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1) Incorporate Lessons Learned SD-99-3766 into JHIT Question 1.	Price Actum Corrective Actum
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CHAPTER 3 - WORK PLANNING & HAZARD ANALYSIS PROCESS

3.1 PURPOSE

This chapter provides the instructions for the three levels of work planning and for performing the JHIT and completing the JHA required for all three levels of work planning. The JHA process helps ensure compliance with the Site's infrastructure requirements including environmental protection. Additionally, this Chapter provides:

- Guidance for completing the JHA and providing safety control measure guidance for hazards identified in the JHIT checklist
- Instructions and guidelines for conducting a more detailed IHA for highly complex or hazardous projects/activities

3.2 SCOPE

This chapter describes the process for implementing each of the three levels of planning (Low, Medium, and High) for activities screened using the ASF. Similarly, the process and requirements for completing a job walkdown, a JHIT, and a JHA are described.

Three planning levels have been established to offer graded approaches to planning based on the anticipated hazards and complexity of the work activity. In particular, each of the planning levels includes varying degrees of the team-based approach to planning. Using this graded approach ensures that the appropriate experience and expertise are included in establishing the work scope, identifying the hazards and associated controls, ensuring that the methods for conducting the work are sound, and that input is received from team members throughout the planning process. See Appendix 3.1 for instructions in completing each planning level.

The JHIT and JHA are completed for all planning levels and are to be used to help the Planning Team understand the magnitude and intensity of the hazards involved in performing the work and to help determine the level of controls required to perform the work safely. The JHIT checklist is a very useful tool to help the planners and workers focus on the hazards associated with performing the work activity, to identify additional SME assistance needed in planning the work, and establishing the proper standards based hazard controls. In its most simple form, the planning team identifies the potential hazards associated with the work scope as part of a job walkdown and establishes the required controls to prevent or mitigate the hazards, and documents the hazards and controls on the JHA form, including safety controls that are identified elsewhere (e.g. RWP, NMSL, ALARA review, AB). Performing a JHA is an iterative process and **SHALL** be re-visited and updated during the planning phase until all controls are identified and during the execution phase if new hazards are discovered, or if the scope or safety controls are changed. For work activities where the work performance is subcontracted to an organization that is different from the organization doing the work planning, the JHIT/JHA and WCD **Should** be reviewed and updated as necessary by the individuals responsible for the work performance. In addition, the work team can review and update the JHA and WCD if either the safety or compliance controls are determined to be inadequate.

The JHA/IHA, along with the JHIT, **SHALL** be the only method by which hazards and safety controls for a particular job are analyzed and documented. Completing a JHA meets the requirements for completing other hazard analyses (e.g., Auditable Safety Analysis, Job Safety Analysis, Operational Safety Analysis).

The most complex or hazardous projects/activities require more thought and effort to identify and analyze the hazards that exist, and then to subsequently determine what controls are required. In those cases, a more detailed IHA is required. Appendix 3.7 provides instructions for conducting an IHA. Appendix 3.7 also provides a matrix of the various types of hazard assessment tools and techniques used at the Site that may be integrated into work planning.

3.3 GRADED WORK PLANNING PROCESS INSTRUCTIONS

Table 3-1 provides a matrix of the low, medium, and high planning process elements. This matrix provides an approach to planning that is graded to be commensurate with the types, levels, and uncertainties in the hazards profile, environmental risk and liability, the uncertainties surrounding the level of experience in the management team and project team, and the complexity and coordination that must be taken to ensure the work activity is performed safely.

The RM refers to Table 3-1 and executes the Planning Process Elements (marked with an "x") by the level of planning indicated. Appendices 3.1 – 3.7 provide additional guidance on how to execute the Planning Process Elements. The RMs are encouraged to expand the planning effort whenever it improves the quality of the planning. Consider the following key issues in performing activity planning for all levels of work planning:

- Ensuring the activity is adequately characterized
- Evaluating required elements for Low, Medium, and High levels of planning
- Identifying SMEs designated to analyze hazards and identify controls
- Determining methodology for performing hazards assessments
- Identifying and assessing the hazards
- Identifying controls to prevent or mitigate the hazards
- Developing and integrating the controls; ensuring all controls are identified in the JHA
- Promulgating the controls into work control documents
- Assessing feedback relative to work planning
- Determining regulatory impacts

Perform all IHA and work planning using a graded approach to address the following elements.

- The relative impact to safety and regulatory compliance
- The magnitude of any hazard involved
- The verified design basis documentation available

Ensure that the IHA and controls development provided in the planning process address:

- Work Activity Definition
- Characterization, Categorization, and Classification of Hazards
- Identification of Scenarios of Concern
- Evaluation of Consequences
- Hazard Mitigation/Identification of Controls
- Determination of the Acceptability of the Consequences
- Documentation of the Assessment

Ensure that the hazards assessments and work planning documents are maintained current and updated, as necessary, throughout the duration of the work activity. Ensure that the ASF and

JHA are re-performed when previously unidentified hazards are discovered or when change occurs in a facility disposition phase, work activity scope, or hazard. The hazard baseline is reevaluated to ensure that 1) new hazards or energy sources have not been introduced and 2) assumptions and commitments associated with the hazard baseline are still valid.

Table 3-1, Matrix of Planning Process Elements - Graded to Level of Planning

PLANNING PROCESS ELEMENT	Level of Planning (Graded Approach)		
	Low	Medium	High
Review Work Experience and Lessons Learned *(previous jobs)*	X	X	X
Work Activity Purpose and Technical Scope / Statement of Work	X	X	X
Work Activity / Job Walkdown	X	X	X
Job Hazard Identification Tool (JHIT) – Appendix 3.2	X	X	X
Job Hazard Analysis (JHA) – Appendix 3.4	X	X	
Job Hazard Analysis (JHA) – Appendix 3.5			X
Environmental Checklist	X[5]	X[5]	X[5]
Develop Work Control Document(s) (*Procedure, WP Type 1, 2, etc.*)	X	X	X
Nuclear Safety Evaluation *(SES/USQD)*	X[1]	X[1]	X[1]
Independent Safety Review *(PRC/ORC)*	X[2]	X[2]	X[2]
Readiness Determination *(Management Review/Readiness Assessment/Operational Readiness Review)*	X[3]	X[3]	X[3]
ALARA Job and ALARA Design Reviews	X[4]	X[4]	X[4]
Project Management / Execution Plan (*Includes WBS, schedule, project resources, budget, barriers & constraints, etc.*) – required only for projects.		X	X
Identify and Form Work Planning Team *(Core Team and SMEs)*	X	X	X
Complete the Team Credential Report		X	X
Formal Post Job Review (*Includes Feedback & Lessons Learned – May be required for Low per Chapter 10)*		X	X
Work Activity / Hazard Characterization			X
Work Activity Flow Chart *(Work Tasks and Subtasks)*			X
Work Activity Task / Subtask Descriptions			X
Work Activity Task / Subtask Expectations *(Controls)*			X
Integrated Hazards Assessment (Appendix 3.7)			X
Work Activity / Job Specific Training			X
Mockups / Dry runs / Drills / Emergency Response as required			X

[1] – Refer to Nuclear Safety Manual, [2] – Refer to 1-5200-ADM-02.01, [3] – Refer to MAN-040-RDM, [4] - Refer to PRO-227-RSP-08.02, [5] – Refer to 1-25000-EPR-NEPA.001

3.4 PLANNING TEAM MAKEUP AND MEMBER QUALIFICATIONS

The makeup of the Planning Team is dependent upon the uncertainty of the work activity, the hazards and requirements expected to be encountered during the performance of the work, and the complexity of the work activity. The ASF provides the RM with the SMEs that **SHALL** be included as part of the Planning Team. Environmental **may** be an environmental and/or waste SME as appropriate for the work to be performed.

