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DECOMMISSIONING IMPLEMENTATION GUIDE

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FOREWORD

The Department of Energy (DOE) faces an enormous task in the disposition of the nation's excess facilities. Many of these facilities are large and complex and contain potentially hazardous substances. As DOE facilities complete mission operations and are declared excess, they pass into a transition phase which ultimately prepares them for disposition. The disposition phase of a facility's life-cycle usually includes deactivation, decommissioning, and surveillance and maintenance (S&M) activities.

Four Guides were developed to provide implementation guidance for requirements, found in DOE O 430.1A, LIFE CYCLE ASSET MANAGEMENT, specific to the transition and disposition of contaminated, excess facilities. The Guides are: DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING FACILITY TRANSITION AND DISPOSITION; DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE; DOE G 430.1-4, DECOMMISSIONING IMPLEMENTATION GUIDE; and DOE G 430.1-5, TRANSITION IMPLEMENTATION GUIDE. The goal of the processes described in the Guides is a continuum of hazard mitigation and risk reduction throughout the transition and disposition phases, leading to a timely, cost-effective disposition of the facility.

Transition activities occur between operations and disposition in a facility's life cycle. Transition begins once a facility has been declared or forecast to be excess to current and future DOE needs. It includes placing the facility in stable and known conditions, identifying hazards, eliminating or mitigating hazards, and transferring programmatic and financial responsibilities from the operating program to the disposition program. Timely completion of transition activities can take advantage of facility operational capabilities before they are lost, eliminating or mitigating hazards in a more efficient, cost-effective manner. In preparation for the disposition phase, it is important that material, systems and infrastructure stabilization activities be initiated prior to the end of facility operations.

Following operational shutdown and transition, the first disposition activity, usually, is to deactivate the facility. The deactivation mission is to place a facility in a safe shutdown condition that is economical to monitor and maintain for an extended period, until the eventual decommissioning of the facility. Deactivation of contaminated, excess facilities should occur as soon as reasonable and for as many facilities as possible. In this way, DOE can apply its resources to accomplish the greatest net gains to safety and stability in the shortest time. Deactivation can accomplish various activities, placing the facility in a low-risk state with minimum S&M requirements.

The final facility disposition activity is typically decommissioning, where the facility is taken to its ultimate end state through decontamination and/or dismantlement to demolition or entombment. After decommissioning is complete, the facility or surrounding area may require DOE control for protection of the public and the environment or for environmental remediation.

S&M activities are conducted throughout the facility life-cycle, including when a facility is not operating and is not expected to operate again. During these last periods of a facility life-cycle, it is important to ensure that S&M is adequate to maintain the facility safety envelope during the final stages of operations through a seamless transition to the final disposition of the facility. S&M is adjusted during the facility life-cycle as transition, deactivation and decommissioning activities are completed. S&M activities include periodic inspections and maintenance of structures, systems, and equipment to ensure, at a minimum, that there is adequate containment of any contamination and that the potential hazards to workers, the public, and the environment are eliminated or mitigated and controlled.

The technical, managerial and planning perspectives offered in these Guides can be equally effective in conducting activities other than transition and disposition, such as refurbishment and "clean-up" for reuse. As such, the adaptation of this guidance can result in efficient results if applied to facilities that are not being declared excess.

An important objective throughout transition and disposition is to continue to maintain an integrated and seamless process linking deactivation, decommissioning and S&M with the previous life-cycle phases. Activities of facility transition and disposition shall incorporate integrated safety management at all levels to provide cost-effective protection of workers, the public and the environment.

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1.0 Introduction

1.1 Purpose

This Guide was prepared to aid in the planning and implementation of decommissioning activities at Department of Energy (DOE) facilities that have been declared excess to any future mission requirements. It is one of four that have been developed to provide guidance for facility transition and disposition activities. The others are: DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING FACILITY TRANSITION AND DISPOSITION; DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE; and DOE G 430.1-5, TRANSITION IMPLEMENTATION GUIDE.

Requirements for decommissioning are stated in DOE Order 430.1A, LIFE CYCLE ASSET MANAGEMENT (LCAM), which identifies the minimum requirements for disposition of an excess DOE facility. This Guide defines activities or actions that provide a sequenced risk reduction to the selected disposition path. It is part of the DOE Directives System, and is consistent with the principles and core functions of P 450.4, SAFETY MANAGEMENT SYSTEM POLICY. Other documents that should be consulted to support the planning and conduct of transition and disposition activities include: DOE-STD-1120-98, INTEGRATION OF ENVIRONMENT, SAFETY AND HEALTH INTO FACILITY DISPOSITION ACTIVITIES, and the Good Practice Guides associated with LCAM. This Guide also addresses implementation of the *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),* May 22, 1995 (commonly known as the Decommissioning Policy).

The DECOMMISSIONING IMPLEMENTATION GUIDE, *Decommissioning Handbook* (Draft - DOE/EM-0383, January 1999), and *Decommissioning Preferred Alternatives Matrix* (June 30, 1997) replace the previously issued *Decommissioning Resource Manual* (DOE/EM-0246, August 1995) and *Decommissioning Handbook* (DOE/EM-EM-0142P, March 1994). The present DECOMMISSIONING IMPLEMENTATION GUIDE differs from the *Decommissioning Resource Manual* (DOE/EM-0246, August 1995), which included a variety of information of interest or potential use to decommissioning project managers and staff. Material from the Resource Manual that directly relates to implementation of these policies and directives has been incorporated in this Guide. Material from the Resource Manual and former Handbook that does not directly relate to acceptable methods for meeting program requirements is being compiled in the present *Decommissioning Handbook* as an information resource for decommissioning project personnel. Material from the former Handbook dealing with decommissioning technologies has been incorporated into the *Decommissioning Preferred Alternatives Matrix.*

1.2 Alternative Methods

This Guide presents acceptable methods for implementing the decommissioning requirements specified in LCAM, to ensure effective and efficient management of DOE excess facilities. It does not in itself impose additional requirements. The Department has invested substantial time and effort in developing a decommissioning framework that (1) meets DOE's requirements and expectations, (2) draws on DOE's previous experience, and (3) is responsive to oversight entities. Although alternative methods and approaches to the ones discussed in this Guide may be used, a comparable amount of time and effort may be needed to evaluate the acceptability of those alternatives.

1.3 Applicability

This Guide may be applied to decommissioning activities and processes at contaminated DOE facilities. "Contaminated" refers to both radioactive contamination and to hazardous-substance contamination. Nuclear facilities and non-nuclear contaminated facilities are included in the scope of this Guide. Project personnel are expected to apply a graded approach in planning and conducting decommissioning activities at different types of facilities and with different hazard conditions.

2.0 Decommissioning Activities -- General Guidance

2.1 DOE/EPA Policy on Decommissioning

In 1994, the Secretary of Energy determined it was inappropriate for the Department to be self-regulating in the performance of decommissioning and that provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) applies when appropriate. A working group involving DOE and the Environmental Protection Agency (EPA) was formed to establish the manner of applying CERCLA to decommissioning. The result of this effort was the *Policy on Decommissioning of Department of Energy Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act,* signed on May 22, 1995, by the Assistant Administrators at EPA's Office of Enforcement and Compliance Assurance and Office of Solid Waste and Emergency Response, and by DOE's Assistant Secretary for Environmental Management. The policy is consistent with, and builds upon, the multi-agency *Guidance an Accelerating CERCLA Environmental Restoration at Federal Facilities*, August 22, 1994.

The policy establishes that decommissioning activities will be conducted as non-time-critical removal actions under CERCLA, unless the circumstances at the facility make it inappropriate. Use of non-time-critical removal actions for conducting decommissioning activities effectively integrates EPA oversight responsibility, DOE lead agency responsibility, and state and stakeholder participation. Non-time critical removal actions are defined and explained in the National Oil and Hazardous Substances Pollution Contingency Plan, known as the National Contingency Plan (NCP) and found at 40 CFR 300. In brief, non-time critical removals are response actions initiated under CERCLA removal authority that are conducted under DOE lead-agency authority and that typically have a planning horizon of six months or more.[1]

2.2 Integrated Safety Management

In accordance with LCAM, sufficient planning shall be done to systematically integrate a safety management system into management and work practices at all levels. DOE's safety management system policy and guidance are identified in DOE Policy 450.4, SAFETY MANAGEMENT SYSTEM POLICY and G 450.4-1, INTEGRATED SAFETY MANAGEMENT SYSTEM GUIDE. The major mechanism for integrating safety and health into decommissioning efforts is the work planning process during which the safety documentation from the facility's earlier phases is reviewed and evaluated. Decommissioning activities are identified and evaluated against existing controls, and modification to controls are identified as required by the new activities that were not previously performed.

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[1] Simultaneous with issuance of the decommissioning policy, the Office of Environmental Management published the *Environmental Restoration Program Decommissioning Implementation Guide* to support policy implementation. That guide included the decommissioning framework agreed to by DOE and EPA for achieving the objectives of the policy. The May 22, 1995, implementation document is the basis for the present Guide.

Often, the safety documentation of an older facility, including worker safety and health aspects, fall short of today's standards and requirements. Revisions, comparisons, crosswalks and other evaluation techniques can be used to determine which decommissioning actions may be covered in existing documentation, and which actions require supplemental coverage. Such evaluation efforts, especially if performed by those who know the facility well, are more cost effective and time efficient than the preparation of new safety documentation. Worker involvement in all levels of safety/hazards analysis in the planning of decommissioning activities is key to implementing all elements of transition.

DOE-STD-1120-98, Section 3.0, "Integrated Safety Management System," provides detailed guidance for developing and implementing a ISMS for decommissioning activities. Furthermore, Appendix C of the referenced Standard, "ISMS Performance Expectations," provides information that may be meaningful to verify that ISM considerations have been adequately addressed.

2.3 Graded Approach

The "graded approach" application of requirements to a particular project, activity or facility is required by LCAM. Implementation of the tailoring approach, as defined in DOE Guide 450.3-3, TAILORING FOR INTEGRATED SAFETY MANAGEMENT APPLICATIONS, is an acceptable method of complying with this requirement. DOE G 450.3-3 demonstrates that tailoring is integral to the Integrated Safety Management system. Application of tailoring is appropriate for all steps in facility decommissioning.

Tailoring allows choices to be made from among a variety of engineering and administrative controls that provide adequate protection for workers, the public, and the environment during the performance of work. Tailoring of higher-level contractual and project agreements enables contractors to establish general standards for work. Individual tasks are tailored so that each task has controls that fit the specific work and the hazards associated with it and that are consistent with higher-level performance expectations.

Tailoring permits the consideration of differences between facilities and provides a means to determine the extent to which actions are appropriate for a particular facility (or portions thereof). The depth of detail required and the magnitude of resources expended for a particular management element is commensurate with the relative importance of that element to safety, environmental compliance, safeguards, and security; the magnitude of any hazard identified; programmatic importance; financial impact; and/or other facility-specific requirements. For projects where no logical delineation between deactivation and decommissioning exists, the requirements are integrated to serve the overall project and completion objectives. In doing so, planning considers the possibility of future changes to priorities and should identify the conditions (end-points) where a project may be safely and efficiently slowed or accelerated, if it becomes necessary to do so.

Tailoring is cost effective because it does not demand a high level of analysis and/or planning for simple jobs already covered in established procedures. Worker involvement, as stated earlier, has also proven to be cost-effective because these employees are often those who have spent many years performing tasks during operations, and they may have a good understanding of the safety and performance requirements of the decommissioning activities.

Tailoring the Integrated Safety Management system offers a means to grade activities and processes to different hazards associated with individual facilities. Tailoring is used to scale expectations and acceptable performance to the needs of the site, activity, facility, or work to be performed. When applied to the five core safety management functions, tailoring promotes a work management system that is safe, efficient, and cost effective.

3.0 The Decommissioning Framework

3.1 Applicability of the Framework to Regulatory Scenarios

DOE has developed a decommissioning framework that implements the requirements of the Decommissioning Policy and the requirements that the LCAM order places on decommissioning activities. This model for decommissioning DOE facilities has been designed explicitly to accommodate all types of regulatory scenarios under which decommissioning can be initiated.

The decommissioning framework, which is the focus of this Guide, is modeled after the process for conducting CERCLA non-time-critical removal actions, as specified in the National Contingency Plan. However, the basic framework is flexible enough to accommodate all DOE decommissioning projects, regardless of the statute, authority, or management decision that initiates the project.

A decommissioning project may be initiated by a variety of circumstances, including:

- Determination that a release or substantial threat of release to the environment is present, and a removal action under CERCLA is appropriate;
- Implementation of a decommissioning plan approved by the Nuclear Regulatory Commission (NRC), with the objective of termination of an NRC license;
- Decommissioning in accordance with a Resource Conservation and Recovery Act (RCRA) permit or order; and
- DOE programmatic management decision to proceed with the disposition of a surplus facility.

The decommissioning framework satisfies the requirements of these potential drivers, as well as the asset management specifications of LCAM and integrated safety management requirements.

3.2 Crosswalk, DOE O 430.1A Requirements to DOE G 430.1-4

The requirements, as specified in LCAM, that are applicable to the decommissioning of a contaminated, excess facility are included in Table 1 and are mapped to the section of this Guide where they are addressed. While the table quotes the requirements as they appear in LCAM, this Guide addresses only those elements which apply to the decommissioning process. Parallel tables in DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING FACILITY TRANSITION AND DISPOSITION; DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE; and DOE G 430.1-5, TRANSITION IMPLEMENTATION GUIDE provide the crosswalks between requirements and guidance for surveillance and maintenance, deactivation and transition, respectively.

Table 1 - Mapping of Requirements - Decommissioning

Requirement	Where Addressed in Guide
O 430.1A 6.a: Application of graded approach	Section 2.3, Graded Approach, and Chapter 4.0, as applicable
O 430.1A 6.g(6)(a)(i): Collection of characterization data, including supplemental data	Section 4.3, Choosing the Decommissioning Alternative, Steps 7-11
O 430.1A 6.g(6)(a)(ii): S&M activities that correspond to facility conditions	Chapter 4.0, Implementing the Decommissioning Framework, particularly Sections 4.1 and 4.2 (Steps 1 and 5) and Section 4.5 (Steps 19 and 20).
O 430.1A 6.g(6)(a)(iii): Method for identifying, assessing, evaluating, selecting alternatives	Section 4.3, Choosing the Decommissioning Alternative, Steps 7-15
O 430.1A 6.g(6)(a)(iv): End-point process that specifies specific facility end-points and activities needed to achieve those end-points.	Section 3.3, Developing End-Points
O 430.1A 6.g(6)(a)(v): Method of detailed engineering planning and plan documentation	Section 4.4, Engineering and Planning, Steps 16 and 17
O 430.1A 6.g(6)(b): Use of non-time critical removal action as approach to decommissioning	Chapter 4.0, Implementing the Decommissioning Framework, Steps 1-22
O 430.1A 6.g(6)(c): Development of a project final report, or equivalent	Section 4.5, Decommissioning Operations, Step 20
O 430.1A 6.j: Decommissioning activities consistent with integrated safety management and facility disposition policies	Chapter 4.0, Decommissioning Framework, particularly Sections 4.3 (Step 11), 4.4 (Steps 16 and 17), and 4.5 (Steps 18 and 20)

3.3 Developing End-Points

The LCAM Order requires an end-point process in decommissioning planning that identifies specific facility end-points and activities needed to achieve those end-points. End-points are the detailed specification of conditions to be achieved for a facility's spaces, systems, and major equipment. End-point specifications for the entire facility are used during and/or after implementation:

- As input for scheduling and cost estimating,
- To create detailed work plans for each space and system in the facility,
- To document bases for performance-based contracting or outsourcing of work, where practical to do so,
- To demonstrate conformance to agreements negotiated with third parties, and

- To show compliance with both local and Federal regulations.

Since identifying the end-points is an integral part of deriving the project work breakdown structure, schedule, and budget, end-point planning and specification must be initiated as soon as possible. Specifying end-conditions is the first part of the end-point planning process. Facility end-point specifications must be quantitative, where possible, and in all instances must be explicit.

Specifying and achieving end-points is a systematic, engineering method for progressing from an existing condition to a stated desired final condition in which the facility has been decommissioned. An end-point method is a way to translate broad mission statements into explicit goals that are readily understood by engineers and the crafts personnel who will perform the work.

The detailed specification and actual end-points achieved will undoubtedly vary from facility to facility across the DOE complex. Variations are expected because of the differences among facilities with respect to previous mission requirements, equipment and systems, containment, degree of contamination, ability to isolate the contamination, facility environs, projected ultimate disposition, and a host of other factors. Regardless of variations in conditions to be achieved, the methods used to decide and specify end-points are fundamentally similar.

Several guiding principles form the foundation of the end-point process:

(1) The decision to specify an end-point needs to be driven by, and clearly linked to, top-tier program objectives.

(2) End-point decisions are integrally linked to decisions (and constraints) on resources and methods. If a proposed end-point is not economically feasible, it will only be specified if mandated by law, applicable regulation, or formal agreement.

(3) Successful end-point development requires "ownership" by all affected organizations, including the planners, the decommissioning work force, and the receiving organization.

(4) Work teams in the field need clear, quantitative completion criteria. End-points must be established up front, must meet the completion criteria, and be practical and achievable.

(5) End-point development is an iterative process. Most end-point decisions can be made during the planning stages early in the project; however, some end-points will have to be revisited as decommissioning proceeds.

(6) Decommissioning end-points need to be consistent with applicable land and facility use plans, and with any planned site remediation activities.

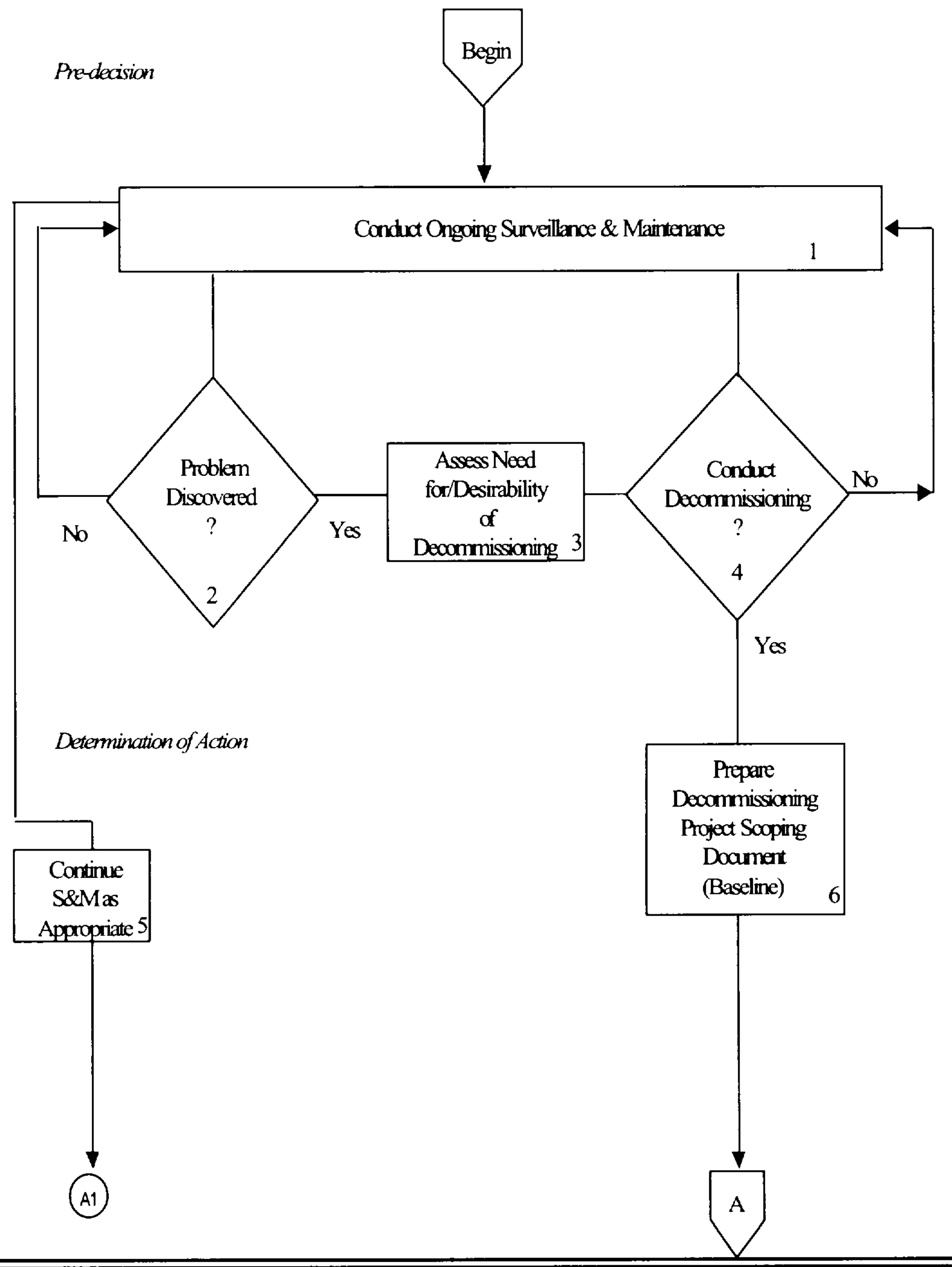
These guidelines should be used when selecting the end-point method, setting up criteria, and specifying detailed end-points. The use of a tailoring approach in the development of the facility end-points is appropriate to differentiate between complex facilities with process systems and/or significant hazards and those with relatively simple buildings that are not substantially contaminated and do not have complex equipment or systems.

The Decommissioning Framework
The Decommissioning Framework provides an end-point development process, as described above, throughout the identification and analysis of alternatives and planning stages of the project. End-points are integrated into the Decommissioning Framework as follows:

Table 2 - End-Points in the Decommissioning Framework

Decommissioning Framework	**End-point Development Process**
Step 6: Prepare Decommissioning Project Scoping Document (Baseline)	In this step, decommissioning objectives are defined; decommissioning objectives are equivalent to end-points. The end-points should be determined as early as possible to provide the basis for identifying and assessing alternatives, then planning the work.
Steps 7-13: Choosing the Decommissioning Alternative	End-points drive the development and analysis of alternatives and will be reevaluated as characterization, risk, and safety data become available.
Step 12: Define and Conduct Activities to Inform/Involve Stakeholders Step 14: Respond to Public Comments	End-points are subject to regulator and stakeholder review and approval.
Step 15: Document Final Decision	Once agreed upon with the regulators and stakeholders, end-points are documented.

U.S. Department of Energy
Decommissioning Framework
Figure 4-1
1 of 3



4.0 Implementing the Decommissioning Framework

The decommissioning framework comprises a sequence of steps that takes a facility through the entire decommissioning process, from pre-decision to close-out (and, if necessary, long-term monitoring). This sequence links required activities in a systematic manner. The decommissioning framework is depicted in flowchart form and described in this section.[2] The framework encompasses decommissioning activities in compliance with an NRC license; with permits or orders issued under RCRA; or with programmatic requirements, including DOE directives; as well as with CERCLA. Implementation of integrated safety management is provided for in this framework, specifically, incorporation of worker and facility safety activities into decommissioning work planning and execution. In all cases, the graded approach is used as appropriate.

This chapter walks through each step in the framework, which comprises six stages of activities typically required at the end of the facility life-cycle, from Pre-Decision through Post-Decommissioning. Where appropriate, reference is made when steps correspond directly to CERCLA as specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) codified in 40 CFR 300. References to companion facility disposition guidance documents are included where appropriate.

Symbols: Matching symbols show continuity from one chart to the next.

4.1 Pre-decision

Prior to decommissioning, the facility typically will be in a stable and known condition maintained through a surveillance and maintenance (S&M) program.. For deactivated facilities, this will have been established at the completion of deactivation and accomplishment of the deactivation end state, as described in DOE G 430.1-3, DEACTIVATION IMPLEMENTATION GUIDE, a companion to the present Guide. The S&M program in effect will be consistent with requirements for environment, health and safety, and radiation protection and designed for cost-effectiveness. For details, see DOE G 430.1A-2, SURVEILLANCE AND MAINTENANCE DURING FACILITY DISPOSITION, also a companion to this Guide.

<u>Step 1 - Conduct On-going Surveillance & Maintenance</u> - In general, facilities (or portions thereof) will have been placed in a stable and known shutdown condition with an S&M program. Conversely, a facility may enter the disposition phase directly decommissioning with its condition and/or operating history unknown. In these cases, the steps described in DOE G 430.1-2, IMPLEMENTATION GUIDE FOR SURVEILLANCE AND MAINTENANCE DURING

[2] The DOE decommissioning approach described here is substantively the same as the original decommissioning framework developed in May 1995 consistent with the Decommissioning Policy, but has been revised to consolidate and streamline related activities.

FACILITY TRANSITION AND DISPOSITION provide a general overview for determining the status and condition of a facility.

The typical decommissioning candidate facility will be in S&M mode, the budget process will be proceeding, and decommissioning will be planned for a future date. In some cases, facilities will transfer directly from deactivation to decommissioning without an interim period of S&M, and the facilities will continue S&M as a follow-on to post-deactivation S&M planning. Similarly, some facilities may transition directly from operating programs to decommissioning without an interim period of S&M, and the facilities will perform S&M as a continuation of operating plant maintenance. Regardless of the scenario, S&M shall be guided by a written program, prepared according to the principles described in DOE G 430.1-2.

The time a facility spends in this S&M mode depends upon conditions specific to that facility. In the past, some operating facilities were shut down with expectations of restarting. Time passed and restart expectations were not realized. These facilities are generally now in an S&M mode and deactivation is proceeding "after the fact."

In general, for high-risk, urgent situations, and for some NRC-mandated schedules, the decommissioning process will proceed promptly. For low-risk situations, a number of years may elapse before budget priority considerations make funds available for decommissioning, assuming no adverse changes in the facility condition arise during that time. Because of differences such as these, the time interval between Steps 1 and 2 or 4 can vary greatly. As conditions change over time, the S&M authorization basis will change accordingly, and the S&M program will need to be updated to reflect these changes.

S&M activities continue as necessary, whether a decision to proceed with decommissioning is made early on or after some time has elapsed, until the facility's ultimate disposition is accomplished.

4.2 Determination of Action

In this stage, the evaluation factors of NCP Section 300.415(b)(2) will be assessed, and any other data will be collected as necessary to determine if decommissioning is appropriate. Evaluation factors include: (1) impact on nearby humans, animals or the food chain; (2) contamination of drinking water supplies or sensitive ecosystems; (3) materials in drums, barrels, tanks or other bulk container that pose a threat of release; (4) materials in soils at or near the surface that may migrate; (5) weather that may cause materials to migrate or be released; (6) threat of fire or explosion; (7) the availability of other appropriate federal or state response mechanisms to respond to the release; and (8) other situations or factors that may pose threats to public health or welfare or the environment. Documentation includes the facility description, threats to workers or public health or the environment, and the basis for proceeding with decommissioning either under a regulatory scenario or as a programmatic decision. DOE shall consult with EPA and the state concerning this determination consistent with applicable local agreements.

DOE elements shall apply the graded approach in determining the nature and extent of documentation appropriate for this stage, consistent with the regulatory or programmatic authority on which the decommissioning decision is based and with local agreements as applicable.

Step 2 - Problem Discovered - This step corresponds to the "discovery" described in 40 *CFR* 300.405. This step may be triggered by discovery of a release or threatened release of hazardous substances (including radionuclides) into the environment, or by some other circumstance that prompts a programmatic decision to consider proceeding with decommissioning.

If an actual release of hazardous material is involved, it will typically be revealed through routine action of government (or government contractor) employees. However, it might be reported directly to DOE officials by the public or through a report to the National Response Center.

Whether a release from a facility is "actual" or "threatened" depends primarily upon temporal considerations. Actual releases should be observable or detectable by instruments. A "threat" of release involves judgments concerning events that have not occurred, yet may occur. Appropriate matters to consider include:

- Condition of storage containers or areas containing contamination
- Evidence of structural failure
- Condition of roofs, windows and doors
- Evidence of human, animal, wind, or water intrusion.

By their nature, facilities in a decommissioning program are aged and some degree of deterioration will have occurred. The determination of whether a "substantial threat of release" exists is a decision to be made on a case-by-case basis in consultation with regional EPA, state, Tribal, and/or local officials as provided for in local agreements.

Notification to the National Response Center (1-800-424-8802, TTY/TDD 202-426-2675) is required for releases or threatened releases of hazardous substances above certain quantities. Notification is not required if quantities do not exceed the Reportable Quantities of 40 *CFR* 302 or if the release is authorized by a federal permit. In addition, under 40 *CFR* 350, 355, 370, 372, Community Right-to-Know Requirements, the State Emergency Response Commission and the Local Emergency Planning Committee must be notified when an amount exceeding established thresholds of an extremely hazardous substance exists or is released into the environment that could result in exposure to persons outside the facility boundaries.

If natural resources are or may be injured by the release, the appropriate state and federal trustees of the affected resources are to be notified. While DOE is the federal trustee for natural resources located on land administered by DOE, the Department may share trustee responsibility with other federal agencies, the states, or affected Native American Tribes. Other actions may be required to assist in assessments, evaluations, investigations, and planning (per 40 CFR 300.410(g)). Where possible, such action will be incorporated into related decommissioning actions and documents, as applicable.

Depending on the circumstances, some other type of response may be necessary. This might include an emergency action, for example, to respond to a spill or leak; a time-critical removal action, of less urgency than an emergency but where response is required in less than six months; or a final or interim remedial action, if circumstances warrant. It is possible that, after some of the responses described above, the logic flow would lead back to Step 1 for continuing S&M.

Step 3 - Assess Need for/Desirability of Decommissioning - This step entails an evaluation of the situation to determine what action, if any, is appropriate. It includes a review of existing documents such as: the authorization basis; relevant deactivation documentation including any defined decommissioning objectives; the Pre-Transfer Review Report (described in DOE G 430.1-5); and the existing S&M program. Information examined can be grouped as follows:

- *Facility History* - Facility history consists of the operating history of the facility to obtain process knowledge of the nuclear and chemical materials that were handled and potential spills or leaks that might have occurred. Interviews with former operating and maintenance personnel may be appropriate. Knowledge of facility modifications and the presence of as-built drawings also are important.

- *The Deactivation Process* - The deactivation process is the manner in which the facility was taken out of active service and placed in a stable shutdown configuration. The "safety envelope" will be defined in a Safety Assessment, a Safety Analysis Report (SAR), or similar documentation. Technical Specifications or a Limiting Conditions Document may exist and should be reviewed. The presence of any unresolved safety issues will be identified and plans developed to address these situations. A deactivation completion package or equivalent document should be available for review.

- *Surveillance and Maintenance* - An S&M plan will describe actions which were planned to maintain and inspect the facility in order to contain the contamination present, protect health and safety of workers and the public, and avoid impact on the environment (in general, maintain the "safety envelope" specified for the facility). Routine S&M records and annual reports will serve as records of events during the S&M period of the facility.

- *The Physical Condition of the Facility* - S&M records will indicate the physical status of the facility and can be useful for detecting trends that might indicate impending problems. Other sources of information about the facility include the Facility Information Management System (FIMS).

