ISM

Inspection of Environment, Safety, and Health Management at the

Hanford Site

March 2002

Office of Independent Oversight and Performance Assurance
Office of the Secretary of Energy

OVERSIGHT

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Abbreviations Used in This Report

AB	Authorization Basis
ADP	Automated Data Processing
AJHA	Automated Job Hazards Analysis
ALARA	As Low As Reasonably Achievable
ALARACT	ALARA Control Technology
CAM	Continuous Air Monitor
CAMS	Corrective Action Management System
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CY	Calendar Year
DAC	Derived Air Concentration
DEG	Deficiency Evaluation Group
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DTS	Deficiency Tracking System
ECN	Engineering Change Notice
EM	Office of Environmental Management
EMS	Environmental Management System
ES&H	Environment, Safety, and Health
ESH&Q	Environment, Safety, Health, and Quality
FEB	Facility Evaluation Board
FHI	Fluor Hanford, Incorporated
FR	Facility Representative
FRAM	Functions, Responsibilities, and Authorities Manual
FSAR	Final Safety Analysis Report

(Continued on inside back cover.)

1.0 Introduction

The Secretary of Energy's Office of Independent Oversight and Performance Assurance (OA) conducted an inspection of environment, safety, and health (ES&H) management at the Department of Energy (DOE) Hanford Site in January-February 2002. The inspection was performed by the OA Office of Environment, Safety and Health Evaluations to assess the effectiveness of selected aspects of the Hanford Site ES&H programs and implementation of the DOE integrated safety management (ISM) system. This OA evaluation focused on the Hanford Site's nuclear material stabilization project and associated work activities at the Plutonium Finishing Plant (PFP).

The DOE Office of Environmental Management (EM) is the cognizant secretarial office for the Hanford Site and has overall Headquarters responsibility for programmatic direction and funding of activities at PFP. Within EM, the Richland Operations Office (RL) has line management responsibility for PFP activities and most other activities at the Hanford Site (with the exception of certain activities managed by DOE's Office of River Protection). Fluor Hanford, Incorporated (FHI) is the prime contractor for operations at PFP and certain other facilities and activities at the Hanford Site.

The Hanford Site performs various activities, including environmental restoration, facility decontamination and decommissioning, nuclear material storage and stabilization, radioactive and hazardous waste management, and research and development. PFP was constructed in 1949 to provide a capability to process plutonium to metal and oxide forms. In 1964, the Plutonium Reclamation Facility was completed to provide an increased capability to process plutonium residues.

The nuclear material stabilization project encompasses the activities needed to transition PFP from a storage/processing facility to deactivated status in preparation for decontamination, decommissioning, dismantling, and disposition. Project activities currently being performed at PFP include storage of special nuclear material, maintenance of facilities, stabilization of nuclear materials, disposition (packaging and shipping offsite) of special nuclear materials, deactivation of inactive systems, and planning for deactivation. In accordance with the DOE Implementation Plan for Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 94-1/2000-1, PFP is scheduled to complete efforts to stabilize and package all plutonium-bearing materials by May 2004 (a stretch goal to complete those efforts by November 2003 has been established). Current DOE plans call for completion of all deactivation, decontamination, decommissioning, and dismantlement activities (removal of all systems and structures resulting in a "clean slab on grade") by 2016.

Ongoing PFP activities involve various potential hazards that need to be effectively controlled, including exposure to external radiation, radiological contamination, nuclear criticality, hazardous chemicals, and various physical hazards associated with chemical plant operations (e.g., machine operations, high-voltage electrical equipment, pressurized systems, noise, and construction/maintenance activities). Large quantities of plutonium-bearing materials are present in various forms at PFP, including solutions, metals, oxides, mixed oxide powders, residues, fluorides, pellets, and polycubes. Ongoing operations to stabilize plutonium materials include thermal stabilization, metal brushing to remove oxides, precipitation of plutonium from liquids, evaporation of plutonium-bearing liquids, removal and treatment of plutonium holdup in process equipment, residue processing and treatment, and packaging.

OA performs concurrent reviews of various areas during consolidated inspections. This OA inspection of ES&H management addressed three related aspects of the Hanford ISM program:

- The RL and FHI ISM program, including evaluations of the principles of safety management, the application of the core functions of safety management to work activities at PFP, and the effectiveness of RL and FHI feedback and continuous improvement programs

- The functionality of a selected essential system (the ventilation system at the 2736-ZB building) using an approach consistent with the intent of the DOE Implementation Plan for DNFSB Recommendation 2000-2

- RL and FHI implementation of environmental protection programs at PFP, including environmental monitoring, waste management, and environmental radiological controls.

The results of the three parts of this evaluation were analyzed collectively to provide insights on the overall effectiveness of line management in establishing an ISM program at PFP.

As described in various OA documents, OA is placing more emphasis on the review of contractor self-assessments and DOE line management oversight in ensuring effective ES&H programs. Throughout the evaluation, OA reviewed the role of DOE organizations in providing direction to contractors and conducting line management oversight of contractor activities. In reviewing RL line management oversight, OA focused on RL's effectiveness in managing its contractors including management functions such as setting expectations, providing implementation guidance, allocating resources, monitoring and assessing contractor performance, and monitoring/evaluating contractor self-assessments.

As discussed in this report, RL has significantly improved its approach to managing and overseeing implementation of the contract. FHI has also made significant improvements in safety management. However, increased management attention is needed to enhance the effectiveness of contractor self-assessments, corrective action management, training programs, and some aspects of hazards analysis, as well as to address RL skill shortages in certain areas.

Section 2 provides an overall discussion of the results of the review of the PFP ISM program, including positive aspects, findings, and other items requiring management attention. Section 3 provides OA's conclusions regarding the overall effectiveness of the program. Section 4 presents the ratings assigned as a result of this review. Appendix A provides supplemental information, including team composition. Appendix B identifies the specific findings that require corrective actions and follow-up. The implementation of the guiding principles of safety management at PFP is discussed in Appendix C. Appendix D provides an evaluation of the RL and FHI feedback and continuous improvement programs. The application of the core functions of safety management to PFP work activities is discussed in Appendix E. The review of the functionality of a selected essential system is discussed in Appendix F. Appendix G discusses environmental protection program management at PFP.

Aerial View of PFP

2.0 Status and Results

The results of this review indicate that the Hanford Site has several significant positive attributes (see Section 2.1). RL and FHI have established an effective ISM framework, and most elements of the program are effectively implemented. However, several weaknesses and areas requiring attention were identified (see Section 2.2).

2.1 Positive Program Attributes

RL has demonstrated leadership and commitment to continuous improvement through the development and implementation of an integrated management system tool. RL has devoted substantial management attention and resources to the development and implementation of the RL Integrated Management System (RIMS). RIMS is a web-based modern information management tool that encompasses all RL activities and provides extensive information about RL operations. Although not all aspects have been implemented, the portions of RIMS that have been implemented are extensively used by RL managers and staff. RIMS provides a framework for effectively implementing many important ES&H and ISM programs, including safety policies; roles and responsibilities of RL staff and managers; requirements management; evaluations of contractor performance; project planning and prioritization; and integration of safety into operations. RIMS also provides an effective framework for addressing individual RL organizational elements and cross-cutting functions. RL is continuing to develop and enhance RIMS and better utilize its capabilities to enhance ES&H programs and ISM.

RL has established effective processes to monitor contractor ES&H/ISM performance and provide incentives for improving safety performance. RIMS provides structured, rigorous, standards-based management systems and processes for oversight, self-assessment, and performance improvement by RL and its contractors. RL is using the annual performance fee evaluation process effectively to establish specific ES&H/ISM performance expectations, evaluate performance against defined criteria, and identify opportunities for improvement in contractor performance. The RL Facility Representative program has been effective in providing ongoing line management oversight of contractor safety performance. The PFP Facility Representatives conduct frequent, thorough, formal surveillances that include an evaluation of the contractor's self-assessment program and a rating. The RL Facility Representatives assigned to PFP effectively communicate with contractor management through direct interactions, attendance at daily status meetings, and periodic meetings.

RL and FHI management have established effective mechanisms for obtaining worker input on ES&H-related matters, and have allocated resources to address worker concerns. RL and FHI have supported the effort to pursue voluntary protection program Star status. With the support of RL, FHI management has established several mechanisms to receive worker input on matters related to ES&H. Examples of these mechanisms include monthly labor/management meetings, the Zero Accident Council, use of a Safety Log Book, and the designation of a union safety representative who relays worker safety input to management. RL and FHI management have been responsive to worker input provided through these mechanisms. For example, FHI evaluated a suggestion by a bargaining unit worker and decided to purchase five defibrillators for the secured areas at PFP. RL took aggressive and innovative actions in teaming with FHI to address workplace environment and other safety concerns reported by PFP employees through the RL employee concerns program.

The RL employee concerns program is well structured and effectively managed, and it receives significant management support and resources from RL management. RL has established an employee concerns program to provide a reliable mechanism for collecting, investigating, and resolving concerns raised by site employees. This program meets or exceeds the requirements of DOE Order 442.1A, *DOE*

Employee Concerns Program, and has been used to address a broad range of concerns, including allegation of reprisal for raising safety concerns. Benchmarking with DOE organizations and energy sector companies is used for program improvements. A supplemental requirements document requires RL contractors to establish substantive employee concerns programs, consistent with expectations established for DOE programs. The RL employee concerns program is among the "best in class" within DOE and should be considered for benchmarking by other DOE organizations seeking to improve their employee concerns program.

RL and FHI have established strong and effective frameworks for providing leadership in environmental protection and have successfully integrated environmental controls into PFP operations. Using the RIMS framework, RL's Environmental Management System has developed into an effective tool for defining requirements, responsibilities, core services, policies, and principles for the environmental aspects of RL operations, thereby making environmental management an integral part of the overall framework of integrated safety management. Concurrently, FHI management has established a comprehensive framework for achieving environmental requirements and milestones. RL and FHI have established good working relationships and mutual trust with State and Federal regulators. The FHI environmental policy supports this framework by striving to achieve excellence in environmental stewardship and clearly articulating that all FHI personnel are responsible for environmental matters. FHI has effectively implemented engineering controls, such as radioactive wastewater treatment systems, to lessen or eliminate potential impacts to the environment. PFP has also reduced their legacy contamination vulnerabilities by upgrading tank containment structures, installing transfer pipe containment and leak detection, and minimizing waste inventories. The Hanford Site pollution prevention activities, managed by FHI for all prime contractors, realized a cost savings/avoidance of $32 million in fiscal year (FY) 2001 and received numerous awards recognizing achievements for waste minimization and recycling.

Managers and supervisors at PFP have established a working environment that prioritizes risk reduction activities and encourages workers to achieve mission activities while emphasizing that safety is not to be compromised. Projects are prioritized, with emphasis on reducing risks by stabilizing and removing the highest-risk material first. Personnel and resources are all directed as necessary to complete the highest-priority work first. Workers are actively involved in planning work through various processes, including pre-job walkdowns, safety committees, and participation on work planning teams, and are encouraged to suggest methods to perform work more efficiently to help meet production goals. Although operators are clearly aware of production goals and are included in an award sharing program for meeting or exceeding project milestones, there were no indications that these incentives have translated into production pressures that would sacrifice safe work practices. Rather, they have led to an environment where workers are included in identifying ways to safely accomplish work more effectively. All workers contacted by the team were clearly aware of the need

Packaging Activities

to perform the work correctly and safely in accordance with approved procedures. They did not indicate they felt pressure by management to reduce the margin of safety to accomplish project goals. This view was echoed by a union safety representative who emphasized that workers have the right and responsibility to stop work when there are safety questions. Facility managers demonstrated a willingness to stop or suspend activities in process areas when necessary to answer questions about safety.

The computer-based automated job hazards analysis (AJHA) system is an effective work planning tool for identifying work activity hazards, and linking hazards to the appropriate hazard controls. For medium and high-risk tasks, the AJHA is the primary tool used to identify, analyze, and control activity-level hazards by FHI. At PFP, the AJHA is also the primary job hazards analysis tool used for low-risk tasks. AJHAs are completed by work planning teams, requiring the involvement of subject matter experts and workers early in the planning stage. A user-friendly system of navigation screens enables the work planning team to define the work scope, identify hazards, specify controls, complete forms and permits, and print reports. Continual feedback and improvement to the AJHA system are achieved by a sitewide AJHA users group that meets regularly and consists of workers, subject matter experts, and work planners.

2.2 Program Weaknesses

PFP is not consistently implementing the unreviewed safety question (USQ) process as described in FHI and PFP procedures. USQ screenings are not always performed for potential inadequacies in the safety basis. Consequently, potential inadequacies are not always identified and reported as such. FHI guidance does not provide clear definitions for demonstrating that a condition is adequately analyzed. In addition, USQ screenings for proposed activities, such as modifications, are not always correctly performed.

The inconsistent implementation of the AJHA process at PFP has resulted in some hazards not being identified, screened, or analyzed. Although the AJHA is a potentially effective tool, it has not always been implemented effectively, resulting in hazards that were not identified or controlled. For a number of maintenance work activities, workers were exposed to hazards not identified on the AJHA form (e.g., noise, chemicals, electrical hazards, and working at elevated heights) or postings. For example, a pump repair job could have resulted in an overexposure to noise, but the noise hazard was not identified. Some hazards identified during the preparation of the AJHA were not incorporated into the applicable procedure, and some potential hazards were not adequately analyzed through the AJHA process. Weaknesses in the standing AJHA program, procedural guidance, and training and qualification programs contribute to the observed weaknesses in implementation of the AJHA process.

The reliance on handheld and outdated radiological monitoring equipment at PFP affects the ability of the facility to consistently meet DOE requirements and guidance for contamination control and continuous air monitoring coverage. PFP continues to use handheld and outdated radiological monitoring devices that have difficulty in meeting DOE requirements and guidance for control of personnel contamination and airborne radioactivity. Inconsistent use of contamination control equipment and methods at step-off pads and the radiological buffer area exit at PFP does not provide sufficient margin for error to assure that personnel contamination above this level will be consistently detected before egress offsite. The use of more controlled egress monitoring equipment or methods is needed to ensure a consistent geometry and counting duration, and to ensure that equipment is operated at sufficient sensitivity to achieve the required detection limit criterion. Also, most PFP continuous air monitors are very old, are subject to electronic instabilities, and do not discriminate effectively between transuranic activity and natural radon daughter activity. The need for upgraded continuous air monitors is recognized, and new Canberra continuous air monitors have been installed or are being scheduled for installation in some but not all areas.


Chemical Measurement Activities

PFP lacks a documented rationale for not performing special bioassays for some contamination events that could reflect an intake resulting in a 100 millirem or greater committed effective dose equivalent. In some cases, PFP has experienced contamination events that have exceeded the workplace indicator trigger level of 10,000 disintegrations per minute on protective clothing. There is no documented rationale for the lack of special bioassay monitoring for these events. Further, the technical justification and decision-making logic governing the performance of special bioassays for specific events exceeding workplace indicator triggers are not clear, and PFP procedures do not require formal and separate documentation of the decisions. PFP also lacks an indicator that considers the unplanned spread of contamination on accessible surfaces, consistent with the guidance in a DOE standard.

In some cases, modifications to facilities are incorrectly categorized as repairs and the resultant work is not adequately reviewed or performed in accordance with the FHI/PFP facility modification program. PFP has clearly defined processes and procedures for controlling plant modifications, including a clear definition of modifications. However, those processes and procedures are not rigorously followed in some cases. One contributing weakness is that the modification process does not distinguish between minor and major modifications.

PFP feedback mechanisms are not fully effective in identifying safety management deficiencies, and FHI and PFP issues management processes have not been effective in evaluating and resolving deficiencies in a timely manner or in preventing recurrence. RL and FHI have numerous systems for identifying deficiencies and providing feedback to management, including a generally effective Facility Evaluation Board. However, weaknesses in processes and implementation of self-assessments, corrective action management, and lessons learned have hindered consistent self-identification of safety issues and effective resolution to prevent recurrence. At the facility and activity level, self-assessments are not consistently identifying deficiencies. The lessons-learned program does not provide assurance that applicable lessons learned are consistently identified, communicated, and implemented in work documents. Accountability for correcting longstanding program and performance weaknesses has been lacking in such areas as procedures, assessments, training, and corrective action management.

3.0 Conclusions

RL and FHI have worked cooperatively to establish the framework for a comprehensive and effective ISM program. RL has provided clear direction and has set clear project and ES&H performance expectations for FHI. RL has also provided the sustained leadership to develop and implement innovative and effective management systems and tools, such as RIMS. FHI has embraced the ISM program and established a good framework for ISM through an appropriate set of FHI-wide and project-specific programs and procedures. Appropriate ISM program policies have been established and communicated. Workers and stakeholders have multiple avenues for expressing ES&H concerns. RL and FHI roles and responsibilities are adequately defined at all levels of the organization. RL and FHI personnel are generally well qualified to perform their responsibilities, and exhibited a good understanding of facility hazards. Systems for identifying applicable requirements and ensuring that they flow down to the work level through policies and procedures are established and effective in most cases.

Some aspects of RL and FHI efforts to implement and enhance ISM are notable. Although not all aspects have been implemented at this stage, RL's RIMS had proven to be an effective tool that facilitates many important ISM functions, such as requirements management and assignment of ES&H responsibilities among various RL organizational elements. RL has also established effective processes for evaluating contractor performance and has used the performance fee evaluation process to hold contractors accountable for ES&H performance. For example, RL has withheld substantial portions of the fee when the contractor did not fully meet ES&H expectations. The RL Facility Representative program has also been used effectively to provide feedback to RL management about ES&H performance at PFP. RL and FHI have devoted significant attention and resources to addressing concerns expressed by workers, including the conduct of a systematic assessment of the safety culture that resulted in a number of corrective actions and enhancements. FHI work planning and prioritization and resource allocation processes systematically consider ES&H resource needs at all phases of projects. The FHI Facility Evaluation Board is an effective process for identifying deficiencies in ES&H programs and facility implementation of requirements.

Many aspects of the ISM program are effectively implemented at PFP. Working with external regulators, RL and FHI have established effective environmental management programs and have successfully integrated environmental controls into PFP operations. The basic foundation for a work control system that implements the core functions of ISM has been established through the AJHA process, which serves as a useful tool for the identification and control of workplace hazards. Work is generally well defined, and pre-job briefings and job walkdowns are thorough and effective, and they appropriately involve line management, subject matter experts, and workers. Workers are involved in the work planning process and have been empowered to identify and stop unsafe work. Injury and illness rates at PFP are lower than the DOE complex average. The PFP 2736-ZB building ventilation systems, which serve important safety functions, are functioning adequately, and the ventilation system operators are experienced and trained.

Although the ISM framework is in place and improving, several important ISM elements need continued or additional attention at both RL and FHI. RL has shortages of skills in certain important areas, such as fire protection and nuclear safety analysis. RL is using available human resource management tools to address some workforce imbalances, but skill shortages exist in a few areas. In addition, some RL organizations have not effectively implemented important aspects of the training program, such as needs assessments and individual development plans.

Within FHI, several longstanding concerns have not yet been fully addressed and resolved. The longstanding shortage of radiation control technicians is being addressed through new hires, but continued attention is needed to ensure that sufficient numbers of radiation control technicians can be retained to meet ES&H and mission needs. The continued use of outdated radiological contamination monitoring equipment and continuous air monitors and the manner in which special bioassay decisions are made and documented also need additional attention. Deficiencies in the implementation of training requirements have been identified by internal assessment organizations for the past several years, but actions to date have not been effective in resolving these concerns. Deficiencies were also identified in some aspects of ISM implementation at PFP, and several deficiencies were evident in implementation of hazards analysis and USQ processes. A few elements of the engineering and configuration management for the safety-related ventilation systems were deficient.

Continuous Air Monitors

Weaknesses in the continuous feedback and improvement programs contribute to the longstanding deficiencies in training and the observed deficiencies in implementation of hazards analysis and configuration management programs. Although management assessment processes and products have recently been improved, the self-assessment programs at the PFP level have not been fully effective in identifying deficiencies. As a result, most ES&H deficiencies at PFP are being identified by RL, FHI institutional assessments (e.g., Facility Evaluation Boards), or external organizations. Further, the issues management systems at FHI and PFP have a number of process weaknesses that hinder comprehensive tracking and timely resolution of identified deficiencies.

Overall, RL and FHI have made significant improvements and established the framework for an effective ISM program. RL and FHI have provided leadership and devoted resources to ES&H programs and ISM, including innovative tools and aggressive efforts to address worker concerns. Work observed by the OA team was generally performed with a high regard for safety and environmental protection. However, implementation of some important ISM processes was not consistently effective, resulting in hazards and conditions that were not fully analyzed and controlled. Weaknesses in supporting ISM systems, such as training programs, PFP self-assessments, and issues management, contribute to the observed implementation deficiencies and recurring weaknesses. RL and FHI have a good understanding of most of the weaknesses and have ongoing actions to address some of them. Continued and increased attention is needed to ensure that weaknesses and their root causes are resolved.

4.0 Ratings

The ratings reflect the current status of the reviewed elements of the Hanford programs.

Safety Management System Ratings:

Guiding Principle #1 – Line Management Responsibility for Safety .... EFFECTIVE PERFORMANCE
Guiding Principle #2 – Clear Roles and Responsibilities .... EFFECTIVE PERFORMANCE
Guiding Principle #3 – Competence Commensurate with Responsibility .... NEEDS IMPROVEMENT
Guiding Principle #4 – Balanced Priorities .... EFFECTIVE PERFORMANCE
Guiding Principle #5 – Identification of Standards and Requirements .... EFFECTIVE PERFORMANCE

Core Function Implementation Ratings:

Feedback and Improvement

Core Function #5 – Feedback and Continuous Improvement .... NEEDS IMPROVEMENT

Work Activities at PFP

Core Function #1 – Define the Scope of Work .... EFFECTIVE PERFORMANCE
Core Function #2 – Analyze the Hazards .... NEEDS IMPROVEMENT
Core Function #3 – Establish Controls .... EFFECTIVE PERFORMANCE
Core Function #4 – Perform Work Within Controls .... EFFECTIVE PERFORMANCE

Essential Systems

Engineering and Configuration Management .... NEEDS IMPROVEMENT
Maintenance .... EFFECTIVE PERFORMANCE
Surveillance and Testing .... EFFECTIVE PERFORMANCE
Operations .... EFFECTIVE PERFORMANCE

Environmental Management

Environmental Management (Core Functions #1-4) .... EFFECTIVE PERFORMANCE

APPENDIX A
SUPPLEMENTAL INFORMATION

A.1 Dates of Review

	Beginning	Ending
Scoping Visit	December 11, 2001	December 13, 2001
Onsite Evaluation	January 28, 2002	February 7, 2002
Report Validation and Closeout	February 19, 2002	February 21, 2002

A.2 Review Team Composition

A.2.1 Management

Glenn S. Podonsky, Director, Office of Independent Oversight and Performance Assurance
Michael A. Kilpatrick, Deputy Director, Office of Independent Oversight and Performance Assurance
Patricia Worthington, Director, Office of Environment, Safety and Health Evaluations
Thomas Staker, Deputy Director, Office of Environment, Safety and Health Evaluations (Team Lead)

A.2.2 Quality Review Board

Michael Kilpatrick
Patricia Worthington
Dean Hickman
Robert Nelson

A.2.3 Review Team

Thomas Staker, Team Lead
Brad Davy, Technical Team Lead

Safety Management Systems
Ali Ghouvanlou
Bill Eckroade
Mark Good
Bernie Kokenge

Feedback and Improvement
Robert Compton

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Victor Crawford
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Jim Lockridge
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Essential Systems
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Ed Stafford

A.2.4 Administrative Support

MaryAnne Sirk
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APPENDIX B
SITE-SPECIFIC FINDINGS

Table B-1. Site-Specific Findings Requiring Corrective Actions

FINDING STATEMENT	REFER TO PAGES:
PFP feedback mechanisms are not fully effective in identifying safety management deficiencies, and FHI and PFP issues management processes have not been effective in evaluating and resolving deficiencies in a timely manner or in preventing recurrence.	39
PFP is not consistently implementing the unreviewed safety question (USQ) process as described in FHI and PFP procedures.	44
The inconsistent implementation of the AJHA process at PFP has resulted in some hazards not being identified, screened, or analyzed.	45-46
The reliance on handheld and outdated radiological monitoring equipment at PFP affects the facility's ability to consistently meet DOE requirements and guidance for contamination control and continuous air monitoring coverage.	48
PFP lacks a documented rationale for not performing special bioassays for some contamination events that could reflect an intake resulting in 100 mrem or greater committed effective dose equivalent.	49-50
In some cases, modifications to facilities are incorrectly categorized as repairs, and the resultant work is not adequately reviewed or performed in accordance with the FHI/PFP facility modification program.	52

APPENDIX C

GUIDING PRINCIPLES OF SAFETY MANAGEMENT IMPLEMENTATION

C.1 Introduction

The U.S. Department of Energy (DOE) Office of Independent Oversight and Performance Assurance (OA) evaluation of safety management systems focused on five of the seven guiding principles of integrated safety management (ISM) as applied to the Plutonium Finishing Plant (PFP):

- Guiding Principle #1 – Line Management Responsibility for Safety
- Guiding Principle #2 – Clear Roles and Responsibilities
- Guiding Principle #3 – Competence Commensurate with Responsibility
- Guiding Principle #4 – Balanced Priorities
- Guiding Principle #5 – Identification of Standards and Requirements.

The other two guiding principles (Guiding Principle #6 – Hazard Controls Tailored to Work Being Performed and Guiding Principle #7 – Operations Authorization) significantly overlap the core functions of safety management, which are discussed in Appendices D and E.

The Richland Operations Office (RL) performed its Phase II verification and approved the ISM description and ISM implementation in July 2000. The OA team reviewed various documents and records, including the sitewide and PFP ISM system descriptions; associated procedures; the RL Functions, Responsibilities, and Authorities Manual (FRAM); and the RL Quality Assurance Program Description. In the evaluation of the guiding principles, OA considered the results of the OA review of the core functions, environmental programs, and ventilation systems. RL and Fluor Hanford, Incorporated (FHI) personnel were interviewed to determine their understanding of the ISM program and their responsibilities, as well as the status of ongoing initiatives and corrective actions.

C.2 Results

C.2.1 Line Management Responsibility for Safety

GUIDING PRINCIPLE #1: Line management is directly responsible for the protection of the public, the workers, and the environment.