The RM generally selects a team of no less than two and typically no more than 12 people. These people have a combination of individual and collective experience and education so that they have expertise about the hazards of the work activity under consideration. The team can include members from contractors and subcontractors, including floor-level workers and SMEs where appropriate, and where such inclusion is required, to reach quality decisions about safety and hazard controls. The combination of expertise on the team has the capability to:

- Provide a detailed analysis of the hazards inherent in the work activity
- Use the appropriate level of work planning to establish an adequate set of controls for the safe performance of work
- Based on the hazards analyses, determine and define the controls in a way that can be communicated to those performing the work.

Depending on the rigor required for planning, the team may need to physically work together to take advantage of the synergism of the team; that is, the deliberations and decisions about hazards, analyses, and selection of controls take place while the team is together in one location.

Upon completion of the process, the team membership, deliberations, and decisions are documented and included in the work control document files. Instructions for completing the Planning Team Credentials Report (Medium & High Levels) are discussed in Section 3.4.3.

In any given project, there could be more than one team necessary to plan the work, based upon how the project is subdivided into activities.

3.4.1 Work Planning Team Decision/Dissenting Opinions

The following approaches **may** be used to reach a decision before and when a conflict arises:

- Define the criteria for team decision-making (i.e., a consensus decision, majority rule, etc.)
- When a conflict arises, individually and jointly define the problem. Lack of a defining process to resolve conflicts could result in the team not reaching agreement
- Discuss individual needs and goals, team needs and goals, and not positions
- Actively listen, be open-minded, flexible, and keep in mind individual & team needs/goals
- Keep other perspectives in mind. Don't place blame, but rather, look for mutual benefits
- Clarify differences, look for alternatives or options

Agreement can be reached if members are willing to work through the issues. However, in cases where agreement cannot be reached, the decision-making process and criteria should have established the mechanism to reach a decision. In the case of a dissenting opinion, the opinion is documented.

3.4.2 Work Planning Team Roles and Responsibilities

Some projects require multiple teams for specific or unique activities. In those cases where multiple teams are required, a single points of contact list should be identified to interface between teams, disseminate information, and to establish team hierarchy. For each team, the team's roles and responsibilities should be identified and documented to include the following:

- Identification of stakeholders
- Agreement on working schedules
- Management commitment to allow team members to participate
- Selection of team members for all aspects of the activity

- Priority of maintaining team continuity and minimizing team member turnovers
- Identification of training requirements/qualifications
- Identification of specific roles and responsibilities for each team member
- Identification of part-time SMEs for areas with weak coverage by full-time team member

3.4.3 Planning Team Credentials Report Instructions

For Medium and High Planning Levels, the Team Leader **SHALL**:

- Determine number of team positions and disciplines required for areas of expertise. This **SHALL** be based on the results from the Hazard Profile Screen from the ASF. Additional SMEs **SHALL** be added in accordance with the JHIT checklist, Appendix 3.2.
- Select team members and SMEs who have the required qualifications.
- Environmental **may** be an environmental and/or waste SME as appropriate for the work to be performed.
- Obtain permission from the managers of the individuals selected to utilize their services for a specific time period and percentage of time.
- List the activity title and work control number on the Planning Team Credentials Report Form.
- Document the following information on the Planning Team Credentials Report Form:
  - Name (printed)
  - Role and justification for being selected on team or other comments.
- Submit the Planning Team Credentials Report to the RM for review and approval. Resumes **may** be requested.
- Distribute completed and approved Planning Team Credentials Report to all team members and their managers, and include in the work document.

APPENDIX 3.1 - PLANNING LEVEL INSTRUCTIONS

This appendix provides guidance related to work planning approaches covering application of the ASF as it relates to selection of work planning levels.

Graded Work Planning Approaches

There are three levels of work planning approaches that can be selected as result of the ASF screening: Low, Medium, and High. Specific knowledge for the following factors is considered when determining an appropriate level of work planning:

- Scope Definition
- Work Process Flow
- Nature of the Hazards
- Complexity/Coordination/Uncertainty

In general, the more uncertainty and hazard that exists about a work activity, the more rigor and analysis is required in the planning phase. Using the graded approach concept, a low-risk simple activity requires a low level of planning and could be planned with minimal participation by the SMEs, while a high-risk, complicated, or large activity requires a higher level of planning and would require more participation and commitment. In all cases the ASF and JHIT will indicate the required level of SME involvement.

Activities **Should** be characterized as completely as possible before performing the graded hazards assessment and planning in this chapter. Characterization of the activity is an essential element in the first function of the ISM systems, "Define the scope of work". Project Baseline Descriptions and Work Authorization Documents provide a level of description for activities and work being planned and budgeted for each fiscal year. However, the ASF requires that additional characterization information for a work activity be obtained and documented in order to develop the hazard profile and select the proper planning process. The type of characterization information that needs to be considered in work activity planning process includes the following:

- The purpose and type of the activity or work being performed
- The starting and ending points for the activity
- A description of the major work steps, phases, or elements
- Principal types of hazards directly involved with an activity or expected to be encountered
- Significant uncertainties that currently exist that could affect the performance of the activity
- The potential interfaces with other activities and/or concurrent activities in the same location
- History of the work activity performance, including historical records, process knowledge, etc.
- Environmental or regulatory impacts that may occur as the result of the work

Once the activity planning has been completed and the work control documents have been established, the workers and their supervisors are provided with the necessary documentation and management support such that work can be conducted safely. Feedback during conduct of work is used to prevent future incidents and improve the future work planning.

The ASF uses a preliminary qualitative hazard assessment approach to aid in the selection of the planning process. Once in the planning development phase, other qualitative, semi-quantitative, or quantitative hazard approaches will be identified by the team and applied as appropriate.

Table A3-1 provides an overview of typical work planning hazard assessment techniques as well as the products developed by those processes and examples of the planning and implementation tools.

APPENDIX 3.1 - PLANNING LEVEL INSTRUCTIONS

Table A3-1 - Work Planning Processes Products

Work Planning Process Approach	Hazard Assessment Technique	*Example* Planning Tools	*Example* Implementation Tools
Site Procedure Development	Qualitative	JHAs, Procedures, Operations Orders	Procedures, Drawings, Instructional Job Aids
IWCP Approach	Semi-Qualitative to Qualitative, depending on Planning Level	JHAs, HASPs, ASAs, Work Packages, ALARA Reviews	Work Packages, EDPs, Procedures, ALARA Reviews
Nuclear Safety AB Development	Quantitative	AB Documents (SARs, Basis for Interim Operations, Basis for Operations)	Work Packages, Procedures
Environmental Checklist	Regulatory and Environmental Impact	Environmental Checklist	See *Implementation of NEPA Documentation*

Low Planning Level

The low planning level work control process is applied when the scoring results from the ASF screen are 15 points or less. This level is usually applied when the activity hazards and complexity are low, regulatory requirements and environmental impact is minimal, and the work is either routine or simple and there is some experience performing most, if not all, of the work. A project management plan and a team-based approach are not normally required for this level of planning. The planning team members, as identified on the ASF, may have minimal commitment and input into the WCD, but are accountable for their approval of the JHIT/JHA and the WCD.

