following potential contributing elements were important considerations:
>
> - Timing of radiological release. Hazard scenarios involving fires can develop quickly, but not so rapidly as to preclude evacuation as an effective mitigative measure; other scenarios, like criticality or explosion can entail significantly more rapid radiological exposure.
> - Hazard warning. The availability of reliable hazard warning and its timing relative to significant radiological exposure may impact Immediate Worker consequences; warning may be provided by engineered systems [e.g., Continuous Air Monitors (CAMs), fire alarms] or by the event itself (e.g., fire smoke, drum lid displacement).
> - Scenario impact on protective action capability. Hazards scenarios involving explosions can cause damage to structures or injury to personnel impeding egress; thus, increasing potential radiological consequences.
> - Preventive or mitigative controls. The only effective controls to protect the Immediate Worker who might "attend" a criticality are preventive. While mitigative controls may help other workers in the facility; consequences to the attending worker in such an instance may not be a useful test of the adequacy of proposed mitigative controls.
> - Potential exposure magnitude. Severity of radiological injury is a function of the magnitude of the scenario release and the pathways for transport to and absorption by workers; inhalation is typically the dominant exposure pathway.
> - Consequence uncertainty. The radiological threshold for prompt death varies among individuals and for evaluation, must be compared with localized doses that would be difficult to calculate and that are beyond the scope of this effort. Thus, the qualitative evaluation of Immediate Worker consequences employs conservatism which, when combined with the effectiveness of imposed controls, can result in more effective worker protection than the consequence thresholds require.
>
> Based on these guidelines, unmitigated scenarios that lead to *HIGH* Immediate Worker consequences include all criticalities, explosions leading to a moderate or high release, and fires causing a large release. *MODERATE* Immediate Worker consequences are expected for unmitigated fires causing moderate releases, unmitigated spills causing moderate to high releases, and unmitigated explosions causing small releases. Lesser fires or spills (unmitigated) lead to *LOW* Immediate Worker consequences. The Table 2-4 summarizes these unmitigated consequence level for the Immediate Worker.

The attached red-lined page change added this methodology to Section 4.2.3 and concluded in Section 4.4 that the above methodology was applied to the 903 DSA and that the conclusion is the same, i.e., no Safety Significant SSCs or TSR ACs needed to protect the immediate workers. RFFO concurs with the following conclusion presented in the revised DSA Section 4.4:

> "All of the 903 Pad Project unmitigated accident scenarios discussed in Section 4.2 result in *low* to *moderate* radiological and chemical dose consequences to the IW as defined by the comparison criteria shown in Table 8, *Qualitative Guidelines for IW Consequences.* However, it is judged that the mitigated IW consequences are reduced to *low* by crediting the Site SMPs as described in Section 3. Personnel awareness that an accident has occurred, prompt notification of nearby workers, timely evacuation, and the use of appropriate PPE are some of the important aspects of IW protection prescribed by the SMPs. Based on the *low* radiological and chemical dose consequences, all scenarios result in Risk Class III or less events to the IW without crediting preventive controls. Based on the accident analysis in Section 4 and a review of the Site PHA, no exclusively IW controls were identified that warrant elevation to the TSR level (*i.e.*, specific AC control or restriction)."

Environmental Protection: The controls that prevent or mitigate the consequences of postulated accidents for the collocated worker and the public will also significantly reduce the potential for an uncontrolled release that could impact the environment. Although the environmental protection is not explicitly evaluated in the DSA, the DOE views those features that protect the health and safety of the public and the collocated workers as adequate to protect the environment. Reference 25 is an assessment required by the Rocky Flats Cleanup Agreement to meet the CERCLA and NEPA requirements. It evaluates the project hazards regarding achieving the end state condition and acknowledges that it will be performed in a weather structure (tent) and that there will be air and water monitoring as required by other procedures and documents.