Policies and Expectations

RL and FHI have established appropriate environment, safety, and health (ES&H) policies for the site and the nuclear material stabilization project (NMSP), including policies for ISM, conduct of operations, quality assurance, and the voluntary protection program. Specific policies have been established to ensure that management expectations are communicated in important areas, such as stop-work responsibilities, reporting unsafe conditions, right to a safe workplace, and zero tolerance for retaliation. Appropriate policy has also been established that requires managers and supervisors to communicate safety-related information to their workforce, including subcontractors. Performance expectations consistent with ES&H policies have been articulated, communicated, and incorporated into work processes and procedures. For example, RL and FHI have established expectations for ISM implementation and ES&H performance, such as reductions of injury and illness rates (as measured by the Severity Index, Lost Workday Case Rate, and Total Recordable Case Rate) and event and accident rates. FHI has also established a zero tolerance policy for non-compliance with environmental and regulatory requirements. Facility and task-level activities at PFP have been enhanced in recent years through these policies and programs.

Office of Environmental Management Leadership

The DOE Office of Environmental Management (EM) is in the process of revising how it interacts with operations offices, including RL and their contractors. Until recently (late 2001), EM management (through EM-5) was proactively supporting EM lead offices in identifying sites' ES&H needs and weaknesses. Performance information was documented in a site safety profile for use by operations offices. EM senior management has changed its management approach and is now focusing on developing and applying performance measures to monitor the effectiveness of operations offices in managing their contractors. Discussions with the EM organization responsible for PFP (EM-43) indicate that its current focus is business operations rather than safety issues. A formal policy for the new EM expectations has not been established, and the EM FRAM has not yet been revised to reflect new expectations.

Richland Operations Office Leadership

Senior RL managers have relevant hands-on experience, good leadership qualities, and a strong commitment to ensuring the contractual goals are met safely. These managers have been successfully working towards establishing a systematic approach for defining mission and business work, setting expectations for schedules and outcomes, monitoring performance objectives, and managing the performance incentives process.

RL has established a set of performance plans that describe "what" and "when" the work of Federal employees needs to be accomplished. To complement the performance plans, RL uses the RL Integrated Management System (RIMS) to describe "how" the work will be accomplished. RIMS is a web-based, modern information management tool that encompasses all RL activities within 14 organizationally neutral "management systems" (see Figure C-1). Although not all aspects of RIMS are fully implemented, the portions that have been implemented are used extensively by RL managers and staff. In addition, RIMS provides extensive information relevant to RL operations including the description of RL safety policies and operating principles, and assigned roles, responsibilities, accountabilities, and authorities of RL staff and managers. The combination of RL performance plans and RIMS provides an effective framework for communicating safety expectations, processes, and procedures for doing work that addresses individual RL organizational elements and cross-cutting functions. Efforts to further develop and enhance RIMS are ongoing.

The RL organizational structure consists of a number of elements including a mission element, a safety

Figure C-1. RL Integrated Management System

element, and a continuing awareness element. For the NMSP, the Office of the Assistant Manager for Central Plateau has mission element responsibilities in collaboration with the Office of the Assistant Manager for Safety & Engineering, and the Facility Representative program. These organizations appropriately coordinate their efforts to provide direction to the contractor and a good balance between mission and safety.

RL has also established clear communication channels with FHI management. RL and FHI senior managers frequently interact in a variety of forums, including weekly meetings. In addition to contractor-provided performance information, RL has proactively collected and organized information for assessing the safety performance of the contractor. Procedures for these efforts are included in several RIMS modules (e.g., the Integrated Performance Evaluation, the Safety and Health Management module, and the Integrated Planning and Acquisition Management module). RL managers who were interviewed believe that enough safety-related information is being collected through assessments and Facility Representatives' observations. However, they are not fully satisfied with the effectiveness of current RL methods for analyzing that information and believe that more effective methods are needed (see Appendix D, Feedback and Continuous Improvement).

The RL management team has provided effective leadership in clearly defining its expectations, including its safety expectations for the NMSP, in the FHI contract. In coordination with FHI, RL has influenced the flowdown of these expectations through the contractor organizations to the working level. Through its Performance Objective, Measures, and Expectations process, RL is capable of tracking clearly specified measures and expectations associated with each objective.

In addition to the Performance Incentive process, RL utilizes the annual comprehensive performance fee method for the FHI contract. Four sets of objectives/measures are evaluated annually. The first performance objective/measure relates to the protection of workers and public safety. In evaluating this objective, RL judges whether fees should be reduced based on the contractor's ES&H performance (for more detail see Appendix D, Feedback and Continuous Improvement). Although the Performance Incentive process is effective and essential to evaluating all aspects of the contractor's performance, its subjective nature has led to some communication difficulties between RL and the NMSP. Insufficient involvement of operating-level project managers contributed to some confusion in the presentation and interpretation of calendar year (CY) 2001 comprehensive evaluation results. RL recognizes the need for a more comprehensive process and has taken steps to improve the current process.

FHI Nuclear Material Stabilization Project Leadership

The FHI corporate Integrated Safety Management System (ISMS) Description Document adequately addresses requirements for an integrated environment, safety, and health management system based on DOE Policy 450.4. Several project-specific ISMS descriptions have also been developed, including the PFP Integrated Environment, Safety and Health Management System Description. The PFP ISMS description focuses on delineating roles and responsibilities and defining how project work will be implemented by mapping ISM core functions to corporate and NMSP implementing mechanisms.

The PFP ISMS description addresses the five DOE core functions of safety management and two additional core functions identified in the Hanford ISM program: (1) FHI and RL activities to capture requirements for establishing ES&H policies, and (2) to provide for management reviews of project activities. The NMSP describes a number of formal management review processes for monitoring the progress of the projects. These processes include semiannual meetings with stakeholders and RL, and monthly, weekly, and daily meetings between PFP management and staff. In general, the NMSP management team has embraced ISM mechanisms for incorporating safety into work performance and has been successful in flowing down ES&H policies and expectations into processes and implementing procedures. As discussed under Guiding Principle #4, the NMSP has a well established vision and mission and has articulated clear expectations and milestones at the facility and task level.

PFP line managers have a high level of involvement and presence at the facility and task level. These managers are co-located with their work crews and closely monitor all aspect of work performance. PFP project managers display a clear ownership of all aspects of work performed in their operations, including the ES&H responsibilities. The PFP ES&H and Quality (ESH&Q) organization and other support organizations, such as maintenance and engineering, provide support to line management for project activities. A number of PFP and FHI committees have been established with charters that focus wholly or partially on safety and/or safe operations.

Although most aspects of communications and interactions among RL, FHI, and the NMSP PFP staff are effective, additional attention is needed to ensure that persistent and recurring weaknesses are adequately addressed (see Appendix D, Feedback and Continuous Improvement).

Worker Participation and Empowerment

RL and FHI have established appropriate policies and mechanisms to involve workers in safety, including a work planning and control system that involves workers in identifying and controlling job hazards, employee safety committees, stop-work procedures, and numerous systems to raise ES&H-related concerns. Employees are aware of their responsibilities for safety, their authority to stop work, and the avenues for raising ES&H concerns to management.

In the establishment of the safety program, RL and FHI have pursued recognition under DOE's voluntary protection program. Appropriate mechanisms have been established at the project and task levels to facilitate participation by employees in enhancing the safety of work. For example, the site work planning and control system utilizes a teaming approach for evaluating ES&H aspects of job tasks and workers are routinely involved in the execution of the automated job hazards analysis (AJHA) system and the performance of pre-job walkdowns.

RL and FHI management have clearly communicated to workers their expectations for the creation of a safe work environment and for employees to raise safety concerns. FHI has established a "Stop Work Responsibility" procedure, which articulates that employees have the responsibility and authority to stop work when they are convinced there is a danger to themselves, coworkers, or the environment. Management has appropriately emphasized employee stop-work authority in posters and in publications. To reinforce these expectations, the RL manager and the presidents of site management and operating contractors, including FHI, have issued a zero-tolerance policy that affirms the expectations that site employees are free to raise safety concerns and states that retaliation against employees raising concerns will not be tolerated.

FHI has established the President's Zero Accident Council as a mechanism to improve health and safety and resolve concerns. The President's Zero Accident Council is co-chaired by FHI, and the presidents of the Hanford Atomic Metal Trades Council (HAMTC) and the Hanford Guards Union. Membership consists of bargaining unit and non-represented employees from each FHI project, including PFP. At PFP, FHI has established a hierarchy of employee Zero Accident Councils at the team, division, and project levels to identify and resolve ES&H-related concerns.

FHI has established appropriate formal and informal mechanisms for employees to raise ES&H concerns. While employees are encouraged to raise concerns to supervisors, other mechanisms have been established. For example, a HAMTC safety representative has been established at each FHI project to rapidly address ES&H concerns identified by bargaining unit employees.

The FHI formal employee concerns program is aggressively responding to concerns raised by FHI employees but can be improved in a number of areas. The recently developed FHI employee concerns procedure does not capture important requirements contained in the RL contractor requirements document for DOE Order 442.1, including requirements for independent investigations, concern tracking and closure, and preparation of reports. Analysis of employee concerns information could be enhanced by documenting and reporting the analysis of trends and observations on an established frequency.

RL has established an employee concerns program to collect, investigate, and resolve concerns raised by site employees that meets or exceeds the requirements of DOE Order 442.1. The RL employee concerns program is well structured and effectively managed, and it receives significant management support and resources from RL management. Formal issues and observations identified through concerns investigations are entered into the RL action tracking system. Benchmarking with other DOE organizations and energy sector companies is used to promote program improvement.

External Stakeholder Involvement

RL and FHI actively support several venues for external stakeholder involvement in ES&H decisions, including the Environmental Protection Agency, Washington State Department of Ecology, Citizens Advisory Board, and DOE-sponsored public meetings. These venues provide stakeholders with opportunities to comment on a broad range of ES&H issues. There are a number of outreach efforts to encourage and

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facilitate participation by the local tribal councils and the public. Stakeholders' recommendations are carefully considered in the decision-making process.

Summary of Guiding Principle #1

RL and FHI have coordinated their efforts to develop and communicate appropriate ES&H policies. The Hanford and PFP ISM programs are well defined and maturing. RL has demonstrated effective leadership in the development of clear contractual performance objectives and measures that flow down to the working level. NMSP line managers have embraced ISM and actively monitor the status of ES&H programs, including frequent presence in the operating facilities. RL and FHI have been proactive in ensuring that workers have multiple avenues for expressing safety concerns and taking action to address concerns identified by workers. Similarly, there are several avenues for stakeholders to obtain information and express concerns.

Overall, the processes in place for ensuring line management responsibility for safety are effective as applied to the NMSP. However, additional attention is needed to further improve communication and feedback on contractor performance.

C.2.2 Clear Roles, Responsibilities, and Authorities

GUIDING PRINCIPLE #2: Clear and unambiguous lines of authority and responsibility for ensuring safety shall be established and maintained at all organizational levels within the Department and its contractors.

Office of Environmental Management

The EM ES&H roles and responsibilities are described in the current EM FRAM. As discussed under Guiding Principle #1, EM is in process of revising how it interacts with its operations offices and sites. When the transition is complete, the EM FRAM needs to be revised to reflect ES&H responsibilities and interfaces.

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The RL FRAM defines the line management to consist of a chain from the Secretary of Energy through the Headquarters program offices to the RL Manager and to the contractors. Within the RL business model, authority to execute specific functions is delegated downward by the RL Manager, but he retains the responsibility for the outcome. The authority delegated by the RL Manager is divided into two distinct functions: (1) Mission Element Management, which establishes mission direction and works with the contractors to achieve specified objectives and milestones; and (2) Mission Support Management, which provides the balance of RL activities for support and services.

At RL, responsibilities and accountabilities for exercising these roles are mapped into 14 organizationally neutral management systems that collectively comprise the RIMS system (see Guiding Principle #1). Each management system is mapped to the requirements that it is designed to implement, including authorities that have been delegated by the Headquarters program offices to RL, applicable DOE orders, and laws and regulations. The responsibility for maintaining the scope of each management system is assigned to a senior RL manager as the "steward" of the system. One of the responsibilities of the steward is to ensure that the appropriate set of requirements for each system is conveyed to the contractors. Cross-cutting processes and organization-specific procedures under each management system ultimately define the specific roles and responsibilities of various RL organizational elements and their staff. ES&H

provisions are included in position descriptions and performance evaluations.

Reviews of the RL FRAM and several management systems within RIMS, as well as interviews with staff and managers, reveal a number of strengths in the RL approach for defining roles and responsibilities. For example, the RL approach provides a direct link between requirements and the responsibilities necessary to satisfy them. Also, the approach is systematic and fundamentally sound, and thus its continued use provides a framework for continuous improvement in the implementation of safety management responsibilities and their links to requirements.

RL is currently involved in correlating the roles and responsibilities described in the RIMS procedures and positions, training needs, and individual performance evaluations. These administrative processes are important and, if not done comprehensively, could lead to confusion about individual work assignments. The RL approach for integrating mission elements and mission support with human resource elements, such as position descriptions and individual performance plans, is based on generic roles, responsibilities, authorities, and accountabilities (R2A2s) developed for a chain of command from the RL Manager to staff. A review of these generic R2A2s reveals, however, that the definition of authorities and accountabilities in these documents needs to be strengthened to facilitate this integration.

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Roles and responsibilities of FHI organizations are defined in a number of documents, including the FHI Management Plan and the ISMS Description Document, which focuses on safety management responsibilities. FHI is organized into functional groups, project organizations, and service providers. Three functional groups have frequent safety management interfaces with the NMSP at PFP: (1) the Environment Safety & Health Group; (2) the Safety & Mission Assurance Group, with responsibilities including such functions as Facility Evaluation Board independent assessments; and (3) the Project Operations Center, a recent effort by FHI to consolidate engineering processes and expertise.

In general, the roles and responsibilities of the functional groups are well defined and documented in various sources, including the FHI Management Plan. These organizations operate mostly at the institutional level and perform such functions as recommending policies, providing resources to projects when requested, and supporting the office of the FHI President in overseeing project activities. Institutional processes for implementing project work through application of an expanded set of ISM core functions (see Guiding Principle #1) are delineated in the ISMS Description Document, which references the implementing mechanisms, including applicable policies and procedures. Based on interviews and a review of a number of these procedures, the roles and responsibilities for performing work are appropriately defined and understood.

At the NMSP level, roles and responsibilities for planning and controlling work at PFP are clearly defined through the PFP ISMS description. This corporate procedure clearly defines the roles and responsibilities of work requesters, work team members (e.g., maintenance workers, operations personnel, and work planners), and their supervisors for planning, and performing low, medium, and high risk work. Roles and responsibilities and interfaces among various organizations are also controlled effectively through formal and informal communications among PFP managers. Another mechanism, NMSP's Key Functions & Responsibilities, identifies the project roles and responsibilities for line organizations (production projects) and functional support organizations (including ESH&Q, engineering, and maintenance). This document is generally up to date, although it does not reflect some recent changes.

Detailed roles and responsibilities for many safety-significant positions and assignments (e.g., Shift Managers, Person in Charge, Team Leaders, and ES&H support) are also described in PFP administrative procedures or in various work planning and control procedures. In addition, all NMSP projects have developed project-specific procedures that define roles and responsibility for their work teams and their supervisors. Appropriate roles and responsibilities have also been identified for workers' participation in the hazard identification and mitigation process, such as job planning walkdowns. The annual performance appraisal process for FHI, including the NMSP, includes safety performance as a standard for managers and staff.

Summary of Guiding Principle #2

RL and FHI have clearly defined roles, responsibilities, and accountability for safety through various policy documents, procedures, and implementing mechanisms. Responsibilities for safety are generally well defined at all levels of the organization, from senior managers to the working level. RL is continuing to develop and refine systems, such as R2A2, to better integrate mission-required roles and responsibilities with important human resource processes for managing the workforce.

C.2.3 Competence Commensurate with Responsibility

GUIDING PRINCIPLE #3: Personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.

Richland Operations Office

RL continues to experience a skill mix imbalance between the competencies of its staff and the competencies needed to perform its line management mission effectively and efficiently. The skill mix imbalances are evident in various areas, including certain ES&H technical disciplines. Skill imbalances within RL were identified in a 1996 Independent Oversight safety management evaluation. Recognizing that skill mix concerns hinder its ability to fulfill safety management responsibilities, RL managers have implemented mitigative measures and are undertaking various initiatives to address the concerns. RL recognizes that there are shortages in skilled staff in the specific ES&H technical disciplines of fire protection, nuclear safety analysis, quality assurance, electrical engineering, and Facility Representatives.

RL continues to experience an overall decline in its approved staffing levels. Recent staffing reduction efforts were accomplished through buyouts and early retirement incentives that were available to all staff and did not include provisions for retaining critical labor categories. Technical staff were also transferred to the Office of River Protection. The staff reductions have resulted in the loss of experienced ES&H personnel, including specialists in important safety-related areas such as radiation protection, nuclear criticality safety, and quality assurance. Other than these recent transfers and reduction efforts, staff attrition has been at relatively low levels in the past several years. As a result, there have been few recruitment opportunities to adjust the skill mix, obtain employees with needed competencies, and address the aging of the workforce.

Recognizing the loss of key personnel and hiring constraints, RL has effectively used available human resource management tools to address workforce imbalances that could affect safety. Excepted service positions were utilized to support radiological protection and nuclear safety shortages. Currently, RL has eight excepted service personnel serving in senior technical staff and advisory positions. The RL Manager also brought in a senior manager from a DOE contractor to serve as the Deputy Manager for Site Transition. To help retain critical competencies, retention bonuses have been given to employees serving in critical skill positions, including Facility Representatives and some technical subject matter experts. RL managers have also made use of support contractors to supplement RL staff in some important ES&H areas. Additionally, resources from other DOE organizations have been brought in for specific projects or special assignments.

The RL management team is fully aware of the need to address skill mix concerns. The RL Manager is championing initiatives to address human resource issues, including a broad-based review of organizational functions against strategic priorities, the review of staffing and competencies needed to perform high-priority work, and the realignment of Federal staff within the organization. Concurrently, the RL manager has chartered an organizational and cultural improvement initiative to review current policies, programs, and performance in areas affecting human resources.

RL Training and Qualification Programs

RL management has provided appropriate levels of management support and resources to support employee training and development. Resources have been allocated for staff to participate in training required to meet facility access and safety requirements. Resources have also been adequately allocated to promote staff technical training and development,

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including a number of instances of specialized technical training courses for RL and site contractors. RL managers also serve key roles in the administration of the RL training and qualification program, including the assignment of senior managers to the Hanford Federal Technical Capability Panel.

The Hanford technical capability program (TCP) establishes recruitment, qualification, training, and retention requirements for RL managers and staff performing safety-related oversight and management duties for defense nuclear facilities. The Hanford TCP is implemented consistent with the requirements of the DOE Federal Technical Capability Manual (DOE Manual 426.1-1). Pursuant to the Hanford Federal TCP, selected managers and technical staff were identified to participate in the Hanford technical qualification program (TQP). RL senior management has appropriately focused their TQP on the management and staff positions most critical to safety responsibilities, including managers designated as senior technical safety managers, Facility Representatives, and staff serving in identified critical positions in nuclear safety, criticality safety, radiation protection, and fire protection. All managers serving in substantive ES&H technical manager positions, including the RL Deputy Manager for Site Transition, office directors, and division directors, were appropriately designated as senior technical safety managers.

Other RL technical staff are also included in the TQP. For most technical staff, the formal qualification requirements are limited to the general technical base (GTB) requirements as established by the DOE Headquarters TQP. The GTB is a set of fundamental ES&H technical competencies developed in 1995. This approach represents a significant change in the previous RL strategy for implementing DOE Order 360.1 TQP requirements, in that a large majority of ES&H staff positions, including many RL subject matter experts, no longer have to qualify against functional area standards. Although the TQP implementation at RL is generally adequate, the GTB standard is significantly out of date with respect to changes in DOE orders and regulatory requirements. RL has not systematically addressed changes in requirements that impact the competencies defined in the GTB standard in the RL continuing professional development program.

RL management has shifted the focus of their employee training and development efforts by establishing internal requirements for continuing training for all employees, both within and outside of the TQP. The foundation for this approach is that supervisors are responsible for identifying the necessary knowledge, skills, and abilities (KSAs) for each position, consistent with the employee's individual performance plan and assigned work activities. To implement the continuing training program, RL has established requirements for the development of employee individual development plans (IDPs). Supervisors and employees are required to work together to establish the specific developmental and training strategies to satisfy the identified KSAs.

The key to successful implementation of the continuing training program is the performance of supervisors in identifying KSAs and identifying effective developmental opportunities through training, assignments, and structured self-study efforts. Currently, RL management has not established formal guidance on their expectations for supervisors in the performance of this duty. Implementation of these requirements has varied among RL supervisors. For example, the RL Waste Management Division has established a formal set of KSAs for employees performing waste management program management activities. The team leader for these employees has reviewed each individual's experience and training against competency requirements, has identified training and required reading assignments, and formally verifies completion. On the other hand, several RL divisions did not perform the required needs analysis, and some supervisors have not clearly documented the KSAs for positions. The IDP requirements at RL were established in March 2001, but IDPs have been completed for only about one-half of the RL staff, and no deadlines for competing the IDPs has been established. Some IDPs were completed without the prerequisite needs analysis.

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FHI has applied adequate ES&H staff resources to support the operation of NMSP activities at PFP. No significant staffing shortages affecting the safety of work activities were identified. NMSP environmental and safety professionals were generally competent to perform their assigned duties. For example, all radiological staff, including radiological engineers, radiation supervisors, and radiation control technicians (RCTs), had an appropriate level of knowledge consistent with their responsibilities.

PFP has longstanding and recognized shortages of RCTs. OA's observations of work indicated that the shortage of RCTs is not currently impacting worker radiological protection. However, some work schedules are impacted by the RCT shortages. The RCT shortage is receiving significant management attention within

FHI and is being addressed through new hires and training. Managers have also been authorized to recruit to fill some of the other vacant ES&H and training positions within the NMSP.

PFP employees are provided extensive training in the KSAs needed to implement safety requirements, operate equipment in a manner consistent with established procedures, and meet regulatory requirements and corporate training requirements. A review of occurrence reports for the last few years revealed only two events that were caused by deficiencies in training. With a few exceptions, PFP employees were appropriately trained to protect themselves from facility hazards and were qualified to perform their assigned responsibilities consistent with ES&H and procedural requirements. Examples of effective training and competencies include: workers were well aware of facility hazards and the importance of procedural compliance, RCTs were proficient in the execution of their radiological control procedures and use of survey instruments, Nuclear Chemical Operators had a thorough understanding of operational requirements and effectively performed their work evolutions, and Stationary Operating Engineers were found to be knowledgeable of their systems and operating procedures.

However, some performance deficiencies noted during this OA inspection (see Appendix E, Core Function Implementation) are partially attributable to weaknesses in competency and/or training. For example, the incorrect categorization of modifications and incorrect interpretation of USQ screening requirements resulted from a combination of inadequate procedures and lack of understanding of procedural requirements.

FHI administers training programs through a central training organization and through the PFP training team. FHI has established a central training organization that includes staff responsible for training policies, delivery of cross-cutting training services to site organizations, and management of the Hazardous Materials Management and Emergency Response and Education Center (HAMMER) training facility. The central training office manages the development and delivery of training in areas that are common among various FHI organizations, such as radiological training, hazardous waste training, emergency response training, and training in various safety and health topics. The majority of ES&H-related training provided to PFP employees is provided by FHI central training at HAMMER. The HAMMER facility offers a modern training environment and access to unique engineered training facilities to provide practical, hands-on learning. PFP personnel who were interviewed indicated that most training courses taken at HAMMER were effective.

The PFP training team is responsible for providing training services to PFP line organizations relating to facility-specific hazards, procedures, and requirements. The PFP training program appropriately implements the requirements of DOE Order 5480.20A, including specifications for the use of a systematic approach to training. PFP training procedures establish formal qualification and certification programs for employees performing operations, maintenance, and support functions associated with PFP nuclear operations. Consistent with DOE and FHI requirements, the PFP training team manages a structured qualification/ certification process, which requires completion of on-the-job training, on-the-job evaluations, written examinations, and independent evaluation of job performance measures. For positions requiring certifications, the PFP director has retained final signature authority on employee qualification cards.

The maintenance and implementation of PFP qualification and certification programs have been hindered by organizational changes and the training organization's focus on high-priority nuclear material stabilization startup activities. In the late 1990s, most training responsibilities and staff were transferred out of the PFP training program to individual PFP functional areas in an effort to "redesign" the PFP organization. By August 2000, training resources were reunited as the PFP training team. The PFP training organization has also experienced significant staffing reductions and personnel changes. Training materials supporting qualifications and certifications, as well as sections of the PFP training program procedure, were not consistently updated to reflect current expectations and practices.

The administration of training and qualification programs within the FHI NMSP has been reviewed by the FHI Facility Evaluation Board (FEB) on a number of occasions. FEB reviews in 2000 and 2001 identified numerous specific weaknesses in the implementation of the training program at PFP, including incomplete identification of required qualifications and certifications for PFP personnel; deficiencies in analysis of work tasks, identification of training needs, and instructional materials; and procedural deficiencies in the training program.

For the 2001 FEB findings, the PFP training manager has established corrective actions to address the specific findings. Staff assignments and milestones have been established, and commitments are being tracked. Improvements have been noted in a number of areas:

- The PFP training team has established useful tools to provide information to functional and project organizations on the status of employee training with respect to the requirements in their training plans. PFP management now has established a performance measure to track expired training, contributing to a reduction in the number of instances of expired training.

- A systematic review of the certification packages for Nuclear Chemical Operators was performed, resulting in an organized effort to improve job analysis information and task-to-training matrix for 15 of the course packages.

- An ongoing, major effort is to update the training program procedure to reflect current requirements and responsibilities. For example, the chapter on maintenance training is being revised. The current version of this chapter describes organizations that do not currently exist and training responsibilities that are not being performed.

- The PFP training manager has developed a management process to evaluate changing requirements and to analyze lessons learned for training impacts. A "Training Impact Assessment" email inbox has been established to allow posting of notifications of lessons learned and procedural changes.