The activity purpose and scope can be simple statements and the project requirements (WBS and schedule) are usually small and straightforward. A JHIT checklist is required for even the simplest activities and is usually completed in parallel with the job walkdown. A task flow chart and detailed hazard analysis are not required. The controls are developed based on the JHIT (i.e., infrastructure standards based requirements) and then documented on the JHA, and are usually not much more than "skill-of-the-craft" with some specific precautions or routine controls identified (for example, lockout/tagout). The JHA integrates and documents the controls identified in other documents (e.g. RWP, NMSL, ALARA review, AB) and these controls are incorporated into the WCD.

No special reviews or assessments are usually required. The normal document review and approval process, including a nuclear safety evaluation, if required, is followed. An independent safety and/or environmental review and a readiness review/assessment could be required in some special cases based on regulatory requirements. The work activity is conducted using the infrastructure requirements in place, based on where the work is being performed. After the job is finished, closeout documentation is completed and submitted along with any feedback on the job. The results from this level of planning are documented (as required by the instructions).

The RM **SHALL**:

- Select, as a minimum, a work planner and a worker knowledgeable about the work to plan the work, and other SMEs as identified on the ASF
- Ensure that the controls, identified by the planning team are incorporated in the appropriate WCD

The Planning Team **SHALL:**

- Review the lessons learned from the Lessons Learned/Generic Implications (LL/GI) homepage on the Site intranet, perform a walkdown, and complete the JHIT. Based on the results of the JHIT, a JHA **SHALL** be completed in accordance with the JHA Guide.

APPENDIX 3.1 - PLANNING LEVEL INSTRUCTIONS

- Perform the low planning level approach, ensuring that the required low planning level elements are addressed. The JHIT/JHA and the WCD **SHALL** be updated/revised as needed during the work planning or execution if new hazards or controls are identified, or if the scope or hazard controls are changed, or if the work performance team is different (subcontracted) from the planning team.

Medium Planning Level

A medium planning level work control process is applied when the scoring results from the ASF screen are between 16 to 40 points. This level is usually applied when there are some significant hazards (or there is uncertainty about the hazards), moderate regulatory requirements or potential for environmental impact, the activity is somewhat complex, or the activity has not been performed by the project team at the Site. A project management plan and a team-based approach are required. The RM convenes a team composed of the appropriate SMEs (determined by ASF), planners, and floor level workers to identify and analyze the hazards, and then determine the controls necessary to safely perform the activity.

The medium planning level uses a team-based work planning approach to enhance the quality of the decisions and judgments regarding the analysis of the hazards and the controls required to perform the work safely. The planning team consists of core team members familiar with the activity and SMEs in specific technical, environmental, and safety disciplines. One of the first steps for the planning team is to review the governing requirements, work experience, and lessons learned. The activity purpose and scope are then defined in several sentences or a few paragraphs and the project requirements (WBS and schedule) are usually somewhat detailed. A JHIT checklist is required and is usually completed in parallel with the job walkdown. Detailed hazard identification and analysis are performed as needed and at the discretion of RM. The well-defined safety and compliance controls are developed based on the JHIT and is documented on the JHA including any controls identified in other documents (e.g. RWP, NMSL, ALARA review, AB). The need for additional controls is evaluated by testing the potential consequences against the proposed controls to determine if they are acceptable. The resultant integrated control set is graded to the level of hazards, the complexity of the work, and the uncertainty involved.

After the safety and compliance controls have been established, the work control documents are developed, which contain and implement the controls. The SME reviews are performed, as required by the JHIT. A nuclear safety evaluation is performed on the resultant work control documents, as directed by infrastructure procedures. In addition, an independent safety review and a readiness determination could be required based on infrastructure procedural requirements.

The work activity is conducted using the developed work control documents and infrastructure procedures in place based on where the work is being performed. After the job is finished, a formal PJR is conducted and then the closeout documentation is completed and submitted along with any feedback. The results from this level of planning are documented (as required).

The RM **SHALL**:

- Assign a Team Leader to form a Planning Team based on SMEs identified in the ASF, including a worker, and approve the membership of the team by signing the Planning Team Credentials Report
- Ensure that the controls identified in the JHA are incorporated in the proper WCD

APPENDIX 3.1 - PLANNING LEVEL INSTRUCTIONS

The Planning Team **SHALL:**

- Review the lessons learned from the Lessons Learned/Generic Implications (LL/GI) homepage on the Site intranet, perform a walkdown, and complete the JHIT. Based on the results of the JHIT, a JHA **SHALL** be completed in accordance with the JHA Guide.
- Perform the medium planning level approach, ensuring that the required medium planning level elements are addressed. The JHIT/JHA and the WCD **SHALL** be updated/revised as needed during the work planning or execution if new hazards or controls are identified, or if the scope or hazard controls are changed, or if the work performance team is different (subcontracted) from the planning team.

High Planning Level

A high planning level work control process is applied when the scoring results from the ASF screen are 41 points or greater. This level is usually applied when there are significant regulatory requirements or environmental impact, hazards (or there is significant uncertainty about the hazards), and there is either significant complexity or the activity has never been performed by the project team at the Site. A project management plan and a team-based approach are required. Often, an activity requiring a high planning level will have multiple teams of individuals planning or working on individual components for the activity, e.g., AB documents, Environmental Assessments, HASPs, WPs, procedures, and training packages. The RM convenes a team composed of a team leader and the appropriate SMEs as identified in the ASF.

The high planning level uses a team-based work planning approach to enhance the quality of the decisions and judgments regarding the analysis of the hazards and to provide a "justification of adequacy" related to the controls chosen to ensure that the work is performed safely. The planning team consists of core team members familiar with the activity and SMEs in specific technical and safety disciplines. One of the first steps for the planning team is to review the work experience and lessons learned. The activity purpose and scope are then defined in several paragraphs and the project requirements (WBS and schedule) are usually very detailed.

A JHIT checklist is required for this level of planning and is usually completed in parallel with the job walkdown. A task flow chart, along with task descriptions are required to be developed, but are more detailed than that required for the medium planning level. Detailed hazard identification and analysis (nuclear and non-nuclear) is required and the planning team is responsible for choosing the applicable hazard analysis tools and techniques to fit the job. The well defined control set is developed based on the JHIT and the results from the consequence analysis and detailed hazard analysis, controls identified in other documents (e.g. RWP, NMSL, ALARA review, AB), and documented on the JHA (Appendix 3.5). The need for additional controls is evaluated by testing the potential consequences against the proposed controls to determine if they are acceptable. The resultant integrated control set is graded to the level of hazards, the complexity of the work, and the uncertainty involved.

After the safety and compliance controls have been established, the WCDs are developed, which contain and implement the controls. The SME reviews and validations are performed and documented, along with comment resolution. A nuclear safety evaluation, independent safety review and a readiness determination are performed as required by Site procedures.