Conclusion: Hazard identification for 903 Pad was adequate for the analysis and derivation of controls. The facility hazard categorization was correctly determined and justified as nuclear Hazard Category 3. The hazard analysis evaluates the hazards associated with the activities that will be performed in 903 Pad and identifies preventive and mitigative features for a spectrum of events. The RFFO reviewed the applicable accident scenarios in the 903 DSA and the Site PHA to evaluate whether the collective suite of controls were considered. The RFFO concluded that the control set selection process adequately evaluated the suite of controls and were appropriately factored into the DSA. The hazards and accident analysis appropriately applies the "graded approach" for a Hazard Category 3 nuclear facility which handles and stores low-content Pu. In addition, the hazards and accident analysis was determined to adequately address defense in depth, worker safety, environmental protection, and Safety Significant SSCs. Collectively the Site PHA, the MWA NSTR, and the SMP-provided hazards assessments (e.g., ER HASP, ALARA Job Review, FHA, etc.) provide the basis for the Chapter 4 (Safety Analysis) and Chapter 5 (Technical Safety Requirements) of the 903 DSA. Through the review and comment resolution process, including red-lined page changes attached to this SER, the above identified issues related to the inadequacies of the DSA Hazards Analysis were adequately addressed. This criterion related to adequacy of the hazards and accident analysis is met.

5.3 Adequacy of Safety Structures, Systems, and Components

Identification of Safety SSCs is a product of the hazard and accident analyses, which provide the bases for their designation. Determining the adequacy of Safety SSCs defined by the accident analyses results in being able to conclude that the DSA contains sufficient documentation and basis to meet the following criteria from DOE-STD-1104:

1) The Safety SSCs identified and described are consistent with the logic presented in hazard and accident analyses.
2) Safety functions for Safety SSCs are defined with clarity and are consistent with the bases derived in the hazard and accident analyses.
3) Functional requirements and system evaluations are derived from the safety functions and provide evidence that the safety functions can be performed.

The RFFO issued the "Authorization Basis Development" guidelines (Reference 8) which is designed to provide a consistent methodology to define the minimum set of most significant SSCs, which will in turn, improve the implementation and maintenance of these controls without compromising safety. These are also referred to as the "Nuclear Licensing Streamline Initiative". The terminology used in the DSA associated with defining Safety SSCs is consistent with the terminology used in 10 CFR 830, DOE-STD-3009, and Reference 8.

The DSA defines Safety Class SSCs as those SSCs whose preventive or mitigative function is necessary to limit radioactive and hazardous material exposure to the public as identified by safety analysis. Limiting exposure means that Evaluation Guidelines (EG) are not exceeded. Therefore, Safety Class SSCs are SSCs whose safety function is necessary to keep exposure to the MOI below the (EG). The radiological EG used for this classification is 5 rem to the MOI based on Reference 8. Based on the Chapter 4 Safety Analysis, there are no Safety Class SSCs identified in the DSA. RFFO concurs with this conclusion.

The DSA defines Safety Significant SSCs as SSCs whose preventive or mitigative function is a major contributor to defense-in-depth or worker safety as determined by the safety analysis. The Safety Significant SSC classification includes those SSCs necessary to reduce radiological dose consequence to the MOI or CW to below Risk Class III or that are available to provide a defense-in-depth function. The goal is the identification of a minimum of two defense-in-depth controls for those scenarios that need to credit controls to reduce unmitigated Risk Class I or II events. Based on this criterion, no SSCs were designated as Safety Significant in the 903 DSA as all events were Risk Class III or IV *unmitigated*. Since there are no unmitigated Risk Class I or II events, the overall Chapter 4 Safety Analysis was reviewed to determine if there were any SSCs that should be elevated to Safety Significant status based on the qualitative definition of defense in depth as described in DOE-STD-3009 (Reference 3). Based on this additional criterion, the Review Team concluded that there were no preventive or mitigative controls that warranted elevation to Safety Significant status; however, one member did not agree.