Although training and qualification programs at PFP have several positive aspects, areas of weaknesses were identified:

- PFP senior management has not been proactive in evaluating management issues and causal factors associated with recurring technical training deficiencies identified through FEB evaluations. Repeat findings were identified in a number of areas by the most recent FEB. Many individual corrective actions remain open. Additionally, in response to the 2000 FEB, an action plan to improve PFP training services was developed by the PFP training manager and approved by senior PFP managers, but it was never implemented.

- Recently, the PFP manager chartered a management assessment to look at causes of identified training deficiencies. This January 2002 assessment determined that "the flow down of roles, responsibilities, and expectations for training from senior facility management through the functional area management to training staff and the first line operators, chemical technologists, and team leads is neither clear or consistent." The management assessment determined that this condition resulted in functional area managers developing and implementing training within their own organizations, and they are reluctant to communicate with the training organization. The PFP training manager has been tasked with establishing an action plan to address the identified concerns and implement proposed recommendations.

- Interviews with PFP managers and employees revealed that communications and teamwork within PFP in the area of training need improvement. Some managers and staff do not recognize PFP training as a reliable resource for technical training support. In at least one case, a training course was developed without the help of the training program. Some individuals expressed reluctance to contact training for help in administering on-the-job training and on-the-job evaluations. PFP personnel also expressed concerns about the lack of clear technical points of contact and the availability of appropriate training resources.

- Past assessments have identified that PFP qualification and certification course materials were not adequately maintained. Efforts to update important course materials are ongoing in some important areas. However, there is no formal management strategy or priority list for updating all course packages. The training program procedure does not have a requirement for periodic reevaluation and updating of training course materials; the central training organization reviews the courses on a two-year cycle. Additionally, the strategies established by the PFP training manager for updating training materials to incorporate changing requirements, operating procedures, and lessons learned have not been institutionalized in a procedure to ensure organizational acceptance and compliance.

- While line organizations are tracking the completion of position-specific training requirements, this OA review determined that training requirements identified through implementation of the AJHA process were are not consistently verified before the start of work. The pre-job briefing checklist and the PFP "Person-in-Charge" procedure require the verification of training and qualifications before starting work. However, team members observed that on several work activities, training and qualifications were not verified before work began. Furthermore, PFP management expectations for acceptable methods for verifying training and qualifications (e.g., training record review and verbal verification during pre-job briefings) are not adequately defined. In some cases, it was determined that workers had not kept their training current with FHI and Occupational Safety and Health Administration (OSHA) training requirements (see Appendix E, Core Function Implementation)

Summary of Guiding Principle #3

Overall, RL and FHI have many experienced and well-qualified personnel. Workers were generally familiar with facility hazards and procedures and understood the importance of conducting work safely and within established controls. However, skill mix imbalances hinder RL's ability to perform effective reviews in certain areas, such as quality assurance and nuclear safety analysis. Additional RL management attention is needed in the area of training, with particular attention to supervisory responsibilities and consistent implementation of training-related requirements such as needs assessments and IDPs. Additional FHI management attention is warranted in aspects of ES&H staff resource management, and training and qualification programs. RL and FHI have ongoing actions to address the recognized deficiencies, but some PFP weaknesses in training are longstanding or recurring.

Construction Activities

C.2.4 Balanced Priorities

GUIDING PRINCIPLE #4: Resources shall be effectively allocated to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.

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RL has the necessary mechanisms in place to clearly define the work scope, priorities, and resources for carrying out the nuclear materials stabilization and facility deactivation project activities at PFP. Guidance to FHI is linked to RL strategic plans and management plans, and incorporates stakeholder input. The existing contract and Integrated Environmental Management Life-Cycle Baseline provide effective mechanisms for integrating work scope, priorities, performance objectives, and resources for the PFP project.

RL employs a hierarchy of documents that form the contractual basis for defining work scope for FHI. This hierarchy provides an increasing level of specificity regarding the Hanford Site mission and ES&H expectations. The RL Science and Technology Mission Strategic Plan, August 2001, provides the broad strategic framework for safely transitioning the Central Plateau, including nuclear materials stabilization and deactivation and decommissioning of PFP and the application of ISM and other safety systems needed to carry out the strategic mission of the site. The Hanford Site Environmental Management Specification, June 2001, provides monitoring, surveillance, and decontamination and decommissioning requirements for PFP and other Hanford Site facilities. Management plans, such as the RL Program Management Plan and Central Plateau Management Plan, provide additional detail relative to work scope, ES&H, and the management systems required to carry out the Hanford Site mission. Collectively, this hierarchy of documents has been used effectively to establish the contractual requirements for FHI.

In addition, RL considers stakeholder forum results in developing RL plans and setting priorities, which are also used for defining contractual requirements. RL

Tri-Party Agreement (TPA) milestones are used to establish priorities for the FHI contract. RL also uses information from Hanford Advisory Board meetings to develop plans and priorities. For example, input from the Board was used in developing plans and priorities for stabilizing plutonium solutions at PFP.

RL has established an effective contractual mechanism with FHI for cleaning up portions of the Hanford Site. This contract clearly defines the scope of work to be performed, establishes priorities for cleanup activities at PFP, and specifies ES&H expectations. In addition, RL has provided direction to the contractor through a set of contractual performance objectives, measures, and expectations. This portion of the contract is administered by RL through the contractor award and incentive fee process. Two categories of performance incentives, "discrete" and "comprehensive," have been established. The discrete performance incentive effectively establishes the overall priorities for dispositioning plutonium and uranium at PFP and for deactivating the facility, both of which reduce overall safety risks at the site. The comprehensive performance incentive portion of the contract provides for protection of worker and public safety and health as well as protection of the environment. This safety-related performance incentive has a negative fee factor that allows fee to be lost due to poor safety performance.

Through the FHI contract, RL has established an Integrated Environmental Management Life-Cycle Baseline that defines and integrates technical requirements, cost, and schedule. This approach effectively establishes a contractual baseline that defines the scope of work, priorities, and resources necessary to safely complete stabilization of nuclear materials and facility deactivation and decommissioning of PFP. Changes to this baseline are managed and documented through the RIMS Baseline Change Control process. RL provides formal Baseline Updating Guidance as needed to FHI. This guidance establishes RL's expectations for scope, schedule, and cost for each project. This guidance requires FHI to provide resource-loaded schedules that ensure an appropriate level of ES&H resources at the project level; milestones that reflect DOE priorities and commitments – e.g.. Defense Nuclear Facilities Safety Board (DNFSB) and TPA milestones; and metrics related to performance objectives, measures, and expectations that are an integral part of the Integrated Baseline.

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FHI has the processes in place necessary to translate contractual requirements and DOE guidance into plans and schedules and to allocate ES&H resources in support of the PFP mission. FHI has developed and implemented an Integrated Project Management Plan that effectively integrates FHI contractual requirements and sets forth plans, organization, and control systems for managing the PFP NMSP. The Integrated Project Management Plan incorporates contractual performance incentives and measures that establish priorities for the reduction of safety risks in accordance with DNFSB Recommendation 94-1/2000-1. It also describes the strategies for achieving risk reduction through project execution strategies and management controls. A detailed PFP work breakdown structure is used to manage the Integrated Environmental Management Life-Cycle Site Baseline, and a set of critical performance measures reflecting safety and mission performance is tracked by senior RL and FHI management. These performance measures include critical DNFSB Implementation Plan milestones that provide the framework for setting PFP project priorities. In addition, the Integrated Project Management Plan incorporates the safety strategies used by management to establish project priorities and to obtain a balance between safety and mission-related activities.

FHI has implemented the Integrated Environmental Management Life-Cycle Baseline as the basis for translating contractual work scope and priorities into executable plans and schedules, and for allocating ES&H resources. Mission planning and budget guidance from RL identify funding and project priorities that incorporate essential safety activities for maintaining facilities in a safe condition and for safely performing work. That guidance is reviewed by FHI senior management, and any impacts to resources or schedule are then formally transmitted to RL for review and resolution along with the FHI project prioritization strategy and an integrated priority list for managing its projects. This information gives top priority to ensuring that ES&H services are provided within PFP and other Hanford projects. Once agreement is reached on available funding for a fiscal year, changes are made to the Integrated Baseline and are ultimately reflected in resource-loaded schedules at the detailed project level of the work breakdown structure.

FHI involves appropriate levels of management in the decision-making processes related to establishing and balancing priorities and allocating resources. For example, a Resource Management Board, consisting of FHI senior management and including the Chief Operating Officer, all Project Vice-Presidents, and the Vice President, ES&H, has been established to review RL budget and work scope guidance, approve changes to the Integrated Baseline, and participate in decisions related to the allocation of resources, including those related to ES&H. A charter defining the membership, roles, responsibilities, and protocol of the Resource Management Board was under development at the time of the OA evaluation. A Project Review Board has been established at PFP to further refine project priorities, allocate resources, and approve changes to the Integrated Baseline at the project level. The Project Review Board consists of the PFP Director and Deputy Director, the NMSP Deputy Director, the PFP Decommissioning Director, NMSP ESH&Q Manager, and the NMSP Business Management Manager. The existing charter describes the purpose and responsibilities of the Project Review Board but needs to be updated to reflect current membership and its planning and decision-making responsibilities related to the Integrated Baseline (it currently references Multi-Year Work Plans that are no longer required).

"Units of Analysis" are used to describe the results of risk analyses that are performed on discrete, manageable work elements. This information is then used to prioritize work scope. This approach is described in the Hanford Risk Management Plan and is traceable to the work breakdown structure and the project Integrated Baseline. Through this mechanism, risks to the public, workers, and the environment are identified and rolled into project priorities that are used in the development of the site integrated priority list. This, in turn, is used to support annual budget requirements, which are ultimately reflected in the current Integrated Baseline for the site.

Baseline Change Requests are the mechanism for ensuring management review and approval of changes to the Integrated Baseline that have ES&H and work-scope implications. For example, a Baseline Change Request was submitted and approved by ES&H and NMSP management to complete the 291-Z-1 Stack Monitor System upgrade. The management thresholds for approving such changes are described in the FHI draft management directive on Baseline Change Control, which has not yet been issued as an approved document.

FHI has the necessary planning processes and mechanisms in place to ensure that ES&H is appropriately considered in the prioritization of project activities at the facility and activity levels at PFP. In general, FHI has maintained an appropriate balance between mission and safety in establishing priorities at PFP. Resources related to ES&H have been appropriately allocated to support facility and work activities. For example, positive trends in performance indicators (e.g., PFP Operational Surveillance Requirements/Surveillances Entering Extension and the PFP Backlog of work packages) indicate that an appropriate level of resources is being made available for maintenance of safety-related systems.

An exception to the generally positive picture of balanced priorities is the acquisition of appropriate radiological monitoring equipment. The reliance on handheld and outdated radiological monitoring equipment used at PFP affects the facility's ability to consistently meet DOE expectations for contamination control and continuous air monitoring (see Appendix E, Core Function Implementation). In the case of contamination control, the Radiological Control Manager is in the process of completing a proposal for acquiring improved personnel monitoring equipment. However, no final decision has been made as to whether or not this equipment will be acquired. With regard to continuous air monitoring equipment, sufficient funds had not been originally allocated in fiscal year (FY) 2000 for the purchase and installation of continuous air monitors (CAMs). Although the need for upgraded CAMs is recognized and some new Canberra CAMs are scheduled for installation, not all CAMs are scheduled for replacement.

Summary of Guiding Principle #4

RL has established an effective contractual mechanism with FHI that clearly defines the scope of work that is to be performed, establishes priorities for cleanup activities at PFP, and specifies ES&H expectations. RL has also effectively incorporated performance objectives, measures, and expectations within the FHI contract as a means for establishing priorities. FHI has the processes in place to translate contractual requirements into plans and schedules and to allocate resources in support of the PFP mission. Although FHI has achieved a balance between mission and safety, failure to acquire appropriate radiation monitoring equipment points to some problems in setting priorities and allocating resources. While actions are under way to address these problems, increased attention is needed to ensure that actions are effective in fully addressing the concerns.

C.2.5 Identification of Safety Standards and Requirements

GUIDING PRINCIPLE #5: Before work is performed, the associated hazards shall be evaluated and an agreed-upon set of safety standards shall be established that, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences.

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RL Integrated Management System (RIMS). RL has made significant improvements in the requirements management process and procedures since the 1996 integrated safety management evaluation. RL developed and implemented RIMS to provide a comprehensive framework for requirements management as well as other safety management functions (see Guiding Principles #1, 2, and 4). RIMS went online in May 2000, and RL is continuing to further develop and improve the format, content, and usability of the system. For example, in November 2000, the Requirements Organization revised the requirement management cross-cutting process to clarify procedures for reviewing, analyzing, implementing, and retiring requirements. In April 2001, the Contractor Requirement Documents procedure was revised and improvements were made to the exemption procedure. Changes to RIMS and system products are controlled by formal procedures for *RIMs Products Use, Product Development, Product Revisions, and Cancellations, RIMs Products Variances, and RIMs Directories Updates.*

RIMS includes cross-cutting processes consisting of RL-wide procedures and guidelines that are developed to support implementation of the policies and operating principles when procedures and guidelines are applicable to a broad group of staff or multiple topical areas, such as requirements management. The system provides clear web-based linkages to policies, procedures, and other documents required for RL site documents and requirements management.

Requirements Management. The Requirement and Products Management System, one of the 14 management systems, describes the process and contains the procedures that provide for management, documentation, and flowdown of requirements to contractors on the Hanford site. The Requirements Management Organization assigns each requirement to one of the 14 management systems, each having a responsible management system steward and several subject matter experts (SMEs). Management system stewards accept responsibility for specific requirements and assign them to one or more SMEs. The SMEs are usually aligned to each DOE order or other requirement functional area. Requirements may span different management systems and be coordinated between management system stewards, although the assigned management system steward retains responsibility and accountability for the requirement. The management system stewards and SMEs monitor, maintain, and analyze new and changed requirements. Formal procedures are in place and are being effectively used for processing new and changed requirements. These procedures (i.e., *Review and Comment on Draft Requirements, Analyzing and Implementing Requirements, Contractor Requirements, Exemption Requests for Requirements, and Retiring Requirements*) are generally adequate.

Records of Decision. The procedure for analyzing and implementing requirements specifies a Record of Decision (ROD) process that is to be used to document requirement decisions, analysis, and action items necessary to complete requirement implementation. The RODs also specifically identify the individuals responsible for each action item and require them to acknowledge the action item and milestones. Requirement management actions such as RODs, ROD status, action items and status, contract requirement documents, and other supporting information is maintained in the RL Requirements Management Database (see Figure C-2). The Requirements Management Organization is actively maintaining the database and tracking completion of action items associated with implementing requirements.

Most of the ROD documents that were reviewed were appropriately completed and reflected actions that resulted in proper implementation of requirements. Some were detailed and comprehensive. The ROD applicability matrices generally stated the requirements and implementing documents/procedures for each listed requirement. However, the OA team identified some areas for improvement;

- RL recognizes that the ROD process has not been consistently applied to all external requirements and has initiated an action item to determine the need to develop RODs for Federal regulations, DOE

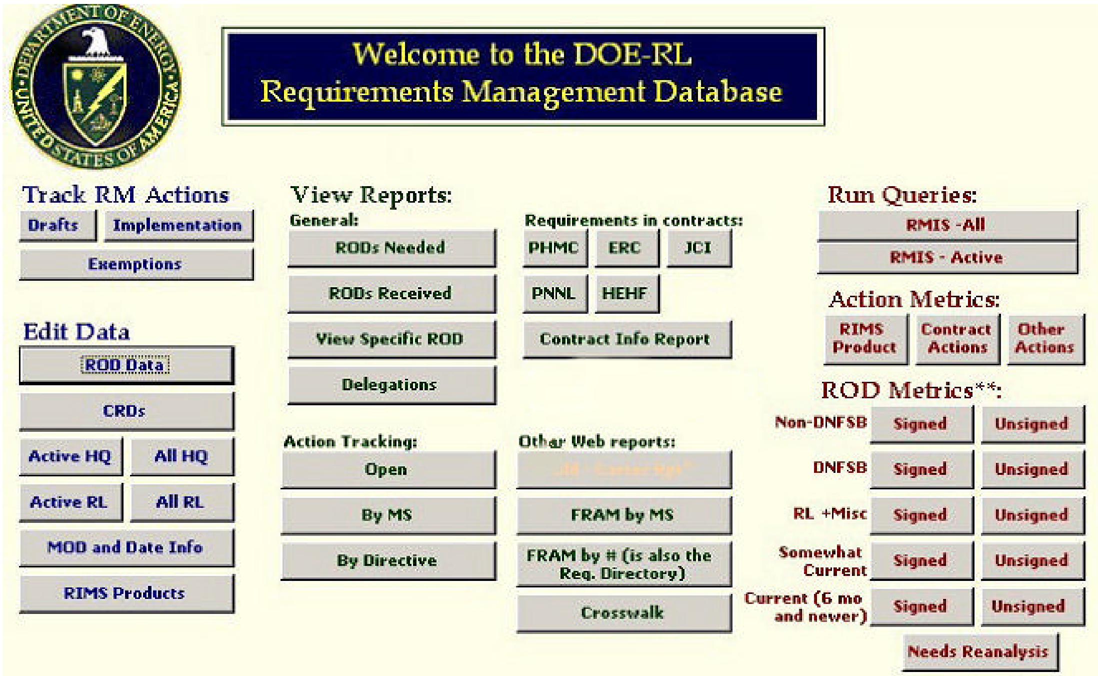

Figure C-2. Requirements Management Database

Headquarters delegations, and programmatic letters of direction. However, the RL procedure for analyzing and implementing requirements states that the applicability is for "implementation of external requirements" and should include all requirements, not merely orders and directives.

- There were many cases in the ROD applicability matrix where the implementing documents for requirements were broadly listed. The matrices did not contain a specific procedure or reference to specific sections or subsections of the programs that implemented the requirement. Therefore, the RODs did not provide good traceability down to specific implementing information for the listed requirements. For example, the implementing document for a requirement to maintain an OSHA 200 occupational illness and injury log (DOE Manual 231.1) is listed as the "ES&H cross-cutting process," with no reference to a specific procedure or part of the cross-cutting process that directly implements the requirement. In other cases, program descriptions or broad areas such as "Requirements Management" are listed as implementing documents rather than procedures that implement those aspects of the program descriptions.

Exemptions. The Requirements Management Organization maintains a formal procedure that controls the requirement exemption process. The procedure is used and adequately addresses the elements to ensure that exemption requests are initiated, distributed, reviewed, analyzed, documented, and forwarded to the field element manager or appropriate DOE Headquarters cognizant secretarial officer for approval. A web-based change request and template contains exemption request evaluation criteria and a sample exemption package. Exemptions that have been processed since inception of the RIMS system have been documented in the Requirements Management Database. However, the Requirements Management Organization has determined that some exemptions were not known to the Requirements Management Organization when RIMS was implemented and are not presently captured in the database. An action item was initiated to gather, validate, and document other outstanding exemptions. For example, several fire protection exemptions, though documented in the new standards/requirements identification document (S/RID) set for PFP, are not documented in the Requirements Management Database. These exemptions must be documented to allow proper evaluation of changes against a known set of requirements.

Standards/Requirements Identification Document. RL approved a single S/RID for Hanford projects just before the start of this OA evaluation (January 11, 2002). The single S/RID replaced seven separately maintained S/RIDs (one for each project). With the implementation of the new S/RIDs, FHI has elected to develop and maintain the database for all projects at the company level rather than at the project or facility level. The expected result is a significant reduction in duplicated requirements, reduced potential for requirement errors, and increased efficiency for RL and FHI. The approved S/RIDs have an applicability statement for each requirement and can be sorted by project/area to facilitate implementation. RL has implemented a formal procedure that addresses the review and approval of contractor health and safety documents, including S/RIDs.

Until the recent development and approval of the single S/RID, RL and its contractors had not adequately maintained the S/RIDs and the S/RID database. As a result, S/RID requirement traceability to facility-level procedures is not current, and numerous PFP-level procedures have been cancelled.

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FHI Requirements Management. The FHI requirements management is contained within the Project Hanford Management System. FHI documents (i.e., Requirements Management and the Requirements Management Process Procedure) address the system and requirements for establishing and maintaining requirements and the implementing process respectively. The Requirements Management Process procedure also implements requirements contained in the Hanford Document Control Program, Quality Assurance Program Description, and Configuration Management procedures. Generally, these procedures provide adequate requirements and guidance for implementing requirements management at FHI.

Contract Requirements and Streamlining. The FHI requirement basis is contained in the contract, which lists applicable DOE orders and notices, S/RIDs, RL-tailored contractor requirements, and "other RL items for compliance." Other items for compliance include such documents as the Hanford Emergency Plan, the site lockout/tagout program, the Hanford Site Waste Minimization and Pollution Awareness Program Plan, and others. The FHI contract contains an appropriate set of requirements tailored to the contractor's scope of work.

The contract also contains a requirement for "streamlining" the FHI requirements set. FHI contract language requires that the contractor and RL "work cooperatively in reviewing the current list of DOE Directives evaluating them for value added, efficiency of operations, redundancy with other laws and regulations, and conflict with FHI Corporate and best commercial practices." An FHI contract deliverable was submittal of a request to the RL Contracting Officer to eliminate selected directives by April 30, 2001. As a result of the FHI review of the 133 directives in the contract, 43 were identified for deletion, 20 for modification, and 5 for deferred review. With few changes, RL approved the request on June 29, 2001. The FHI submittal was comprehensive, included in-depth analyses and comparison of similar and redundant requirements, and recommended retention of requirements or deletion where appropriate. Decisions to delete or change requirements were based on sound rationale, such as the fact that the requirements were redundant or expired, or were based on superseded DOE orders, or were not applicable to the contractor's scope of work.

A second streamlining effort is under way within FHI to simplify the requirements set and provide additional efficiencies for requirements management. Some of these actions include establishing FHI requirement documents that may or may not have associated implementing procedures at the company level, determining what requirements can be "self implementing" (e.g., an implementing procedure says no more than the requirement), and conducting a thorough review of project and facility procedures. Although this review will be conducted by knowledgeable teams that include FHI requirement interpretive authorities, discussions with FHI requirements management personnel indicated that specific criteria and a detailed plan had not yet been developed for the review. Without consistent criteria and guidance, paring down of requirements documents and implementing procedures at the company, project, and facility level could challenge FHI's ability to maintain the integrity of requirement flowdown to the working level. Recent Facility Representative surveillances have identified requirements management process issues associated with the cancellation of certain Hanford implementing procedures and replacing them with the requirements documents. In some cases, the requirements documents require only compliance, not an implementing procedure (or other implementing process) at the project or facility level. This situation was evident in the management assessment area at PFP where a PFP procedure and a desk-level procedure on management assessments were cancelled. The remaining Hanford Site implementing procedure does not provide facility-level implementing information, a possible contributor to the deficiencies in the management assessment program discussed in Appendix D, Feedback and Continuous Improvement.

Subcontracting. The OA team's review of selected FHI subcontracts indicates that ISM/ES&H requirements were properly flowed down to subcontractors performing work on site, with emphasis on work affecting PFP. FHI provides extensive guidance for subcontracting on its *Project Hanford Management Contract – Policies and Procedures* web page, a subset of the Project Hanford Management System. Contracting procedures and guidance include acquisition procedures, requirements documents, business process guides, acquisition desk instructions, and acquisition policy guides. The system includes checklists to facilitate determining general provisions, clauses (based on the nature of the work), and special provisions (ES&H and ISM). ES&H special provisions include one for routine onsite work and a more comprehensive provision for more hazardous work requiring unique safety provisions. The special provisions provide specific requirements for integrating ES&H into work planning and execution. The subcontract for the PFP 3013 container seismic supports was reviewed and determined to be adequate.

The OA team identified one area for improvement with the flowdown and communication of medical requirements to PFP subcontractors. The occupational medical requirements of DOE Order 440.1A, Chapter 19, are partially flowed down to the construction subcontractor by Special Provision – Onsite Services, SP-5A. This provision contains four clauses related to medical requirements. Although the subcontract does not contain all DOE Order 440.1A medical requirements, it requires that the Hanford Site occupational medical contractor (the Hanford Environmental Health Foundation, or HEHF) perform all medical examinations required for the performance of the work scope. The FHI construction subcontractor is not implementing required occupational medical requirements, and FHI has not communicated the availability of HEHF medical services for contractor personnel. Provisions of the order that are currently not being met include: having a formally documented occupational medical program, ensuring that the medical provider has been provided job hazards analysis information, and performing targeted medical examinations based on an up-to-date knowledge of work site hazards. Construction subcontractor personnel (safety officer and workers) were not knowledgeable or informed by FHI of the medical surveillance services provided by the HEHF, and subcontract workers who work in high noise areas or wearing respiratory protection are not enrolled in the HEHF medical surveillance program.

Oxalate Material in Glovebox

Summary of Guiding Principle #5

Overall, the requirements management area is effectively implemented at RL and FHI. As experience is gained with the requirements management system, the system is being improved. Some areas for further improvement, identified through the self-assessment process, are documented and being tracked. Further tailoring of the FHI requirements basis must be done carefully to ensure requirement integrity down to the work activity level.

C.3 Conclusions

Overall, RL and FHI have coordinated their efforts to establish the framework for a comprehensive and effective ISM program. Policies have been established and communicated. Workers and stakeholders have multiple avenues for expressing ES&H concerns. RL and FHI roles and responsibilities are adequately defined at all levels of the organization, and RL and FHI personnel are generally well qualified to perform their responsibilities. Most FHI personnel exhibited a good understanding of facility hazards and the importance of safety provisions. RL and FHI have established and communicated priorities that reflect the importance of safety and have implemented management systems that ensure that ES&H needs are considered and balanced against mission needs at all stages of project planning. Systems for identifying applicable requirements and ensuring that they flow down to the work level through policies and procedures are established and generally effective.

Some aspects of the RL and FHI efforts to enhance ISM are innovative and provide a sound framework for continued improvement. While not yet fully implemented, RL's RIMS provides an effective and comprehensive framework for systematically and comprehensively defining responsibilities for safety, ensuring that organizations and individuals are responsible for implementing applicable requirements, and integrating safety into project tasks. In addition, RL is effectively using the annual performance fee evaluation process to establish specific ES&H/ISM performance expectations, evaluate performance with respect to defined criteria, and identify opportunities for improvement in contractor performance. FHI has been effective in establishing its ISM framework, and PFP management and workers have embraced the ISM approach. The AJHA process has developed into a significant tool for workers, work planners, and line managers to systematically identify work activity hazards, identify the appropriate controls, and ensure that workers and SMEs are appropriately involved in analyzing job hazards.