- *Preliminary Characterization Data* -This information focuses on identifying the nature and location of the contamination (nuclides, chemical constituents) in the facility. General mapping of dose rates and airborne contamination (rad and non-rad) should be available. Characterization data and documents accumulated during deactivation, if applicable, serves as a starting point. If these data are not available, they must be collected in a site inspection. If information about quantities is available, it should be examined, but quantitative information is not a primary interest in this preliminary assessment.

- *Preliminary Hazards Analysis* - The hazards present in the facility and the risks presented by those hazards will have been identified so that appropriate features can be incorporated into the S&M program to keep impact on people and the environment at a low and acceptable level. This information shall be reviewed to confirm status and determine if any additional hazards are present. DOE-STD-1120-98, Section 3.2, "Integrated Hazard Analysis," provides further discussion of hazards analysis.

In considering whether a CERCLA response is appropriate, additional factors will be examined, including:

- *Nuclear Incidents.* Section 101(22)(C) of CERCLA excludes from the definition of release any source, by-product, or special nuclear material from a nuclear incident when that release is covered by the financial protection requirements (emphasis added) as established by the NRC.

- *Uranium Mining Sites.* Section 101(22)(C) of CERCLA provides an additional exclusion from the term release. If a release of source by-product or special nuclear material from any processing site designated under Sections 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act (UMTRCA) occurs, a response action under CERCLA is not necessary.

- *Federally Permitted Releases.* CERCLA Section 101(10) defines a federally permitted release in terms of releases permitted under specific environmental statutes. If a release occurs from a vessel or facility that is permitted under an environmental statute listed in CERCLA Section 101(10), a response action may not be appropriate. EPA proposed regulations to clarify the scope of the federally permitted release exemption on July 19, 1988 (53 *FR* 27268). A Supplemental Notice of Proposed Rulemaking appeared on July 11, 1989 (54 *FR* 29306) providing additional clarification on the Section 101(10)(H) exemption for air releases.

- *Petroleum.* Hazardous substance, as defined in CERCLA Section 101(14), excludes the term petroleum, which includes crude oil or any fraction thereof that is not specifically listed or designated as a hazardous substance. EPA issued a memo to clarify this exemption on July 31, 1987 (OSWER Directive Number 9838.1). It states that the exclusion applies to petroleum products or derivatives, natural and synthetic gases, or mixtures of natural and synthetic gases. The exclusion, however, does not cover contaminants present in used oil or in any other petroleum substance. Contaminants are substances not normally found in refined petroleum fractions or present at levels which exceed those normally found in such fractions.

- C Underground *Storage Tanks (USTs).* The remediation of USTs is governed by RCRA, as specified at 40 CFR 280.

- C *Other Considerations.* Workplace exposures, fertilizer applications and engine exhaust emissions are excluded from the definition of "releases," under CERCLA Section 101(22).

In addition to considering facility condition and status information, factors to be considered at this point include state historic preservation office approval.

The site evaluation may include perimeter or on-site inspections. Any physical inspection must be planned so as to maintain worker health and safety and to protect the public and the environment. The S&M health and safety program derived from the authorization basis will be used as a foundation and augmented as necessary to assure protection during any inspection.

<u>Step 4 - Conduct Decommissioning?</u> - Step 4 provides a decision point to evaluate whether or not to go forward with decommissioning at this time. A decision to conduct decommissioning can be triggered in two ways. As described under Steps 2 and 3 above, one way the decommissioning process can be initiated is in response to a problem that has been discovered. The site evaluation provides flexibility to determine whether CERCLA response is warranted or another appropriate federal or state response is necessary and available.

Differences between CERCLA and non-CERCLA actions to be considered at this point include the following:

- C Permits are not required if decommissioning is conducted as a CERCLA response, but legal provisions and other requirements that give rise to the need for permits will be included as applicable or relevant and appropriate requirements (ARARs). Otherwise, necessary permits must be obtained.

- C If environmental samples are to be collected, the sampling and analysis plan must be submitted to and approved by EPA if decommissioning is conducted as a CERCLA response. Otherwise, the sampling and analysis plan does not require outside approval.

- C Decommissioning projects conducted as CERCLA responses shall involve EPA and/or the State, as required by the policy on decommissioning under CERCLA. Such involvement shall be consistent with the provisions of the site-wide compliance agreement, if there is one.

- C Decommissioning projects conducted under NRC-approved decommissioning plans or RCRA permits or orders may need to meet requirements specific to those plans, permits, or orders and some additional information may be specified under such plans, permits, or orders.

- C Decommissioning projects under CERCLA must adhere to the public participation and administrative record requirements of the NCP. Separate review of the environmental impact under the National Environmental Policy Act (NEPA) is not required. This review will be accomplished by incorporating NEPA values in decisions and documents prepared as part of the CERCLA process.

- Public participation also is an essential part of the decommissioning framework for projects that are not CERCLA responses. The decommissioning project manager still must ensure that stakeholders are informed about decommissioning decisions and activities. In this case, the NEPA process provides for review of environmental impacts and for public participation.

CERCLA response may not be necessary for a facility licensed by the NRC and being decommissioned in conformance with an NRC-approved decommissioning plan, for a facility being decommissioned in compliance with a RCRA permit or order, or if a release or substantial threat of release is not present at the facility or the amount of hazardous substances present does not warrant federal response. DOE is to consult with EPA and the state concerning this decision in accordance with applicable site agreements.

A programmatic decision to proceed with decommissioning also can initiate the process for a facility in the S&M mode. In this event, Step 4 immediately follows Step 1. In the case of a programmatic decision, DOE may consider other factors to make a decision to decommission a facility under its authority from the Atomic Energy Act (e.g., a building may be more costly to maintain than to dismantle, budget windfall, asset management at multi-program sites).

In either case, this step brings together the key factors for determining whether or not decommissioning will proceed at this time. In all cases, when decommissioning does proceed, the same basic process outlined in this framework is followed. If the determination is made to proceed with decommissioning, the process continues with Step 6. If the decision is made that decommissioning is not appropriate at this time, Step 1 S&M activities will be continued until a future time when it is appropriate to consider Step 4 again.

Step 5 - Continue S&M as Appropriate - This step depicts the continuation of S&M as a parallel activity throughout this phase and, given a decision to proceed, as planning and programmatic actions go forward. S&M activities continue throughout the life of the decommissioning project, until phased out in the manner planned during decommissioning operations (Step 19) or converted to a long-term, post-cleanup situation (Step 22).

Step 6 - Prepare Decommissioning Project Scoping Document (Baseline) - This step entails preparation of a decommissioning project scoping document or preliminary project plan. The scoping document conceptually defines the objectives/end-points of the project and establishes the preliminary technical scope, cost, and schedule baseline ranges for the project. The scoping document, or preliminary project plan, describes the general approach to be taken to protect the safety and health of workers and the public, and to protect the environment, to the extent such matters can be determined at this stage of the project. Additionally, this document identifies the specific approach to readiness reviews (Step 17) that will be followed in the project.

The decommissioning end-points should be determined as early as possible; refer to Section 3.3 for further discussion on end-points. End-points provide the basis for identifying and assessing alternatives, then planning the work. Decommissioning end-points must be consistent with applicable land and facility use plans, and with any planned site remediation activities.

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Decommissioning Framework
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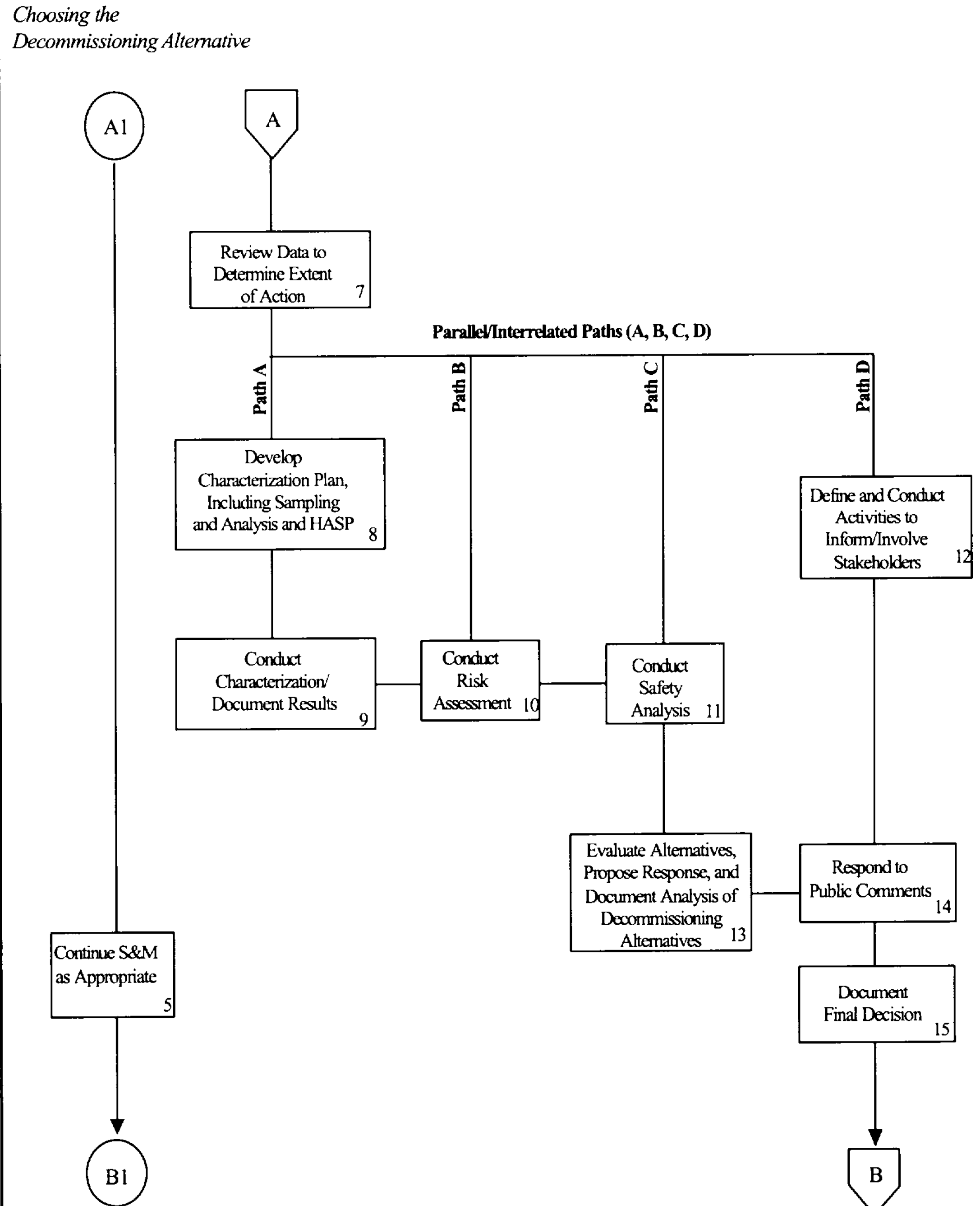

4.3 Choosing the Decommissioning Alternative

This stage of the process (steps 7-15) involves collecting additional information, performing additional analyses, identifying the decommissioning alternatives, and then choosing the most appropriate alternative with input from the public as appropriate. Decommissioning end-points drive the development and analysis of alternatives during this phase subject to regulator and stakeholder review and comment.

In accordance with LCAM, the graded approach shall be applied to developing documentation associated with this stage. Evaluation factors and results are to be documented as appropriate, though individual documents are not required for each step.

Step 7 - Review Data to Determine Extent of Action - This step starts the process of selecting and evaluating decommissioning alternatives for the facility (or portions thereof). All data compiled to this point is to be reviewed including, but not limited to, information gathered for transition, deactivation, S&M, the removal site evaluation, review of facility history, preliminary hazard characterization, and the project scoping document or preliminary project plan. The obvious starting point for selecting potential alternatives is the project scoping document or preliminary project plan prepared in Step 6. However, if some years have elapsed since the preliminary project plan was prepared, it is appropriate to review and update the list of potential alternatives, considering the factors and the types of actions described in the NCP (40 CFR 300.415(b)(2) and (d)), among others. Following identification of candidate alternatives, four parallel yet interrelated paths of actions will lead to the selection of the appropriate alternative. Site agreements will specify the manner of coordinating with EPA and the State in determining the level of regulator involvement and what response action is appropriate for facilities on the National Priorities List (NPL). NRC-approved decommissioning plans and RCRA permits or orders also may specify coordination between the regulator(s) and DOE.

If the decommissioning is not proceeding under CERCLA, managers are to attention at this point to the need to obtain long-lead permits. Permitting requirements of a decommissioning project must be evaluated early and frequently so that the time requirements for permits are not an impediment to timely completion of the work.

Step 8 - Develop Characterization Plan, Including Sampling and Analysis and HASP - This step continues the process of characterization of the facility and areas contiguous to the facility as necessary so that the nature of contamination is identified. Where a facility has been characterized as part of deactivation, then deactivated to specified end-points, the need for characterization may be satisfied by characterization data and documents resulting from deactivation activities. Per LCAM, characterization results and documents from prior deactivation activities shall be augmented as necessary to reflect changes in facility conditions during the disposition process. This step entails preparation of a characterization plan if additional characterization is required. The plan satisfies NCP requirements in 40 CFR 300.415(b)(4)(ii) for a field sampling plan and a quality assurance project plan (referred to collectively as the sampling and analysis plan). The NCP requirement in 40 CFR 300.415(b)(4)(ii) to submit the sampling and analysis plan to EPA for review and approval (for CERCLA actions only) must be satisfied if environmental (e.g., soil, surface water, ground water) samples are to be collected. The plan must include a Health and Safety Plan (HASP) for the field sampling work, to ensure adequate controls for worker safety while conducting characterization activities, and an assessment of the physical condition of the DOE facilities involved and other programmatic requirements. See DOE-STD-1120-98, Section 3.3.4, "Hazard Baseline Documentation, for further discussion.

Step 9 - Conduct Characterization/Document Results - This step entails the conduct of the field characterization work, data analysis, and documentation, as appropriate. The graded approach shall be applied to the collection and analysis of data and to the associated documentation.

Step 10 - Conduct Risk Assessment - This step entails preparation of a risk assessment to support the safety analysis and the evaluation of decommissioning alternatives. The focus should be on the environmental safety and health risks associated with the decommissioning alternatives, using the graded approach. The scope and depth of the assessment should be in proportion to the potential threat resulting from actual conditions at the facility.

Step 11 - Conduct Safety Analysis - This step entails an analysis of hazards and identification of mitigating actions associated with each decommissioning alternative, performed in graded conformance with DOE 5481.1B (or 5480.23). For each alternative, hazards and risks are to be identified and mitigation measures that are to be provided for in the decommissioning plan described. Sections 3.2, "Integrated Hazard Analysis," and 3.3, "Hazard Controls and ES&H Documentation," of DOE-STD-1120-98 provide guidance on integrated hazard analysis and hazard controls, respectively, which should be consulted during this step.

Step 12 - Define and Conduct Activities to Inform/Involve Stakeholders - DOE field offices are responsible for developing and implementing comprehensive public participation plans and programs for environmental restoration activities and thus may have established public participation programs. An established program that provides for the activities in Steps 12 and 14 may be followed in lieu of these specific steps. (Guidance was provided in DOE/EH-0221, [*Public Participation in Environmental Restoration Activities*], U.S. DOE, Office of Environmental Guidance, RCRA/CERCLA Division, EH-231, November 1991.)

This step initiates the process to involve stakeholders in the selection of the decommissioning alternative. This initial step satisfies the NCP requirement in 40 CFR 300.415(m)(1) to designate a spokesperson, inform the community of the actions taken, respond to inquiries, provide information concerning the release (or threat of release), and to notify affected citizens and officials, when appropriate.

The Secretarial Policy on the National Environmental Policy Act, U.S. Department of Energy, June 1994, emphasizes the importance of early public involvement in the CERCLA process and making CERCLA documents available to the public as early as possible in keeping with the NEPA process. If decommissioning is not proceeding as a CERCLA response, the public participation requirements of NEPA will apply.

This step also includes the establishment of the Administrative Record for CERCLA action, as specified by the NCP (40 CFR 300.800). The Administrative Record is to be established as soon as possible after the decommissioning scoping document or preliminary project plan is prepared (Step 6) and no later than the issuance for public comment of the document which analyzes decommissioning alternatives (Step 14). The Record is to contain the results of the Step 3 evaluation and other factual information and analyses upon which the decision to conduct response action was based. As additional information is developed that forms the basis for selection of the response action, such information is to be included. Public comments, and DOE's response, will be included in the Administrative Record.

Activities in this step include conducting interviews and preparing a formal community relations plan (CRP) and establish and maintain an information repository for decommissioning projects initiated as CERCLA removal actions where on-site action is expected to extend beyond 120 days from the initiation of on-site removal activities (40 CFR 300.415(m)(3)). Per 40 CFR 300.415(m)(4)(i)), these actions must be completed prior to the completion of the analysis of alternatives (Step 13).

Step 13 - Evaluate Alternatives, Propose Response and Document Analysis of Decommissioning Alternatives - Using the information from the steps preceding, DOE will formulate and evaluate the decommissioning alternatives and select and identify the preferred alternative. The analysis of decommissioning alternatives will be commensurate with the scope and complexity of the decommissioning project, consistent with the graded approach.

The Secretarial Policy on the National Environmental Policy Act, U.S. DOE, June 1994, provides for incorporating NEPA values into CERCLA documents, such as analysis of cumulative, off-site, ecological and socioeconomic impacts, to the extent practicable. If decommissioning is not performed as a CERCLA response, NEPA evaluation is required during this step.

Step 14 - Respond to Public Comment - This step entails providing an opportunity for public review and comment on the alternatives considered. Public comments are reviewed and written response may need to be made to significant public comments in this step. For CERCLA actions, this step involves publication in a major local newspaper of a notice of availability of the Analysis of Decommissioning Alternatives and provides 30 calendar days (45 or more, upon timely request) for submission of written and oral comments on the analysis in compliance with 40 CFR 300.415(m)(4)(ii) and (iii). The public comments are reviewed and written responses are made to significant public comments pursuant to 40 CFR 300.820.

Step 15 - Document Final Decision - The final decision in the selection of the decommissioning action is documented. The decision takes into account the analysis of decommissioning alternatives, the comments received on the analysis, and, if appropriate, comments received prior to the analysis comment period. The determination in this step must be documented. Applicable portions of the EPA Action Memorandum format may be used to document the determination. DOE will consult with regulators concerning this decision in a manner consistent with applicable local agreements, NRC-approved decommissioning plans, or RCRA permits or orders.

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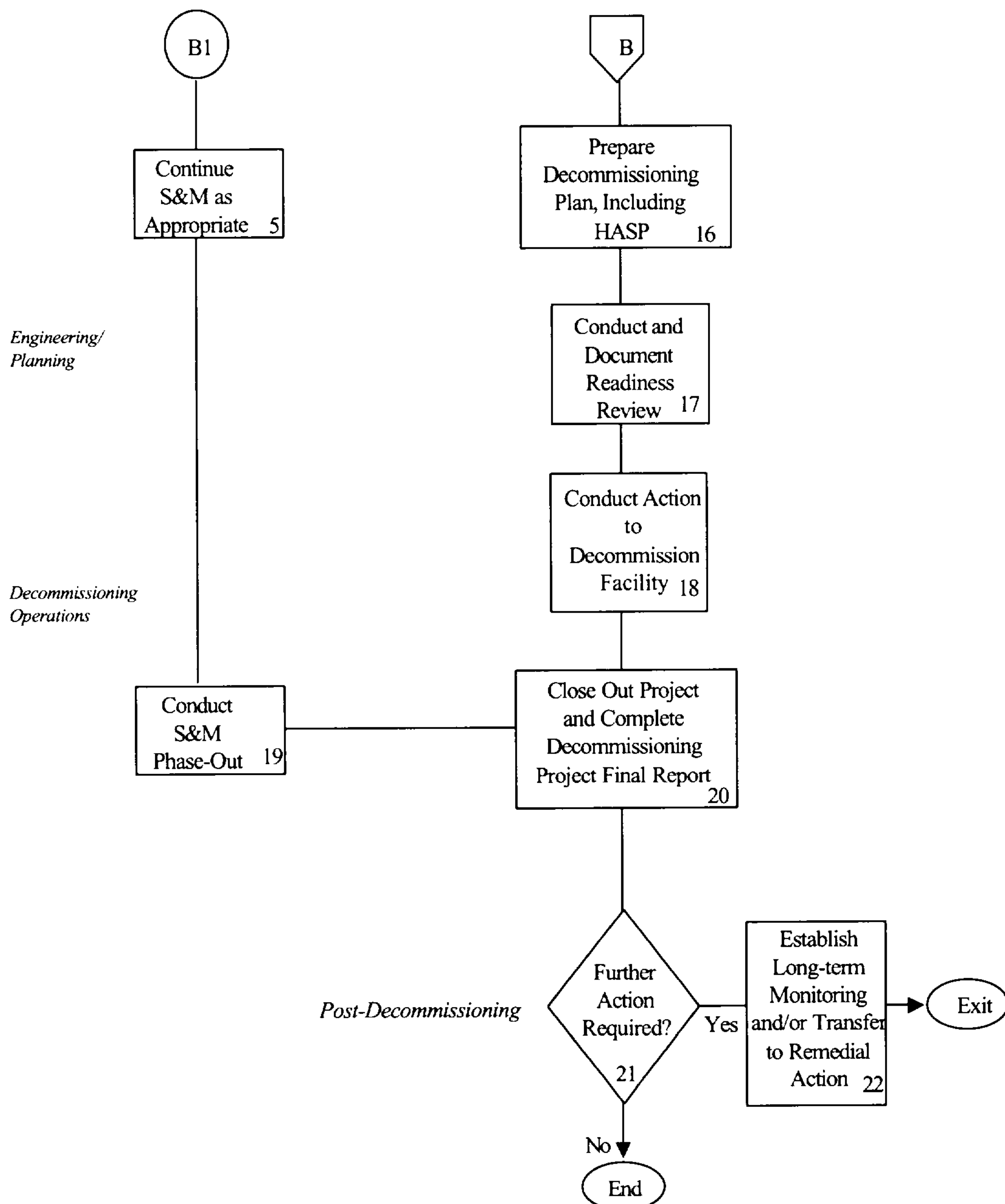


4.4 Engineering and Planning

Steps 16 and 17 describe engineering and planning work that must be performed to address the specific risks present during decommissioning and to provide measures to mitigate the risks and protect workers, the public, and the environment. The decommissioning end-points reflected in the selected alternative drive detailed planning, including determination of criteria for determining that end-points have been achieved.

Step 16 - Prepare Decommissioning Project Plan, including HASP - This step includes the engineering and planning work required to prepare the decommissioning project plan or equivalent documentation. Coordination with regulators during this step will be the subject of local agreements under CERCLA, NRC-approved decommissioning plans, RCRA permits or orders, and/or NEPA provisions. At sites on the NPL, the work described in the decommissioning project plan must be consistent with long-term remedies at the site.

Work planning activities need to include integrating safety and health considerations specific to worker protection and facility safety during decommissioning. This includes development of performance indicators to ensure adequate protection during project execution. Section 3.0, "Integrated Safety Management System" of DOE-STD-1120-98 provides specific guidance on integrating safety and health factors into project planning and into the decommissioning project plan, or equivalent, and related performance expectations. As part of this step, the existing safety analysis will be revised as necessary to reflect the specified decommissioning activities. The planning work considers ALARA in the decision-making process.

Decommissioning Project Plan Contents

The decommissioning project plan functions as the detailed design for the project and, if so specified in local agreements, may serve as the document to communicate to regulators and other stakeholders the scope and intent of the decommissioning action to be taken. The scope of the decommissioning project plan addresses, subject to the graded approach, the following topics: Facility description and history to provide context for the decommissioning decision and approach; project scope and end-points; summary of characterization results; technical approach, including the decommissioning approach to be followed and the technical baselines and assumptions; project management, including approach, cost, schedule, quality assurance, project organization, and training; worker and environmental protection and facility safety, including the HASP, the ALARA program and how it was applied during planning, and the safety analysis; waste management plan; and plans and criteria for the final site survey.

Consistent with the graded approach, the scope and detail of the decommissioning project plan will be commensurate with the scope and complexity of the decommissioning project. The decommissioning project plan or equivalent documentation should provide for change control, unless change control management is addressed on a site-wide basis.

When it is completed and approved, the decommissioning project plan or equivalent will replace the preliminary project plan (or scoping document), constituting the new technical, cost, and schedule baselines for the project, and will become the technical specifications for performing the work.

Planning Considerations

In defining, organizing, and planning the technical components of a decommissioning project, program or project managers should consider a number of factors. Such factors will vary from site to site and may include:

- Physical proximity,
- Continuing operational requirements,
- Land use requirements,
- Logical groupings of facilities and activities,
- Similarities in structures and nature of contamination,
- Realistic forecast of available funding, and
- Relationship and proximity to soil/ground water remedial action projects.

In particular, the release criteria to be used for the decontamination of equipment, structures, and the environment (i.e., soil, air, ground water) need to be established in the planning process for a decommissioning project. The criteria must be established early in the project, because these will have a significant effect on the technical approach, schedule, and cost for the project. The radiological criteria to be used will depend on regulatory requirements that may be imposed and on whether the decontaminated facility or site will be released for use with or without radiological restrictions.

For release of non-real DOE property, such as tools and equipment or reusable debris, the release process specified in the *Handbook for Controlling Release for Reuse or Recycle of Non-Real Property Containing Residual Radioactive Material* is followed. The steps spelled out in this process are designed to satisfy the requirements of DOE 5400.5, *Radiation Protection of the Public and the Environment*, and the codification of that order as proposed in 10 *CFR* 834 (58 *FR* 16268, March 25, 1993).

For real property (that is, facilities or sites) to be released without radiological restrictions, the release criteria shall be developed on the basis of the guidelines found in Chapter IV of DOE 5400.5, *Radiation Protection of the Public and the Environment*, and proposed for codification at 10 CFR 834. The process of establishing release criteria starts with the guideline values for residual radioactive material. Generic guidelines for thorium and radium in soil, airborne radon decay products, external gamma radiation, surface contamination, and residual radionuclides in air and water are specified in the order. Guidelines for radionuclides in soil other than thorium and radium must be derived on a site-specific basis.

To derive site-specific guidelines for soils and remaining structures, a contribution to the basic radiation dose limit of 100 mrem/yr is applied to a member of a critical population group, using the DOE material code RESRAD, and employing a realistic pathway analysis. The radiation dose is defined here as the effective dose equivalent from external radiation plus the committed effective dose equivalent from internal radiation. This limit applies to all routine DOE activities, not just the decommissioning project. The radiation dose limit is based on radiation protection standards and requirements specified in DOE 5400.5.

"Authorized limits" are defined as concentrations of radionuclides and levels of radioactivity that must not be exceeded if the remedial action or decontamination effort is to be considered complete and the site is to be released for use without radiological restrictions. Authorized limits are set equal to guideline values unless (1) variations (supplemental limits or exceptions) specified in DOE 5400.5 apply, in which case an authorized limit may be set above the corresponding guidelines value for the specific location or condition to which the exception applies; or (2) it can be clearly established that limits below the guideline values are reasonable and that the use of such limits are cost beneficial and comply with appropriate requirements (DOE 5400.5).

In addition to requiring that residual radioactivity be below guideline values, DOE also requires, as a matter of policy, that residual radioactivity be reduced to ALARA levels before a site is released, regardless of the guidelines. Socioeconomic considerations, as well as technical feasibility, need to be taken into account in implementing this policy. The ALARA requirements apply to all DOE actions, as described in Chapter IV of DOE 5400.5, including establishment of the "authorized limits."

Step 17 - Conduct and Document Readiness Review - In this step, the organization that will perform the decommissioning will be identified and/or acquired. It may be an independent contractor or an in-house resource (especially for small projects). The performing organization will make preparations for the field work, such as completion of appropriate detailed procedures, manuals and additional plans, and the training of personnel. The performing organization's involvement in work planning is described in Section 3.1, "Work Planning and Hazard Identification" of DOE-STD-1120-98.

Preparation of Detailed Work Packages

The information contained in the project plan forms the basis for the development of detailed work packages (activity specifications). These specific work packages provide the safety and health requirements as well as the step-by-step instructions to the workers responsible for the conduct of the work to be performed.

As the level of detail improves during project development, detailed work tasks can be developed and scheduled. These tasks are identified, evaluated, and controlled within the facility's existing job-control system. As indicated in Section 2.2 of this Guide, the principles of Integrated Safety Management must be an integral part of the work package and job-control system.

To be effective, work packages should include the following items:

- A description of specific work scope activities.
- Identification of the type of hazard analysis required for the activity, and verification that the analysis was performed.
- A method to ensure that hazards associated with each of the planned activities are documented and shared with workers together with the steps to eliminate, minimize or reduce the risk of those hazards to an acceptable level.
- Work permits necessary to conduct such work.
- The necessary training requirements to perform each task.
- A listing of equipment and each item's intended use.

- The personal protective equipment needed to limit exposure to the identified hazards.
- The emergency response procedures applicable to the task.
- A description of the management structure, including communication and reporting channels.
- Engineering studies applicable to the task.
- The expected results upon completion of the task.

The detailed work packages provide the details of the work to be accomplished and the process for doing such work safely and efficiently. The work packages, also, provide the structure of project activities needed to sufficiently inform all involved parties of the work to be accomplished. This documentation ensures that safety and health impacts have been verified and evaluated that controls are established prior to commencing work.

As a final step to work package preparation, the planned work activities are evaluated against the potential impact to the safety authorization of the facility. A safety review is conducted to ensure that the work activities are authorized to be performed within the facility's safety envelope. The formality and rigor of this type of process may vary with the hazard classification of the project or facility. However, a determination of the impact on the authorization basis is essential.

Contracting Approach Considerations

DOE has been moving toward more performance-based contracting where there are appropriate opportunities. Work packages are prepared in biddable format to the extent feasible and practical and in sufficient detail, for competitive bidding and award on a basis with maximum degree of fixity (e.g., lump-sum, fixed price preferred; fixed unit prices next in preference).

In making decisions concerning the contracting approach, managers will need to consider a number of factors. Some of these factors are:

C *Funding availability.* Are sufficient funds available for a meaningful contracting effort or is it prudent to plan the work and/or the flexibility of performance by in-house labor forces?

C *Size of Project.* Larger projects may be more successfully contracted out than smaller projects.

C *Uncertainty of Scope.* If, despite a reasonable level of investigation, uncertainty exists about the scope of certain work (e.g., extent of contamination in cracks, under slabs), unit prices may be more appropriate than a fixed price contract, or performance by in-house labor may be appropriate.

C *Labor Source.* At some DOE sites it may be appropriate to use retrained or otherwise qualified ex-production workers to perform decommissioning work. This will need to be weighed against potential economics of competition bidding and award to contractors with their own labor sources. If Building and Construction Trades labor is to be used, local jurisdictional practices related to demolition need to be considered.

