CONTENTS

1.0 INTRODUCTION

Interest has continued for the Department to explain and demonstrate the basis for the site worker protection programs and how hazard analysis and resultant worker safety controls are derived from applicable requirements and standards. Issues include the following question. Can judgments, criteria, and practices applied for work activities be justified across DOE from a technical and policy standpoint?

The Worker Protection Criteria (WPC) effort was designed to provide factual answers to this question through self-assessment of representative hazard analysis and control derivation processes fundamental to WPC practiced at various DOE sites in a spectrum of work activities. Identified processes as well as criteria judgments applied were evaluated by the sites to determine how existing decision making processes work. Improvements and needed "corporate" actions were also identified.

The intent of this activity was neither to presume that local judgments regarding hazard analysis and control are inadequate nor to assume that additional Headquarters requirements, criteria, or guidance is necessary. The historical safety and health statistical record of the Department has been favorable and is getting better; however, DOE continues to lose the institutional memory represented by the experienced line managers and technical professionals at various sites whose judgments have formed the worker protection decision making process. The overriding WPC goal is to reaffirm that the longstanding process guiding worker protection criteria and procedures continues to be sound and is sufficiently documented so that incoming managers can prepare adequate hazard analyses and controls for worker protection.

Relationship to Integrated Safety Management

The Department established its policy and framework for worker protection in DOE Orders 450.1 and 450.4. In response to concerns raised during development and implementation of Integrated Safety Management (ISM), the Worker Protection Criteria Questionnaire was developed as a self-directed effort to be carried out at volunteer sites to provide a balanced perspective of the Department's capabilities for implementing a hazard-based worker protection program.

The activity focuses on the success, scope, depth of application, and usefulness of existing DOE Orders and guidance that are applicable to accomplishing successful hazard analysis and control.

It should be noted that WPC were designed to examine safety issues *at the worker or work activity level only.* Hazard analysis as applied to facilities, operations, and environmental consequences, is not included except as it relates to mitigation of direct worker occupational safety and health risks.

Goals

Crucial to the establishment of worker protection programs are the hazard analysis process and appropriate controls for worker protection. To address the above, the following goals were incorporated into the WPC effort:

- Review the development process and the basis of worker protection procedures.
- Through knowledge and documentation, demonstrate the continuity of the worker protection decision making process.
- Based on a review of field experience, consider needed guidance, procedural changes, communication of lessons learned, and training.

Implementation

Five sites (Hanford, Oak Ridge, Savannah River, Rocky Flats, and Fernald) recognized the benefit of this activity and volunteered to participate. Participation entailed completion of a questionnaire (see

Appendix A) jointly developed by the participating sites as well as the Offices of Environmental Management, Defense Programs, and Environment, Safety and Health.

The questions were designed to develop a picture of the worker protection, hazard analysis, and hazard control program in place at the work or task level. Information regarding the current tailoring of programs and the decision making process used in the acceptance of comprehensive program elements were assessed by each site. The depth to which a responding site examined any given question was based on the sites specific program attributes and method of application of hazard analysis and risk management program concepts as tailored to individual site hazards, risks, and mission.

Products

In a White Paper Report [White Paper Report on U.S. Industry Safety & Health Practices, Supplement to the December (1995) issue of the *American Industrial Hygiene Journal*], self-audit findings were found to be more valuable as program performance measures than were the traditional injury and illness statistics. Comments such as "Nice thick books on rules and requirements are good for attorneys, but not for people in the trenches" also indicated that line management is looking for ways to wade through the flood of rules and regulations. The products associated with the WPC activity serve as lessons learned which sites can use to compare their programs and demonstrate how safety and health decisions can be made and how peers are implementing DOE requirements. These products are:

- A best practices/lessons learned workshop (June 11-12, 1997);
- A possible chapter (section) on worker protection criteria in the ISM guide if necessary; and
- This compilation of responses (entitled "Field Perspectives") to the WPC questionnaire.

The workshop has been designed to allow participating sites to report on the outcome of their self-assessment and showcase their programs lessons learned and best practices. In addition, this workshop will offer a forum for participants to exchange information and probe each other's health and safety processes, leading to the development of follow-on recommendations.

This document represents the compilation of responses from the five participating sites as well as an unsolicited response from the Plutonium-Uranium Extraction (PUREX) Facility in Hanford, Washington. The format allows you to compare and contrast participating sites' responses. The responses are presented in the following five sections consistent with the WPC self-assessment questionnaire:

- Hazard Analysis;
- Risk Management;
- Links to Integrated Safety Management;
- Performance Measures; and
- Field Perspectives.

A short description for each site of the project or task activity for which the questions were answered is provided below.

Richland Responses to this questionnaire are provided primarily for the Tank Waste Remediation System (TWRS). However, consultation with the site Integrated Safety Management System (ISMS) core team was essential to ensure a coordinated and consistent response for TWRS. *Note: All italicized items refer to TWRS privatization*.

Paducah Responses are based on the movement of 48-inch depleted uranium hexafluoride (DUF_6) cylinders. The processes described are those used for all Environmental Management and Enrichment Facilities (EMEF) routine work activities at Paducah. Similar processes are used for non-routine work.

Y-12 Responses were developed with input from operations, facilities management, radiological control, and industrial health and safety personnel. They are based on a typical maintenance activity performed at the Y-12 Site. The processes described are governed by the maintenance work control process. There are similar work control processes that define work scope, analyze hazards, and identify and implement controls commensurate with the facility- and task-specific hazards for operational work (e.g., weapons disassembly) and for construction activities.

Savannah River Westinghouse Savannah River Company's (WSRC) input was provided directly from its document entitled, "Worker Safety - A Guide to an Integrated Approach."

Fernald Fernald responses were based on their "Thorium overpack" project.

PUREX Responses from PUREX, the first deactivation demonstration pilot, were based on experiences with the deactivation and decommissioning (D&D) pilot activities. This project was designed to help reduce the plant's safety and health risks and annual operating costs by removing the associated nuclear fuel, radioactive, chemical, other hazardous materials and physical structures. PUREX completed deactivation activities in May 1997.

Rocky Flats Rocky Flats responses were based on the Activity Based Management process developed by the site. Examples were of actual D&D projects in which the facility Activity Control Envelope (ACE) Team completed the hazards analysis. ❑

2.0 HAZARD ANALYSIS

Hazard Analysis is the 'critical element' that establishes the basis for a site's worker protection program. This section (Hazard Analysis) of the questionnaire was designed to provide information regarding the varied nature of hazard analyses and how they are undertaken at the participating sites.

The type of work being undertaken at each site is distinct, as are the specific hazards that may be encountered, yet all sites have some mechanism in place to conduct hazard analysis. All sites responded with their specific procedures. In some cases all work is analyzed in the same manner; however, graded approaches are generally used.

Based on the specific characteristics of the task, the approach to hazard analysis (team approach, employee involvement, etc.), and the robustness of the analysis vary. This variety is reflected in the responses. All sites use some form of team at various stages of the hazard analysis process. Use of these teams in addition to checklists or computer programs is instrumental in avoiding duplication of effort and missing critical actions. Employee involvement in the hazard analysis process varies at each site. The most common approach is the use of pre-job briefings and walkdowns. Several sites include workers in the planning process and one site indicated only that workers may be involved in the planning or walkdown. The scope (robustness) of the analysis is often defined by the site procedures [Job Hazard Analysis (JHA), Job Safety Analysis (JSA), Safety Analysis Report (SAR), etc.] or analysis tools such as the JHA computer tool developed at PUREX.

Questions were also included to determine how the collected hazard analysis data are utilized and communicated to everyone involved with the work. Responses stated that training and hazard control were the primary uses of these types of data. An additional use of hazard analysis data was the identification of medical monitoring requirements for workers. Other sites utilize the data in a compliance based approach to health and safety (i.e., compliance with established DOE, Federal, State, and local standards). Communication of the hazard data between health and safety professionals as well as management and workers was most often accomplished using a team approach and open discussions.

Last but certainly not least, the questionnaire addressed the issue of how collocated workers are identified and included in the hazard analysis process. Responses to these questions ranged from 'not addressed' and 'no provisions to provide hazard information' to the coordination of activities through project managers and discussions between teams. Specific examples included Rocky Flats' indication that they identified and established a boundary control limit, and Y-12's inclusion of these issues in their job planning and plan-of-the-day activities.

HA-1: How are hazard analyses conducted at the project/facility-level linked to job task analyses focused on worker safety?

Richland The primary mechanism used at the activity level to identify hazards is the Job Hazard Analysis (JHA). The linkage between hazard analysis at the facility level and hazard analysis at the activity level is a self-identified weakness. To strengthen the transfer of information from the facility level to the activity level, site-wide implementation of an automated JHA is proposed to assist in the identification of hazards and the integration of controls.

Paducah During the development of the authorization basis documents, the facility safety analysis group evaluated the nonstandard industrial hazards that could have resulted in irreversible health effects to any worker onsite. This evaluation identified the institutional safety programs that controlled the hazard as well as any individual controls that the program should address specifically. This information is documented and is available for input to any job-specific task analysis.

The movement of 48-inch DUF_6 cylinders is one of the cylinder program tasks analyzed during the job task analysis (JTA) performed in mid-1995. The results of the analysis were

published in a basis for interim operation (BIO) (authorization basis document) at that time. The JTA process is based on the information in the DOE training accreditation program manual. The major steps were as follows:

1. Develop a preliminary task list in survey form.
2. Conduct a survey with a representative sample of job incumbents to rate tasks for difficulty, importance, and frequency.
3. Select tasks for training.
4. Analyze tasks for steps, hazards, skills, knowledge, and ability.
5. Use the output of the task analysis to develop task-specific procedures and training materials.

During the survey, the BIO information was used to help determine the importance of each task. BIO information provided the potential consequences of failure to perform the task correctly.

During the task analysis, the BIO information and health and safety subject matter experts provided details of the task hazards and needed hazard controls.

Y-12 The maintenance work control process, as defined by Y-12 Plant Procedure Y10-35-001, *Maintenance Management Program*, governs the planning, scheduling, execution, post-maintenance testing, and completion of maintenance work. The work control process is tailored according to the hazards associated with the work and depending on the categorization of the structure, system, or component being serviced.

Maintenance work that is complex or that contains potential risk to the worker requires a planned job package. The maintenance planner develops a work package according to Y10-35-002 and the planners guide. Working with the requester, the planner walks-down the job and verifies that the information provided on the Maintenance Job Request (MJR) is complete and accurate. A job planning checksheet is used to guide the planner conducting the job-specific hazard analysis. The checksheet identifies potential environmental, health, and safety (ES&H) hazards and the corresponding permits and authorizations required before the job plan can be executed.

Savannah River The Work Management System (WMS) addresses special considerations (e.g., industrial hygiene, safety, radiological controls, electrical safety) involved in a maintenance activity and the need for permits, such as the Work Clearance Permit (WCP). The WCP is of primary importance to the evaluation of hazards and to the establishment of controls to mitigate them for maintenance work at Savannah River Site (SRS). Some maintenance activities do not involve hazardous conditions, are covered by operating procedures, or are repetitive in nature (e.g., calibrations), in which case, hazards are addressed by procedures covering the activity.

The work clearance and authorization process commonly referred to as the WCP establishes the methodology and requirements for controlling workplace hazards and authorizing work. The process of preparing a WCP provides for:

- Work hazard screening.
- Health and safety requirements and/or compensatory measures to mitigate existing hazards.
- Assurance that all health, safety and regulatory permits have been obtained.
- Written authorization from the shift manager and involved work group supervisor(s) to start work.

A WCP is NOT required for:

- Routine work performed in designated shop areas.
- General office work.
- Routine servicing of refrigerators.
- Repairing light and portable equipment.
- Vendor-performed copy machine and food service machine servicing.
- Software loads and system management activities on process control and systems.
- Routine operations support activities, such as changing chart paper and relamping or moving/maintaining protective clothing and/or building supplies.
- Surveillance and routine preventive maintenance performed according to approved facility-specific procedures authorized by the shift manager.
- Facility operations being performed according to approved facility operating procedures.

Note: Approved procedures authorized for use without a WCP must identify hazards associated with the activity and methods to mitigate them, including the specific type of personal protective equipment (PPE), when required.

The initiator (e.g., a work planner in some organizations) of a WCP has to review the work documentation, and document all known or anticipated hazards, such as system, area, task, etc., on WCP Section 2. If additional hazards are present, one or more additional pages are added to the WCP.

The JHA, developed through the Job Hazards Program, provides a source of information on hazards. A JHA is a three-step process that involves (1) reviewing basic sequential steps of an activity or job, (2) identifying hazards to the worker, and (3) identifying preventive measures that need to be in place to protect the worker.

Information obtained from performing a JHA is in addition to the WCP initiator's knowledge of the task to be performed. This knowledge may be based on personal work experience, onsite inspection of the task to be performed, discussions with knowledgeable support organizations (e.g., Industrial Hygiene, Radiological Control, Process Engineering) and/or discussions of the work and its hazards with workers that will be involved in the job.

The work group supervisor is responsible for ensuring, by physical walkdowns of the work area as needed, that identified hazards and actions required to mitigate the hazards are complete, or scheduled to be completed, as required to support safe job completion.

The shift manager indicates which, if any, additional reviews are required for the WCP. Reviewers routinely considered include personnel from the following:

- Mechanical Maintenance
- Electrical and Instruments
- WSRC or BSRI Safety
- Level 2 Operating Department
- Utilities Service Group (Power)
- Fire Protection
- Security
- Engineering/Technical
- Industrial Hygiene
- Radiological Control Operations
- Rigging/Cranes
- Subcontract Technical Representative
- Subcontractor

- Environmental Protection
- HVAC

Based on their area of expertise, each reviewer ensures that WCP Sections 1, 2, and 3 address adequate safety requirements and compensatory measures for work to be performed. When satisfied, the reviewer signs Section 4 indicating concurrence.

WSRC 2S Manual, Procedure 1.1, "Procedure Administration," requires the procedure review performed by the Cognizant Technical Function (CTF) to include a technical accuracy verification of the procedure with regard to items such as technical standards, operational safety requirements, Safety Analysis Report, process requirements, Process Hazard Review (PHR), Design Agency requirements, test authorizations, and nuclear criticality safety and interlock configurations. The Radiological Control Organization (RCO) must review procedures involving radiological work in accordance with the WSRC 5Q Manual. Other departments or organizations, such as occupational safety and industrial hygiene, must also review the procedure when their expertise is applicable to identified hazards.

The procedure preparer has to identify hazards associated with the facility and work to be performed. The Preliminary Hazard Analysis (PHA), the Hazard Analysis Document (HAD), the Safety Analysis Review (SAR) for the facility, and the Process Hazard Review (PHR) are among sources for identification of facility hazards.

Because experienced operations staff have performed operational activities in SRS facilities, their involvement in the identification of hazards and controls necessary to mitigate them is crucial to the development of procedures which ensure safe work performance. The JHA program provides a process to identify hazards specific to the job, and involves workers and work groups performing the task.

As described in WSRC 2S Manual, Procedures 1.1 and 1.2, the author of a procedure is responsible to provide users of technical procedures with safety steps where failure to complete the step would create danger to personnel or facility safety. The CTF reviewer performs a verification of the technical accuracy of the procedure with respect to items such as technical standards, operating safety requirements, safety analysis reports, process requirements, PHRs, Design Agency requirements, test authorizations, nuclear criticality safety, interlock configurations and environmental permits/requirements.

A JHA is a three-step process that involves reviewing steps of an activity or job, identifying hazards to the worker, and identifying preventive measures (procedures and protection) that need to be in place to protect the worker. A JHA is performed by line personnel prior to, or at the start of, each task when required by elements of the Job Hazard Program. Safety measures are identified and incorporated into the work plan. Where lessons learned are identified, Job Hazards Program elements are modified to prevent recurrence.

The Job Hazard Program is a collection of programs that implement preventive measures required to protect workers from job hazards. Some of the current program elements are:

- Occupational Safety Policy
- Occupational Safety and Hygiene Management Requirements and Procedures
- WSRC 8Q Employee Safety Manual
- WSRC 4Q Industrial Hygiene Manual
- WSRC 1Y Conduct of Maintenance Manual
- WSRC 2S Conduct of Operations Manual
- WSRC 5Q Radiological Control Manual
- WSRC 2Q Fire Protection Program Manual

- Air Sampling
- Pressure Protection
- Process Hazards Analysis
- WSRC 9B Site Item Reportability and Issues Management (SIRIM) Manual
- Site Rigging Manual
- WSRC 18Q Safe Electrical Practices and Procedures Manual
- WSRC 19Q Transportation Safety Manual

Fernald A PHA is developed with input from all health and safety disciplines and operations personnel. Hazards and risk assessment, per job sequence, are developed and addressed in various documents, such as the operating procedures for the project.

PUREX Each work activity is reviewed using the computer-based JHA process. This review is conducted by the work team with involvement of the appropriate safety professionals. The JHA addresses both worker safety and nuclear safety [Technical Safety Requirements (TSR) and process control] items.

Rocky Flats The primary mechanism for hazard analysis is activity-specific planning. This takes place in two primary formats at Rocky Flats: first, through development of the activity control envelope (ACE), including a hazards and controls table for a specific project or process level. This process is used in high-hazard, high-uncertainty work. In addition, job safety analyses (JSAs) are linked to the integrated work control program and procedure development to ensure appropriate hazard identification and specification of controls for individual tasks or processes within a facility. For routine work, JHA is captured within the integrated work control program. Hazard analysis and safety mechanisms are imbedded in the integrated work control process, which focuses on worker safety by walking down the job to ensure all procedures and job conditions which could possibly result in an accident are looked at.

HA-2: How does your site determine which hazard analysis approach to use for a work task? Are there defined criteria?

Richland A consistent methodology is used for all Job Hazard Analyses (JHA), but tailoring is used in its applications to job-specific activities. The methodology is provided in WHC-CM-1-10. Tailoring is performed based on the risk and complexity of the activity for the effective implementation of safe and cost-effective work practices. In addition to risk and complexity, the routine/nonroutine nature of the work assists in establishing a proper balance of work instruction or procedure, JHA worksite supervision, and craft skill.

Paducah The approach does not differ for work tasks. The basic steps are:

1. Describe the work.
2. Describe the hazards.
3. Analyze the hazards.
4. Select the hazard controls.
5. Document in:
   a. Procedures for routine work,
   b. Work package for maintenance-unique tasks, or
   c. Activity hazard analysis for construction tasks.

Criteria for this process are included in procedures for procedure development, work control, and activity hazard analysis.

TASK 6 : LIFT CYLINDER FROM CURRENT LOCATION			
Task Conditions:	1. Cylinder is located in an authorized and controlled cylinder storage yard; 2. Cylinders may or may not be on storage saddles; 3. Cylinders may be stacked 2 or 3 high; 4. No adverse weather conditions.		
Element/Step	**Step Hazard**	**Hazard Control**	**Governing Standard**
Move Allied Wagner cylinder handler to the cylinder	Toxic Chemicals including UF_6 & HF; Radiation; Radioactive Contamination; Fissile Material; Vehicle-Equipment Operation / Obstructed View and Obstructed Equipment Travel Paths	Procedure Cylinder wall integrity Communication devices RWP Criticality Safety Program/CSAs	29 CFR 1910 29 CFR 1926
Lower cylinder handler grappler to the cylinder	Vehicle-Equipment Operation / Obstructed View and Obstructed Equipment Travel Paths; Pinch Points;	Procedure	29 CFR 1910 29 CFR 19261
Close grappler tines around cylinder body	Vehicle-Equipment Operation / Obstructed View and Obstructed Equipment Travel Paths; Pinch Points; Hazardous Substance Releases	Procedure	29 CFR 1910 29 CFR 1926

TASK 6 : LIFT CYLINDER FROM CURRENT LOCATION			
Task Conditions:	1. Cylinder is located in an authorized and controlled cylinder storage yard; 2. Cylinders may or may not be on storage saddles; 3. Cylinders may be stacked 2 or 3 high; 4. No adverse weather conditions.		
Element/Step	**Step Hazard**	**Hazard Control**	**Governing Standard**
Lift cylinder from current location	Toxic Chemicals including UF_6 & HF; Radiation; Radioactive Contamination; Fissile Material; Suspended Loads; Vehicle-Equipment Operation / Obstructed View and Obstructed Equipment Travel Paths; Pinch Points; Hazardous Substance Releases;	Procedure Cylinder wall integrity Communication devices RWP Criticality Safety Program/CSAs	29 CFR 1910 29 CFR 1926 ACGIH 10 CFR 835 DOE N441.1 ANS-8.1 Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors ANS-8.3 Criticality Accident Alarm System ANS-8.7 Guide for Nuclear Criticality Safety in the Storage of Fissile Materials ANS-8.19 Administrative Practices for Nuclear Criticality Safety ANS-8.20 Nuclear Criticality Safety Training

Y-12 The Maintenance Planner's Guide (Y10-035-008) contains detailed guidance for completing each section of the job planning checksheet. Section A of the checksheet, "Health and Safety," includes an evaluation by the planner, the maintenance supervisor, and the customer (operations) to determine the need for a JHA, permits, hold points, and other requirements. Criteria for making this determination are listed in the guide as well as in Appendix B of Y70-043, *Job Hazard Analysis*, and include considerations such as the type of materials involved, electrical safety issues, and hoisting/rigging requirements. Section A also lists the requirements for special permits, environmental assessments, and Unreviewed Safety Question Determinations (USQD).

During the job planning process, many other disciplines provide input to the job plan. Operations personnel work closely with the planner to make sure the work scope is well defined and understood. In many cases, the worker who operates the system/equipment is involved as the subject matter expert. Evironment, safety and health (ES&H) technical support personnel who are assigned to the facility participate in the JHA, as needed, and specify the controls required for the job. Requirements for personal protective equipment (PPE), special permits or approvals, lockout/tagout, and the like are specified in the job package.

The results of post-maintenance tests and any lessons learned during work execution are reviewed during the post-job review. Based on this feedback, the job plan may be updated to reflect lessons learned so that the same or a similar type of work is accomplished more effectively in the future. Equipment repair history data are collected, analyzed, and used to help establish frequencies for scheduled maintenance activities.

Y-12 is currently piloting an Enhanced Work Planning (EWP) process that will further improve the work control process. The EWP process provides an automated screening tool that better defines when a detailed JHA is needed. The EWP pilot effort has included benchmarking of the work planning processes at other DOE sites, including Hanford and Fernald.