Although much progress has been made, increased attention is needed in a number of areas. RL has technical skill mix imbalances within its staff and shortages of experienced personnel in a few important ES&H areas, such as nuclear safety analysis and fire protection. RL is using available human resource management tools to address some workforce imbalances, but skill shortages exist in a few areas. In addition, some RL organizations have not effectively implemented important aspects of the training program, such as needs assessments and IDPs. FHI needs to address several longstanding concerns with recruiting and retaining RCTs and the reliance on outdated radiological monitoring equipment. FHI processes to ensure accountability for the effectiveness of corrective actions for recurring deficiencies also need to be strengthened.

C.4 Ratings

The ratings of the guiding principles reflect the status of the reviewed elements of the PFP ISM program.

Guiding Principle #1 – Line Management Responsibility for Safety .... EFFECTIVE PERFORMANCE
Guiding Principle #2 – Clear Roles and Responsibilities .... EFFECTIVE PERFORMANCE
Guiding Principle #3 – Competence Commensurate with Responsibility .... NEEDS IMPROVEMENT
Guiding Principle #4 – Balanced Priorities .... EFFECTIVE PERFORMANCE
Guiding Principle #5 – Identification of Standards and Requirements .... EFFECTIVE PERFORMANCE

C.5 Opportunities for Improvement

This OA review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible EM, RL, and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic objectives.

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1. **Further enhance processes for communicating expectations to contractors and RL staff.**

   - Develop methods for analyzing the large amount of performance and assessment information to enhance the ability to systematically evaluate the contractor's overall ES&H performance.

   - Increase the involvement of operating-level project managers in the presentation and interpretation of comprehensive evaluation results.

- Communicate expectations for effectively addressing longstanding and recurring weaknesses in the areas of training program administration, corrective action management, and radiation monitoring equipment, and scrutinize recurring weaknesses and longstanding findings in the evaluation of overall ES&H performance and fee determinations.

- Evaluate the existing R2A2s to determine what improvements are needed to enable effective integration of RIMS and human resources elements. Develop methods to enhance responsibilities in individual position descriptions, development plans, and performance evaluations.

- Consistently apply the ROD process to all external requirements, including Federal regulations, DOE letters of delegation, and DOE letters of direction.

- Improve the quality of the ROD documents to provide more specific implementing document information (e.g., specific procedures or sections of program documents) to ensure better traceability to requirement implementing documents.

2. **Fully implement and further enhance RL training and qualification programs.**

   - Create systems and assignments so that changes in requirements relating to GTB and functional area competencies for critical positions are identified and evaluated for professional development needs.

   - Develop clear expectations for RL supervisors to analyze requisite job knowledge, skills, and abilities for employees. Circulate available guidance and examples of acceptable needs analyses to RL supervisors.

   - Perform an institutional review of completed needs analyses to measure achievement of established objectives.

   - Set clear milestones for IDP development and monitor progress.

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1. **Enhance individual competency by resolving recurring training and qualification program deficiencies and enhancing training and qualification programs.**

   - Systematically analyze deficiencies and determine the root causes of recurring deficiencies in the training and qualification program. Develop and implement an action plan to address root causes.

   - Establish mechanisms to champion teamwork among NMSP functional and project organizations with respect to development and execution of training and qualification programs. Consider assigning an FHI senior manager as a champion/steward.

   - Establish formal strategies to prioritize the update of qualification and certification course materials for NMSP workers. Formalize emerging strategies for continuous updating of course materials into NMSP training procedures.

   - Enhance mechanisms for incorporating lessons learned and identified deficiencies in individual performance (e.g., incorrect USQ screenings) into training and qualification programs.

2. **Address gaps and improve specificity in existing requirement management processes.**

   - Clearly communicate DOE Order 440.1 and subcontract medical requirements and the available of services from the Hanford medical service contractor.

   - Verify that subcontractors meet applicable requirements.

3. **Institutionalize current practices for setting priorities, allocating resources, and maintaining the FHI Integrated Environmental Management Life-Cycle Baseline documents.**

- Update and issue charters for the Resource Management Board and PFP Project Review Board to reflect their current roles, responsibilities, and membership.

- Finalize and issue the draft baseline control directive, “Baseline Change Control.”

- Issue a replacement procedure for the outdated “Multi-Year Work Planning” procedure, describing the responsibilities, requirements, and steps for updating the FHI Integrated Environmental Management Life-Cycle Baseline.

- Develop an FHI procedure that describes the process for translating contractual requirements and DOE guidance into plans, priorities, and resource-loaded schedules for implementation at the project level.

APPENDIX D
FEEDBACK AND CONTINUOUS IMPROVEMENT (CORE FUNCTION #5)

D.1 Introduction

The Office of Independent Oversight and Performance Assurance (OA) evaluation of feedback and improvement at the Hanford Site Plutonium Finishing Plant (PFP) included an examination of the U.S. Department of Energy (DOE) Richland Operations Office (RL) and Fluor Hanford, Incorporated (FHI) programs and performance. The OA team reviewed FHI institutional processes, such as assessments/inspections, employee concerns, lessons learned, and corrective action/issues management, and activity-specific processes such as post-job reviews. The OA team also examined the RL line management oversight of PFP integrated safety management (ISM) processes and implementation, including the Facility Representative program; environment, safety, and health (ES&H) program management; and the award fee/performance evaluation and measurement process.

D.2 Results

D.2.1 RL Line Management Oversight

RL processes for oversight of FHI ES&H performance are described in the RL Integrated Management System (RIMS) and involve several organizations, management systems, and cross-cutting processes. RL develops an assessment schedule annually reflecting prioritized, planned surveillances, assessments, and reviews, including key contractor and external evaluations. This integrated schedule is developed through identification and evaluation of various factors, including past performance, emerging issues, risk, scheduled contractor external assessments, and mission changes. Project-specific and sitewide assessments and evaluations by RL functional area subject matter experts and planned surveillances by facility representatives are included on the schedule.

Day-to-day monitoring of contractor safety performance is conducted by Facility Representatives (FRs). The FRs for several projects report to a Team Leader, supervised by the Director of the Operations Oversight Division (OOD) in the Office of Performance Evaluation.

Formal instructions detail the various aspects of the FR program. Detailed assessment guides have been developed covering 69 subject areas. PFP FRs conducted 16 formal surveillances in fiscal year (FY) 2001. The number of formal surveillances will increase with a new emphasis on conducting formal oversight and the addition of another FR at PFP. Eleven formal surveillances were conducted at PFP in the first quarter of FY 2002. Seventy findings were documented in these five quarters, and most surveillances resulted in findings and observations requiring a contractor response and action. These surveillances were thorough and included a color-coded rating for performance in the area reviewed. Of the 27 surveillances conducted in the last five quarters, ten were color-coded by RL as yellow (significant improvement required) and one was color-coded red (unsatisfactory). In addition, each surveillance report includes an evaluation of the contractor's self-assessment of the area being reviewed. These frequent reviews of the contractor's self-assessment program provide important information for judging the needed level of DOE line oversight, as outlined in DOE Policy 450.5, *Line Environment, Safety, and Health Oversight*. Surveillance reports are reviewed by supervisors and issued to contractors through the applicable RL mission element office after they are completed. A monthly report is issued to FHI compiling the month's surveillance findings and observations that require contractor response and summarizing the status of previous issues.

In addition to attendance at numerous project staff planning and status meetings, the PFP FRs meet every two weeks with PFP senior managers to discuss current issues and concerns. The FRs, their Team Leader, and PFP senior management and their direct reports meet monthly to discuss surveillance results. Planned weekly conferences between mission elements, mission support subject matter experts, and the FRs ensure good communication between RL PFP oversight counterparts. In September 2001, the PFP FRs formally summarized and analyzed prior monitoring/surveillance results and contractor performance (e.g., the DOE

Occurrence Reporting and Processing System and the Facility Evaluation Board) to support development of the FY 2002 surveillance schedule, an annual schedule that is updated as needed to adjust to changing conditions and areas of concern. In addition, in the last year, FRs conducted several formal, FHI-wide surveillances to evaluate potential cross-cutting safety concerns, including the lock and tag program and safety documentation control, to determine whether there were programmatic breakdowns. The FRs maintain a log of day-to-day monitoring activities. The PFP FRs also prepare and issue to their Team Leader and the OOD Director a weekly summary of their activities and key observations, referred to as the "Critical Items Report."

The OA evaluation team identified a few areas for improvement in the FR program. Although the FRs clearly communicate concerns verbally to the contractor and communicate formal surveillance findings and observations to the contractor in writing, an individual safety deficiency identified by an FR during routine walkthroughs may not get communicated in writing unless a special, reactive surveillance report is written. Thus, some safety issues may not be captured in the formal issue management system. Significant FR observations resulting from day-to-day monitoring are communicated to the contractor verbally or via email and tracked informally by the FRs. However, a review of FHI categorizations of PFP deficiencies put into the Deficiency Tracking System (DTS) from February 1, 2001, to February 1, 2002, indicated 32 items identified in FR surveillances, 28 items identified in RL assessments (typically operational readiness review findings), and no items linked to RL walkthroughs. In addition, the FR logs are not being regularly reviewed by the FR Team Leader as specified in FR instructions.

RL does not require individual responses to RL surveillance report findings, but the FR sitewide monthly summary reports specify a response containing the actions taken or planned. However, the FHI responses to the sitewide monthly FR report do not reflect any details on the corrective actions taken or management commentary except for significant cross-cutting issues. Because of the extended time spent in the contractor's deficiency evaluation process, responses only identify that the current month's issues will be evaluated and the deficiency tracking number and status of previous issues. More detailed and formal feedback from the contractor on RL-identified performance deficiencies would enhance communications and reflect contractor management engagement with these issues. The OOD director indicated that processes for more formal communication of FR monitoring activities and expectations for more detailed responses to FR evaluation results were being drafted.

Although the contractor's self-assessment performance is documented in individual FR surveillance reports, RL does not perform routine, documented analysis to reflect overall performance at individual projects or FHI. FRs and the RL Assistant Manager for Safety and Engineering have performed evaluations of self-assessment programs for many functional areas and for other contractors, but RL has not performed a coordinated, collective analysis of FHI performance. An RL process for validating contractor self-assessment programs is identified as a part of the RIMS Contractor Oversight and Evaluation Planning process, but has not yet been implemented. The FY 2002 RL integrated assessment schedule does not include an assessment of the contractors' self-assessment programs, although RL management indicated that they intend to do a review this year.

RL and the contractor have structured a contract that provides mechanisms for identifying ES&H performance objectives and criteria and providing financial incentives for achieving these objectives. Three of five performance objectives, measures, and expectations established in a "Comprehensive-1" contract performance incentive include safety-related elements. One performance objective/measure, completely related to safety, is a negative fee with a possible fee deduction up to 30 percent of the total Comprehensive-1 incentive. RL has employed these contract measures to drive performance improvement. For the FY 2001 evaluation period, performance shortfalls in these three comprehensive fee criteria involving ES&H resulted in over $1,000,000 of non-earned and deducted fees. Numerous opportunities for improvement were cited in the evaluation report, including several related to FR findings at PFP. In addition to the incentive clauses in the renegotiated contract, RL issued a letter to FHI on November 28, 2001, detailing a negative performance trend identified during readiness reviews at PFP and T-plant. This letter identified negative trends in corrective action management, lessons learned, and contractor readiness verification.

As described in Appendix C under Guiding Principle #1, the DOE employee concerns program is a well structured and effectively managed feedback mechanism. Although the number of contractor concerns reported to DOE is not large, RL was aggressive and innovative in addressing a potentially serious work environment issue at PFP when six concerns were logged in the RL system in one month in mid-2001. RL worked with the FHI employee concerns program staff to conduct a limited study of the work environment. PFP subsequently conducted a more extensive safety culture assessment that identified 30 items needing management attention and corrective actions. RL plans to repeat the assessment later this year to measure improvement and the effectiveness of corrective actions. The safety culture issue was cited as one of the opportunities for improvement in the FHI performance fee determinations for FY 2001 for Comprehensive-1, Performance Objective/Measure 4 (Effective Leadership), for which a 20 percent reduction (approximately $280,000) in available fee was assessed.

Self-assessment is a defined RIMS cross-cutting process and requires a minimum of one self-assessment of each of the 14 management systems. In December 2001, RL completed self-assessments of each management system, consolidated into one report with the dual intent of meeting self-assessment requirements and addressing the adequacy of actions for ISM verification issues. The report was comprehensive and self-critical, identifying approximately 100 individual improvement actions.

Lack of clear definitions and consistency among several RIMS management system documents contributes to inconsistency in management of issues at RL. RIMS Self-Assessment and Improvement Action process documents make reference to terminology such as "opportunities for improvement," "process improvements," "deficiencies," "findings," "observations," "concerns," and "issues," but do not define these terms or how they are to be used by assessors. Similarly, the summary self-assessment report did not reflect any analysis of the approximately 100 individual weaknesses and deficiencies for more generic or cross-cutting issues.

No formal process is being applied to the evaluation and resolution of findings from the RIMS self-assessment. RL determined that evaluation and tracking of issues identified in the RIMS self-assessment in DTS, as specified in the Improvement Action Management System, were unsuitable. The RIMS procedure will be revised to specify the use of another database for self-assessment findings. Pending development of the revised procedure, self-assessment findings are being addressed as determined by the individual management system stewards.

Overall, RL has established and is implementing a formal, rigorous oversight program for contractor safety management. RL oversight processes are well defined and provide for operational awareness, functional area assessments, and reactive/for cause evaluations. Day-to-day monitoring, formal surveillances, and communication with PFP management by the FRs have provided continuous feedback on safety performance to the contractor. Safety-related performance objectives and measurable criteria with financial incentives have been built into the contract with FHI. RL has used these incentives to focus contractor management attention and drive continuous improvement. However, RL assessment processes have not ensured effective resolution of some longstanding and recurring deficiencies at PFP. Also, RL self-assessment and issues management procedures have not always been followed.

D.2.2 FHI/PFP

FHI has a number of institutional programs that provide feedback on ES&H effectiveness. In mid-calendar year 2001, many FHI feedback and improvement policy organizations were consolidated under a Vice President of Safety and Mission Assurance, including management and FHI independent assessment functions, Price-Anderson Amendments Act, and corrective action management. The Safety and Mission Assurance organization reports directly to the Executive Vice President and Chief Operating Officer. The new organization has been performing self-evaluations of processes, organization, roles, responsibilities, authorities, and performance in these functional areas and initiating improvement actions. ES&H assessment activities at PFP are described in company-level procedures on management assessments and Facility Evaluation Board (FEB) assessments, which implement the applicable requirements. As discussed below, the various assessment and feedback programs each have some effective elements and some weaknesses that need to be addressed.

Management Assessments

Management assessments are required to be conducted by the managers in each FHI line project, operations, and functional organization. FHI independent assessments are conducted by teams from the Safety and Mission Assurance organization. Each project, operations, and functional organization is required to develop, issue, and implement an annual management assessment plan and schedule. Each organization is also required to prepare a quarterly report of management assessment activities and results for compilation by Safety and Mission Assurance for presentation to the FHI Feedback and Improvement Quality Council. PFP has issued FY 2001 and FY 2002 management assessment plans and schedules. As part of the resolution to an FEB finding regarding PFP management assessment program weaknesses, PFP performed an analysis of prior issues to prioritize FY 2002 assessments. The FY 2002 plan includes a discussion of the basis for the selected assessments, a general description of the approach, and 18 identified and scheduled assessments. For FY 2002, in an effort to increase assessment effectiveness, PFP has modified its approach and the focus of PFP management assessments to include more team assessments (9 of 18) and focus on causal factors rather than compliance.

A Senior Supervisory Watch (SSW) program has been in place for years at PFP to involve managers directly in evaluating ES&H/ISMS performance and interfacing with workers. Many of the SSWs are conducted on backshifts, and emphasis is placed on watching work activities. The process is documented in a procedure, and activities and observations are documented in logbooks and on checklists. SSW logbooks and checklists are periodically reviewed by the PFP Corrective Action Management Representative and SSW Program Administrator for trends and deficiencies that should be formally evaluated by the Deficiency Evaluation Group (DEG). The Program Administrator is to meet quarterly with all Senior Supervisory watch-standers to discuss any noted trends or repeated observations. The PFP Quality group also conducts planned surveillances of specific functional areas specified in PFP administrative procedures.

Although the framework for an effective management assessment program is in place, weaknesses in the process and implementation are hindering the self-identification of program and performance deficiencies at PFP:

- The PFP implementing administrative procedure cited in the PFP ISM System description and the desk instruction cited in the PFP Quality Assurance Program Plan for management assessments have been cancelled, and the institutional-level procedure does not provide sufficient detail on how PFP management assessments are to be performed.

- The PFP FY 2002 management assessment plan/schedule does not clearly identify and integrate other self-assessment activities being performed at PFP, including various reviews and assessments by line organizations required by procedures and quality assurance/quality control surveillances. The FY 2002 plan description does not define or discuss how findings/deficiencies are to be documented or processed. Completed PFP management assessment reports do not always clearly reflect the issues and supporting data to facilitate issue evaluation and management. Many of the assessments performed in FY 2001 were not rigorous, in-depth evaluations of processes and performance and did not reflect significant planning and input from project managers.

- The new approach to performing management assessments at PFP for FY 2002 is to focus on causation and programmatic conclusions. This approach has not been adequately coordinated with the FHI corrective action management program, which focuses on tracking compliance issues.

- PFP management and self-assessment processes are not effective in identifying and reporting deficiencies. Less than 10 percent (25 out of 276) of all program and performance deficiencies documented in the corrective action system were identified by management self-assessments. As a result, many deficiencies are not self-identified and not reported until identified by RL, FEBs, or external appraisals.

- Performance and process deficiencies identified during SSW evaluations have not been rigorously documented and screened for input to the FHI corrective action management system (CAMS) process. For example, in December 2001, SSW logs indicated failures to follow procedures on three different occasions, but no checklists were completed for those days and there was no documentation of input to DTS or corrective/preventive actions. Corrective actions were verbally initiated by PFP senior management, but without the benefit of the CAMS process (which provides documented causal factor analysis, extent-of-condition reviews, evidence of completed actions, and records for trending).

- Deficiencies noted during some self-assessment activities are not being expeditiously evaluated for input to CAMS and determination of the extent of condition. Examples of failures to perform assessments activities required by PFP administrative procedures were identified by the RL FRs during 2001 and by PFP ES&H and Quality (ESH&Q). However, the non-compliance was not identified as an issue for the DEG. PFP Quality Assurance is conducting a series of surveillances to determine the extent of the condition, but their action is not scheduled for completion until October 2002, and no interim measures have been documented.

FHI Independent Assessments

The FHI independent assessment function is being performed by a group also within Safety and Mission Assurance. Periodic comprehensive, performance-based, multi-disciplinary FHI independent assessments are performed by the FEB in accordance with a formal procedure. Typical FEB reports evaluate ten functional areas, including management systems and operations, evaluating each against a formal set of performance objectives and criteria. Each FEB report on a project or organization contains an evaluation of ISM implementation. In addition, the FEB annually conducts an ISM system review of FHI safety functional areas as input to the required annual ISM program review. FEB reports identify individual issues (potential deficiencies that required evaluation in accordance with the FHI CAMS process), observations that support issues, and noteworthy practices. If appropriate, the FEB identifies core issues, defined as cross-cutting, programmatic problems that are reflected in multiple functional areas. Core issues are also potential deficiencies that are to be evaluated in accordance with the FHI CAMS process. Each assessment area is also rated at a "performance level," currently a red, yellow, green color code. FEB evaluations of the PFP in 1997, 2000, and 2001 have been rigorous and identified numerous program and performance issues and opportunities for improvement. The FHI Office of Independent Assessment is currently reviewing the FEB process and considering modifying the frequency of project evaluations based on past performance and tailoring individual assessments to focus efforts on functional areas where available performance data indicate that attention is needed.

The OA evaluation team noted some weaknesses in the FHI independent assessment program. A document detailing the overall scope and implementation of the program requirements specified in the FHI Quality Assurance Program Description has not been established. The Integrated Environment, Safety and Health Management System Description does not reference the FEB procedure or clearly define the FHI independent assessment function.

Issues and Corrective Action Management

The FHI CAMS, as detailed in the Corrective Action Management procedure, is a process for evaluating potential deficiencies (a deviation from requirements), analyzing confirmed deficiencies, and developing corrective actions to prevent recurrence. Source documents, such as assessments, internal surveillances and inspections, radiological problem reports, and Occurrence Reporting and Processing System reports, are screened by a qualified "authoritative source" at PFP. Potential deficiencies are evaluated by a DEG and are assigned a risk rank value and analyzed for cause. Corrective actions are identified and assigned, and entered into the DTS. At PFP, the DEG typically consists of the PFP CAMS coordinator, the FHI CAMS program representative, management, source document representative, and the issue owners. Risk rank values are assigned to each deficiency, defining the rigor to be applied in processing the deficiency. At PFP, an internal tracking system is used to track non-DTS issues and commitments. The DEG process provides a forum for clear discussion and communication of the rationale for findings, causes, risk ranking, and corrective actions. It also promotes direct involvement of project managers in understanding and resolving deficiencies. PFP management has initiated several actions to improve corrective action management performance, including assignment of an experienced manager as the CAMS representative and scheduling of a management assessment of CAMS in the second quarter of FY 2002.

Process and implementation weaknesses in the FHI and PFP corrective action management program adversely impact the timely and effective resolution of program and performance deficiencies to prevent recurrence:

- The FHI CAMS is designed to address compliance issues from source documents but is less effective in capturing and addressing performance issues and programmatic weaknesses. It does not address certain deficiencies (e.g., deficiencies identified through employee concerns programs and drills). Core issues from the PFP 2000 and 2001 FEB reports were not input to DTS, and there is no mechanism for capturing the issues identified outside of a formal assessment process.

- The DEG process is not timely in processing, evaluating, and correcting most deficiencies. The evaluation of source documents by the PFP DEG has been subject to significant backlogs. Most deficiencies are accepted or assigned to an owner, evaluated, and corrected informally before the CAMS process is initiated.

- PFP has not devoted sufficient rigor and management attention to categorizing and evaluating significant performance deficiencies that have been repeatedly identified by internal and external assessments, and implementing corrective and preventive actions. For example, issues related to procedures, management assessments, and corrective action management have been identified in the last three FEB reports for PFP, as well as other internal and external assessments. However, the core issues from the FEB report were not evaluated for CAMS. The specific issues cited in reports were evaluated, but most were given a low risk rank, with an explanation the issues were "administrative" in nature and had no direct "impact." Corrective actions were often cryptic and minimal, with no follow-up or objective evidence required for closure due to the low risk rank. Other longstanding and repetitive issues that have not been aggressively addressed include inadequacies in training programs and post-job reviews. In addition, the PFP resolution of FEB issues does not appear to be timely. Dozens of corrective actions related to training from FY 2000 and FY 2001 are still open.

Lessons Learned

FHI and PFP have formal procedures describing the processes for distributing lessons learned to organizations and personnel for review and application. Company-level and PFP lessons-learned coordinators have been designated and are processing lessons learned. FHI and PFP coordinators have personal computer databases of lessons learned that have been reviewed or sent to subject matter experts or staff contacts for evaluation of applicability or actions needed. Internal lessons learned are being generated and distributed at PFP. The FHI job hazards analysis procedure requires lessons learned to be generated as a result of work activity post-job reviews, and also requires planners to review and incorporate those lessons into new work plan documents. The FHI coordinator has conducted periodic assessments of program effectiveness as required by the Hanford lessons-learned procedure by reviewing performance at one individual project quarterly. PFP was assessed in February 2001. However, the lessons-learned processes and implementation methods do not provide assurance that proper evaluations are being performed and that lessons are consistently applied to prevent recurrence:

- Lessons-learned procedures lack details regarding how the process is to be implemented and do not provide for documented assurance that lessons learned are fully evaluated, disseminated, and applied. For example, the PFP procedure for managing lessons learned does not define how actions are to be documented.

- The specific applicability of externally generated lessons learned and any actions to be taken by FHI personnel are not identified in the distributed lessons learned. Recommended actions from the originating site are transmitted without tailoring to Hanford organizations, policies, and processes. Corrective actions listed in PFP internal lessons learned are typically a citation of completed actions rather than expected actions to be taken and are not clear in addressing specific recurrence controls.

- Processes and practices related to lessons learned do not provide assurance that lessons learned are consistently and appropriately identified, evaluated and incorporated into work control and training documents. For example, the PFP procedure for managing lessons learned specifies that managers and team leaders determine whether actions are required but does not have an action step to implement or ensure implementation of required actions.

- FHI and PFP lessons-learned coordinators' personal databases are not being consistently and rigorously maintained. For example, only 4 of 56 items in the company-level database indicated a review by a subject matter expert.

- Although the assessments performed by the FHI lessons-learned coordinator identified numerous weaknesses in processes and performance, many similar to those discussed in this OA report, there is no indication that any corrective actions have been taken or that the items have been screened by the FHI corrective action management process. PFP has not conducted any self-assessment of their lessons-learned program.

A number of reviews are being performed and actions taken to address process and performance weaknesses and deficiencies for management assessment, FHI independent assessment, and corrective action management. Recent reorganizations, personnel changes, and program reviews reflect attempts by FHI management to address these concerns. However, no overall formal plans or documented paths forward exist at this time to provide confidence in timely and effective resolution.

Trend Analysis and Performance Indicators

The FHI Offices of Independent Assessment and Quality Assurance conduct periodic reviews of assessment findings from all sources to identify cross-cutting issues and adverse trends. The FHI Office of Independent Assessment also conducts performance analysis of integrated data. However, these processes are not consistently performed, and the Feedback and Improvement Quality Council does not appear to be an effective tool in driving performance improvement. The council has not met since September 2001, and the charter for the council is still in draft form. Potentially significant issues regarding unreviewed safety questions, procedure compliance, and lock and tag usage have been discussed and actions specified and tracked in meeting minutes. However, not all actions have been completed, actions often do not have due dates, actions are dropped off succeeding minutes without explanation, and issues are presented without sufficient analysis of data.