C *Department of Labor (DOL) Determinations.* At the Shippingport Station Decommissioning Project, DOL made the determination that the lower wage rates of the Service Contract Act applied to the decommissioning work, rather than the construction wage rates of the Davis-Bacon Act. This type of decision can have a major effect on the cost of larger projects and may affect the contracting approach.

Activity specifications should focus on ***WHAT*** is to be done and what management and safety considerations are necessary and appropriate for the job. To the extent possible, the means, methods, and techniques should be left up to the performing organization. That performing organization should prepare detailed procedures that describe ***HOW*** the work will be performed. It is crucial that all of these activities be performed under the umbrella of site-wide safety and health and quality assurance programs.

Readiness Review

When the performing organization is fully prepared, an appropriately graded readiness review will be conducted to ensure that all the necessary activities have been completed and documented prior to the start of decommissioning operations. The purpose of the review is to minimize the possibility of halting the progress of decommissioning operations due to incomplete planning and preparation and to ensure safety during decommissioning operations.

The readiness review is necessary to ensure that all hazards have been identified, appropriate safety and health requirements have been met, and safety systems and controls are in place and capable of performing their intended functions. DOE-STD-1120-98 provides further guidance on, and a checklist for, performing readiness reviews prior to initiating decommissioning projects.

It is possible that a project may have more than one readiness review to cover portions of the project that are separated in time (e.g., acquisition of the performing contractor and the completion of its manuals and training programs, followed by the acquisition of a specialty subcontractor and the completion by it of the detailed procedures applicable to its work.) It also is possible that not all items need to be complete before work can start. For example, operating procedures for one group of activities may be needed for the start of the work while others may not need to be prepared until later in the course of project activities. It should be the judgment of the review group as to which items need to be complete for a particular stage of readiness for the project. In any case, the decommissioning scoping document or preliminary project plan (and subsequently, the decommissioning project plan) should identify the specific approach to readiness reviews that will be followed for the project.

The readiness review should be conducted by an organization that is not directly involved with the day-to-day management of the decommissioning project. The results and conclusions of the review should be documented by the reviewer and include a list of open items that must be completed before and after the start of decommissioning operations.

In scheduling the project activities, a period of time (approximately one month) should be considered between the readiness review and the start of decommissioning operations. This will allow for the completion of any open items identified in the readiness review.

4.5 Decommissioning Operations

Step 18 - Conduct Action to Decommission Facility - This step is the performance of the field work to achieve the end-points stated in the decommissioning project plan or equivalent. During decommissioning operations, provisions of the HASP and the technical specification of the decommissioning project plan or equivalent must be followed to assure that field operations are protective of workers, the public and the environment, consistent with the graded approach. During decommissioning operations, all wastes generated must be handled in compliance with all applicable regulatory requirements.

A change management process should be in place to ensure that safety controls are current, adequate, and documented as decommissioning progresses. Section 3.4.2 of DOE-STD-1120-98 provides guidance on management of change to address worker protection and facility safety throughout the decommissioning project.

The safety and health performance indicators developed in the planning phase and documented in the decommissioning project plan should be monitored regularly to ensure that they are being met and that timely corrective action is taken if end-points are not being met. Section 3.5 of DOE-STD-1120-98 provides additional guidance on safety and health performance feedback and evaluation.

Step 19 - Conduct S&M Phase-Out - During field operations, S&M activities will be continued until phased out in the planned manner. See DOE G 430.1-2 for applicable guidance.

Step 20 - Close Out Project and Complete Decommissioning Project Final Report - This step comprises project close-out activities. This includes conducting final facility (or portions thereof) surveys to demonstrate that decommissioning end-points have been achieved. Decommissioning will be completed by conducting final radiation and chemical surveys to demonstrate that the project end-points (which shall be consistent with DOE 5400.5 and appropriate non-radiological contamination criteria) have been achieved. S&M activities will cease with the achievement of decommissioning end-points, unless required for long-term remedial action or continuing site control pending release or transfer of the property or facility.

Independent verification may be required to verify that the decommissioning end-points have been achieved. Independent verification is necessary for:

(1) Facilities that are to be released for unrestricted use.

(2) Decommissioning projects in which DOE has sole responsibility for the closure documents. These include:

- Removal actions conducted under CERCLA where neither the U.S. Environmental Protection Agency nor the state signs the closure document and where no further action will be required to remediate the site under CERCLA remedial action.

- C Decommissioning projects performed under DOE Atomic Energy Act authority, rather than under CERCLA, RCRA, NRC, or Agreement State authority.

A decommissioning project final report or equivalent must be prepared, consistent with the graded approach, after all technical work has been completed and verified. The final report describes decommissioning activities; accomplishments; final facility status; and lessons learned, including evaluation and feedback on the safety management system.

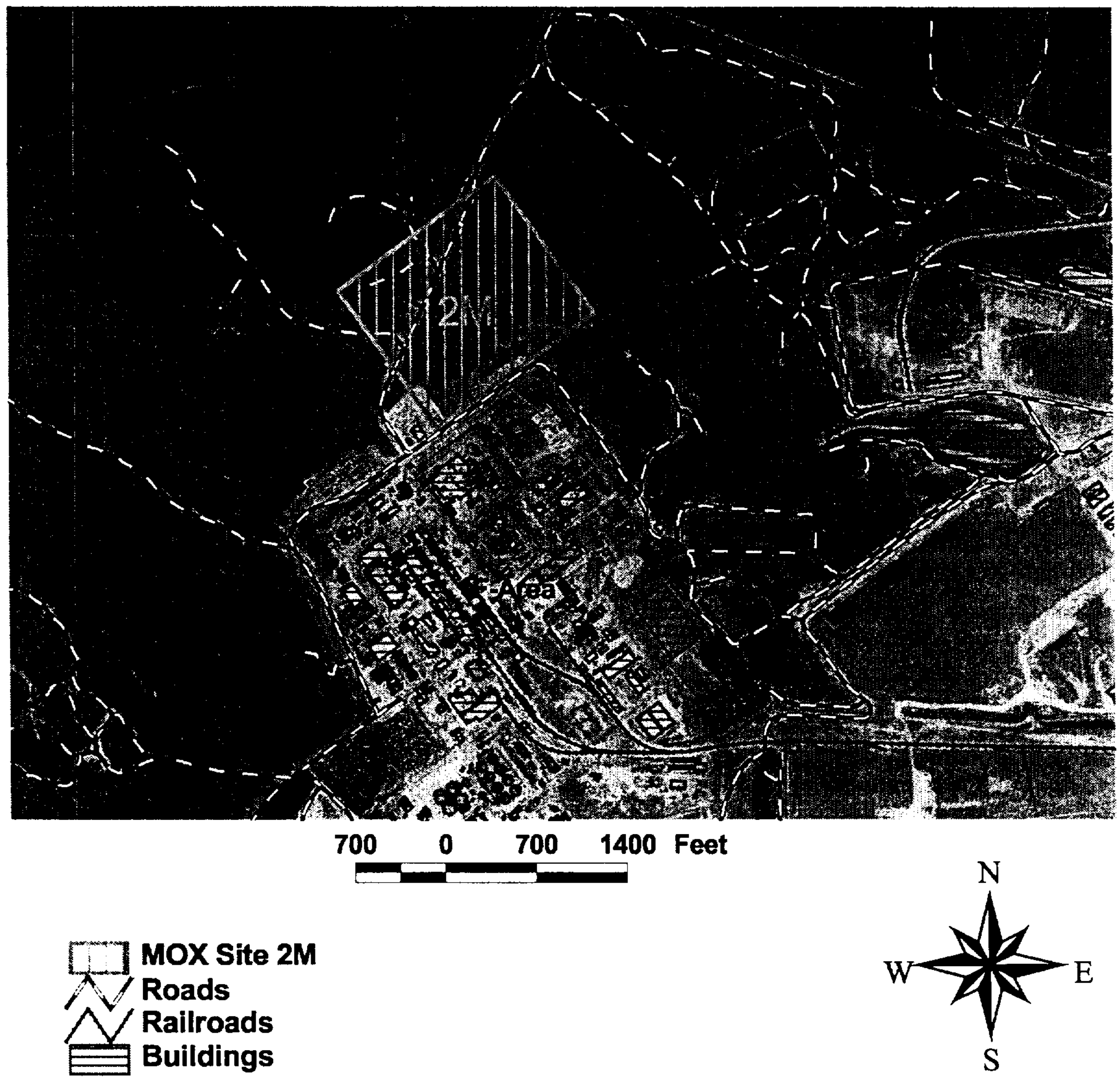
4.6 Post-decommissioning Action

Decommissioning will not always be the final action, particularly at NPL sites where follow-on remedial action for soils and water bodies often is required to complete the cleanup. When this is the case, follow-up responsibilities will be included in ongoing remedial action programs. Another type of post-decommissioning action that may be necessary is long-term monitoring of the site, whether or not additional remedial action is performed.

Step 21 - Further Action Required. - This step entails evaluating whether or not further action is required, and, if so, what that further action will be.

Step 22 - Establish Long-term Monitoring and/or Transfer to Remedial Action - Additional action may include long-term monitoring, if appropriate; transfer to site remedial action for final cleanup of adjacent soil or ground water; continuing site control activities, as necessary, pending property or facility release or transfer to another authorized party; or administrative action consistent with the decommissioning end state and/or site plan.

MOX Site 2M Location



ATTACHMENTS FOR RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION FOR THE DUKE COGEMA STONE & WEBSTER (DCS) MIXED OXIDE (MOX) FUEL FABRICATION FACILITY (FFF) ENVIRONMENTAL REPORT (ER)

General Comments

2-1	Digital GIS layers for roads
2-2	Digital GIS layers for railroads
2-3	Digital GIS layers for F Area

Specific Comments

2-1	DOE G 430.1-4, *Decommissioning Implementation Guide.*
2-2	DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement,* DOE/EIS-0283, Not available electronically
4-1	*SRS Waste Management Final Environmental Impact Statement* (DOE/EIS-0217) http://nepa.eh.doe.gov/eis/eis0217/eis0217_toc.html
4-2	HLW-2001-00040, *SRS High Level Waste System Plan*, Revision 12, March 2001.
5-1	DCS-FQ-1999-001, Rev. 2, Fuel Qualification Plan, April 2001
5-2	D. G. Kolman, M. E. Griego, C. A. James, and D. P. Butt, *Thermally induced gallium removal from plutonium dioxide for MOX fuel production,* Journal of Nuclear Materials 282 (2000) 245-254.
6-1	Department of Energy-Chicago Operations Office, "HEPA Filter/Sand Filter Alternatives Analysis", Final Report, January 19, 2001
8-1	*SRS Waste Management Final Environmental Impact Statement* (DOE/EIS-0217) Located at http://nepa.eh.doe.gov/eis/eis0217/eis0217_toc.html
11-1	Land use along transportation routes
12-1	DOE/EH-0629, *DOE Occupational Radiation Exposure 1999 Report*
13-1	Old F-Area Seepage Basin Mixing Zone Application , WSRC-RP-97-39
13-2	OFASB well screen and survey information
13-3	OFASB well profile data
13-4	OFASB well analytical results including detection limits.
13-5	Figure of OFASB well locations
14-1	USGS - Upper three runs discharge data
14-2	WSRC-TR-2000-00450, Revision 0, *Natural Phenomena Hazards (NPH) Design Criteria and Other Characterization Information for the Mixed Oxide (MOX) Fuel Fabrication Facility at Savannah River Site* (U)
15-1	WSRC-TR-2001-00145, *Instream Biological Assessment of NPDES Point Source Discharges at the SRS,* 2000
16-1	SRS Urban Wildlife: Environmental Information Document" by Mayer and Wike (1997)
16-2	WSRC 1997, "SRS Ecology Environmental Information Document," WSRC-TR-97-0223, Aiken, SC

16-3	USDA Forest Service, 1999, "Savannah River Site Red-cockaded Woodpecker Management Plan,"
16-4	Davis, C.E., and L.L. Janecek, 1997, "DOE Research Set- Aside Areas of the Savannah River Site," SRO-NERP
18-1	SRS Archaeological Programmatic Memorandum of Agreement (1990)
18-2	1994 archaeological survey for lands within or near F-Area
18-3	data recovery plan for the National Register of Historic Places (NRHP)-eligible site.
18-4	Concurrence letter from the State Historic Preservation Officer (SHPO)
19-1	listing of number of employees for each SRS contractor by county and/or zip code
21-1	"Surplus Plutonium Disposition (SPD) Environmental Data Summary", ESH-EMS-2000-849, Rev 0
24-1	Output and assumptions used in the MOBILE5b and PART5 code runs
30-1	Maximally Exposed Offsite Individual Location Determination for NESHAPS Compliance", WSRC-RP-2000-00036, January 2000
31-1	National Nuclear Security Administration, Office of Fissile Materials Disposition, Distribution Draft *Report to Congress on the Projected Life-Cycle Costs of the U.S. and Russian Fissile Materials Disposition Programs*, March 30, 2001.
32-1	1992 Onsite Worker Population for PRA Applications," WSRC-RP-93-197, by J.M. East
36-1	Biwer et al., 1997, "Transportation Impact Analyses in Support of the Depleted UF_6 Programmatic Environmental Impact Statement"
38-1	Additional Source Term Data
41-1	MACCS2 & ARCON96 Inputs and Assumptions
41-2	MACCS2 Meteorological Data
44-1	Sutcliffe, W.G.; Condit, R.H.; Mansfield, W.G.; Myers, D.S.; Layton, D.W.; and Murphy, P.W. 1995 "A Perspective on the Dangers of Plutonium". UCRL-JC-118825. Livermore, California: Lawrence Livermore National Laboratory. Located at http://www.llnl.gov/csts/publications/sutcliffe/
44-2	Peterson, Vern L., *Deterministic Health Effects from Plutonium Inhalation*, 2001 ANS Annual Meeting, June 20, 2001.
48-1	**See Attachment 21-1,** "Surplus Plutonium Disposition (SPD) Environmental Data Summary" ESH-EMS-2000-849, Rev 0, 8/3/00
48-2	"Plutonium Disposition Program (PDP) Preconstruction and Preoperational Environmental Monitoring Plan", ESH-EMS-2000-897, Rev 0, 10/10/00
49-1	DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement,* DOE/EIS-0303D. Located at http://tis.eh.doe.gov/nepa/docs/deis/eis0303/eis0303d.html

49-2	DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement,* DOE/EIS-0283. Located at: http://nepa.eh.doe.gov/eis/eis0283/eis0283.htm
49-3	DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279. Located at: http://nepa.eh.doe.gov/eis/eis0279/eis0279.htm
49-4	DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement,* DOE/EIS-0082-S2D. Located at: http://nepa.eh.doe.gov/eis/eis0082S/eis0082s_toc.html
51-1	1997 "Nuclear Facility Environmental Radiation Monitoring Annual Report,"
52-1	*Nonnuclear Consolidation Environmental Assessment*, DOE/EA-0792, Not available electronically.
52-2	Final F-Canyon Plutonium Solutions EIS, DOE/EIS-0219. Located at: http://nepa.eh.doe.gov/eis/eis0219/eis0219_toc.html
52-3	Final Supplemental EIS, *Defense Waste Processing Facility*, DOE/EIS-0082-S. Located at: http://nepa.eh.doe.gov/eis/eis0082S/eis0082s_toc.html
52-4	Draft Programmatic EIS, *Tritium Supply and Recycling*, DOE/EIS-0161. Located at: http://nepa.eh.doe.gov/eis/eis0161/eis0161_toc.html
52-5	Draft EIS, Interim Management of Nuclear Materials, SRS, DOE/EIS-0220D. Final Available. Located at: http://nepa.eh.doe.gov/eis/eis0220/eis0220_toc.html
52-6	*Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final EIS*, DOE/EIS-0203. Located at: http://nepa.eh.doe.gov/eis/eis0203f/0203ftoc.html
52-7	*Disposition of Surplus Highly Enriched Uranium Draft EIS*, DOE/EIS-0240D. Final Available. Located at: http://nepa.eh.doe.gov/eis/eis0240/toc.htm
52-8	*Storage and Disposition of Weapons-Usable Fissile Materials Draft EIS*, DOE/EIS-0229. Not available electronically.
52-9	*Draft Programmatic EIS for Stockpile Stewardship and Management,* DOE/EIS-0236. Located at: http://nepa.eh.doe.gov/eis/eis0236/eis0236.htm
54	DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement,* DOE/EIS-0303D. Located at: http://tis.eh.doe.gov/nepa/docs/deis/eis0303/eis0303d.html
55-1	DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement,* DOE/EIS-0303D. Located at: http://tis.eh.doe.gov/nepa/docs/deis/eis0303/eis0303d.html
56-1	**See Attachment 36-1**, Biwer et al., 1997, "Transportation Impact Analyses in Support of the Depleted UF_6 Programmatic Environmental Impact Statement

DUKE COGEMA
STONE & WEBSTER

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

12 July 2001
DCS-NRC-000053
Response Requested: *No*

Subject: Docket Number 070-03098
Duke Cogema Stone & Webster
Mixed Oxide Fuel Fabrication Facility
Responses to the Request for Additional Information
on the Environmental Report

Reference: T.H. Essig (NRC) letter to R.H. Idhe (DCS), dated 08 June 2001, "Request for Additional Information on the Duke Cogema Stone & Webster (DCS) Mixed Oxide Fuel Fabrication Facility Environmental Report"

As requested in your 08 June 2001 letter, please find attached our response to your request for additional information on the Mixed Oxide Fuel Fabrication Facility Environmental Report. In addition to the responses, ten compact discs are enclosed with this letter. Each compact disc contains the responses, a list of the attachments referenced in the responses, the attachments arranged by question and response, and proposed revisions to the Environmental Report text. DCS is not revising the Environmental Report at this time, however, DCS plans to revise it later this year to incorporate these changes.

To facilitate your review, the compact discs also contain a copy of the Adobe reader software to ensure that the files can be read.

If you have any questions, please call me at (704) 373-7820 or Mary Birch at (704) 382-1401.

Sincerely,

Peter S. Hastings, P.E.

Licensing Manager

PO Box 31847
Charlotte, NC 28231-1847

400 South Tryon Street, WC-32G
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Enclosures: 1.) Responses to MFFF ER Request for Additional Information

2.) A Compact Disc containing a copy of the responses, a list of the attachments referenced in the responses, the attachments arranged by question and response and proposed revisions to the Environmental Report text.

xc w/ CDs: B. Jennifer Davis, USNRC/HQ – 10 CDs
Kirk E. LaGory, ANL – 2 CDs

xc w/o CDs: Charlotte E. Abrams, USNRC/HQ
Mary L. Birch, DCS
Theodore J. Bowling, DCS
Edward J. Brabazon, DCS
Jack P. Clemmens, DCS
Thomas H. Essig, USNRC/HQ
Sterling Franks, USDOE/SR
Joseph G. Giitter, USNRC/HQ
Robert H. Ihde, DCS
James V. Johnson, USDOE/MD
Timothy C. Johnson, USNRC/HQ
Eric J. Leeds, USNRC/HQ
John E. Matheson, DCS
Andrew Persinko, USNRC/HQ
Robert C. Pierson, USNRC/HQ
Donald J. Silverman, Esq., DCS
Jon H. Thompson, USDOE/MD
Thomas E. Touchstone, DCS
PRA/EDMS: Corresp\Outgoing\NRC\Licensing\DCS-NRC-000053

RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION FOR THE DUKE COGEMA STONE & WEBSTER (DCS) MIXED OXIDE (MOX) FUEL FABRICATION FACILITY (FFF) ENVIRONMENTAL REPORT (ER)

GENERAL COMMENTS

1. The ER does not include a section on potential mitigative actions in the unlikely event of a severe accident. General Savannah River Site (SRS) site-wide emergency management plans and MOX FFF-specific emergency management plans should be provided. Provide a copy of DCS and/or SRS Emergency Preparedness Plans and/or appropriate plans that would cover a MOX fuel transportation accident. Also, identify and briefly describe local emergency plans for the surrounding communities of Aiken, North Augusta, and Augusta that would address a MOX-related accident either at SRS or on local roadways.

Response:

Potential mitigative actions to be taken in the unlikely event of a severe accident at the MOX Fuel Fabrication Facility (MFFF) are not addressed in the emergency plans specified nor is an MFFF emergency plan required under 10 CFR Part 70. 10 CFR Part 70 and the MOX SRP guidance (NUREG-1718) establish the categories of accidents to be considered for safety analysis for the MFFF. The term "severe accident" is not defined in 10 CFR Parts 51 or 70 or in NUREG-1718. On March 23, 2000, the NRC Staff recommended that NUREG-1555 be used as guidance for format and level of detail guidance in the development of the MFFF Environmental Report. The term "severe accident" is used in NUREG-1555 but its use in that document seems based solely on application to reactors as indicated by its focus on core-damage frequency, containment failure, and IPE/IPEEE results.

In contrast, 10 CFR Part 70 provides a set of consequence- and likelihood-based criteria for determining acceptability of the plant's safety design bases. For the MFFF, event likelihoods are defined qualitatively; credible events have been identified and either mitigated or prevented, as discussed in Section 5.5 and Appendix F to the Environmental Report (ER) and Chapter 5 of the Construction Authorization Require (CAR). As part of the CAR, the events considered bounding were assessed under the assumption that all preventative measures failed. Even under these extremely conservative assumptions, the postulated consequences are still significantly below the threshold in 10CFR70.22(i)(1) requiring submittal of an Emergency Plan for NRC approval as part of the license application.

For this reason, an MFFF-specific Emergency Plan has not been developed. A facility-specific annex to the Savannah River Site Emergency Preparedness Plan will be developed as part of integration activities with the site[1].

The general DOE Savannah River Site (SRS) Emergency Plan, a large multi-volume document, does not currently include any provisions specific to the MFFF. Consequently we have not included a copy of the document with this response.

The SRS emergency plan does not address transportation accidents for MOX fuel shipments. The shipment of MOX fuel assemblies to mission reactors will be accomplished by DOE under Safe Secure Transport. Safe secure domestic transportation of all DOE controlled special nuclear material including the MOX fuel shipments is managed by the Office of Transportation Safeguards in Albuquerque, NM (DOE-AL). Consequently, emergency planning for Safe Secure Transport is conducted by the Office of Transportation Safeguards. The Office of Transportation Safeguards program has the administrative and courier personnel, special transport and escort vehicles, and a Security Communications Center required to carry out the total responsibility for the safe secure domestic transportation of all DOE-owned or controlled nuclear explosives and quantities of special nuclear material. The Office of Transportation Safeguards emergency plans do not contain provisions specific to MOX fuel shipments.

All of the local counties have Federal Emergency Management Administration funded emergency plans. The local emergency plans are general emergency plans and do not address MFFF-related accidents either at SRS or on local roadways. In fact, these plans treat the Savannah River Site no differently than any other industrial site with respect to hazardous materials. Generally, the local community plans address identification of shelters, emergency response facility activation and communication links, pre-established mitigation activities, etc., per the standard emergency plan format promulgated by the Federal Emergency Management Agency.

Action:

None.

2. The following Global Information System (GIS) information is needed to describe SRS existing conditions and conduct the impact assessment: (a) a roads digital layer, (b) a railroads digital layer, and (c) a F-Area digital layer or hardcopy map.

Response:

Digital layers for roads, railroads, and the F Area buildings and roads are provided in the attached Compact Disc (CD).

1 Note that NUREG-1718 (14.5.1A) does not call for submittal of an Emergency Plan (if required) or demonstration that an Emergency Plan is not required until the time of submittal of the application of license to possess and use SNM.

Attachment:

G2-1 Electronic only copy of GIS layer for roads.
G2-2 Electronic only copy of GIS layer for railroads.
G2-3 Electronic only copy of GIS layer for F Area buildings and roads.

Action:

None.

SPECIFIC COMMENTS

1. Section 1.2.1, F-Area Infrastructure Upgrades. Section 1.2 of the ER refers to augmented de-ionized water supplies necessary to support the MOX FFF. Explain what is meant by "augmented water supplies." If augmentation requires construction of new water treatment facilities, indicate their size and show locations on a site map.

Response:

The requirements of the MFFF will not exceed the deionized surplus capacity of the Savannah River Site (SRS).

The existing SRS F-Area de-ionized water distribution piping will simply be extended (*i.e.*, "augmented") from its present location to the southwest of the F-Area Fire Water Storage Tanks to the new MOX FFF. No new deionized water treatment facilities are planned at SRS by DOE to support other SRS activities. The deionized water system at SRS has sufficient capacity to provide the additional demands of the MOX MFFF without "augmenting" its capacity.

Action:

Revise ER Section 1.2.1 to change reference to "expand deionized water supply lines"

2. Section 1.2.8, Decommissioning of the Surplus Plutonium Disposition Facilities and Section 5.3 Deactivation. A general plan for decommissioning the MOX FFF is needed in sufficient detail to support a description of the process and impact analysis in the Environmental Impact Statement (EIS). (See also comments 35 and 50.)

Response:

As discussed in ER Section 5.3, DCS will deactivate the MFFF and terminate the license. The discussion in ER Section 5.3 gives a complete description of the deactivation that is in accordance with the DOE Directives. Should the National Nuclear Security Administration (NNSA) elect to not reutilize the decontaminated MFFF for a new Federal mission after completion of the surplus plutonium disposition mission, it will consider an appropriate decommissioning option, as identified in the *Surplus Plutonium Disposition Final Environmental Impact Statement*. Since the earliest possible MFFF decommissioning activity is more than 20 years from now, and since it is not the only option for this facility, NNSA has not been compelled to develop a detailed MFFF Decommissioning Plan. Principles associated with a MFFF Decommissioning Plan are found in DOE G 430.1-4, *Decommissioning Implementation Guide.*

Although a general plan for decommissioning has not yet been developed, NNSA has proposed four options for decommissioning this facility. A conservative approach is to assume that the facility will be decontaminated, dismantled, and the environment restored as presently being implemented at the Rocky Flats Environmental Technology Site (RFETS) near Denver, Colorado. Utilizing recent information from the RFETS decommissioning project, DCS has conservatively established the approximate MFFF decommissioned building area, MFFF glovebox volumes and MFFF glovebox weights. From these parameters, various waste quantities and disposal costs have also been estimated. The results of this evaluation are presented in detail in the response to RAI 50.

Attachment:

2-1) DOE G 430.1-4, *Decommissioning Implementation Guide.*

2-2) DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement* DOE/EIS-0283.

Action:

None

3. <u>Section 3.1.1, MOX Fuel Fabrication Building (1st Para., p. 3-2)</u>. The Environmental Report (ER) refers to Unclassified Controlled Nuclear Information (UCNI). It is our understanding that UCNI will not be applicable to the MOX FFF licensing review. Confirm if UCNI will or will not be used in the MOX licensing review.

Response:

The ER does not contain UCNI information. Information requested by NRC for the MOX licensing review that is provided by DOE may contain UCNI information. These UCNI documents may require declassification or programmatic negotiation between DOE and NRC to facilitate NRC receipt and handling of UCNI.

Action:

Revise ER to remove reference to UCNI information.

4. <u>Section 3.2.1, Plutonium Polishing</u>. Under 10 CFR 51.45(b)(1), the applicant's ER must address the impact of the proposed action on the environment. The ER provides no discussion on processing, handling, storage, and disposition of U-235 that will be produced in the aqueous polishing step. U-235 is a decay product of Pu-239. While it is present in low concentrations, a

significant quantity could be produced in the polishing of the 25.6 MT of surplus plutonium. Provide the environmental impacts from the processing, handling, storage, and disposition of U-235 produced in the aqueous polishing process.

Response:

ER Section 3.3.2.4 notes that all uranium removed from the process will be isotopically diluted to less than 1%, for criticality considerations, and combined with the liquid high alpha waste stream. Environmental impacts of this waste are included with the environmental impacts of the high alpha liquid waste.

Because the liquid high alpha waste is isotopically similar to the plutonium raffinate solutions from the F-Canyon, the liquid high alpha waste stream will be transferred to the F-Area Outside Facility where it will be pH adjusted or neutralized. The neutralized waste will be added to the SRS high level radioactive waste (HLW) tanks in the F Area. The SRS HLW system already contains large quantities of americium and uranium. This liquid high alpha waste stream will be blended with existing wastes in the HLW system for waste treatment. This treatment will result in the eventual production of additional high level waste canisters by the Defense Waste Processing Facility, an approximate 1% increase attributable to the introduction of the MFFF high alpha stream with its uranium content. Saltstone production would also increase by about 1%. The majority of the increase in DWPF vitrified waste canisters is attributable to the uranium in the high alpha liquid waste stream.

All transfers to the SRS HLW system will meet the DOE Waste Acceptance Criteria as approved at the time of transfer.

The environmental impacts associated with operation of the SRS HLW system, including accident evaluations, are described in the *SRS Waste Management Final Environmental Impact Statement* (DOE/EIS-0217). This EIS analyzed management and treatment of the approximate 35 million gallons of existing HLW, as well as additional quantities under various scenarios up to an additional 7.1 million gallons (EIS Section 2.4.2). With the MFFF expected to generate less than 48,000 gallons per year (gal/yr), the environmental impacts of treating the MFFF high alpha waste are bounded by existing analyses. SRS waste management staff have recently evaluated the impact of the MFFF liquid high alpha waste on the capacity of the HLW treatment system.

The HLW System Plan, Revision 12, issued March 2001, which is revised annually, documents the strategy of the HLW System to receive, store, treat and dispose of liquid high-level wastes generated at SRS. Section 10.6 of the System Plan describes the results of an evaluation of the impact of the MFFF liquid high alpha waste stream on the HLW System and concludes that the volume represents a minimal impact and the constituents within the waste stream are acceptable.

While several recent process and equipment problems associated with evaporator operations and storage of waste in the older style tanks have limited the current operational flexibility of the Tank Farms, there remains an adequate margin of safety for the protection of human health and the environment. With the MFFF scheduled to begin operation in FY07, the recent process and equipment problems will not limit the operation of the MFFF.

[Note: The volume of stripped uranium in the ER (68,000 gal.) is incorrect. The correct volume of stripped uranium is 35,140 gal/yr average with a maximum of 42,300 gal/yr during transition periods. The ER will be updated to reflect this correction.]

Attachments:

4-1) *SRS Waste Management Final Environmental Impact Statement* DOE/EIS-0217.

4-2) SRS High-Level Waste System Plan, Revision 12, issued March 2001

Action:

Update ER Table 3-3, 5-12, 5-15, 6-1 and associated text.

5. Section 3.2.1, Plutonium Polishing. Under 10 CFR 51.45(b)(3), the ER must contain alternatives to the proposed action. The applicant's ER discusses the aqueous polishing process for removing impurities from the plutonium feedstock. However, the ER provides no discussion of the dry process alternative developed by Los Alamos National Laboratory for removing gallium impurities. Based on comments received at the scoping meetings, NRC staff currently plan to evaluate both the dry and the wet process for plutonium polishing in the EIS. Information about the dry process at the same level of detail as the wet process should be provided to allow an analysis of the two options and comparison in the EIS.