The dissenting opinion of the Review Team member is that while the 903 DSA does a good job at the Accident Analysis and developing TSRs for the postulated spills and fires, it "missed the boat" on the Hazards Analysis based on the "significant defense-in-depth principle". The weather structure was put up as a defense-in-depth containment in order to prevent radioactive

contamination from reaching the environment, collocated worker, or the public. Therefore, the weather structure (tent) should be identified as a Safety Significant TSR Design Feature and the HEPA ventilation system should be designated as a Safety Significant SSC and have appropriate TSR Limiting Conditions for Operation, Required Actions, Surveillance Requirements, and Bases to assure that the confinement safety function will be available. As the DSA document is currently written, the Radiological Protection SMP is being relied upon to terminate work if the HEPA ventilation system fails or some type of event (such as weather, natural disaster, or transportation accident) causes a large tear in the tent fabric that would bypass HEPA filtration. Sole reliance on the SMP was not believed adequate by the Review Team member who is dissenting.

This issue was elevated to RFFO management for resolution. For this ER activity and temporary staging/storage of waste containers, the RFFO decision was that the tent ventilation/HEPA filtration system should not be designated as Safety Significant SSCs due to the relatively low consequences of evaluated accidents, the conservatisms of the accident analysis, and because elevating the SMP-required safety systems to TSR-level controls would not provide any additional assurance that the safety function would be provided for this type of ER activity. As added assurance, technical direction is being provided in Appendix B to assure that the requirement for the ventilation/HEPA filtration system be operable or suspend work be included in appropriate work control documents, (e.g., Radiation Work Permits, IWCP packages, etc.).

As discussed in Section 5.2 of this SER, there are a few other safety-related SSCs required by specific SMPs that will provide protection for the immediate workers, collocated workers, and the public. These are identified in the ER HASP (References 9 and 10), SMP hazards analyses (e.g., ALARA reviews, Fire Hazards Analysis), and work control documents (e.g., IWCP Job Hazards Analysis, field procedures, etc.).

Conclusion: There are no Safety SSCs identified for 903 Pad. RFFO concurs with this determination. RFFO is relying on the SMPs to require other safety-related SSCs to protect immediate workers, collocated workers, the public, and the environment and specify the requirements in the ER HASP, work control documents (e.g., IWCP Job Hazards Analysis, field procedures, etc.), or SMP hazards analysis documents (e.g., ALARA reviews).

5.4 Adequacy of Derivation and Development of Technical Safety Requirements

Technical Safety Requirement (TSR) identification and derivation is a product of the hazard and accident analyses. The TSRs are derived from the most significant preventive and mitigative features identified in the hazard and accident analyses and from the designation of Safety SSCs. The 903 Pad DSA provides the bases for deriving the TSRs in Section 4.6 based on the Chapter 4 Safety Analysis. Chapter 5 of the DSA contains the full set of TSRs for the 903 Pad. The following three criteria from DOE-STD-1104 were used to evaluate the adequacy of the derivation of TSRs as well as the 903 Pad TSRs.

1) The bases for deriving TSRs that are identified and described in the hazard and accident-analyses and safety SSC discussions are consistent with the logic and assumptions presented in the analyses.

2) Bases for deriving safety limits, limiting control settings, limiting conditions for operation, surveillance requirements, and administrative controls are provided as appropriate.
3) The controls are consistent with other Site AB documents, are consistent with controls established for other facilities, and are appropriate to maintain an acceptable operational safety envelope for the facility.

This criterion addresses the consistency and logic of taking the safety features (administrative and engineered) identified in Chapter 4 of the DSA and mapping them to specific controls in the TSRs. There are no credited or defense-in-depth Safety SSC controls derived from the hazards and accident analyses as discussed in Section 5.3 of this SER.