Performance indicators are developed and issued periodically by many FHI organizations at the company and project or functional area level. The FHI Performance Indicator Process describes general requirements and expectations for the development and distribution of performance indicators. Performance indicators are developed by Quality Assurance for CAMS data, by the radiation protection organization, and ES&H for accidents and employee concerns in accordance with a Hanford management directive.

Employee Concerns

The FHI employee concerns program, while not utilized extensively by PFP personnel, provides a structured, independent vehicle for FHI employees to seek and obtain resolution of safety concerns, with anonymity if desired. Sixteen concerns from PFP were received in FY 2000 and ten in FY 2001; approximately six related to safety. The availability of the program is well communicated, the process is governed by a formal procedure, and records are maintained of all concerns and their resolution. Trending and analysis of concern data are conducted periodically, and results are provided verbally and graphically to senior management. However, the periodic analysis of program data is not defined in procedures, and the analysis results and needed corrective actions are not formally documented. The FHI employee concerns procedure and desk instruction do not address the use of the formal CAMS process, and corrective actions are addressed and tracked using an internal employee concerns tracking system as specified in the desk instruction. Employee concerns staff are not trained in FHI corrective action management processes.

PFP Zero Accident Council

The PFP Zero Accident Council, a subset of the FHI President's Zero Accident Council, provides a forum for communicating safety concerns and initiatives and management expectations between representatives of all workforce units and project managers. The PFP council consists of representatives from various PFP work groups and management (approximately 20 total) who have been meeting twice a month. The council is detailed in a formal charter, and meeting minutes are kept and are posted on the PFP intranet. The council administers a key worker feedback element consisting of a number of logbooks located in various buildings/ locations where individuals can document safety concerns with pursuit of resolution, follow-up, tracking, and feedback by a council volunteer as monitored by the full council. Although the records were sometimes cryptic or incomplete, workers appear to use the process frequently, indicating overall satisfaction with the process. Active use of this approach likely minimizes the number of employee concerns that are reported through the formal FHI employee concerns program. The council is currently in a state of transition, with a goal of resolving concerns at a lower level and more direct involvement of the workers.

PFP Activity-Level Feedback and Improvement

The FHI job hazards analysis procedure requires a post-job review for high-risk work activities, recommends one for medium-risk tasks, and makes a post-job review optional for work categorized as low risk. However, the assignment of risk is solely based on radiological considerations, and only a very few work tasks are rated high risk at PFP. In November 2001, a "Post-Job Review" form was added to the work control process, and a form has been included in every work package. However, the use of this new form has not yet been incorporated into site or project procedures. Before November, a signature was required acknowledging consideration of a post-job review. According to the PFP Work Control Center, the "Post-Job Review" form has been completed for only about 25 percent of work tasks, and the main reason for completing the review is to document the reasons for delayed or stopped work, not for process improvements. Formal worker feedback in the form of post-job reviews has not been consistently or effectively used at PFP to improve safety performance.

Finding: PFP feedback mechanisms are not fully effective in identifying safety management deficiencies, and FHI and PFP issues management processes have not been effective in evaluating and resolving deficiencies in a timely manner or in preventing recurrence.

D.3 Conclusions

RL has established and executed, and is continuously improving, processes for monitoring and assessing contractor ES&H/ISM performance and provides incentives for improving safety performance. The ongoing development and implementation of RIMS provides structured, rigorous, standards-based management systems and processes for oversight, self-assessment, and performance improvement by RL and its contractors. RL is effectively using the annual performance fee evaluation process to establish specific ES&H/ISM performance expectations, evaluate performance against defined criteria, and identify opportunities for improvement in contractor performance. Improvements are needed in documenting and communicating the results of FR routine monitoring, ensuring accountability for contractor performance of self-assessment and issue management, and establishing an effective process for evaluating and tracking RL self-assessment findings.

FHI and PFP have numerous feedback and improvement mechanisms in place. The Zero Accident Council and employee concerns programs provide avenues for workers to express and obtain resolution of safety concerns. Assessments are made, deficiencies and performance issues are identified and evaluated, and corrective actions are taken. Lessons learned are reviewed, developed, and disseminated. However, weaknesses in FHI assessment, corrective action management, and lessons-learned programs and their implementation have hindered self-identification, rigorous evaluation, and effective recurrence control of ES&H deficiencies. At the facility and activity level, self-assessments do not reliably and consistently self-identify deficiencies. The lessons-learned program does not provide assurance that applicable lessons learned are consistently identified, communicated, and implemented into work documents. Accountability for correcting longstanding and/or recurring program and performance weaknesses has been lacking.

D.4 Rating

RL and FHI have numerous systems for identifying deficiencies and providing feedback to management. However, some key feedback systems have weaknesses and are not consistently effective in identifying and resolving deficiencies and preventing recurrences. As a result, a rating of NEEDS IMPROVEMENT is assigned.

D.5 Opportunities for Improvement

This OA review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible EM, RL, and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic objectives.

Richland Operations Office

1. **Enhance RL processes for monitoring contractor performance and holding contractors accountable.**

   - Improve the formality in communicating day-to-day FR monitoring activities and observations to the contractor and ensuring that issues are captured by the contractor's corrective action management system as required by contractor procedures.

   - Conduct periodic formal assessments of the overall effectiveness of the contractor's self-assessment program for each project and collectively for FHI.

2. **Clarify and strengthen RL management systems for self-assessments and performance improvement.**

   - Provide more detail in RIMS procedures on the required processes for evaluating and tracking self-identified issues.

   - Ensure that program and performance deficiencies are evaluated and resolved consistently, regardless of the source or subject area.

   - Ensure that, if multiple issues management processes are employed, data is communicated in formats that are suitable for analysis and trending and that clearly communicate overall performance to management.

Fluor Hanford

1. **Strengthen feedback and improvement processes to enhance the self-identification of performance deficiencies and effective resolution of issues.**

   - Provide increased management attention to the conduct and documentation of self-assessments at PFP. Consider elevating approval authority for management assessments to a higher level of management or a single management system specialist.

   - Provide mentoring and training in assessment techniques to PFP staff who conduct management assessments.

   - Provide formal instructions to address the apparent conflict between the new PFP management assessment focus identifying programmatic issues and causal factors and the current compliance-based CAMS process to ensure that such issues are effectively resolved.

   - Increase program owners' oversight of project implementation of management assessment and corrective action management. Senior FHI management should ensure that subordinate managers are held accountable for effective implementation of feedback and improvement programs and processes.

   - Clarify and strengthen the performance data analysis function in Safety and Mission Assurance.

   - Formalize and strengthen the role and performance of the Feedback and Improvement Quality Council in focusing senior management attention on significant safety performance issues.

   - Expand the use of formal post-job reviews. Encourage and facilitate written worker feedback for all work packages.

2. **Enhance the processes for tracking and resolving identified deficiencies.**

   - Enhance the CAMS process or develop alternative mechanisms to ensure that performance issues are effectively evaluated and resolved in addition to compliance issues.

   - Establish a formal mechanism for documenting and initiating the CAMS process for deficiencies and issues that are identified outside the structure of a formal assessment or review.

- Formalize the actual process used to address identified deficiencies (which often occurs before a source document is submitted for DEG review) to provide documentation of assigned responsibility, causal determination, and development and implementation of corrective actions and recurrence controls.

- Evaluate the adequacy of the structure and application of the CAMS risk ranking process to ensure that appropriate attention is applied to programmatic and administrative issues could significantly impact safety.

- Increase the level of rigor and senior management attention to ensuring that deficiencies at PFP are resolved in a timely manner and that actions are verified as effective in addressing the specific issue and in preventing recurrence.

- Formalize lessons-learned processes to provide documentation of applicability reviews, corrective/preventive action determinations, and actions taken.

APPENDIX E
CORE FUNCTION IMPLEMENTATION (CORE FUNCTIONS 1-4)

E.1 Introduction

The U.S. Department of Energy (DOE) Office of Independent Oversight and Performance Assurance (OA) evaluation of work planning and control and implementation of the first four core functions of integrated safety management (ISM) at the Plutonium Finishing Plant (PFP) focused on safety performance during work activities across several Fluor Hanford, Incorporated (FHI) operations. Examples of observed activities included glovebox operations, bagin and bagout of materials, normal and abnormal facility operations, equipment preventive and corrective maintenance, plant modification work, and construction. In addition, work control systems and their implementation were reviewed. Procedures and policies, such as stop-work policies, were evaluated, and hazard analysis and control systems were examined. This approach enabled OA to evaluate differing processes across the PFP.

E.2 Status and Results

E.2.1 Core Function #1 - Define the Scope of Work

Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.

The scope of projects within the nuclear material stabilization program are well defined, with clearly identified milestones and performance expectations. Plutonium stabilization efforts at PFP have been divided into several separate projects. The solution stabilization project is responsible for treating solutions stored from past processes. For each type of plutonium-bearing solution at PFP, FHI has identified a treatment process. The thermal stabilization and polycubes project is responsible for thermally treating all the metals, oxides, and precipitates within the plant. The residues project has identified all the types of residues within the building and has a planned path forward for repackaging and disposal of the residues. Each of these projects has clearly identified milestones for completion, and each of the project managers has established daily production goals in order to meet the necessary project milestones.

Stabilization processes are clearly defined, with involvement by experts from the DOE national laboratories to ensure that final products are suitable for long-term storage or disposal. Each material in the plant has been characterized, and necessary processes to stabilize those materials have been defined. For chemical processes, chemical engineers and scientists, with support from the national laboratories, have been intimately involved in defining the necessary chemical flowsheets and processes. Experts from the national laboratories are also involved in developing and modifying assay techniques as necessary to ensure accurate characterization and quantification of the stabilized materials. For waste materials, waste acceptance processes have been certified by the Waste Isolation Pilot Plant.

The PFP director has established a system of daily meetings to obtain briefings from each project manager regarding the previous day's activities, achievements against established goals, and current priorities. This forum is used to coordinate between projects where necessary, establish priorities, and ensure that identified problems are appropriately addressed. Each of the project managers then conducts a daily briefing for his/her project personnel. This system allows the managers to readjust expectations and priorities as necessary on a continuing basis and keeps managers fully informed.

Projects are prioritized with emphasis on stabilizing and removing the highest-risk material first. Plutonium solutions, as the most hazardous form of plutonium currently in the facility, are receiving the highest priority for resources within the plant. Personnel and resources are all directed as necessary to complete the solutions stabilization. The next priority is the thermal stabilization efforts, which is appropriate because this portion of the process supports the solutions stabilization efforts, and because the materials being treated pose higher hazards until they have been completely stabilized and packaged. Lower-priority work is based on the lower risk related to the material being processed in the residue project. Overall, the prioritization efforts are consistent with the goal of achieving the maximum near-term risk reduction.

The scope of work packages and operations procedures is clearly defined. The review of numerous work packages revealed that careful attention had been taken to ensure that the information included in the scope of the work was clear and concise. The operations procedures that were reviewed by the OA team contained well written descriptions defining the scope of the procedure and satisfied the requirements defined in the PFP Writer's Guide.

Pre-planning walkdowns for maintenance work are effectively used to correctly identify the scope of work and associated hazards. PFP has established a job walkdown policy that is more rigorous than the FHI policy in that it requires a walkdown of all jobs involving the development of a new job hazards analysis, regardless of risk. Furthermore, walkdowns are performed by a field planning team, which includes the assigned Field Work Supervisor (or Person in Charge), workers, and subject matter experts. PFP planning walkdowns are generally thorough and well attended. For example, the walkdown of the hydrogen peroxide line in Room 264, in preparation for draining the line, required a walkdown of all segments of the affected system and was well-attended by work planners, PFP engineering, workers, and subject matter experts.

Calciner at PFP

Hazard categorization for radiological work has clearly defined thresholds for radiation and contamination that trigger more-detailed analysis as the hazard increases. The radiological work planning and as-low-as-reasonably-achievable (ALARA) program requires the completion of a radiological work screening form for all work activities that might involve radiation hazards. Radiological engineers complete the form in conjunction with the job hazards analysis. A series of yes-and-no questions related to the expected radiation and contamination levels during performance of the work determines how the work is categorized.

Risk categorization of PFP work activities does not clearly address non-radiological hazards and the complexity of the work. Most work performed at PFP has physical and chemical hazards as well as radiological hazards. The Job Hazard Analysis procedure establishes the minimum requirements for the work planning process relative to the risk and complexity of the work operation or task. In this procedure, work planning requirements for defining the work, analyzing the hazards, performing work within controls, and feedback and improvement depend on whether the job is classified as a low, medium, or high-risk task. Low-risk tasks have few requirements with respect to developing work instructions, written job hazards analyses, pre-job briefings, and post-job reviews. Medium and high-risk work requires significantly more rigor with respect to work planning. There is no PFP process for systematically evaluating identified physical or chemical hazards to determine the risk for non-radiological hazards. Although the FHI Job Hazard Analysis procedure and automated job hazards analysis (AJHA) program provide some guidance in assessing non-radiological risk, the guidance is insufficient to designate a risk category for most physical and chemical hazards at PFP. Furthermore, planners do not routinely use the guidance when planning work. Most work at PFP is categorized as low risk based on the radiological hazard, although the work may involve work at elevated heights, hazardous chemicals, and energized equipment.

Similarly, neither the FHI Job Hazard Analysis procedure nor the PFP Job Control System procedure provides sufficient guidance for evaluating the complexity of a work task to determine whether the complexity of the work could result in increased risk to the worker. For example, a recent work activity to install thermo-gravimetric analyzers was ranked as low risk and simple in complexity, although the project required multiple craft, several AJHAs, and a mockup to ensure that equipment was installed in accordance with the design. According to the guidance in the FHI Job Hazard Analysis procedure, this activity should have been categorized as a complex task and required additional work process controls.

Overall, PFP has a good framework in place for defining the scope of work, and most processes are effectively implemented. However, risk categorization processes do not fully address non-radiological hazards or the complexity of the work.

E.2.2 Core Function #2 - Analyze the Hazards

Hazards associated with the work are identified, analyzed, and categorized.

FHI has a DOE-approved safety analysis report that, although it has not been upgraded to the requirements of DOE Order 5480.23 (superseded by issuance of 10 CFR 830), was determined to be adequate to cover cleanout and stabilization activities. Several new addenda have been prepared to cover new processes and activities. DOE also reviews and approves these addenda. FHI has procedures, processes, and guidance for maintaining the existing safety analysis that meet the requirements of the new regulation.

The unreviewed safety question (USQ) process is not being implemented as described in FHI and PFP procedures. The USQ procedure for screening and evaluation is not being followed in cases where questions arise about the adequacy of the safety basis. While USQ screenings and evaluations are being performed when required by the facility modification process, they are not always performed for new information or questions not previously analyzed. Furthermore, USQ screenings are not always correctly performed. USQ screening is permitted, by 10 CFR 830, to reduce the administrative burden associated with changes that are clearly administrative in nature. If more detailed analysis is required, that analysis is required to be performed and documented in a USQ evaluation. At PFP, screeners are performing the USQ evaluation as part of the screening, rather than the evaluation, process. Several engineering change notices (ECNs) reviewed by the OA team with their attendant USQ review documentation had the first screening question answered incorrectly. In the facility procedures for Unreviewed Safety Question Process and Unreviewed Safety Question Process Guidance, the first screening question is "Does the proposed activity or occurrence represent a change to the facility or procedures as described in the (documented) Safety Bases (safety analysis)?" For the ECNs of concern, the reviewers indicated that the change did not impact the authorization basis but did not adequately address the question about "changes to the facility." These "no" answers allowed the changes to be made without USQ determinations. If the screening question had been answered correctly, the answers would have been "yes," and USQ determinations would have been performed. There is a perception among reviewers that the phrase in the screening question, "as described in the Safety Bases," applies only to safety-class or safety-significant structures, systems, and components so described. The USQ procedures apply a much broader criteria, in that evaluations should be performed on any aspect of the facility "described" in the Safety Basis, not simply safety-related or safety-significant structures, systems, and components.

Potential inadequacies of the safety analysis (PISA) are not always identified and reported as such. The facility procedure allows time for management to make a reasonable determination that a PISA exists. The FHI guidance provides an example that a knowledgeable individual can "demonstrate" that the condition or information is covered by the existing analysis. No further guidance is provided defining or clarifying requirements to demonstrate the condition is adequately analyzed. In one case observed by the team, it was "demonstrated" to facility management that a condition was analyzed by a verbal statement from the responsible engineer that he had made an assumption in the accident analysis. That assumption was not documented, and could not have been verified or independently reviewed during the safety analysis report approval process. Consequently, the condition should have been evaluated, using the USQ process, as a PISA. After extended discussions regarding this assumption, as well as others, the question was eventually screened, and a USQ evaluation was being prepared.

Finding: PFP is not consistently implementing the USQ process as described in FHI and PFP procedures.

Discrete work activities are evaluated using a computer-based AJHA. The AJHA process has developed into a significant tool for workers, work planners, and line managers to systematically identify work activity hazards, identify the appropriate controls, and ensure that workers and subject matter experts are appropriately involved in analyzing job hazards. For medium and high-risk tasks, the AJHA is the primary tool used to identify, analyze, and control activity-level hazards at the Hanford Site. At PFP, the AJHA is also the primary job hazards analysis tool for low-risk tasks. AJHAs are completed by work planning teams, requiring the involvement of subject matter experts and workers early in the planning stage. A user-friendly system of navigation screens enables the work planning team to define the work scope, identify hazards, specify controls, complete forms and permits, and print reports. A full-time AJHA administrator supports the AJHA system. Continual feedback and improvement to the AJHA system is achieved by a sitewide AJHA users group consisting of workers, subject matter experts, and work planners.

PFP uses a graded approach to radiological risk screening where high-hazard jobs receive a thorough and detailed ALARA review, which must be signed off by senior facility management. Through the use of the radiological risk screening process, radiological work is classified by hazard potential, requiring more detailed and thorough review and approvals as the risk increases from low to medium and finally high risk. All high-risk work must receive a detailed and documented ALARA review, which is presented to the Enhanced ALARA Committee for review and comment. Work cannot be initiated until approval is received from the committee, which is chaired by the PFP Facility Manager.

Although the AJHA process is an effective hazards assessment tool, in some cases it was not effectively implemented at PFP, resulting in some hazards not being adequately identified, screened, or analyzed. The OA team observed a number of maintenance work activities in which some hazards were not identified on the AJHA form (e.g., noise, chemicals, electrical hazards, and working at elevated heights). In most cases, when the AJHA did not identify the hazard, controls were not specified in the AJHA for mitigating the hazard. For example, the noise hazard near the 26-inch vacuum pumps in Room 308, when measured by the OA team, ranged from 92 dBA to 96 dBA. The area was not posted as a high noise area, nor was the noise hazard identified in several of the work packages and surveillance procedures associated with the area. Some supervisors were unaware that the noise levels in the area exceeded acceptable levels established by FHI. During a four-hour repair of one 26-inch vacuum pump, maintenance workers could unknowingly be overexposed to noise at levels beyond the regulatory limit of 85 dBA (time-weighted average).

In a number of cases, the hazards identified in AJHAs were not incorporated into the associated procedure. For example, the PFP procedure for "Dry Air and Instrument Air System Operation" did not include the standard industrial hazards (noise and working at elevated heights) identified in the AJHA prepared for this activity. The PFP procedure on writing procedures provides little guidance on how to incorporate safety hazards and controls from an AJHA into technical procedures.

In some cases, potential hazards were not adequately analyzed through the AJHA process. For example, the AJHA for a non-asbestos duct insulation repair job addressed only the application of a cement patch and not the mixing of the cement, which, according to the cement material safety data sheet, was the most hazardous aspect of the activity. For a floor repair job in the 234-5Z Building, the AJHA appropriately identified the potential for a blind penetration when attaching a repair plate into a thin corrugated metal floor. However, the penetration hazard was not adequately analyzed or documented on the AJHA to justify why the penetration would not result in a risk to workers. PFP construction subcontract work observed by the OA team involved concrete dust and noise hazards. Although the hazards were identified in the construction work package, the concrete dust had not been analyzed for silica, nor had the sound levels been monitored to ensure that the protective equipment provided to workers was adequate. If, for example, the silica hazards were found to be in excess of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit, the low-risk construction activity would need to be reclassified as a medium-risk work activity according to the FHI Job Hazard Analysis procedure.

In some cases, PFP has adopted the use of a "standing" AJHA for repetitive work tasks performed in different plant locations. Formal instructions for the use of AJHAs are not sufficient to ensure that the standing AJHA process is being appropriately and consistently implemented at PFP. Although many PFP work packages utilize a standing AJHA for the identification of hazards, guidance on the use and limitations of the standing AJHA is minimal, consisting of a few sentences in the FHI Job Hazard Analysis procedure, AJHA pull-down menus, and the PFP Job Control System procedure. Collectively, these instructions do not address a number of the PFP standing AJHA practices or "rules of thumb." For example, PFP maintenance excludes the documentation of some work environment hazards on a standing

AJHA if the task is being performed plantwide and/or the hazards are posted in the work areas. This practice is not documented and appears to be inconsistent with the Job Hazard Analysis procedure. There is no consistent policy for communication of information on hazards and controls on a standing AJHA, which may be used repetitively for years, without workers reading the standing AJHA on a prescribed frequency or being briefed before starting work. There is minimal guidance on limiting the use of a standing AJHA for potentially significant physical and chemical hazards. For example, a standing AJHA used for a recurring low-risk preventive maintenance task on heating, ventilation, and air conditioning (HVAC) filters identifies beryllium as a potential hazard. However, no beryllium controls are established, and the location or nature of the beryllium hazard is not explained. Similarly, there is no guidance in standing AJHAs concerning its maximum duration, the review and approval process, walkdowns, use during pre-job briefings, required reading, and revisions and modifications. In one case, the standing AJHA for a process vacuum system operation procedure had been listed as "expired," although the procedure was in effect.

Finding: The inconsistent implementation of the AJHA process at PFP has resulted in some hazards not being identified, screened, or analyzed.

PFP has not established a comprehensive (non-radiological) exposure assessment strategy in accordance with the guidelines of the DOE Standard 6005-2001, "Industrial Hygiene Practices." Industrial hygiene exposure assessments at PFP are conducted for potentially hazardous work operations and activities, and in response to concerns from employees and/or PFP management. Although these industrial hygiene evaluations are of critical importance to supporting PFP operations, DOE Order 440.1A and the related DOE technical standard recommend supplementing these exposure assessments with assessments where no significant exposures are expected or determined. The latter is important since new exposure effects may be identified, and retrospective health concerns can only be addressed by documented assessment records. Such routine assessments are not typically conducted at PFP. Furthermore, PFP noise exposure assessments are based on area sound-level surveys and do not incorporate personal sampling for noise (i.e., noise dosimetry). Much of the PFP workforce is highly mobile (e.g., maintenance workers) and performs work throughout the plant where there are significant variations in sound levels. For these workers, OSHA requires that the employer use representative personal sampling to comply with the requirements of the Occupational Noise Standard, 29 CFR 1910.95. There are no records of any noise dosimetry having been performed at PFP.

The radiological work screening form is normally used in conjunction with the AJHA process to document the level of radiological hazards associated with a particular job and apply the appropriate radiological hazard analysis and planning. A radiation work permit (RWP) is then normally developed or applied to the work as the primary control mechanism. In many cases, a single RWP is used to govern multiple work activities or tasks. In those cases, aspects of multiple work activities covered in a single RWP have not always received the proper level of radiological risk screening and hazards analysis consistent with PFP radiological work planning requirements. Some tasks are not clearly identified in the RWP or supporting technical procedures, which often do not include a reference to required radiological steps. RWPs have been changed without analysis of all allowed tasks to ensure that the hazards analysis is still appropriate. As a result, some

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work activities that meet the criterion for a higher risk category may be performed as low risk without a corresponding ALARA review as called for by the radiological work planning process. For example, a cutter wheel replacement on the bagless transfer system was defined and screened as low risk because, according to the original RWP, the activity was to be allowed only when contamination levels were below 2000 disintegrations per minute per 100 square centimeters (dpm/100 cm^2). The technical procedure made no reference to any radiological requirements or steps. The RWP also applied to other work evolutions involving the bagless transfer system, and, based on past findings of contamination in the bagless transfer system enclosure, the RWP was revised to allow for decontamination of levels exceeding 2000 dpm/100 cm^2 up to 20,000 dpm/100 cm^2. In accordance with the PFP procedure, these radiological conditions would place the decontamination task in the medium-risk category. No risk screening or ALARA review for the bagless transfer system decontamination was ever performed. In a related concern, casualty responders and contaminated individuals could encounter resuspension of contamination when responding and reacting to a personal protective equipment (PPE) contamination event, but these contamination hazards have not been analyzed or addressed through the AJHA, radiological risk screening, or RWP processes.

Overall, when rigorously implemented, the AJHA is an effective tool for analyzing hazards. The hazards analysis process for medium and high-risk tasks is well defined. Job walkdowns are well-attended, thorough, and tailored to the risk associated with the work. However, some hazards are not adequately identified, screened, analyzed, or documented. Furthermore, some hazards analysis processes are not comprehensive (e.g., industrial hygiene baseline exposure assessment) or have not been implemented in some cases (e.g., USQ screening).

E.2.3 Core Function #3 - Develop and Implement Hazard Controls

Safety standards and requirements are identified and agreed upon, controls to prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.

PFP has a clear written policy on the use of procedures as delineated in the "PFP Technical Procedure Use Policy." The policy on procedures emphasizes that procedure compliance is mandatory at PFP. It also clearly defines the different types of procedures at PFP (i.e., General, Routine, and Step-by-Step) and the unique user requirements for each. This policy is extremely important because procedures are used for all activities within the facility. Most of the procedures are maintained electronically, with an expectation that the user verify the online version to ensure that the correct version is being used. This practice of verifying the correct version of the procedure prior to use was observed to be consistently applied during the review.

The OA team attended a number of pre-job briefings for PFP maintenance, the PFP Analytical Laboratory, and production tasks and found these briefings to be thorough, informative, well attended, and interactive. Although the FHI Job Hazard Analysis procedure does not require a pre-job briefing for low-risk work, PFP typically conducts a pre-job briefing for most low-risk work, with the content and rigor of the pre-job briefing being consistent with the complexity of the work.