Savannah River

The Work Management System (WMS) addresses special considerations (e.g., industrial hygiene, safety, radiological controls, electrical safety) involved in a maintenance activity, and the need for permits, such as the Work Clearance Permit (WCP). The WCP is of primary importance to the evaluation of hazards and to the establishment of controls to mitigate them for maintenance work at SRS. Some maintenance activities do not involve hazardous conditions, are covered by operating procedures, or are repetitive in nature (e.g., calibrations), in which case, hazards are addressed by procedures covering the activity.

The Radiological Control Organization (RCO) reviews procedures in accordance with the WSRC 5Q Radiological Control Manual. When additional departments or organizations (Occupational Safety, Industrial Hygiene, etc.) are affected by a new or revised procedure, they review the applicable procedure sections. Identified safety issues or technical inadequacies are documented on the review form for evaluation and disposition by the procedure owner.

The initiator (e.g., a work planner in some organizations) of a WCP has to review the work documentation and document all known or anticipated hazards, such as system, area, and task on WCP Section 2. If additional hazards are present, one or more additional pages are added to the WCP.

The JHA, developed through the Job Hazards Program, provides a source of information on hazards. A JHA is a three-step process that involves (1) reviewing basic sequential steps of an activity or job, (2) identifying hazards to the worker, and (3) identifying preventive measures that need to be in place to protect the worker.

Information obtained from performing a JHA is in addition to the WCP initiator's knowledge of the task to be performed. This knowledge may be based on personal work experience, onsite inspection of the task to be performed, discussions with knowledgeable support organizations (e.g., Industrial Hygiene, Radiological Control, Process Engineering) and/or discussions of the work and its hazards with workers that will be involved in the job.

The WCP initiator identifies appropriate hazard mitigation methods by checking the applicable identified safety requirements/compensatory measures on the WCP, Section 3. The initiator also provides any special health, safety, or hazard analysis requirements, including special permits and/or additional requirements necessary to complete the work safely. If additional hazard mitigation information is needed, other pages are added to the WCP.

During the process of identifying potential hazards and appropriate mitigation methods, the need for additional permits may be identified. The Radiological Work Permit (RWP), Confined Space Entry Permit, and Hot Work Permit are examples of commonly used permits.

Fernald

The Nuclear Safety Department uses a graded approach to determine the hazard analysis approach (Reference NS-0003).

PUREX The JHA is used to determine the appropriate level of additional analysis. For simple tasks with low hazards and complexity, the JHA may be the only analysis. For more complex and higher hazard activities, the JHA will identify that a preliminary hazards screening/analysis (PHSA) is required. The PHSA is completed with the help of an experienced analyst and work team members. This process is used to determine the appropriate level and type of analysis.

Rocky Flats Hazard analysis type is determined by the category of the job. The activity definition process, which uses DOE-STD-102-92, *Hazard Categorization and Accident Analysis Techniques,* DOE-EM-STD-5502-94, *Hazard Baseline Documentation,* 40 CFR 302, and 29 CFR 1910.119, is a way to determine this. The two primary mechanisms used for occupational safety and health (OSH) hazard analysis are the activity control envelope (ACE) for process-type activities and JSAs for short-duration specific-scope activities such as maintenance or construction. Criteria are contained in the health & safety practices manual (HSP) and the level-one procedure guiding ACE development. HSP chapters, Occupational Safety and Health Administration (OSHA) requirements, National Institute for Occupational Safety & Health (NIOSH) recommendations, and American National Standards Institute (ANSI) specifications are among the criteria used in determining the hazard analysis approach to use.

HA-3: How robust is the spectrum of hazard analysis for worker safety versus operational or facility safety, across all health and safety disciplines? Too much or not enough understanding of radiological, chemical, and occupational safety factors? How does your site view this in respect to the "defense-in-depth" model?

Richland Robust hazard analysis has been performed at the Tank Waste Remediation System (TWRS) facility level, considering worker safety with respect to all health and safety disciplines. This information has been documented both in the facility hazard analysis referenced in the TWRS basis for interim operation (BIO) and in the facility Health and Safety Plan (HASP). TWRS will continue to identify enhancements in these areas. Different types of controls exist as a result of the hazard identification and analysis. Engineered and administrative controls serve as the primary protection. Defense-in-depth controls are the additional controls that are a result of controls identified in the HASP, and reviews of the Job Hazard Analysis (JHA) by health and safety professionals. The defense-in-depth controls provide additional protection to the worker. Also the Unreviewed Safety Question (USQ) process serves to identify the appropriate defense-in-depth controls during the screening process.

Paducah The facility safety analysis evaluates nonstandard industrial hazards that exceed the screening levels presented in DOE-EM-STD-5502-94 for potential impact on worker safety. The hazard analysis is graded by requiring a more detailed analysis for more significant hazards that could result in health effects beyond the immediate vicinity of the hazard. The facility safety analysis uses the defense-in-depth approach by relying on the institutional safety programs to accomplish stated objectives and by performing analyses to determine any additional controls to support worker safety.

The institutional safety programs provide experts in industrial hygiene, industrial safety, health physics, and facility safety for the work hazard identification process described in the answer to question HA-2. Formal Unreviewed Safety Question Determination (USQD) processes are used when the work affects or could affect the authorization basis.

Defense-in-depth is achieved through the use of the safety analysis, technical safety requirements, work package screening by health and safety professionals, facility

managers, and work supervisors. Whenever possible, workers are involved in the work planning and procedures development activities.

Y-12 The process is tailored according to the risk associated with the task. For complex, high-risk tasks, the analysis is very robust and includes input from applicable health and safety professionals. These professionals are assigned to support specific facilities and, in addition to their knowledge and expertise in their particular discipline, they are familiar with the operations and the facility.

With respect to "defense-in-depth," multiple layers of controls exist to protect the worker. The safety authorization basis includes a hazard analysis of the facility, and engineered and administrative controls are in place at the facility level to protect the worker. The additional controls that are applied as a result of the JHA, such as personal protective equipment (PPE), provide an additional layer of protection.

Savannah River See response to question HA-2.

WSRC 11Q Facility Safety Document Manual describes the process for performing and documenting process hazard analyses. Formal process hazard analyses are completed for each nuclear facility to identify and analyze accident scenarios associated with the operation of that facility, specify any controls necessary to prevent/mitigate the event and classify each event relative to frequency and severity.

The hazard classification process divides accident events into two basic groups; more significant events are identified as scenario Class I and II events and less significant events (including some Common Industrial Hazards [CIHs]) are identified as scenario Class III and IV events. Facility safety documentation [Safety Analysis Report (SAR), BIO, etc.] addresses the more significant events (Class I and II, which exceed DOE criteria for offsite receptors), and records specific links between these accident scenarios and controls necessary to prevent and/or mitigate each event. Annual updates to process hazard analyses ensure that the defined safety envelope is bounding and any new events identified by the USQ process have been included. Implementation of controls identified for these events is tracked by the organization's Commitment Management System (CMS).

Less significant events (Class III and IV) are also identified in the process hazard analysis, but are not included in the SAR or BIO. These events are reviewed by the Facility Operations Safety Committee (FOSC) for formal dispositioning. For those identified Class III and IV events that the FOSC determines require additional actions or controls, a Special Process Hazard Review (SPHR) or JHA will be performed to evaluate the event further and identify any controls necessary. Events identified in the periodic Process Hazard Review (PHR) are also carried forward into the process hazard analysis, providing additional assurance that worker safety has been adequately evaluated.

Sources of information on hazards in operations activities are provided in the Hazards Analysis (HA) sections of SARs and BIO documents. Information is also available from PHRs conducted through the WSRC Process Safety Management (PSM) program.

Design PHRs are conducted by the engineering organization having responsibility for design of a new facility, with input from the operating organization. Pre-operational PHRs are performed jointly by the design team and the operations team. Periodic PHRs are conducted by teams of engineers and operators having intimate knowledge of the process. These reviews allow the team to consider recent operating experience and recent changes in design and operations and, most importantly, help the team consider what can go wrong and how to prevent accidents. Reviews are conducted periodically and at specific stages of the process's life cycle. The frequency of the periodic PHR is determined by the operational organization's Process Safety Committee, based on the hazard level

determined for the facility or process. This program has been in place at SRS for over ten years, and is based on the chemical industry process safety practices developed by the DuPont Company.

A JHA is a three-step process that involves reviewing steps of an activity or job, identifying hazards to the worker and identifying preventive measures (procedures and protection) that need to be in place to protect the worker. A JHA is performed by line personnel prior to, or at the start of, each task when required by elements of the Job Hazard Program. Safety measures are identified and incorporated into the work plan. Where lessons learned are identified, Job Hazards Program elements are modified to prevent recurrence.

The Job Hazard Program is a collection of programs that implement preventive measures required to protect workers from job hazards. See the final paragraph of the response to question HA-1 for a list of some of the current program elements.

Westinghouse Savannah River Company (WSRC) maintains an Integrated Standards-Based Safety Management Program, referred to as the ISBSM Program. The objective of this program is to integrate safety systematically into management and work practices at all levels of the organization so that missions are accomplished while protecting the public, workers, and the environment. The ISBSM Program applies to all segments of WSRC, its partners and subcontractors, and satisfies all requirements of the DOE Plan for Safety Management.

Actions by WSRC and its subcontractors to ensure safety management are guided by the following fundamental safety management principles:

- Line management is responsible for the protection of the public, workers, and the environment.
- Clear and unambiguous lines of authority and responsibility for ensuring safety are established and maintained at all organizational levels within the Company and its subcontractors.
- Personnel possess the experience, knowledge, skills, and abilities necessary to discharge their responsibilities.
- Resources are effectively allocated to address safety, programmatic, and operational considerations. Protecting the public, workers, and the environment is the priority whenever activities are planned and performed.
- Before work is performed, the associated hazards are evaluated, and an agreed-upon set of safety standards and requirements are established that, if properly implemented, provide adequate assurance that the public, workers, and the environment are protected from adverse consequences.
- Administrative and engineering controls to prevent and mitigate hazards are tailored to the work and associated hazards being performed.
- Conditions and requirements to be satisfied for operations to be initiated and conducted are clearly established and agreed upon.

Safety management activities that follow the above principles are grouped into five core functions:

- Define scope of work.
- Identify and analyze hazards associated with the work.
- Develop and implement hazard controls.
- Perform work within controls.
- Provide feedback on adequacy of controls and continuous improvement in defining and planning work.

The above functions are applied to WSRC and subcontractor work through the ISBSM Program, ensuring that:

- Based on defined work scope, hazards are identified and appropriately evaluated for each facility or activity, using WSRC 11Q Facility Safety Document Manual.
- Appropriate environment, safety and health (ES&H) standards to prevent undue risk to workers, the public, and the environment from recognized hazards are identified and assessed using WSRC 8B Compliance Assurance Manual.
- Company-level policies/programs are used to implement required standards; control hazards through mitigation techniques; provide uniformity; and enhance WSRC's operational imperatives: Safety, Disciplined Operations, Continuous Improvement, Cost-Effectiveness, and Teamwork.
- Self-assessments and independent assessments are conducted, using WSRC 12Q Assessment Manual and WSRC SCD-4 as appropriate, to verify that appropriate regulatory, contractual, and Company requirements are being met; facility performance is being optimized; the public, workers, and the environment are being protected; and corrective actions are being implemented.
- Assessment results are evaluated and integrated into future operations to ensure effective program implementation, continuous improvement, and the balance of priorities.
- The ES&H Management Plan is adjusted annually to describe methods employed to ensure ES&H requirements are integrated into appropriate phases of Company operations.

The WSRC ISBSM Program links activities, based on hazard identification results, to required ES&H standards and company-level and facility/program-specific procedures for attaining compliance with these standards. Five elements link together to comprise this program. These elements, described more fully below, are hazard identification, standard selection, implementation, assessment, and evaluation.

Element 1: Hazard Identification

WSRC 11Q Facility Safety Document Manual establishes requirements and guidelines for safety analysis and documentation activities, including:

- Determining facility hazard categories for all facilities.
- Preparing, reviewing, approving, and revising safety analyses for all facilities and operating modes.
- Implementing DOE Orders 5480.21, 5480.22 and 5480.23, and applicable requirements, contained in the approved Standards/Requirements Identification Document (S/RID).

The facility hazard category is based primarily on quantities, locations and forms of radiological and hazardous material inventories present. The facility hazard category has a major impact on analysis detail, types of safety documents and facility design criteria, requirements, and standards.

Facility hazard categories include:

- Nuclear HC-1: Nuclear operations involving radioactive materials that present a potential for significant offsite consequences.

- Nuclear HC-2: Nuclear operations involving radioactive materials that present a potential for significant onsite consequences.
- Nuclear HC-3: Nuclear operations involving radioactive materials that present a potential for significant localized consequences.
- Radiological: Facilities with radiological hazards below HC-3, but above a minimum Environmental Protection Agency (EPA) level of concern.
- Chemical (High): Facilities with a chemical inventory that requires an OSHA Process Safety Management (PSM) program or satisfies EPA high-hazard chemical facility requirements.
- Chemical (Low): Facilities with a chemical inventory below the threshold for “Chemical (High)", but above the criteria for “Other Industrial."
- Other Industrial: Facilities with hazards below the EPA minimum level of concern for both radiological and other hazardous material. Examples of hazards that may be excluded include: material in forms or quantities commonly used or encountered by the public; chemicals purchased in common quantities that are adequately controlled by industrial standards; chemicals in “laboratory quantities"; and chemicals that are inert, do not interact with other chemicals, pose no health hazard, or are in a non-dispersible form.

Facility hazard categories allow for a graded approach in developing safety documents. For example, a nuclear facility will require safety documents with more formality and detail than a radiological facility.

The five phases of the safety analysis and documentation system are: hazard identification, hazard analysis, accident analysis, safety documents, and safety basis. This system results in the preparation, review, approval, and maintenance of safety documents included in a facility’s safety basis. The system also allows for a graded approach based on the facility hazard, complexity and lifetime.

Hazard Identification

Hazards are identified from material inventories and energy sources, and are recorded by amount, physical and chemical characteristics, and location. Common industrial materials are eliminated from further analysis. The final inventory that represents the safety basis must be conservative and consider operating fluctuations, since they are the basis for operating restrictions and administrative controls. Safety basis inventories are used to determine the facility hazard category which, in turn, is used to select safety document requirements, approval levels, and facility design criteria.

Hazard Analysis

Hazard analysis is a comprehensive evaluation of potential process-related, natural phenomena and external hazards that can affect either the public, workers, or the environment.

The objectives of a hazard analysis include:

- Evaluating hazards (e.g., type, cause, controls, qualitative consequence, frequency) in order to assess whether those characteristics are acceptable.
- Identifying controls and limits that provide adequate protection.
- Selecting accidents that may require a more detailed analysis.

Evaluation consists of a comprehensive qualitative analysis of the complete spectrum of hazards and their potential release to determine cause, failure modes, method of detection, preventive or mitigative systems, emergency actions and consequence, frequency, and risk rankings. From this information, consequences and frequencies are assessed by comparing

the qualitative estimates to a matrix of consequence versus frequency range. The matrix identifies accident sequences important enough for additional analysis. Also, important controls and operating limits can be selected from the hazard and accident information gathered during a hazard evaluation.

Accident Analysis

Accident analysis is a detailed assessment of significant accidents identified in a hazard analysis. The objectives of an accident analysis include:

- Identifying by functional classification the systems, structures, and components (SSCs) and design requirements needed to adequately control design basis accidents (DBAs).
- Establishing operating limits.
- Analyzing, in detail, accident consequence and frequency, taking SSCs into account.

A detailed analysis is not generally required for Nuclear HC-3, Radiological, Low Hazard Chemical, and Other Industrial facilities. A deterministic approach to assessing frequency ranges and unmitigated consequences should suffice in many cases.

Operating limits and administrative controls (e.g., technical safety requirements) ensure the facility hazard category remains valid; safety class systems, structures, and components (SCSSCs) and safety-significant systems, structures, and components (SSSSCs) are operable and reliable; and analysis conclusions presented are ensured by protecting important characteristics in the safety analysis. Operating limits can be defined from a hazard evaluation or an accident analysis.

Documentation

Safety analysis conclusions are reported in several types of safety documents, some of which are included in a facility’s safety basis. These documents include:

Hazard Analysis Documentation

Hazard analysis documentation represents a category of documents that report results of hazard analyses depending on programmatic needs. The documents include:

- Hazard Assessment Document (HAD): Communicates results of hazard identification and categorization.
- HASP: Documents a special hazard analysis performed for facilities or operations involving hazardous waste per OSHA regulation 29 CFR 1910.120.
- Process Hazards Review (PHR): Evaluates hazards during design and periodically during operation per OSHA regulation 29 CFR 1910.119.
- Emergency Preparedness Hazards Assessment (EPHA): Documents a special hazard assessment that satisfies emergency management requirements per DOE Order 5500.3A, “Planning and Preparedness for Operational Emergencies."

Safety Analysis Documentation

Safety analyses include several other safety documents to support selection of operating limits and administrative controls. These safety documents include: SAR, BIO, Technical Safety Requirements (TSRs), Justification for Continued Operation (JCO), and Auditable Safety Analysis (ASA) . The purpose for such a variety is to provide a graded approach for generating safety documents based, in part, on the facility hazard category.

A SAR is the main component of a nuclear facility safety basis. It presents results of hazard and accident analyses and supporting information to demonstrate the facility, as designed and constructed, can be operated without undue risk to the public, workers, and the environment. In brief, a SAR: (a) describes site, facility and operation characteristics, (b) defines the safety basis, (c) presents hazard and accident analyses, (d) identifies SCSSCs, SSSSCs, and operating limits derived from the analyses, and (e) describes administrative programs that support safe operation (e.g., emergency preparedness, fire protection, criticality safety).

SAR requirements have changed significantly since 1986, such that existing SARs vary in compliance with new requirements. For existing facilities, a document called a “BIO” was created as a bridge between old safety analyses and newer requirements. The BIO serves as an interim safety-basis document if the facility has an approved exemption request, or until an SAR is upgraded.

TSRs replace previous Operating Safety Requirements (OSRs) and Technical Specifications (TSs). TSRs define conditions, safe boundaries and their bases, and management or administrative controls required to ensure safe operation.

The JCO has been used to document the current safety envelope for facilities that do not conform to current safety documentation requirements, and to provide an interim operating basis, if an extended analysis is needed during the USQ process.

ASA documentation is a graded approach to providing safety analysis documents for non-nuclear facilities. ASA objectives are to provide systematic identification of hazards and to describe and analyze the adequacy of measures to eliminate or control those hazards. These objectives can be satisfied by other documents prepared in the course of performing a hazard or safety analysis.

Administrative Limits (ALs) are a graded approach to providing operating limits for non-nuclear facilities. ALs preserve the facility hazard category and important safety basis conclusions and assumptions. If other safety documents provide enough information to serve the same function as ALs, then separate ALs are not necessary.

Safety Basis Documents

The safety basis represents those aspects of facility design and operational requirements relied upon for facility safety. For nuclear facilities, the safety basis is called the Authorization Basis (AB), and the documents relied upon by DOE to authorize operation are called AB documents. For other facilities, the safety basis is the ASA. For new operations, the minimum sets of safety basis documents are:

- Nuclear (HC-1 or 2): Full-scope SAR and TSR
- Nuclear (HC-3): Reduced-scope SAR, TSR for inventory control
- High Hazard Chemical: ASA (inc. OSHA haz. analysis) plus AL
- Radiological/Low Hazard Chemical: ASA plus AL
- Other Industrial: AL

For existing operations, safety basis documents may comprise a variety of safety documents as discussed above. As new or existing operations continue, changes to

operations and documents may result in revised or new safety documents becoming part of the safety basis.

Linking Documents

Operations are conducted at WSRC by procedure. Once a safety document is added to the safety basis, procedures are revised or added to incorporate new requirements, assumptions, equipment, or administrative limits. Thus, there is a link between the safety basis and operating procedures.

Safety Basis Control

Safety basis control is the process by which changes to facilities are authorized and revisions to safety documents made. Thus, safety basis control consists of authorization of proposed activities and maintenance of safety documents.

Safety Basis Authorization

Proposed Activities (PAs) to change nuclear facility configuration, procedures, or management systems are reviewed to determine if they are within the AB. If determined to be within the AB, they are considered to be pre-authorized by DOE; otherwise they are submitted to DOE for approval prior to implementing the change. For non-nuclear facilities, the safety basis is authorized by DOE approval of ASA documentation for High-Hazard Chemical facilities, and by WSRC for the remaining facilities.

Safety Basis Maintenance

Once changes to an AB are approved, it can be revised. In addition, nuclear facility SARs and TSRs are subject to an annual review to ensure accuracy of the AB.

Element 2: Standard Selection

DOE establishes rules and regulations, and issues directives and guidelines specifying requirements for management and conduct of operations at SRS. It is the policy and obligation of WSRC to manage and conduct its assigned operations and related programs in full compliance with all such applicable rules, regulations, directives and guidelines. WSRC has a single comprehensive Compliance Assurance Program that applies broadly to all operations and related programs. This program is designed as a graded program that places greater emphasis on those particular requirements relating to protection of the environment, the public, and worker safety and health.

The Compliance Assurance Program has four major stages: requirements definition, programmatic compliance assessment, adherence compliance assessment, and corrective actions and reporting.

The first stage, requirements definition, codifies requirements in the S/RID, which relates and groups requirements in 22 predefined ES&H functional areas (e.g., training and qualification, radiation protection, occupational safety).

The second stage, programmatic compliance assessment, determines whether standing company policies and procedures, or other written guidance, properly reflect and promulgate the stated requirements. These determinations are documented in Part I of the Compliance Assessment and Implementation Reports (CAIRs). The CAIRs serve a two-fold purpose: (1) the provision of a standard format and methodology for performing

compliance assessments and (2) as an internal control document for controlling subsequent changes to referenced implementing management controls.

Stage three, adherence compliance assessment, is involved in demonstrating compliance through performance-based verifications and self-evaluation activities described in WSRC 12Q Assessment Manual. If the verification and self-evaluations identify any non-compliances, corrective actions are identified and implemented.

Stage four, corrective actions and reporting, captures the non-compliances identified in stages two and three in Requests for Approval (RFAs), that document the needed corrective actions, associated costs, schedule impacts, benefits, compensatory measures and justifications.

Element 3: Implementation

WSRC policies, procedures, and other management controls are linked to ES&H requirements in the S/RID through CAIRs. Implementation is achieved by operating in accordance with approved implementing policies and procedures.

Element 4: Assessments

Assessments are conducted to demonstrate field adherence to WSRC policies and procedures, as well as to foster continuous improvement. WSRC 12Q Assessment Manual and WSRC-SCD-4, "Assessment Performance Objectives and Criteria, establish the program for conducting assessments. WSRC-IM-96-147, "Self-Assessment Handbook," provides guidance for planning, conducting, and documenting results of assessments.