Response:

As noted in the DOE *Surplus Plutonium Disposition Final Environmental Impact Statement* [DOE/EIS-0283] Section 1.7.2, page 1-13, although DOE originally considered the Thermally Induced Gallium Removal (TIGR) process, a dry process for gallium removal developed by Los Alamos National Laboratory, DOE concluded that the dry process would not meet the technical requirements for MOX fuel for the removal of gallium and other impurities. Since NEPA only requires consideration of those alternatives that are reasonable and will bring about the ends of the proposed action, *see, e.g., Citizens Against Burlington v. Busey*, 938 F.2d 190, 195 (D.C. Cir 1991); *Hydro Resources, Inc.* CLI-01-04, *slip op.* at 32 (2001), the dry process alternative is not discussed in the ER , and does not need to be addressed in the NRC's EIS.

To support the assertion that the TIGR process would not meet the technical requirements for MOX fuel, we note that the gallium content of the PuO_2 powder must be less than 120 parts-per-billion (p.139 of Attachment 5-1); gallium concentrations in TIGR produced plutonium oxide powder were about 22 ppm (Attachment 5-2). Furthermore, the TIGR process remains an experimental process requiring further testing to scale the process to production while ensuring uniform plutonium oxide powder physical characteristics such as particle size, surface area, chemical reactivity, and density (Attachment 5-2). DOE is no longer providing funding for continued work on the TIGR process.

The aqueous polishing process, however, is a proven technology that is known to remove impurities that might have adverse impacts on fuel fabrication or performance. In addition to removing gallium and impurities, the aqueous polishing process produces uniform plutonium oxide powder with the appropriate physical characteristics. The aqueous polishing process also removes the existing americium from the plutonium to permit fuel fabrication and at-reactor fuel handling to proceed with much lower operational radiation exposures. The TIGR process would not reduce radiation exposures.

Attachments:

5-1) DCS-FQ-1999-001, Rev. 2, Fuel Qualification Plan, April 2001.

5-2) D. G. Kolman, M. E. Griego, C. A. James, and D. P. Butt, *Thermally induced gallium removal from plutonium dioxide for MOX fuel production,* Journal of Nuclear Materials 282 (2000) 245-254

Action:

Revise ER Chapter 1 to include a section on "Alternatives Considered But Not Evaluated" and describe why the TIGR process was abandoned and not considered for the MFFF.

6. Sections 3.2.4 and 3.2.5, Section 5.2.10, Section 5.5.2.2, and Section 5.7.3.6. Under 10 CFR 51.45(b)(3), the applicant's ER must contain alternatives to the proposed action. The confinement systems are based on the use of high efficiency particulate air (HEPA) filters. A cursory discussion of the sand filter option is presented in Section 5.7.3.6, but this discussion lacks details of the environmental impacts during routine operations and during accidents. For example, in certain fire accidents, the use of a sand filter may reduce releases of radioactive materials. In addition, sand filters would generally not need replacement over the life of the MOX FFF, minimizing the impacts associated with periodic replacement of HEPA filters. Based on comments received at the scoping meetings, NRC staff currently plan to evaluate both HEPA filters and sand filters in the EIS. Present a complete evaluation of the environmental impacts of using sand filters in the confinement system as an alternative to the proposed action. The impacts should include a full life-cycle cost analysis.

Response:

A recent DOE study (Attachment 6-1) evaluates HEPA filters versus sand filters for the Pit Disassembly and Conversion Facility, one of the plutonium disposition facilities and the source of plutonium oxide feed for the MFFF. The DOE study concludes:

> SECTION 11, Safety Analysis of Alternatives – *Both alternatives as designed in this study provide an adequate safety class function of containment for prevention of offsite release impacts. However, the HEPA filter option requires additional safety class features (prefilters and fire screens) to comply with SRS fire safety parameters. The sand filter provides an additional margin of impact mitigation (unquantified) for large (study basis) fires. The sand filter decontamination factor is slightly less than that for the HEPA filter system, but both systems provide adequate decontamination efficiency (i.e., the Δ in DF is insignificant). Both systems provide adequate resistance to design basis seismic events. Both alternatives can be designed and qualified to … [seismic] criteria. The projected availability for both alternative systems is comparable.*

SECTION 8. Life Cycle Cost Analysis – The capital cost of the HEPA filter option is slightly lower (Δ $4M) than the sand filter, while the life cycle cost of the sand filter option is slightly lower (Δ $4M) than the HEPA filter configuration presented in this study. Overall, cost is not a significant distinguishing factor between the two alternatives.

SECTION 12. Environmental, Regulatory, and Permitting Implications – The differences in environmental impacts and permitting requirements identified in this study are not significant to influence the alternatives selection process. The sand filter would inundate more land area. The sand filter is not as efficient as the HEPA filter at controlling facility releases, but the difference is minor (both systems meet environmental requirements). Since the HEPA filter alternative provides complete site remediation, there is no post-closure care as with the sand filter alternative. The sand filter option will produce less LLW during the operation phase. ...[T]he sand filter option has no credible identified failure mechanisms.

SECTION 13. Decontamination and Decommissioning Considerations – The D&D costs are not significantly different for either alternative, assuming all wastes are LLW (no TRU), and that sand filters will be entombed in place. If complete site remediation is required, the costs for sand filter D&D would be large.

DCS determined that HEPA filters were preferable for the following reasons:

- HEPA filters are used in the MELOX facility, which is the technical baseline for the MFFF.
- The MFFF HEPA filter system incorporates prefilters and spark arrestors to provide the additional safety class features to comply with SRS fire safety parameters.
- The MFFF has 340 separated fire areas, eliminating the possibility of a large facility-wide fire.
- HEPA filters are the nuclear industry standard for high-efficiency air cleaning, 99.97% for particulate matter.
- HEPA filters are identified in NRC Regulatory Guide 3.12 as being acceptable to the Regulatory staff for the design of ventilation systems for plutonium processing and fuel fabrication plants and, therefore, are considered "adequate to protect health and minimize danger to life and property."
- HEPA filters are covered by National standards.
- Sand filters have an increased performance risk. Failure of the filter to pass performance tests during startup and potential degradation of the sand filter during plant operations would expose the project to cost and schedule risks. These risks do not exist with HEPA filters.

See the response to RAI 60 for additional information on HEPA filter performance.

Attachment:

6-1) Department of Energy-Chicago Operations Office, "HEPA Filter/Sand Filter Alternatives Analysis", Final Report, January 19, 2001.

Action:

Expand ER Section 5.7.3.6 to summarize the evaluation of sand filters.

7. Section 3.3.2.7, Nonhazardous Liquid Waste. This section states that sinks, showers, etc., will be discharged to the sanitary sewer system. If the showers are ever used for the facility operators to wash themselves, describe what controls will be in place to ensure that contamination does not wash off of someone and into the sewer system. As has been shown in other locations at other fuel facilities, this can become a significant problem over time.

Response:

The only bathing showers, hand sinks, etc., subject to potential contamination within the manufacturing building are located in the shipping and receiving area and these will drain to the Aqueous Polishing area contaminated drain system (KWD) for transfer to SRS effluent treatment facility. All safety showers within the contamination zones of the manufacturing building will similarly drain to the contaminated drain system. There is no direct discharge to the sanitary sewer.

Only showers and sinks outside of the radiation area in the manufacturing building and support buildings will discharge to the SRS sanitary waste treatment facility. The operational Radiation Protection Contamination Monitoring and Control Program (described in CAR Chapter 9) ensures that showers and sinks outside of the radiation area will not be contaminated. This program requires personnel and equipment leaving contaminated areas to be monitored to ensure that they are not contaminated.

Action:

Revise ER 3.3.2.6 and 3.3.2.7 to reflect the discussion provided in the response above.

8. Section 3.3, Section 4.13, and Section 5.2.12. Under 10 CFR 51.45(b)(1), the applicant's ER must address the impact of the proposed action on the environment. The ER indicates that liquid and solid wastes will be transferred to the Department of Energy (DOE) for processing and management. The ER also provides general information regarding how DOE manages its waste streams, but provides no specific information on how MOX FFF wastes will be processed or managed. Although waste processing will not be a part of the DCS operations, it will produce environmental impacts that need to be considered in the EIS.

Describe how wastes generated by the MOX FFF will be processed. Provide information on the applicable environmental impacts from the processing, effluent releases, storage, and disposal operations applicable to solid transuranic wastes and the liquid high alpha waste stream, including those areas under DOE control.

Response:

Solid TRU Wastes:

The solid TRU wastes resulting from the MFFF will be processed along with other SRS TRU wastes in the existing SRS waste infrastructure and will meet the requirements of the applicable Waste Acceptance Criteria (WAC). This infrastructure is described and the environmental impacts evaluated in the *SRS Waste Management Final Environmental Impact Statement* (DOE/EIS-0217) over a wide range of waste volumes that could result from SRS operations. The *SRS Waste Management Final Environmental Impact Statement* evaluated three scenarios: a minimum generation scenario, an expected generation scenario, and a maximum generation scenario. Table 8-1 compares the MFFF waste generation to SRS waste generation. The MFFF TRU waste is estimated to be 132 cubic meters per year and to contain approximately 286 Curies of plutonium. Over 10-15 years, MFFF would expect to generate from 1,320 to 1,980 cubic meters of TRU waste. The forecast for SRS TRU waste generation over the next 30 years ranges from a minimum estimate of 5,794 cubic meters to 543,330 cubic meters with an expected forecast of 12,564 cubic meters (DOE/EIS-0217). The estimated MFFF TRU solid waste quantity is 10-15% of the expected SRS TRU waste generation and only a small fraction of the SRS maximum generation estimate. Consequently, the waste volumes generated from MFFF are small in comparison to the annual SRS volumes and are well within the bounds evaluated in the Waste Management EIS.

Liquid High Alpha Wastes:

The waste streams that comprise the liquid high alpha waste stream and are to be transferred to SRS for management include the americium stream, the alkaline wash stream, the excess acid stream and the stripped uranium stream. The total volume of these streams is estimated to be 175 cubic meters per year. The composite stream contains approximately 84,000 Curies of Americium-241 and 17 Curies of uranium and plutonium isotopes. This waste is isotopically similar to liquid raffinate waste produced from the F-Canyons and stored in the SRS high level radioactive waste (HLW) tanks. All transfers to the HLW system will meet the DOE Waste Acceptance Criteria as approved at the time of transfer. The SRS HLW system already contains large quantities of americium and uranium. The liquid high alpha stream will be neutralized and blended with existing wastes in the HLW system and will result in the eventual production of additional vitrified high level waste canisters by the Defense Waste Processing Facility (DWPF). These additional canisters represent an approximate 1% increase attributable to the introduction of the MFFF liquid high alpha stream with its uranium content. Saltstone production will also increase by about 1%.

The environmental impacts associated with operation of the SRS HLW system, including accident evaluations, are described in the *SRS Waste Management Final Environmental Impact Statement* (DOE/EIS-0217). This EIS analyzed management and treatment of the approximately 132,500 cubic meters (35 million gallons) of existing HLW, as well as additional quantities under various scenarios up to an additional 26,900 cubic meters (7.1 million gallons) (EIS Section 2.4.2). With the MFFF expected to generate about 175 cubic meters (46,300 gallons) per year, the environmental impacts of treating the MFFF high alpha waste are bounded by existing analyses. SRS waste management staff have recently evaluated the impact of the MFFF liquid high alpha waste on the capacity of the HLW treatment system.

The HLW System Plan, Revision 12, issued March 2001, which is revised annually, documents the strategy of the HLW System to receive, store, treat and dispose of liquid high-level wastes generated at SRS. Section 10.6 of the System Plan describes the results of an evaluation of the impact of the MFFF liquid high alpha waste stream on the HLW System and concludes that the volume represents a minimal impact and the constituents within the waste stream are acceptable.

While several recent process and equipment problems associated with evaporator operations and storage of waste in the older style tanks have limited the current operational flexibility of the HLW System, there remains an adequate margin of safety for the protection of human health and the environment. With the MFFF scheduled to begin operation in FY07, the recent process and equipment problems will not limit the operation of the MFFF.

Table 8-1 presents a comparison of the wastes generated by the MFFF to the waste volumes considered in the *SRS Waste Management Final Environmental Impact Statement* (DOE/EIS-0217).

Table 8-1 Comparison of Waste Generation for MFFF and SRS

Waste Type	**Current SRS Inventory**	**SRS Annual Generation**	**MFFF Annual Generation (per ER)**	**Future Waste Generation per WM EIS**		
				Minimum	**Expected**	**Maximum**
	yds^3 / (m^3)	yds^3 / (m^3)	yds^3 / (m^3)	yds^3 / (m^3)	yds^3 / (m^3)	yds^3 / (m^3)
TRU	9,125 (7,000)	564 (430)	210 (160)	7,586 (5,800)	16,500 (12,600)	710,000 (543,000)
Mixed LLW	9,220 (7,050)	1,484 (1,135)	trace[a] (<1)[a]	111,000 (85,000)	295,000 (225,000)	1,050,000 (805,000)
Hazardous	1,852 (1,420)	97 (75)	trace[b] (<1)	282,000 (216,000)	570,000 (434,000)	885,000 (677,000)
Non-Hazardous Solvent Recovery			2,800 gal (10.6)			
Low Level (solid)	3,113 (2,380)	13,100 (10,000)	104 (80)	480,000 (367,000)	620,000 (474,000)	1,840,000 (1,405,000)
Data Source	ER Table 4-27	ER Table 4-27	ER Table 5-12	SRS WM EIS, Appendix A		

a Source of MFFF Mixed LLW is laboratory waste not quantified at this time.
b Source of MFFF hazardous waste is parts washing facility not quantified at this time.

Attachment:

8-1) *SRS Waste Management Final Environmental Impact Statement* DOE/EIS-0217

Action:

Revise ER Section 5.2.12 to include information that waste management impacts are evaluated under the *SRS Waste Management Final Environmental Impact Statement* (DOE/EIS-0217).

9. Section 4.1.1, Site Location. In the first paragraph of section 4.1.1, note that the description of public access to the SRS area should include the fact that the NRC considers SRS workers who are not closely and frequently connected to the licensed activity and who are outside the MOX FFF restricted area and within the controlled area boundary to be "members of the public." Identify whether this definition affects the ER determination of impacts to workers, and describe how those impacts should change.

The NRC's policy on delineating members of the public in controlled areas is described in NRC Staff Requirements Memorandum SECY-98-038, "Hanford Tank Waste Remediation System Privatization Co-located Worker Standards."

Response:

During development of the revised 10 CFR Part 70 rule, SECY-98-038 (dated March 4, 1998) and SECY-98-185, Proposed Rulemaking - Revised Requirements for the Domestic Licensing of Special Nuclear Material (dated July 30, 1998) were consistent with respect to the co-located worker. However, SECY –99-147, Proposed Rulemaking - Revised Requirements for the Domestic Licensing of Special Nuclear Material, dated June 2, 1999, provided a subsequent draft of the proposed Part 70 rule in which the treatment of site workers not related to licensed operations was substantially changed. In Attachment 1 to SECY-99-147, Federal Register Notice – Proposed Rule (under Supplementary Information, II. Description of Proposed Action, Section 70.61(f)) it is stated that:

> "... the Commission recognizes that certain licensees may have ongoing activities at their site (i.e., within the controlled area) that are not related to the licensed activities."

Furthermore, in the final rule itself of September 18, 2000, at 10 CFR 70.61(f):

> "For the purpose of complying with the performance requirements of this section, individuals who are not workers, as defined in Sec. 70.4, may be permitted to perform ongoing activities (e.g., at a facility not related to the licensed activities) in the controlled area, if the licensee: ..."

The position of the Commission is further clarified in the statements of consideration (65 FR 56212, September 18, 2000, under Supplementary Information, II. Public Comments on

Proposed Rule, A. Performance Requirements and Design Criteria, Comment A.4) issued with the revision of 10 CFR Part 70 which state:

> "The licensee can set the controlled area at any location around its facility as long as it maintains control of the area as specified in Part 20 and retains the authority to exclude or remove personnel and property from the area. If the controlled area included the nearby Department of Energy (DOE) facilities, then NRC would consider the personnel working at those facilities to be 'workers' for the purposed of the performance requirements of Sec. 70.61, provided the conditions of Sec. 70.61(f)(2) are met."

As stated in Section 1.1.2.1 of the Construction Authorization Request, DCS intends to comply with the requirements of 10 CFR §70.61(f)(2). The treatment of SRS workers is consistent with the findings of NUREG-1708, July 1999, "External Regulation of Department of Energy Nuclear Facilities: A Pilot Program" (under Additional Issues, Co-located workers; note that the timeframe of this NUREG is the same as the SECY-99-147 rule development). Consequently, there is no restriction that "SRS workers who are not closely and frequently connected to the licensed activity and who are outside the MOX FFF restricted area and within the controlled area boundary ... be 'members of the public.'"

Action:

None

10. Section 4.1.1, Site Location, and Figure 4.2, Location of F Area and Controlled Area Boundary. Section 70.61(f) states that each licensee must establish a controlled area for which they retain the authority to exclude or remove personnel and property. The area that is defined by DCS in Section 4.1.1 includes areas within the SRS that the DOE does not currently control access by physical structures, such as gates, barriers or fences. This includes, for example, the area north of SCR 278 and the area southwest of SCR 125. Revise the description of the controlled area boundary to include only those areas to which DCS can limit access for any reason, and describe whether this revision would alter any of the ER assessments of impacts to the public.

Response:

The draft rule contained in SECY-98-185, *Proposed Rulemaking - Revised Requirements for the Domestic Licensing of Special Nuclear Material* (dated July 30, 1998), did include the definition for a physical barrier for (what was then called) the Controlled Site Boundary. However, the final rule (65 FR 56211) specifically did not include such a requirement. Rather, it included the provisions of 10 CFR §70.61(f), with which DCS intends to comply through the implementation of §70.61(f)(2). The subject of Controlled Site Boundary and Controlled Area was discussed in a March 24, 1999, public meeting concerning the Part 70 rulemaking. The transcript reveals that the NRC distinguished between a Controlled Site Boundary (i.e., consisting of physical barriers) and a Controlled Area. The deletion of the Controlled Site Boundary (requiring a physical barrier) occurred in SECY-99-147 (June 2, 1999) and the wording in the final rule is essentially the same as that in the June 1999 draft.

During normal conditions the public is permitted to travel along SCR 125 and 278 within the SRS boundary. Under emergency or special conditions traffic can be stopped by blocking access to these roads and removing personnel/vehicles from them.

With regard to the area north of SCR 278, the area is fenced, with one permanent secondary road and a few trails. Public access is allowed through this area to permit individuals to reach housing located north of the SRS property line from US Route 278. These access roads are not provided with barricades, but there are agreements in place with local law enforcement to isolate access through these roads whenever necessary.

With regard to the area southwest of SCR 125, the area is fenced and/or bounded by Savannah River and its swamps. In the northern portion of this area there are a series of gates that have been opened to allow access for hunting and recreation. There is a program in place to send vehicles with a distinctive siren into the area to warn individuals in the area. The gates are capable of being closed to isolate the area if needed.

DCS believes the controlled area boundary and the impacts to the public as described in the ER and the Construction Authorization Request are consistent with each other and the regulations, therefore, no revision is necessary.

Action:

None

11. Section 4.2, Land Use. The following land use documents will need to be consulted for updates to information provided in the Surplus Plutonium Disposition (SPD) EIS and ER:

a) Any applicable comprehensive planning documents prepared by the Lower Savannah River Council of Governments (comprising Aiken, Allendale, and Barnwell counties)
b) Existing land use information and planning documents for areas along the likely transportation routes from the MOX FFF to Catawba and McGuire reactor stations.

Response:

a) The Lower Savannah Council of Governments only prepares planning documents when funded by their client counties, the State of South Carolina, or the Federal government. Because of funding cuts there are no comprehensive planning documents available.

b) Available land use information for areas along the transportation routes are attached in Attachment 11-1.

Attachment:

11-1) Land use along transportation routes.

Action:

None

12. Section 4.11, Current Risk from Ionizing Radiation, and Table 4-25, Radiation Doses to Workers from Normal SRS Operations. With regard to the actual average Savannah River Site radiation worker total effective dose equivalent from normal operations of 156 mrem per year that appears in Table 4-25, clarify whether this dose is from external radiation sources only or from both external and internal sources.

The reference for the 156 mrem per year value that appears in Table 4-25 is the SRS External Dosimetry Technical Basis Manual. Therefore, it is not clear that the 156 mrem per year value includes the SRS radiation worker annual average 50-year committed effective dose equivalent from internally deposited radionuclides.

Response:

The dose of 156 mrem per year that appears in Table 4-25 does not include internal dose and is incorrect. The correct TEDE dose is 46 mrem/yr based on the *DOE Occupational Radiation Exposure 1999 Report* (DOE/EH-629). The Table has been revised to reflect the correct exposure numbers and references.

Attachment:

12-1) *DOE Occupational Radiation Exposure 1999 Report*, DOE/EH-0629.

Action:

Revise Table 4-25 to reflect the correct exposure numbers and references.

13. Section 4.4.3.3, Potential Sources of Groundwater Contamination. Describe any groundwater monitoring results, applicable to the existing proposed MOX FFF site, for radioactivity and hazardous chemicals, the location of monitoring wells, and the depth to well screens. Results should include data that are above and below Environmental Protection Agency Safe Drinking Water limits. Address any new understandings of the groundwater hydrology in the vicinity of the proposed MOX FFF. Address any predicted impacts from the remediated seepage basin.

Response:

As described in Section 1.3.4.6 of the MFFF CAR, the Old F-Area Seepage Basin (OFASB) is located just west of the MFFF site. The OFASB is a RCRA/CERCLA unit managed by SRS and regulated by SCDHEC and by US EPA. The Old F-Area Seepage Basin Mixing Zone

Application (WSRC-RP-97-39) (Attachment 13-1) describes the groundwater mixing zone application supporting closure of the seepage basin.

Several groundwater monitoring wells near the OFASB have been in place for some time, while more distant OFASB compliance wells were installed more recently and were not initially sampled until late 2000. Well screen and survey information is provided in the attached Attachment 13-2 for all wells associated with the OFASB, including the aquifer zone designation for the screen zone. Attachment 13-3 provides profiles of the wells including location of the screens. Finally, OFASB groundwater monitoring results that have previously been submitted to SCDHEC are provided in Attachment 13-4 for all detected hazardous and radioactive constituents. Attachment 13-4 provides all of the analytical results for all detected hazardous and radioactive constituents for the period 1997 through 2000 for the FNB-series wells, including detection limits.

The predicted fate and transport of shallow groundwater contaminants near OFASB were examined as part of the OFASB Mixing Zone Application (WSRC-RP-97-39). SRS has obtained no new or different understanding of the shallow groundwater systems near OFASB since the Mixing Zone Application was completed.

In January 2001, the results of the first round of groundwater sampling for the compliance wells indicated concentrations of H-3, I-129, Sr-90, and nitrates above Drinking Water Standards in several wells. Other radioactive and non-radioactive parameters measured were within Drinking Water Standards. In accordance with the mixing zone application, SRS has conducted a confirmatory second round of tests. Validated results are not yet available, but are expected in July 2001. SRS will evaluate the new analytical data and propose corrective actions, if appropriate, and report the results to SCDHEC and to US EPA. DCS will stay abreast of the progress of the OFASB monitoring program, and will advise NRC of these results. DCS will also use the information derived to assess the extent of monitoring needed for the MFFF site.

It is expected that the presence of the Old F-Area Seepage Basin (OFASB) and any associated plumes will have no impact on construction of the MFFF. The planned site construction, preparation, and development for the MFFF facilities will be confined to near-surface soils. Only surface grading and shallow excavation are anticipated to level the northwest area of the MFFF site for construction of parking lots, roads, and shallow spread foundations to support the Technical Support Building and Administration Building. Excavations will not extend at depth to the groundwater level. The planned construction activities are not anticipated to have any adverse effects on the existing aquifer systems beneath the MFFF site.

Since the MFFF is designed to transfer all process waste to SRS for treatment and no portion of the facility will be constructed within the confines of the water table aquifer, the MFFF operations are not anticipated to affect existing groundwater.

Attachments:

13-1) Old F-Area Seepage Basin Mixing Zone Application, WSRC-RP-97-39.
13-2) OFASB well screen and survey information.
13-3) OFASB well profile data.

13-4) OFASB well analytical results including detection limits.
13-5) Figure of OFASB well locatons.

Action:

Update ER Section 4.4.3.3 to reflect text from CAR.

14. Section 4.4, Hydrology. The following information is needed to characterize and update water use and surface water conditions on SRS and the vicinity. Where more current water use information or compliance statistics are available, include the data in your response. If the data mentioned below represents the most current information available, indicate that in the response.

a) Current water use from the Savannah River (1999 data shows 140 billion liters).
b) Current NPDES compliance statistics (listed as 99.8% compliant in 1995).
c) More current data for mean flow in Upper Three Runs Creek (in 1991, mean discharge was 240 cfs).
d) Information on the 500-year floodplain.
e) Current information on groundwater withdrawals for site (3.4 billion gallons per year reported for 1993).

Response:

a) Total water usage from the Savannah River in 2000 was 49.7 billion liters (13.1 billion gallons).

b) Compliance is expressed as a percentage of all analyses performed on outfalls (pH, temperature, oil & grease, total suspended solids, metals, etc.) that were in compliance with the NPDES permit. Current NPDES compliance statistics from 1996 through the present are:

1996	99.8%
1997	99.9%
1998	99.3%
1999	99.8%
2000	99.7%
2001	99.6% (through May)

c) This information is provided in Attachment 14-1.

d) Reference 14-2 reports calculated the flood levels as a function of return period (annual probability of exceedance) for the Upper Three Runs, Tims Branch, Fourmile Branch, and Pen Branch basins due to precipitation. The report concluded that the probabilities of flooding at A-, C-, E-, F-, H-, K-, L-, S-, Y-, and Z-Areas are significantly less than 10E-5 per year. Consequently, a 500-year flood plain has not been developed for SRS.

e) The amount of groundwater pumped from beneath SRS in 2000 was 2.1 billion gallons.

Attachments:

14-1) USGS Stream flow data for Upper Three Runs.

14-2) WSRC, 2000c. *Natural Phenomena Hazards (NPH) Design Criteria and Other Characterization Information for the Mixed Oxide (MOX) Fuel Fabrication Facility at Savannah River Site (U)*, WSRC-TR-2000-00454, Rev. 0, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC, November. **This attachment was provided to NRC as part of the MFFF ER References.**

Action:

Update ER Section 4.4 to reflect more recent data.

15. Section 4.6.1.2, Proposed Facility Location (Ecology). Provide more detailed information (i.e., from 1994 to the present), if available, on the fish community of Upper Three Runs and the aquatic community of Fourmile Branch. The requested information is needed to adequately describe and assess impacts to aquatic ecological resources.

Response:

The most recent ecological data for these streams are provided in *Instream Biological Assessment of NPDES Point Source Discharges at the SRS*, 2000 WSRC-TR-2001-00145 attached.

Attachment:

15-1) *Instream Biological Assessment of NPDES Point Source Discharges at the SRS*, 2000 WSRC-TR-2001-00145

Action:

None

16. Section 4.6.2.2, Proposed Facility Location (Ecology). If available, provide full copies of (1) "SRS Urban Wildlife: Environmental Information Document" by Mayer and Wike (1997) (the version accessible on the ER CD is an abridged copy), and (2) WSRC 1997, "SRS Ecology Environmental Information Document," WSRC-TR-97-0223, Aiken, SC (ER Admin. Record ER-PR-265), (3) USDA Forest Service, 1999, "Savannah River Site Red-cockaded Woodpecker Management Plan," and (4) Davis, C.E., and L.L. Janecek, 1997, "DOE Research Set- Aside Areas of the Savannah River Site," SRO-NERP.

Response:

Requested papers are included as Attachments 16-1 through 16-4.

Attachments:

16-1) SRS Urban Wildlife: Environmental Information Document" by Mayer and Wike (1997) (the version accessible on the ER CD is an abridged copy)

16-2) **Electronic only** - WSRC 1997, "SRS Ecology Environmental Information Document," WSRC-TR-97-0223, Aiken, SC

16-3) USDA Forest Service, 1999, "Savannah River Site Red-cockaded Woodpecker Management Plan,"

16-4) Davis, C.E., and L.L. Janecek, 1997, "DOE Research Set- Aside Areas of the Savannah River Site," SRO-NERP

Action:

None.

17. Section 4.7.1, General Site Description (Noise). The noise survey "Sound-Level Characterization of the Savannah River Site," NUS Report No. NUS-5251 was written in August 1990. If a more recent noise survey is available, provide it so the survey data can be updated.

Response:

The 1990 report is the most current data.

Action:

None

18. Section 4.8, Regional Historic, Scenic, and Cultural Resources. To complete the MOX FFF EIS we will need the following cultural and paleontological resources information. The following information is necessary to support the cultural resources impact analysis of the MOX FFF, support facilities, and site infrastructure upgrades:

a. The SRS programmatic memorandum of agreement (1990) that stipulates how cultural resources are to be managed at SRS.
b. The 1984, 1993, and 1994 archaeological surveys for lands within or near F-Area, and the results of any other recent surveys of the area that were not explicitly mentioned in the ER.
c. The data recovery plan for the National Register of Historic Places (NRHP)-eligible site.
d. Concurrence letters from the State Historic Preservation Officer (SHPO) and other related consultations regarding the surveys and data recovery activities taking place in F-Area.
e. Summary of consultations with Native American groups, especially responses from these groups to the letters sent out for the SPD EIS.

Response:

a) The SRS programmatic MOA with the SHPO is Attachment 18-1
b) The 1984 and 1993 archaeological surveys are preempted by the 1994 survey and are not included. The 1994 survey is included as Attachment 18-2.
c) The data recovery plan is included as Attachment 18-3.
d) The concurrence letter from the SHPO is included as Attachment 18-4
e) Copies of the letters from DOE to Native American Groups can be found in Appendix O of the DOE *Surplus Plutonium Disposition Final Environmental Impact Statement* (DOE/EIS-0283). The absence of written responses is because none of the Native American organizations responded to the inquiries. The DOE *Surplus Plutonium Disposition Final Environmental Impact Statement* notes on page 4-287 that, "Consultations with Native American groups indicate that it is unlikely that any significant Native American resources would be damaged."

Attachments:

18-1) SRS Archaeological Programmatic Memorandum of Agreement (1990)
18-2) 1994 archaeological survey for lands within or near F-Area
18-3) data recovery plan for the National Register of Historic Places (NRHP)-eligible site.
18-4) Concurrence letter from the State Historic Preservation Officer (SHPO)

Action:

None

19. Section 4.9.1, Permanent Residents. Current information is needed on residential locations by community and county for all DOE, and Westinghouse SRS employees. This information is necessary to support the economic impact assessment of MOX FFF.

Response:

A listing of number of employees for each SRS contractor by county and/or zip code is included as Attachment 19-1.

Attachments:

19-1) Listing of employees for each SRS contractor by county and/or zip code

Action:

None.