The AJHA process is an effective means of selecting controls associated with identified hazards. The computer-based AJHA process provides a user-friendly mechanism for selecting and linking hazard controls to hazards identified during work planning. During work planning, once the planning team identifies hazards on the AJHA hazard tree, the AJHA automatically populates mandatory controls and possible additional controls. Mandatory controls based on requirements associated with the identified hazards are automatically assigned to the activity and cannot be removed. Based on the planning team's approach to controlling the hazard, additional controls can be selected. After the controls are selected, a list of the controls is automatically compiled into the "Controls" section of the AJHA, including provisions for additional detail such as the type of respirator required for potential lead exposures. As the controls are populated by the AJHA, required forms and permits are also triggered from the hazard tree and then populated in the "Forms and Permits" screen. The AJHA system allows forms and permits to be completed and reviewed on line and included in the work package.

The facility has made good use of engineering controls to reduce gamma radiation exposures to workers. Significant gamma exposure rates exist in many processing and storage locations. A variety of engineering controls were evident in many of these locations and have been noted to be effective in reducing external exposures to gamma radiation. Controls include the use of lead foil shielding, temporary lead blankets, process modifications, and use of pewter rather than tin containers. Significant neutron exposures are also evident in portions of the facility. Engineering controls to reduce neutron exposures have been more challenging, but there has been some success in utilizing various types of shielding to reduce neutron exposures in some areas. Continuing efforts are under way to strengthen this initiative.

Postings for criticality safety at PFP are adequate in clarity and usefulness. Each posting has a purple border that readily identifies it as a posting for criticality safety. With few exceptions, limits are easy to comprehend and follow. The OA team observed no unsafe or non-conservative limits. Fissile material handlers who were interviewed or observed while working demonstrated a good understanding of the criticality limits applicable to their work areas. PFP personnel indicated that they comply with these limits verbatim and ask for clarification or other assistance if they have any questions whatsoever. PFP personnel are working to improve criticality safety limits, including efforts to reconsider the use of overlapping postings and criticality specifications, clarify the wording of some limits, and reevaluate current limits for storage containers. The lead criticality safety representative plans to issue modifications in March 2002 in conjunction with the annual fissile material handler refresher course. This rollout strategy is designed to help ensure that changes will be well understood and correctly implemented.

The reliance on handheld and outdated radiological monitoring equipment at PFP affects the ability of the facility to consistently meet DOE requirements and guidance (as defined in various DOE technical standards) concerning contamination control and continuous air monitoring coverage. For personnel contamination, PFP is required to be able to detect 500 dpm/100 cm^2. Inconsistent use of handheld contamination control equipment and methods at stepoff pads and the radiological buffer area exit at PFP do not provide sufficient assurance that personnel contamination above this level will be consistently detected before egress offsite. Under acceptable scanning conditions, including a scan rate of 2 inches per second and ¼ inch distance, the minimum detectable activity for the instruments in use is approximately 500 dpm/100 cm^2. A lower minimum detectable activity would require slower scan speeds and/or smaller distance. Since a consistent geometry and scan rate cannot be assured given the extensive self-frisking activities at the site, it is to be expected that in some cases, alpha contamination of 500 dpm/100 cm^2 or more may not be detected.

Most continuous air monitors (CAMs) at PFP are very old, are subject to electronic instabilities, and do not discriminate effectively between transuranic activity and natural radon daughter activity. DOE technical standards and FHI procedures recommend a minimum detectable level setting of 8 derived air concentration (DAC)-hours. However, the minimum detectable levels for PFP CAMs are set at the 30 DAC-hour alarm level to avoid spurious alarms. Even at the 30 DAC-hour alarm setpoints, spurious CAM alarms were noted frequently during the assessment. Each alarm must be investigated and evaluated, resulting in significant expenditure and reallocation of resources and delay or cancellation of ongoing work as part of the response. These spurious alarms have become somewhat commonplace, potentially desensitizing personnel to the potential hazards of a real event. The need for upgraded CAMs is recognized, and some (but not all) facility CAMs have been replaced or are being scheduled for replacement with new Canberra CAMs.

Finding: The reliance on handheld and outdated radiological monitoring equipment at PFP affects the facility's ability to consistently meet DOE requirements and guidance for contamination control and continuous air monitoring coverage.

The scope and span of control for many RWPs are too broad to consistently determine specific requirements and ascertain radiological conditions to be expected on discrete job evolutions. RWPs are not always developed in a manner that ensures a well-defined, manageable span of control. A number of PFP RWPs are either "continuing" RWPs or are for routine, broad-scope work. The RWP for low-risk radiological work with stable and well characterized radiological conditions had been used nearly 8000 times in the three-month period from October 1 through December 31, 2001. A small percentage of RWPs have traditionally accounted for a large portion of the total RWP use at PFP, indicating that much of the work is not evaluated for task-specific radiological conditions. Some efforts have been made to reduce this trend and prepare more specific RWPs, but additional attention is needed.

Under the current RWP system, some controls are not specifically tailored to the work being performed. The RWP used to control decontamination efforts in the bagless transfer system enclosure prescribed that workers should wear two pairs of surgeons gloves, with an option for leather gloves on the outside. However, the decontamination of the bagless transfer system enclosure presented a unique, task-specific hazard because the contamination was noted to be primarily from metal shavings; the shavings could present a puncture hazard, for which leather gloves may need to be mandatory. It is also often difficult to ascertain specific requirements for discrete job evolutions or anticipated radiological conditions from many RWPs. For example, radiation control technician (RCT) coverage requirements are often denoted as "intermittent," with special instructions intended to further clarify when coverage is required. However, the special instructions do not always list all cases when RCT coverage is required, such as cutter wheel replacement. Similarly, the section of the RWP that deals with expected radiological conditions is not tailored to the anticipated work conditions. Since Contaminated Areas are often posted for potential rather than actual contamination, much of the work under this RWP is actually in relatively "clean" areas where a finding of contamination or high dose rates would be unexpected. Similarly, for workers reviewing the RWP, it is difficult to ascertain the expected radiation and contamination level in work areas when they are as broad as the posting definitions.

Routine plutonium detection technologies (annual bioassays) for internal monitoring have limitations in that small intakes of plutonium can lead to doses that are impossible to detect at the required regulatory monitoring levels of 100 mrem (per 10 CFR 835). Compensatory measures and the general DOE expectation and techniques for assuring that routine internal exposures are detected at the 100 mrem committed effective dose equivalent (CEDE) dose levels are outlined and discussed in DOE Standard, Internal Dosimetry (DOE-STD-1121-98, December 1999), and DOE Standard, Guide of Good Practices for Occupational Radiological Protection in Plutonium Facilities (DOE-STD-1128-98, June 1998). Those techniques generally involve the use of workplace indicators to identify conditions that might lead to worker exposures, and to identify when workers should be monitored by the use of supplemental special bioassay techniques. Consistent with good industrial practices, FHI and PFP have mechanisms designed to detect internal intakes at the required levels through a series of routine workplace indicators. The FHI and PFP procedures recognize the DOE requirements and guidance and have indicators that are generally consistent with the provisions outlined in the guides. While some special bioassays have been performed for events at PFP, the OA team identified problems that may result in not capturing potential worker intakes from contamination events, and therefore the workers may not receive the appropriate evaluation, special bioassay, and internal dose evaluations.

One identified problem was that FHI and PFP procedures are not clear in that they do not specify the use of workplace indicators as indicators of 100 mrem potential exposure (normally triggering a requirement for special bioassay) and do not clearly delineate responsibility for making the decision. Consequently, bioassays are not always performed, and the justification for not performing them is not well documented when workplace indicators are exceeded, particularly for contamination events. For example, during the assessment, a PPE contamination event occurred in which levels of contamination on the protective clothing (sleeve) exceeded the workplace indicator level of 10,000 dpm. During this event, there was a potential for resuspension of contamination during taping and doffing at the scene. However, neither the contaminated individual nor the RCTs responding to the event wore respiratory protection. The DOE technical standards suggest special bioassay for these conditions to adequately determine dose, but FHI and PFP personnel decided that no special bioassay was necessary. The technical justification and basis for that decision and subsequently assigning "no dose" to the event were not clear. PFP Radiological Problem Report (RPR) records indicate other personnel contamination events where PPE contamination trigger levels have been exceeded with no resulting special bioassays. Aside from the RPR information, there is no formal mechanism for recording the rationale for special bioassay decisions for individual cases that have exceeded trigger levels, representing a potential liability to DOE and the contractor. Relatively few special bioassays have been performed in response to PPE contamination events at PFP, so there is insufficient historical data upon which to base such decisions.

Another identified problem is that not all workplace conditions that could lead to 100 mrem CEDE have been included in the site's workplace indicators. For example, FHI and PFP lack an indicator that considers the unplanned spread of contamination on accessible surfaces, consistent with the guidance in DOE STD-1121-98. Such circumstances exist at PFP, and the use of an indicator for these situations could help identify additional cases where the potential for unplanned intakes may need evaluation via special bioassay.

Finding: PFP lacks a documented rationale for not performing special bioassays for some contamination events that could reflect an intake resulting in 100 mrem or greater committed effective dose equivalent.

The PFP Personnel Contamination procedure provides incorrect direction and faulty procedural linkage to guide follow-up actions to a PPE contamination event including the stabilization and removal of contaminated PPE. The procedure advises radiological control personnel to follow a specific procedure for personnel decontamination after stabilizing the scene. However, that procedure explicitly states that it is not applicable to removal of contamination from clothing and refers to a procedure that no longer exists. A replacement procedure contains no guidance for removing contaminated protective clothing. Consequently, PFP casualty responders do not have the benefit of procedural guidance when attempting to fix contamination in place and remove contaminated PPE. Most importantly, the hazards associated with the possible resuspension of PPE contamination and the possible need for controls during this type of casualty response have not been formally addressed.

On some jobs, controls identified in the AJHA process are not adequately tailored to the job or the identified physical or chemical hazards. Although the AJHA process provides an effective means for identifying hazard controls, the team observed a number of PFP work packages in which the controls were not adequately tailored to the hazards. The Job Hazard Analysis procedure requires that all controls identified through the AJHA process be implemented. For example, the face protection control identified in the AJHA for a floor repair job was not implemented but may not have been required, because safety glasses with side shields had already been specified. Some Field Work Supervisors (FWSs) and Persons-In-Charge (PICs) misinterpreted the identification of controls on the AJHA to be voluntary. In other cases, the application of a selected control was not adequately described in the AJHA. For example, the requirement for leather gloves during the performance of a damper preventive maintenance task may have only been required during the installation of damper blockers, although the lack of descriptive information in the "Controls" Section of the AJHA implied that gloves were required for all work. Most frequently, controls specified in standing AJHAs are not sufficiently tailored to the work activity, either through the selection of the control or an explanation of the application of the control. For example, the standing AJHA for filter changeout, a recurring preventive maintenance activity, identifies numerous hazards and controls, most of which were not required for the observed work. In a number of cases, neither the pre-job review nor the standing AJHA was sufficiently tailored to explain which of the identified controls was pertinent to the current work.

For several work activities observed by the OA team, training requirements were not consistently verified prior to the start of work. The pre-job briefing checklist and the PFP "Person-in-Charge" procedure require that the PIC/FWS "verify training and qualifications" prior to initiating work. However, OA team members observed that, on several work activities, training and qualifications were not verified before the commencement of work. Furthermore, PFP management expectations for acceptable methods for verifying training and qualifications (e.g., training record review or verbal verification during pre-job briefings) are not adequately defined. Although integrated training matrices and training histories are available electronically for all PICs/FWSs, these systems are not directly linked to the AJHA process, thereby making training and qualification verification a tedious process that is not consistently implemented. Verification of training is further complicated by having multiple training courses that can satisfy a training requirement. For chemical hazards, for example, it is not clear to some PICs/FWSs whether Hanford General Employee Training, or other courses in hazard communication or hazardous waste operations, will satisfy the training required when working with chemicals. With the site's centralization of a number of craft services (e.g., sheet metal workers), some craft workers do not report to PFP line managers. Knowledge of their training and qualification status is less obvious to the PICs/FWSs, and verification of training and qualification before work starts is more critical. In some cases, workers had not kept their training current with FHI and OSHA training requirements. For example, most PFP workers who are routinely exposed to high noise and are registered in the FHI hearing conservation program have not completed their annual hearing protection training as required by the FHI Hearing Conservation procedure or 29 CFR 1910.95. A number of these workers were significantly delinquent in maintaining their annual hearing conservation training.

Overall, controls are established and implemented for recognized hazards, and engineered controls are used effectively in many instances to reduce exposure risks. However, some aspects of controls (e.g., required training) were difficult to verify and enforce, and some controls are not sufficiently tailored to the specific jobs. The reliance on handheld and outdated radiological monitoring equipment, broadly defined RWPs, and the lack of a documented rationale for performing special bioassays present some vulnerabilities to effective implementation of required radiological controls at PFP.

E.2.4 Core Function #4 - Perform Work Within Controls

Readiness is confirmed and work is performed safely.

Workers and line managers at PFP are aware of the radiological, chemical, and physical hazards encountered in routine and non-routine work activities. The PFP workforce is experienced and knowledgeable of the PFP plant, plant hazards, and the appropriate controls for eliminating or mitigating those hazards. Workers are empowered to stop work if an unsafe condition is identified, and have exercised their stop-work authority on a number of occasions.

Plant conditions were carefully verified before the shift managers authorized the start of work, as required for both operations and maintenance work. As part of the PFP Work Control process, a written approval must be obtained from the Shift Manager. No maintenance work was found to have commenced without this approval. On several occasions, when the shift mangers were given work packages to review and approve, they reviewed the details of the proposed work in relation to current plant conditions. If required, the necessary plant conditions were established (i.e., restrict fissile material movement, or ensure that the necessary valve, electrical, or ventilation lineup was established including using the lockout/tagout system) to allow approval of the work.

Conduct of radiological operations generally conformed with DOE and site requirements. Personnel at PFP demonstrated a respect for the material with which they work. Practices for doffing and donning anti-contamination clothing were strictly adhered to by all operators observed entering and exiting controlled areas. RWP-specified controls and special instructions were followed, such as frequent hand checks when working with potential contamination. Command and control responses to CAM alarms and related events, such as the spread of contamination, were effective. However, the OA team observed that personnel who were self-frisking at control points did not always exercise frisking techniques in accordance with the sensitivity of the monitoring instruments. A wide variation in self-frisking techniques was observed, including scanning much too

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fast, with only a small part of the probe, or too far from the surface to be effective. The lack of proper attention to detail in performance of self-frisking can result in inadequate contamination control and confinement. In addition, some RWP requirements were not consistently implemented. In some cases, RCTs were noted to rely on routine survey results rather than performing certain types of radiological measurements, such as contamination surveys and neutron measurements, during the performance of work. In the absence of these measurements at the time of the work, it is difficult to verify compliance with RWP suspension limits for these parameters.

Although operators are clearly aware of production goals and are included in an award-sharing program for meeting or exceeding project milestones, there were no indications that these incentives have translated into production pressures that would sacrifice safe work practices. Rather, they have led to an environment where workers are included in identifying ways to safely accomplish work more effectively. All workers contacted by the team were clearly aware of the need to perform the work correctly and safely in accordance with approved procedures. They did not feel any pressure by management to conduct work unsafely to accomplish the project goals. This view was echoed by the Hanford Atomic Metal Trades Council Union Safety Representative, who emphasized that workers have the right and responsibility to stop work when there are safety questions. Facility managers also demonstrated the willingness to stop or suspend activities in process areas when necessary to answer questions about safety.

Limitations on the availability of RCTs currently delay some work. RCT staffing deficiencies are recognized, and FHI has undertaken some initiatives to alleviate this problem through a recruiting strategy and an in-house training program. However, RCT training programs and processes for granting the necessary security clearances are time consuming. Shortages of RCTs continue to affect facility work planning and execution. While the OA team saw no examples of work being performed without appropriate RCT coverage, continued attention is needed to ensure that radiological safety is not degraded because of the shortage of RCTs.

Safety and health professionals are proactive in stopping and correcting unsafe work practices. The five-person PFP Safety and Health Team is actively involved in supporting field work teams in the planning of work, walkdowns, and the preparation and review of AJHAs. PFP safety engineers and industrial hygienists are experienced and knowledgeable of PFP facilities, work practices, and workers, and they are actively involved in identifying and resolving PFP safety and health issues.

Although FHI and PFP have clearly defined processes and procedures for controlling plant modifications, including a clear definition of modifications, those processes and procedures are not rigorously followed in all cases, particularly for repairs or minor modifications. In some cases, when repairs result in facility modifications, the work is not covered by the facility modification process and thus is not adequately reviewed. This weakness is particularly evident in two areas. Maintenance personnel were not sufficiently sensitive to the difference between a repair and a modification, particularly for what they believed to be simple repairs of non-safety-related structures, systems, and components. In some cases, such repairs resulted in modifications. The modification process as currently designed also includes temporary or permanent shielding. Contrary to the procedures, installation of temporary shielding, such as lead blankets, has not been treated as a plant modification and consequently, has not been controlled or analyzed for its impact on affected safety-related or safety-significant equipment (e.g., gloveboxes). One contributing factor is that the modification process does not distinguish between minor modifications and major modifications.

Finding: In some cases, modifications to facilities are incorrectly categorized as repairs, and the resultant work is not adequately reviewed or performed in accordance with the FHI/PFP facility modification program.

Procedure compliance has recently been an area of significant management focus, and improvements have been made. Despite this recent management attention, a few cases were identified where workers did not perform the procedure as written. Continued vigilance by managers and supervisors is warranted to ensure continued improvement.

Overall, work is performed within established controls, and workers understand the site hazards and the importance of strict procedural compliance. Conduct of operations was effective for radiological work, and workers indicated that they felt empowered to stop work if safety concerns arose. However, increased attention is needed to clarify expectations for performing facility modifications.

E.3 Conclusions

The basic foundation for a work control system that implements the core ISM functions is sound. Work control processes are in place at PFP to define the work, analyze the hazards, develop and implement controls, and perform work safely. The AJHA process is mature and serves as a useful tool in the identification and control of workplace hazards. Work is generally well defined, and pre-job briefings and job walkdowns are thorough and effective and appropriately involve line management, subject matter experts, and workers. Workers are involved in all aspects of the work planning process and have been empowered to identify and stop unsafe work. Injury and illness rates at PFP are lower than the DOE complex average, and the evaluation team identified only one unsafe work practice, which facility personnel promptly corrected.

However, in some cases, hazards analysis and control processes are not effectively implemented. Hazards for some maintenance, construction, and operations work activities are not adequately identified, screened, analyzed, or evaluated for risk to workers. In other cases, work control processes are not being implemented in accordance with FHI or PFP procedures (e.g., the USQ process), or current procedures do not provide sufficient guidance (e.g., modifications and standing AJHAs). The reliance on handheld and outdated radiological monitoring equipment, broadly defined RWPs, and the lack of a documented rationale for performing special bioassays present some vulnerabilities to effective implementation of required radiological controls at PFP.

E.4 Rating

The ratings of the core functions reflect the status of the reviewed elements of the PFP ISM program:

Core Function #1 – Define the Scope of Work .... FFECTIVE PERFORMANCE
Core Function #2 – Analyze the Hazards .... IMPROVEMENT NEEDED
Core Function #3 – Develop and Implement Hazard Controls .... FFECTIVE PERFORMANCE
Core Function #4 – Perform Work Within Controls .... EFFECTIVE PERFORMANCE

E.5 Opportunities for Improvement

This OA review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible EM, RL, and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic objectives.

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1. **Develop a risk categorization process for PFP work activities that evaluates the risk of physical and chemical hazards to workers, and the complexity of the job when determining a risk classification for the work (i.e., high, medium, or low).**

   - Expand upon the guidelines in the FHI Job Hazard Analysis procedure and develop PFP-specific criteria for categorizing risk from chemical and physical hazards, similar to the radiological screening criteria currently used at PFP to determine whether radiological risks are high, medium, or low.
   - Expand upon guidelines in the FHI Job Hazard Analysis procedure and develop PFP-specific criteria for categorizing PFP work activities as complex or simple.
   - Because 99 percent of the work activities at PFP are currently categorized as low risk and simple complexity, the graded approach to work control at PFP may not be having the desired effect. Consider developing a work risk ranking process that allows for greater degrees of risk categorization.

2. **Develop a PFP procedure for the standing AJHA process that clearly defines the use and limitations of the standing AJHA process at PFP.**

   - Expand and consolidate the existing FHI guidance on standing AJHAs into a standing AJHA procedure.
   - Incorporate, as a minimum, the following topics in the standing AJHA procedure: documentation of work area hazards on standing AJHAs; pre-job briefings and walkdowns; standing AJHA development, review, and approval; revising a standing AJHA; limitations and use of standing AJHA based on risk, complexity, or specific hazards (e.g., beryllium); and standing AJHA expiration periods.

3. **Establish an effective mechanism for verifying worker training and qualification requirements prior to commencement of work.**

   - Enhance the AJHA computer-based system to identify FHI training course numbers for training requirements specified as control measures in AJHAs.
   - Develop an interface between the FHI Integrated Training Database and the AJHA database so that worker training records can automatically be compared to training requirements defined in AJHAs.

4. **Perform and maintain a comprehensive industrial hygiene survey of PFP facilities as outlined in DOE-STD-6005-2001, "Industrial Hygiene Practices."**

   - Supplement "work activity based" exposure assessments with exposure assessments (e.g., chemical and noise) of routine work tasks to establish a facility exposure baseline.

   - Incorporate work group exposure assessments into the comprehensive industrial hygiene survey using the results of personnel sampling for chemicals and noise in selected work groups (e.g., painters and PFP laboratory workers).

   - Develop a strategy for performing periodic exposure assessments on work groups and in PFP plant areas based on risk.

5. **Increase the attention to detail when identifying, screening, and analyzing hazards at PFP.**

   - Ensure that hazards and controls identified in AJHAs are adequately tailored to the work activity.

   - Add more descriptive information to AJHAs to ensure that hazards are fully explained and that controls, and limitations of applicability, are described.

   - Verify that the scope of planned activities is enveloped in the AJHA hazards analysis.

   - When multiple work activities are covered by a single RWP, ensure that the level of hazards analysis and risk screening is consistent with PFP radiological work planning requirements.

   - Ensure that the hazards associated with the possible resuspension of PPE contamination during casualty response have been identified and documented.

6. **Increase emphasis on creating more-specific RWPs with controls and information specifically tailored to individual tasks and job locations.**

   - Provide better linkage between RWPs and work packages. Institute a requirement that technical procedures and work instructions include reference to all required radiological steps or surveys to better define when RCT coverage is required and what specific tasks are intended to be performed under the RWP.

   - Subdivide broad-scope RWPs into two or more discrete RWPs with more narrow and realistic numerical ranges on expected radiological conditions and suspension limits, ideally based on actual survey data or anticipated conditions.

   - Require that all work activities, including casualty response, be subjected to AJHA and radiological work screening processes so that all hazards, such as possible resuspension of contamination, are appropriately identified and mechanisms to control them are implemented.

7. **Pursue interim compensatory measures to address inconsistencies in workers' self-frisking techniques that could allow contamination to migrate off site.**

   - Increase targeted radiological surveillances to locate these deficiencies. Ensure that RPRs are prepared for incidences of poor self-frisking technique observed in the field. Institute graded disciplinary measures for repeat offenders.

   - Upgrade self-frisking qualification by providing a separate, more detailed, and more frequent self-frisking training module to PFP workers than is currently required under the biennial radiation worker training.

8. **Establish a clearly defined set of activities that constitute minor modifications for which the level of rigor could be reduced.**

   - Include provisions that clearly exempt specific types of routine minor modification, such as installation of whiteboards/chalkboards or hanging of signs or pictures, on non-safety-related walls.

   - Ensure that all personnel are sensitive to the definitions of modification and repair and the distinction between them (anything other than the exact same fit, form, and function is a modification).

- Review the existing plant modifications, especially temporary shielding, to ensure that past activities have not compromised the safety functions.

9. Reestablish the USQ screening process within the confines of procedures.

- Thoroughly review existing USQ-related procedures to detect any requirements or discussions that may be contrary to or unclear as to the requirement that all changes to the facility or procedures as described in the authorization basis be subjected to a full USQ evaluation. Revise these procedures to eliminate these discrepancies.

- Institute retraining for all personnel who perform screening, evaluation, review, and approval roles in the USQ processes.

- Clarify guidance to facility managers in FHI and PFP procedures regarding “determination” that a PISA exists.

APPENDIX F
ESSENTIAL SYSTEM FUNCTIONAL REVIEW

F.1 Introduction

The purpose of an essential systems functional review is to evaluate the functionality and operability of a facility's systems and subsystems essential to safe operation by performing a technically focused evaluation of a representative sample of one or more systems. The review criteria were similar to the criteria for the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2000-2 implementation plan reviews; however, this review by the U.S. Department of Energy (DOE) Office of Independent Oversight and Performance Assurance (OA) also included a review of selected portions of system design and the adequacy of the authorization basis. The systems selected for this review were the 2736-ZB building ventilation systems. The safety function of those systems is to prevent the release of radioactive materials by applying active and passive design features and associated procedures. The technical areas addressed included engineering and configuration management, maintenance, surveillance and testing, and operations. The review determined the effectiveness of the responsible organizations in these areas in establishing and maintaining the systems' ability to perform their safety functions. Primary elements of this assessment included interviews, review of applicable procedures and other documents, field inspections of system hardware, observation of facility activities, and review of the technical quality and procedural compliance of the organizations' output documents. Specific areas of review included the authorization bases (including the operational safety requirements), the facility and procedure change processes, conduct of operations, engineering products such as modifications and calculations, operations procedures, surveillance testing, and personnel training and qualifications.

System Overview

The ventilation systems in Building 2736-ZB are interrelated and include the main building ventilation, analytical laboratory ventilation, and Plutonium Stabilization and Packaging Equipment (SPE) ventilation. These systems were selected because the facility mission will continue for some time, portions of the systems are designated as safety-class or safety-significant, and functionality is necessary to protect workers, the public, and the environment from radiological consequences during normal operations and following abnormal events or accidents.