The assessment process is a consistent, comprehensive, integrated assessment process that employs total quality management concepts supporting SRS's five imperatives: safety, disciplined operations, continuous improvement, cost-effectiveness and teamwork. This process provides for recognition of noteworthy practices and identification of specific performance deficiencies, and provides input to the management evaluation process.

The assessment process is governed by: (1) operational status of the facility undergoing assessment and its position in the life cycle, (2) assignment of responsibility to line management or an independent entity for different aspects of the assessment, and (3) use of standardized performance objectives and criteria.

The performance objectives and criteria are contained in WSRC-SCD-4, which is revised at least annually to reflect changes to regulatory requirements as well as to incorporate lessons learned from personnel conducting assessments in the field.

In order to start up or restart activities for nuclear facilities, processes, equipment, or systems, special self-assessments, such as the Readiness Self-Assessment (RSA), Operational Readiness Review (ORR), and Readiness Assessment (RA), are performed.

When a facility becomes operational, self-assessments are required to:

- Demonstrate ongoing compliance with requirements through performance-based assessments.
- Evaluate adequacy of the line self-assessment process.

WSRC has chartered the Facility Evaluation Board (FEB) to:

- Provide accurate, consistent, and gradeable measures of performance effectiveness.

- Evaluate adequacy of the line self-assessment process.
- Satisfy contractual obligations for company-level independent oversight.

Element 5: Evaluation

Management evaluation focuses on the use of evaluation processes to understand assessment results, and to determine what those results mean relative to the performance of the assessment unit or functional program. Although not prescribed, structured analytical techniques have been developed and are advocated for use in interpreting assessment results and making intelligent decisions regarding improvement actions. These evaluation requirements are directed at optimizing value gained from the assessment results to correct root cause problems and identify necessary assessment unit or functional program improvements to raise the respective performance level to acceptable standards. An improvement package may be compiled to define and prioritize actions in the ensuing year, to eliminate performance deficiencies, and to focus subsequent self-assessments on areas of needed improvement.

Fernald A broad spectrum of operational safety concerns is reviewed by representation from all safety disciplines as well as operations personnel. Stringent requirements are imposed to abate hazards identified and are relaxed only when the field experience and job monitoring activities indicate that the safety precautions may be relaxed.

PUREX The process was developed to ensure that a process was in place to address the full spectrum of hazards using a graded hazard analysis process. The JHA was designed to address industrial safety, industrial hygiene, nuclear safety, environmental, and radiological hazards. This process, combined with the other required hazard analyses (fire hazard analysis, SAR, criticality safety evaluations, etc.), provides defense-in-depth.

Rocky Flats Following are a few examples of hazard and safety analysis that exhibit cross-coverage and in-depth coverage for worker safety operational and facility safety: JSA, JHA, activity hazard analysis, audible safety analysis, and occupational safety analysis.

HA-4: How do site line management and support personnel (industrial hygiene, safety, radiological safety, nuclear safety, training, engineering, medical) use, exchange, and integrate hazards data at the task level?

Richland Line management is involved in job planning and as part of the work planning process, appropriate health and safety disciplines are also used in the development/approval of the work package. The automated Job Hazard Analysis (JHA) will strengthen the integration of information (data) and controls.

Employee job task analyses (EJTAs) are also being developed and used in some facilities. This tool was designed as part of the Hanford Occupational Health Process (HOHP) and Enhanced Work Planning (EWP). It is used to evaluate each employee's known or anticipated essential job functions, job requirements, and exposures to hazardous chemical and physical agents. This information is used to place employees in appropriate medical programs. Initially, an EJTA is to be reviewed whenever the routine exposure profile changes (i.e., job or location change that leads to different exposures) or annually. Completion of an initial EJTA and electronic submittal to the site occupational health contractor for every contractor and subcontractor employee onsite is mandatory by 6/30/97. Integration of this system with the JHA will be a future development activity.

Paducah The industrial hygiene (IH), industrial safety (IS), and health physics (HP) experts meet weekly to discuss ongoing and upcoming work projects and hazards. Project managers are invited to these meetings to discuss the more complex tasks.

Cylinder handlers described the work and work methods. IH, IS, HP, and supervisors identified the hazards and hazard controls. The hazard data and controls are included in the procedures and training as follows:

1. Hazards were identified through “Warnings” and “Cautions” in the procedure.
2. Hazards controls were specified as action steps in the procedure.
3. Knowledge items were identified and linked to existing training.
4. Skill items were included in task-specific Job Performance Measures (JPM).
5. Worker knowledge was verified by reviewing training records.
6. Task-specific training was conducted on each of 13 task-related JPMs.

We are capturing the data developed during the Job Task Analysis (JTA) and Work Smart Standards processes in a relational database that can be used for change control and planning future work.

Y-12 Health and safety professionals are assigned to specific facilities and they work closely with operations line management in the work planning process. In accordance with Y-12's ISMS program description, these technical support resources are being organized into facility operational safety boards (OSBs). The OSB, formed and led by the facility operations manager, formalizes the integrated approach to work planning and authorization.

Savannah River During the process of identifying potential hazards and appropriate mitigation methods, the need for additional permits may be identified. The Radiological Work Permit (RWP), Confined Space Entry Permit, and Hot Work Permit are examples of commonly used permits.

Radiological Work Permit

The RWP is an authorization document that identifies radiological conditions, specifies entry requirements (e.g., establishes worker radiological protection and monitoring requirements), and contains specific approvals for radiological work activities. An RWP serves as the primary administrative process for controlling any work that requires the handling of radioactive material, or requires access to Radiological Buffer Areas, Radiation Areas, High Radiation Areas, Very High Radiation Areas, Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas, Radioactive Material Areas (commonly referred to as Radiological Areas), and/or any excavations within Soil Contamination Areas and Underground Radioactive Material Areas. In addition, an RWP informs worker(s) of radiological conditions, establishes PPE and respiratory protection requirements, sets suspension limits at which work must be stopped, and provides a mechanism to relate worker exposure to specific work activities.

An RWP is not required for X-ray, radiography, or operation of equipment or instruments containing sealed radioactive sources that are covered by approved written operating procedures. When this type of work is performed in a pre-existing Radiological Area, all personnel performing work shall comply with any applicable RWP for that area.

Radiological Control (RadCon) Hold Point and Action Step

While not a permit, a RadCon Hold Point is an important cautionary step for inclusion in the technical work document that requires Radiological Control Operations (RCO) to perform some action or verification to prevent radiation exposures in excess of administrative control levels, high airborne radioactivity concentrations, or an inadvertent release of radioactivity to the environment.

RadCon Hold Points shall contain pre-determined limits/conditions where omission or incorrect action could result in one or more of the following:

- Exceeding the SRS administrative control level or > 5 rem per hour momentarily.
- Releasing environmental airborne radioactivity in excess of the facility authorized limits.
- Releasing environmental radioactive liquid in any concentration.
- Spreading radiological contamination in excess of WSRC 5Q Radiological Control Manual, Table 2-2 values outside Contamination Area boundaries.
- Spreading high removable surface contamination outside the containment or High Contamination Areas in excess of WSRC 5Q Manual, Table 2-2 values.
- Releasing high airborne radioactivity above the protection factor for respirator equipment in use.

RadCon Action Steps provide specific directions for activities not meeting baseline criteria for RadCon Hold Points. RadCon Action Steps should be used to prevent loss of control of contamination, prevent a significant increase in the radiation level or control the opening of a radiological process system, or when specified by RCO.

Confined Space Entry Permit

The Confined Space Entry Permit (OSR 20-15) allows and controls safe entry into a confined space. An approved Confined Space Entry Permit is required for all confined space entry work performed by WSRC or its subcontractors in a space that meets the permit-required confined space criteria.

To constitute a confined space, all of the following three conditions must be met:

- The space is large enough and so configured that an employee can enter and perform assigned work.
- The space has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits).
- The space is not designed for continuous employee occupancy.

A non-permitted confined space is a confined space that does not contain atmospheric hazards or have the potential to contain any hazard capable of causing death or serious physical harm. Non-permit confined spaces are identified through completion of the Non-Permit Required Confined Space Hazard Evaluation (OSR 20-170).

Hot Work Permit

Hot work is defined as the use of portable acetylene welding and cutting torches, electrical welding equipment, blow torches, propane torches, melting pots, portable furnaces and heaters, grinding, spark-producing operations and open flames of any kind. Hot rivets, soldering irons, and spark-producing devices are considered open flames if a potential fire or explosion hazard exists.

As part of the planning process, a work planner and/or requester of hot work activities determines if the work can be performed without the need for hot work activities. The Fire Safety Review Checklist, OSR 20-168, provides assistance in making this determination. Examples of alternative methods to hot work include:

- Using hand or electric saws, pipe cutters, or other equipment.
- Relocating the work to an approved hot work area.
- Taking other steps to negate the need for hot work.

The use of fuel-fired portable furnaces and heaters, excluding authorized office heaters, requires a Hot Work Permit.

A Hot Work Permit (WSRC 2Q Fire Protection Manual, Procedure 5.4, “Control of Hot Work and Hot Work Permits,” Attachment 1, “Hot Work Permit Template") is required for all hot-work-producing activities, and must be approved and posted in a visible location before hot work is started.

For permanent hot work areas (shops, booths, etc.), a Standing Hot Work Permit is required. Standing Hot Work Permits are indicated by placing “Standing” on the duration line of the Hot Work Permit. Standing Hot Work Permits are renewed annually in accordance with requirements for new permits.

All other Hot Work Permits are valid only for the period specified on the permit by the facility manager and Fire Protection Coordinator.

Hot Work Permits may be issued for periods of up to 14 days. A permit is valid for only one job (work package), at one location. Multiple operations within a single area at different time periods require multiple permits. Blanket work packages require a separate Hot Work Permit for each job.

Hot work is prohibited in the following situations unless specifically approved by the Fire Protection Coordinator:

- In buildings with sprinklers out of service.
- Where explosive atmospheres of gases, vapors, or dusts are present, or where an explosive atmosphere could develop from residues or accumulations in confined spaces.
- On metal walls, ceilings, or roofs constructed of combustible (rigid plastic foam, cellulose, etc.) sandwich-type panel construction, or having a combustible covering.
- In areas with high combustible fuel loading, such as cable spreading rooms, cable tunnels, other electrical rooms with heavy concentrations of cables in cable trays, oil storage rooms, and combustible material storage areas.
- In areas that contain a high-oxygen atmosphere that lacks adequate ventilation.
- Near the storage of large quantities of exposed, readily-ignitable material, such as wood, paper, or rags.

Shift Managers review Work Clearance Permits (WCPs) to understand activities to be performed and how those activities may impact employee safety and facility operations. The shift manager reviews WCP Sections 1, 2, and 3 to ensure that the permit addresses adequate health and safety protective measures for the work to be performed. Only the shift manager can mark the “N/A” boxes in WCP Section 4 for those cognizant organizations that are not impacted by work to be performed under the WCP.

The shift manager may delegate the review to a competent designee; however, the shift manager’s responsibility for all facility activities is not reduced, and the shift manager must be apprised of all changes in facility status and concur with the proposed course of action.

The Work Group Supervisor reviews WCP Sections 1, 2, and 3 to ensure safety requirements and compensatory measures needed to safely perform the work are identified. The work group supervisor may request that support groups and other subject matter experts review the WCP in addition to those designated by the shift manager.

Work group supervisor responsibilities include:

- Ensuring, by physical walkdowns of the work area as needed, that identified hazards and actions required to mitigate them are complete, or scheduled to be completed, as required to support safe job completion.
- Reviewing the work site and written plans (technical work document, lockout/tagout plan, Confined Space Entry Permit, Excavation/Trenching Checklist, etc.), and providing additional remarks or comments in WCP Section 1 (adding pages as needed) to guide the workers.
- Ensuring safety and health requirements are documented on the WCP, including safety requirements and compensatory measures when safety equipment is removed from service as part of the work activity (e.g., providing a portable eyewash when permanent facilities are out of service), to protect the workers.
- Ensuring that for a deactivated facility, an additional HASP is available that identifies any special hazards inside pipelines or vessels that may react to heat - or spark-producing activities by generating toxic gases or by igniting.
- Ensuring employees know and understand work they are to perform.
- Ensuring employees know the hazards associated with the work, including hazards in the work area and, if applicable, those associated with the process system to be worked on, and adding this information to the WCP for review during the pre-job briefing and performance of the work.
- Ensuring that the operating department Level 2 manager has reviewed the WCP, Section 4 , “Review Signatures,” before allowing any energized electrical work that requires upper level manager approval.
- Obtaining all required WCP review signatures.
- Signing WCP Section 4.

Industrial Hygiene reviews WCPs that require respiratory protection for non-radiological chemical hazards.

The shift manager indicates which, if any, additional reviews are required for the WCP. Reviewers routinely considered include the personnel listed in the response to question HA-2.

Based upon their area of expertise, each reviewer ensures that WCP Sections 1, 2 and 3 address adequate safety requirements and compensatory measures for work to be performed. When satisfied, the reviewer signs Section 4 indicating concurrence.

As described in WSRC 2S Manual, Procedures 1.1 and 1.2, the author of a procedure is responsible to provide users of technical procedures with safety steps where failure to complete the step would create danger to personnel or facility safety. The CTF reviewer performs a verification of the technical accuracy of the procedure with respect to items such as technical standards, operating safety requirements, SARs, process requirements, PHRs, Design Agency requirements, test authorizations, nuclear criticality safety, interlock configurations and environmental permits/requirements.

The RCO reviews procedures in accordance with the WSRC 5Q Radiological Control Manual. When additional departments or organizations (Occupational Safety, Industrial Hygiene, etc.) are affected by a new or revised procedure, they review the applicable procedure sections. Identified safety issues or technical inadequacies are documented on the review form for evaluation and disposition by the procedure owner.

Fernald The hazard analysis team is formed during PHA activities. Personnel representing all safety disciplines and operations are present to discuss the hazards associated with the

project, how they are to be eliminated or abated and the procedure best suited to address the issue [SAR, TSA, Operating Procedures (OP), etc.]

PUREX These personnel are involved by the team, as appropriate, during the JHA process. Further, should any additional analysis be required, the appropriate safety professionals are involved in that analysis.

Rocky Flats Primary integration of multidisciplinary hazard assessment analysis is through input to the integrated work control program for maintenance and construction type tasks, including, as appropriate, Job Safety Analysis (JSA) preparation. More detailed integration is provided at the process level through the activity control envelope (ACE) process, which involves a designated multidisciplinary team with relevant experience to the activity (i.e., IH, safety, RAD, craft personnel, etc.) In work from routine to high hazard, PODs, job walkdowns, pre-evolutions, and toolbox meetings are also used to exchange and integrate data.

Site line management and support personnel use hazard data and experience with the hazards during the IWCP development process.

HA-5: Are hazard analysis teams formed from various disciplines and organizations? How are duplicative efforts and documentation avoided?

Richland Yes, multidisciplinary teams are used at the site. At the facility level, a common hazard analysis and starting point prevent duplicative efforts. At the activity level, the JHA is used to identify the necessary team members. Prior JHAs are used to minimize duplication and documentation for routine/highly repetitive work.

Paducah The facility analysis uses operations/maintenance/engineering personnel as appropriate to define and evaluate the hazards. Teams are formed for both job and task analysis. Similar teams were formed for the Work Smart Standards (WSS) process. The WSS process was a combination of the JTA and AHA processes. The process described in the response to question HA-2 is the one used by the analysis teams.

The facility safety hazard analysis is documented in plant-approved packages that require the facility owner to accept the results. The information is summarized in a user-friendly format for implementation into facility-specific procedures. The documentation for the task analysis added the hazard and hazard control columns to the traditional task analysis data collection form. Because of the iterative nature of our analysis processes, there is some duplication in documentation. For example, some of the original cylinder task analysis data are stored in a partially developed training database provided by a subcontractor, while more recent data are documented in an appendix to the Work Smart Standards report. This is being resolved by the use of a single relational database. Duplication of effort was avoided by using the outcome of previous analysis efforts in the JTA and WSS processes. One of the first steps in analyzing a job or task was to gather all related existing analysis data.

Y-12 See response to HA-4.

Savannah River See the concluding two paragraphs of the response to question HA-1.

Fernald Refer to the response to question HA-4.

PUREX Yes, the teams include workers from the appropriate disciplines, the appropriate safety professionals, and for more detailed analyses, a safety analyst. Since each activity is

evaluated by the team and professionals, the process provides a once-through process with the information available for any additional documentation that is required. One example of this is the Unreviewed Safety Question (USQ). A USQ is completed after the JHA or additional analysis. As a result, the information obtained in the hazards screening/analysis process is used as input in the JHA. This reduces duplication while serving to make the necessary documentation complete.

Rocky Flats Hazard analysis teams are used primarily in IWCP preparation and, more specifically, in the activity control envelope (ACE) development processes. It is expected that IWCP integration will increase further with Enhanced Work Planning's (EWP) implementation. Activities that are performed have to be on the master activity list (MAL). This identifies and tracks activities, so that duplicative efforts and documentation are kept to a minimum.

Subject matter experts (SMEs) are identified within Kaiser-Hill to address specific topics relating to health and safety. Analysis teams are assembled to conduct accident analysis.

HA-6: What criteria are used to grade hazard analysis activities appropriately? Is a screening process used? Are lessons learned and prior analysis data used? How are hazard severity and task complexity evaluated?

Richland See response to question HA-2. Hazards (based on thresholds) determine the appropriate health and safety disciplines required and the complexity of the Job Hazard Analysis (JHA). Yes, a screening process is used. Yes, lessons learned and prior data are used as part of the process for developing JHAs and minimizing rework and duplication. Severity (thresholds) and complexity determine the rigor at which the JHAs are developed (task specific, routine). If a specific hazard exists, an expert in that particular field is called in to support the effort.

Paducah The facility safety analysis uses a screening process to grade the hazard analysis. The screening criteria used are indicated on the attached table. Past operational history and previous hazard analysis were considered. The hazard analysis approach applied the principles and types of techniques defined in DOE-STD-1027 for the different hazard categories.

The facility safety analysis provided acceptance criteria for facility safety as well as public health and safety. Corporate goals for worker safety provided the acceptance criteria for the importance determinations made during the job analysis.

The job analysis used the following importance, difficulty, and frequency screening criteria to screen tasks for further analysis and training. Lessons learned and prior analyses were used to help the screening process and in identifying potential consequences of failure to perform a task properly.

ATTACHMENT 4

TASK RATING SYSTEM

Frequency of Performing

Minimum	1. Less than once per year.
	2. Once every 5 to 12 months.
	3. Once every 3 weeks to 4 months.
	4. Once every 1 to 2 weeks.
Maximum	5. More frequently than once per week.

Importance of Task

Minimum	1. Consequences of improper performance are negligible (improper performance would make no difference in plant operation).
	2. Consequences of improper performance are undesirable (improper performance may impair reliability of a system or a process).
	3. Consequences of improper performance are serious (improper performance may require an Unusual Occurrence Report).
	4. Consequences of improper performance are severe (improper performance may result in an Alert Event).
Maximum	5. Consequences of improper performance are extremely severe (a serious injury or site emergency may result).

Difficulty of Performing Task

Minimum	1. "Very easy" to perform.
	2. "Somewhat easy" to perform.
	3. "Moderately difficult" to perform.
	4. "Very difficult" to perform.
Maximum	5. "Extremely difficult" to perform.

Y-12 The Maintenance Planner's Guide (Y10-035-008) contains detailed guidance for completing each section of the job planning checksheet. Section A of the checksheet, "Health and Safety," includes an evaluation by the planner, the maintenance supervisor, and the customer (operations) to determine the need for a JHA, permits, hold points, and other requirements. Criteria for making this determination are listed in the Planner's Guide as well as in Appendix B of Y70-043, *Job Hazard Analysis*, and include considerations such as the type of materials involved, electrical safety issues, and hoisting/rigging requirements. Section A lists the requirements for special permits, environmental assessments, and Unreviewed Safety Question Determinations (USQD).

During the job planning process, many other disciplines provide input to the job plan. Operations personnel work closely with the planner to make sure the scope of the work is well defined and understood. In many cases, the worker who operates the system/equipment is involved as the subject matter expert (SME). ES&H technical support personnel who are assigned to the facility participate in the JHA, as needed, and specify the controls that are required for the job. Requirements for PPE, special permits or approvals, lockout/tagout, etc., are specified in the job package.

The results of post-maintenance tests and any lessons learned during work execution are reviewed during the post-job review. Based on this feedback, the job plan may be updated to reflect lessons learned so that the same or a similar type of work is accomplished more effectively in the future. Equipment repair history data are collected, analyzed, and used to help establish frequencies for scheduled maintenance activities.

Y-12 is currently piloting an EWP process that will refine the work control process. The EWP process provides an automated screening tool that better defines when a detailed job hazard analysis is needed. The EWP pilot effort has included benchmarking of the work planning processes at other DOE sites, including Hanford and Fernald.

Savannah River See "Element 1: Hazard Identification " through "Safety Basis Authorization" in the response to question HA-3.

Safety Basis Maintenance

Once changes to an authorization basis (AB) are approved, the AB can be revised. In addition, nuclear facility Safety Analysis Reports (SAR) and Technical Safety Requirements (TSR) are subject to an annual review to ensure accuracy of the AB.

The Lessons Learned Program promotes safe, effective operation of SRS facilities, and enhances the safety and health of employees and the public by applying lessons learned from operations throughout the DOE complex, commercial nuclear industry, and the site. Process safety includes not only conditions causing degradation of operations and equipment, but also those conditions capable of negative impact on the environment and public confidence. The Lessons Learned Program provides a systematic review of positive and negative operating experiences of similar facilities or processes for the purpose of applying lessons learned from those experiences.

Division Lessons Learned Coordinators ensure that lessons learned items are disseminated to all appropriate division personnel, including workers, for corrective action evaluation. Dissemination is sufficiently widespread to ensure that all personnel, facilities, and processes that could be affected by the experience are included in the evaluation.

Fernald USQs are used to screen potential hazards.

A required-reading program (including a lessons learned section) is required to be reviewed by all project personnel.

The hazard severity and task complexity is conducted through the development of the SAR and/or USQ.

PUREX The hazard screening is accomplished by the JHA and Preliminary Hazard Screening/Assessment (PHSA) forms as appropriate. Key portions of the PHSA have been incorporated into the JHA and are completed by the team. The screening for additional analysis is based on the complexity, hazards, and facility experience with the activity.

Since the screenings (JHA) are done by the team, they incorporate what they have learned from previous activities and evaluations. Additionally, the JHAs completed for previous activities are maintained on the computer system and can be consulted for new activities or used again for the same activity.