The work activity is conducted using the developed WCDs and infrastructure procedures in place based on where the work is being performed. After the job is finished, formal PJR is conducted and then the close-out documentation is completed and submitted along with any feedback on the job. The job feedback and lessons learned are formally documented and submitted with the close-out documentation.

APPENDIX 3.1 - PLANNING LEVEL INSTRUCTIONS

The high planning level process is an iterative process that can require the team to go back and update planning tasks previously completed before the "final" integrated control set is completed (e.g., task flow chart, task descriptions, activity bounding conditions, specific task expectations, the hazards analysis). The results from this level of planning are formally documented (as required by the instructions).

The RM **SHALL**:

- Assign a Team Leader to form a Planning Team based on SMEs identified by the ASF, including a worker, and approve the membership of the team by signing the Planning Team Credentials Report
- Ensure that a JHA/IHA is performed
- Ensure that the controls identified in the JHA/IHA are incorporated in the proper work control documentation that are developed from Chapters 4 through 7

The Planning Team **SHALL:**

- Review the lessons learned from the Lessons Learned/Generic Implications (LL/GI) homepage on the Site intranet, perform a walkdown, and complete the JHIT. Based on the results of the JHIT, a JHA **SHALL** be completed in accordance with the JHA Guide.
- Perform the high planning level approach, ensuring that the required high planning level elements are addressed. The JHIT/JHA and the WCD **SHALL** be updated/revised as needed during the work planning or execution if new hazards or controls are identified, or if the scope or hazard controls are changed, or if the work performance team is different (subcontracted) from the planning team.

Flow Chart and Task Descriptions

The Planning Team **SHALL** develop a task flow chart for the activity being planned. List in sequential order on the High Planning Level JHA the major tasks required to perform the work. More than one page may be required to list all the sub-tasks associated with a particular high level task.

Subtasks Descriptions

The Planning Team **SHALL**:

- List in sequence the first level subtasks required to perform the work, keeping in mind that the first level subtasks could require a second level of subtasks below them to adequately describe performance of the work. The objective of rendering the work flow into subtasks is to understand the components of the work in enough detail that the team can be assured that they understand the hazards associated with performing the work.
- List, in sequence, the second level subtasks required to perform the work. Not all level one sub-tasks will require second level sub-tasks. The choice of whether second level subtasks are required or not depends on the team's judgment about the detail required to define the work flow so that the team can be assured that they understand the hazards associated with performing the work.

NOTE: *Each first level subtask has a number that consists of the major task number, the sequence number for the first level subtask, and a sequence number for the second level subtask, if any. For example, second level subtask number 3 of first level subtask number 2 of major task number 1 has a number that is 1.2.3.*

- Describe the tasks in sufficient detail that a person having a general knowledge of the scope of work could understand the steps being performed. Use continuation pages as required.

APPENDIX 3.1 - PLANNING LEVEL INSTRUCTIONS

Hazard Identification

The Planning Team **SHALL**:

- Review the results from the Hazard Profile Screen from the ASF (Block D-Screen 2) completed as part of the ASF procedure, as a starting point for identifying all the hazards for the activity.
- Use the JHIT to initiate identification of the hazards associated with each first and second level task and document the results on the High Planning Level JHA. The Team then decides if this is sufficient. If not, the team conducts an IHA, graded to the activity, and updates the JHA as needed. Appendix 3.7 provides guidance and instruction on conducting an IHA.
- This step frequently must be repeated after conducting hazards analyses or assessments, or after any other activity that discloses additional hazards. The JHA **Should** be revised as frequently as necessary to reflect the best knowledge of the hazards associated with each task.

Hazard Analysis/Assessment

The Planning Team **SHALL**:

- Perform a hazard analysis/assessment for each step listed in the JHA, considering both normal and reasonably anticipated abnormal events and the following criteria:
  - Graded approach commensurate with the level of risk, hazard and consequence of the task(s)
  - Any pre-existing hazards analyses or safety analyses pertinent to the work under consideration (e.g.; AB, Health and Safety Plan, Nuclear Safety Analyses, Auditable Safety Analyses)
  - Specific to the task(s) of concern
  - Ensure all hazards on the JHIT are addressed in the JHA
- Record the results of the hazards assessment/analyses on the JHA.
- Identify initiating events and potential mitigating systems failures ("what-if" scenarios) that could cause the hazard to produce undesirable consequences. Use team processes involving the whole team (e.g.; brainstorming) to optimize the determination of an adequate hazard evaluation.
- Some of the scenarios determined by the "what-if" technique could require extensive and complex analyses to determine the consequences and required controls (e.g., nuclear safety analyses, criticality safety analyses, chemical safety thresholds). The Planning Team determines when this is necessary and engages the appropriate qualified personnel to perform these analyses.

Control Set Identification

The Team determines the proper controls from their analyses and circumstances of performing the task. The Planning Team **SHALL** record on the JHA the control(s) for the hazard associated with each particular task from the hazard analysis.

Planning Document Preparation, Review and Approval

- After completing the JHA, the planning team prepares a planning document that contains the results from all the steps performed for the high planning level approach (includes scope description, JHA, Planning Team Credentials Report). The planning document is reviewed and signed by the entire planning team and additional SMEs (if used).
- The RM reviews the final planning document and indicates approval by signing.

APPENDIX 3.2 - JOB HAZARD IDENTIFICATION TOOL (JHIT)

WCF No.:	Title/Description:	Date:
Specific Work Location:		

		Yes	No	P	T	M	SAFETY SME INVOLVEMENT H&S	ENG	RAD	Qual.	CRIT	NS	ENV	FP
1	Are electrical, mechanical, hydraulic, or chemical energy sources, including power hand tools, going to be used to repair or service the item, or could workers be placed at risk of contacting hazardous energy sources?			X	X		C G							
2	Will work be done on an energized electric circuit?			X	X		C							
3	Does the task involve work in a confined space or an area that is a suspected confined space?			X	X		R							R
4	Is the work activity likely to result in an inhalation or dermal exposure to dust, mists, vapors, gases, or fumes that may require the use of a respirator or protective clothing?				X	X	R							
5	Does the activity require the use of chemicals, or are chemicals present in the work area or to be brought into the area? **If "NO", then proceed to question #6.**				X		C						R	
5a	Could the worker's eyes or skin be exposed to toxic or corrosive chemicals?				X		C						C	
5b	Will the activity result in the generation of waste chemicals?				X		C						R	
6	Is the area posted as a high noise area or will the work activities result in an uncharacterized noise exposure?				X	X	C G							
7	Could workers be exposed to environments that may be immediately dangerous to life and health or chemicals for which air purifying respiratory protection is inadequate (e.g., methylene chloride, nitric acid, carbon monoxide, carbon dioxide, or oxygen deficient atmospheres)?				X		R							
8	Will asbestos containing material or potential asbestos containing material be disturbed?			X	X	X	R			G			R	
9	Will worker be exposed to falling objects (e.g., construction area)?						C							
10	Are compressed gas cylinders or systems to be used?				X		C						R	
11	Are pressure vessels, systems and relief devices included in the work scope, or is there exposure to pressurized vessels other than gas cylinders in the vicinity of the work area that are not protected by compliant pressure devices?				X		C	C						
12	Is work to include movement of material, tools, or equipment? **If "NO", then proceed to question #13.**													
12a	Is hoisting and rigging equipment to be used?			X	X	X	C	C		G				
12b	Is a powered industrial truck (forklift) to be used?			X	X	X	C	C		G				
12c	Will rollers (multi-tons), lift tables, jacks, or other material movement accessories be used?						C	C						