20. Section 5.1.1, Land Use. This section indicated that the SRS and M & O contractor had not designed the F-Area Outside Facility needed to support the processing of liquid high alpha waste. Provide information on the approximate size and location of the F-Area Outside Facility. Describe the vegetation and topographic conditions of the site. Provide information on the location, width and length of the right-of-way to be disturbed for the double-walled pipeline leading from the MOX FFF to the F-Area Outside Facility.

Response:

The design of the F-Area Outside Facility for the treatment of MFFF liquid high alpha waste has not progressed to a significant level at this time. The following information is very preliminary.

Based on preliminary conceptual design, the new neutralization capability required to support the transfer of MFFF liquid high alpha waste into the existing SRS waste management system is to be built in a flat, paved portion of the F-Area Outside Facilities in north-central F-Area adjacent to the F-Canyon in an industrial area of the SRS. The facility is anticipated to consist of a 10,000-gallon tank (approximately 12'dia. X 12' high) tank in an approximately 18' X 18' X 18' concrete containment vault with a stainless steel liner and sump. The tank will be supplied with a removable top center mounted mixer/agitator. The top of the vault will be removable to allow tank replacement. An adjoining 550-gallon removable/transportable stainless steel tank in a 9' X 12' X 2' high spill containment dike is anticipated to be constructed above grade to store depleted uranium for potential use in making final adjustments to the uranium content of the waste.

MFFF liquid high alpha waste is anticipated to be pumped by MFFF area pumps to the neutralization tank through a 2200-ft long double-walled pipeline. Although not finalized, the route for the pipeline is anticipated to be from the southwest corner of the MFFF site south to an existing utility corridor on the north side of the existing F-Area perimeter roadway, west to a point roughly north of the F Canyon and then south to the F-Area Outside Facility. The width of the disturbed area for the right-of-way is expected to be less than 25 ft. This results in a total disturbed land area of less than 1.5 acres.

Action:

Update ER 5.1.1 to reflect land use impacts of F-OF.

21. Section 5.1, Land Use. Provide F-Area environmental characterization data (e.g., soil, surface water or groundwater sampling data) with specific emphasis on areas which would be excavated for the MFFF. The ER provides only qualitative statements about environmental data for the proposed site. These data are needed for the EIS evaluation of potential impacts of construction and operation of the MOX FFF on health of workers.

Response:

As part of the DOE preconstruction monitoring program for the Surplus Plutonium Disposition Project a summary of available environmental data in the F Area was prepared. The *Surplus Plutonium Disposition (SPD) Environmental Data Summary*, ESH-EMS-2000-849, Rev 0 is provided as Attachment 21-1.

Attachment:

21-1) *Surplus Plutonium Disposition (SPD) Environmental Data Summary*, ESH-EMS-2000-849, Rev 0

Action:

None

22. Section 5.1.3, Water Use and Quality. The discussion in this section suggests that current discharge structures may need to be increased to handle incremental wastewater and process discharge volumes produced by MOX FFF, the Pit Disassembly and Conversion Facility (PDCF) and Plutonium Immobilization Plant (PIP). Provide approximate locations for any new outfalls anticipated. This information is necessary to evaluate water quality effects downstream of the discharge locations.

Response:

The existing stormwater outfalls and drainage ways that are located between the MFFF and F-Area will need to be relocated due to construction of the MFFF. A retention/detention basin would likely be located east of the MFFF and north of the PDCF along the path of the existing discharge to the unnamed tributary of Upper Three Runs, upstream of the designated wetlands area. Preliminary design of this basin has a surface area of approximately 3 acres and a maximum depth of 30 feet. The only anticipated release other than normal stormwater will be clean condensate from the HVAC and steam line. The condensate, with a volume of less that 20 gallons per minute, will be piped to the stormwater collection system where it is anticipated to have a negligible impact.

Action:

None

23. Section 5.1.3, Water Use and Quality. Estimate the number of retention ponds designed to control stormwater runoff that would be constructed. Describe the size, depth, and design/landscaping characteristics of these ponds. Would these ponds be expected to contain water throughout the year?

Response:

Existing preliminary site development information for all three projects is used to address this question. The PIP, because of its location relative to the other projects would require its own storm water detention and/or retention pond. The size and location of this pond has not been determined yet.

As noted in the answer to RAI 22, the existing stormwater outfalls and drainage ways that are located between the MFFF and F-Area will need to be relocated due to construction of the MFFF. A retention/detention basin would likely be located east of the MFFF and north of the PDCF along the path of the existing discharge to the unnamed tributary of Upper Three Runs Creek, upstream of the designated wetlands area. Preliminary design of this basin has a surface area of approximately 3 acres and a maximum depth of 30 feet.

Action:

Update ER 5.1.3 to reflect the additional data

24. Section 5.1.4, Air Quality (Construction). The footprint of the MOX FFF, and the associated emissions differ in the SPD EIS, the ER, and the data calls. To ensure that the data being used are consistent with the latest design studies and to provide a basis for independently checking construction emissions the following information is needed:

a) The maximum area disturbed at one time during construction of the MOX FFF and its support facilities, or the total area expected to be disturbed during construction,
b) Measures to be used to control dust generation during construction (may be specified in the Construction Emissions Control Plan),
c) The activity levels and emission factors used to estimate diesel equipment emissions,
d) The throughput for the concrete batch plant and confirmation that its use is still anticipated,
e) The assumptions and activity levels used to estimate vehicle emissions using MOBILE5b and PART5 including vehicle miles traveled (VMT) estimates for the workforce and shipments.

Response:

a) In the Environmental Report, 31 acres per year was the disturbed area used to calculate fugitive dust emission. Additional design work enlarges the affected area to the equivalent of approximately 81 acres. This acreage includes roads and the new electric transmission corridor but does not include additional disturbances for other utility corridors. The disturbed area associated with these corridors will only contribute to fugitive dust emissions for a short period of time during construction and so the use of 31 acres is a good nominal value for an annual average over the construction period.
b) Our calculations assumed 50% control of dust emissions from heavy construction operation, based on the use of watering trucks.
c) The emission factors used to estimate diesel equipment emissions are as follows:

	CO	NO_x	PM	SO_2	HC
Emission Factor (kg/1000 liters)	14.22	36.72	2.809	3.735	2.906

d) The annual fuel usage used for the construction diesel equipment emissions is estimated to be 580,000 gallons per year (2,195,300 liters).

e) The throughput used for the anticipated concrete batch plant to estimate the emissions is 110,000 cubic yards per year.

f) The estimate of vehicle miles traveled (VMT) used for the workforce and shipment vehicle emissions estimates is 4,071,000 miles per year. The assumptions used in the MOBILE5b and PART5 code runs are contained in the output in Attachment 24-1. The emission factors used for the workforce and shipment vehicle emissions are as follows:

Vehicle Emissions (g/mi) – MOBILE5b and PART5

Month	VOC	CO	NOx	PM
Jan	1.14	10.086	2.558	
Feb	1.11	9.635	2.519	
Mar	1.06	8.64	2.429	
Apr	1.048	7.798	2.352	
May	1.074	7.269	2.299	
Jun	1.145	7.336	2.309	
Jul	1.196	7.414	2.315	
Aug	1.156	7.372	2.312	
Sep	1.1	7.29	2.304	
Oct	1.045	7.768	2.349	
Nov	1.061	8.716	2.436	
Dec	1.11	9.635	2.519	
Ann Avg (g/mi)	1.104	8.247	2.392	8.44 (paved road fleet average)

Attachments:

24-1) Output and assumptions used for MOBILE5 and PART5 code runs.

Action:

None.

25. Section 5.1.4, Air Quality (Construction) and Section 5.2.4, Impacts on Ambient Air Quality (Operation). To provide a basis for the independent verification of revised SRS MCB results, the following inputs for the ISC model runs used to produce the revised SRS MCB are needed:

a) The source path data,
b) The receptor path data, and
c) Receptor locations at which the SRS MCB values occurred.

Response:

a) The source path data for the ISC model runs used to produce the revised SRS MCB are provided in Attachment 24-1.

b) The receptor path data for the ISC model runs used to produce the revised SRS MCB were provided in Attachment 24-1.

c) Receptor locations at which the SRS MCB values occurred are as follows:

Averaging Period	Maximum Concentration (ug/m^3)	Receptor x (m)	Location y (m)
1 hr.	20.39038	430031.56	3677757.75
3 hr.	9.59511	431182.00	3676085.75
8 hr.	4.48858	431505.56	3675791.50
12 hr.	3.19546	432344.53	3674868.25
24 hr.	1.59981	432344.53	3674868.25
Annual	0.06489	430989.56	3676420.25

Action:

None

26. Section 5.1.10, Impacts from Ionizing Radiation. This section mentions that construction workers will be monitored for potential radiation exposure. Describe the monitoring program and whether it will be subject to NRC review and regulatory requirements.

Response:

The only workers during construction that are likely to receive a dose in excess of ten percent of the 10 CFR §20.1502 limits (i.e., the threshold beyond which individual monitoring or badging of workers for potential radiation exposure is required) are radiographers. Radiographers will be monitored or badged, in accordance with the contractor's existing NRC or agreement state license(s) to perform this work.

Action:

Update ER Section 5.1.10 to reflect additional clarification.

27. Section 5.1.11, Infrastructure. The statement is made in reference to infrastructure that "... upgrades include clearing and grading of all three sites, developing integrated stormwater flow patterns for all three sites, providing utility services to all three sites, and providing any new access roads". Details of these upgrades, particularly design and location information, are needed to support the impact assessment of areas disturbed during construction. How much land will be disturbed for new access roads needed for MOX FFF construction? Provide a map showing the approximate locations of new access roads. Also, provide the types of habitats these upgrades would be routed through.

Response:

Designs for the MOX MFFF and PDCF facilities are at varying design detail and design for the PIP facility has not been initiated. Therefore, infrastructure to support these facilities is at a preconceptual stage and subject to change. The following information represents current design and is subject to change in the final design.

Parking Areas:

Based on the current MOX and PDCF facility layout designs and the preliminary conceptual design for infrastructure, permanent parking areas for MOX and PDCF totaling approximately six acres will be located within the respective facility site boundaries. Temporary construction parking that may be needed will be confined to an area south of the PDCF site along the unpaved road connecting to the SRS Road E.

Roadways:

The preliminary design for the new F-Area perimeter connector roadway includes the following improvements:

- F-Area entrance road, widen approximately 2,200 feet of existing roadway from 22 to 49 feet (4-12 foot lanes plus 6 inches either side to prevent raveling).
- F-Area perimeter road to the entrance to the proposed parking area at the PDCF, widen and realign approximately 6,900 feet of existing road from 20 foot to 25 foot wide (2-12 foot lanes plus 6 inches each side to prevent raveling).
- New and realigned roadway from the PDCF parking entrance to E- Road, approximately 5,000 feet (2-12 foot lanes plus 6 inches each side to prevent raveling).

Because only 1,300 to 1,500 feet of the proposed roadway (in two pieces) is not in previously cleared road rights-of-ways, the total land area expected to be disturbed in connection with road work is less than 5 acres. See attached Figure 27-1, Site Infrastructure Development Concept.

Road upgrades for ingress and egress to the MFFF site will be conducted in existing traffic rights-of-ways. Relocation of the South Carolina Electric &.Gas power line, digital cable lines, telephone lines, and adjacent survey area includes flat sandy uplands, flanking slopes that transition to erosion ditches and a small stream bottom. Within these topographic areas, the following plant communities are noted; upland longleaf pine, successional mixed pine-hardwood, dry oak-pine slopes, mesic hardwood slope, moist-bottom mixed pine-hardwood forest and a series of early successional systems. Assessment of the general ecological conditions and potential wetland areas for the proposed plutonium disposition facilities found no wetland areas within proposed construction site, no endangered or threatened species and no rare or unique ecological resources.

Storm Water Detention/Retention:

Storm water detention/retention facilities are addressed in the response to RAI 23.

Utilities:

Utilities for the PIP, MFFF and PDCF will generally be routed along the existing F-Area Limited Area perimeter roadway – to the east and to the north of the road. This corridor also contains existing steam lines. The design of the utilities routing is still at the conceptual phase and will be developed in more detail with each facilities' design effort.

Power Line Relocation:

The existing 115KV transmission line entering F-Area from the north crosses the MFFF site and will be rerouted around the facility. The new route for the 115KV line will parallel the MFFF northern boundary and turn south at the eastern boundary of the PIP site. It will rejoin and follow the existing route across the F-Area perimeter road at a point south and west of the closed F-Area seepage basin. The power line relocation is expected to impact approximately 11 acres on the north and west sides of the MFFF site. The ecology of the impacted area is similar to the communities identified for the MFFF site.

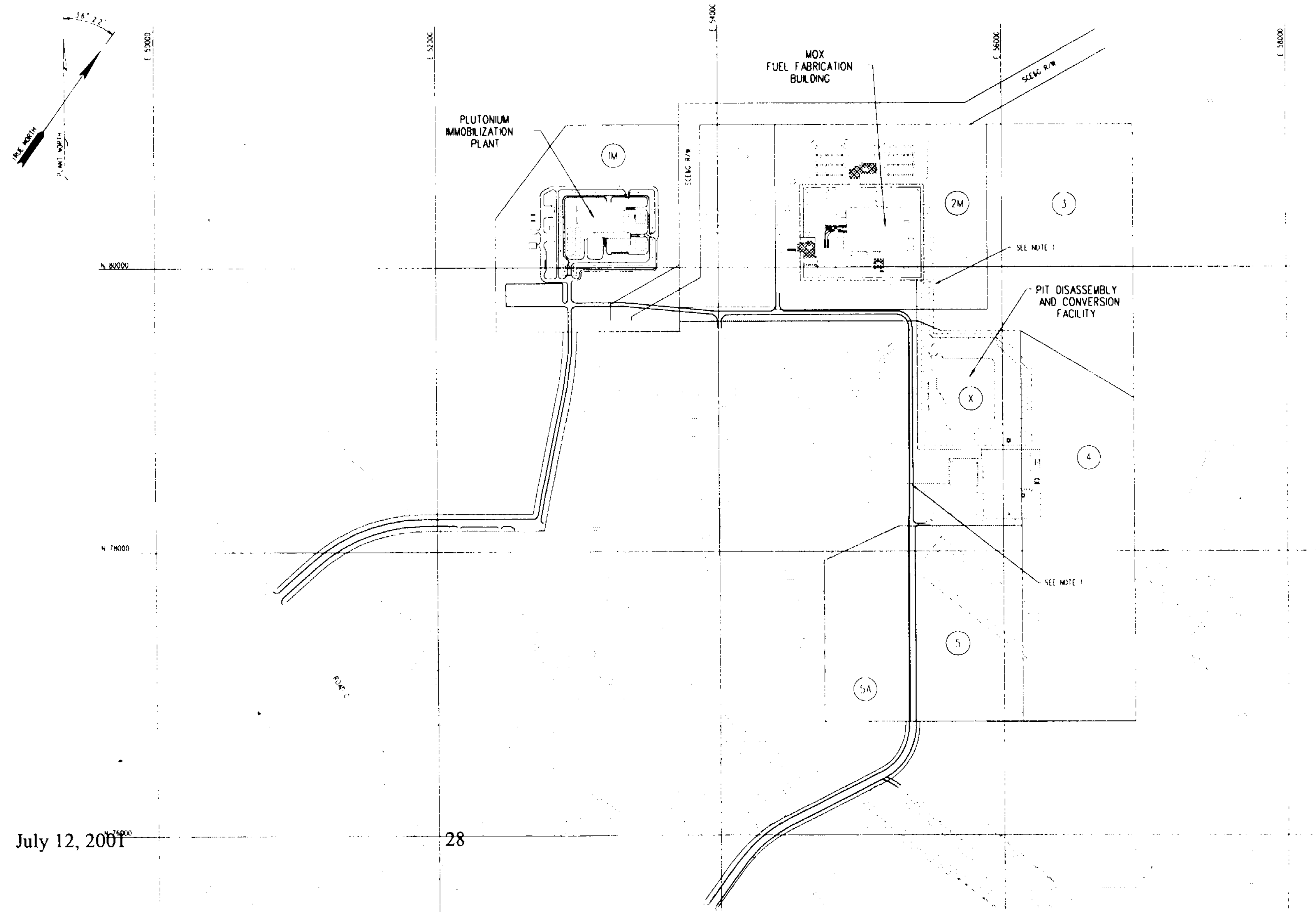

Figure 27-1 Site Infrastructure Development Concept

Action:

Update ER 5.1.11 to reflect infrastructure upgrades.

28. Section 5.2.3 Impacts on Groundwater Quality. There is no discussion on groundwater use for normal operations, although water use is indicated. Expected water use data should be provided and impacts on the groundwater system should be evaluated.

Response: MOX Facility water demands are estimated at:

	Average	Peak	Groundwater System
Process:	70 gpm	105 gpm	F-Area Service Wells (905-101F, 905-103F)
DI:	20 gpm	40 gpm	F-Area Service Wells (905-101F, 905-103F)
Domestic:	21 gpm	104 gpm	A-Area Domestic Wells (905-112G, 905-113G)

Assessment of Groundwater System Impact:

Minimal impact from groundwater use is anticipated. The amount of SRS groundwater withdrawals were reduced by approximately a third over the past 7 seven years, noted in the response to RAI 14e. The proposed additional withdrawals to MFFF will not cause a rise to equal or exceed that reported in 1993.

At SRS considerable quantities of well water are available from various wells. For example, F-Area: Wells 905-101F and 905-103F have a combined capacity in excess of 500 gpm and currently receive little use. Cleaning of the well screens could also substantially increase the output from these wells.

A-Area: Wells 905-112G and 905-113G were designed to produce up to 3000 gpm; this capacity is well above the SRS 754 gpm current (Year 2000) average usage rate.

Action:

Update ER 5.2.3 to reflect MFFF groundwater withdrawal and impact to aquifer.

29. Section 5.2.4, Impacts on Ambient Air Quality (Operation).

a) Operational emissions have changed between the ER, the SPD EIS, and some of the data calls. In addition, the SPD EIS states that no hazardous chemicals and no carcinogenic chemicals would be released as a result of operations. This may not be consistent with the list of input chemicals given in Table 3-2 of the ER which gives the carcinogen hydrazine as a required chemical. To ensure that the data being used are consistent with the latest design studies and to provide a basis for independently checking operational emissions and assessing the health impacts of chemical releases during routine operations, the following are needed:

(1) For the MOX process itself, emissions of criteria pollutants (CO, NO_2, SO_2, VOCs, $PM_{2.5}$, PM_{10}, and TSP); emissions of process, trace, and hazardous pollutants such as hydrazine, nitric acid, and benzene; and emissions of uranium.
(2) Confirmation that boilers are not needed to support MOX FFF operations. Boilers were an emission source in the SPD EIS but not in the ER. If new boilers are needed, the data needed to calculate boiler emissions (fuel type and sulfur content, capacity, fuel use, and controls) should be provided,
(3) The activity levels and emission factors used to estimate emergency generator emissions,
(4) The throughput and assumptions used to estimate VOC emissions from storage of diesel fuel,
(5) The assumptions and activity levels used to estimate vehicle emissions using MOBILE5b and PART5 including VMT estimates for the workforce and shipments.

b) To model the MOX FFF or check the existing modeling, the following are needed:

(1) The latest stack parameters and stack configuration for the MOX FFF: height above grade, exit temperature, volume flow [stack diameter and exit velocity (the velocity of 0.03 m/sec used in the ER and SPD EIS appears to be too low)]; and the height above mean sea level of the grade level assumed for the MOX FFF.
(2) To account for downwash or determine whether downwash needs to be considered, the heights, dimensions, and locations of the buildings (existing and new construction such as the PDCF) within about five stack heights (about 150 ft based on ER stack height of 26 ft) of the MOX FFF building.
(3) The background values used in estimating total concentrations.
(4) The ISC source pathway used to model MOX FFF impacts.
(5) The location of the concrete batch plant.
(6) If a new boiler is required, the boiler's stack parameters (height, temperature, volume flow or exit velocity/diameter) and location.

Response:

a) Operational emissions are as follows:

1) Controlled NO_x off-gas emissions from the aqueous polishing process have been estimated to be 1,640 kg/year based on continuous operation. The sintering furnace off-gas emissions include 1.3 kg/day of organic compounds due to the use of lubricants for

pellet processing that are volatilized in the furnace. The organic compounds emitted are conservatively assumed to be VOCs that amount to approximately 475 kg/year. There are no other criteria pollutant emissions expected from the MOX process itself. Emissions of hazardous chemicals stored in the Reagents Building, such as hydrazine and nitric acid, are vented to vapor washing columns and are assumed to be negligible due to a high level of control.

2) Fuel burning boilers are not needed to support the MFFF operations.

3) The emission factors used to estimate emergency and standby generator emissions are as follows:

	CO	NO_x	PM	SO_2	HC
Emission Factor (kg/1000 liters)	15.6	72.4	5.09	4.76	5.91

The annual fuel usage used for the emergency generator emissions estimate is 85,000 liters per year for all engines.

4) VOC evaporative emissions from the emergency and standby diesel generator fuel oil storage tanks are estimated using the TANKS 4.0 program. The emergency fuel oil storage tank is a horizontal underground tank with a volume of 18,000 gallons, a shell length of 31.0 ft and a diameter of 10.0 ft. The net throughput used is 22,500 gallons per year. The standby fuel oil storage tank is a horizontal underground tank with a volume of 5,000 gallons, a shell length of 13.3 ft and a diameter of 8.0 ft. The net throughput used is 5,000 gallons per year. Augusta, GA meteorological data was selected from the TANKS4.0 database for both tanks. These tank sizes are currently under design review. If tank sizes are changed we will notify NRC.

5) The vehicle miles traveled (VMT) estimate used for the employee and shipment vehicle emissions estimates is 3,960,000 miles per year. The assumptions used in the MOBILE5b and PART5 runs are the same as those provided in the response to RAI 24(e).

b) Operational emissions modeling input data are as follows:

1) The MFFF stack parameters are as follows:

Stack height = actual stack height is 93 ft above grade, 86 ft above grade was used in the calculations.
Stack diameter = 8.5 ft
Stack volume flow = 200,000 cfm

Stack exit velocity = 54.0 ft/sec
Stack exit temperature = ambient
Grade height above mean sea level = 273 ft.

2) As described in Section 3.1.1 of the Environmental Report, the vent stack is 20 feet tall, mounted on the top of the MOX Fuel Fabrication Building, with a discharge height of approximately 366 feet above MSL. A radius of five stack heights affects only the buildings on the MFFF site proper. Section 11.1 of the MFFF Construction Authorization Request presents detailed configuration information about the MFFF site and buildings. CAR Figure 11.1-1 presents a scale version of the site plan and shows the relationship of the various buildings. The table below summarizes the CAR figures showing configuration details of the buildings, as well as the associated roof elevations.

Building	Finish Floor Elev (ft MSL)	Building Height (ft)	Roof Elevation (ft MSL)	CAR Figures (11.1-xx)
BMP	273	73	346	16, 17, 18
BAD	270	26	296	35, 36
BTS	273	26	299	38, 39
BSW	270	26	296	37
BRP	271	20	291	34
BEG	271	26	297	33
BSG	271	26	297	40

3) The background air pollutant concentrations, including the contribution of other SRS sources, used in estimating total concentrations are as follows:

Pollutant	Averaging Time	Concentration, (ug/m^3)
CO	8 hours	671.1
	1 hour	5096.8
NO_2	Annual	11.4
PM-10	Annual	4.9
	24 hours	85.7
SO_2	Annual	16.7
	24 hours	222.0
	3 hours	725.0
TSP	Annual	45.4

4) The ISC source pathways used to model MFFF impacts were provided in Attachment 24-1.

5) There will not be a concrete batch plant during the operation phase.

6) Fuel burning boilers are not needed to support the MFFF operations.

Attachments:

29-1) Plot plan and elevation drawings.

Action:

None

30. Section 5.2.6, Impacts from Facility Noise (Operation). It is reasonable to assume that the distance of the MOX FFF from the site boundary will probably result in negligible noise impacts. However, to make the demonstration more quantitative, the following are needed:

a) If available, noise levels associated with MOX FFF operations,
b) The locations of the off-site residence and sensitive receptor (school, hospital, park, and nursing home) closest to the MOX FFF site,
c) If any, locations of on-site residence and sensitive receptor closest to MOX FFF site.

Response:

a) The ambient noise level throughout most of the MFFF should be similar to those of the operating La Hague and MELOX facilities in France. Neither of these facilities have any areas that require any ear protection, which is required if ambient noise levels exceed 75 dBA. Therefore, all noise generated during facility operations should be damped to ambient levels outside of the MFFF buildings.

b) The document "Maximally Exposed Offsite Individual Location Determination for NESHAPS Compliance", WSRC-RP-2000-00036, January 2000 is being provided to address this question. The following table is extracted from this reference. **Note:** The sectors are provided in SRS coordinates that are 36° 22' counterclockwise from true north and based on the center of F-Area.

Distance to the Nearest Residence, School, Business, or Farm for Demonstrating NESHAP Compliance.

Sector	Distance (m)	Sector	Distance (m)
S	19026	**N**	10933
SSW	16135	**NNE**	14180
SW	15328	**NE**	16290
WSW	10229	**ENE**	18973
W	9442	**E**	19279
WNW	9996	**ESE**	17303
NW	9450	**SE**	19820
NNW	9948	**SSE**	19115

c) There are no onsite residents, schools, hospitals, parks, or nursing homes on the SRS.

Attachment:

30-1) *Maximally Exposed Offsite Individual Location Determination for NESHAPS Compliance*, WSRC-RP-2000-00036, January 2000

Action:

None

31. Section 5.2.8, Socioeconomic Impacts. Provide detailed cost and schedule information for construction and operation of the MOX FFF, Pit Disassembly Facility and Immobilization Facility. Cost and schedule information is needed to determine socioeconomic impacts by year. Annual detailed operating costs will also be needed to determine socioeconomic impacts during operations. Both construction and operations costs will be used in the cost benefit analysis.

Response:

Table 3-2, Total Annualized Life-Cycle Cost Projections by Fiscal Year and Cost Category (millions of constant 2001 dollars) of a distribution draft, *Report to Congress on the Projected Life-Cycle Costs of the U.S. and Russian Fissile Materials Disposition Programs*, March 30, 2001, provides the requested cost and schedule information needed to determine socioeconomic impacts by year.

Attachment:

31-1) National Nuclear Security Administration, Office of Fissile Materials Disposition, Distribution Draft *Report to Congress on the Projected Life-Cycle Costs of the U.S. and Russian Fissile Materials Disposition Programs*, March 30, 2001.

Action:

None

32. Section 5.2.10.2, Radiation Doses to Site Workers. The distribution of on-site workers (locations and numbers of the workers) at SRS is needed to support derivations of more representative dose estimates. Provide a copy of "1992 Onsite Worker Population for PRA Applications," WSRC-RP-93-197, by J.M. East, as referenced by Tables 1.3-6 to 1.3-8 in "Natural Phenomena Hazards (NPH) Design Criteria and Other Characterization Information for

the Mixed Oxide (MOX) Fuel Fabrication Facility at Savannah River Site (U)," WSRC-TR-2000-00454, Rev. 0, Nov. 2000.

Response:

A copy of the "1992 Onsite Worker Population for PRA Applications," WSRC-RP-93-197, by J.M. East is provided as Attachment 32-1

Attachment:

32-1) *1992 Onsite Worker Population for PRA Applications*, WSRC-RP-93-197, by J.M. East is provided as Attachment 32-1

Action:

None

33. Section 5.2.10.3, Radiation Doses to Facility Workers. Time-motion studies of involved (facility) workers and the dose rate(s) at their respective locations are needed in order to estimate exposures. This data was not provided in the ER or the SPD EIS. Only results were presented.

Response:

The basis for the exposure results that were presented in Section 5.2.10.3 of the ER is founded in the actual occupational doses at the MELOX facility in France, whose design is similar to the MFFF. The congruency of the MFFF design with MELOX will result in similar operations and maintenance activities. However, the expected doses for the MFFF were adjusted for the difference in the dose rates due to radioisotopic differences. Additional doses were estimated for the aqueous polishing side of the facility based on La Hague processes and limited personnel access. Therefore, time-motion studies of involved workers at their respective locations were not needed in the estimation of MFFF occupational doses.

Action:

None

34. Section 5.2.12, Waste Management Impacts. Provide the expected capacity of the planned double-walled pipeline needed to support the processing of the liquid high-alpha waste.

Response:

The total flow of liquid high alpha waste stream will be less than 1250 gallons per week. The transfer line would consist of about 2200 feet of 3-inch diameter 304L or 316 stainless steel enclosed within a 6-inch diameter outer stainless steel jacket equipped with leak detection. Volume of the pipe itself would be about 850 gallons.

Action:

None.

35. Section 5.3, Deactivation. Under 10 CFR 51.45(b)(1), the applicant's ER must address the impact of the proposed action on the environment. The ER indicates that because DCS will deactivate the MOX FFF at the end of its operations and return the facility to DOE, no meaningful decommissioning impacts can be assessed. Even though DCS will not be performing decommissioning activities, there will be decommissioning impacts for the facility.

Discuss reasonable decommissioning options for the facility and the resultant environmental impacts assuming that DOE does not reuse the facility.

Response:

As noted in the DOE *Surplus Plutonium Disposition Final Environmental Impact Statement*, there are four potential alternatives for disposition of the facilities:

- D&D and demolition of the structures and release of the site for unrestricted use
- D&D and demolition of the structures and restricted use of the site
- Partial D&D and retention of the structures for unrestricted use
- Partial D&D and retention of the structures for modified or restricted use.

Should decommissioning be an appropriate option for the MFFF after its mission has been completed, NNSA would have to evaluate the most cost-effective and most environmentally benign options that will be available at the time. In lieu of this evaluation, and in order to characterize environmental impacts, the decommissioning option that was evaluated is assumed to be the same option presently being applied to a 45-year old DOE facility (i.e., Rocky Flats Environmental Technology Site (RFETS) near Denver, Colorado). This option decontaminates and demolishes the facility and restores the environment to a level suitable for unrestricted reuse. The resultant waste volumes and environmental impacts have been developed for this case and are presented in the response to RAI 50.

Action:

None

36. Section 5.4.2.2, Impacts of Transportation Accidents. Provide an assessment of non-radiological impacts from transportation accidents involving the chemical hazard from UF_6.

Response:

The chemical hazard of UF_6 is only a concern if the container is breached during an accident and the UF_6 is released to the atmosphere and subsequently exposes people, primarily through inhalation. UF_6 is not a carcinogen so latent cancer incidences are not expected. Biwer et al., in a recent 1997 *Transportation Impact Analyses in Support of the Depleted UF_6 Programmatic Environmental Impact Statement* noted, "The chemical risk associated with UF_6 cylinder transport would be much less than the radiological risk; however, the total risks would be dominated by vehicle-related risks, which would be about 10 times larger than the radiological and chemical risks combined."