Task complexity and hazard severity are initially evaluated as part of the JHA process by the work teams. If the levels identified by the team meet established criteria, then the PHSA is completed by the analyst and team members. The PHSA addresses the complexity and hazards in more detail and is then used to determine if more analysis is warranted.

Rocky Flats The necessary and sufficient philosophy is used in determining the level of analysis required. More specific guidance is used, as appropriate, for activities such as Operational Readiness Review (ORR) or Readiness Assessment (RA) preparation. Lessons learned

and prior analysis are considered appropriate to the task in question. Severity and task complexity are evaluated using a professional judgment and expert closure process as defined for activity-based planning and the activity control envelope (ACE).

For certain analyses, criteria used for grading hazards include dose evaluation guidelines, the DOE-STD-3011, and ERPGs. If an ACE is used, part of the process includes screening. Lessons learned are used if applicable in the judgment of the personnel involved in the task. Personal judgment is also how hazard severity and task complexity are judged.

Health and safety personnel with responsibility for a specific task will review the task and rely on SME input, professional experience, and site regulatory requirements.

HA-7: How do sites use hazard data for determining worker protection criteria, exposure assessments, medical monitoring, training, ES&H staffing, and support services?

Richland Hazards determine qualification and training requirements for workers, via employee job task analyses (EJTA), which focus on the medical, and Job Hazard Analyses (JHA), which cover specific hazardous conditions (e.g., energized systems) and require specific experience and training. Specific individuals such as line management, industrial hygienists, and safety professionals review potential exposures to hazards and hazardous conditions to establish appropriate engineering and administrative controls and personal protective equipment (PPE), determining the appropriate medical monitoring and examinations, as well as various training requirements (entry into hazardous locations, handling of hazardous materials, fitting for PPE, etc.) The hazards determine the necessary participation of team members and approvals in the JHAs. Hazards also determine the necessary controls (PPE) required.

Paducah Identified hazards were compared to Federal, State, and DOE published exposure limits. Worker protection measures were based on the criteria in these standards.

Personnel monitoring and exposure controls were based on the identified hazards and expected changes in the hazard parameters due to planned work.

Medical monitoring is based on the field monitoring for hazards and routine radworker monitoring requirements.

Training was provided on the identified hazards and procedures as described in the response to question HA-1.

ES&H staffing is based on the disciplines needed for all EMEF work activities and the field monitoring workload based on cylinder program work load. Where temporary services are needed, qualified subcontractors are hired.

Y-12 In general, worker exposure limits are established by the ES&H standards and requirements found in DOE Orders, laws, and other regulatory documents. These standards and requirements flow into Y-12 site-level ES&H procedures (70 series procedures) that define the programs and requirements for worker protection. Examples include the radiological control program, hearing protection program, and respirator program.

Savannah River See the discussion of the responsibilities of the initiation of the Work Control Permit (WCP) in the response to question HA-2. In addition, see the discussion of the

Radiological Work Permit (RWP), Confined Space Entry Permit, and Hot Work Permit in the response to question HA-4.

Hazardous Energy Control Program

The primary purpose of the WSRC 8Q Manual, Procedure 32, “Hazardous Energy Control (Lockout/Tagout)” program is to provide a system of controlling hazardous energy for the protection of site personnel. The program provides for the isolation and restoration of equipment and systems to protect personnel from injury and equipment from damage and to prevent the release of hazardous material to the environment during maintenance, testing, inspections, training, and similar activities.

Closely associated with the Hazardous Energy Control Program is the Electrical Safety program described in the WSRC 8Q Manual, Procedure 10, “Non-Electrical Work Near Overhead Power Lines and Critical Process Piping,” and Procedure 25,"Basic Electrical Safety Awareness,” and WSRC 18Q Safe Electrical Practices and Procedures Manual, Procedure 1, “Electrical Safety Program and Responsibilities,” Procedure 2, “Safe Practices On or Near Electrical Conductors,” and Procedure 3, “Grounding in Addition to Electrical Lockouts.” These procedures describe actions required by employees and managers to ensure that work on or near electrical systems can be conducted safely.

Non-Electrical Work Near Overhead Power Lines

Non-electrical personnel whose work may cause them, or any long materials they may be handling, to come within 10 feet of unguarded overhead power lines equal to less than 50 kV must have written approval from: their supervisor/manager, Hoisting and Rigging supervisor, the utility owner, the E&I supervisor/manager and the line Custodian/Facility Administrator. Approvals are documented on a completed WCP that defines controls necessary to ensure personnel safety.

When planning for use of mobile equipment in the vicinity of unguarded overhead power lines, equipment locations should be selected that, whenever possible, allow no part of the equipment to come within 20 feet of power lines either by rotation, boom extension, or elevation. If the job does not require mobile equipment to come within 20 feet of overhead unguarded power lines, but this clearance could be unintentionally violated, the WCP defines locations and applicable controls for keeping equipment at least 20 feet from the lines.

Work Near Critical Process Piping

The operation of mobile equipment that will raise loads above or boom over critical piping (e.g., acid, steam, radioactive materials, transfer lines) must be authorized in writing by the operator’s supervisor, the utility owner, and the line Custodian/Facility Administrator. A completed WCP documents the approvals and defines controls used to ensure safety of personnel and protection of equipment and facilities.

Excavations and Trenches

An excavation is any man-made cut, cavity, trench, or depression in the earth’s surface that is formed by earth removal, including soil boring and hand augering. Driving stakes deeper than 12 inches is also considered an excavation.

A trench is a narrow excavation (in relation to its length) made below the surface of the ground. A WCP authorizes work for excavation and trenching activities.

A field map is a sketch, developed from applicable drawings, that identifies known commodity interferences, unknown interferences identified by a non-obtrusive survey method (e.g., ground penetrating radar), and defines the boundary for excavation/trenching work.

The following excavation/trenching activities are exempt from requiring preparation of a field map, and require only signature approval on a WCP by the shift manager (and Custodian/Facility Administrator, if different) and lead work group:

- Hand-earthen excavation (e.g., shovel, posthole digger, etc.) not exceeding 12 inches in depth.
- Machine-earthen excavation (e.g., backhoe, grader) not exceeding 3 inches in depth.
- Concrete excavation/trenching using carbide-tipped drilling equipment and not exceeding 3 inches in depth.

WSRC 8Q Manual, Procedure 34 , “Excavations and Trenches,” does not apply to removal of asphalt and crusher-run base (4 inch maximum) or grading from roads, parking lots, tank farm areas, etc.; coring, chipping, and drilling in concrete (WSRC 18Q Manual and SRS Engineering Standard 03010-01-R); or penetrations of walls, floors, ceilings, or structural alterations (see WSRC 8Q Manual, Procedure 12, “General Site Safety Requirements").

Railroad or Site Roadway Clearance

The following work requires a WCP signed by the Central Services Works Engineering (CSWE) Transportation Section manager, or designee:

- Work on lines (pipe and/or electrical) crossing over or under a railroad track; any excavation work, use of equipment, or storage of material closer than 8 feet to a track centerline.
- Any excavation 3 feet or deeper that is within 15 feet of a railroad track centerline.
- All work within the right-of-way (generally a minimum of 100 feet from the railroad track) of the CSX railroad crossing.

Work on power or communication lines crossing, or adjacent to, all established paved or unpaved roadways requires a WCP signed by the responsible Power Department area supervisor or designee and the CSWE Transportation Section manager or designee.

Process System Access

A hazardous process system consists of any part-pipeline, tank, duct, cylinder, valve, or any other physical component or assembly of components that is judged to potentially contain hazardous materials. Hazardous process systems also include any system that takes nonhazardous material and, through heating, changes that material to a potentially hazardous material. Instrument impulse lines are treated the same as process lines until verified that no hazardous condition exists, such as pressure, radioactive materials, toxic materials, corrosives, or hot or cold materials.

All process system access, except as exempted by the WSRC 8Q Manual, Procedure 36, “Process System Access,” is presumed to fall within the hazardous system requirements of Procedure 36 until specifically exempted by notation on the WCP. Determination of a hazardous versus nonhazardous system is established on a case-by-case basis using all available sources of background information, such as operating procedures and Material Safety Data Sheets (MSDS) to confirm safe performance of activties.

Initial access to hazardous systems is planned under the assumption that the system contains trapped, hazardous materials under worst-case conditions. Subsequent access requires consideration of the potential for hazards. Any reduction in protective measures after a system has been opened must be agreed upon by the custodian and work group(s) involved.

Alteration to Process Ventilation Systems

Process ventilation systems are those HVAC systems whose primary function is to prevent personnel exposure and environmental releases of radioactive and/or toxic contaminants by maintaining zone airflow directions, differential pressures, enclosure/hood face velocities, and exhaust filtration up to the point of release to the atmosphere. A WCP is required, unless exempted by WSRC 8Q Manual, Procedure 35, "Work Clearance and Authorization," for alterations to process ventilation systems, in addition to an approved technical work document. The appropriate HVAC Coordinator's approval is documented on the WCP.

The Radiological Control Organization reviews procedures in accordance with the WSRC 5Q Radiological Control Manual. When additional departments or organizations (Occupational Safety, Industrial Hygiene, etc.) are affected by a new or revised procedure, they review the applicable procedure sections. Identified safety issues or technical inadequacies are documented on the review form for evaluation and disposition by the procedure owner.

Exposure assessments

The RWP is an authorization document that identifies radiological conditions, specifies entry requirements (e.g., establishes worker radiological protection and monitoring requirements), and contains specific approvals for radiological work activities. An RWP serves as the primary administrative process for controlling any work that requires the handling of radioactive material, or requires access to Radiological Buffer Areas, Radiation Areas, High Radiation Areas, Very High Radiation Areas, Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas, Radioactive Material Areas (commonly referred to as Radiological Areas), and/or any excavations within Soil Contamination Areas and Underground Radioactive Material Areas. In addition, an RWP informs worker(s) of radiological conditions, establishes PPE and respiratory protection requirements, sets suspension limits at which work must be stopped, and provides a mechanism to relate worker exposure to specific work activities.

An RWP is not required for X-ray, radiography, or operation of equipment or instruments containing sealed radioactive sources that are covered by approved written operating procedures. When this type of work is performed in a pre-existing Radiological Area, all personnel performing work shall comply with any applicable RWP for that area.

WSRC provides employees, other site contractor and subcontractor personnel, visitors, and members of the general public radiological protection from radiation exposure originating from operations of the SRS. Radiation exposure of the work force and public is controlled so that radiation exposures are well below regulatory limits, no radiation exposure is present without commensurate benefit, and exposure is maintained as low as reasonably achievable (ALARA) at all times. Managers hold workers and their supervisors accountable for radiological control performance. Managers also ensure that orientation, training, and indoctrination reinforce rules and guidelines to minimize radiation exposure and control radioactive contamination for each worker. Workers are responsible for familiarizing themselves with, and following, radiological safety procedures governing

their work, and shall immediately notify management of any condition or situation where a loss of control has occurred or is likely to occur.

Industrial Hygiene

WSRC provides a place and condition of employment that is free from, or protected against, recognized hazards that cause, or are likely to cause, sickness, impaired health and well-being, or significant discomfort and inefficiency among workers. This objective is achieved through a professional, comprehensive industrial hygiene program based on management commitment and employee involvement, worksite analysis, hazard identification, hazard prevention and control, and safety and health training. Among those responsible for implementing this program are:

Industrial Hygiene Section is responsible for:

- Developing and implementing an industrial hygiene program that complies with DOE Orders and prescribed occupational safety and health standards.
- Developing and administering support for new and existing industrial hygiene hazard-specific programs.
- Providing technical support for implementation of industrial hygiene programs and practices at all facilities.
- Informing facility management of control measures necessary to reduce employee exposures to identified hazards, etc.

Line management is responsible for:

- Maintaining places and conditions within their work environments free from, or protected against, recognized hazards.
- Implementing applicable industrial hygiene programs.
- Training employees to perform assignments in a knowledgeable and safe manner.
- Planning, budgeting, and providing materials and equipment necessary to support a comprehensive industrial hygiene program, etc.

Employees are responsible for:

- Observing all safety and health rules.
- Using all prescribed PPE.
- Following established health and safety practices and procedures.
- Immediately notifying supervision of suspected exposures to harmful agents or conditions, and performing all tasks so as to not endanger themselves or others.

The Industrial Hygiene organization is responsible for performing and documenting periodic hazard assessments to anticipate, recognize, evaluate, and control occupational health hazards. The Occupational Health Hazard Assessment Program consists of worker and workplace surveillance activities that include baseline hazard assessments and special and annual workplace surveys. Workplaces are surveyed to identify potential occupational exposures, investigated to establish complete workplace exposure profiles, and periodically assessed for changes to operations, engineering controls, and/or work practices. These activities are in addition to the industrial hygienists' input to work control identified through the WCP process.

Medical monitoring

It is WSRC policy to provide a quality occupational health program that promotes the physical and mental well-being of employees while maintaining medical information in a confidential, ethical, and legal manner.

The WSRC Medical Program maintains a Medical Information System to meet growing surveillance and epidemiological needs.

Training

Each employee (e.g., worker, work group supervisor, initiator, reviewer, shift manager) involved in a job requiring a WCP must be trained on the requirements of WSRC 8Q Manual, Procedure 35, “Work Clearance and Authorization."

WSRC provides training that supports employee performance of work assignments in a safe, effective, and total quality manner and contributes to the safety and formality of operations. Management encourages employee training efforts, and supports the effective and efficient implementation of the training function through integration of site training activities.

ESH&QA staffing; and determining support services

These activities are determined as part of the process of developing the annual budget and operating plan for the site.

Fernald Procedures were developed (operating procedures, JSAs, etc.) to identify the hazard and determine the type of PPE to be used to abate the hazard. Medical monitoring and training requirements are also documented in the procedures.

PUREX The JHA and/or additional analyses are used to identify worker protection criteria directly from the applicable standards/requirements and the implementing documents. Exposure is addressed in the industrial hygiene and radcon evaluations of the JHA. Training, staffing, and support services are not directly addressed in the JHA process and are evaluated and implemented by the team prior to work. These are verified in the pre-job briefing just before beginning work.

Rocky Flats Development of hazard analyses for process or task-specific activities is used to determine necessary personnel monitoring (e.g., air monitoring, noise monitoring, heat and cold stress, ionizing radiation). In addition, specific training requirements are determined based on task scope and appropriate protective actions (e.g., respirator training if respirators are to be used, hoisting and rigging, Radworker II). Industrial hygiene and safety personnel are directly involved in use of employee questionnaires, based on hazards exposure associated with their work assignment, which are forwarded to occupational medicine to assist in scoping appropriate medical monitoring (e.g., hazardous waste operations workers, nuclear workers, hearing conservation program). Regulatory/site requirements, professional judgment, and SME input from the foundation are used for identifying worker protection criteria, exposure assessments, medical monitoring, and training requirements.

HA-8: Is there a clear understanding of what the hazard analysis functions and outputs are? How is the information presented to supervision and workers?

Richland Employees understand and participate in the hazard analysis process. Workers help identify potential hazards of the work or task and comply with the applicable controls and practices specified. Line management receives instruction on conducting the hazard analysis process. The information derived from the process is communicated through hazard and control walkdowns, the employee job task analyses (EJTA), routine employee/management discussions, pre-job briefings, work packages, in some cases post-job briefings, procedures, lessons learned postings/meetings/internet site, and safety/tail-gate meetings.

Generally, workers are aware that JHAs are used to identify hazards, but the process is being improved to increase the understanding that the JHA is also used to identify controls, training requirements, and review and approval processes. The linkage between the authorization basis documentation and JHA is a self-identified weakness. Efforts have been underway to automate access/review of authorization basis and safety basis documentation. Linkages between the authorization basis hazard analysis and the JHA are being developed.

Paducah Yes. For routine cylinder movement, the information is represented to supervision and workers through procedures and Radiological Work Permits.

The facility safety hazard analysis is documented in plant-approved packages that allow the facility owner to accept the results. The information is summarized in a user-friendly format for implementation into facility-specific procedures.

Y-12 Workers and supervisors are trained to understand the hazards of their workplace. General employee training, required for all workers, identifies site hazards. In addition, facility-specific training is required for employees who work in moderate-hazard facilities (Y-12 has no high-hazard facilities). At the task level, the results of JHAs are reviewed with the worker during pre-job briefings. The job plan identifies the potential hazards and the associated controls that must be in place during work execution, and the plan (including work instructions, procedures, and required permits) is reviewed with the worker at the pre-job briefing.

Savannah River The work clearance and authorization process commonly referred to as the WCP establishes the methodology and requirements for controlling workplace hazards and authorizing work. The process of preparing a WCP provides for:

- Work hazard screening.
- Health and safety requirements and/or compensatory measures to mitigate existing hazards.
- Assurance that all health, safety, and regulatory permits have been obtained.
- Written authorization from the shift manager and involved work group supervisor(s) to start work.

A WCP is NOT required for:

- Routine work performed in designated shop areas.
- General office work.
- Routine servicing of refrigerators.
- Repairing light and portable equipment.
- Vendor-performed copy machine and food service machine servicing.
- Software loads and system management activities on process control systems.
- Routine operations support activities, such as changing chart paper and relamping or moving/maintaining protective clothing and/or building supplies.
- Surveillance and routine preventive maintenance performed according to approved facility-specific procedures authorized by the shift manager.
- Facility operations being performed according to approved facility operating procedures.

Note: Approved procedures authorized for use without a WCP must identify hazards associated with the activity and methods to mitigate them, including the specific type of PPE, when required.

The work Group Supervisor reviews WCP Sections 1, 2, and 3 to ensure safety requirements and compensatory measures needed to safely perform the work are identified. The work group supervisor may request support groups and other SMEs review the WCP in addition to those designated by the shift manager.

Work group supervisor responsibilities include:

- Ensuring, by physical walkdowns of the work area as needed, that identified hazards and actions required to mitigate them are complete, or scheduled to be completed, as required to support safe job completion.
- Reviewing the work site and written plans (technical work document, lockout/tagout plan, Confined Space Entry Permit, Excavation/Trenching Checklist, etc.), and providing additional remarks or comments in WCP Section 1 (adding pages as needed) to guide the workers.
- Ensuring safety and health requirements are documented on the WCP, including safety requirements and compensatory measures when safety equipment is removed from service as part of the work activity (e.g., providing a portable eyewash when permanent facilities are out of service), to protect the workers.
- Ensuring that for a deactivated facility, an additional HASP is available that identifies any special hazards inside pipelines or vessels that may react to heat- or spark-producing activities by generating toxic gases or by igniting.
- Ensuring employees know and understand work they are to perform.
- Ensuring employees know the hazards associated with the work, including hazards in the work area and, if applicable, those associated with the process system to be worked on, and adding this information to the WCP for review during the pre-job briefing and performance of the work.
- Ensuring that the operating department Level 2 manager has reviewed the WCP, Section 4 , “Review Signatures,” before allowing any energized electrical work that requires upper level manager approval.
- Obtaining all required WCP review signatures.
- Signing WCP Section 4.

The Work group supervisor ensures that work is performed in accordance with approved work documents, and promptly informs the shift manager of changes in work activity status during the shift, including notification as to when the work activity is scheduled to start, delays encountered, completion of work, and notification of unexpected early termination of work.

The work group supervisor stops work and informs the manager if the scope of the job changes, additional hazards arise that were not identified on the WCP, or WCP requirements cannot be followed.

Before the end of the shift, the work group supervisor ensures that the facility manager receives the current status of all work activities performed during the shift, regardless of whether a status change has occurred.

Additional work group supervisor responsibilities include:

- (Including vendors and subcontractors) ensuring that the task is properly authorized by the shift manager before performing work.
- Conducting a pre-job briefing with all involved workers.
- Signing and dating WCP Section 5, after the pre-job briefing is complete and all requirements of the WCP have been addressed, authorizing workers to perform work. The work group supervisor’s signature indicates his/her agreement with all

documented requirements, and identifies that he/she has reviewed the requirements of the WCP with all affected workers.

Workers

Workers perform work in accordance with WCP requirements, and stop work and inform their supervisor if the scope of the job changes, hazards arise that were not screened on the WCP, or WCP requirements cannot be followed.

All WSRC personnel, including vendors and subcontractors, involved in work activities for which a WCP has been prepared must print their name and department, and initial WCP Section 6. This indicates that they have read, understand, and agree to comply with requirements of WCP Sections 1, 2, and 3.

During the pre-job briefing, workers are provided an opportunity to review hazards and compensatory measures in place to protect their safety and health. Any concerns expressed by workers must be addressed before work is allowed to proceed. Workers can exercise their stop work authority at any time to ensure that work is conducted safely.

WSRC 2S Manual, Procedure 1.1, “Procedure Administration” requires the procedure review performed by the Cognizant Technical Function (CTF) to include a technical accuracy verification of the procedure with regard to items such as technical standards, operational safety requirements, SARs, process requirements, PHRs, Design Agency requirements, test authorizations, nuclear criticality safety, and interlock configurations. The RCO must review procedures involving radiological work in accordance with the WSRC 5Q Manual. Other departments or organizations, such as occupational safety and industrial hygiene, must also review the procedure when their expertise is applicable to identified hazards.

The procedure preparer has to identify hazards associated with the facility and work to be performed. The PHA, the Hazard Analysis Document (HAD), the Safety Analysis Review (SAR) for the facility and the PHR are among sources for identification of facility hazards.

Controls identified through the hazard identification and analysis processes described above must be incorporated into work packages and operating procedures. When engineering or process control needs are identified, they must be logged into a system which provides prioritization, followup and identification of resources needed for completion.

WSRC maintains a Conduct of Operations program to enhance the safe operation of its facilities. Conduct of Operations applies to all programs and functions of facility operations that may have an impact on the safety of the public, employees, and the environment. Conduct of Operations is defined as the minimum acceptable level of performance expected of operations and support personnel that may affect safety. Regardless of the degree of complexity, the same quality level of performance is expected. All levels of management, supervision, and employees shall comply with requirements of the Conduct of Operations program as it applies to their specific job and responsibility.

The Conduct of Operations program ensures that:

- Operations are managed, organized, and conducted in a manner that ensures an acceptable level of safety.
- A minimum standard of performance is well-defined, understood, and accepted by all affected personnel.
- Operations are performed by trained and qualified/certified personnel using approved procedures.

- Operations are periodically assessed by management to ensure compliance with the Conduct of Operations program, and that activities are performed in a safe, conservative manner.

Fernald The hazard analysis is used to ensure that all potential hazards and mitigators are evaluated before the project starts. Hazards and mitigators are listed in project-specific HASPs.