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APPENDIX 3.2 - JOB HAZARD IDENTIFICATION TOOL (JHIT)

WCF No.							SME INVOLVEMENT							
		Yes	No	P	T	M	H&S	ENG	RAD	Qual.	CRIT	NS	ENV	FP
13	Is spark, flame, or heat producing work, to include welding, cutting and/or brazing to occur outside a NS/FP pre-approved designated welding area? **If "NO", then proceed to question #14.**			X	X		C	C		G	G			C
13a	If welding, cutting or brazing is to be performed, is the material to be worked on contaminated with either fixed or removable radioactive material, or does the work surface or area have a radiological history?			X	X		C		R		G			
13b	Is spark, flame, or heat producing work, to include welding, cutting, and/or brazing, to occur in a nuclear facility, other than in a NS/FP pre-approved designated welding area (e.g., machine shop)?			X			C		C		G	C		C
14	Is there a beryllium exposure hazard • Is beryllium to be handled, • Are surfaces in the work area beryllium contaminated or suspected to be beryllium contaminated, • Will equipment (including process systems) be worked on that are suspected of being beryllium contaminated, • Will workers enter a beryllium operations area or a limited access beryllium operations area, • Or is there a potential beryllium inhalation exposure during the work activities?			X	X	X	R			C			C	
15	Is work to be performed on domestic (potable) water lines?									G			R	
16	Are lead, lead containing products, or painted surfaces being cut, scraped, recycled, sanded or melted?				X	X	R						R	
17	Is work to be performed on batteries?				X		C						C	
18	Are explosives to be handled?				X		R				G	C	R	C
19	Does the activity involve maintenance of a ventilation system or ducting where a fume hood or glovebox was vented and the potential for an explosion may exist due to residual perchlorates?				X		R						R	C
20	Will an established and marked exit or egress route be blocked, rerouted, or changed while work is being performed?			X			C							R
21	Will the activity involve elevated work? **If "NO", then proceed to question #22.**													
21a	Will ladders be used for this work?				X		C							
21b	Is scaffolding required?			X	X		C							
21c	Is fall protection required?				X		C							

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WCF No.							SME INVOLVEMENT							
		Yes	No	P	T	M	H&S	ENG	RAD	Qual.	CRIT	NS	ENV	FP
21d	Is an aerial work platform to be used?			X	X	X	C							
21e	Is the work being performed on a roof?				X		C							
22	Are pinching hazards and/or sharp edges present?						C							
23	Are ergonomic hazards present? (i.e., does the activity involve a combination of the following; working in awkward postures, repetitive motion, and/or the use of force to complete the task)?						R							
24	Does this activity involve areas where temperature or humidity extremes exist or there will be changes in ventilation that could affect human habitability?						R		G					
25	Will the activity involve any penetrations into or through, walls, ceilings (including ceiling tile removal), floors, slabs, or pads or demolition of any of these? **If "NO", then proceed to question #26.**						C	R		G		G	C	G
25a	Is the material being penetrated in a radiologically posted area or will the penetration protrude into a radiologically controlled area?			X	X				R				C	
25b	Is there record, evidence or suspicion that the material being penetrated could have come in contact with radioactive material?			X	X				R					
25c	Has the surface of the material being penetrated been treated in any way such that absorbed contamination could be hidden (e.g., painted, scabbled, or other decon efforts)?			X	X				R				C	
25d	Will the activity involve any penetrations into a Material Access Area?								R			C		
25e	Will the activity involve penetrating or cutting a hole through the tertiary confinement of a nuclear building?											R		G
26	Does this activity involve a configuration change/modification?							R	G	G	G	G		
26a	Does this activity add equipment that could generate substantial heat, noise, or vibration?						C	R						
26b	Does this activity add equipment or systems that could bring in large amounts of flammable or potentially asphyxicant gasses (i.e., propane, Ar, He, H_2, N_2, CO_2, etc.) or venting of significant quantity of such gasses inside of buildings?						R	R						
26c	Does this activity involve structural modifications to buildings, substantial change in floor loading, drilling in pre-cast beams, cutting a significant number of re-bar, supporting or removing large loads, or moving heavy equipment?							R						
27	Does the activity involve movement, interaction or removal of fissile material?				X		C		R		R	C		
28	Are flammable/explosive gases involved in or required for the work in a nuclear facility, other than in an approved area (e.g., maintenance shop)?						C		R			C	C	R

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WCF No.:							SME INVOLVEMENT							
		Yes	No	P	T	M	H&S	ENG	RAD	Qual.	CRIT	NS	ENV	FP
29	Is the work activity occurring within a building, structure, or area that currently has or previously had radioactive material? **If "NO", then proceed to question #30.**													
29a	Is the work being conducted in a posted Radiation Area, High Radiation Area or Very High Radiation Area?			X	X				R					
29b	Is the work conducted in a posted Contamination Area?			X	X				C					
29c	Is the work being conducted in a posted High Contamination Area?			X	X				R					
29d	Is the work conducted in a posted airborne radioactivity area?			X	X				R				C	
29e	Has the area ever been designated as a radiological area?			X	X				C				C	
29f	Does the area's history indicate a past presence of radioactive materials or operations?			X	X				R					
29g	Is there a potential for the activity to release radioactive material to the air through mechanical, chemical or other means?			X					R				R	
29h	Does the area contain, or is it bounded by any radiological postings, barriers, signs or labels?			X	X				R					
29i	Will the activity involve the transfer, pumping, or draining of radioactive or radioactively contaminated liquids?			X					R		C		C	
29j	Does the work activity involve equipment containing a sealed radioactive source or on equipment capable of generating radiation?			X	X				R					
29k	Does the work involve penetration into systems, or surfaces containing or suspected of containing radioactive materials or contamination?			X	X				R		C			
29l	Does the work involve removal or addition of shielding?								R		C			
29m	Does the activity involve removal of equipment, ducts, piping, gloveboxes, plenums or tanks from a radioactive area?			X	X		C		R		R	C	R	
30	Does the activity involve the use of "NEW" processes, equipment or tools used in the work process? **If "NO", then proceed to question #31.**													
30a	Will this new tool, process or equipment be used for radioactive materials?			X	X			R	R		R	C		
30b	Does the user of this new tool, process, or equipment require additional training?				X			R						
31	Will this activity be conducted outside of a building? **If "NO", then proceed to question #32.**													
31a	Is the work being conducted in a soil contamination area?								R				C	
31b	Will the work involve excavation in an area adjacent to an under-building contamination area?								R				C	