Building 2736-ZB was built in the early 1980s as part of the 2736-Z complex. The primary function of the building is to provide shipping, receiving, and repackaging support for the 2736-Z plutonium storage vaults. The original ventilation system consisted of supply and exhaust fans, high efficiency particulate air (HEPA) filters, control dampers, and associated equipment designed to confine contamination during normal operations for worker safety and during accident conditions for worker and public safety. The building and its ventilation system were modified in 2001 to add further capability for plutonium stabilization and packaging. The SPE project added a series of interconnected gloveboxes enclosing process equipment designed to stabilize and/or repackage portions of the existing plutonium-bearing materials within the Plutonium Finishing Plant (PFP) into packages consistent with the DOE 3013 design standard for long-term (50+ years) storage. The associated modifications for the SPE ventilation system added a nitrogen supply system for the gloveboxes, new exhaust fans and HEPA filters for the gloveboxes and process rooms, and a new stack. The current 2736-ZB ventilation systems are depicted in Figure F-1.

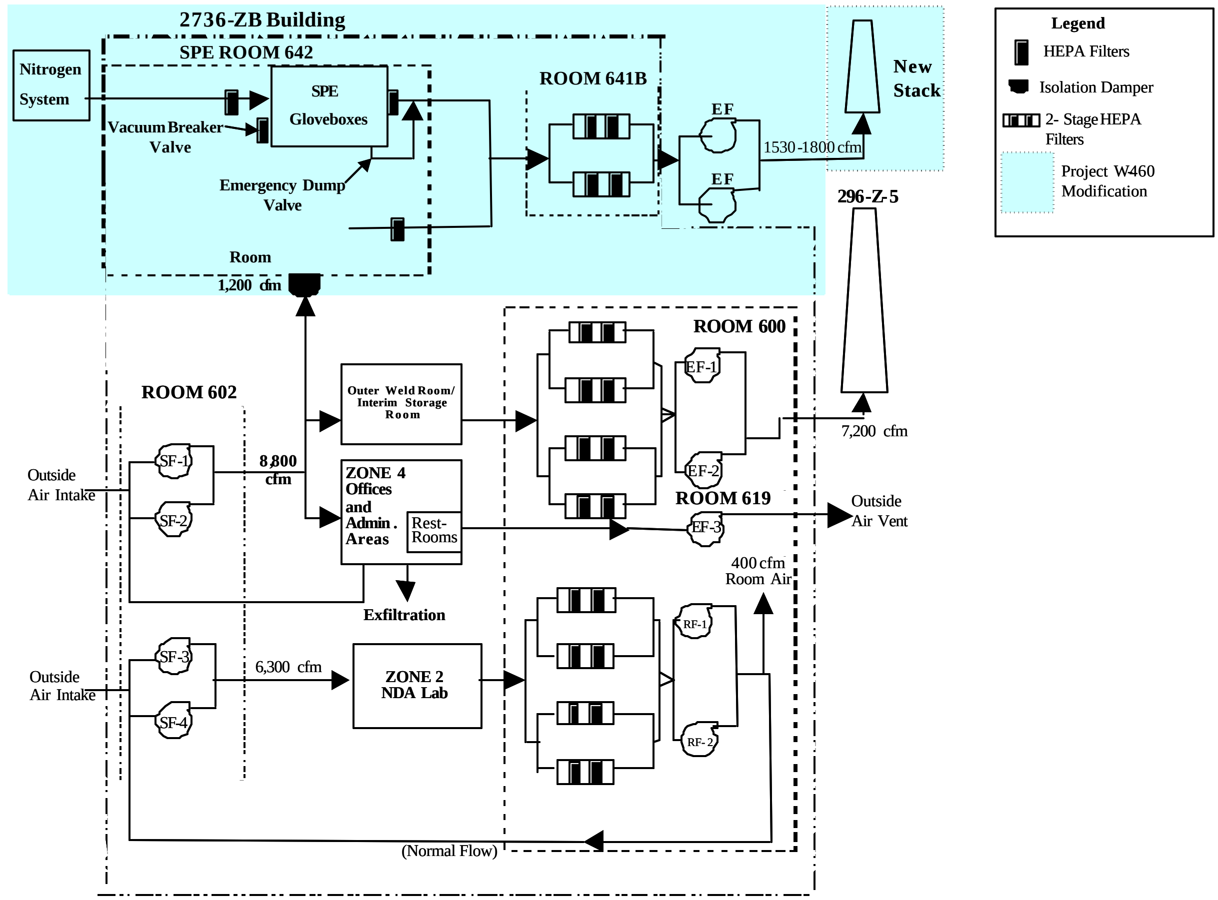

Figure F-1. 2735-ZB Ventilation Systems

F.2.1 Engineering and Configuration Management

In general, configuration management of the 2736-ZB building ventilation systems is being conducted in a manner that provides assurance that the system's technical, functional, and performance requirements as described in the authorization basis (AB) are being suitably documented and maintained, and that changes to the systems' hardware, procedures, and associated documents are being adequately controlled. However, weaknesses exist in some of the AB documentation and in some engineering procedures and practices. Specific observations regarding engineering and configuration management are discussed below.

Authorization/Safety Basis

The authorization/safety basis documents, including the final safety analysis report (FSAR), the operational safety requirements (OSRs), and the OSR basis, in most instances, adequately document the systems' safety functions, roles, and performance requirements in detecting, preventing, and mitigating analyzed events. The analyses of normal, abnormal, and accident conditions for the subject systems are clear and adequately documented, and in most cases they contain appropriate inputs, assumptions, methods, and levels of detail, with the following exceptions:

- **Plutonium Container Integrity:** Plutonium is stored in the 2736-Z complex in carbon steel containers commonly know as food pack cans. The FSAR section on "Accident Analysis – Calculations, 2736-Z Complex, Container Heatup" analyzed the heatup of these containers for a loss-of-ventilation event, the resultant container pressure increase, and their integrity under these conditions, and concluded that they would not fail. The OA team discovered the following discrepancies in these analyses:

- The failure pressure model was non-conservative; it did not address the containers' probable weak link, the lid-to-side rolled joint.

- Supporting statements were not based on valid, documented, applicable analyses or testing.

In response to the OA team's observations, the facility issued an occurrence report indicating a potential inadequacy in the safety analysis, entered the unreviewed safety question (USQ) process, initiated new analyses, and initiated research to validate the test container data. The new analyses indicated a substantially lower container pressure for the event than had previously been calculated, which when compared with the newly validated test data confirmed the original conclusion – that the containers would not fail.

- **Failure To Implement Analytical Assumptions Regarding Protection Against Overpressurization of the SPE Room:** The analysis entitled "Conservatisms in Analysis of DBE [Design Basis Event] with Fire" (performed in support of the FSAR addendum) states the following assumption: "In the case of loss of all air and nitrogen flows, it is expected that the PuO_2 would be dispersed slowly in the SPE Room." To support this assumption, requirements were incorporated in the FSAR addendum, stating that the nitrogen supply to the SPE gloveboxes and room air supply to the SPE room must be shut off upon loss of exhaust flow to ensure that the gloveboxes and the room are not pressurized in relationship to the outside environment. The current SPE Room design includes a number of sources for air and/or nitrogen, which could cause pressurization of the SPE room in relationship to the outside environment. Some of these sources are:

  - Leakage through the normally open nitrogen and/or process air lines to furnaces that are connected to gloveboxes

  - Leakage through the isolation devices, which were not tested for leakage (see discussion on this subject in Section F.2.3)

  - Potential air leakage around door gaskets from room 641 to room 642

  - The largest potential source of the leakage is from a postulated break of the supply ductwork between the room penetration and the bubble tight damper, because the ductwork was not analyzed to ensure pressure boundary integrity following the design basis seismic event. This lack of pressure integrity has a major impact on the safety analysis. The unmitigated analysis assumed full heating, ventilation, and air conditioning (HVAC) supply flow of approximately 1,200 cubic feet per minute (cfm) and full nitrogen flow of approximately 300 cfm (the mitigated analysis assumed no flow). Thus, the inability to credit the HVAC pressure boundary could be equivalent to flow of approximately 1,200 cfm, or virtually an unmitigated case.

In response to the OA team's observations, the facility issued an occurrence report indicating a potential inadequacy in the safety analysis and entered the USQ process. At the completion of the site visit, the USQ evaluation was still in progress.

Modification Controls

The modification control processes are evolving. The latest controlling procedure, "Facility Modification Package Process," dated November 6, 2001, brings together in one coordinated document the requirements and roadmaps of all of the various modification control processes. Previously, these processes had been dispersed across multiple, sometimes-disconnected organizations, and as a result they were not well coordinated and controls were not optimal.

The OA team's review of these processes included a sampling of 42 recent (within the last 3 years) engineering change notices (ECNs) on modifications to the 2736-ZB ventilation systems. All of these ECNs, however, predated the current procedure (none had been generated on the system since the latest procedure revision). Of the 25 recent ECNs that required USQ screenings, 14 incorrectly answered the first question on whether the modification was a change to the facility or procedures as described in the AB. As a result, complete USQ evaluations were not performed. Although previous evaluations had identified similar problems with the process as early as November 2000, corrective actions have not been effective. See the USQ finding in Section E.2.2 for further details.

DOE Facility Representative/Subject Matter Expert Oversight

The Richland Operations Office (RL) provides a sufficient number of Facility Representatives as well as a technically competent ventilation system subject matter expert (SME) to provide adequate oversight of the 2736-ZB system. The RL Facility Representatives provide day-to-day oversight of the systems, along with the rest of PFP. Further details regarding Facility Representative performance are described in Appendix D of this report. RL also provides an SME for the site ventilation systems. The SME was knowledgeable of ventilation systems and had an awareness of PFP systems in general. The SME provides expertise to the Facility Representatives when requested, and they have used him on several occasions. The current RL oversight of ventilation systems includes the DNFSB Recommendation 2000-2 reviews, led by the RL ventilation SME. However, the DNFSB Recommendation 2000-2 reviews do not address the adequacy of the safety bases or authorization bases, or the design of systems or support systems. Other RL reviews, such as the operational readiness review for the SPE upgrade, have not been successful in ensuring an accurate authorization basis.

F.2.2 Maintenance

The PFP administrative procedure "Preventive Maintenance and Surveillance Recall System" adequately describes PFP Preventive Maintenance & Surveillance (PM/S) administrative requirements, responsibilities, and procedures as applied to recall of OSR and non-OSR requirements. This PM/S process uses the Job Control System (JCS) Automated Data Processing (ADP) system to recall, forecast, document, and maintain PM/S activities. Preventive maintenance and corrective maintenance are being conducted in accordance with the PFP Maintenance Implementation Plan, prescribed work packages, or formal procedures. Calibrations are being completed in accordance with formally approved procedures.

Planners use appropriate source documents, such as vendor manuals, industry standards, DOE orders, technical manuals, and other requirements, in developing HVAC system maintenance work packages. These documents are maintained primarily in the Document Service Center and in the PFP Work Control Center within the maintenance work packages. Equipment, components, parts, and structures affiliated with the 2736-ZB HVAC system are included under the Maintain Facility System and Components Baseline, commonly referred to as the Component and Master Equipment Lists. Specifically, equipment, components, parts, and structures of the 2736-ZB HVAC system are included in the PFP HVAC System Component Index, Definition and Means of Maintaining the Ventilation System Confinement Portion of the PFP Non-Safety HVAC Equipment (Draft), and other maintenance documents or lists.

The material and physical condition of the 2736-ZB HVAC system is adequate to provide the required functions of the systems. A small (less than ten) maintenance backlog rate associated with the overall PFP HVAC systems is evidence that there is focused effort to manage the maintenance backlog.

The 2736-ZB HVAC system is inspected periodically according to maintenance requirements, and deficient conditions are evaluated and or corrected. At minimum, the Cognizant Engineer/HVAC Control Team Manager or the Infrastructure Services (Maintenance) Manager conducts bimonthly walkdowns of the HVAC system. In addition, craft workers and technicians conducting preventive maintenance and maintenance corrective actions also periodically identify, evaluate, and correct deficient conditions.

Historical files for corrective maintenance on system components are adequately maintained. HVAC maintenance work packages and the JCS ADP system retain the history of components with regard to preventive maintenance and corrective action. Under the JCS ADP system, maintenance work packages, upon final closeout, are permanently stored in an archived file. Over the last few years, corrective maintenance on the systems addressed expected minor failures; no excessive component failures were apparent.

Maintenance managers, supervisors, and technical staff (such as instrument technicians, electricians, and Stationary Operating Engineers) understand the procedures, process, and operating features of the 2736-ZB HVAC system. PFP maintenance managers, supervisors, and staff appropriately prioritize maintenance tasks and preventive maintenance of the HVAC system using priority guidelines and codes. On occasion, the radiation control technician is pulled from routine preventive maintenance and corrective action maintenance tasks to support high-priority work. Maintenance work packages and tasks are then adjusted during planning and scheduling meetings, such as the plan-of-the-week and plan-of-the-day meetings, to compensate for the shortage of radiation control technicians.

Several deficiencies are associated with the maintenance of the 2736-ZB HVAC system:

- Several completed 2736-ZB ventilation system work packages had missed, flawed, unsigned, or changed procedural steps within work instructions. For example, a revised work procedure had steps that physically could not be completed as written, although the work package was signed off as complete. While no deficiencies directly affecting system or component operability were found, these types of procedure compliance deficiencies can be leading indicators of a larger problem of degradation in conduct of maintenance in general.

- The date of failure on HVAC equipment, components, parts, structures, and systems is not normally entered in the JCS ADP system, possibly leading to an inaccurate portrayal of the maintenance backlog.

- Many of the newly hired (in the past five years) craft workers who maintain the HVAC system have not completed awareness training on suspect-counterfeit parts/items.

F.2.3 Surveillance and Testing

In general, surveillance and testing activities for the 2736-ZB ventilation systems have good procedures and generally provide adequate assurance that OSR requirements (as captured in the OSR basis) are being met. Surveillance and test procedures are organized in a logical and concise manner. The procedures have the appropriate attributes, such as signoffs, dates, and references to limiting conditions of operation sections, limits, precautions, system and test prerequisite conditions, data required, and acceptance criteria. HEPA filter efficiency testing and the original vendor testing are performed in accordance with established requirements in accordance with the OSR limiting conditions for operation and applicable DOE requirements. Instrumentation and measurement and test equipment for the system are calibrated and maintained.

In a few instances, however, the PFP procedures, practices, and supporting analyses do not provide full assurance that all aspects of the facility's safety-significant structures, systems, and components are capable of performing their design function. The following specific deficiencies were identified:

- **OSR Surveillance Requirements Do Not Verify Leakage Across Isolation Devices as Assumed in the Accident Analysis:** The analysis of the mitigated case of overpressurization of the SPE room was based on the assumption that there was no flow of HVAC supply air or nitrogen following the exhaust fan trip. Additionally, the FSAR addendum provides the following two specific requirements for leakage across the HVAC supply air damper: "The SPE Room Air Supply Isolation Damper specification is a reverse flow leakage limit of 140 l/min (5 cfm) at 2 in. water gauge differential pressure. The system is testable to ensure that it operates upon demand." and "The SPE Room Air Supply Isolation Damper interlock system is required to be intact and operational to prevent pressurizing the SPE Room and prevent reverse flow through the HVAC air supply system. In addition, the flow-through ratings from the manufacturer must be verified to be below 5 cfm for the design differential pressure range of 2 in. water gauge." The analytical and the FSAR requirements were not explicitly translated in the OSR and the OSR basis. The only explicit requirement in the OSR is limited to verification that the isolation devices are closed. The OSR and the OSR basis do not require measuring the leakage. During installation of the SPE modification, neither the nitrogen nor the HVAC airflow leakage post-installation test was conducted, and the design of the HVAC system does not have the features to facilitate the flowthrough or the reverse flow testing. In addition, HVAC damper vendor test data indicated that the isolation test was conducted in one direction only. Consequently, the as-built configuration of the facility is not capable of supporting surveillances assumed in the analysis. In response to the OA team's observations, the facility issued an occurrence report indicating a potential inadequacy in the safety analysis and entered the USQ process. At the completion of the site visit, the USQ evaluation was still in progress.

- **Failure To Incorporate Instrument Uncertainty into Acceptance Criteria:** The procedures for calibration and testing of the maximum allowable differential pressure across the HEPA filter establish an acceptance criterion at 10 inches water column (w.c.). The 10 inches w.c. value is used in the OSR basis as a limiting value. Use of the 10 inches w.c. as an acceptance criterion without any consideration of the instrument uncertainty could result in exceeding the established limit. Furthermore, the OA team's walkdown identified that the actual field values were slightly greater than 10 inches w.c. Upon notification of this concern, the contractor generated a notice of intent to revise the acceptance criterion to 8 inches w.c.

- **Missing Steps in Procedures:** Two of a sample of eight surveillance procedures for the ventilation system were missing several steps that would have precluded (literal) implementation of these procedures. The PFP Technical Procedure Validation Checklists for these procedures indicated that both procedures were verified by a "Walk Through" method, and in each case the response to a question "Can each step be performed as written? " was "Yes." The contractor indicated that they identified the same problem several weeks ago and generated notices of intent to add the missing steps to each procedure.

F.2.4 Operations

Stationary Operating Engineers (SOEs) operate all PFP ventilation systems, including the systems for Building 2736-ZB. The operators monitor the ventilation systems, perform system realignments when necessary, perform some surveillance tests, and respond to alarms and abnormal conditions within the systems. SOEs are knowledgeable of system operation and design requirements. SOEs generally demonstrated an adequate understanding of system operations, interlocks, and equipment location. In procedure walkdowns and simulated abnormal scenarios, SOEs were familiar with the system procedures, drawings, and requirements associated with the 2736-ZB ventilation systems. SOEs and Building Emergency Directors demonstrated an excellent understanding of the OSRs. For example, during postulated scenarios involving loss of equipment, the on-duty Building Emergency Director made prompt and accurate decisions on entering limiting condition of operation action statements, taking actions to place the facility in a safe condition, making the occurrence report declarations, and documenting the failed equipment on status boards and the operating logs.

SOE training and qualification programs are comprehensive and accurate, and they provide sufficient content to address SOE training needs for the 2736-ZB ventilation systems. Training on these systems relies heavily on self-study and on-the-job training, and trainees are evaluated using comprehensive tests and field job performance evaluations based on operating procedures. Training materials for the 2736-ZB ventilation systems were comprehensive and adequate for initial and requalification training. Continuing training materials on modifications, such as the SPE project ventilation systems, were also comprehensive and addressed the SOE training needs of the new system. The worker training records for this modification were complete and indicated that the qualified SOEs received the required training.

In some cases, SOEs do not maintain adequate proficiency in ventilation system watch-standing duties and operations. The current organizational structure does not require all qualified SOEs to periodically stand watch to maintain proficiency. Consequently, some qualified SOEs in organizations other than the rotating shifts lose proficiency in routine control manipulations. Although SOEs demonstrated an adequate knowledge of the systems, loss in control manipulation proficiency increases the risk of human error, particularly in response to abnormal situations. Upon notification of this concern, PFP management initiated actions to include all SOEs in periodic watch-standing activities.

Operation of the ventilation systems in 2736-ZB is governed by the "2736-Z, 2736-ZA, and 2736-ZB Ventilation Systems Operation" procedure, which contains the necessary instructions to address normal and expected abnormal operations. The procedure is technically accurate and provides instructions in sufficient depth to effectively direct the actions of a qualified SOE. Although technically accurate, the procedure has not been developed for ease of use. For example, this one procedure contains 21 separate sections addressing various normal and abnormal operations, with no subheadings depicting which sections are for use in abnormal operations. In a ventilation upset situation, SOEs may have difficulty in locating the right section. For example, an SOE initially had some difficulty in immediately identifying the correct section of the procedure to follow when presented with a simulated abnormal situation of momentary loss of offsite power. In addition, the procedure sections contain an excessive number of IF/THEN statements, which can cause confusion and frustration in procedure use. For example, the procedure contains over 95 IF/THEN statements, and in some sections, IF/THEN statements comprise over two thirds of the procedure steps.

The Alarm Response procedures for ventilation system alarms are comprehensive and provide adequate instructions to operators. For example, the "MICON AB HVAC Annunciator Alarms" procedure provides SOEs with appropriate response instructions for the ventilation systems in response to the MICON control system alarms. The "Responding to SPE Alarms in 2736-ZB" procedure is written for Nuclear Chemical Operators to address process equipment and operations when alarms on the systems are received. This procedure provides adequate instructions to place the processes in a safe condition during ventilation system upsets.

System drawings and system piping and instrument diagrams (P&IDs) associated with the Building 2736-ZB ventilation systems accurately depict the as-built condition and functions of the systems. They are logically arranged and generally technically accurate. The only discrepancies found during walkdowns of the P&IDs were two small instrument lines incorrectly drawn. These errors would not affect functionality of the system and were pointed out to the system engineer. Of all the components verified, no labels were inaccurate, and only two were not labeled (two of the three oxygen sensors inside the gloveboxes). The facility replaced these two missing labels within a week. The drawings and P&IDs used by the SOEs for lockout/tagout are administratively controlled. Drawings and P&IDs are kept current with respect to new modifications by entering the completed ECN numbers on the controlled drawings and including copies of the completed ECN packages in the drawing folders.

During the 2000-2001 timeframe, 12 occurrence reports containing 13 occurrences were associated with Building 2736-ZB. Although several of these ventilation events resulted in the loss of negative pressure within the containment zones, none of the reports indicate spread of contamination during upset conditions. Seven of the reports (containing eight occurrences) described an externally initiated event that ultimately led to a shutdown of the ventilation system. These events typically indicated procedural problems or inadequate ventilation system configuration control. The remaining five reports (containing five occurrences) involved mechanical component failure as the initiating event resulting in a shutdown of the ventilation system. Although many of these reports reflect needed improvements in system operations, the apparent high number of Occurrence Reporting and Processing System reports dealing with loss of ventilation can be partially attributed to the conceptual design of the system. In 2736-ZB, the fail-safe design is to shut down all fans, which, according to DOE Order 232.1A, is reportable as an off-normal event due to loss of ventilation without loss of confinement. In most confinement ventilation systems, the fail-safe mode is to keep only one exhaust fan running. In these systems (such as the main PFP Building 234-5Z), failures in ventilation systems similar to the failures in the ZB building would not have been reportable because one exhaust fan would have been running. This approach results in an artificially high rate of occurrence reports in this category for Building 2736-ZB.

F.3 Conclusions

In general, configuration management of the Building 2736-ZB ventilation systems is being conducted in a manner that provides assurance that the system's technical, functional, and performance requirements as described in the AB are being suitably documented and maintained, and that changes to the systems' hardware, procedures, and associated documents are being adequately controlled. Although engineering and configuration management adequately assure the functionality and operability of the ventilation systems within the AB, several significant configuration control weaknesses were identified that could allow the facility to be outside the AB or in an unanalyzed condition. In addition, process adherence for USQ screenings is weak as a result of a general non-rigorous interpretation of the requirement that all changes to the facility or procedures as described in the AB undergo a USQ evaluation. Management attention is needed to ensure that configuration control is maintained.

Maintenance on the Building 2736 HVAC systems is adequate to ensure that the condition of the systems will support assumed functions during normal and emergency conditions. In some cases, however, a lack of attention to detail in work packages was apparent. These types of deficiencies can lead to larger problems with maintenance if not corrected.

The surveillance and test procedures generally provide adequate assurance that OSR requirements (as captured in the OSR basis) are being met. Surveillance and test procedures are organized logically and concisely, and they have the appropriate attributes required for successful implementation of the OSR requirements. However, the OSRs do not contain all the surveillances assumed in the analyses. Increased management attention regarding translating the design basis into the OSR is needed to ensure that surveillance procedures adequately reflect the details of the analytical assumptions and AB requirements.

Operations personnel (both SOEs and Nuclear Chemical Operators) are trained on and knowledgeable of Building 2736 ventilation system operations and procedures. Procedures and other pertinent documents, such as drawings, are technically accurate for use in achieving required system performance during normal operations and abnormal or emergency conditions. Increased management attention regarding the usability of procedures and the proficiency of the SOEs would contribute to increased reliability and better system performance.

DOE oversight of the Building 2736 ventilation systems through the Facility Representatives and the SMEs is generally adequate and comprehensive. However, the DNFSB 2000-2 implementation reviews do not review the AB or the facility design, and other RL oversight activities have not been effective in identifying the types of weaknesses identified in this OA review.

F.4 Ratings

Engineering and Configuration Management .... NEEDS IMPROVEMENT
Maintenance .... EFFECTIVE PERFORMANCE
Surveillance and Testing .... EFFECTIVE PERFORMANCE
Operations .... EFFECTIVE PERFORMANCE

F.5 Opportunities for Improvement

This OA review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic objectives.

1. **Eliminate the errors, ambiguities, and misinformation currently in the authorization basis in order to assure safe facility operation within valid bases.**

    - Initiate a project specifically aimed at verifying, validating, and correcting the AB for the 2736-Z complex (which has a mission that will continue well past 2004) and for any areas of the facility design not conforming to the revised AB.
    - Improve the quality and timeliness of engineering support for plant operations by enhancing the retrievability of all AB/design information, including references in the approved safety basis.

2. **Optimize and improve engineering effectiveness by assigning the responsibilities between two basic functional areas: Design Authority and Systems.**

    - To the Design Authority role, assign the responsibilities of maintaining the facility design within the AB through the maintenance, generation, and interpretation of engineering analyses, including new and existing analyses, and the generation of all other design engineering products, such as conceptual and detailed designs for modifications.
    - To the Systems role, assign the responsibilities of engineering support for troubleshooting, diagnosis, and consulting to Operations, Maintenance, Construction, Startup, Testing,

and Design on day-to-day technical issues and concerns.

- To both roles, assign the responsibility to closely coordinate with all other facets of the facility organization to assure coordinated facility activities within the AB.

3. Ensure that qualified SOEs maintain sufficient operational proficiency to be able to safely monitor and operate ventilation systems when required.

- Establish a periodic rotation to the shift watch stations for all qualified SOEs.

APPENDIX G
ENVIRONMENTAL MANAGEMENT

G.1 Introduction

The Office of Independent Oversight and Performance Assurance (OA) evaluated the implementation of the first four core functions of integrated safety management as they relate to environmental protection and waste management activities at the Plutonium Finishing Plant (PFP). The purpose of the review was to evaluate the Department of Energy (DOE) Richland Operations Office (RL) and Fluor Hanford, Incorporated (FHI) systems to ensure that environmental protection is integrated into site operations, as well as to determine the adequacy of PFP management processes in analyzing and controlling potential environmental impacts relating to site operations and legacy hazards.

OA reviewed selected aspects of waste management activities involved in supporting PFP operations for plutonium stabilization and cleanout, including operation of waste management accumulation, storage, and treatment facilities. Operations associated with the management of stabilized plutonium material were not evaluated.