PUREX The workers have been trained in the JHA process and are familiar with expectations and their role in the process. Through the use of this process, they have developed a good understanding of the use of the JHA and the expected outputs. The JHA is a tool that they use to help ensure their safety and that of the facility during the planned work activity.

Rocky Flats JSA and ACE preparations are becoming more and more standardized and accepted sitewide. In addition, preparation of working procedures, including hazard analysis and controls within the procedure, has become standard format for Rocky Flats. Information from these mechanisms is presented to supervision of workers in the form of ACE documents, which are converted to IWCP and/or operating procedures for the process in question, and in stand-alone JSAs and/or JSAs involved in IWCP packages and site procedures.

HA-9: What mechanisms are in place to provide worker participation in the hazard identification process and in control measure determination?

Richland Workers participate in on-the-job planning, pre-job briefings, and job/procedure/control walkdowns as part of the hazard analysis planning process. In the development of the TWRS BIO, workers participated in walkdowns to verify the hazards and controls in their work areas. Hazards were matched to controls specifically in the BIO.

At the craft level two features are available. These features empower the workers as the final check for safety. The Worker Bill of Rights ensures a safe workplce while the Stop Work Authority enables a worker to suspend operations if warranted.

Paducah For cylinder movement, workers were involved in the procedure development process. A Performance Measurement Team (PMT) established with workers, supervisors, and H&S support staff from three sites was used to develop the procedures and hazard control measures.

Similar teams are formed for planning non-routine work such as cylinder weld patch repair.

The hazard analysis process for the facility safety analysis requires the participation of operational/maintenance personnel as appropriate for the hazard being evaluated, and the controls are discussed and documented. The results are then routed through the same personnel for review and approval.

Y-12 The planner's guide encourages worker involvement in the job planning process. Workers may be asked to walk down the job with the planner to help identify potential hazards. When a formal work procedure is developed, workers participate in verification and validation of the procedure. Employees are encouraged to identify potential hazards in their workplace and to bring them to management's attention via the Employee Concerns Program and the safety suggestion process. All employees, regardless of position in the organization, have stop work authority when they believe health and safety may be compromised.

Savannah River See discussion of responsibilities of work group supervisors and workers in the response to the previous question.

Fernald There are several ways in which site personnel participate in the hazard identification and control process, such as project safety work groups, through safety advocates, pre-job briefings and walkthroughs, and project tabletop meetings.

PUREX The JHA must be completed by members of the work team. Further, management has directed that the workers involved be a representative cross section of personnel actually performing the activity.

Rocky Flats IWCP, ACE, and procedures development processes all provide for participation of operations personnel in development. Job pre-evolutions and walkdowns are also used. The Joint Company and Union Safety Committee (JCUSC) and the Worker Bill of Rights are among the mechanisms used.

HA-10: How do the site's hazard analysis approaches include provisions for evaluating and integrating data regarding the hazards associated with collocated workers (i.e., workers adjacent to work processes being evaluated)?

Richland Hazards are identified through the authorization basis for each facility. Collocated workers are not addressed in job-specific hazard analysis, except to verify that the authorization basis is preserved.

Activity JHAs in the protection of other facility workers enhance the protection of collocated workers. For this questionnaire, the collocated worker is defined as a worker at >100 m.

As part of the pre-job planning, work performed in adjacent areas is identified for worker awareness (paricularily for higher risk work). In addition, physical boundaries are established to control access. In some cases, adjacent workers are removed from affected areas. Plan-of-the-day meetings are used to coordinate and identify adjacent work activities.

Paducah The cylinder project manager controls all work in the cylinder yards. As a key member of the work planning process, this manager coordinates the work between work groups. During the planning process, job-site walkdowns are used to identify hazards presented to or by collocated work. If the work cannot be separated by space or time, joint controls and pre-job briefings are used to protect both groups of workers.

If adjacent work is being performed by non-cylinder work groups, it is coordinated through the LMUS work control coordinator. Daily discussions are used to coordinate this work.

The site hazard analysis used an integrated approach to workers beyond the immediate facility. One of the guidelines for the analysis was to define any actions that might be required of operational personnel prior to an evacuation of a facility that could occur as a result of an onsite accident in another facility. These actions were documented and evaluated to ensure they could be accomplished should there be a need to evacuate. In addition, for each accident that could result in irreversible health effects beyond the immediate facility, essential actions were identified that would minimize the risks to these workers.

Y-12 The job planning process considers hazards to adjacent workers. For example, a job that involves asbestos removal will require evacuation of surrounding facilities during work execution to avoid worker exposure to friable asbestos, and will also specify the area to be monitored before returning the area to normal operations. All work scheduled to be performed in a facility is discussed in the facility's plan of the day (POD) meeting, and the POD is attended by the area supervisors in the facility. This provides an integrated look at

all activities that will take place so that any potential conflicts or hazards resulting from planned work can be addressed at the facility level.

Savannah River No specific reference to evaluating and integrating data regarding the hazards associated with collocated workers is available in site procedures. In practice, the analysis of hazards at the job site includes all workers that may be potentially affected by the task, both those involved in the task and those working in proximity to the task area. For example, activities that may generate airborne radioactive materials are assessed for impact on downwind locations and appropriate controls instituted.

Fernald Safety personnel evaluate hazardous effects to adjacent facilities through the USQ and/or as low as reasonably achievable (ALARA) process.

PUREX In the current structure at PUREX, each team is responsible for a particular area of the facility or key system. The work planned by all groups is discussed among the team leaders and the teams, to ensure that interactions do not present unacceptable hazards. A configuration control specialist works as a gatekeeper for all work.

Rocky Flats Primary emphasis related to collocated workers from a JHA/ACE development standpoint is on establishing boundaries and limits of control on the process or activity in question (i.e., if an asbestos abatement project is underway with immediately collocated workers, secondary containments and/or other work control measures may be specified to limit potential exposure to that hazard to ancillary personnel).

At the SAR/BIO/BFO level, all accidents are evaluated for collocated worker impact as well as for impact on the public. The consequence of an accident to the collocated worker can drive OSR/TSR controls. This is driven by the DOE-STD-3009 and 3011. Walkdowns, pre-evolution meetings, and IWCP processes are among the methods used.

HA-11: What uses are made of hazard and control information for collocated workers?

Richland Collocated workers are addressed by the authorization basis (safety-significant controls are derived) through the identification of hazards and the implementation of controls. See response to HA-10.

For TWRS privatization, the methodology supporting responses to questions HA-1 through HA-11 is currently under development by the private contractors.

Paducah See response to HA-10. Controls are identified specifically in the facility safety analysis and, if necessary, TSRs are defined to ensure the controls are maintained and implemented.

Y-12 The job planning process considers hazards to adjacent workers. For example, a job that involves asbestos removal will require evacuation of surrounding facilities during work execution to avoid worker exposure to friable asbestos, and will also specify the area to be monitored before returning the area to normal operations. All work that is scheduled to be performed in a facility is discussed on the facility's POD meeting, and the POD is attended by the area supervisors in the facility. This provides an integrated look at all activities that will take place so that any potential conflicts or hazards resulting from planned work can be addressed at the facility level.

Savannah River As described above (HA-10), the hazards to collocated workers are analyzed. If the hazards might affect the collocated worker, the workers may be removed from the affected area for the duration of the task, or if their activities cannot be suspended, appropriate controls would be instituted to protect those workers.

Fernald The hazard analysis includes potential impacts on collocated personnel and facilities. All personnel entering the area must be briefed on these hazards.

PUREX There is no specific provision in the JHA process to provide this information to the other teams. The process used is communication through the team leaders as part of the work development process and the pre-job briefing.

Rocky Flats Workers in collocated areas are warned that activities which may affect them are about to take place. The controls derived from the accident analyses will cause use of equipment, systems, design features, or administrative systems to prevent or mitigate accidents with severe consequences to collocated workers. These may factor into emergency plans to ensure actions to protect collocated workers.

Walkdowns, pre-evolution meetings, and IWCP processes are among the methods used. ❑

3.0 RISK MANAGEMENT

Although approaches may differ, a number of similarities in issues among the seven sites were noted in their responses to the questions on how they develop risk management criteria.

Regarding how sites developed their criteria and established thresholds, there was much similarity in sites using a preliminary hazard analysis (PHA) and risk-estimating approach. In general, sites felt that the hazard data are best used to develop thresholds. Several sites used these thresholds to determine who needed to participate in the analysis and feed this information back into the development of procedures and controls. Most sites believe that criteria are developed through the Job Hazard Analysis (JHA) process. All felt that a graded approach was appropriate for analysis and risk estimation.

Most sites saw risk management as what is done to specify and establish controls and barriers against the hazards evaluated by the hazard analysis process. Using warnings, cautions, and procedures is seen as appropriate means to communicate hazards and potential risks to workers. Commonly, a site's facility safety staff establishes risks and evaluates the hazard against the authorization basis to determine whether an unreviewed safety question (USQ) exists. All sites rely on existing standards to provide the baseline risk parameters such as worker exposure limits, found in ES&H standards, and requirements, found in DOE Orders, Federal laws, and other regulatory documents. With respect to Safety Analysis Reports (SARs) and BIOs, sites used DOE-STD-1027 to establish hazard categories; hazard categories then are used to grade hazards. All may use this approach to flow these standards down to operating procedures that define the programs and requirements for worker protection. Sites use hazard and risk estimating as part of the work planning and procedures development process. In making risk decisions, most sites base this more qualitatively on the relative hazard and perceived risk and uncertainty about barriers and controls, job complexity and on prior or similar experience with the work activity or hazard.

Most sites have some procedures or guidance for developing the hazard and risk analysis, including Job Safety Analysis (JSA) and associated processes, and these define the scope and applicability for each type of hazard analysis. All use the facility hazard analysis guidance provided in DOE-STD-1027 to grade the amount of analysis performed. While all sites have some guidance for work-level JSAs, the question remains of whether there is a need for a uniform approach such as a DOE Standard for job safety analysis documentation and work activity level risk criteria.

The issue of professional judgment was a key aspect of how sites saw hazard and risk analysis to be able to meet timely conclusions and resolutions. This is most often associated with the development of the content of the work packages and procedures, but most feel that safety professionals need to be able to exercise professional judgment. Sites feel that some degree of professional judgment may also be applied to evaluate existing safety practices and procedures in place to control the hazard and to determine if the hazards observed are bounded by written hazard analyses or procedures. Most sites are using floor-level procedures and guidance to communicate hazards and risks to employees and to implement administrative controls for risks. These are also often controlling documents for development of job safety analysis and operating procedures. Some sites felt that these processes need to allow professional judgment in determination of specifics during the conduct of the analysis and that the formal closure process should be used to validate professional judgment.

Some sites felt that because of the dynamic nature of the D&D mission, heavier emphasis needs to be placed on professional judgment. All felt that some feedback mechanism is important. The results or lessons learned during work planning execution need to be reviewed and assumptions and judgments of risk and hazard potentials validated. Based on this feedback, the job plan may be updated to reflect lessons learned so that the same or a similar type of work is accomplished more effectively in the future. Some sites that had experience with the Enhanced Work Planning (EWP) Project felt that it will further improve the work control process. For some sites (Hanford and Fernald), the EWP process has caused them to develop an automated screening tool that better defines when a detailed JHA is needed.

The EWP pilot effort has included benchmarking of the work planning processes at other DOE sites as well.

Regarding how and who makes risk acceptance decisions, generally, sites acknowledge that risk acceptance decisions are made at the facility level in the authorization basis. At the work package level, the contractor establishes facility conditions prior to the performance of work. Sites felt that risk acceptance at the activity level is met through compliance with existing requirements. Modifications to the authorization basis need to be done either at the DOE-Area office level or at DOE Headquarters. Sites recommend that risk decisions for standard industrial hazards to workers are made at the work activity level by the contractor and that the process is approved by DOE managers. Workers should be involved in the definition of acceptable risk and developing procedures. Some sites require that risk acceptance decisions (Category 3) are made by the head of operating contractor organization with DOE concurrence. Where individual work activity decisions are made at the work control team level, such as those activities requiring only a JHA, sites felt that this can be authorized by the subject matter expert or work team leader. This needs to be documented in the work development and hazard analysis procedures. Generally, sites defined how worker safety is integrated into authorization basis by using a defense-in-depth approach.

RM-1: How do you use hazard data to establish internal procedures, worker protection criteria, and thresholds that trigger particular levels or methods for hazard analysis?

Richland Hazard data develop thresholds. Thresholds activate health and safety participation, type of expertise, and controls (such as procedures). The level of risk/complexity of the work dictates the level of analysis and appropriate controls. The controls are matched back to the hazards. Worker protection criteria are determined through the JHA.

Paducah The facility safety analysis evaluates the hazards and identifies any procedural actions necessary to protect the worker from irreversible health effects. The more significant the hazard, the more detailed the analysis to support the results.

Warnings, cautions, and notes in the cylinder handling procedures tell operators when hazards exist and how to recognize them. Action steps tell the operators what to do when they recognize the hazard. For example, a warning tells the operator when HF gas may be released and what it looks and smells like. An action step tells them to secure the handling equipment and evacuate the area. An emergency squad will respond to stop the release and evaluate the hazard further.

If a hazard is discovered that is not covered in the procedures, the workers report it to their supervisor. Health and safety experts evaluate the hazard and recommend changes to the procedures to control the hazard. The facility safety staff evaluates the hazard against the authorization basis to determine whether a USQ exists.

Y-12 In general, worker exposure limits are established by the ES&H standards and requirements found in DOE Orders, laws, and other regulatory documents. These standards and requirements flow into Y-12 site-level ES&H procedures (70 series procedures) that define the programs and requirements for worker protection. Examples include the radiological control program, the hearing protection program, and the respirator program.

Savannah River The initiator (e.g., a work planner in some organizations) of a Work Control Permit (WCP) has to review the work documentation and document all known or anticipated hazards, such as system, area, and task, on WCP Section 2. If additional hazards are present, additional page(s) are added to the WCP.

The JHA, developed through the Job Hazards Program, provides a source of information on hazards. A JHA is a three-step process that involves: (1) reviewing basic sequential

steps of an activity or job, (2) identifying hazards to the worker, and (3) identifying preventive measures that need to be in place to protect the worker.

Information obtained from performing a JHA is in addition to the WCP initiator's knowledge of the task to be performed. This knowledge may be based on personal work experience, onsite inspection of the task to be performed, discussions with knowledgeable support organizations (e.g., Industrial Hygiene, Radiological Control, and process engineering) and/or discussions of the work and its hazards with workers that will be involved in the job.

The WCP initiator identifies appropriate hazard mitigation methods by checking the applicable identified safety requirements/compensatory measures on the WCP, Section 3. The initiator also provides any special health, safety, or hazard analysis requirements, including special permits and/or additional requirements necessary to complete the work safely. If additional hazard mitigation information is needed, other pages are added to the WCP.

WSRC 2S Manual, Procedure 1.1, "Procedure Administration" requires the procedure review performed by the CTF to include a technical accuracy verification of the procedure with regard to items such as technical standards, operational safety requirements, SARs, process requirements, PHRs, Design Agency requirements, test authorizations, and nuclear criticality safety and interlock configurations. The RCN must review procedures involving radiological work in accordance with the WSRC 5Q Manual. Nther departments or organizations, such as occupational safety and industrial hygiene, must also review the procedure when their expertise is applicable to identified hazards.

The procedure preparer has to identify hazards associated with the facility and work to be performed. PHA, the HAD, the SAR for the facility, and the PHR are among sources for identification of facility hazards.

Fernald Operating procedures and job safety analyses are developed using the information generated by the hazard analysis.

PUREX The hazard screening and analysis process is part of the work development process. Hazards identified can lead to changes in the work process to mitigate the hazards, or to controls such as PPE. The criteria used to determine the hazard analysis level to be performed were discussed in the questions above. This is based on the relative hazard/risk, complexity, and facility experience.

Rocky Flats Details of JSA, ACE, and procedure development processes are contained in the Level 1 guidance documents associated with those processes, including scope and applicability for each format of hazard analysis.

RM-2: How does the site balance professional judgment and documented guidance with respect to hazard analysis data?

Richland Professional judgment, knowledge, and experience are used in the identification and control of hazards. Guidance is used in the selection of an appropriate methodology for the performance of hazard analysis and in the documentation of those results.

Paducah As indicated in the response to HA-6, the facility hazard analysis used the guidance provided in DOE-STD-1027 to grade the amount of analysis performed. Professional judgment was also applied where appropriate institutional safety programs were in place to control the hazard and minimize a duplication of effort on the evaluation. During field

observations, managers and health and safety experts use professional judgment to determine when the hazards observed are bounded by the written hazard analyses or procedures. When necessary, work is stopped until analyses and procedure changes are completed.

Y-12 In general, worker exposure limits are established by the ES&H standards and requirements in DOE Orders, laws, and other regulatory documents. These standards and requirements flow into Y-12 site level ES&H procedures (70 series procedures) that define the programs and requirements for worker protection. Examples include the radiological control program, the hearing protection program, and the respirator program.

Savannah River The Shift Manager reviews a WCP to understand activities to be performed and how those activities may impact employee safety and facility operations. The shift manager reviews WCP Sections 1, 2, and 3 to ensure that it addresses adequate health and safety protective measures for the work to be performed. Only the shift manager can mark the "N/A" boxes in WCP Section 4 for those cognizant organizations that are not impacted by work to be performed under the WCP.

The shift manager may delegate the review to a competent designee, however, the shift manager's responsibility for all facility activities is not reduced, and the shift manager must be apprised of all changes in facility status and concur with the proposed course of action.

The work group supervisors carry out their responsibilities as detailed in the response to question HA-8.

Industrial Hygiene reviews WCPs that require respiratory protection for non-radiological chemical hazards.

Optional Reviewers

The shift manager indicates which, if any, additional reviews are required for the WCP. Reviewers routinely considered include personnel from the following:

- Mechanical Maintenance
- Electrical and Instruments
- WSRC or BSRI Safety
- Level 2 Operating Department
- Utilities Service Group (Power)
- Fire Protection
- Security
- Engineering/Technical
- Industrial Hygiene
- Radiological Control Operations
- Rigging/Cranes
- Subcontract Technical Representative
- Subcontractor
- Environmental Protection
- HVAC

Based on their area of expertise, each reviewer ensures that WCP Sections 1, 2, and 3 address adequate safety requirements and compensatory measures for work to be performed. When satisfied, the reviewer signs Section 4 indicating concurrence.

WSRC 2S Manual, Procedure 1.1, “Procedure Administration” requires the procedure review performed by the CTF to include a technical accuracy verification of the procedure with regard to items such as technical standards, operational safety requirements, Safety Analysis Report, process requirements, PHR, Design Agency requirements, test authorizations, and nuclear criticality safety and interlock configurations. The RCO must review procedures involving radiological work in accordance with the WSRC 5Q Manual. Other departments or organizations, such as occupational safety and industrial hygiene, must also review the procedure when their expertise is applicable to identified hazards.

Fernald Meetings are conducted with personnel representing all safety disciplines and with operations personnel. Through these meetings, consensus on the issues is reached.

PUREX For the work-task-level analysis being discussed here, hazards are identified through the JHA (1st level) using the judgment of the workers and safety professionals. The controls are then determined by the appropriate guidance (i.e., Industrial Safety Manual, etc.)

Rocky Flats As stated in RM-1, guidance on shop floor hazard analysis is provided primarily in controlling documents for development of the JSA, ACE, and operating procedures. All these processes allow professional judgment in determination of specifics during the conduct of the analysis. The most formal closure process to validate professional judgment is through the ACE process where an expert closure group is used to cross table results of the hazard analysis team’s ACE preparation.

Both are used; however, because of the D&D mission, heavier emphasis has to be placed on professional judgment. Both elements are prescriptive and restrict exercise of professional judgment. The extent of the balance between these two depends on the type or types of hazard being addressed.

RM-3: Does the site use a graded approach to determine an appropriate level of hazard analysis?

Richland Yes, a graded approach is used. See response to HA-6.

Paducah A graded approach was used as described in the response to HA-6.

Y-12 The Maintenance Planner’s Guide (Y10-035-008) contains detailed guidance for completing each section of the job planning checksheet. Section A of the checksheet, "Health and Safety,” includes an evaluation by the planner, the maintenance supervisor, and the customer (operations) to determine the need for a JHA, permits, hold points, and other requirements. Criteria for making this determination are listed in the Planner’s Guide as well as in Appendix B of Y70-043, *Job Hazard Analysis*, and include considerations such as the type of materials involved, electrical safety issues, and hoisting/rigging requirements. Section A of the checksheet also lists the requirements for special permits, environmental assessments, and USQDs.

During the job planning process, many other disciplines provide input to the job plan. Operations personnel work closely with the planner to make sure the scope of the work is well defined and understood. In many cases, the worker who operates the system/equipment is involved as the SME. ES&H technical support personnel who are assigned to the facility participate in the JHA, as needed, and specify the controls required for the job. Requirements for PPE, special permits or approvals, lockout/tagout, etc., are specified in the job package.

The results of post-maintenance tests and any lessons learned during work execution are reviewed during the post-job review. Based on this feedback, the job plan may be updated to reflect lessons learned so that the same or a similar type of work will be accomplished

more effectively in the future. The equipment repair history data are collected, analyzed, and used to help establish frequencies for scheduled maintenance activities.

Y-12 is currently piloting an EWP process that will refine the work control process. The EWP process provides an automated screening tool that better defines when a detailed JHA is needed. The EWP pilot effort has included benchmarking of the work planning processes at other DOE sites, including Hanford and Fernald.

Savannah River

The hazard analysis as applied at the worker or work activity level is applied using a uniform rather than a graded approach.

The work clearance and authorization process commonly referred to as the WCP establishes the methodology and requirements for controlling workplace hazards and authorizing work. The process of preparing a WCP provides for:

- Work hazard screening.
- Health and safety requirements and/or compensatory measures to mitigate existing hazards.
- Assurance that all health, safety, and regulatory permits have been obtained.
- Written authorization from the shift manager and involved work group supervisor(s) to start work.

A WCP is NOT required for:

- Routine work performed in designated shop areas.
- General office work.
- Routine servicing of refrigerators.
- Repairing light and portable equipment.
- Vendor-performed copy machine and food service machines servicing.
- Software loads and system management activities on process control systems.
- Routine operations support activities, such as changing chart paper and relamping or moving/maintaining protective clothing and/or building supplies.
- Surveillance and routine preventive maintenance performed according to approved facility-specific procedures authorized by the shift manager.
- Facility operations being performed according to approved facility operating procedures.

Note: Approved procedures authorized for use without a WCP must identify hazards associated with the activity and methods to mitigate them, including the specific type of PPE, when required.