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WCF No.:							SME INVOLVEMENT							
		Yes	No	P	T	M	H&S	ENG	RAD	Qual.	CRIT	NS	ENV	FP
31c	Does the activity involve soil probing or well installation?								R				C	
31d	Will this activity involve excavations, trenching, drilling, geoprobe sampling or any other disturbances of ground (soil, pavement, etc.) to occur?			X	X	X	R	R	R	G			R	
31e	Will the activity disturb an Individual Hazardous Substance Site and result in potential worker exposure to hazardous substances?				X	X	R		C				R	
32	Is there a potential for pyrophoric material to be handled, processed, or encountered during the work activity, including generation, transfer or storage of any plutonium metals, solutions, residues, or salts that are within the scope of HSP 31.11?						C		R		R	R	C	R
33	Will there be a new air emission or a change in the quantity of an existing air emission to the atmosphere (including radionuclide National Emission Standard for Hazardous Air Pollutants)?			X									R	
34	Is this work activity being conducted in accordance with a Decommissioning Operations Plan, a Proposed Action Memorandum, an Interim Measures/Interim Remedial Action document, consent orders, Federal Facility Compliance Agreements, or other CERCLA decision document under the Rocky Flats Cleanup Agreement (RFCA)?						R						R	
35	Will this activity install, modify, move, or impact an Underground or Aboveground Storage Tank?				X		R	C	C				R	
36	Will this activity modify a current RCRA-regulated hazardous waste unit, relocate all or part of a unit, or otherwise impact a unit?				X		R						R	
37	Does the activity include closure of a RCRA hazardous waste unit or placing it in a RCRA stable configuration?				X		R						R	
38	Will this activity generate waste? **If "NO", then proceed to question #39.**													
38a	Will this activity generate polychlorinated biphenyl (PCB) ballasts or other Toxic Substance Control Act governed waste types, including PCB bulk product or bulk waste?				X		C						C	
38b	Will this activity generate a liquid sanitary waste (non-radioactive, non-hazardous aqueous waste)?				X		C						R	
38c	Will this activity generate solid sanitary waste, which falls into the category of "special sanitary wastes"?				X		C						R	
38d	Will this activity generate solid sanitary waste (excluding prohibited items)?				X		C		C				R	
38e	Will this activity generate hazardous, radioactive, or mixed waste?				X		C		R				R	

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WCF No.:							SME INVOLVEMENT							
		Yes	No	P	T	M	H&S	ENG	RAD	Qual.	CRIT	NS	ENV	FP
39	Is the work being conducted in an area covered by a Criticality Accident Alarm System that has been determined to not meet Life Safety / Disaster Warning (LS/DW) system audibility criteria or that has not been tested for LS/DW audibility and Criticality Accident Alarm System beacons are not visible from or within the affected area?						C				C	R		
40	Does this activity impact other facilities outside of the facility where the work is being performed (i.e.: work on the LS/DW radio feed affects other buildings required to broadcast music)?						G	G	G	G	G	G	G	G
41	Will the proposed work involve liquid of any types in areas which currently or formerly had fissile solutions?										C			
42	Work with reactive, shock sensitive, explosive (*e.g., natural gas, hydrogen, propane*) or incompatible chemicals or materials, including decomposition and radiolysis byproducts?						R	G					G	C
43	Do any Standing Orders, Operations Orders, or company/facility specific directives/instructions containing additional health and safety requirements apply to the work activity?						G	G	G	G	G	G	G	G
44	Does this activity involve any other hazards not previously identified or could this activity introduce any new hazards?						G	G	G	G	G	G	G	G

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APPENDIX 3.3 - JOB HAZARD IDENTIFICATION TOOL/JOB HAZARD ANALYSIS GUIDE

INSTRUCTIONS

NOTE: *The Work Planner acts as the Team Leader for those activities performed using the "low" planning level.*

NOTE: *Every effort should be made to involve the floor-level worker who will be performing the work activity with the JHA development.*

NOTE: *The JHIT/JHA Guide in this appendix is used to assist in identifying the safety control measures for the identified hazards.*

The RM **SHALL** establish the planning team. This is based on the ASF results and the instructions for the level of planning outlined in Chapter 3. Environmental **may** be an environmental and/or waste SME as appropriate.

NOTE: *It is important for the Planning Team to have a thorough understanding of the job scope prior to performing the Hazard Analysis process. This will help the team identify the hazards associated with the work, along with the work steps and methods for controlling the hazards.*

The Planning Team **SHALL:**

- Perform a walkdown of the job site to identify all hazards present, along with the expected hazards based on the work scope. Any additional SMEs identified on the JHIT checklist as "Required" with the corresponding hazard **SHALL** also be members of the planning team.
- Complete the JHIT checklist by answering all (not sub-questions if the header question is answered "NO") of the questions either YES or NO depending on the hazards present.
- Complete the worksheet portion of the JHA, Appendix 3.4 (Low/Medium) or Appendix 3.5 (High). The hazard controls developed **SHALL** address the needed safety controls, permits, training, and medical monitoring requirements identified in the JHIT Guide. The JHA **SHALL** document the controls identified in other documents (e.g. RWP, NMSL, ALARA review, AB), and any other applicable requirements discussed here. These documents **SHALL** have the controls identified and developed prior to approving the JHA.
  - Identify the job specific training necessary to ensure workers are competent to perform the job being planned. Training may consist of regulatory courses, specific job processes and equipment, and skill of craft competencies.

Upon completion of the JHA, all members of the Planning Team **SHALL** enter their printed name, signature, and date in the space provided.

The RM **SHALL** approve the JHA by signing the JHA in the space provided.

The JHIT and JHA are important regulatory compliance and accident prevention tools that work by finding hazards and eliminating or minimizing them before the job is performed through identified controls, and before they have a chance to become accidents. Use the JHA to inform employees of specific job hazards and protective measures/required controls. The protective measures/required controls are subsequently incorporated into the WCD. In general, the information in this Appendix is guidance; however the use of **SHALL** in this appendix denotes a requirement. Additionally, the "guidance" provided in this appendix may refer to other documents which contain other programmatic requirements. Lessons Learned that may be applicable to each question have been identified by the Lessons Learned number, the source document number and name and **Should** be reviewed for applicability to the activity being planned.

Before filling out the JHA, consider the following: The purpose of the job - What has to be done? Who has to do it? The activities involved - How are they done? When are they done? Where are they done? In summary, to complete this form you should consider the purpose of the job, the activities it involves, and hazards it presents and the controls needed to eliminate or minimize those hazards.