Acute impacts to human health can range from slight irritation to fatality for the exposed individuals. Two endpoints for acute health effects were assessed in Biwer et al. 1997: potential for irreversible adverse health effects (from permanent organ damage or the impairment of everyday functions up to and including lethality) and potential for adverse effects (effects that occur at lower concentrations and tend to be mild and transient in nature). Using the collective population unit risk factors for the chemical hazards of UF_6 shipped by truck of 1.0E-12 adverse effects/km and 7.1E-13 irreversible adverse effects/km (Biwer et al. 1997, Table 6.1) and the shipment distance and number of shipments, the calculated number of adverse effects is 1.0 E-7 and the number of irreversible adverse effects is 7.2E-8. The impacts for the maximally exposed individuals along the transportation route are estimated to be similar to those calculated for the DUF_6 PEIS, where up to 3 persons could be affected by irreversible adverse effects from a severe transportation accident involving the UF_6 cylinders (for truck transport).

Attachment:

Biwer et al., 1997, *Transportation Impact Analyses in Support of the Depleted UF_6 Programmatic Environmental Impact Statement* was provided to NRC as part of the ER References and is included on the CD.

Action:

Update ER Section 5.4.2.2 to include the discussion of chemical hazards.

37. Section 5.4.5, Comparison with NUREG-0170. Provide a transportation assessment which includes potential sabotage impacts.

Response:

Guidance from NUREG-1437 Vol. 1 states:

> *With regard to sabotage, quantitative estimates of risk from sabotage are not made in external event analyses because such estimates are beyond the current*

> *state of the art for performing risk assessments. The commission has long used deterministic criteria to establish a set of regulatory requirements for the physical protection of nuclear power plants from the threat of sabotage, ... Although the threat of sabotage events cannot be accurately quantified, the commission believes that acts of sabotage are not reasonably expected. Nonetheless, if such events were to occur, the commission would expect that resultant core damage and radiological releases would be no worse than those expected from internally initiated events.*

The potential for sabotage is minimized by the method of shipment. Because of the number of fuel assemblies to be transported in the proposed transport package, the transport of MOX fuel assemblies will be classified as Category I safeguards shipment under NRC regulations and shipped by the DOE Transportation Safeguards System. Under the DOE Transportation Safeguards System, the package will be shipped by SGT [SafeGuards Transporter] with a full physical security escort. Shipments will not be publicized. State, local or tribal governments will not be routinely notified of shipments. The SGT is a secured vehicle with driver protective capability. If the vehicle is stopped, the tractor can be disabled and the tractor and trailer locked together. This will prevent theft of the trailer or removal of the SGT tractor. Local law enforcement will be contacted in any emergency where the armed escort team is not able to maintain control of the shipment.

The SPD FEIS (Appendix L.6.5) states that because of the Transportation Safeguards System, DOE considers sabotage or terrorist attack on an SGT carrying the MOX fresh fuel assemblies to be unlikely enough such that no further risk analysis is required. Other materials, including uranium hexafluoride and uranium dioxide, are commonly shipped and do not represent particularly attractive targets for sabotage or terrorist attacks.

Based on the guidance in NUREG-1437 and the information provided in SPS FEIS, we believe that the impacts of sabotage for fresh MOX fuel assemblies are bounded by the impacts of reasonably foreseeable accidents for the shipment of MOX fuel assemblies.

Action:

Update ER 5.4 to address sabotage.

38. <u>Section 5.5, Facility Accidents</u>. The accident analyses in the ER are presented at a very general level. There is minimal discussion to show that the results presented will bound the impacts. For example, it is unclear why the bounding internal fire is a fire in the PuO_2 Buffer Storage Unit or the bounding explosion is an explosion in the aqueous polishing cell.

Provide a basis for the selection of the evaluated scenarios as being the bounding accident events.

Response:

The bounding events are determined by calculating the consequences for all events identified in the MFFF hazard evaluation. The event with the potential to produce the largest unmitigated consequence for each event type is designated as the bounding event (event types are described in ER section 5.5.2). Details associated with the calculation of bounding consequences and identification of design basis events are provided in Sections 5.4 and 5.5 of the MFFF CAR. Additional source term information is provided in Attachment 38-1.

Attachment:

38-1) Supplemental accident analysis information.

Action:

Update ER Section F.6.

39. Section 5.5, Facility Accidents. Provide a reference for the "MOX FFF Integrated Safety Analysis, Safety Assessment of the Design Basis," mentioned in this paragraph.

Response:

The "MOX FFF Integrated Safety Analysis, Safety Assessment of the Design Basis" was a preliminary title for a section of the Construction Authorization Request. The document referred to is the CAR.

Action:

Change ER 5.5 text to properly reference the CAR.

40. Section 5.5, Facility Accidents. Source terms are needed for potential accidents involving uranium oxide powder. All accidents assessed in the ER consider only plutonium source terms. Since substantial quantities of uranium dioxide powder will also be located in the MOX facility, estimates of consequences of accidental release of uranium are also needed.

Response:

Consequences for all radionuclides including uranium are evaluated in the MFFF accident analysis. The unmitigated consequences of events involving uranium are low and less than consequences associated with events involving plutonium. Thus events involving uranium are not the bounding events and are not reported in the ER. Details associated with the calculation of consequences are provided in Chapter 5 of the MFFF CAR. Additional source term information is provided in Attachment 38-1.

Action:

Update ER Section 5.5.2.

41. Section 5.5 and Appendix F. Aside from the location of the off-site MEI and the accident source terms, no input data to the MACCS2 or ARCON96 codes were provided in the SPD EIS or the ER. These data are required to evaluate the exposures estimated in the ER and includes:

a) The complete methodology used to estimate the off-site population impacts, including information such as the exposure pathways evaluated and exposure duration,
b) Hourly weather data for input to MACCS2.

Response:

The Melcor Accident Consequence Code System for the Calculation of the Health and Economic Consequences of Accidental Atmospheric Radiological Releases (MACCS2), Version 1.12 and Atmospheric Relative Concentrations (ARCON96) are used to compute the relative air concentrations (χ/Qs) for a 1 hour, 2-hour, 8-hour and a 24-hour release. The relative concentration is the dilution provided relative to SRS meteorology and distance to a specified receptor(s).

In addition, MACCS2 is used to compute the offsite population dose for accident conditions in support of the MFFF ER

a) Inputs and assumptions for the MACCS2 are provided in Attachment 41-1.

b) Meteorological files for MACCS2 are provided as Attachment 41-2

Attachment:

41-1) Inputs and Assumptions for MACCS2 and ARCON96.
41-2) Meteorological files for MACCS2.

Action:

None

42. Section 5.5 and Appendix F Accident Definitions and Characteristics. The following data are needed to assess the MOX FFF accident impacts in the EIS:

a) Descriptions of one or more bounding accidents (accidents that are likely to cause the highest consequences to the public offsite and/or workers on the SRS who are not directly involved in the MOX FFF operations) in each of the following frequency bins

greater than 10^{-2} per year
between 10^{-2} and 10^{-4} per year
between 10^{-4} and 10^{-6} per year, and
less than 10^{-6} per year (generally between 10^{-6} and 10^{-7})

Since the radiolological and chemical health risk endpoints are different, consideration should be given to assigning different bounding accidents under radiological and chemical impacts.

b) Source terms for each accident sequence giving the quantities of radionuclides and/or hazardous chemicals released to the environment and time dependence of release
c) Stack parameters for releases through a stack (i.e., height, flow velocity, and temperature).
d) The ER describes and provides source term data for four accidents; two of the accidents are said to be in the unlikely frequency range and the other two in the highly unlikely range. Need confirmation that these two frequency categories correspond to the 10^{-2} to 10^{-4} per year and 10^{-4} to 10^{-6} per year frequency bins given above and that the accidents can be taken as the bounding accidents for those categories.

Response:

Question 42 part "a" contains two separate questions related to 1) event binning, and 2) evaluation of different bounding events for radionuclides and chemicals. The responses are provided separately.

a1) A description of all events evaluated in the MFFF Safety Assessment is provided in Appendix 5A of the CAR. In accordance with 10 CFR Part 70 and the MOX guidance in NUREG-1718, qualitative estimates of the likelihood category for these events are conservatively estimated. Likelihood categories are defined in the CAR (in accordance with 10CFR70.65(b)(9)) and provided in ER Section F.2, however numerical values are not assigned. This approach is consistent with the requirements of 10CFR70 and the guidance found in the MOX SRP (see NUREG-1718, 5.4.3.2.B.vii).

Although numerical values are not assigned, the following general likelihood classifications of bounding events are applicable, using the likelihood categories identified in 10 CFR Part 70.61 and defined in ER Section F.2:

- Not Unlikely: Events considered as Not Unlikely would be expected to occur as a result of normal operations and off-normal occurrences. These events and their consequences are described in the discussion of the impacts of normal operations (ER section 5.2.10).

- Unlikely: The bounding fire and load-handling events described in Appendix F are estimated to have a likelihood of Unlikely. A less severe fire or a load handling event is estimated to be a not unlikely event, but one with the bounding consequences is estimated to be unlikely due the design and operating characteristics of the MFFF. Note that in the MFFF CAR, these bounding events are conservatively considered to be not unlikely (i.e., assumed to occur) and the associated bounding consequences are low, satisfying the performance criteria of 10CFR70.61.

- Highly Unlikely: The explosion and criticality events described in Appendix F are classified as Highly Unlikely due to the engineered features and management measures allocated to their prevention. Although not required to meet the performance criteria of 10CFR70.61, bounding consequences are determined and reported for informational purposes. Note that, even presuming the failure of prevention measures, these events result only in low consequence to the public and site workers.

Additionally, the MFFF is designed to withstand the effects of design bases natural phenomena hazards. NPH that exceed the design bases are considered highly unlikely.

- Not Credible: NPH and External Man-Made Events that have a very low probability of occurring or are not possible at the MFFF site are considered to be not credible. Consequences are not determined for these events.

This method ensures the results are conservative and bounding, and satisfy the requirements of 10CFR Part 70

a2) Different accidents are assigned for the bounding radiological and chemical events. The bounding radiological events are discussed in response a1 above. The evaluation of chemicals is based on performing bounding calculations and further refining the analysis as necessary. The bounding analysis is based on releasing the contents of the largest container or vessel for each chemical, conservatively modeling the release rate, and determining the concentration at the receptors of interest. The bounding analysis is summarized in the CAR (see CAR section 5.5.3). Chemical consequences were not presented as bounding events because no scenarios were identified where the consequences were estimated to be greater than "low consequence". As necessary, more detailed analysis involving specific event sequences and elevated temperatures associated with applicable fires or explosions will be performed as part of the ISA.

Attachment 38-1 provides additional source term information.

b) Details of the radiological source terms for bounding accidents are provided in ER Appendix F. The quantity of radioactive and chemical material at different MFFF locations and a discussion of source terms is provided in Chapters 5 and 8 of the CAR. Attachment 38-1 provides additional source term information.

c) Stack parameters are not used in the calculation of receptor dose. As stated in ER Section F.1.4, Dispersion Modeling, a ground release is assumed.

d) The likelihood categories assigned are conservative, qualitative estimates, as discussed in response to part a1, above. Numerical values have not been assigned to these categories, consistent with the methodology described in NUREG-1718. The accidents described in the ER provide the bounding consequences for those likelihood categories.

Action:

Update ER F.5 and F.6.

43. Section 5.5.2.3, Internal Fire. This section states that the radiological consequences to the nearest site worker due to a fire are low. However, fire is one of the most significant methods for dispersing contamination. A fire involving radioactive materials in a contained area could expose workers to significant airborne activity. Provide the analysis that determined the maximum exposure to an operator would be limited to 90 mrem. Secondly, this analysis (and all others discussing radiological exposures) needs to address chemical toxicity from uranium and plutonium. The effects of the chemical toxicity of uranium at low enrichments far exceed the radiological hazard.

Response:

a) The 90 mrem maximum exposure is not to an "operator," but to a site worker (a worker outside the MFFF facility). The details of this calculation are provided in Appendix F of the ER.

   Management measures such as training and procedures, and SSCs, ensure "operators" (i.e., facility workers) evacuate the area or don respiratory protection to preclude receiving a dose from a fire. Specific facility features are identified in Chapter 5 of the MFFF CAR. These results satisfy the performance criteria of 10CFR§70.61, thus no quantitative analysis has been performed to estimate the dose to the facility worker for this event.

b) The response to the portion of this comment related to the chemical evaluation of plutonium and uranium is provided in the response to RAI 44.

Action:

None

44. Section 5.5.2.4, Explosion. This analysis needs to address chemical toxicity from uranium and plutonium. The effects of the chemical toxicity of uranium at low enrichments far exceed the radiological hazard.

Response:

The chemical analyses have been revised to include the chemical consequences for events involving uranium. Results indicate that the chemical consequences are low as defined by ER Table F-4. The list of chemicals evaluated is provided in Attachment 38-1.

The chemical consequences for events involving plutonium are not evaluated as the radiological effects of plutonium far exceed its chemical toxicity (Sutcliffe 1995, Petersen 2001), and no chemical limits for plutonium have been identified. Thus, the chemical consequences associated with a release of plutonium were not evaluated as part of the chemical analysis.

Attachments:

44-1) Sutcliffe, W.G.; Condit, R.H.; Mansfield, W.G.; Myers, D.S.; Layton, D.W.; and Murphy, P.W. 1995 "A Perspective on the Dangers of Plutonium". UCRL-JC-118825. Livermore, California: Lawrence Livermore National Laboratory.

44-2) Peterson, Vern L., *Deterministic Health Effects from Plutonium Inhalation*, 2001 ANS Annual Meeting, June 20, 2001.

Action:

Revise ER Appendix F.6.5 to include the results of the chemical impacts of accidents.

45. Section 5.5.2.6, External Man-Made Events. This section does not adequately explain how the screening evaluation determined that credible external man-made events will not significantly impact MOX FFF operations. It would seem that the proximity of the numerous radiological and chemical hazards of both existing and proposed facilities in that area warrant a detailed discussion of how this conclusion was reached.

Response:

As part of the safety assessment of the design bases, an evaluation is performed to determine if credible external man-made events could impact MFFF operations. This evaluation is described in detail in sections 5.5.1.1.3 and 5.5.2.7 of the MFFF CAR.

Action:

Add to ER Section 5.5.2.6 to cross-reference to Chapter 5 of the CAR.

46. Section 5.5.2.9, Chemical Releases. This section does not appear to consider the release of uranium or plutonium as a chemical release. Low enriched, natural, and depleted uranium are more of a hazard from a chemical toxicity perspective than a radiological perspective. List the chemicals that were analyzed, and address uranium and plutonium as chemical releases.

Response:

Chemical releases of uranium and plutonium are discussed in the response to RAI 44.

Action:

None

47. Section 5.6.1, Impacts From SRS Activities. Coordinated infrastructure development associated with the MOX FFF, PDCF, and PIP should be described in sufficient detail to allow an evaluation of its cumulative impact. The location, size, and design characteristics of all parking areas, stormwater detention facilities, and utility corridors should be identified and described. The ER defers evaluation of these impacts to "separate EISs." However, they are related "reasonably foreseeable actions" and therefore should be included in the cumulative impact analysis.

Response:

Designs for the MOX MFFF and PDCF facilities are at varying design detail and design for the PIP facility has not been initiated. Therefore, infrastructure to support these facilities is at a conceptual stage and subject to change. The following information represents current design and is subject to change in the final design.

Parking Areas:

Based on the current MOX and PDCF facility layout designs and the preliminary conceptual design for infrastructure, permanent parking areas for MOX and PDCF totaling approximately six acres will be located within the respective facility site boundaries. Temporary construction parking that may be needed will be confined to an area south of the PDCF site along the unpaved road connecting to the SRS Road E.

Roadways:

As discussed in the response to RAI 27 there will be only nominal impact on the environment resulting from roadway improvements.

Storm Water Detention/Retention:

Storm water detention/retention facilities are addressed in the response to RAI 23. The overall effect of the three projects on storm water will be to increase total runoff in any given storm event. In accordance with South Carolina Department of Health and Environmental Control regulations, the detention/retention basins will mitigate these impacts by retaining suspended solids and dampening peak stormwater flows.

Utilities:

Utilities for the PIP, MFFF and PDCF will generally be routed along the existing F-Area Limited Area perimeter roadway – to the east and to the north of the road. This corridor also contains existing steam lines. The design of the utilities routing is still at the conceptual phase and will be developed in more detail with each facilities' design effort.

Power Line Relocation:

The existing 115KV transmission line entering F-Area from the north crosses the MFFF site and will be rerouted around the facility. The new route for the 115KV line will parallel the MFFF northern boundary and turn south at the eastern boundary of the PIP site. It will rejoin and follow the existing route across the F-Area perimeter road at a point south and west of the closed F-Area seepage basin. The power line relocation is expected to impact approximately 11 acres on the north and west sides of the MFFF site.

Action:

Update ER Section 5.1.11 and 5.6.1

48. Section 5.6.1, Impacts From SRS Activities. Impacts of current SRS activities should be itemized to the extent possible. The ER presents a single aggregated value for each impact area (Table 5-15) that presumably includes the impacts of all current activities. For the cumulative impact analysis, it will be important to identify the sources of existing SRS impacts including those impacts resulting from existing operations and from past actions that have resulted in residual impacts such as land disturbance or existing contamination. The historical data review report (Fledderman 2000) would be a useful document for estimating past impacts. In addition,

the final version (October 2000) of the Surplus Plutonium Disposition Preconstruction and Pre-Operational Monitoring Plan (Fledderman 2000) should be provided.

Response:

The SRS environmental monitoring program encompasses the entire site and therefore it is not possible to identify existing impacts by source. A baseline is provided in the response to RAI 49. This baseline identifies impacts from all current SRS activities.

The "Surplus Plutonium Disposition (SPD) Environmental Data Summary" ESH-EMS-2000-849, Rev 0, 8/3/00, and "Plutonium Disposition Program (PDP) Preconstruction and Preoperational Environmental Monitoring Plan", ESH-EMS-2000-897, Rev 0, 10/10/00 are provided as attachments 48-1 and 48-2.

Attachments:

48-1) *Surplus Plutonium Disposition (SPD) Environmental Data Summary* ESH-EMS-2000-849, Rev 0, 8/3/00

48-2) *Plutonium Disposition Program (PDP) Preconstruction and Preoperational Environmental Monitoring Plan*, ESH-EMS-2000-897, Rev 0, 10/10/00

Action:

None.

49. Section 5.6.1, Impacts From SRS Activities. Impacts of reasonably foreseeable future SRS activities should be itemized to the extent possible. The ER aggregates these impacts with those of current activities making it very difficult to discern the source of impacts. Values are taken from the SPD EIS which were based on a list of DOE EISs available at the time. This information should be updated and any new proposals (as described in draft or final NEPA documents) should be included. As for the impacts of current activities, this information would be most usefully presented in a table.

Response:

Environmental impacts of current activities and reasonably foreseeable future SRS activities have been itemized using recent DOE EISs and are included in Tables 49-1 through 49-4. This information is based on current available data from the listed references for each table.

Attachments:

49-1) DOE 2000, High-Level Waste Tank Closure Draft Environmental Impact Statement, DOE/EIS-0303D.

49-2) DOE 1999, Surplus Plutonium Disposition Final Environmental Impact Statement, DOE/EIS, DOE/EIS-0283.
49-3) DOE 2000, Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement, DOE/EIS-0279.
49-4) DOE 2001, Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement, DOE/EIS-0082-S2D.

Action:

Tables 49-1 through 49-4 will be inserted in the ER replacing Table 5-15, and Section 5.6.1 will be revised to describe this added information.

Table 49-1. Estimated maximum cumulative ground-level concentrations of nonradiological pollutants (micrograms per cubic meter) at SRS boundary

Pollutant	Averaging time	SCDHEC ambient standard (μg/m³)	SRS baseline (μg/m³)[a]	MFFF (μg/m³)[b]	Other Pu Disposition Facilities[c]	SNF[d]	Tank closure (μg/m³)[e]	Salt processing alternative[f]	Other foreseeable planned SRS activities (μg/m³)[g]
Carbon monoxide	1 hour	40,000	10,000			9.760	3.4	18.0	36.63
	8 hours	10,000	6,900	0.189	0.37	1.31	0.8	2.3	5.15
Oxides of Nitrogen	Annual	100	26	0.0127	0.063	3.36	0.07	0.03	4.38
Sulfur dioxide	3 hours	1,300	1,200			0.98	0.6	0.4	8.71
	24 hours	365	350			0.13	0.12	0.05	2.48
	Annual	80	34	0.00083	0.12	0.02	0.006	5.0×10^{-4}	0.17
Ozone	1 hour	235	NA	NA	NA	0.80	2.0	2	0.71
Lead	Max. quarter	1.5	0.03			NA	4.1×10^{-6}	4.0×10^{-7}	0.00
Particulate matter (≤ 10 microns aerodynamic diameter)	24 hours	150	130			0.13	0.06	0.07	3.24
	Annual	50	25	0.00089	0.0042	0.02	0.03	1.0×10^{-3}	0.13
Total suspended particulates (μ g/m³)	Annual	75	67	0.00089	0.042	0.02	0.005	1.0×10^{-3}	0.06

a DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

b MFFF ER

c DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283

d DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

e DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

f DOE 2001, *Savannah River Site Salt Processing Alt4rnatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D

g DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

Table 49-2. Estimated average annual cumulative radiological doses and resulting health effects to offsite population and facility workers

Activity	Maximally exposed individual				Offsite Population				Workers	
	Dose from airborne releases (rem)	Dose from liquid releases (rem)	Total dose (rem)	Probability of fatal cancer risk	Collective dose from airborne releases (person-rem)	Collective dose from liquid releases (person-rem)	Total collective dose (person-rem)	Excess latent cancer fatalities	Collective dose	Excess latent cancer fatalities
SRS Baseline[a]	$5.0x10^{-5}$	$1.3x10^{-4}$	$1.8x10^{-4}$	$9.0x10^{-8}$	2.2	2.4	4.6	$2.3x10^{-3}$	165	0.066
MFFF[b]	$4.1x10^{-7}$	(1)	$4.1x10^{-7}$	$2.1x10^{-10}$	0.035	(1)	0.035	$1.8x10^{-5}$		
Other Plutonium Disposition Facilities[c]	$3.7x10^{-6}$	(1)	$3.7x10^{-6}$	$1.9x10^{-8}$	1.6	(1)	1.6	$8.0x10^{-3}$	434	$5.0x10^{-3}$
Management of Spent Nuclear Fuel[d]	$1.5x10^{-5}$	$5.7x10^{-5}$	$7.2x10^{-5}$	$3.6x10^{-8}$	0.56	0.19	0.75	$3.8x10^{-4}$	55	0.022
Surplus HEU Disposition[e]	$2.5x10^{-6}$	(1)	$2.5x10^{-6}$	$1.3x10^{-8}$	0.16	(1)	0.16	$8.0x10^{-5}$	11	$4.4x10^{-3}$
Tritium Extraction Facility[f]	$2.0x10^{-5}$	(1)	$2.0x10^{-5}$	$1.0x10^{-8}$	0.77	(1)	0.77	$3.9x10^{-4}$	4	$1.6x10^{-3}$
Defense Waste Processing Facility[g]	$1.0x10^{-6}$	(1)	$1.0x10^{-6}$	$5.0x10^{-11}$	0.71	(1)	0.71	$3.6x10^{-5}$	120	0.048
Management Plutonium Residues/Scrub Alloy[h]	$5.7x10^{-7}$	(1)	$5.7x10^{-7}$	$2.9x10^{-10}$	$6.2x10^{-3}$	(1)	$6.2x10^{-3}$	$3.1x10^{-6}$	7.6	$3x10^{-3}$
DOE complex miscellaneous components[i]	$4.4x10^{-6}$	$4.2x10^{-8}$	$4.4x10^{-6}$	$2.2x10^{-9}$	$7.0x10^{-3}$	$2.4x10^{-4}$	$7.2x10^{-3}$	$3.6x10^{-6}$	2	0.001
Sodium-Bonded Spent Nuclear Fuel[j]	$3.9x10^{-7}$	$1.2x10^{-7}$	$5.1x10^{-7}$	$2.6x10^{-11}$	$1.9x10^{-2}$	$6.8x10^{-4}$	$2.0x10^{-2}$	$9.8x10^{-6}$	38	0.015
Tank Closure[k]	$5.2x10^{-8}$	(1)	$5.2x10^{-8}$	$2.6x10^{-11}$	$3.0x10^{-3}$	(1)	$3.0x10^{-3}$	$1.5x10^{-6}$	490	0.20
Salt Processing[l]	$3.1x10^{-4}$	(1)	$3.1x10^{-4}$	$1.6x10^{-7}$	18.1	(1)	18.1	$9.1x10^{-3}$	29	0.12
Plant Vogtle[m]	$5.4x10^{-7}$	$5.4x10^{-5}$	$5.5x10^{-5}$	$2.7x10^{-8}$	0.042	$2.5x10^{-3}$	0.045	$2.2x10^{-5}$	NA	NA

(1) Less than minimum reportable levels

a Arnett and Mamatey, 1998, *Savannah River Site Environmental Data for 1997*, WSRC-TR-97-00322 as cited in DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.

b MFFF ER.

c DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283.

d DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.

e DOE 1996, *Disposition of Highly Enriched Uranium Final Environmental Impact Statement*, DOE/EIS-0240.

f DOE 1999, *Final Environmental Impact Statement for the Construction and Operation of a Tritium Extraction Facility at the Savannah River Site*, DOE/EIS-0271.

g DOE 1994, *Final Defense Waste Processing Facility Supplemental Environmental Impact Statement*, DOE/EIS-0082-S.

h DOE 1998, *Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy at the Rocky Flats Environmental Technology Site*, DOE/EIS-0277F.

i DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.

j DOE 1999, *Draft Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel*, DOE/EIS-0306D.

k DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D.

l DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D.

m NRC 1996, *Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1992*. NUREG/CR 2850.

Table 49-3. Estimated cumulative waste generation from SRS concurrent activities (cubic meters)

Waste Type	SRS Operations[a,b]	MFFF[c]	Other Pu Disposition Facilities[d]	SNF Management[e]	Tank Closure[f]	Salt Processing[g]	Envirinmental Restoration /D&D[a]	Other Waste Volume[a]
High-level	14,129	0		11,000	97,000	45,000	0	69,552
High Alpha Activity		175						
Low-level	118,669	889	141	140,000	19,260	920	61,630	110,102
Hazardous/mixed	3,856	8	91	270	470	56	6,178	4,441
Transuranic	6,012	171	113	3,700	0	0	0	8,820

a DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.
b Based on total 30 year expected waste forecast which includes previously generated waste.
c MFFF ER
d DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283.
e DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.
f DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D.
g DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D.

Table 49-4. Estimated average annual cumulative utility consumption

Activity	Electricity (megawatt-hours)	Water usage (liters)
SRS baseline[a]	4.11×10^5	1.70×10^{10}
MFFF[b]	8.0×10^4	5.8×10^7
Other Pu Disposition Facilities[c]	4.4×10^4	1.58×10^8
SNF management[a]	1.58×10^4	2.11×10^8
Tank closure[d]	Not Available	8.65×10^6
Salt processing[e]	2.4×10^4	1.2×10^7
Other SRS foreseeable activities[a]	1.51×10^5	6.73×10^8

a DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.
b MFFF ER
c DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283.
d DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D.
e DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D.

50. Section 5.6.1, Impacts From SRS Activities. Provide estimates of the impacts of decontamination and decommissioning of the MOX FFF. Decontamination and decommissioning are dismissed in the ER as "too far into the future to allow any meaningful evaluation of impacts." This position is consistent with that presented in the SPD EIS, but is not acceptable for the MOX FFF because these impacts, while perhaps ill-defined at this time, would be directly related to facility construction and operation. Reasonable assumptions should be made as to the nature of decontamination and decommissioning activities and the impacts of these actions determined. (See also Comment 35.)

Response:

A summary-level review of the MOX and Aqueous Polishing (AP) facilities was conducted using principally glovebox volumes and relevant facility areas to determine waste quantities and cost estimates. This data was associated with comparable data from two similar facilities at Rocky Flats Environmental Technology Site (RFETS) near Denver, Colorado, that are presently in the process of being decommissioned. The values for decommissioning waste volumes and cost data for the MFFF were estimated using waste volumes and cost estimates from the decommissioned RFETS facilities. The following assumptions apply to this analysis:

1) The MFFF waste estimate was based on the decommissioning waste estimating method used for similar RFETS plutonium handling facilities. This method uses the physical characteristics and waste generated from the decommissioning of the first DOE site plutonium facility, RFETS Building 779, which was completed in FY 00. Relevant metrics (e.g., cubic meters of glovebox volume, pipe length, process area square feet) were compared against the TRU, low-level, low-level mixed, and construction demolition waste generated during the decontamination, strip-out, and decommissioning of the building. Factors developed from these comparisons were consequently applied to the remaining plutonium facilities at the site, with appropriate adjustments based on the differences between these buildings and RFETS Building 779.

2) Due to the differences in its proposed processes, the MFFF analysis varied from the available RFETS database. The MOX production processes are mostly dry processes that are contained in large gloveboxes. The AP facility processes are mostly of wet processes conducted in a "canyon" environment (i.e. a room with glovebox-type ventilation).

3) Accordingly, the summary estimate methodology identified the Rocky Flats buildings that were most representative of the processes within the MOX and AP facilities. The methodology assumed that the secondary systems (i.e., ventilation, instrumentation and control, power, etc.) were similar. It also assumed that the decommissioning methods used for these facilities would be similar to those that were used for Building 779 and other representative RFETS facilities.

4) RFETS Building 707 is determined to be most representative of the MOX facility. This building was a manufacturing facility for plutonium weapons components, which conducted casting and machining activities in dry gloveboxes under an inert nitrogen atmosphere.

5) RFETS Building 371 is determined to be most representative of the AP facility. This building was a plutonium recovery facility for plutonium residues. This facility conducted aqueous purification operations in "canyon" rooms, handled nitric acid process equipment, and had automated precipitation and reduction equipment similar in size to the AP equipment that would have to be removed by manual in-place size reduction.

6) The costs identified for the decommissioning activities are the direct project costs and do not include other site costs such as security, residue and fuel deactivation and removal, environmental programs, or overhead management and financial activities. The costs are based on the RFETS Disposition Cost Model, modified as appropriate, based on the understanding of the representativeness of the MOX and AP facilities.

7) All waste costs are approximate costs for characterizing and managing the decommissioning waste at the location as well as the disposition cost.

Table 50-1 shows the input data, resultant waste quantities, waste costs, and Decontamination & Decommissioning (D & D) costs for both the MOX and AP Buildings.