In conducting this evaluation, the OA team reviewed the adequacy and implementation of site policies and procedures, performed facility inspections, evaluated the operation of pollution control equipment, and interviewed radiation control, environmental protection and waste management subject matter experts (SMEs) and operating department personnel. Technical evaluations of the work performed under site programs were performed in the areas of waste management and radiological releases to the environment (i.e., air, ground, and water). Contractor and DOE operations pertaining to these programs associated with the PFP were reviewed.

G.2 Results

G.2.1 Core Function #1 - Define the Work

The nature and scale of ongoing and planned nuclear material stabilization activities defines the scope of the environmental protection requirements applicable to PFP, in accordance with overall environmental protection requirements for the Hanford Site. In pursuit of these overall environmental protection requirements, RL has established an Environmental Management System (EMS). The stated purpose for the EMS is to ensure that environmental protection is integrated into all Hanford Site mission processes in order to achieve and maintain, at a minimum, compliance with environmental regulatory as well as DOE requirements. As part of the RL Integrated Management System (RIMS), the EMS effectively defines requirements, responsibilities, core services, policies, and principles for the environmental aspects of RL operations, thereby making environmental management an integral part of the overall framework of integrated safety management.

The Hanford Site is legally required to comply with applicable Federal and State of Washington environmental and waste management regulations. In addition, the EMS defines applicable DOE orders, manuals, and policies as well as Executive Orders and site-specific agreements, including the Tri-Party Agreement (TPA). The TPA, officially entitled the Hanford Federal Facility Agreement and Consent Order, defines the framework for negotiating Hanford Site cleanup requirements and milestones between RL, the Environmental Protection Agency, and the State of Washington. TPA milestones specific to PFP include repackaging of residues (Hanford ash and sand, slag, and crucible material), direct discard of solutions, and shipment to the Hanford Site Central Waste Complex. Milestones for the transition of PFP to the restoration program, managed by the RL Environmental Compliance organization, are currently being negotiated. Working within this framework, both RL and the contractor have developed good working relationships with the state and Federal regulators.

FHI is contractually bound by requirements listed in the contract. The requirements include compliance with Federal, state, and local laws and regulations and with specified DOE orders and directives. The framework for meeting the contract requirements has been defined in the Integrated Environment, Safety, and Health Management System Description. Specific to environmental protection and waste management, the description includes a table indicating how the International Organization for Standardization's environmental management system (ISO 14001) elements and the guiding principles and core functions of DOE Policy 450.4 have been integrated to form the Project Hanford Integrated Environment, Safety, and Health Management System (ISMS). The TPA is also included in the ISMS as a key driver for environmental actions. FHI is responsible for establishing the specific mechanisms, delineating responsibilities, and implementing agreed-upon work in order to achieve the RL-defined broad requirements and Hanford missions under the TPA. By clearly defining the relationship between elements of ISO 14001 and DOE Policy 450.4, combined with discussions on implementing TPA requirements, FHI has effectively defined the site environmental protection programs consistent with applicable requirements and best management practices.

FHI management has established a framework for achieving environmental requirements and milestones through continuous improvements in environmental performance using ISMS. The FHI Environmental Policy and Policy for Environment, Safety, and Health both stress excellence in the stewardship of the environment and the effective integration of environmental aspects into all FHI operations. The FHI Environmental Policy expands upon excellence in environmental stewardship by stating that all managers and employees are responsible for conducting work consistent with consideration of environmental impacts; compliance with applicable laws, regulations, and directives; integration of pollution prevention, resource conservation, and waste minimization into work activities; and continual assessment of performance and implementation of opportunities to achieve environmental excellence.

Overall, RL and FHI through the RIMS and ISMS, respectively, have effectively defined the site environmental protection programs and have established management strategies to implement Federal, State of Washington, and DOE requirements. FHI management has defined expectations in the environmental area through appropriate environmental policies for excellence in environmental stewardship, pursuit of ISO 14001 elements, and continuous improvements in environmental performance. FHI has applied sufficient resources to maintain environmental compliance while striving to meet TPA milestones as PFP transitions to deactivation.

G.2.2 Core Function #2 - Analyze Hazards

RL and FHI have been effective in performing environmental hazards analyses in order to obtain amendments to the TPA. Pursuant to TPA, FHI is required to perform an analysis of proposed operational changes in order to evaluate potential environmental hazards and resultant waste generation. For example, PFP was able to transition between various feed materials in the residue repackaging project and effect a change in the solutions stabilization project by performing the required hazards analysis in a timely manner. The result is that the TPA milestones were negotiated without adversely affecting the nuclear materials stabilization project schedule.

FHI has established effective mechanisms to ensure that environmental reviews are conducted in order to appropriately analyze the potential for environmental impact and waste generation. FHI utilizes the Automated Job Hazards Analysis (AJHA) process as a tool for workers, work planners, and line managers to systematically identify hazards and supporting requirements (e.g., waste management). The process ensures that environmental and waste management SMEs review the proposed work plan to identify appropriate controls. Environmental hazards and waste management requirements were effectively identified in work packages. Additionally, other FHI and PFP programs require environmental impact identification and analysis, such as the radiation work permit (RWP) program and various procedures (i.e., National Environmental Protection Act, State Environmental Protection Act, Cultural and Natural Resources, Air Quality – Radioactive Emissions, and Solid Waste Management).

PFP utilizes a systematic approach to identify and characterize waste generated from material stabilization, support, and construction operations. Waste identified via the AJHA, RWP, Chemical Management System, or other mechanisms is characterized based on process knowledge, material safety data sheet, and/or sampling and analysis. Information is entered into the Solid Waste Identification Tracking System (SWITS) and determinations are made as to how the waste will be managed and disposed of based on the general category: transuranic (TRU) and mixed transuranic waste, low-level (LLW) and mixed low-level waste, hazardous waste, or non-radioactive/non-hazardous waste. The SWITS is comprehensive and up to date.

PFP has evaluated pathways for release of radionuclides from routine operations and many legacy conditions to the air, liquid streams, and solid waste streams. With few exceptions, hazards analysis processes for environmental pathways at PFP were systematic and, where evaluated, effectively performed.

PFP performs systematic analysis of air emissions to determine the site's regulatory requirements with respect to the TPA and the National Emission Standards for Hazardous Air Pollutants. The site applies major stack monitoring requirements to all stacks regardless of regulatory status, thereby ensuring compliance with monitoring requirements associated with less than major stacks. Furthermore, the Washington State ALARA (as-low-as-reasonably-achievable) Control Technology (ALARACT) demonstration requirements are typically used for new radionuclide emission control technology when employed.

Radiological liquid effluent pathways have been evaluated and divided into two primary waste streams. Liquid effluent streams, transferred to the Tank Farms, are rigorously monitored and controlled via procedures and work packages prior to transfer to the tank farms. A second liquid effluent stream, consisting of stormwater runoff and a variety of miscellaneous process sources, is discharged to the site Treated Effluent Disposal Facility (TEDF). The miscellaneous sources are subject to pretreatment by activated charcoal and bone char for gross removal of organic and radioactive material, respectively. Routine analysis of pre- and post-filtration effluents is conducted with the goal of conservatively maintaining discharges to the TEDF to below 4 pCi/L (the drinking water standard) for gross alpha activity. However, radiological and organic monitoring is not performed in real-time. Therefore, wastewater exceeding TEDF acceptance criteria will not be identified until after the waste has been transferred. PFP has experienced at least one exceedence in the past two years but has not exceeded the overall TEDF permitted discharge limit.

The site has not completely analyzed environmental impacts regarding liquid discharges to contaminated soil columns. Although permitted by the State, discharges from the ET-9 exhaust and Building 291-Z steam condensate continue to flow into an identified legacy contamination area. Site documents indicate this french drain "is a stream discharging in a surface contaminated area" and designates it as a "b" stream to be addressed in the site Miscellaneous Streams Best Management Practices Report. Documentation further states that "a preferred alternative for this waste stream will be developed when the scope and design of the new site steam systems have been established." However, the new site steam system did not eliminate the need for this discharge point.

Overall, PFP has evaluated pathways for release of pollutants from routine operations and legacy conditions to the air, liquid effluents, and solid waste streams. With few exceptions, hazards analysis processes for environmental pathways at PFP were systematic and, where evaluated, effectively performed. The AJHA, RWP, National Environmental Protection Act, and SWITS programs are used effectively to identify and analyze environmental impact and waste management requirements. The one exception is the failure of PFP to fully analyze the environmental impact of continued liquid discharges to contaminated soil columns.

G.2.3 Core Function #3 - Establish Controls

FHI has established administrative controls for waste management and environmental protection programs through its sitewide and facility-specific procedures. The procedures establish administrative and technical controls for production and support operations to perform work activities in accordance with established environmental and waste management regulations, applicable DOE orders, and FHI environmental policies. Work instructions have been established within the Hanford procedure system to implement waste management requirements at the site and provide a systematic process for management of waste from operational activities. The controls require analysis of all processes generating wastes, use of compatible containers, labeling of containers in a consistent format to reduce potential errors, use of a bar-coding system to track waste containers, placement of wastes in the appropriate interim storage areas with compatible wastes types, and shipping requirements for both on- and offsite treatment, storage, and disposal actions.

Site-level procedures pertaining to radiological air pollution control, liquid discharges, and waste management and work instructions describing the responsibilities of Environmental Compliance and Solid Waste Operations staff contain an appropriate set of operational specifications. In addition, Environmental Compliance, Solid Waste Operations, and Site

Radiological Control staffs have an appropriate level of education, training, and experience to effectively implement their assigned duties.

The AJHA process is an effective means of identifying controls associated with identified hazards, including environmental hazards, and determining, among other things, waste management actions. The process clearly links identified environmental impacts to a menu of possible controls that can be selected in part or in total by the planner. As previously described, this process also is designed to ensure that the appropriate SMEs are involved in the planning process to identify further controls that may be needed to perform the work in accordance with applicable waste management and environmental protection requirements. Based on reviews of several work packages and SME interviews, the AJHA is effectively implemented and is accomplishing these goals for environmental activities.

PFP has instituted some controls that are more rigorous than required by law or DOE. For example, only Solid Waste Operations personnel are allowed to place waste in hazardous waste satellite accumulation containers, many of which are locked. In addition, hazardous waste piping and tank systems are inspected more frequently than required by regulation. However, PFP has not fully established a quality assurance program as part of their overall waste certification program, other than the program associated with waste destined for the Waste Isolation Pilot Plant (WIPP). The Hanford Site Solid Waste Acceptance Criteria requires that waste generators implement the requirements of 10 CFR 830.120 and DOE Order 414.1A. PFP has been relying on Waste Services to perform verification of waste streams for all but the waste destined for WIPP. As a result, several drums of TRU waste and LLW have been returned to PFP because inappropriate items were discovered in the containers. This situation has resulted in an increase in verification of TRU waste and LLW containers to 100 percent, an increased cost to PFP for the increased verification, and an increase in the potential radiological exposure to personnel due to repackaging of the rejected containers.

FHI and PFP have established controls for non-radioactive/non-hazardous waste that are consistent with the rigorous controls established for radioactive and hazardous waste. For example, the solid waste dumpsters are required, by FHI and PFP procedure, to be locked except when adding waste. This control was established following an inadvertent release of radioactive material to an offsite sanitary landfill from the Hanford Site. This "lesson-learned" has not been applied to the recycle bins used for collecting recycled cardboard. The bins, located along side the solid waste dumpsters, could be a route for release of radioactive or hazardous material, because they are not locked.

PFP has reduced their contamination vulnerabilities and has implemented many engineering controls to reduce the potential for environmental releases. In addition, legacy waste inventories have been reduced. PFP Environmental Compliance maintains oversight of approximately 20 active and inactive waste sites within the fence line at PFP. Many of the legacy spill areas have undergone remediation but have not been removed from the site Waste Information Data System (WIDS) pending Washington State approval. Other inactive areas include former ditches, trenches, french drains, cribs, settling tanks, and piping systems (including transfer boxes). Most of these areas have been stabilized and/or covered over with soil/gravel and are currently managed as subsurface contamination or radioactive material areas. Several active sites include french drains and septic tank drain field systems, which continue to receive non-hazardous effluents.

The Hanford Site pollution prevention activities, managed by FHI for all prime contractors, realized a cost savings/avoidance of $32 million in fiscal year 2001and received numerous awards recognizing achievements for waste minimization and recycling. The reduction in waste generation and environmental impacts was made possible by an aggressive pursuit of pollution prevention opportunities. Waste minimization is defined in numerous guides, implementation plans, and lessons learned available on the Hanford Pollution Prevention homepage.

The following pollution prevention/waste minimization measures are being effectively and appropriately implemented at both the FHI and PFP level:

- A chemical management program requires that all material requisitions be reviewed by PFP solid waste, environmental control, and safety teams to ensure that excess materials are not purchased. This program also serves as a clearinghouse for reusing materials throughout the Hanford Site as an alternative to disposal.

- Fluorescent light bulbs, batteries, white paper, cardboard, and aluminum are collected and then transported off site for recycling. The site recycled

106 tons of cardboard, 46 tons of newspaper, 474 tons of paper, a ton of batteries, and 26 tons of chemicals.

- In support of pollution prevention activities and waste minimization, numerous guides, implementation plans, and lessons-learned documents have been developed and are made available on the Hanford Pollution Prevention homepage.

- PFP is assessing additional pollution prevention opportunities, such as the elimination of double-wrapped packaging of rubber gloves used in controlled areas and the use of protective gloves that do not have leachable amounts of lead above the Federal or state limits for declaring them a hazardous/dangerous waste when discarded.

PFP has effectively applied engineering controls in many areas to mitigate or prevent release of radioactive and hazardous material to the environment:

- High efficiency particulate air (HEPA) filtration of air emissions has been on installed on the ventilation systems to keep concentrations of radionuclides in air effluents within regulatory limits.

- Containment devices (radiological tents and enclosures) have been erected for work over waste tanks and other radioactive material handling areas.

- Secondary containment has been provided for liquids in bulk and non-bulk containers and hazardous waste piping systems.

- Pre-treatment operations are conducted on some low-level liquid radioactive wastewater streams to remove/reduce potential organic and radioactive constituents.

- Other engineering controls include use of gloveboxes and negative pressure within buildings to further preclude the spread of contamination to the environment.

The Hanford environmental monitoring plan effectively establishes environmental surveillance requirements. PFP-specific effluent monitoring, near-facility ambient air monitoring, and environmental media sampling have been integrated into a sitewide, systematic analysis to determine the site's status with respect to regulatory requirements and the levels of radionuclide emissions to the environment. However, radiological surveys to identify and analyze legacy waste sites are not being conducted at PFP in a systematic manner for facilities not routinely utilized and for general outdoor areas.

PFP has established appropriate administrative controls for airborne radiation and liquid process effluents. Specific controls have been established for liquid process discharges to the tank farms, the TEDF, and the sanitary septic system. Site-level procedures establish specific requirements and limitations for process discharges and require controlled changes to liquid discharge piping systems in order to maintain an appropriate configuration. FHI has also established procedural instructions to establish controls for reporting and monitoring of air and liquid process effluents.

The environmental ALARA process has not been fully implemented in the nuclear materials stabilization project. DOE Order 5400.5 requires the ALARA process be formally implemented at all facilities that could release radioactive materials to the environment and cause public dose. The DOE guidance indicates that the ALARA process must be applied no matter how small the dose. Without a formal program in place and a responsible individual assigned to its implementation, there is no assurance that all activities receive appropriate and/or documented ALARA reviews, such as justification and consideration of alternatives that can further reduce doses and potential environmental radiological impacts. Although PFP has developed many aspects of a radiological environmental compliance program that considers environmental ALARA (e.g., numerous procedures reference ALARA review, AJHAs require appropriate SME review to identify and control radiological releases to the environment, and the use of Washington State ALARACT standards when employing new control technology), no formal environmental ALARA program has been developed.

Overall, FHI and PFP have established controls for environmental protection and waste management. The procedures and programs contain an appropriate level of control in order for PFP to maintain compliance with Federal, state, and DOE requirements. FHI and PFP have also effectively applied engineering controls in many areas, most notably liquid storage in bulk and non-bulk containers, to mitigate or prevent process releases to the environment. Although controls have generally been developed and implemented effectively, PFP has not fully established a quality assurance program as part of its overall waste certification program and has not fully implemented an environmental ALARA process into project operations.

G.2.4 Core Function #4 - Work Within Controls

Most of the controls established by FHI and PFP procedures for the protection of the environment and management of waste were effectively implemented.

- HEPA filtration systems were operating within the differential pressure tolerances specified in the established work instructions and consistent with regulatory requirements. Logs of differential pressure recordings were maintained as required. Maintenance and quality assurance checks on these systems are also being performed in accordance with established procedures.

- Surveillance of stack effluent sampling systems was conducted as specified in the established work instructions and consistent with regulatory requirements. Logs of calibration settings were maintained as required.

- The radioactive wastewater treatment systems were being operated consistent with facility procedures in order to ensure that radionuclide contamination was not released to the site TEDF.

- Solid waste management operations (monitoring of pipelines and underground storage tanks, adherence to labeling requirements, inspection and operation of accumulation areas, preparation for transportation, maintenance of required training, and document control) were being conducted in accordance with applicable Federal, state, DOE, site and facility regulations and procedures.

- Maintenance functions generating waste adhered to the established work package requirements.

- Effluent monitoring was being conducted in accordance with the Hanford sitewide monitoring plan.

- Containers were being tracked in the SWITS database.

- The control and transfer of process and laboratory liquid waste to the tank farm system were performed in accordance with applicable waste acceptance requirements.

Although generally appropriate and effectively implemented, some controls were not fully implemented in accordance with established work instructions and regulatory requirements.

- When radiological contaminated areas are identified, there is no systematic process for incorporating them into the management system for legacy areas. For example, on November 27, 2001, PFP issued a Radiological Problem Report (RPR) following discovery of legacy contamination on two confined-space covers located between the PFP perimeter fence and the inner fence. The Radiological Control organization conducted the survey, which discovered these covers incidental to the annual WIDS surveys. The actual radiological survey was conducted on October 6, 2001. The delay between the survey and the issuance of the RPR was not timely, given the identification of a previously undocumented or posted contamination area. The area was posted as a controlled area following the survey, but future action was deferred to the deficiency evaluation process. A deficiency evaluation was conducted on January 7, 2002, and a decision of low impact was issued. Part of this decision was based on the fact that the location was being managed under the PFP WIDS. However, the two specific locations are not being managed under the WIDS. The decontamination and painting (to fix contamination) assigned as the action to be conducted, by the deficiency board, has not yet been conducted (due to cold temperatures). In addition, Environmental Compliance has not been notified of the need to evaluate this facility for inclusion in the WIDS.

- Radiological surveys at PFP are not conducted systematically for facilities that are not routinely utilized (e.g., process buildings) or for general outdoor areas. Annual radiological surveys are conducted under WIDS for outdoor areas with known fixed contamination and for known legacy-contamination areas. Additionally, work to be conducted in areas without recent survey data would necessitate radiological evaluation. However, contaminated areas may not be detected or included in the WIDS unless discovered by chance. Furthermore, no formal mechanism is in place to notify the PFP WIDS project manager of discovered legacy contamination areas. The need for systematic performance of environmental surveys is supported by site documents indicating that "The Hanford Site poses a unique challenge in the area of outdoor contamination control. This is due to a historical legacy of relatively uncontrolled outdoor contamination (both above and below the surface of the ground), and also due to existing environmental factors that enhance the spread of contamination on the site. These include frequent high winds, dry weather conditions, loose dusty soil, wide-open spaces, and the presence of highly invasive and mobile flora and fauna. The net result of these environmental factors is the occasional transfer of contaminated material to non-radiological areas." PFP may conduct surface scans for fixed and removable contamination in known legacy areas and in support of issuance of an RWP for soil excavation activities. However, there is no surface soil sampling program within the fence line to detect the "occasional transfer of contaminated material to non-radiological areas."

- TRU waste and LLW drums are being rejected by Waste Services, mostly because of inappropriate items being found in the containers (e.g., lead seals and batteries). The facility-specific procedures pertaining to management of these wastes are clear as to what can be placed in the containers; however, some generators are continuing to add inappropriate items.

- Several sanitary-trash dumpsters were not secured as required by FHI and PFP procedures. Dumpsters located in areas with a high potential for release of radiological material are required to be kept locked, except when adding or removing material.

Overall, PFP administrative and engineering controls for environmental protection and waste management were generally effectively implemented. However, some established controls were not fully implemented in accordance with established procedures and regulatory requirements (e.g., systematic radiological surveys to identify contamination areas, TRU waste and LLW containers rejected by Waste Services, and sanitary dumpsters not secured).

G.3 Conclusions

RL and FHI management have established effective management systems to implement their environmental responsibilities. These include the RL environmental management systems within RIMS and the FHI integrated environment, safety, and health management system. These systems define the environmental protection process and establish management strategies to meet Federal, state, and DOE requirements.

PFP has evaluated many pathways for release of pollutants from routine operations and legacy conditions to the air, liquid effluents, and solid waste streams. With few exceptions, hazards analyses of environmental pathways at PFP were systematic and effectively performed. FHI and PFP have established administrative controls for environmental protection programs through FHI and site-level procedures. The PFP procedures for air pollution control, wastewater discharges, and waste management contain an appropriate set of operational specifications. Additionally, PFP has effectively applied engineering controls in many areas to mitigate or prevent process releases to the environment. Most of the controls established by procedure for environmental protection programs were effectively implemented. PFP personnel in production departments were familiar with established administrative and technical requirements in nearly all cases. While overall effective management systems have been established, in a few cases PFP has not effectively analyzed radiological environmental hazards, established appropriate controls, or implemented requirements.

Although several deficiencies were identified, the PFP environmental management program has a number of significant positive attributes and is effectively implemented in the main manufacturing areas, where the most significant potential environmental hazards are located. Few deficiencies were identified, and most of those occurred in implementation of a programmatic approach to environmental ALARA or in the management of legacy contamination areas located outside main processing facilities, indicating a need for additional attention in these areas.

G.4 Rating

While a number of isolated deficiencies were identified, the systems for analyzing and controlling environmental hazards are generally effectively established and implemented. Therefore, this topic is rated as having EFFECTIVE PERFORMANCE.

G.5 Opportunities for Improvement

This OA review identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are intended to be reviewed and evaluated by the responsible DOE and contractor line management and prioritized and modified as appropriate, in accordance with site-specific programmatic objectives.

1. **Develop and implement a formal quality assurance program for PFP waste management activities.**

   - Strengthen quality assurance practices for PFP waste management activities in accordance with DOE Order 414.1A as required by the FHI Waste Services waste acceptance criteria.
   - Consider instituting a quality assurance inspection/oversight function at the point of waste packaging to reduce the rejection rate for PFP LLW and TRU waste.
   - Consider integrating all waste management quality assurance activities into a formal program and institute a graded approach to inspection (e.g., based on rejection by Waste Services).

2. **Strengthen radiological survey practices associated with areas not generally frequented to ensure that contaminated areas are identified and entered into the WIDS.**

   - Ensure that radiological surveys are conducted for facilities that are not routinely utilized (i.e., process buildings) or general outdoor areas.
   - Consider establishing a systematic radiological surveys program at PFP to cycle through all areas for survey on a predetermined basis (e.g., annually).
   - Consider developing a mechanism to ensure that the PFP WIDS project manager is notified when legacy contamination areas are discovered.
   - Consider establishing a radiological surface-soil sampling program within the fence line to detect the "occasional transfer of contaminated material to non-radiological areas."

3. **Develop and implement a formal environmental ALARA program.**

   - Apply the ALARA process to all facilities and activities that could release radioactive materials to the environment, no matter how small the potential dose.
   - Assign a responsible individual to assure that all activities receive appropriate, documented ALARA reviews.
   - Conduct programmatic ALARA reviews, which include justification and consideration of alternatives that can further reduce doses and potential environmental radiological impacts.

4. **Strengthen controls for the spread of radiological contamination or potentially contaminated material to the environment.**

   - Address existing discharges to legacy contamination areas to limit additional impacts to the soil column.
   - Consider issuing required reading or other retraining to waste operations personnel pertaining to securing sanitary-trash dumpsters.
   - Consider reassessing the need to secure recycling containers located outdoors, consistent with the requirement for sanitary-trash dumpsters.
   - Consider using real-time monitoring or holdup sampling of LLW liquid prior to discharge to TEDF to keep wastewater from exceeding TEDF acceptance criteria.

AbbreviationsUsed in This Report (continued)

FWS	Field Work Supervisor
FY	Fiscal Year
GTB	General Technical Base
HAMMER	Hazardous Materials Management and Emergency Response and Education Center
HAMTC	Hanford Atomic Metal Trades Council
HEHF	Hanford Environmental Health Foundation
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilation, and Air Conditioning
IDP	Individual Development Plan
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
ISO	International Organization for Standardization
JCS	Job Control System
KSA	Knowledge, Skills, and Abilities
LLW	Low-Level Waste
NMSP	Nuclear Material Stabilization Project
OA	Office of Independent Oversight and Performance Assurance
OOD	Operations Oversight Division
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
OSR	Operational Safety Requirement
P&ID	Piping and Instrument Diagram
PFP	Plutonium Finishing Plant
PIC	Person in Charge
PISA	Potential Inadequacy of the Safety Analysis
PM/S	Preventive Maintenance and Surveillance
PPE	Personal Protective Equipment
R2A2	Roles, Responsibilities, Authorities, and Accountabilities
RCT	Radiation Control Technician
RCRA	Resource Conservation and Recovery Act
RIMS	Richland Operations Office Integrated Management System
RL	Richland Operations Office
ROD	Record of Decision
RPR	Radiological Problem Report
RWP	Radiation Work Permit
SOE	Stationary Operating Engineer
SME	Subject Matter Expert
SPE	Stabilization and Packaging Equipment
S/RID	Standards/Requirements Identification Document
SSW	Senior Supervisory Watch
SWITS	Solid Waste Identification Tracking System
TCP	Technical Capability Program
TEDF	Treated Effluent Disposal Facility
TPA	Tri-Party Agreement
TQP	Technical Qualification Program
TRU	Transuranic
USQ	Unreviewed Safety Question
w.c.	Water Column
WIDS	Waste Information Data System
WIPP	Waste Isolation Pilot Plant