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SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARDS	REQUIRED CONTROLS
Examining a specific job by breaking it down into a series of steps or tasks will enable you to discover potential hazards employees may encounter. Each job or operation will consist of a set of steps or tasks. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. To determine where a step begins or ends, look for a change of activity, change in direction or movement. Picking up the box from the conveyor and placing it on a hand truck is one step. The next step might be to push the loaded hand truck to the storage area (a change in activity). Moving the boxes from the truck and placing them on the shelf is another step. The final step might be returning the hand truck to the receiving area. List *all* the steps needed to perform the job. Some steps may not be performed each time; an example could be checking the casters on the hand truck. However, if that step is generally part of the job, it should be listed.	A hazard is a potential danger. The purpose of the analysis is to identify ALL hazards - both those produced by the environment or conditions and those connected with the job procedure. Include potential hazards identified in other documents (e.g. RWP, NMSL, ALARA review, AB). Close observation and knowledge of the job are important. Compiling an accurate and complete list of potential hazards will allow for the development of safe job procedures needed to prevent accidents. To identify hazards, complete the JHIT Checklist and ask yourself these basic questions about each step: • Is there a danger of the employee striking against, being struck by, or otherwise making injurious contact with an object? • Can the employee be caught in or between objects? • Is there potential for slipping, tripping, or falling? • Could the employee suffer strains from pushing, pulling, lifting, bending, or twisting? • Is the environment hazardous to safety and/or health (toxic gas, vapor, mist, fumes, dust, heat, or radiation)? • Is there potential for environmental release or spill? • Is there potential for regulatory compliance, permit, or agency agreement impact? • Is there potential for regulatory noncompliance or issues regarding issued consent orders or agency agreements: • Is there potential to pose environmental harm or damage? • Review Lessons Learned from similar jobs to determine if the same hazard may be present.	Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the hazards that could lead to an accident, injury, or occupational illness or environmental impact. Begin by trying to: 1) engineer the hazard out; 2) provide guards, safety devices, etc.; 3) provide personal protective equipment; 4) provide job instruction training; 5) maintain good housekeeping; 6) ensure good ergonomics (positioning the person in relation to the machine or other elements in such a way as to improve safety). List the recommended safe operating procedures. Begin with an action word. Say exactly what needs to be done to correct the hazard, such as, "lift using your leg muscles." Avoid general statements such as, "be careful." List the required or recommended personal protective equipment necessary to perform each step of the job. List the required training (i.e., regulatory, job specific, skill of craft competencies). List required permit modification or other action to be taken to mitigate environmental impact. Give a recommended action or procedure for each hazard. Serious hazards should be corrected immediately. The analysis should then be changed to reflect the new conditions. List the required controls identified in other documents (e.g. RWP, NMSL, ALARA review, AB) Finally, review the input on all three columns for accuracy and completeness. Determine if the recommended actions or procedures have been put in place. Re-evaluate the JHA as necessary.

APPENDIX 3.3 - JOB HAZARD IDENTIFICATION TOOL/JOB HAZARD ANALYSIS GUIDE

QUESTION	CONTROL MEASURE GUIDANCE
1	**Are electrical, mechanical, hydraulic, or chemical energy sources, including power hand tools, going to be used to repair or service the item, or could workers be placed at risk of contacting hazardous energy sources?**

Checklist / Permit: LO/TO Permit (if required)
Additional Training: Lockout/Tagout required for LO/TO Managers, Operations Managers, System Managers, Supervisors, Foremen, LO/TO Isolators and Verifiers. Lockout/Tagout Worker Workshop required for workers and subcontractors. Electrical Safety for Non-Electrical Workers or personnel who are at risk of electrical shock, as identified in MAN-072-OS&IH PM, Chapter 36, *Electrical Safety Program.*
References: MAN-072-OS&IH PM Chapter 9, *Lockout/Tagout,* Standing Order 23, *Operation of Steam and Condensate Systems*
Medical Monitoring: N/A
Process Guidance: Evaluate methods to de-energize the source of hazardous energy, complete the LO/TO permit (if required), follow all requirements to ensure the system is de-energized, and install LO/TO per the effective procedure. Ensure the process is in place to re-energize the system safely prior to removing the LO/TO. Refer to Standing Order 23 if the work involves steam and/or condensate systems. Contact H&S for guidance if necessary. H&S involvement is required for High Planning Level activities.
Lessons Learned: 2-4, SD-99-0339 Condensate induced water hammer; 6-6, SD-99-1918 Lockout/Tagout procedural violations (geared to pre-ev); 6-10, SD-99-1934 Inattention to detail = near miss; 11-13, SD-99-3766, Good Work Practice or Control Measure?

2	**Will work be done on an energized electric circuit?**

Checklist / Permit: Energized Electrical Work Permit must be completed.
Additional Training: Electrical Safety – CPR Qualification required for Electrical Workers when applicable. Electrical Safety for Electrical Workers. Electrical Safety for Non-Electrical Workers for personnel who are at risk of electrical shock, as identified in MAN-072-OS&IH PM, Chapter 36, *Electrical Safety Program.* Workers will have verifiable electrical craft competencies.
References: MAN-072-OS&IH PM, Chapter 36, *Electrical Safety Program,* MAN-072-OS&IH PM Chapter 9, *Lockout/Tagout*
Medical Monitoring: N/A
Process Guidance: Employees, including electricians, welders, and their supervisors whose work brings them close enough to exposed parts of energized electrical circuits (operating at 50V or more to ground for a hazard to exist), **SHALL** be familiar with safety-related work practices. Electric Circuit - the loop of current-carrying conductors from a source of voltage to a load and back to the same source of voltage. The circuit should be de-energized and LO/TO applied per the effective procedure. If the circuit must be worked energized, an Energized Electrical Work Permit must be completed.
Lessons Learned: 10-7, SD-99-3362 Employee receives electrical shock while modifying office cubicle wall partitions 3-12, SD-98-0771 Wireman conducted work in energized breaker panel with 480 and 208 volts AC

3	**Does the task involve work in a confined space or an area that is a suspected confined space?**

Checklist / Permit: Confined Space Entry Permit must be completed.
Additional Training: Confined Space Entry Safety Awareness for personnel who work in confined spaces.
References: MAN-072-OS&IH PM Chapter 21, *Confined Space Entry Program*
Medical Monitoring: N/A
Process Guidance: Evaluate each potential space as a confined space (based on the definition below) if work activities are being performed. Normally occupied rooms and areas of general occupancy do not have to be evaluated, however spaces or areas that have not been occupied for a large period of time and have been isolated should be evaluated. If a question arises consult an H&S professional for interpretation. K-H Safety and Health will maintain a database identifying known confined spaces at the Site.
A confined space is defined as a space that:

- Is large enough and so configured that an employee can bodily enter and perform work; and
- Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, valve-vaults, and pits); and
- Is not designed for continuous employee occupancy.

A confined space may be posted as a permit required confined space or a non-permit confined space. A permit-required confined space requires air sampling by H&S and Fire Department approval of the emergency retrieval system prior to entry. When working in a confined space it should be noted that LS/DW audibility may not have been verified during routine LS/DW tests. Therefore, personnel working in confined spaces **SHALL** ensure that adequate communications have been established or the applicable AB compensatory actions have been taken.
Lessons Learned:

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4	**Is the work activity likely to result in inhalation or dermal exposure to dust, mists, vapors, gases, or fumes that may require the use of a respirator or protective clothing?**

Checklist / Permit: N/A
Additional Training: Training for hazard communication and respiratory protection may be necessary in addition to compound specific training (lead, asbestos, or beryllium).
References: MAN-072-OS&IH PM
Medical Monitoring: May be required depending upon the contaminant of concern.
Process Guidance: Contact your company H&S representative to assist in the analysis of exposure and to determine the appropriate controls. Engineering and/or administrative controls **SHALL** be the first choice to control potential employee exposures. If engineering or administrative controls are not feasible, respiratory protection and/or protective clothing **SHALL** be selected in accordance with the above references.
Lessons Learned: 9-16, SD-99-3284 Inspection works (defective Level B suits);
9-15, SD-98-3360 Working in "automatic"

5	**Does the activity require the use of chemicals or are chemicals present in the work area, or to be brought into the area? If "NO", then proceed to question #6.**