Summary Estimate			
Input Data	MOX Building	AP Building	Total
GB Volume (m^3)	957	147	1,104
GB Weight (lbs.)	320,000	47,000	367,000
Building Area (ft^2)	383,000	86,000	469,000
Waste Quantities			
TRU/Mixed TRU (m^3)	1,140	790	1,930
Low-Level Waste (m^3)	22, 700	10,200	32,900
Low-Level Mixed Waste (m^3)	106	25	131
Non-Radioactive Demolition Waste (tons)	55,000	15,000	70,000
Waste Costs (FY00 $)			
TRU/Mixed TRU	20,500,000	14,200,000	34,700,000
Low-Level Waste	22,700,000	10,200,000	32,900,000
Low-Level Mixed Waste	1,400,000	300,000	1,700,000
Non-Radioactive Demolition Waste	1,700,000	500,000	2,200,000
D&D Costs (FY00 $)			
Glovebox/Canyon	27,000,000	4,200,000	31,200,000
Pipe and Duct	13,500,000	2,100,000	15,600,000
Remaining Costs	191,500,000	43,000,000	234,500,000
Total Project-Specific Costs	278,300,000	74,500,000	352,800,000

It should be noted that the costs in Table 50-1 are conservative since decommissioning costs of an older contaminated structure are going to be larger than the costs associated with a modern facility that will be operated in such a manner as to minimize radioactive contamination.

Action:

None

51. Section 5.6.2, Impacts from Other Nearby Actions. Provide quantitative estimates of the impacts (in each impact area) of current and reasonably foreseeable future actions in the SRS vicinity. Currently, the Vogtle nuclear plant, Chem-Nuclear Services disposal facility, and Starmet CMI are mentioned as contributing to the cumulative impact in the region of influence, but their incremental impacts are not presented. Other non-radiological impacts are not provided. The cumulative impact analysis must consider the nonradiological and radiological impacts of other nearby actions particularly those that would impact air and water quality (e.g., the Savannah River).

Response:

As discussed in the response to RAI 49, environmental impacts of current and reasonably foreseeable future SRS activities have been quantified and itemized in Tables 49-1 through 49-4. Impacts of Vogtle Nuclear Plant are included in the tables. Radiological and non-radiological impacts are provided in the tables, including airborne and aqueous releases.

Impacts from the Chem-Nuclear Services disposal facility (Barnwell disposal facility) and Starmet CMI facility are not included in Tables 49-1 through 49-4. Current information is not available for the Chem-Nuclear and Starmet facilities since SCDHEC no longer issues the "Nuclear Facility Environmental Radiation Monitoring Annual Report," which quantified releases from those facilities. Excerpts from the 1997 "Nuclear Facility Environmental Radiation Monitoring Annual Report," which was the last update of that report, are attached. This information reaffirms statements in the ER indicating that dose contributions from the Chem-Nuclear and Starmet facilities are relatively low and have little impact on the overall cumulative effects for SRS.

Attachment:

51-1) Nuclear Facility Environmental Radiation Monitoring Annual Report, 1997

Action:

None

52. Section 5.6.3, Transportation Impacts. The impacts of transportation associated with other activities on and off SRS should be provided. The impacts of transportation associated with MOX FFF operations will be an incremental addition to the impacts of current and future transportation activities. These impacts should be provided in sufficient detail to allow addition to the transportation impacts of the MOX FFF in the cumulative impact analysis.

Response:

Four programs at SRS will account for most of the shipments of hazardous and radioactive material to and from the site over the period of operation of the MFFF (2007 to about 2020) – Tritium production and recycling, Fissile Material Disposition, Spent Fuel Management, and Waste Management. Each of these programs has existing NEPA documents which describe the expected shipments and transportation impacts related to the program as described below. All of the referenced documents are available at the DOE NEPA website.

Tritium Production:

The *Final EIS for the Production of Tritium in a Commercial Light Water* (DOE/EIS-0288) evaluated the impacts of the decision reached to produce tritium in a commercial light water reactor and ship the targets to SRS for tritium recovery. See section 5.2.8 for the summary of this analysis. The details of transportation impact analysis is provided in Appendix E.

Fissile Material Disposition:

- The *Surplus Plutonium Disposition EIS* (DOE/EIS-0283) in Appendix L analyzes the human health impacts associated with shipments of plutonium and uranium feedstocks to the pit disassembly, immobilization, and MFFF facilities, as well as fuel to the mission reactors and DWPF canisters containing the immobilized plutonium to a geologic repository. Data in Appendix L can be used to disaggregate the shipments and impacts associated with MFFF from the other two facilities.
- The *Disposition of Surplus Highly Enriched Uranium Final EIS* (DOE/EIS-0240) discusses intersite transportation in section 4.4, including HEU, DU or NU blendstock, and product shipments.

Waste Management:

Since all wastes from the MFFF operation will be transferred to SRS and co-managed with equivalent wastes from other operations, transportation impacts from shipments to WIPP or other offsite disposal options should be derived from data in the *SRS Waste Management Final Environmental Impact Statement* (EIS-0217). See section 4.1.11.2 and Appendix E. In addition, the *Waste Management Programmatic EIS* (DOE/EIS-0200) has tables showing the range of impacts of various waste management alternatives (Table 11.17-1) and the cumulative impacts of existing operations, waste management alternatives, and "other reasonably foreseeable future actions" (Table 11.17-2). The "other reasonably foreseeable future actions" included in this table are defined in Note a and include data from the following NEPA documents:

- *Nonnuclear Consolidation Environmental Assessment* (DOE/EA-0792)
- *Final F-Canyon Plutonium Solutions EIS* (DOE/EIS-0219)
- *Final Supplemental EIS, Defense Waste Processing Facility* (DOE/EIS-0082-S)
- *Draft Programmatic EIS for Tritium Supply and Recycling* (DOE/EIS-0161)
- *Draft EIS, Interim Management of Nuclear Materials, SRS* (DOE/EIS-0220D)
- *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final EIS* (DOE/EIS-0203)

- *Disposition of Surplus Highly Enriched Uranium Draft EIS* (DOE/EIS-0240-D)
- *Storage and Disposition of Weapons-Usable Fissile Materials Draft EIS* (DOE/EIS-0229-D)
- *Draft Programmatic EIS for Stockpile Stewardship and Management* (DOE/EIS-0236)

Spent Fuel Management:

The *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final EIS* (DOE/EIS-0203) addressed the geographical distribution of management of DOE owned spent fuel, and the shipments required to relocate fuels to its management site. The EIS addressed a wide range of alternatives with vastly different shipping profiles. In 1995 DOE decided to implement what is called the Regionalization by Fuel Type alternative. The shipments and shipment impacts involved in this alternative are described in sections I-3.2 and I-4. Specific information regarding SRS impacts is included in section 5.11 of Appendix C.

Attachments:

52-1)	*Nonnuclear Consolidation Environmental Assessment*, DOE/EA-0792
52-2)	Final F-Canyon Plutonium Solutions EIS, DOE/EIS-0219
52-3)	Final Supplemental EIS, *Defense Waste Processing Facility*, DOE/EIS-0082-S
52-4)	Draft Programmatic EIS, *Tritium Supply and Recycling*, DOE/EIS-0161
52-5)	Draft EIS, Interim Management of Nuclear Materials, SRS, DOE/EIS-0220D Draft Not Available, Final Available
52-6)	*Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final EIS*, DOE/EIS-0203
52-7)	*Disposition of Surplus Highly Enriched Uranium Draft EIS*, DOE/EIS-0240D Draft Not Available, Final Available
52-8)	*Storage and Disposition of Weapons-Usable Fissile Materials Draft EIS*, DOE/EIS-0229
52-9)	*Draft Programmatic EIS for Stockpile Stewardship and Management*, DOE/EIS-0236

Action:

None

53. Section 5.10, Environmental Monitoring Program. The direct radiation measurements and the air, soil, vegetation, surface-water and sediment sampling programs for uranium and plutonium should also sample for americium and technetium-99, and depleted uranium daughter products and fission products.

Response:

Comment noted. Details of environmental monitoring program will be part of the License Application (Chapter 10)

Action:

Consider NRC recommendations in preparing the specifics of the environmental monitoring program for the License Application.

54. Appendix E, Transportation Risk Assessment, and Section E.5, Representative Routes, Parameters, and Assumptions. Although the following input parameters to the transportation risk models can be reasonably assigned by ANL staff, they have a large impact on the estimated risks. To be consistent with the ER and SPD EIS, the same values, if deemed reasonable, should also be used in the MOX FFF EIS.

a) External dose rate at 1 m from the side of the transport vehicle for each of the UF_6, UO_2, and fresh MOX fuel assembly shipments.
b) Package size (length) used in RADTRAN for each of the UF_6, UO_2, fresh MOX fuel assembly, and spent fuel (SNF) shipments.

Response:

a) External dose rate at 1 m from the side of the transport vehicle:
   UF6 - 0.23 mrem/hr (same value as Depleted UF6 PEIS, Table 5.2 for UF6 with overcontainer)
   UO2 - 0.76 mrem/hr (same value as Depleted UF6 PEIS, Table 5.2 for UO2)
   MOX - 4.84 mrem/hr (value from MOX Fresh Fuel Package Preliminary Design)

b) The package size parameter provides a characteristic dimension (typically length) of the source term. Package size used in RADTRAN for the shipments:
   UF6 - 5.52 meters
   UO2 - 4.90 meters
   MOX - 3.66 meters (actual active length of fuel assembly)

As stated in ER Section 1.2.7, transportation impacts of MOX SNF shipments are addressed in *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain*, Nye County, Nevada, DOE/EIS-0250D, 1999.

Attachment:

54-1) *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain*, Nye County, Nevada, DOE/EIS-0250D, 1999.

Action:

None.

55. Appendix E, Transportation Risk Assessment, and Section E.5, Representative Routes, Parameters, and Assumptions. Provide the complete radionuclide inventory (Ci per isotope) for each type of shipment (UF_6, UO_2, fresh MOX fuel assembly, and SNF).

Response:

The following are the radionuclide inventories per shipment:

Isotopes	UF6 (Ci)	UO2 (Ci)	MOX Fuel (Ci)
U-235	4.17E-05	7.63E-05	7.06E-06
U-238	2.59E-03	4.73E-03	4.38E-04
Pu-236	0	0	2.22E-03
Pu-238	0	0	4.29E-01
Pu-239	0	0	4.86E+00
Pu-240	0	0	1.08E+00
Pu-241	0	0	4.30E+01
Pu-242	0	0	9.56E-05

As noted in ER Section 1.2.7, transportation impacts of MOX SNF shipments are addressed in Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, DOE/EIS-0250D, 1999.

Action:

None.

56. Appendix E, Transportation Risk Assessment, and Section E.3.1, Uranium Hexafluoride Packaging. Transportation of depleted UF_6 is stated to occur using Model 30B cylinders in overpacks. The bulk of the depleted UF_6 stored at the Portsmouth Gaseous Diffusion Plant site is in 14-ton (48 inch diameter) cylinders, not the smaller 30B (30 inch diameter) cylinders. Since the conversion facility is not designed to accommodate the larger 14 ton cylinders, the 30B cylinders must be used and transfer of the UF_6 from the 14 ton cylinders must be performed before transport. Describe the arrangements that have been made for this transfer to be accomplished.

Response:

DCS and DOE have no contractual arrangement at this time for the source of the depleted UF_6 and the conversion services to produce depleted $U0_2$ from the depleted UF_6. The scenario described in ER Appendix E was used to prepare representative bounding environmental impacts. Under the current scenario used to calculate representative environmental impacts, it is most likely that USEC (under contract to DOE and DCS) would transfer DUF_6 from DOE 48" cylinders to 30B cylinders provided by Framatome ANP. The 30B cylinders would then be transported to a conversion facility. The Depleted UF_6 PEIS and supporting transportation analysis in Biwer et al. 1997 evaluated an alternative that would transfer the nonconforming cylinders into new cylinders as preparation for offsite transportation. A facility necessary to effect such a transfer was assumed to be located at the sites where the existing UF_6 cylinders are stored (including Portsmouth). The transfer of the DUF_6 for the MFFF from the 48" cylinders to 30B cylinders is very similar to the operations analyzed in the Depleted UF_6 PEIS cylinder transfer option (Section 6.1 of Biwer et al. 1997).

Attachment:

56-1) Biwer et al. 1997, *Transportation Impact Analyses in Support of the Depleted UF6 Programmatic Environmental Impact Statement.*

Action:

None

57. Appendix E, Transportation Risk Assessment, Section E.2.3.1, Transportation Modes and Section E.3 Packaging and Representative Shipment Configurations. All shipments are assumed to occur using truck transport. However, SRS and both the McGuire and Catawba reactors have direct rail access and the depleted UF_6 storage locations and potential UF_6-> UO_2 conversion facility location have direct or nearby access to rail transport. Should rail transport of the UF_6 and UO_2 be considered as well as truck transport? If there is a rail alternative to the SafeGuards Transporter, should rail transport of the fresh MOX fuel be considered.

Response:

The UF_6 and UO_2 are shipped routinely via truck and represent minimal radiation hazards. The dose from these packages is so small that the decision as to what mode of transport to use should be based primarily on commercial economic considerations.

For transportation of nuclear weapons materials, there is no rail alternative to the Safeguards Transporter truck shipments. DOE formerly operated a Safe Secure Railcar system, but this was last used in 1985. DOE determined that its highway-based system is more efficient and less noticeable. The Transportation Safeguards System is designed to provide safe, secure transport for highway shipments. Since the establishment of the Transportation Safeguards Division in 1975, this system has transported DOE-owned cargo over more than 151 million km (94 million mi) with no accidents that resulted in a fatality or release of radioactive material.

Action:

None

58. Appendix F, Section F.1.4, Dispersion Modeling. Evaluate whether inventories of soluble chemical compounds of plutonium (such as plutonium nitrate) would result in the bounding accident scenarios. The doses from soluble plutonium are generally more limiting than doses from insoluble forms.

Response:

Consequences for all events identified in the MFFF Hazard Evaluation are determined. These events involve both soluble and insoluble materials. Bounding events are determined as described in response to RAI 38. Although the dose conversion factors for soluble plutonium are greater than those for insoluble plutonium by approximately a factor of 2, the quantities of insoluble material available for release outweigh this difference by approximately a factor of 5, and therefore define the bounding events.

Action:

Update ER Appendix F.6.

59. Appendix F, Section F.1.6, Likelihood of Fatal Cancer. Section F.1.6 describes a bounding consequence assessment in which the respirable release fraction (ARF x RF) is $6x10^{-4}$. However, the reference for this value (NUREG/CR-6410, Nuclear Fuel Cycle Facility Accident Analysis Handbook) cites an ARF = $6x10^{-3}$ and an RF = 0.01 for solid, noncombustible powders exposed to thermal stress (i.e., an ARF x RF = $6x10^{-5}$). Clarify the choice of $6x10^{-4}$ as the respirable release fraction (ARF X RF) for the bounding accident consequence assessment in Section F.1.6.

Response:

Although NUREG/CR-6410 does cite an ARF of 6×10^{-3} and an RF of 0.01 for fires involving non-reactive powders, under the technical basis (p. 3-72 of the NUREG) it is noted that some tests involving PuO_2 in a calcining furnace noted higher RF values based on temperature of the furnace. Since the MFFF has a similar calcining furnace and the PHA includes a fire event involving this furnace, the release fractions were adjusted to ensure bounding consequences were established for this event. Thus, the RF was increased by a factor of 10 per the technical discussion in NUREG/CR-6410.

Action:

None

60. Appendix F, Sections F.5 and F.6. In the ER, the ventilation filtration system is assumed to operate and mitigate releases of radioactive material following accidents. The ER states that the leak path factor for two banks of HEPA filters is assumed to be 1E-04. The basis for this assumption is not presented. NRC guidance in "Nuclear Fuel Cycle Facility Accident Analysis Handbook," NUREG/CR-6410, recommends that removal efficiencies of 99 percent to 95 percent be used of a series of HEPA filters that are not protected by prefilters, sprinklers, and

demisters under severe accident conditions. Justify the use of a leak path factor of 1E-04 for ventilation filtration system under accident conditions.

Response:

The range of 99 to 95 percent recommended by NUREG/CR-6410 (Appendix F Section 2.1.3) for unprotected filters is not applicable to the MFFF high efficiency particulate air (HEPA) final filters because the final filters are protected before, during, and after design basis events.

Each of the MFFF HEPA final filters credited in the safety analysis are designed and tested to be at least 99.97% efficient at 0.3 micrometer diameter particles. NUREG/CR-6410 suggests the assuming 99.9% efficiency for the first filter and 99.8% efficiency for the second filter for accident analysis for filters that are protected by "prefilters, sprinklers, and demisters." As described in Section 11.4.9 of the CAR, the final filters are protected by spark arresters and prefilters. Other measures include: location as far as practical from postulated fires; separation of redundant trains; small fire areas which limits soot loading on filters; and adequate mixing of exhaust air to ensure filter inlet temperatures do not challenge the filters in the event of a postulated fire. The filters are tested in accordance with ASME N510-1995 (*Testing of Nuclear Air-Treatment Systems*). Sprinklers are not necessary for this application because analysis has shown that the mixed air temperature entering the filter is below the rated filter temperature during postulated fires involving the highest flow rate (exhaust) fire areas. Prefilters, spark arresters, and HEPA filters are of non-combustible construction and no ignition source is located inside the filter housing to initiate a fire. Demisters are appropriate for applications involving the need for removal of entrained droplets that could damage or plug filters; demisters are not necessary for this application, which does not involve any significant liquid or vapor stream that could challenge the filters.

Accordingly, the measures discussed above are judged to be equivalent to the protection indicated in NUREG/CR-6410. Thus the use of 99.9% efficiency for the first filter and 99.8% efficiency for the second filter is justified, as provided for in NUREG/CR-6410. For additional conservatism, however, the accident analysis applies an efficiency of 99% for each stage.

Action:

Insert new third paragraph to ER Section F.5.

Revised Text as indicated in Action Statement
With each Question

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designated domestic commercial reactor, although production is anticipated to closely follow product need.

1.2 RELATED ACTIONS

1.2.1 F-Area Infrastructure Upgrades

As part of the implementation of the surplus plutonium disposition facilities, the U.S. Department of Energy Savannah River Operations Office (DOE-SR) will provide integrated upgrades to F-Area infrastructure to support all three surplus plutonium disposition facilities. These upgrades include clearing and grading all three sites, developing integrated stormwater flow patterns for all three sites, providing utility services to all three sites, and providing any necessary access roads. Specific to the MFFF, the F-Area infrastructure upgrade will include expanding ~~augmenting~~ deionized water lines ~~supplies~~ and constructing a liquid waste pipeline from the MFFF to the F-Area Outside Facility. The environmental impacts resulting from this infrastructure project were considered in the DOE *Surplus Plutonium Disposition Final Environmental Impact Statement* (SPD EIS) issued November 1999 (DOE 1999c). Any actions that are not included in the SPD EIS assumptions ~~may subsequently be evaluated by DOE through the appropriate site-specific NEPA documents.~~ are included in this ER.

1.2.2 Irradiation of MOX Fuel

The MOX fuel will be irradiated in four mission commercial nuclear power reactors: two units at the Catawba Nuclear Station near York, South Carolina, and two units at the McGuire Nuclear Station near Huntersville, North Carolina. The environmental impacts associated with irradiating the MOX fuel in these reactors were evaluated as part of the SPD EIS (DOE 1999c, 2000b). Fuel irradiation will require separate NRC licensing action. The NRC licensees for these commercial nuclear reactors will submit license amendment requests to gain NRC approval to irradiate MOX fuel. Any appropriate environmental impacts of irradiation will be considered at that time. Accordingly, the irradiation of the MOX fuel is not part of the proposed licensing action described in this ER.

Although the irradiation of the MOX fuel is not part of this proposed licensing action and the environmental impacts of irradiation will not be reanalyzed in this ER, the conclusions presented in the SPD EIS regarding irradiation impacts are summarized in Section 5.6 of this ER as part of the cumulative impacts discussion. Refer to the SPD EIS and SPD EIS Record of Decision (ROD) for detailed discussion of the environmental impacts related to the irradiation of the MOX fuel.

1.2.3 Pit Disassembly and Conversion

DOE will construct, operate, and ultimately decommission a facility (i.e., PDCF) for disassembling pits (a weapons component) and converting the recovered plutonium, as well as plutonium from other sources, into plutonium dioxide for ultimate disposition. The PDCF will

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3.1.1 MOX Fuel Fabrication Building

The MOX Fuel Fabrication Building is a multi-functional complex containing all of the plutonium handling, fuel processing, and fuel fabrication operations of the MFFF. The MOX Fuel Fabrication Building is located within the protected area and has the requisite security measures in place to adequately safeguard the facility and prevent any attempts to illicitly remove SNM from the facility. The MOX Fuel Fabrication Building is comprised of three major functional interrelated areas: the aqueous polishing area, the fuel fabrication area, and the shipping and receiving area. Figures 3-2 and 3-3 provide a conceptual general arrangement of the aqueous polishing area and fuel fabrication area, respectively. ~~Detailed general arrangement drawings contain Unclassified Controlled Nuclear Information (UCNI). The primary thrust of UCNI is the protection of information about security-related items. To protect the integrity of this security-sensitive information, general arrangement drawings are not provided in the ER.~~

The MOX Fuel Fabrication Building (i.e., aqueous polishing area, fuel fabrication area, and shipping and receiving area) is a multi-story, hardened, reinforced-concrete structure with a partial below-grade basement and an at-grade first floor. The MOX Fuel Fabrication Building has an overall height above grade of 73 ft (22.3 m). The 20-ft (6-m) tall vent stack, mounted on top of the MOX Fuel Fabrication Building, has a top elevation of approximately 93 ft (28 m) above grade. This facility meets all applicable requirements for processing SNM, as discussed in the Construction Authorization Request (CAR) and Safety Assessment (SA). The entire MOX Fuel Fabrication Building structure and the three component building areas are designed to withstand extreme natural phenomena, including design basis earthquakes, floods, and tornadoes, as well as a spectrum of potential industrial accidents that could impact the fissile process materials. The lowest floor level of the MOX Fuel Fabrication Building, approximate elevation 256 ft (78 m) above mean sea level (msl), is well above the F-Area calculated design basis flood level with a 100,000-year return period (WSRC 1999a). Stormwater runoff from the MFFF site is directed to retention basins where it is released at rates equivalent to pre-construction stormwater runoff rates. Additional information on the MFFF design basis is provided in the CAR.

Functional areas and processes in the MOX Fuel Fabrication Building complex include the following:

- Shipping and receiving (i.e., truck bay) area
- Aqueous polishing area
- Blending and milling area
- Pelletizing area
- Sintering area
- Grinding area
- Fuel rod fabrication area
- Fuel bundle assembly area
- Storage areas for feed material, pellets, rods, and fuel assemblies
- A laboratory area

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Table 3-3. Aqueous Polishing Waste Streams

Waste Stream	Annual Volume (gal)	Main Chemical or Isotope Concentration or Annual Quantity
Liquid americium stream Concentrated stream from acid recovery after silver recovery	8,900	Am-241: < 24.5 kg (0.7% maximum Pu content) Pu: < 150 g/yr Hydrogen ions: 3 N Nitrate salts: 200 kg Silver: < 8 kg/yr
Excess acid	1,400	Am: < 14 mg/y (rectification step after two evaporation steps) Hydrogen ions: 13.6 N
Stripped uranium	68,000	Plutonium: < 16 g/yr Stripped U quantity: < 2150 kg [~1% U-235] Hydrogen ions: 0.11 N
Solvent regeneration alkaline wash	3,000	Pu: < 13 g/yr U: < 13 g/yr Na: < 115 kg
Excess solvent residues	2,800	Solvent: 30% tributyl phosphate in branched-dodecane Hydrogen ions: 0.007 N Pu: < 17 mg
Acid recovery condensate	82,000	Pu: < 4E-03 mg/yr Am-241: < 0.8 mg/yr Activity 10^8 Bq/yr (after two rectification and evaporation steps)
Rinsing water	132,000	Alpha activity: < 5 Bq α/L

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Table 3-3. Aqueous Polishing Waste Streams

Waste Stream	Annual Volume (gal)	Main Chemical or Isotope Concentration or Annual Quantity	Disposition (gal)
Liquid americium stream Concentrated stream from acid recovery after silver recovery	8,060 9,700 (max)	Am-241: < 24.5 kg (0.7% maximum Pu content) Pu: < 150 g/yr Hydrogen ions: 3 N Nitrate salts: 250 kg Silver: < 5 kg/yr	High Alpha Waste 47,100 56,400 (max)
Excess acid	1,400	Am: < 14 mg/y (rectification step after two evaporation steps) Hydrogen ions: 13.6 N	
Stripped uranium	35,140 42,300 (max)	Plutonium: < 0.1mg/L Stripped U quantity: < 2150 kg [~1% U-235] Hydrogen ions: 0.11 N	
Solvent regeneration alkaline wash	2,500 3,000 (max)	Pu: < 13 g/yr U: < 13 g/yr Na: < 115 kg	
Excess solvent residues	2,300 2,800 (max)	Solvent: 30% tributyl phosphate in branched-dodecane Hydrogen ions: 0.007 N Pu: < 17 mg	SRS Solvent Recovery 2,300 2,800 (max)
Acid recovery distillate	68,700 82,500 (max)	Pu: < 4E-03 mg/yr Am-241: < 0.8 mg/yr Activity 10^8 Bq/yr (after two rectification and evaporation steps)	Liquid LLW 200,700 240,500 (max)
Rinsing water	132,000 158,000 (max)	Alpha activity: < 5 Bq α/L	

(max) Represents maximum expected annual volume due to unplanned rinses and change-overs.

Table 3-4. Solid Waste Generated by MFFF Fuel Fabrication Processes

Waste Stream	Annual Volume (Mass)[a]	Contamination[b] (mg Pu/kg)
Potentially contaminated solid waste[c]	600 yd^3 (78 tons)	Under detection limit Free of contamination waste collected in controlled area
UO_2 area LLW	18 yd^3 (1.6 tons)	Uranium contamination
Cladding area organic waste	20 yd^3 (1.8 tons)	< 1
Zirconium swarfs and samples	3 yd^3 (0.4 tons)	< 0.2
Inner cans	< 9 yd^3 (2 tons)	< 0.2
Building and U area ventilation filters	< 52 yd^3 (5.6 tons)	< 0.3
Nonroutine Low-Level Waste (LLW)	< 1 yd^3 (0.2 tons)	< 0.2
Low contamination TRU waste	106 yd^3 (16 tons)	approximately 5
High contamination TRU waste	80 yd^3 (12 tons)	approximately 250
PuO_2 convenience cans	6.5 yd^3 (1 tons)	approximately 200
Filters	14 yd^3 (1 tons)	approximately 1,000
Nonroutine TRU waste	1.6 yd^3 (0.5 tons)	approximately 200

[a] Values are approximate based on preliminary design
[b] Estimates for plutonium mass collected in solid waste is about 4 kg.
[c] Potentially contaminated waste will be surveyed and released as nonradioactive if determined to be below NRC release limits.

REPLACE WITH ATTACHED

Table 3-4. Solid Waste Generated by MFFF Fuel Fabrication Processes

Waste Stream	Annual Volume	Contamination[b] (mg Pu/kg)	Disposition[c]
Uncontaminated, nonhazardous solid waste	575 yd^3 1,200 yd^3 (max)		Solid Non-Hazardous Waste 875 yd^3 1,800 yd^3 (max)
Potentially contaminated solid waste[c]	300 yd^3 600 yd^3 (max)	Under detection limit Free of contamination waste collected in controlled area	
UO_2 area LLW	9 yd^3 18 yd^3 (max)	Uranium contamination	Solid LLW 56 yd^3 104 yd^3(max)
Cladding area LLW	10 yd^3 21 yd^3(max)	< 1	
Zirconium Swarfs and Samples	1 yd^3 2.5 yd^3(max)	< 0.2	
Stainless Steel Inner Cans	< 9 yd^3	< 0.2	
Building and U area ventilation filters	< 26 yd^3 52 yd^3(max)	< 0.3	
Miscellaneous LLW	< 1 yd^3 1.3 yd^3(max)	< 0.2	
Low contamination TRU waste	88 yd^3 106 yd^3(max)	approximately 5	Solid TRU 173 yd^3 208 yd^3(max) Reported as 210 yd^3
High contamination TRU waste	65 yd^3 80 yd^3(max)	approximately 250	
PuO_2 convenience cans	6.5 yd^3	approximately 200	
Filters	12 yd^3 14 yd^3(max)	approximately 1,000	
Miscellaneous TRU waste	1.3 yd^3 1.6 yd^3(max)	approximately 200	

[a] Values are approximate based on preliminary design

[b] Estimates for plutonium mass collected in solid waste is about 4 kg.

[c] Potentially contaminated waste will be surveyed and released as nonradioactive if determined to be below NRC release limits.

(max) Represents maximum expected annual volume due to unplanned change-overs.

Table 5-12. Potential Waste Management Impacts from MFFF Operation

Waste Type	Estimated Waste Generation [a]	Site Waste Generation [b]	Percent of Site Waste Generation
Liquid LLW (gal/yr)	214,000	Not available	Not available
Solid LLW (yd^3/yr)	103	13,136	< 1
Liquid High Alpha Activity Waste (gal/yr)	81,300	Not available [d]	Not available [d]
Solid TRU Waste[c] (yd^3/yr)	210	564	37
Hazardous Waste (yd^3/yr)	11	97	11
Liquid Nonhazardous Waste (gal/yr)	1,700,000	109,921,990	1.5
Solid Nonhazardous Waste (yd^3/yr)	600	8,724	6.8

[a] From Tables 3-3 and 3-4.
[b] From Table 4-27.
[c] Includes mixed TRU waste.
[d] Pending classification of high alpha activity waste.

Delete Replace with Attached

Table 5-12. Potential Waste Management Impacts from MFFF Operation

Waste Type	Estimated MFFF Waste Generation [a]	Site Waste Generation [b]	Percent of Site Waste Generation
Liquid LLW (gal/yr)	200,700 240,500 (max)	Not available	Not available
Solid LLW (yd^3/yr)	56 104	13,136	< 1
Liquid High Alpha Activity Waste (gal/yr)	47,100 56,400 (max)	Not available [c]	Not available [c]
Solid TRU Waste (yd^3/yr)	173 210 (max)	564	37
Non-hazardous Solvent Recovery Waste (gal/yr)	2,300 2,800 (max)	NA	NA
Liquid Nonhazardous Waste (gal/yr)	1,700,000	109,921,990	1.5
Solid Nonhazardous Waste (yd^3/yr)	875 1,800 (max)	8,724	6.8

[a] From Tables 3-3 and 3-4.

[b] From Table 4-27.

[c] Pending classification of high alpha activity waste.