WSRC 2S Conduct of Operations Manual establishes fundamental requirements for the safe operations of SRS facilities, just as WSRC 1Y Manual addresses maintenance of SRS facilities. Within the WSRC 2S Manual, the procedure for preparation of operating procedures prescribes the incorporation of preventive or mitigative controls into operating procedures for identified hazards.

WSRC 2S Manual, Procedure 1.1, “Procedure Administration” requires the procedure review performed by the CTF to include a technical accuracy verification of the procedure with regard to items such as technical standards, operational safety requirements, SARs, process requirements, PHRs, Design Agency requirements, test authorizations, and nuclear criticality safety and interlock configurations. The RCO must review procedures involving radiological work in accordance with the WSRC 5Q Manual. Other departments or organizations, such as occupational safety and industrial hygiene, must also review the procedure when their expertise is applicable to identified hazards.

The procedure preparer has to identify hazards associated with the facility and work to be performed. The PHA, the HAD, the SAR for the facility and the PHR are among sources for identification of facility hazards.

Because experienced operations staff have performed operational activities in SRS facilities, their involvement in the identification of hazards and controls necessary to mitigate them is crucial to the development of procedures that ensure safe work performance. JHA program provides a process to identify hazards specific to the job, and involves workers and work groups performing the task.

In some instances, as described in WSRC 2S Manual, Procedure 1.2, "Procedure Preparation," the hazards may be significant enough to require use of control steps in the procedure for the user to initial. Examples of these hazards and the criteria for their use include:

- Control of Criticality: A step which provides controls for nuclear criticality safety. Failure to perform these steps could result in reduced margins of safety for nuclear criticality.
- Control of Process Hazards: A step that provides controls necessary for the safe manufacturing of a product, or the control of process waste or its by-products. These steps are identified by PHRs.
- Safety Controls: Failure to complete these steps would reduce the margin of facility or personnel safety, and could endanger workers.

Fernald Yes, per the guidance found in 5480.23.

PUREX Yes, as discussed above, the process used at PUREX is a graded one.

Rocky Flats Yes, the site does use a graded approach in determining the appropriate level of hazard analysis. As stated previously, these fall primarily in the form of JSA development for maintenance and construction-type fixed-scope activities, ACE development for more process-related analysis, and use of JSA-type input to operating procedure development for ongoing processes. Risk acceptance decisions may be made at various levels, including shop-floor employees in determining whether they feel safe in conducting an evolution, first-line supervisors in authorizing the work, facility managers and/or operations managers in evaluating impacts to the operating facility and potentially, senior management for significant issues.

With respect to SARs/BIOs, DOE-STD-1027 establishes hazard categories. When established, hazard categories lead to a graded set of hazard analyses.

RM-4: By whom and at what level are risk acceptance decisions made? Do written criteria exist for this decision process?

Richland Risk decisions are made at the facility level in the authorization basis. Modification to the authorization basis is done either at the DOE-RL manager level (requiring a three-tier review process) or at DOE Headquarters. Criteria exist for the preparation, review, and approval of the authorization basis.

At the field or work package level, the contractor shift manager establishes facility conditions prior to the performance of work. Risk acceptance at the activity level is met through compliance with approved procedures, which implement the necessary (applicable) requirements. Another example of risk decision made at the activity level is the integration of safety and health requirements in the selection of worker PPE.

Paducah The facility safety analysis defined a set of guidelines for acceptance of risk based on DOE and NRC standards and rules. DOE approved these guidelines.

Risk decisions for standard industrial hazards to workers are made by contractor and DOE site managers. The workers were involved in the definition of acceptable risk that was written into the cylinder handling procedures.

Y-12 In general, worker exposure limits are established by the ES&H standards and requirements in DOE Orders, laws, and other regulatory documents. These standards and requirements flow into Y-12 site level ES&H procedures (70 series procedures) that define the programs and requirements for worker protection. Examples include the radiological control program, the hearing protection program, and the respirator program.

Savannah River During the process of identifying potential hazards and appropriate mitigation methods, the need for additional permits may be identified. RWP, Confined Space Entry Permit and Hot Work Permit are examples of commonly used permits. See the response to question HA-4 for a discussion of these permits.

After all required review signatures are obtained and the work activity is ready to begin, the work group supervisor submits the WCP and the technical work document to the shift manager and requests authorization to begin work.

Shift manager responsibilities include:

- Considering potential impacts of all ongoing facility activities, including conditions relevant to facility status, and ensuring that status indicators (e.g., Work Authorization Log, Shift Manager's Log, Lockout/Tagout Log, Caution Tag Log, Temporary Modification Log, Shift Manager's Turnover Check Sheets, system status files, normal operating procedures) accurately reflect facility status and that the work can be accomplished safely under existing facility conditions.
- Verifying, before authorizing the WCP, that identified hazards, safety requirements, compensatory measures, and appropriate reviews on the WCP are adequate to safely conduct the job.
- Verifying that the lockout/tagout plan, technical work document, and WCP are specific for the work activity, and records both the lockout/tagout plan and technical work document numbers in WCP Section 1.
- Discussing the WCP with the work group supervisor(s) before authorizing work.
- Entering authorized duration, dates, and times in WCP Section 1, Block 1F, and signing Section 5, authorizing work to begin.
- Entering an "X" in the "Yes" or "No" box indicating whether the Operations Control Room needs to be notified before work begins, or placing an "X" in the "N/A" box indicating Operations Control Room notification is not applicable.
- Entering a copy of the authorized WCP in the system status file or Work Authorization Log, as applicable.

Work Group Supervisor

The work group supervisor ensures that work is performed in accordance with approved work documents, and promptly informs the shift manager of changes in work activity

status during the shift, including notification as to when the work activity is scheduled to start, delays encountered, completion of work, and notification of unexpected early termination of work.

The work group supervisor stops work and informs the manager if the scope of the job changes, additional hazards arise that were not identified on the WCP, or WCP requirements cannot be followed.

Before the end of the shift, the work group supervisor ensures that the facility manager receives the current status of all work activities performed during the shift, regardless of whether a status change has occurred.

Additional responsibilities of the work group supervisor include:

- (Including vendors and subcontractors) ensuring that the task is properly authorized by the shift manager before performing work.
- Conducting a pre-job briefing with all involved workers.
- Signing and dating WCP Section 5, after the pre-job briefing is complete and all requirements of the WCP have been addressed, authorizing workers to perform work. The work group supervisor's signature indicates his/her agreement with all documented requirements, and identifies that he/she has reviewed the requirements of the WCP with all affected workers.

Workers

Workers perform work in accordance with WCP requirements, and stop work and inform their supervisor if the scope of the job changes, hazards arise that were not screened on the WCP, or WCP requirements cannot be followed.

All WSRC personnel, including vendors and subcontractors, involved in work activities for which a WCP has been prepared must print their name and department, and initial WCP Section 6. This indicates that they have read, understand, and agree to comply with requirements of WCP Sections 1, 2, and 3 .

During the pre-job briefing, workers are provided an opportunity to review hazards and compensatory measures in place to protect their safety and health. Any concerns expressed by workers must be addressed before work is allowed to proceed. Workers can exercise their stop work authority at any time to ensure that work is conducted safely.

As defined in WSRC 1B Management Requirements and Procedures Manual, Procedure 3.01, "Integrated Procedure Management System (IPMS)," procedures provide detailed, documented, step-by-step, sequential actions or requirements that prescribe an auditable method of completing a specific task. Procedures are required to ensure the quality, safety, health, security, legal, functional, and/or financial accountability of the task. Within the WSRC procedure system, procedures may be either company-level procedures or program-specific procedures.

Company-level procedures are managed in accordance with WSRC 1B Manual, Procedure 3.26, "Management of Company-Level Policies and Procedures." Company-level procedures set responsibilities for all WSRC divisions; consequently, the responsibility (accountability) for complying with a procedure rests with all affected divisions. Company-level procedures are approved by the WSRC Office of the President to ensure a consistent method of doing business throughout WSRC (i.e., applicable to multiple WSRC organizations). In general, company-level procedures should contain sufficient detail so as to minimize the need for any lower-tier implementing procedures.

Program-specific procedures are managed in accordance with WSRC 1B Manual, Procedure 3.27, "Management of Program-Specific Procedures." Program-specific procedures include all procedures (e.g., division/department/section/group) that provide detailed, step-by-step sequential actions and a prescribed, auditable method of completing a particular technical or administrative process or task. These procedures set requirements only for the division developing the procedure. The WSRC 2S Conduct of Operations Manual provides requirements for the generation and processing of program-specific technical and response procedures.

Fernald Risk acceptance decisions HAZCAT 3 and above are made by the Office of the President with DOE concurrence. Yes, Reference 5480.23.

PUREX Activities requiring only a JHA can be authorized by the work team leader. However, activities requiring more detailed analysis would be brought to the attention of higher level management personnel. This is documented in the work development and JHA procedures.

Rocky Flats Risk acceptance decisions are made at the SME level as well as senior levels, based on the operation to be conducted. With respect to written criteria, dose evaluation guidelines and ERPGs are used. Written criteria are built into the IWCP process.

At worker, line management, and H&S organization levels. Workers always retain the right to stop work, as assured by the Steelworkers Contract, and pre-evolution meetings reinforce this right.

RM-5: How is worker safety integrated into the safety authorization basis process?

Richland The TWRS BIO addresses worker safety in the hazard analyses. Worker safety is integrated into the safety authoriztion basis by using defense-in-depth analysis and controls. The TWRS HASP is driven by the hazard analyses. Further strengthening of integration is going to be accomplished through the implementation of the ISMS (feedback from lessons learned, occurrences, authorization basis upgrades).

For TWRS privatization, the methodology supporting responses to these questions is currently under development. Contractors are proposing RM through their ISMS.

Paducah Worker safety is integrated into the safety authorization basis by using a defense-in-depth approach. The authorization basis requires the following elements to ensure this approach is integrated throughout the document:

1. Institutional Safety Management Programs are required by the TSR and described in the SAR (e.g., Radiation Protection).
2. Guidelines established that require worker safety to be addressed.
3. Hazard analysis that considers worker safety in all areas of the plant.
4. Hardware controls that are significantly important in protecting worker safety are designated as safety significant, and appropriate QA controls are placed on their importance.
5. Controls are specifically identified to support preparation of plant procedures to control the hazard.

Screening thresholds				
Document type	***Onsite***		***Offsite***	
	Radiological	***Non-radiological***	***Radiological***	***Non-radiological***
PHS Document	# 40 CFR 302.4	# 40 CFR 302.4	N/A	N/A
		PHS THRESHOLD		
Limited Analysis	> 40 CFR 302.4 and < DOE-STD-1027 Category 3 Limits	> 40 CFR 302.4 and qualitative consequences would not result in life-threatening or serious health effects close to the event	N/A	N/A
		PrHA THRESHOLD		
PrHA	DOE-STD-1027 Category 3 Limits	Qualitative consequences which could result in life-threatening or serious health effects close to the event	N/A	N/A
		PSOA THRESHOLD		
PSOA	25 rem anywhere on-site or DOE-STD-1027 Category 2 Limits	Qualitative consequences which could result in life-threatening or serious health effects beyond the immediate facility area	5 rem	Qualitative consequences which could result in irreversible or other serious health effects that could impair abilities to take protective action

Y-12 A fundamental element of the Integrated Safety Management System (ISMS) that protects the worker is the safety authorization basis. The ISMS relies on the clear identification of each facility's authorization basis so that proposed work can be evaluated to ensure it falls within the safety envelope. This is accomplished through formal safety analysis to define the controls necessary to operate the facility safely, and through the use of formal work control processes that identify additional controls to address hazards specific to the work being performed. The integration of these processes, through teamwork and face-to-face communication among line management, technical support, and ES&H support personnel, is important to ensure that controls are tailored to risk and that unnecessary controls that could adversely affect the safety or the productivity of the worker are not imposed.

Savannah River Operations are conducted at WSRC by procedure. Once a safety document is added to the safety basis, procedures are revised or added to incorporate new requirements, assumptions, equipment or administrative limits. Thus, there is a link between the safety basis and operating procedures.

Fernald Site employees attend a pre-job briefing and walkdown. Problems, questions, and concerns are brought up and resolved in this format. If concerns cannot be resolved, employees have the right to stop the work activity until the problem has been resolved.

PUREX The PUREX authorization basis was developed in the 1980s and does not have a section on worker safety consistent with current requirements. However, by using the process

described above to address both worker and authorization basis hazards and impacts, the two are successfully integrated.

Rocky Flats Worker safety is being considered with regard to development of the authorization basis for the site. This scope of consideration has increased from historical levels in development and use of the new BIO and BFO systems.

Worker safety is integrated through commitment to safety management programs in BIOs/BFOs/SARs; also, conduct of work and worker protection. Finally, all controls established by OSRs/TSRs ultimately protect collocated workers and the public and the environment. ❑

4.0 LINKAGE TO INTEGRATED SAFETY MANAGEMENT AND WORK SMART STANDARDS

Integrated Safety Management (ISM) is the element that ties together the varying aspects (e.g., industrial hygiene, occupational safety, fire protection, radiological protection) of a site's worker protection program.

Sites provided a wide variety of responses as to how their current hazard analysis and control practices link to ISM guiding principles and in response to performance objectives and budgeting for ISM. One site focused on line management responsibility for controlling work at the facility level within the facility's safety authorization basis. At another site, the focus for the analyses was on the work activity level. One site reported that their intent was to tie the hazards to the S/RIDs requirements identified to address the hazard. Other sites' responses were more general, indicating that they provide for use of multidisciplinary review and analysis in the development to ensure that appropriate hazard identification and control provisions are included.

To gain a better understanding of site programs and whether the sites were being provided with sufficient guidance and direction for ISM, they were asked if their programs use a Work Smart or similar approach and if existing guidance is sufficiently supportive. Most indicated that they had or were about to adopt Work Smart Standards (WSS). The majority indicated that DOE could offer more guidance and direction on the implementation of this initiative. One site noted that DOE has drafted guidance but that final guidance is not yet available. One site noted that DOE Orders promote a top-down approach to hazard analysis and safety management, while their approach was bottom up.

Incorporation related programs, including the Voluntary Protection Program, Process Safety Management and Responsible Care, were also included in the question set. The responses to this question were fairly consistent in that the majority of the sites responded that they were pursuing or had completed working toward implementation of some of these programs.

ISM-1: How do the current site hazard analysis and control practices link to the guiding principles for Integrated Safety Management?

Fernald *(No Response)*

Paducah Hazard analysis and control practices start with analyzing the task to be performed in the cylinder yards. The focus for the analyses is the work to be done to safely store UF_6 in cylinders until final disposition of the material is selected. As described in the response to question HA-1, hazards and hazard controls are based on the work.

Y-12 Y-12's Integrated Safety Management System (ISMS) focuses on line management's responsibility for controlling work at the facility level within the facility's safety authorization basis. It relies on the clear identification of each facility's authorization basis so that proposed work in the facility can be evaluated to ensure that it falls within the safety envelope by establishing a process that evaluates work against the authorization basis, and, where necessary, with DOE approval, modifies the authorization basis to address new hazards.

A facility's authorization basis establishes the limiting conditions of operation (LCOs) within the facility. The authorization basis also identifies those systems, structures, and components important to safety and the requirements to maintain them operational. Therefore, included in the authorization basis are management's commitments to implement programs such as configuration management, maintenance, selection and qualification of personnel, and procedures development and implementation. In addition, the programs for emergency preparedness and response, and the administrative controls

necessary to successfully execute the activity being authorized are part of the authorization basis.

These requirements flow into the technical procedures, training, and processes used to execute work at the facility and organization level. Technical procedures provide additional layers of controls and, in many cases, reduce the LCOs to an even more conservative level. Conduct of operations, or operational formality, provides a structured and systematic way of performing work and ensures that procedures, training, and processes are followed.

Formal work control processes are used to plan and execute operational, maintenance, and construction activities. The work control processes ensure that before any hands-on activity is performed in a facility, the scope of work is understood, the activity is verified to fall within the facility's authorization basis, the associated hazards have been identified and communicated to the worker, and the controls commensurate with the hazards have been established and remain in place throughout work execution. Where proposed work is not within the current safety basis, the process provides a means to conduct required hazard analysis, recommend changes and additional controls, if justified, to the authorization basis for DOE approval.

Richland The TWRS ISMS is built on the seven principles and five functions of Integrated Safety Management.

PUREX This entire process is consistent with the DNFSB 95-2 process and recommendations. To strengthen this relationship, PUREX began incorporation of the S/RIDs into the JHA tool. The intent here was to tie the hazards to the S/RIDs requirements that were identified to address the hazard. This has not been completed for all of the JHA tool but was successful where it was implemented.

Rocky Flats Current activities for development of IWCP packages, including JSAs, ACE documents, BIOs, BFOs, and operating procedures, all make provision for use of multidisciplinary review and analysis in the development cycle to ensure appropriate hazards identification and control provisions are included.

Hazard analysis should link very well after the site completes reengineering on the IWCP process.

Savannah River DOE P 450.4, "Safety Management System Policy," states that it is DOE policy that the safety management systems (SMS) shall be used to systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, workers, and the environment.

The DOE SMS establishes a hierarchy of components to facilitate the orderly development and implementation of safety management throughout the DOE complex. The SMS consists of six components: (1) the objective, (2) guiding principles, (3) core functions, (4) mechanisms, (5) responsibilities, and (6) implementation. The first three components will be used consistently in implementing safety management throughout the DOE complex, while the final three components will vary based on the nature and hazard of work being performed.

The implementation guide accompanying Order 450.4, DOE G 450.4, provides a description of DOE's expectations of an SMS, as delineated in DOE P 450.4. The guide provides information on the development and implementation of an SMS.

ISM-2: Do your site's current procedures, policies, or internal guidance support using the Work Smart or similar approach?

Fernald *(No Response)*

Paducah Yes. The cylinder program has completed the Work Smart Standards process and established a set of Work Smart Standards.

Y-12 The Y-12 site has an S/RID that establishes the contractual, site-level requirements. The Work Smart Standards (WSS) process has been piloted in one area of the site, the General Manufacturing Organization (GMO). GMO is a non-nuclear facility, and the WSS process has enabled it to reduce the number of requirements posed by the site-level S/RID.

Richland The current approach to requirements management is to use S/RIDs. Although S/RIDs have been approved for TWRS, they are not yet fully implemented at TWRS.

PUREX The PUREX facility performed S/RIDs.

Rocky Flats The site is in the process of moving toward a work smart (e.g., necessary and sufficient) approach to doing work. Multi-layered hazard analysis, based on level of risk and complexity of project or process, is evidence of a work smart approach to doing business.

Savannah River The site uses the Work Smart approach for selected activities working directly from the guidance in DOE Policy DOE/EH/-0416, DOE Notice 450.3, DOE Manual 450.3-1, and DOE Policy 450.3.

If your site is applying a Work Smart approach, how are hazard analysis and controls integrated?

Fernald *(No Response)*

Paducah The Work Smart Standards are being included in the SAR during the annual update. Implementation of Work Smart Standards in the three site cylinder program procedures is nearing completion. The site safety processes continue to be used in task planning and control.

Y-12 The General Manufacturing Organization (GMO) is developing an implementation plan for its WSS; the advantage of applying WSS to other non-nuclear facilities will be evaluated after WSS implementation in GMO demonstrates measurable improvements in cost and efficiency.

Richland Not Applicable

PUREX Work Smart Standards have been used at the Hanford Site.

Rocky Flats *(No Response)*

Savannah River The site uses the Work Smart approach for selected activities, working directly from the guidance in DOE Policy DOE/EH/-0416, DOE Notice 450.3, DOE Manual 450.3-1, and DOE Policy 450.3.

ISM-3: Does the existing DOE guidance support the appropriate level of hazard analysis and safety management system concepts as defined by the ISM guiding principles?

Fernald *(No Response)*

Paducah Current DOE Orders promote a top-down approach to hazards analysis and safety management. The Work Smart Standards approach used in the cylinder program used a bottom-up approach. This bottom-up approach is in keeping with the ISM guiding principles. Very few DOE Orders were selected as Work Smart Standards. The Orders tend to direct multiple, arbitrary management “programs” that seldom contribute to safe and efficient fieldwork, for example, Conduct of Operations program (DOE 5480.19) and

Maintenance Management Program (DOE 4330.4B). These programs contain some concepts that should be an integral part of site work practices. They should not be separate "programs."

Y-12 No. Currently, DOE has not published an ISM guidance document.

Richland Yes, hazard analysis guidance is adequate and, in draft form, guidance on the ISMS is provided. Final ISMS guidance is not currently available.

PUREX The current regulations are confusing and contradictory at times. There are efforts at DOE to address these deficiencies.

Rocky Flats Yes, the existing DOE guidance does support an appropriate level of hazard analysis consistent with the ISM guidelines.

Savannah River No, the existing DOE guidance does not adequately address the issue of hazard analysis and safety management system concepts as it applies to the worker or work activity level of detail.

ISM-4: How does your site incorporate or relate to other health and safety programs such as the Voluntary Protection Program (VPP), Process Safety Management (PSM), and Responsible Care?

Fernald The site is pursuing star status under the VPP. Approximately 200 work groups have been set up to deal with safety concerns at the workplace.

Paducah These programs were reviewed in part during the WSS process. They were not selected as necessary processes for the cylinder program.

Y-12 Y-12's ISMS, which builds on existing ES&H programs, incorporates the tenets of these programs. A specific focus of both the ISMS and these other programs is worker involvement and participation and line management ownership and responsibility for safety.

Richland Elements of each of these programs are represented in the ISMS.

PUREX The VPP program is being implemented at Hanford and is one part of the overall safety program at PUREX.

Rocky Flats Rocky Flats is not currently subject to the Process Safety Management standard found at 20 CFR 1910.119 as a result of not having specified chemical agents in quantities approaching the respective threshold quantity to trigger planning. The site is actively evaluating principles as outlined in the VPP, including interface and information exchange with other DOE sites and private-sector institutions currently holding VPP Star status. It is our intent to embrace those standards, as appropriate to the site, and potentially lead to a formal process to pursue VPP Star status.

Savannah River The site has applied for and been assessed by DOE for STAR status under the VPP. STAR status is scheduled to be awarded after the successful completion of seven recommendations from the VPP Assessment Team.

WSRC 11Q Facility Safety Document Manual describes the process for performing and documenting process hazard analyses. Formal process hazard analyses are completed for each nuclear facility to identify and analyze accident scenarios associated with the operation of that facility, specify any controls necessary to prevent/mitigate the event, and classify each event relative to frequency and severity.