Chapter 4 of the DSA defined the controls credited for each accident scenario and for each receptor (public, collocated worker, and immediate worker). There are no credited controls, engineered or administrative, for the evaluated spills and fires. The Derivation of TSRs is very simple in that only Administrative Controls (ACs) are needed, there are no Safety SSCs that require Limiting Conditions for Operation (LCO) statements. No Safety Limits, Limiting Control Settings, Design Features, or LCOs were required based on the hazard and accident analyses performed in Chapter 4 of the DSA.

The following Administrative Controls (ACs) and associated Surveillance Requirements, specified in the TSRs define the specific attributes of programs identified within the safety analysis or relied upon to protect assumptions in the analysis:

- AC 5.2, Organization and Management
- AC 5.3, Safety Management Programs

The ACs are accepted because they adequately provide the program elements necessary for safe facility operation, Required Actions, Completion Times, and Bases. No Surveillance Requirements were specified because these ACs do not have measurable indicators that can be assessed on a frequent basis, and instead the overall programs are subject to self-assessments by the contractor's responsible manager, SMP owners, and independent assessment organizations, as well as their DOE RFFO counterparts. A few clarifications to these two ACs were made during the review process based on consistency with the Site SAR (Reference 14) TSRs and recently approved DSAs – these are included in attached red-lines to this SER (see Appendix A technical direction).

Section 4.6 derivation of TSRs does not present the correlation of the control to the hazards and accident analysis. Since there are only two ACs on organization and management and the commitment to SMPs, this was deemed adequate for a graded hazards category 3 facility/ER activity. The specific bases for each TSR AC requirement are provided in Section 5B, Technical Safety Requirements Bases, of the DSA. The TSR Bases provide adequate linkage between the controls and the hazards and accident analyses. The DSA and associated TSRs establish a safety envelope commensurate with the low risk of facility operations at time of DSA approval.

Conclusion: With the attached red-lined page changes, the TSRs were determined to prescribe an adequate set of controls consistent with the hazards and accident analysis, similar in nature to other

facilities with the same or similar hazards, and sufficient to ensure the safety of all receptors for the analyzed events. This criterion is adequately met.

5.5 Adequacy of Programmatic Controls

Programmatic controls encompass the elements of institutional programs and facility management that are necessary to ensure safe operations based on assumptions made in the hazards and accident analyses. In the 903 Pad DSA, programmatic controls are identified as Safety Management Programs (SMPs) in Chapter 3. The following two criteria from DOE-STD-1104 were used to evaluate the adequacy of programmatic controls identified in the 903 Pad DSA:

1) The major programs needed to provide programmatic safety management are identified.
2) The major safety programs are noted, and references to facility or site program documentation are provided.

Seventeen SMPs are described in Chapter 3 of the DSA which provide worker protection and defense-in-depth for all receptors. The DSA emphasizes the entire program, which will ensure that not only the controls identified in the Chapter 4 Safety Analysis are included, but also the programmatic controls that may have been overlooked or the controls that are indirectly involved but were not recognized would be included. The program manager will be responsible to ensure the program is established, will track, trend and correct noncompliances, and perform periodic self-assessments to verify continuing compliance. An Administrative Control, AC 5.3, Safety Management Programs, links the SMPs to the TSRs; however, the specific attributes of these programs are no longer listed like they were in recently approved DSAs/TSRs. These nuclear safety attributes are discussed in detail in the Site SAR (Reference 14), and the 903 DSA Chapter 3 elaborates on a few of them as related to its Chapter 4 Safety Analysis.