(max) Represents maximum expected volumes due to unplanned rinses and change overs

Table 5-15. Summary of Cumulative Operational Impacts Within SRS

Impact	MOX Fuel Fabrication Facility	Surplus Plutonium Disposition Facilities[a]	Other Savannah River Site Activities[a]
Developed Land (acres)	41	79	17,000
Water Use (Million Gallons/yr)	5.3	57	2,068
8-hr Carbon Monoxide Increase ($\mu g/m^3$)[b]	0.189	0.37	673
Annual Nitrogen Dioxide Increase ($\mu g/m^3$)[b]	0.0127	0.063	14.8
Annual PM_{10} Increase ($\mu g/m^3$)[b]	0.00089	0.0042	4.96
Annual Sulfur Dioxide Increase ($\mu g/m^3$)[b]	0.00083	0.12	16.8
Annual Total Suspended Particulate Increase ($\mu g/m^3$)[b]	0.00089	0.0042	45.4
Population Dose within 50 miles (person-rem/yr)	0.035	1.2	44.8
Workers	400	1,120	13,616
Critical Habitat Disturbance (acres)	0	0	0
Cultural Resources Disturbed	Excavate prehistoric site	Excavate prehistoric site	None identified
Liquid Low-Level Radioactive Waste (gal/yr)	214,000	Not Reported	Not Reported
Solid Low-Level Radioactive Waste (yd^3/yr)	103	314	13,136
Liquid High Alpha Activity Waste (gal/yr)	81,300	Not Reported	Not Reported
Solid TRU Waste (yd^3/yr)	210	235	564
Hazardous Waste (yd^3/yr)	11	123	97
Liquid Nonhazardous Waste (gal/yr)	1,700,000	29,058,925	109,921,990
Solid Nonhazardous Waste (yd^3/yr)	600	4,055	8,724

[a] Source: SPD EIS (DOE 1999c)
[b] Contribution to ambient concentrations

DELETE Replace with Attached

Tables #5-15a, 5-15b, 5-15c, 5-15d

Table 6-1. Comparison of Environmental Impacts for the Proposed Action and the No Action Alternative

Environmental Impact	Proposed Action[a]	No Action Alternative[b]
Land Use (acres)	41	0
Surface Water Quality	No Impact	No Impact
Groundwater Quality	No Impact	No Impact
Ambient Carbon Monoxide Increment ($\mu g/m^3$) 8-hour average	0.189	34.1 – 3000
Ambient Nitrogen Dioxide Increment ($\mu g/m^3$) Annual average	0.0127	0.25 – 24
Ambient Particulate Matter – PM_{10} Increment ($\mu g/m^3$) 24-hour average	0.0220	0.77 – 89
Ambient Sulfur Dioxide Increment ($\mu g/m^3$) 24-hour average	0.0205	2.0E-05 – 171
Public Population Dose – 50 mi (80 km) in 2030 (person-rem)	0.035	6.3E-06 – 2.9E-04
Maximally Exposed Public Individual (mrem)	4.1E-04	6.8E-06 – 6.5
Limiting Accident Public Population Dose Within 50 mi (80 km) (person-rem)	< 6	723 – 2,590
Wetlands Affected (acres)	None	None
Critical Habitat Lost (acres)	None	None
Cultural Resources Disturbed	Excavation of archaeological site[c]	None
Liquid LLW (gal/yr) - average [redacted]	~~214,000~~ 200,760	No change
Solid LLW (yd^3/yr) - average [redacted]	~~103~~ 56	No change
Liquid High Alpha Activity Waste (gal/yr)	~~81,300~~ 47,106	No change
Solid TRU Waste (yd^3/yr)	~~210~~ 173	No change
Hazardous Waste (yd^3/yr)	~~11~~ 41	No change
Liquid Nonhazardous Waste (gal/yr)	~~1,700,000~~ 57,800,000	No change
Solid Nonhazardous Waste (yd^3/yr)	~~600~~ 875	No change

Source for No Action Impacts: S&D PEIS (DOE 1996b) and SPD EIS (DOE 1999c); Source for Mission Reactor Impacts: SPD EIS (DOE 1999c)

[a] Projected impacts are based on preliminary design and assumed to be bounding. Impacts of the proposed action are expected to occur for a 20-year period.

[b] Impacts for the No Action Alternative are expected to occur indefinitely.

[c] Mitigation of the archaeological site may result in a positive environmental impact due to recovery of archaeological artifacts.

Non-hazardous Solvent Recovery Waste (gal/yr)	2,300	no change

Table 5-15a. Estimated maximum cumulative ground-level concentrations of nonradiological pollutants (micrograms per cubic meter) at SRS boundary

Pollutant	Averaging time	SCDHEC ambient standard (μg/m³)	SRS baseline (μg/m³)[a]	MFFF (μg/m³)[b]	Other Pu Disposition Facilities[c]	SNF[d]	Tank closure (μg/m³)[e]	Salt processing alternative[f]	Other foreseeable planned SRS activities (μg/m³)[g]
Carbon monoxide	1 hour	40,000	10,000			9.760	3.4	18.0	36.63
	8 hours	10,000	6,900	0.189	0.37	1.31	0.8	2.3	5.15
Oxides of Nitrogen	Annual	100	26	0.0127	0.063	3.36	0.07	0.03	4.38
Sulfur dioxide	3 hours	1,300	1,200			0.98	0.6	0.4	8.71
	24 hours	365	350			0.13	0.12	0.05	2.48
	Annual	80	34	0.00083	0.12	0.02	0.006	5.0×10^{-4}	0.17
Ozone	1 hour	235	NA	NA	NA	0.80	2.0	2	0.71
Lead	Max. quarter	1.5	0.03			NA	4.1×10^{-6}	4.0×10^{-7}	0.00
Particulate matter (≤ 10 microns aerodynamic diameter)	24 hours	150	130			0.13	0.06	0.07	3.24
	Annual	50	25	0.00089	0.0042	0.02	0.03	1.0×10^{-3}	0.13
Total suspended particulates (μ g/m³)	Annual	75	67	0.00089	0.042	0.02	0.005	1.0×10^{-3}	0.06

a DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

b MFFF ER

c DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283

d DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

e DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D

f DOE 2001, *Savannah River Site Salt Processing Alt4rnatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D

g DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279

Table 5-15b. Estimated average annual cumulative radiological doses and resulting health effects to offsite population and facility workers

Activity	Maximally exposed individual				Offsite Population				Workers	
	Dose from airborne releases (rem)	Dose from liquid releases (rem)	Total dose (rem)	Probability of fatal cancer risk	Collective dose from airborne releases (person-rem)	Collective dose from liquid releases (person-rem)	Total collective dose (person-rem)	Excess latent cancer fatalities	Collective dose	Excess latent cancer fatalities
SRS Baseline[a]	5.0×10^{-5}	1.3×10^{-4}	1.8×10^{-4}	9.0×10^{-8}	2.2	2.4	4.6	2.3×10^{-3}	165	0.066
MFFF[b]	4.1×10^{-7}	(1)	4.1×10^{-7}	2.1×10^{-10}	0.035	(1)	0.035	1.8×10^{-5}		
Other Plutonium Disposition Facilities[c]	3.7×10^{-6}	(1)	3.7×10^{-6}	1.9×10^{-8}	1.6	(1)	1.6	8.0×10^{-3}	434	5.0×10^{-3}
Management of Spent Nuclear Fuel[d]	1.5×10^{-5}	5.7×10^{-5}	7.2×10^{-5}	3.6×10^{-8}	0.56	0.19	0.75	3.8×10^{-4}	55	0.022
Surplus HEU Disposition[e]	2.5×10^{-6}	(1)	2.5×10^{-6}	1.3×10^{-8}	0.16	(1)	0.16	8.0×10^{-5}	11	4.4×10^{-3}
Tritium Extraction Facility[f]	2.0×10^{-5}	(1)	2.0×10^{-5}	1.0×10^{-8}	0.77	(1)	0.77	3.9×10^{-4}	4	1.6×10^{-3}
Defense Waste Processing Facility[g]	1.0×10^{-6}	(1)	1.0×10^{-6}	5.0×10^{-11}	0.71	(1)	0.71	3.6×10^{-5}	120	0.048
Management Plutonium Residues/Scrub Alloy[h]	5.7×10^{-7}	(1)	5.7×10^{-7}	2.9×10^{-10}	6.2×10^{-3}	(1)	6.2×10^{-3}	3.1×10^{-6}	7.6	3×10^{-3}
DOE complex miscellaneous components[i]	4.4×10^{-6}	4.2×10^{-8}	4.4×10^{-6}	2.2×10^{-9}	7.0×10^{-3}	2.4×10^{-4}	7.2×10^{-3}	3.6×10^{-6}	2	0.001
Sodium-Bonded Spent Nuclear Fuel[j]	3.9×10^{-7}	1.2×10^{-7}	5.1×10^{-7}	2.6×10^{-11}	1.9×10^{-2}	6.8×10^{-4}	2.0×10^{-2}	9.8×10^{-6}	38	0.015
Tank Closure[k]	5.2×10^{-8}	(1)	5.2×10^{-8}	2.6×10^{-11}	3.0×10^{-3}	(1)	3.0×10^{-3}	1.5×10^{-6}	490	0.20
Salt Processing[l]	3.1×10^{-4}	(1)	3.1×10^{-4}	1.6×10^{-7}	18.1	(1)	18.1	9.1×10^{-3}	29	0.12
Plant Vogtle[m]	5.4×10^{-7}	5.4×10^{-5}	5.5×10^{-5}	2.7×10^{-8}	0.042	2.5×10^{-3}	0.045	2.2×10^{-5}	NA	NA

(1) Less than minimum reportable levels

a Arnett and Mamatey, 1998, *Savannah River Site Environmental Data for 1997*, WSRC-TR-97-00322 as cited in DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.

b MFFF ER.

c DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283.

d DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.

e DOE 1996, *Disposition of Highly Enriched Uranium Final Environmental Impact Statement*, DOE/EIS-0240.

f DOE 1999, *Final Environmental Impact Statement for the Construction and Operation of a Tritium Extraction Facility at the Savannah River Site*, DOE/EIS-0271.

g DOE 1994, *Final Defense Waste Processing Facility Supplemental Environmental Impact Statement*, DOE/EIS-0082-S.

h DOE 1998, *Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy at the Rocky Flats Environmental Technology Site*, DOE/EIS-0277F.

i DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.

j DOE 1999, *Draft Environmental Impact Statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel*, DOE/EIS-0306D.

k DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D.

l DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D.

m NRC 1996, *Dose Commitments Due to Radioactive Releases from Nuclear Power Plant Sites in 1992*. NUREG/CR 2850.

Table 5-15c. Estimated cumulative waste generation from SRS concurrent activities (cubic meters)

Waste Type	SRS Operations[a,b]	MFFF[c]	Other Pu Disposition Facilities[d]	SNF Management[e]	Tank Closure[f]	Salt Processing[g]	Envirinmental Restoration /D&D[a]	Other Waste Volume[a]
High-level	14,129	0		11,000	97,000	45,000	0	69,552
High Alpha Activity		175						
Low-level	118,669	80	141	140,000	19,260	920	61,630	110,102
Hazardous/mixed	3,856	0	91	270	470	56	6,178	4,441
Transuranic	6,012	160	113	3,700	0	0	0	8,820

a DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.
b Based on total 30 year expected waste forecast which includes previously generated waste.
c MFFF ER
d DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283.
e DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.
f DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D.
g DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D.

Table 5-15d. Estimated average annual cumulative utility consumption

Activity	Electricity (megawatt-hours)	Water usage (liters)
SRS baseline[a]	4.11×10^{5}	1.70×10^{10}
MFFF[b]	8.0×10^{4}	
Other Pu Disposition Facilities[c]	4.4×10^{4}	1.58×10^{8}
SNF management[a]	1.58×10^{4}	2.11×10^{8}
Tank closure[d]	Not Available	8.65×10^{6}
Salt processing[e]	2.4×10^{4}	1.2×10^{7}
Other SRS foreseeable activities[a]	1.51×10^{5}	6.73×10^{8}

a DOE 2000, *Savannah River Site Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279.
b MFFF ER
c DOE 1999, *Surplus Plutonium Disposition Final Environmental Impact Statement*, DOE/EIS-0283.
d DOE 2000, *High-Level Waste Tank Closure Draft Environmental Impact Statement*, DOE/EIS-0303D.
e DOE 2001, *Savannah River Site Salt Processing Alternatives Draft Supplemental Environmental Impact Statement*, DOE/EIS-0082-S2D.

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and MOX fuel fabrication also provides important insurance against uncertainties of implementing either approach by itself.

In response to the foreign policy commitments in the *Agreement Between the Government of the United States of America and the Government of the Russian Federation Concerning the Management and Disposition of Plutonium Designated as No Longer Required for Defense Purposes and Related Cooperation* (White House 2000), DOE believes that only the hybrid approach can meet the need for the action to reduce the threat of nuclear weapons proliferation worldwide by disposing of surplus plutonium.

INSERT NEW 1.4 (ATTACHED)

~~1.4~~ 1.5 ALTERNATIVES CONSIDERED IN THIS ENVIRONMENTAL REPORT

Taking into consideration the above framework of determinations previously made by DOE and the nature of the proposed action before the NRC (see Section 1.1 above), DCS has developed the following range of alternatives for consideration in this ER.

This ER includes a No Action Alternative that is relevant to the proposed action. The No Action Alternative for this ER is a decision by the NRC to not grant a license to DCS to possess and use SNM at the MFFF. Because of previous DOE decisions, the consequences of the No Action Alternative are the same as those discussed in the SPD EIS (DOE 1999c); all weapons-usable fissile materials would remain in storage at existing sites using proven nuclear material safeguards and security procedures. The No Action Alternative consequences, evaluated and discussed in the SPD EIS, are summarized in Section 5.7.1 of this ER but were not reanalyzed in this ER. The consequences of the No Action Alternative are discussed in more detail in the SPD EIS.

Within F Area at SRS, DCS considered various locations for the MFFF. This evaluation is discussed in Section 5.7.2 of this ER. Design alternatives that may impact the environment are addressed in Section 5.7.3 of this ER.

~~1.5~~ 1.6 PROJECT SCHEDULE

The following timetable represents the anticipated schedule for licensing, construction, and operation of the MFFF.

Submit Application for Construction Authorization	Early 2001
Submit License Application	June 2002
Initiate Facility Construction	March 2003
Receive SNM	November 2005
Commence Production of MOX Fuel	January 2007

Any significant delay in the schedule of the MFFF could adversely affect the overall MFFF plutonium disposition mission.

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1.4 ALTERNATIVES CONSIDERED BUT NOT EVALUATED IN THIS ENVIRONMENTAL REPORT

1.4.1 Thermally Induced Galium Removal

As noted in the DOE Surplus Plutonium Disposition Final Environmental Impact Statement (DOE 1999c), DOE originally considered the Thermally Induced Gallium Removal (TIGR) process, a dry process for gallium removal developed by Los Alamos National Laboratory. DOE concluded that the dry process would not meet the technical requirements for MOX fuel for the removal of gallium and other impurities. The best reported gallium removal (Kolman et al. 2000) results in impurities still two order of magnitude higher than that required in the fuel. Furthermore, the TIGR process remains an experimental process requiring further testing to scale the process to production while ensuring uniform plutonium oxide powder physical characteristics such as particle size, surface area, chemical reactivity, and DOE is no longer providing funding for continued work on the TIGR process.

The aqueous polishing process, however, is a proven technology that is known to remove impurities that might have adverse impacts on fuel fabrication or performance. In addition to removing gallium and impurities, the aqueous polishing process produces uniform plutonium oxide powder with the appropriate physical characteristics. The aqueous polishing process also removes the existing americium from the plutonium to permit fuel fabrication and at-reactor fuel handling to proceed with much lower operational radiation exposures. The TIGR process would not reduce radiation exposures.

D. G. Kolman, M. E. Griego, C. A. James, and D. P. Butt, *Thermally induced gallium removal from plutonium dioxide for MOX fuel production*, Journal of Nuclear Materials 282 (2000) 245-254

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5.7.3.5 Decloggable Metallic Pre-filter in Powder Grinding Glovebox

Based on operating experience, DCS replaced a two-stage cyclone separator in the MOX powder processing with a decloggable metallic filter. This design results in an overall reduction of TRU waste volume during periodic filter replacement downstream of these components.

5.7.3.6 Sand Filters Versus Multiple Fire Areas

~~DCS has selected a design that limits the propagation of fires to small fire areas within the facility, eliminating the possibility of a facilitywide fire. This design maintains dynamic confinement during postulated fire events with the normal HEPA filters. The design eliminates the need for additional filtration such as sand filters. Environmental impacts from the additional land requirements for the sand filters are eliminated.~~

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5.7.3.7 Facility Heat Exchangers

Because the MFFF has a relatively small heat load, DCS evaluated both water-cooled (cooling tower) and air-cooled heat exchangers to dissipate the building and process heat loads. The engineering evaluation recommended the use of air-cooled heat exchangers for the MFFF. This decision eliminated any potential environmental impacts normally associated with water-cooled heat exchangers such as impacts from cooling tower drift or blowdown.

5.7.3.8 Physical Security Barriers

DCS evaluated a number of options for the creation of security barriers for the facility. One option included the construction of an engineered berm around the facility. This option, which would have required a larger site and impacted land resources, was eliminated in favor of other security barrier options, which resulted in less land disturbance.

5.7.3.9 Material Transfer Between the PDCF and MFFF

Plutonium that has been converted to plutonium oxide must be transferred from the PDCF to the MFFF. DCS evaluated several different options for this transfer including a tunnel and a closed transfer trench. The engineering evaluation discarded both of these options in favor of transfer using an overland vehicle. Both the tunnel and trench options would have had minor impacts to land resources. The vehicle option requires no additional land and moves the material over relatively short distances within F Area.

5.8 SHORT-TERM USES AND LONG-TERM ENVIRONMENTAL PRODUCTIVITY

The use of land on SRS for the MFFF would be a short-term use of the environment; on completion of the disposition activities, such land could be returned to other uses, including long-term productive uses.

Losses of the natural productivity of terrestrial and aquatic habitats due to construction and operation of the MFFF are possible. Land clearing and construction and operational activities

Insert for ER page 5-53

DCS compared the advantages of sand filters and HEPA filters on the design licensing, construction, and operation of the MFFF. The comparison was based, in part, on a recent study by the DOE (DOE-Chicago Operations Office 2001). Both alternatives can provide an adequate safety class function of containment for prevention of offsite release impacts. The sand filter decontamination factor is slightly less than that for the HEPA filter system, but both systems provide adequate decontamination efficiency (i.e., the Δ in DF is insignificant). The capital cost of the HEPA filter option is slightly lower (Δ $4M) than the sand filter, while the life cycle cost of the sand filter option is slightly lower (Δ $4M) than the HEPA filter configuration presented in this study. Overall, cost not a significant distinguishing factor between the two alternatives. The D&D costs are not significantly different for either alternative, assuming all wastes are LLW (no TRU), and that sand filters will be entombed in place. If complete site remediation is required, the costs for sand filter D&D would be large

The differences in environmental impacts were not significant to influence the alternatives selection. The sand filter would inundate more land area. The sand filter is not as efficient as the HEPA filter at controlling facility releases, but the difference is minor (both systems meet environmental requirements). Since the HEPA filter alternative provides complete site remediation, there is no post-closure care as with the sand filter alternative. The sand filter option will produce less LLW during the operation phase.

DCS selected HEPA filters for the following reasons:

- HEPA filters are used in the MELOX facility, which is the technical baseline for the MFFF.
- The MFFF HEPA filter system incorporates prefilters and spark arrestors The design limits the propagation of fires to small fire areas within the facility, eliminating the possibility of a facility-wide fire. This design maintains dynamic confinement during postulated fire. The design eliminates the need for sand filters to mitigate a facility wide fire.
- Environmental impacts from the additional land requirements for the sand filters are eliminated.
- HEPA filters are the nuclear industry standard for high-efficiency air cleaning, 99.97% for particulate matter
- HEPA filters are identified in NRC Regulatory Guide 3.12 as being acceptable to the Regulatory staff for the design of ventilation systems for plutonium processing and fuel fabrication plants and, therefore, are considered "adequate to protect health and minimize danger to life and property."
- Sand filters have an increased performance risk in that actual filter performance will not be known until the filters have been constructed and tested, while HEPA filters are factory tested before delivery and will have know performance characteristics.

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3.3.2.4 Stripped Uranium Stream

After the uranium stripping process, the diluted uranium (uranium-235 < 1%) is collected in a storage vessel. The uranium stream will be transferred to the F-Area Outside Facility with the liquid high alpha activity waste for management by SRS.

3.3.2.5 Rinse Water

Potentially contaminated wastewater is collected in the controlled area. This wastewater consists of laboratory rinse water, mop water from washing, and condensate from room air conditioners. These rinse waters are collected, sampled, and analyzed. After analysis, water with acceptable levels of radioactivity is discharged to the local SRS sanitary sewer line for transfer to the SRS CSWTF. If the levels of radioactivity are above what is permitted for CSWTF disposal, the rinse water stream is discharged to the process sewer for treatment at the SRS Effluent Treatment Facility (ETF).

3.3.2.6 Contaminated Drains

The MFFF building contaminated drains system consists of drains, piping, and necessary tanks, which collect all contaminated and potentially contaminated fluids from within the process areas and other potentially contaminated areas. All drains lead to central collection tanks in the MFFF building radioactive waste area for monitoring and discharge to the appropriate SRS facility for processing. Drains from rooms that contain criticality-safe equipment and collection tanks must have a critically-safe geometry aligned to criticality-safe tanks. Drains in rooms that contain conventional equipment will be aligned to conventional tanks. # The design of the contaminated drains system considers the collection system guidelines in Regulatory Guide 3.10 (NRC 1973).

Additional liquid containment features include the following engineered systems:

- Tanks containing contaminated liquids are located in diked rooms/areas that are of sufficient size to contain the contents of a single tank.
- Concrete vaults and dikes are used for spill protection of diesel fuel oil storage tanks.
- Stainless steel-lined floors and portions of walls creating containment basins in tank rooms of the aqueous polishing building are used.
- Double-walled pipes are used for transport of contaminated liquids between or outside of the buildings.
- Stormwater collection and monitoring basins and oil separators are employed.

Bathing showers, hand sinks, etc., within the radiation control areas ~~are subject to potential~~ contamination and will drain to the contaminated drain system. Th
the sanitary sewer.

3.3.2.7 Nonhazardous Liquid Waste

Nonhazardous liquid waste includes HVAC condensate, rinse water, and the sanitary waste from sinks, showers, urinals, and water closets from the inactive area. Nonhazardous wastewater, exclusive of the potentially radioactive LLW rinse water, is discharged to the SRS F-Area sanitary sewer system that connects to the CSWTF.

3.3.3 Facility Solid Waste Management

The management of solid waste for the MFFF is discussed in the SPD EIS, Appendix H, Section H.4.2.3.2 (DOE 1999c). No HLW will be generated by the facility. Solid waste is classified as transuranic (TRU) waste, mixed TRU waste, LLW, mixed LLW, hazardous waste, and nonhazardous solid waste. Waste that is potentially contaminated with plutonium is collected, drummed, and then analyzed to determine the waste category. The drums are then separated by waste category and stored as TRU waste, mixed TRU waste, LLW, and mixed LLW. All solid waste will comply with SRS WAC and certification requirements. The methods and materials used in the management of these various waste streams are often similar and are noted in the following discussion.

3.3.3.1 Solid Transuranic Waste

TRU waste is radioactive waste containing more than 100 nCi (3,700 Bq) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years. Contact-handled TRU waste is TRU waste with a surface dose rate not greater than 200 mrem/hr. The container itself provides sufficient protection, and no extra shielding is required.

TRU solid waste generation is related to the normal process operations, maintenance operations, and replacement of faulty equipment. TRU solid waste includes disposable materials and replaced equipment. TRU solid waste may be both compactible and non-compactible.

TRU solid waste streams are separated at the source of generation and packaged in standard metallic 55-gal (208-L) drums.

Waste containers are marked at the point of generation. The containers are processed sequentially. Each drum is checked for plutonium mass, labeled, and registered, if within the plutonium mass limits. The drums are uniquely labeled, and the drums are tracked through the storage and shipping cycles in the waste management computer system.

3.3.3.2 Solid Mixed Transuranic Waste

The only solid mixed TRU waste produced at the MFFF may consist of the lead-lined gloves that may be used in the gloveboxes. Removal of this potential waste source is under consideration.

The Radiation Protection Contamination Monitoring and Control Program ensures that showers and sinks outside of the restricted radiation zones will not be contaminated. This program requires personnel and equipment leaving contaminated areas to be monitored to ensure that they are not contaminated.

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gal/yr (1.6 billion L/yr) (DOE 1999c). The water treatment system has an approved capacity to service this volume of water. Therefore, no impacts on water availability would be expected.

5.2.12 Waste Management Impacts

MFFF operational impacts on SRS waste management activities are discussed in Section 4.4.2.2 of the SPD EIS (DOE 1999c).

The waste management facilities within the MFFF will transfer all wastes generated to SRS. Table 5-12 compares the expected waste generation rates from operating the MFFF with the existing site waste generation rates.

As described in Section 3.3, the MFFF will not generate any HLW. The aqueous polishing process produces a liquid high alpha activity waste that will be transferred through a double-walled pipe to the F-Area Outside Facility. ~~The aqueous polishing process also produces a uranium waste stream that is transferred to the F-Area Outside Facility with the liquid high alpha activity waste. Unrecyclable solvent will be collected as a liquid hazardous waste at a satellite collection point and transferred to SRS for disposal as a hazardous waste.~~ Potentially contaminated wastewater will be tested for radiological contaminant levels. If levels are acceptable for discharge, the waste will be discharged to the SRS CSWTF. If contaminant levels are not suitable for discharge, the liquid waste will be discharged to the ETF for processing.

Insert 5.2.12 A

~~Solid wastes will be packaged and certified to meet WSRC WAC, as appropriate, and transferred to SRS for treatment and disposal. All waste will be stored, treated, and disposed by SRS in accordance with the SRS Waste Management Plan. The environmental impacts of SRS waste management were previously evaluated in two DOE EISs (DOE 1995a, 1995b).~~

Insert 5.2.12 B

Table 5-12 illustrates that the MFFF waste generation rates are generally less than 10% of the SRS generation rates, except for solid TRU waste, which is projected to be about 37% of the SRS annual generation rate. Because MFFF waste generation is small compared to SRS waste generation, any impacts to the environment should be bounded by those evaluated in the previous DOE EISs (DOE 1995a, 1995b). The MFFF will generate a liquid high alpha activity waste. This liquid high alpha activity waste is a new waste stream, and the F-Area Outside Facility is being developed to process this waste appropriately. The MFFF liquid high alpha activity waste is predominately a remotely handled liquid americium stream generated by the aqueous polishing process. This stream will be processed to conform to the WAC requirements for the F-Area Tank Farm in the F-Area Outside Facility and combined with the F-Area liquid HLW.

5.3 DEACTIVATION

5.3.1 Introduction

The MFFF is owned by DOE and operated by DCS under the terms of the DOE-DCS contract and scope of work. After all of the MOX fuel is fabricated, DCS is required to deactivate the

Inserts for ER Page 5-20

Insert 5.2.12 A

The waste streams that comprise the liquid high alpha liquid waste stream and are to be transferred to SRS for management include the americium stream, the alkaline wash stream, the excess acid stream and the stripped uranium stream. The total volume of these streams is estimated to be 47,100 gallons per year. During start-up this waste is expected to have a maximum annual volume of 56,400 gallons. The composite stream contains approximately 84,000 Curies of Americium-241 and 17 Curies of uranium and plutonium isotopes. All transfers to the SRS High Level Waste (HLW) system will meet the DOE Waste Acceptance Criteria as approved at the time of transfer. The SRS HLW system already contains large quantities of americium and uranium. The liquid high alpha stream will be neutralized and blended with existing wastes in the HLW system and will result in the eventual production of additional vitrified high level waste canisters by the Defense Waste Processing Facility (DWPF). These additional canisters represent an approximate 1% increase attributable to the introduction of the MFFF liquid high alpha stream with its uranium content. SRS saltstone production would also increase by about 1%.

The environmental impacts associated with operation of the SRS HLW system, including accident evaluations, are described in the *SRS Waste Management Final Environmental Impact Statement* (DOE 1995b). This EIS analyzed management and treatment of the approximately 35 million gallons (132,500 cubic meters) of existing HLW, as well as additional quantities under various scenarios up to an additional 7.1 million gallons (26,900 cubic meters) (DOE 1995b). With the MFFF expected to generate about 47,100 gallons (178 cubic meters) per year, the environmental impacts of treating the MFFF high alpha waste are bounded by existing analyses.

In addition, the MFFF is expected to generate about 207,700 gallons (786 cubic meters) per year of low-level liquid waste. The MFFF will include collection tanks with sampling capability for the LLW stream. The solution will be verified to meet the acceptance criteria for the SRS Effluent Treatment Facility (ETF). After confirming solution acceptability, it will be pumped on a batch basis to a tie-in with the existing F Area process sewer. The F Area process sewer is used to transfer similar low level waste streams from existing operations to the ETF.

The SRS Effluent Treatment Facility treats low-level radioactive wastewater from the F and H Area separations and waste management facilities. The ETF removes chemical and radioactive contaminants before releasing the water in Upper Three Runs, which flows to the Savannah River. Operation of the ETF is approved and permitted by the South Carolina Department of Health and Environmental Control (SCDHEC) and the Environmental Protection Agency.

ETF is permitted to treat up to 430,000 gallons (1,628 cubic meters) per day. The ETF includes wastewater collection and treatment operations that were modified for radioactive use. It is designed to remove heavy metals, organic and corrosive chemicals, as well as radiological contaminants.

ETF effluents are discharged within limits of permits issued by SCDHEC. All personnel operating ETF are certified by the South Carolina Environmental Certification Board.

With the proposed addition of 207,700 gallons (786 cubic meters) per year of MFFF low level liquid waste being only a small fraction of the facility's design and permit capacity (<0.2%), the additional environmental impacts associated with treatment of this stream will be negligible.

Insert 5.2.12 B

Excess dodecane solvent, contaminated with plutonium, will be transferred to SRS for solvent recovery. This is a very small waste stream of 2,300 gallons per year.

The solid low level, and TRU wastes resulting from the MFFF will be processed along with other SRS wastes of the same type in an existing waste infrastructure. This infrastructure is described and the environmental impacts evaluated in the SRS Waste Management Final Environmental Impact Statement (DOE 1995b) over a wide range of waste volumes which could result from SRS and external operations. The MFFF TRU waste is estimated to be 173 yd^3 per year and to contain approximately 286 curies of Plutonium. Over its lifetime, MFFF would expect to generate from 1,726 to 2,589 yd^3 of TRU waste. The forecast for SRS TRU waste generation over the next 30 years ranges from a minimum estimate of 7,578 yd^3 to 710,648 yd^3 with an expected forecast of 16,433 yd^3 (DOE 1995b). The estimated MFFF TRU solid waste quantity is only a small fraction of the maximum estimate.

The MFFF low level waste (LLW) is estimated to be 56 yd^3 per year and to contain approximately 0.2 curies of Plutonium. Over its lifetime, MFFF would expect to generate from 560 to 840 yd^3 of LLW. The forecast for SRS LLW generation over the next 30 years ranges from a minimum estimate of 480,310 yd^3 to 1,837,068 yd^3 with an expected forecast of 620,533 yd^3 (DOE 1995b). The estimated MFFF LLW quantity is only a small fraction of any of the SRS estimates. Consequently, the waste volumes generated from MOX are small in comparison to the annual SRS volumes and are well within the bounds evaluated in the SRS Waste Management EIS.

All TRU wastes and LLW transferred to SRS would meet the requirements of the applicable Waste Acceptance Criteria (WAC).

RAI – 9

NO ACTION REQUIRED

RAI – 10

NO ACTION REQUIRED

RAI – 11

NO ACTION REQUIRED