The hazard classification process divides accident events into two basic groups; more significant events are identified as scenario Class I and II events and less significant events

(including some Common Industrial Hazards [CIHs]) are identified as scenario Class III and IV events. Facility safety documentation (SAR, BIO, etc.) address the more significant events (Class I and II, which exceed DOE criteria for offsite receptors), and record specific links between these accident scenarios and controls necessary to prevent and/or mitigate each event. Annual updates to process hazard analyses ensure that the defined safety envelope is bounding, and any new events identified by the USQ process have been included. Implementation of controls identified for these events are tracked by the organization's Commitment Management System (CMS).

Less significant events (Class III and IV) are also identified in the process hazard analysis, but are not included in the SAR or BIO. These events are reviewed by the Facility Operations Safety Committee (FOSC) for formal dispositioning. For those identified Class III and IV events that the FOSC determines additional actions or controls are required, a Special Process Hazard Review (SPHR) or JHA will be performed to evaluate the event further, and identify any controls necessary. Events identified in the periodic PHR are also carried forward into the process hazard analysis, providing additional assurance that worker safety has been adequately evaluated.

Sources of information on hazards in operations activities are provided in the Hazards Analysis (HA) sections of SARs and BIO documents. Information is also available from the PHRs conducted through the WSRC PSM program.

Design PHRs are conducted by the engineering organization having responsibility for design of a new facility, with input from the operating organization. Pre-operational PHRs are performed jointly by the design team and the operations team. Periodic PHRs are conducted by teams of engineers and operators having intimate knowledge of the process. These reviews allow the team to consider recent operating experience, recent changes in design and operations, and most importantly, help the team consider what can go wrong and how to prevent accidents. Reviews are conducted periodically and at specific stages of the process's life cycle. The frequency of the periodic PHR is determined by the operational organization's Process Safety Committee, based on the hazard level determined for the facility or process. This program has been in place at SRS for over ten years, and is based on the chemical industry process safety practices developed by the DuPont Company.

The site is not currently involved in the Responsible Care program. Most aspects of the Responsible Care program are met by existing site programs.

ISM-5: Describe how the DOE F.O.'s [Contractors] contract performance objectives, budgets, and plans support delivery of ISM.

Fernald *(No Response)*

Paducah Later.

Y-12 *(No Response)*

Richland DOE and the contractors use Performance Agreements (PAs), developed annually, to support ISMS development. Current PAs include PA 5.1.1 (sitewide ES&H Management Plan) and PAs 6.1-1 through 6.1.4 (TWRS comprehensive Safety Management System). Specifically, PA 6.1.4 requests the contractor to provide a plan and two demonstrations of the ISMS by 9/30/97.

TWRS privatization uses Work Smart. For ISM-3, guidance is adequate. For ISM-4, the plans proposed include VPP, PSM, and Responsible Care.

PUREX ISM is written into the PHMC ES&H plan as a performance objective.

Rocky Flats With the implementation of integrated safety management, in accordance with 95-2, in the setup of integrated management contracts (IMC), the multiple contractors will be held responsible through contracts, budgets, and plans to implement ISM.

Savannah River The present contract requires the site contractor to support delivery of the ISM program. ❑

5.0 PERFORMANCE MEASURES

Performance measures and their associated metrics demonstrate program effectiveness by allowing managers and workers alike to track progress, either positive or negative. Performance measures are also an important part of Integrated Safety Management (ISM). One of the guiding principles of ISM is the need for 'Clear Roles and Responsibilities,' defined in the ISM guide as follows: "Responsibility and accountability are demonstrated through performance measures and indicators specified in contracts."

The use of performance measures is also strongly supported and in fact mandated in DOE guidance and the Federal Government Performance and Results Act. DOE has published 'Guidelines for Performance Measurement' (G 120.1-5, June 1996), which presents the following reasons for measuring performance:

- Performance measurement improves the management and delivery of products and services.
- Performance measurement improves communications internally among employees, as well as externally between the organization and its customers and stakeholders.
- Performance measurement helps justify programs and their costs.
- Performance measurement demonstrates the accountability of Federal stewardship of taxpayer resources.
- Performance measurement is mandated by the Government Performance and Results Act of 1993 and is central to other legislation and Administration initiatives.

Based on this need for performance measures, several questions on performance measures were included in the WPC questionnaire.

In addition to the positive results indicated from the use of performance measures in developing budgets and defining deliverables, it is interesting to note the large number of "No Response" indicators in this section. Examples of responses are Y-12's statement that a 'wide range of site-level programs exist for performance monitoring...' and Paducah's 'No Response' on the same question. Given the clear importance of these measures, this section itself may be read as a performance measure (i.e., track your site's progress in comparison to that of other sites) and also compare indicators so that their site can adopt and utilize the most applicable and optimal set.

PM-1: Are you using hazard data (e.g., air monitoring) for developing performance measurements?

Richland Yes, hazard data is used in developing performance measures. For the 53 performance agreements for TWRS, aspects of ES&H must be satisfactory for performance objectives to be met. TWRS data roll up into sitewide objectives and agreements as well. The completion of both the BIO and the final safety analysis requires a comprehensive hazard analysis. Both of these documents are a part of this year's performance agreements with the contractor.

Paducah *(No Response)*

Y-12 *(No Response)*

Savannah River Performance measurements are available for many site hazards, such as individual and collective radiation exposure, personnel and area contamination events, spills of hazardous materials, releases of hazardous materials to the environment, and occupational injuries and illness.

Fernald Continuous air monitors (CAMs) are in place in the thorium overpacking project. Noise monitoring has been conducted.

PUREX *(No Response)*

Rocky Flats Hazard data such as air monitoring is not specifically included in development of performance measures by the contractor at this time. However, indicators of hazard control effectiveness, such as staffing levels for health and safety professionals, area of radiological contaminated buildings, and injury and illness data, are formally being used in existing and future planned performance measures.

PM-2: If yes, how are these used for determining contract performance criteria, targeting internal assessments, program or project management, developing budgets for resource planning, measuring performance at line level, and defining deliverables?

Richland Under an M&I type of contract, performance criteria were developed for each of the major programs at the site. A performance objective and specific objectives were defined well before the creation of performance criteria. Incentive payments were aligned to "bundles" of performance agreements and are based on the completion of deliverables which use hazards data. Resource planning (money, equipment, and people) is tied back to the TWRS program logic. The program logic defines the steps that must be completed to meet the TWRS mission. There are 61 major steps identified at this time. Internal assessments (by the line) are a self-identified weakness. As a result, a comprehensive look at all TWRS self-assessments was completed last year. Specific areas were targeted (authorization basis and USQ) for improvement and increased surveillance. Please note that this response does not reflect the assessment program conducted at the site level.

Paducah *(No Response)*

Y-12 *(No Response)*

Savannah River

1. Determining contract performance criteria:

Performance against site goals is evaluated by DOE in determination of contract award fee payments.

2. Targeting internal assessments:

The annual development of schedules for internal self-assessments looks at the available performance indicators in conjunction with other data available on implementation of site programs to determine which aspects of the programs to subject to self-assessments in the coming year.

3. Program or project management:

Programs suffering from adverse trends in the protection of employees from hazards are subject to increased management attention until conditions improve.

4. Developing budgets for resource planning:

Budgets are planned to accomplish the activities directed by DOE.

Necessary resources are identified based on knowledge of the hazards involved and their impact on work efficiency. That is, hazardous tasks require more work planning, employee training, addressing of hazard controls, decreased efficiencies to account for use of PPE (e.g., respirators), and additional support personnel. These constraints are factored into the proposed budgets.

5. Measuring performance at line level:

The performance indicators are typically subdivided along various line and support organizations and work facilities at the site. This allows both good and poor performers to be identified.

6. Defining deliverables:

Problem areas are addressed in the development of award fee objectives for the next rating period, if not adequately corrected on discovery in the current award fee period.

Fernald From the data generated, stay times were determined. Areas where noise hazards existed were posted as requiring personnel to wear hearing protection.

PUREX *(No Response)*

Rocky Flats Individual performance measures are being used for emphasis areas from an operating standpoint. Example: One component of the cross-cutting safety performance measure for SSOC for FY97 includes reduction in number of areas classified as CAs based on contamination levels. This leads to targeting of resources and actions to decontaminate to appropriate levels and declassify corresponding areas. A second example includes reduction in open criticality infractions and targeting of reduction of the backlog through corrective actions.

PM-3: Do your current mechanisms, procedures, and language use and require hazard analysis?

Richland Yes, hazard analyses are currently required. The contract invokes requirements, S/RIDs, and DNFSB Recommendation 95-2 implementation.

Paducah Service subcontracts and construction subcontracts require hazard analysis through the HASPs.

Y-12 *(No Response)*

Savannah River Yes. For further information, see the response to question HA-3.

WSRC provides employees, other site contractor and subcontractor personnel, visitors, and members of the general public radiological protection from radiation exposure originating from operations of the SRS. Radiation exposure of the work force and public is controlled so that radiation exposures are well below regulatory limits, no radiation exposure is present without commensurate benefit and exposure is maintained ALARA at all times. Managers hold workers and their supervisors accountable for radiological control performance. Managers also ensure that orientation, training, and indoctrination reinforce rules and guidelines to minimize radiation exposure and control radioactive contamination for each worker. Workers are responsible for familiarizing themselves with, and following, radiological safety procedures governing their work, and shall immediately notify management of any condition or situation where a loss of control has occurred or is likely to occur.

WSRC provides a place and condition of employment that is free from, or protected against, recognized hazards that cause, or are likely to cause, sickness, impaired health and well-being or significant discomfort and inefficiency among workers. This objective is achieved through a professional, comprehensive industrial hygiene program based on management commitment and employee involvement, worksite analysis, hazard identification, hazard prevention and control, and safety and health training. Among those responsible for implementing this program are:

Industrial Hygiene Section is responsible for:

- Developing and implementing an industrial hygiene program that complies with DOE Orders and prescribed occupational safety and health standards.
- Developing and administering support for new and existing industrial hygiene hazard-specific programs.

- Providing technical support for implementation of industrial hygiene programs and practices at all facilities.
- Informing facility management of control measures necessary to reduce employee exposures to identified hazards, etc.

Line management is responsible for:

- Maintaining places and conditions within their work environments free from, or protected against, recognized hazards.
- Implementing applicable industrial hygiene programs.
- Training employees to perform assignments in a knowledgeable and safe manner.
- Planning, budgeting, and providing materials and equipment necessary to support a comprehensive industrial hygiene program, etc.

Employees are responsible for:

- Observing all safety and health rules.
- Using all prescribed PPE.
- Following established health and safety practices and procedures.
- Immediately notifying supervision of suspected exposures to harmful agents or conditions, and performing all tasks so as to not endanger themselves or others.

The Industrial Hygiene organization is responsible for performing and documenting periodic hazard assessments to anticipate, recognize, evaluate, and control occupational health hazards. The Occupational Health Hazard Assessment Program consists of worker and workplace surveillance activities that include baseline hazard assessments and special and annual workplace surveys. Workplaces are surveyed to identify potential occupational exposures, investigated to establish complete workplace exposure profiles, and periodically assessed for changes to operations, engineering controls, and/or work practices. These activities are in addition to the industrial hygienists' input to work control identified through the WCP process.

Fernald *(No Response)*

PUREX Yes, via the ES&H management plan.

Rocky Flats From a nuclear safety perspective, hazard analyses are driven by DOE Order requirements that are included in the contract with RFFO.

PM-4: How do the DOE F.O.'s [Contractors] self-assessment programs support and incorporate hazard analysis and risk-estimating information?

Richland Self-assessments are a self-identified area needing improvement. There are several mechanisms being used at TWRS currently. RL/TWRS has created a matrix identifying those areas requiring assessment to ensure a systematic and comprehensive approach. In addition, there are internal as well as external assessments with multiple feedback mechanisms including the lessons learned program, occurrence reporting, and the employee concerns program. One of the key methods used was a walkdown of controls for the TWRS BIO implementation as a first critical step in improvement.

Paducah *(No Response)*

Y-12 A wide range of site-level programs exist for performance monitoring, assessment, and feedback. The LMES Lessons Learned program, operational critiques, occurrence reporting, employee suggestion program, and various oversight programs at the site and

corporate level and DOE-wide provide mechanisms/tools by which line management and workers can take advantage of previous mistakes or feedback from those involved on how work might be accomplished better, more efficiently, and/or more cost effectively in a safe environment. A formal issues management program ensures that when deficiencies are identified (either through internal self-assessments or by external oversight groups), they are documented and analyzed for root cause, and corrective actions for them are identified and tracked to closure.

Site-level performance metrics are negotiated each fiscal year and incorporated into the contract. These metrics are used by DOE to quantitatively judge Y-12's performance in a wide range of areas, including safety management programs, in addition to production performance and business management.

Compliance holds monthly reviews of site-level performance measures. The monthly reviews focus on the status of contract performance metrics in addition to key safety management performance objectives and indicators.

Safety Management Performance Objectives and Indicators

Performance Objectives	Performance Indicators using real Y-12 metrics
Overall ES&H	Nuclear Safety Index OSR Violations
Protect People	Injury and Illness Rate Radiation Exposure Lost Workdays Case Rate Motor Vehicle Accidents DOE Safety Index Days Away Case Rate
Protect the Environment	Reportable Releases to the Environment
Comply with Regulations	Price Anderson Amendments Act
Use Good Management Practices	Status of Corrective Actions/Commitments Self-Assessments

Each month, the Y-12 Safety and Health organization holds a central safety meeting to review the ES&H performance indicators, highlight important safety issues, and promulgate lessons learned from facility to facility. Organizational safety meetings are held to provide flow-down of information from the plant safety review, including lessons learned.

Within each facility, management self-assessments are performed. Procedure Y60-028, *Y-12 Plant Management Assessment Program,* identifies the requirements for each Y-12 organization to implement management assessments in various functional areas such as conduct of operations, conduct of maintenance, configuration management, radiological control, and training.

At the senior management level, the executive steering committee has been re-instituted to provide a mechanism to provide senior line management and oversight, approval, and resolution to significant health and safety issues that are identified at the facility or organization level. The committee, comprising the line managers and functional area managers reporting to the vice president, will meet quarterly to review significant issues, such as major work scope changes and their impact on the safety basis; OSR infractions; CSA/CSR noncompliances; potential PAAA noncompliances; and updates from the Criticality Safety Board, Safety Groups etc. Leaders of the OSBs summarize and report these issues, and the committee identifies and addresses trends, and develops and issues lessons learned. The committee is also responsible for evaluating new requirements that flow down from DOE and other agencies and for establishing the strategy and responsibility for implementation.

The most important element of Y-12's assessment program is management presence in the workplace. Observation of daily activities is considered the primary and most effective technique for performance of self-assessments. Post-job critiques, toolbox safety meetings, and continuing training all take place where the work is performed and provide face-to-face communication and feedback from the line supervisor to the worker.

Savannah River

Assessments are conducted to demonstrate field adherence to WSRC policies and procedures, as well as to foster continuous improvement. WSRC 12Q Assessment Manual and WSRC-SCD-4, "Assessment Performance Objectives and Criteria," establish the program for conducting assessments. WSRC-IM-96-147, "Self-Assessment Handbook," provides guidance for planning, conducting and documenting results of assessments.

The assessment process is a consistent, comprehensive, integrated assessment process that employs total quality management concepts supporting SRS's five imperatives: safety, disciplined operations, continuous improvement, cost-effectiveness and teamwork. This process provides for recognition of noteworthy practices and identification of specific performance deficiencies, and provides input to the management evaluation process.

The assessment process is governed by: (1) operational status of the facility undergoing assessment and its position in the life cycle, (2) assignment of responsibility to line management or an independent entity for different aspects of the assessment, and (3) use of standardized performance objectives and criteria.

The performance objectives and criteria are contained in WSRC-SCD-4, which is revised at least annually to reflect changes to regulatory requirements as well as to incorporate lessons learned from personnel conducting assessments in the field.

In order to start up or restart activities for nuclear facilities, processes, equipment or systems, special self-assessments, such as the RSA, ORR, and RA are performed.

When a facility becomes operational, self-assessments are required to:

- Demonstrate ongoing compliance with requirements through performance-based assessments.
- Evaluate adequacy of the line self-assessment process.

WSRC has chartered the FEB to:

- Provide accurate, consistent, and gradeable measures of performance effectiveness.
- Evaluate adequacy of the line self-assessment process.
- Satisfy contractual obligations for company-level independent oversight.

Management evaluation focuses on the use of evaluation processes to understand assessment results, and to determine what those results mean relative to the performance of the assessment unit or functional program. Although not prescribed, structured analytical techniques have been developed and are advocated for use in interpreting assessment results and making intelligent decisions regarding improvement actions. These evaluation requirements are directed at optimizing value gained from the assessment results to correct root cause problems and identify necessary assessment unit or functional program improvements to raise the respective performance level to acceptable standards. An improvement package may be compiled to define and prioritize actions in the ensuing year, to eliminate performance deficiencies, and to focus subsequent self-assessments on areas of needed improvement.

Fernald *(No Response)*

PUREX Management assessment programs periodically assess all aspects of operations, including processes that analyze hazards and risks.

Rocky Flats *(No Response)* ❑

6.0 FIELD PERSPECTIVES

This section provides field responses to a series of questions regarding the adequacy of current Headquarters technical guidance. The questions solicit field input on what guidance needs to be improved.

In terms of hazard analysis, most sites indicated that existing Federal regulations and industry consensus standards provide sufficient technical guidance but that the diverse needs of analyses within DOE have resulted in stove-piped DOE requirements directed and implemented by different Headquarters and field programs. Most sites strongly suggest that greater coordination and integration of these separate hazard analysis efforts would result in better analyses at lower cost.

Though sites express minimal need for additional worker health and safety guidance, they do indicate that they discover inconsistencies among overlapping requirements when implementing the details of the requirements and that such inconsistencies sometimes cause added complications that are roadblocks to efficiency. An improved process for the identification and timely resolution of such inconsistencies would be beneficial.

Concerning better integration of requirements and the elimination of inconsistencies, some sites point to DOE's Integrated Safety Management (ISM) initiative as the vehicle to catalyze and institutionalize such improvements.

The sites were asked how they determine the adequacy of the hazard analysis. No site responded in terms of meeting a quantitative measure for adequacy. Most sites indicated that adequacy is satisfied through the establishment of a robust worker safety analysis process involving the assignment of capable personnel with clear roles and responsibilities and a system of review, analysis, approval, and oversight. They indicate that the implementation of this robust system is the key to ensuring adequate hazard analysis as well as adequate worker health and safety as a whole.

FP-1: Are current hazard analysis guidance, criteria, standards, and Orders sufficient?

Richland Yes, but conflicts exist between DOE-STD-3009 and DOE 5480.23.

Paducah The Federal regulations and industry consensus standards are sufficient for hazard analysis. DOE Orders often add excessive administrative work without contributing to safety in the cylinder yards. Current DOE Orders promote a top-down approach to hazard analysis and safety management. The Work Smart Standards approach used in the cylinder program used a bottom-up approach, in keeping with ISM guiding principles. Very few DOE Orders were selected as Work Smart Standards. The Orders tend to direct multiple, arbitrary management "programs" that seldom contribute to safe and efficient fieldwork. For example, the Conduct of Operations Program (DOE 5480.19) and the Maintenance Management Program (DOE 4330.4B) both contain some concepts that should be an integral part of site work practices. They should not be separate "programs."

Y-12 The Federal regulations and industry standards are sufficient for hazard analysis. DOE Orders add administrative requirements to the process.

Savannah River No, see the responses for FP-3 and FP-8.

Fernald Yes, as the project proceeds, the hazard analysis continues to be reviewed. Procedures directing the project are living documents and changes will be made to address the project needs.

PUREX DOE 440.1 directs the use of hazards analysis for worker safety issues but leaves flexibility to the field. Other Orders require other analyses (fire protection, SARs, etc.)

There is a need to integrate these both through the directives and standards, and at the field level.

Rocky Flats Yes, as covered in the ISM process description.

FP-2: Is more detailed or specific guidance in a particular area needed?

Richland No, additional guidance is not needed at this time.

Paducah No.

Y-12 *(No Response)*

Savannah River Yes, see the responses for FP-3 and FP-8.

Fernald The project has living documents. As the situation changes in the field, requirements to conduct business may change also.

PUREX The current standard being developed will provide guidance in this area. However, the expectations of separate hazard analyses in different formats for several different groups are costly and redundant.

Rocky Flats From feedback of the ISM process description review, if there are areas that need more detail, the process will be revised to reflect them.

FP-3: Are there some worker protection issues or work activities not covered by existing standards, guidance, or approaches? Are there gaps in the existing field approach?

Richland Gaps within the ISMS are still being evaluated. Gaps are most likely in areas of implementation and integration of ISMS concepts, not in the existence of procedures and processes.

Paducah No. Some identified activities need to have procedures completed or modified, but this is an ongoing effort within the existing approach.

Y-12 None that we can identify. The current set of DOE Orders incorporates the OSHA and ANSI standards and guidance.

Savannah River Yes. JHA, as applied to the worker or work activity level, are not adequately addressed by DOE guidance. For example, while DOE G 450.5 discusses the need to analyze work hazards, DOE does not provide any criteria as to its desired scope of the hazard analysis or thresholds that would trigger the need for an analysis.

Fernald No.

PUREX None have been observed at the PUREX project.

Rocky Flats Currently investigating.

FP-4: Which guidance is most and which least used for the basis of decisions by the contractors?

Richland DOE Orders as specified in the contract are mandatory, along with other Federal and state regulations, and are most used. The contract is the basis for almost all contractor decisions.

Paducah Most - Federal and consensus standards on allowable exposure to identified hazardous materials.

Y-12 *(No Response)*

Savannah River At SRS, mandatory requirements from regulatory and contractual sources receive the highest level of attention. Other sources of DOE guidance, not yet mandatory, such as Implementation Guides, Manuals, and various DOE programs and initiatives, are addressed and/or utilized in cooperation with DOE-SR priorities and the availability of site resources to allocate to the activity.

Fernald Most used--Project Specific Health and Safety Requirements Matrix

Least used--Site Safety Performance Requirements Manual.

PUREX At PUREX the process described above is used. The guidance (S/RIDs) is used to determine the appropriate controls and programs to mitigate the hazards identified.

Rocky Flats The most used guidance is the integrated work process guidance. The least used is the JSA.

FP-5: How does your site determine that you have a comprehensive (adequate) hazard analysis?

Richland Walkdowns are used to verify that the hazards have been identified. As new hazards are identified and through lessons learned, hazards and safety analyses for the facility are updated under configuration control.

Paducah Hazard analyses at the authorization basis level are reviewed by work supervisors, managers, and DOE staff.