The 903 Pad DSA established the link between the Site programs, the Site SAR that formally implements the Site programs, and the SMP program owner's responsibilities. Chapter 3 of the DSA discusses each SMP at the facility-level, and determines if there are any "Nuclear Safety Attributes" of the SMP required in the accident analysis. Of these 17 SMPs, the DSA specifies 10 that are important to provide worker safety or defense in depth with respect to the hazards and accident analyses. RFFO disagreed with this interpretation and believes that all 17 SMPs are important to the facility safety envelope even if specific attributes of a particular program was not identified in the hazards analysis or the accident analysis in Chapter 4. A few examples of SMPs not specifically addressed in the Chapter 4 analysis include emergency preparedness, Engineering, and Environmental Management. The Site SAR provides a general discussion of nuclear safety attributes that are not repeated in the 903 DSA, but are invoked by reference. Red-lined page changes to Chapter 3 are attached to this SER to resolve this issue (see Appendix A technical direction). The DSA states that the 903 Pad SMPs are as described in the Site SAR (Reference 14) and that there are no facility-specific differences between the Site SMP and implementation in the facility. The contract between the DOE and Kaiser-Hill identifies the DOE Orders and requirements that are applicable. The program manuals for the various SMPs provide the mechanism to flow requirements from Orders and regulations down to any Contractor performing work at Rocky Flats. The program manuals are implemented at the facility and project level. The

compliance status of facilities and projects is assured through internal and external assessments. Issues identified regarding compliance to the SMPs will be managed through established processes, such as the corrective action process or exemption process, and enforced through the Price Anderson Amendment Act.

Conclusion: With the attached red-lined page changes, this criterion related to establishing programmatic controls is adequately met.

6.0 REFERENCES

1. *Safety Basis Requirements*, 10 CFR 830, Subpart B, Office of the Federal Register, National Archives and Records Administration, U.S. Department of Energy, Washington, D.C.
2. *Hazard Characterization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, DOE Standard DOE-STD-1027-92, December 1992, Change Notice No. 1, September 1997, U.S. Department of Energy, Washington, D.C.
3. *Preparation Guide for U. S. Department of Energy Non-reactor Nuclear Facility Safety Analysis Reports*, DOE Standard DOE-STD-3009-94, July 1994, Change Notice No. 2, April 2002, U.S. Department of Energy, Washington, D.C.
4. *Integration of Environment, Safety, and Health Into Facility Disposition Activities*, DOE Standard DOE-STD-1120-98, May 1998, U.S. Department of Energy, Washington, D.C.
5. *Nuclear Safety Oversight and Review Process for Authorization Basis Related Submittals*, DOE RFFO Desktop Procedure AME-ABD-01, Revision 0, September 1, 1998, U.S. Department of Energy, Rocky Flats Field Office, Golden, CO.
6. *Review and Approval of Nonreactor Nuclear Facility Safety Analysis Reports*, DOE Standard DOE-STD-1104-96, February 1996, Change Notice No. 1, May 2002, U.S. Department of Energy, Washington, D.C.
7. *Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans*, DOE Standard DOE-STD-3011-94, November 1994, U.S. Department of Energy, Washington, D.C.
8. Memorandum, Mazurowski to Card, AME:NRD:MP:00-02784, "Authorization Basis Development," June 12, 2000, U.S. Department of Energy, Rocky Flats Field Office, Golden, CO.
9. *Environmental Restoration Program Health and Safety Plan for the Rocky Flats Environmental Technology Site*, PRO-1468-HASP-01, September 2002, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.
10. *Health and Safety Plan Addendum for Remediation of IIISS Group 900-11 – 903 Pad*, 14393-HASP Addendum, August 2002, Envirocon, Inc., Rocky Flats Environmental Technology Site, Golden, CO.
11. Memorandum, Jessie Hill Roberson (Headquarters EM) to Eugene Schmitt (RFFO), "Delegation of Authority", August 26, 2002, U.S. Department of Energy, Washington, D.C.

12. Letter, Snyder to Bostic, 02-RF-01991. "Transmittal of the Documented Safety Analysis (DSA) for the 903 Drum Storage Area Remediation Project – DPS-026-02," September 11, 2002, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

13. *Site Preliminary Hazards Analysis to Support Hazard Category 2 and 3 Nuclear Facilities' Authorization Basis Development*, Nuclear Safety Technical Report NSTR-007-01, Revision 0, May 2001, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

14. *Rocky Flats Environmental Technology Site Safety Analysis Report*, Revision 2, October 2002, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

15. *Safety Analysis for Waste Management Activities*, Nuclear Safety Technical Report NSTR-010-01, Revision 0, June 2001, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

16. *Safety Analysis and Risk Assessment Handbook* (SARAH), RFP-5098, Revision 3, December 2001, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

17. *Fire Hazards Analysis, 903 Drum Storage Area (IHSS 112) Remediation Project,* FHA-903-001, Revision 0, September 2002, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

18. "ALARA Job Review for ER Remediation at 903 Pad (IHSS 112)", Revision 0, September 2002, Radiological Engineering, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

19. "Field Implementation Plan Addendum for 903 Pad Drum Storage Area Remediation Project (IHSS 112)", Revision 0, October 2002, Envirocon, Inc., Rocky Flats Environmental Technology Site, Golden, CO.

20. Memorandum, NSEPD:JCS:12672, McEahern (RFFO) to Zimmer (Kaiser-Hill), "Comments on the Basis for Interim Operation Consequence Spreadsheet Template," October 5, 1995, U.S. Department of Energy, Rocky Flats Field Office, Golden, CO.

21. *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*, DOE Standard DOE-STD-3010-94, December 1994, Change Notice No. 1, March 2000, U.S. Department of Energy, Washington, D.C.

22. *Criticality Safety Evaluation, Environmental Remediation Criticality Incredibility,* NMSL: 02-070, Evaluation BIK-181, September 2002, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

23. *Basis for Interim Operation Building 371/374 Complex*, Revision 5, July 1999, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

24. *Building 707 Facility Complex Basis for Interim Operation (BIO)*, Revision 1, March 1999, Safe Sites of Colorado, Rocky Flats Environmental Technology Site, Golden, CO.

25. *Environmental Restoration RFCA Standard Operating Protocol for Routine Soil Remediation, FY02 Notification #02-09, IHSS Group 900-11, IIISS 112 – 903 Pad*, October 2002, Kaiser Hill Company, L.L.C., Rocky Flats Environmental Technology Site, Golden, CO.

APPENDIX A
DIRECTED CHANGES TO THE 903 PAD DSA

The following list presents changes that must be made to the 903 Pad DSA as a condition for the Rocky Flats Field Office (RFFO) approval of the document.

1. RFFO approves the attached red-lined page changes for incorporation into the 903 Pad DSA and TSRs. As long as the attached red-lined revisions are used verbatim (other than pagination or minor document production changes as necessary), no further DOE approval is required.
2. If heating of the tents with a fuel source that could have an explosion hazard is determined necessary, Kaiser-Hill shall submit all negative USQDs 14 days prior to implementing the change.

APPENDIX B
ISSUES TO BE ADDRESSED UPON 903 PAD DSA IMPLEMENTATION

The following list presents issues that shall be resolved during the implementation phase of the 903 Pad DSA.

1. During the IVR, verify that the explosion hazards associated with the P904 propane tank farm have been eliminated (e.g., tanks drained and/or been relocated).
2. Since the only requirement that the tent ventilation and HEPA filtration system be operational or affected ER activities shall be suspended is from the ALARA Job Review, Kaiser-Hill shall assure that this requirement flows down to appropriate work control documents such as Radiation Work Permits, IWCP packages, etc..

APPENDIX C
COMMENTS TO BE INCORPORATED IN THE ANNUAL UPDATE

The items listed below are items that the contractor is to ensure are correct in new authorization basis document submittals and to correct during the next annual update for existing authorization basis documents.

1. Incorporate into the *Safety Analysis and Risk Assessment Handbook* (SARAH) the revised criteria for immediate worker qualitative consequence levels based on the Safety Significant SSCs definition from DOE-STD-3009 Change Notice 2, and the supplemental guidance discussed in Section 5.2 of this SER, and apply to all new DSAs, annual updates to DSAs, or major revisions to current DSAs (Page Changes) that authorize new activities based on additional accident analysis and/or need for TSR controls.