Hazard analyses at the task level are reviewed by independent health and safety experts, supervisors, and workers.

Y-12 The process is as follows;

- LMES implements DOE guidance.
- LMES and DOE together discover deficiencies.
- LMES conducts “self-assessment” programs/independent reviews/etc.
- DOE reviews the results of our efforts.

Savannah River After all required review signatures are obtained and the work activity is ready to begin, the work group supervisor submits the WCP and the technical work document to the shift manager and requests authorization to begin work. For a discussion of shift manager, work group supervisor, and worker responsibilities, see the response to question RM-4.

WSRC 2S Manual, Procedure 1.1, “Procedure Administration” requires the procedure review performed by the CTF to include a technical accuracy verification of the procedure with regard to items such as technical standards, operational safety requirements, SARs, process requirements, PHRs, Design Agency requirements, test authorizations, and nuclear criticality safety and interlock configurations. The RCO must review procedures involving radiological work in accordance with the WSRC 5Q Manual. Other departments or organizations, such as occupational safety and industrial hygiene, must also review the procedure when their expertise is applicable to identified hazards.

WSRC 11Q Facility Safety Document Manual describes the process for performing and documenting process hazard analyses. Formal process hazard analyses are completed for each nuclear facility to identify and analyze accident scenarios associated with the operation of that facility, specify any controls necessary to prevent/mitigate the event and classify each event relative to frequency and severity. This hazard classification system is discussed in the response to HA-3.

A JHA is a three-step process that involves reviewing steps of an activity or job, identifying hazards to the worker and identifying preventive measures (procedures and protection) that need to be in place to protect the worker. A JHA is performed by line personnel prior to, or at the start of, each task when required by elements of the Job Hazard Program. Safety measures are identified and incorporated into the work plan. Where lessons learned are identified, Job Hazards Program elements are modified to prevent recurrence.

Safety Basis Authorization

Proposed Activities (PA) to change nuclear facility configuration, procedures, or management systems are reviewed to determine if they are within the Authorization Basis (AB). If determined to be within the AB, they are considered to be pre-authorized by DOE; otherwise they are submitted to DOE for approval prior to implementing the change. For non-nuclear facilities, the safety basis is authorized by DOE approval of ASA documentation for High-Hazard Chemical facilities, and by WSRC for the remaining facilities.

Assessments are conducted to demonstrate field adherence to WSRC policies and procedures, as well as to foster continuous improvement. WSRC 12Q Assessment Manual and WSRC-SCD-4, “Assessment Performance Objectives and Criteria, establish the program for conducting assessments. WSRC-IM-96-147, “Self-Assessment Handbook,” provides guidance for planning, conducting, and documenting results of assessments.

The assessment process is a consistent, comprehensive, integrated assessment process that employs total quality management concepts supporting SRS’s five imperatives: safety, disciplined operations, continuous improvement, cost-effectiveness and teamwork. This process provides for recognition of noteworthy practices, identification of specific performance deficiencies, and provides input to the management evaluation process.

The assessment process is governed by: (1) operational status of the facility undergoing assessment and its position in the life cycle, (2) assignment of responsibility to line management or an independent entity for different aspects of the assessment, and (3) use of standardized performance objectives and criteria.

The performance objectives and criteria are contained in WSRC-SCD-4, which is revised at least annually to reflect changes to regulatory requirements as well as to incorporate lessons learned from personnel conducting assessments in the field.

In order to start up or restart activities for nuclear facilities, processes, equipment or systems, special self-assessments, such as the RSA, ORR and RA, are performed.

When a facility becomes operational, self-assessments are required to:

- Demonstrate ongoing compliance with requirements through performance-based assessments.
- Evaluate adequacy of the line self-assessment process.

WSRC has chartered the FEB to:

- Provide accurate, consistent, and gradeable measures of performance effectiveness.

- Evaluate adequacy of the line self-assessment process.
- Satisfy contractual obligations for company-level independent oversight.

Management evaluation focuses on the use of evaluation processes to understand assessment results, and to determine what those results mean relative to the performance of the assessment unit or functional program. Although not prescribed, structured analytical techniques have been developed and are advocated for use in interpreting assessment results and making intelligent decisions regarding improvement actions. These evaluation requirements are directed at optimizing value gained from the assessment results to correct root cause problems and identify necessary assessment unit or functional program improvements to raise the respective performance level to acceptable standards. An improvement package may be compiled to define and prioritize actions in the ensuing year, to eliminate performance deficiencies, and to focus subsequent self-assessments on areas of needed improvement.

Fernald Qualified representatives from all safety disciplines and operations collectively develop the hazard analysis. The hazard analysis goes through a comprehensive review and approval process.

PUREX The PUREX project used the process above to evaluate deactivation tasks. The process is graded and the level of analysis is determined by the screening process. These tools and programs define an adequate hazards analysis process for the project.

Rocky Flats By the use of management assessments.

FP-6: Which directives and guidance are used to determine when detailed analysis, requiring DOE approval, is to be undertaken and documented?

Richland DOE O 5480.21 for the USQ process is used.

Paducah USQ process as directed by DOE O 5480.21, 10 CFR 50.59, or 10 CFR 76.95.

Y-12 USQ process as directed by DOE O 5480.21, 10 CFR 50.59, or 10 CFR 76.95.

Savannah River PAs to change nuclear facility configuration, procedures, or management systems are reviewed to determine if they are within the Authorization Basis (AB). If determined to be within the AB, they are considered to be pre-authorized by DOE; otherwise they are submitted to DOE for approval prior to implementing the change. For non-nuclear facilities, the safety basis is authorized by DOE approval of ASA documentation for High-Hazard Chemical facilities, and by WSRC for the remaining facilities.

Fernald 5480.23

PUREX The USQ process (5480.21), the ORR (425.1) process, and the SAR process (5480.23) are used to determine when DOE approval is required. The hazard analysis process is used to determine the level of analysis and the best technique to be used.

Rocky Flats Primarily the health and safety program manual (HSP), and the IWCP.

FP-7: Which directives or site-specific criteria exist for determining the balancing of work controls against hazards? How well are these criteria defined?

Richland Specific RL procedures regarding USQs and safety authorization basis, the RL Nuclear Safety Management Manual, and DOE Orders 5480.21, 5480.22, and 5480.23 all provide

specific criteria for balancing the level of controls to match the hazards. In addition, RL-TWRS is developing new procedures on the USQ process, management of the authorization basis, authorization basis configuration management, readiness assessment, resolution of differing technical opinions, and the three-tier review process. These procedures are under development or in draft.

Paducah 29 CFR 1910, 29 CFR 1926, SAR, TSRs, and 10 CFR 835. Work control procedures, health and safety permit procedures, and health physics procedures are used to apply these standards to specific tasks.

Y-12 *(No Response)*

Savannah River The WCP initiator identifies appropriate hazard mitigation methods by checking the applicable identified safety requirements/compensatory measures on the WCP, Section 3. The initiator also provides any special health, safety or hazard analysis requirements, including special permits and/or additional requirements necessary to complete the work safely. If additional hazard mitigation information is needed, other pages are added to the WCP.

During the process of identifying potential hazards and appropriate mitigation methods, the need for additional permits may be identified. The Radiological Work Permit (RWP), Confined Space Entry Permit and Hot Work Permit are examples of commonly used permits.

For a discussion of these permits, see the response to question HA-4. The Hazardous Energy Control Program, Non-Electrical Work Near Overhead Power Lines, Work Near Critical Process Piping, Excavations and Trenches, Railroad or Site Roadway Clearance, Process System Access, and Alteration to Process Ventilation Systems are discussed in the response to question HA-7.

Work Near Critical Process Piping

The operation of mobile equipment that will raise loads above or boom over critical piping (e.g., acid, steam, radioactive materials, transfer lines, etc.) must be authorized in writing by the operator's supervision, the utility owner and the line Custodian/Facility Administrator. A completed WCP documents the approvals, and defines controls used to ensure safety of personnel and protection of equipment and facilities.

Excavations and Trenches

An excavation is any man-made cut, cavity, trench or depression in the earth's surface that is formed by earth removal, including soil boring and hand auguring. Driving stakes deeper than 12 inches is also considered an excavation.

A trench is a narrow excavation (in relation to its length) made below the surface of the ground. A WCP authorizes work for excavation and trenching activities.

A field map is a sketch, developed from applicable drawings, that identifies known commodity interferences, unknown interferences identified by a non-obtrusive survey method (e.g., ground penetrating radar), and defines the boundary for excavation/trenching work.

The following excavation/trenching activities are exempt from requiring preparation of a field map, and require only signature approval on a WCP by the shift manager (and Custodian/Facility Administrator, if different) and lead work group:

- Hand-earthen excavation (e.g., shovel, post hole digger, etc.) not exceeding 12 inches in depth.
- Machine-earthen excavation (e.g., back hoe, grader) not exceeding three inches in depth.
- Concrete excavation/trenching using carbide-tipped drilling equipment and not exceeding three inches in depth.

WSRC 8Q Manual, Procedure 34 , “Excavations and Trenches,” does not apply to removal of asphalt and crusher-run base (four inch maximum) or grading from roads, parking lots, tank farm areas, etc.; coring, chipping and drilling in concrete (WSRC 18Q Manual and SRS Engineering Standard 03010-01-R); or penetrations of walls, floors, ceilings or structural alterations (see WSRC 8Q Manual, Procedure 12, “General Site Safety Requirements").

Railroad or Site Roadway Clearance

The following work requires a WCP signed by the Central Services Works Engineering (CSWE) Transportation Section manager, or designee:

- Work on lines (pipe and/or electrical) crossing over or under a railroad track; any excavation work, use of equipment, or storage of material closer than 8 feet to a railroad track centerline.

WSRC 2S Manual, Procedure 1.1, “Procedure Administration” requires the procedure review performed by the CTF to include a technical accuracy verification of the procedure with regard to items such as technical standards, operational safety requirements, SARs, process requirements, PHRs, Design Agency requirements, test authorizations, and nuclear criticality safety and interlock configurations. The RCO must review procedures involving radiological work in accordance with the WSRC 5Q Manual. Other departments or organizations, such as occupational safety, and industrial hygiene, must also review the procedure when their expertise is applicable to identified hazards.

Because experienced operations staff have performed operational activities in SRS facilities, their involvement in the identification of hazards and controls necessary to mitigate them are crucial to the development of procedures which ensure safe work performance. The JHA program provides a process to identify hazards specific to the job, and involves workers and work groups performing the task.

In some instances, as described in WSRC 2S Manual, Procedure 1.2, “Procedure Preparation,” the hazards may be significant enough to require use of control steps in the procedure for the user to initial. Examples of these hazards and the criteria for their use include:

- Control of Criticality: A step which provides controls for nuclear criticality safety. Failure to perform these steps could result in reduced margins of safety for nuclear criticality.
- Control of Process Hazards: A step which provides controls necessary for the safe manufacturing of a product, or the control of process waste or its by-products. These steps are identified by PHRs.

- Safety Controls: Failure to complete these steps would reduce the margin of facility or personnel safety, and could endanger workers.

As described in WSRC 2S Manual, Procedures 1.1 and 1.2, the author of a procedure is responsible to provide users of technical procedures with safety steps where failure to complete the step would create danger to personnel or facility safety. The CTF reviewer performs a verification of the technical accuracy of the procedure with respect to items such as technical standards, operating safety requirements, SARs, process requirements, PHRs, Design Agency requirements, test authorizations, nuclear criticality safety, interlock configurations and environmental permits/requirements.

The RCO reviews procedures in accordance with the WSRC 5Q Radiological Control Manual. When additional departments or organizations (Occupational Safety, Industrial Hygiene, etc.) are affected by a new or revised procedure, they review the applicable procedure sections. Identified safety issues or technical inadequacies are documented on the review form for evaluation and disposition by the procedure owner.

Design PHRs are conducted by the engineering organization having responsibility for design of a new facility, with input from the operating organization. Pre-operational PHRs are performed jointly by the design team and the operations team. Periodic PHRs are conducted by teams of engineers and operators having intimate knowledge of the process. These reviews allow the team to consider recent operating experience, and recent changes in design and operations, and most importantly, helps the team consider what can go wrong and how to prevent accidents. Reviews are conducted periodically and at specific stages of the process's life cycle. The frequency of the periodic PHR is determined by the operational organization's Process Safety Committee, based on the hazard level determined for the facility or process. This program has been in place at SRS for over ten years, and is based on the chemical industry process safety practices developed by the DuPont Company.

A JHA is a three-step process that involves reviewing steps of an activity or job, identifying hazards to the worker and identifying preventive measures (procedures and protection) that need to be in place to protect the worker. A JHA is performed by line personnel prior to, or at the start of, each task when required by elements of the Job Hazard Program. Safety measures are identified and incorporated into the work plan. Where lessons learned are identified, Job Hazards Program elements are modified to prevent recurrence.

Controls identified through the hazard identification and analysis processes described above must be incorporated into work packages and operating procedures. When engineering or process control needs are identified, they must be logged into a system which provides prioritization, followup and identification of resources needed for completion.

Safety management activities are applied to WSRC and subcontractor work through the ISBSM Program, which ensures that:

- Company-level policies/programs are used to implement required standards; control hazards through mitigation techniques; provide uniformity; and enhance WSRC's operational imperatives: Safety, Disciplined Operations, Continuous Improvement, Cost-Effectiveness, and Teamwork.

In most cases, the WSRC Environmental Restoration Division (ERD) prepares the remediation safety and health program and the required HASP for each remediation unit. In some cases, when a different organization is custodian of the area or facility being remediated, the operating organization that has custodial responsibilities will prepare the site-specific HASP. The written remediation program for health and safety includes:

- An organization structure.
- A comprehensive work plan.
- A site-specific HASP that need not repeat WSRC standard-operating procedures.
- A health and safety training program.
- A medical surveillance program.
- Standard operating procedures for health and safety.
- A necessary interface between this remediation program for health and safety and site-specific activities.

A HASP includes a risk or hazard analysis for each task in the work plan. The analysis must identify all conditions that pose hazards that could be immediately dangerous to life and health (IDLH). A HASP also includes appropriate engineering controls and PPE requirements, medical surveillance and monitoring requirements, site control procedures and other issues related to worker safety.

Fernald *(No Response)*

PUREX There are several site standards or manuals that require specific controls to address given hazards. These are used for the control of hazards identified in the hazard screening and analysis process. These controls have been adequate at the PUREX project with the process described.

Rocky Flats The HSP is used extensively to balance work controls against hazards. The criteria in the manual are currently being revised.

FP-8: Which current DOE/external directives are helpful and which are confusing regarding hazard analysis requirements? What are regulatory duplications, overlaps, or inconsistencies that are causing problems? What actions has the site taken to resolve inconsistencies and conflicting requirements? Is guidance on these inconsistencies adequate?

Richland There is limited guidance at the activity level, but none is requested. Inconsistencies include conflicts between DOE O 5480.10 and Carcinogen Control (20 CFR 1910). Also, the application of DOE O 5480.8A is not clearly defined. Specific actions taken at the site include creation of an RL policy office for resolution of inconsistencies (ES&H). In addition, RL has issued a Nuclear Safety Management Manual to resolve site inconsistencies.

For TWRS privatization, most of the DOE requirements have been removed and commercial standards have replaced them.

Paducah See dual standards report to Jimmy Hodges.

What are regulatory duplications, overlaps, or inconsistencies that are causing problems? Two sets of Federal regulations for control of radioactive material. One for general industry and NRC regulated facilities and 10 CFR 835. Some inconsistencies have been found in exposure standards for workers, minors, and the public. As we go to increased outsourcing, these duplications will cause increased costs for subcontracts.

What actions has the site taken to resolve inconsistencies and conflicting requirements?

Established a complicated management process and procedure for handling shared site issues with LMUS to determine whether NRC or DOE standards will apply to a specific task. Another roadblock to efficiency.

The WSS process is being used to eliminate as many of the remaining dual standards issues as possible.

Is guidance on these inconsistencies adequate? No

Y-12 *(No Response)*

Savannah River Consideration of hazards analysis and control are contained in a number of DOE Directives. Examples include:

10 CFR 835, paragraphs 501(b) and 1001(b) and associated Implementation Guides and Standards

29 CFR 1910.119

29 CFR 1910.120

DOE Orders 5480.21, 5480.22, 5480.23, 5500.3A, 440.1 (paragraphs 4.i and 4.j)

DOE Policy 450.4, Components 2 and 3

DOE Guide 450.4, Chapter III, sections 2 and 3

All these examples tend to view the need and performance of hazard analyses and hazard controls from differing perspectives, resulting in differing guidance to the contractors. Separate site programs tend to be formed to address these directives because different DOE line organizations have responsibility for ensuring the implementation of the different directives. For example, the DOE oversight for hazard analyses conducted for emergency preparedness purposes is provided by a different group than the DOE oversight for hazard analyses conducted for industrial hygiene purposes. This tends to result in reports and documentation that are unique to each program, rather than one DOE oversight group accepting the results from the program generated by the other DOE oversight group. As a consequence, the contractor tends to form separate groups to conduct the hazard analyses. While there is generally interaction and sharing of information between the two contractor groups, there is still a degree of duplication resulting from these activities.

It would be worthwhile for DOE to identify the full scope of regulatory drivers for the analysis and control of hazards at DOE facilities, such as 10 CFR 835 and 29 CFR 1910, and then identify the range of activities within DOE that may have need for hazard analyses, such as development of SARs, and emergency preparedness plans, ORR and worker/workplace safety. If the drivers can be identified, then it may be possible to develop an integrated hazard analysis and control program that satisfies all these needs.

It appears more likely that a two-tiered hazard analysis and control program will be required. An upper tier program would address the programmatic needs such as 10 CFR 1910, SARs, and emergency preparedness plans and would be based upon a set of threshold values that look at high-hazard/high-risk activities. The output from these assessments would become input for the second tier of the program that would address

hazards and controls at the worker/workplace level of safety. The second tier would have a lower set of thresholds because of the intimate interaction between the worker and the workplace hazards.

Fernald *(No Response)*

PUREX The safety program as implemented at PUREX was specifically developed to address the redundant and overlapping requirements by requiring one hazard screening/analysis for each activity. This analysis addresses all aspects of safety impacted by the planned work activity. By using this process, the redundant requirements that work activities be evaluated for hazards, that hazards be communicated to the workers, and that specific items such as USQ and ORRs be performed are addressed in one evaluation.

Rocky Flats The ISMS that has been recently established is an excellent way to address job hazards in the workplace. This guidance does not conflict with regulations or requirements needed to accomplish our scope of work. ❑

APPENDIX A: WPC QUESTIONNAIRE

Hazard Analysis

HA-1: How are hazard analyses conducted at the project/facility-level linked to job task analyses focused on worker safety?

HA-2: How does your site determine which hazard analysis approach to use for a work task? Are there defined criteria?

HA-3: How robust is the spectrum of hazard analysis for worker safety versus operational or facility safety, across all health and safety disciplines? Too much or not enough understanding of radiological, chemical, and occupational safety factors? How does your site view this in respect to the "defense-in-depth" model?

HA-4: How do site line management and support personnel (industrial hygiene, safety, radiological safety, nuclear safety, training, engineering, medical) use, exchange, and integrate hazards data at the task level?

HA-5: Are hazard analysis teams formed from various disciplines and organizations? How are duplicative efforts and documentation avoided?

HA-6: What criteria are used to appropriately grade hazard analysis activities? Is a screening process used? Are lessons learned and prior analysis data used? How are hazard severity and task complexity evaluated?

HA-7: How do sites use hazard data for determining worker protection criteria, exposure assessments, medical monitoring, training, ES&H staffing, and support services?

HA-8: Is there a clear understanding of what the hazard analysis functions and outputs are? How is the information represented to supervision and workers?

HA-9: What mechanisms are in place to provide worker participation in the hazard identification process and in control measure determination?

HA-10: How do the sites hazards analysis approaches include provisions for evaluating and integrating data regarding the hazards associated with collocated workers (i.e., workers adjacent to work processes being evaluated)?

HA-11: What uses are made of hazard and control information for collocated workers?

Risk Management

RM-1: How do you use hazard data to establish internal procedures, worker protection criteria, and thresholds that trigger particular levels or methods for hazard analysis?

RM-2: How does the site balance professional judgment and documented guidance with respect to hazard analysis data?

RM-3: Does the site use a graded approach to determine an appropriate level of hazard analysis?

RM-4: By whom and at what level are risk acceptance decisions made? Do written criteria exist for this decision process?

RM-5: How is worker safety integrated into the safety authorization basis process?

Linkage to Integrated Safety Management and Work Smart Standards

ISM-1: How do the current site hazard analysis and control practices link to the guiding principles for Integrated Safety Management?

ISM-2: Do your site's current procedures, policies, or internal guidance support using the Work Smart or similar approach?

If your site is applying a Work Smart approach, how are hazard analysis and controls integrated?

ISM-3: Does the existing DOE guidance support the appropriate level of hazard analysis and safety management system concepts as defined by the ISM guiding principles?

ISM-4: How does your site incorporate or relate to other health and safety programs such as the Voluntary Protection Program (VPP), Process Safety Management (PSM), and Responsible Care?

ISM-5: Describe how the DOE F.O.'s [Contractors] contract performance objectives, budgets, and plans support delivery of ISM?

Performance Measures

PM-1: Are you using hazard data (i.e., air monitoring) for developing performance measurements?

PM-2: If yes, how are these used for determining contract performance criteria, targeting internal assessments, program or project management, developing budgets for resource planning, measuring performance at line level, and defining deliverables?

PM-3: Do your current mechanisms, procedures, and language use and require hazard analysis?

PM-4: How do the DOE F.O.'s [Contractors] self-assessment programs support and incorporate hazard analysis and risk-estimating information?

Field Perspectives

FP-1: Are current hazard analysis guidance, criteria, standards, and Orders sufficient?

FP-2: Is more detailed or specific guidance in a particular area needed?

FP-3: Are there some worker protection issues or work activities not covered by existing standards, guidance, or approaches? Are there gaps in the existing field approach?

FP-4: Which guidance is most and which least used for the basis of decisions by the contractors?

FP-5: How does your site determine that you have a comprehensive (adequate) hazard analysis?

FP-6: Which directives and guidance are used to determine when detailed analysis, requiring DOE approval, is to be undertaken and documented?

FP-7: Which directives or site-specific criteria exist for determining the balancing of work controls against hazards? How well are these criteria defined?

FP-8: Which current DOE/external directives are helpful and which are confusing regarding hazard analysis requirements? What are regulatory duplications, overlaps, or inconsistencies that are

causing problems? What actions has the site taken to resolve inconsistencies and conflicting requirements? Is guidance on these inconsistencies adequate? ❑