Attachment to 903 Safety Evaluation Report

RFFO Approved "Red-lined" Page Changes to the 903 PAD DSA and the TSRs

Revised 12/02

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Memorandum

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Department of Energy
Rocky Flats Field Office

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DIST.	LTR	ENC
ARMSTRONG, M.	X	X
BOGNAR, E.	X	X
CIUCCI, J. A.	X	X
COLALANCIA, M.	X	X
DEGENHART, K.	X	X
DEICHLER, C.	X	X
DIETER, T. J.		
FERRERA, D.		
FERRI, M.S.		
GEIS, J. A.	X	X
GERMAIN, A. L.		
GIACOMINI, J.	X	X
HANSON, J. L.	X	X
KIRAR, J.	X	X
LINDSAY, D.		
LONG, J. W.	X	X
LYLE, J. L.	X	X
MARTINEZ, L. A.	X	X
MILLER, G. M.	X	X
MILLER, J. C.	X	X
NAGEL, R. E.	X	X
PARKER, A.M.		
PLAPPERT, R. D.		
POWERS, K.	X	X
SHELTON, D.C.		
SNYDER, D.	X	X
SPEARS, M. S.	X	X
TRICE, K.D.		
TUOR, N. R.	X	X
VOORHEIS, G. M.		

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Reviewed for Addressee
Corres. Control RFP

Date By

Ref. Ltr. #

DOE ORDER #
5480.22

Approval of the Technical Safety Requirement Page Change PGC-RFP-03.0143-JNC, Revision 0, to Appendix J of the Site Safety Analysis Report

Alan M. Parker
President and Chief Executive Officer
Kaiser-Hill Company, LLC

Reference: Streamlined Technical Safety Requirement (TSR) Page Change PGC-RFP-03.0143-JNC, Revision 0, dated 11/21/02

The Department of Energy Rocky Flats Field Office (RFFO) has reviewed the Technical Safety Requirement Page Change to Appendix J of the Site Safety Analysis Report as transmitted in the referenced document. The RFFO basis for approval of the Page Change is attached. The Page Change is approved upon incorporation of the technical direction provided in the attachment. Should you have any questions, please contact me at extension 2025 or my point of contact on this matter, Ron Bostic, at extension 2011.

for Eugene C. Schmitt
Manager

Attachment

cc w/Att:
M. Frei, EM-30
N. Larson, EM-33
S. Stadler, EH-2
D. Owen, DNFSB, RFFO
R. Goldsmith, AMSP, RFFO
J. Schneider, AMP, RFFO
R. Bostic, NRD, RFFO
E. Westbrook, FAD, RFFO
M. Spears, K-H
A. Geis, K-H

Basis for Approval
Site SAR Appendix J Technical Safety Requirements
Page Change PGC-RFP-03.0143-JNC, Rev. 0

Background and Scope of Changes:

The purpose of this Page Change is to modify Technical Safety Requirements (TSRs) in the Safety Analysis Report (SAR) for Outdoor Waste Management (Appendix J to the Site SAR). Since implementing Appendix J of the Site SAR, Kaiser-Hill has identified some changes to TSRs that are needed for consistency with the accident analysis and to eliminate redundancy in the control set. These modifications will clarify the application of Administrative Operating Limits (AOLs) and Surveillance Requirements (SRs) as applied to outdoor Waste Management Cells (WMCs) that are used to store containers of low-level waste.

Approval Bases:

The bases for approval of the Page Change are:

- Administrative Operating Limit (AOL) 1.2 was modified to lower the total amount of nuclear material allowed in WMCs that contain non-aqueous liquid waste (e.g., flammable liquid). This change, which establishes a limit of 150 g WG PU total, is needed for consistency with the accident analysis. This change would not prevent the co-mingling of other types of wastes and is consistent with the approach Kaiser-Hill has taken to implementing the TSRs at all operational WMCs on Site. The proposed change is consistent with the approved accident analysis.

- An exception was added to SR 5.6.3 to exclude those WMCs used exclusively for the staging of loaded transport vehicles. This change would allow these WMCs to receive waste containers that have been prepared for off-site shipment without verifying compliance with AOL 1.3 limits. The rationale for the changes is that WMCs that serve as staging for off-site shipment only receive containers that have already been verified compliant with all criteria as established by the Waste Management Safety Management Programs (SMP). The Bases was also modified to explain the exclusion for this SR. The proposed change is consistent with the approved accident analysis.

Conclusion:

Page Change PGC-RFP-03.0143-JNC, Revision 0 is approved as modified by the technical direction described below. Within 30 days of the date of Rocky Flats Field Office (RFFO) approval, these changes shall be implemented at all active WMCs that are used exclusively for staging of loaded transport vehicles or are used to store non-aqueous liquid waste.

DOE Technical Direction:

The RFFO directs the following change to Page Change PGC-RFP-03.0143-JNC, Revision 0. This technical direction is needed to clarify that activities involving opening or breaching of waste containers or otherwise exposing waste material in transportation WMCs is prohibited.

> The proposed change to the paragraph in Section 5B.6.2 which states, "WMCs used exclusively for staging loaded transportation vehicles are not used for waste packaging, waste container generation etc..." shall be changed to state, "WMCs used exclusively for staging loaded transportation vehicles are not used for waste packaging, repackaging, waste container generation etc..."

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DEICHLER, C.	X	
DIETER, T. J.		
FERRERA, D.		
FERRI, M. S.		
GEIS, J. A.	X	
GERMAIN, A. L.		
GIACOMINI, J.	X	
HANSON, J. L.		
KIRAR, J.	X	
LINDSAY, D.		
LONG, J. W.	X	
LYLE, J. L.	X	
MARTINEZ, L. A.	X	
MILLER, G. M.	X	
MILLER, J. C.	X	
NAGEL, R. E.	X	
PARKER, A.M.		
PLAPPERT, R. D.	X	
POWERS, K.	X	
SHELTON, D.C.		
SNYDER, D.	X	
SPEARS, M. S.	X	
TRICE, K.D.		
TUOR, N. R.		
VOORHEIS, G. M.		
Swanson, B.	X	
Into, E.	X	
Wack, D.	X	

COR. CONTROL	X	X
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PATS/130		

Reviewed for Addressee
Corres. Control RFP

12/24/02 lcg
Date By

Ref. Ltr. #
02RF02537

DOE ORDER #
5480.23

SP:NRD:RB:02-01830

Cancellation of the Building 666 Safety Analysis

D.P. Snyder
Program Manager, RISS Safety
Kaiser-Hill Company, LLC

Reference: Letter, Snyder to Bostic, 02-DOE-02537, dtd 12/03/02, Subject: "Cancellation of Site Safety Analysis Report (SAR) Appendix G, Safety Analysis for Building 666, TSCA Waste Storage Facility – DPS-032-02,"

The Department of Energy Rocky Flats Field Office (RFFO) approves the cancellation of the Appendix G Safety Analysis for Building 666, Toxic Substance Control Act Waste Storage Facility, contained in the Site Safety Analysis Report (SAR) based on the completed decommissioning and demolition of the facility. In addition, Kaiser-Hill Company, LLC may make editorial changes to the Site SAR to remove outdated references to Appendix G as necessary. Should you have any questions, please contact me at extension 2109.

Ronald G. Bostic
Director, Nuclear Regulatory Division

cc:
M. Frei, EM-30
S. Stadler, EH-2
D. Owen, DNFSB, RFFO
R. Goldsmith, AMSP, RFFO
J. Geis, K-H