Checklist / Permit: Environmental Checklist, Chemical Management Consent Order
Additional Training: Hazard Communications.
References: MAN-072-OS&IH PM Chapter 22, *Hazard Communication Program*, 29 CFR 1910.120, and Chemical Management Manual, 1-MAN-019-CMM-001
Medical Monitoring: N/A
Process Guidance: A chemical is any compound, mixture or element that requires a Material Safety Data Sheet (MSDS) according to OS&IH PM Chapter 22 and 29 CFR 1910.120 and as defined by the Sites Chemical Management Manual. Chemicals are generally industrial chemical products, which have the potential for causing occupational exposures. As a general rule, properly stored and maintained chemicals do not pose a problem. Materials brought into an area for a specific task may present a problem due to incompatibility with chemicals already present.
An MSDS must be readily available for any chemical, which will be used during the activity. If chemicals are to be brought into the area, review the MSDS for these chemicals. If chemicals are present in the area, discuss with the Chemical Control Administrator or H&S any precautions that may be necessary because of the new chemicals being introduced into the area. All chemicals are to be procured through the chemical dispensary. Chemicals ordered or intended for use during the activity must have a bar-code, must be on the Integrated Chemical Tracking System, and must be tracked from the start of the activity to the close of the activity per the requirements of the Chemical Management Manual. Every effort should be made to use non-hazardous chemicals or chemicals which will result in waste not considered RCRA regulated hazardous waste.
Lessons Learned: 10-6, SD-99-3317 Inappropriate chemical storage; 6-18, SD-99-2089 What changed (toluene); 4-13, SD-99-1293 Chemical exposure

5a	**Will the worker's eyes or skin potentially be exposed to toxic or corrosive chemicals?**

Checklist / Permit: N/A
Additional Training: Hazard Communications.
References: MAN-072-OS&IH PM, Chapter 29, *Eye & Face Protection*, and Chapter 32, *Emergency Shower and Eyewash Protection.*
Medical Monitoring: N/A
Process Guidance: Eye protection will be required based on the following criteria:

- Class I Eye Protection - Safety glasses with side shields for protection against impact particles (e.g., saw dust from a cut off saw) or innocuous mists (water over spray from dish washer rinsing).
- Class II Eye Protection - Safety glasses with a full-face shield for protection against impact particles, e.g. grinding wheel particles.
- Class III Eye Protection - Chemical goggles and a full-face shield for protection against chemical dusts, liquids, and gasses.
- Class IV Eye Protection - Special work protection as require in welding and laser operations.

All eye protection must conform to ANSI Z87. Personal protective equipment (PPE) will be provided and selected based upon the ability to protect against the hazardous or toxic material. Careful evaluation of latex products should be included to prevent occurrence of latex allergy reactions. Showers and eyewashes **SHALL** be provided where potential injurious materials, such as corrosives, acids, oxidizers, reactants, and volatiles, are handled, used or dispensed. They are to be within 100 feet traveling distance from the hazard except for battery charging stations where the traveling distance is reduced to 25 feet.
Lessons Learned: 3-9, SD-99-0903 Laser eye burn; 10-11, SD-99-3397 Acid spray causes 1ST and 2ND degree burns

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5b	**Will the activity result in the generation of waste chemicals?**

Checklist / Permit: RCRA Permit/Environmental Compliance Checklist
Additional Training: Hazard Communications. Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications.
References: Chemical Management Manual
Medical Monitoring: N/A
Process Guidance: A waste chemical is an unused substance previously used in mission processes or maintenance activities which is no longer required by the owner to support current operations (e.g., has no future intended use) and has been declared a waste by the owner (e.g., waste paint or epoxy). All RCRA waste chemicals must be managed in compliance with regulatory and permit requirements. All unused waste chemicals should be returned to the chemical dispensary for compliant disposition. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 10-4, SD-99-3315 Gang box fire; 7-5, SD-99-2276 Improper movement of hazardous waste; 2-11, SD-99-0460 Unauthorized waste disposal off-site by Sandia employee has consequences

6	**Is the area posted as a high noise area or will the work activities result in an uncharacterized noise exposure?**

Checklist / Permit: N/A
Additional Training: Hearing Conservation for only those personnel identified by H&S to Occupational Medicine as participants in the hearing conservation program.
References: MAN-072-OS&IH PM Chapter 33, *Hearing Conservation Program*
Medical Monitoring: Required for personnel in the Hearing Conservation Program.
Process Guidance: Evaluate the use of engineering or administrative controls to reduce the noise levels associated with the work activities. Provide training in the health effects of high noise exposure and the OSHA standard. Use hearing protection. If area is not posted as a high noise area, but seems noisy, contact H&S for guidance and evaluation if necessary. H&S involvement is required for uncharacterized noise exposure.
Lessons Learned: 7-1, SD-98-2131 Heavy equipment bumps platform: concrete strikes worker

7	**Could workers be exposed to environments that may be immediately dangerous to life and health or chemicals for which air purifying respiratory protection is inadequate (e.g., methylene chloride, nitric acid, carbon monoxide, carbon dioxide, or other oxygen deficient atmospheres)?**

Checklist / Permit: N/A
Additional Training: The specific training will need to be determined by the Job Supervisor based on the known hazards (e.g., respiratory, HazCom).
References: MAN-072-OS&IH PM Chapter 31, *Respiratory Protection Practices*
Medical Monitoring: N/A
Process Guidance: Contact H&S for guidance.
Lessons Learned: 1-10, SD-99-0141 Carbon monoxide safety: think about it; 8-13, SD-99-2990 More is not always better

8	**Will asbestos containing material or potential asbestos containing material be disturbed?**

Checklist / Permit: State Permit may be required per criteria below.
Additional Training: Asbestos Awareness. Job Supervisor **SHALL** refer to the Training Users Manual for specific Waste Handling training and qualifications. Only Colorado Certified Asbestos Workers can perform asbestos abatement.
References: MAN-072-OS&IH PM, Chapter 19, *Asbestos Management Program* & CO Reg. #8 Part B, *Asbestos*
Medical Monitoring: Required for personnel identified as Asbestos Workers by Safety & Industrial Hygiene.
Process Guidance: Asbestos has been used in a great variety of products. Some items that may contain asbestos are; pipe insulation, filler in plastics, wall sizing, continuous pour concrete walls, cement blocks, roofing felt, floor tiles, adhesives, acoustical ceiling tile, building siding, paint, cloth for fire blankets, curtains and drapes, and general insulation materials. The following controls must be followed:

- If greater than 25 linear feet of thermal system insulation or 10 square feet of thermal system insulation or surfacing asbestos containing material and potential asbestos containing material, is to be removed, a separated decontamination station must be established.
- If greater than 260 linear feet or 160 square feet of thermal system insulation or surfacing asbestos containing material or potential asbestos containing material or the volume equivalent of one 55 gallon drum, a separate decontamination station must be established and a state permit is required.

If potential asbestos containing material, consult H&S and Facility Management for the status of the material. If a facility characterization does not exist or the Facility Manager indicates material is uncharacterized, request assistance from H&S to characterize. Refer to the Site Quality Assurance Manual and/or contact Quality Assurance to determine if their involvement is required.
Lessons Learned: 3-2, SD-99-0689 D&D electrical safety lessons learned; 9-12, SD-99-3266 Cover your asbestos abatement plans completely

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9	**Will worker be exposed to falling objects (e.g., construction area)?**

Checklist / Permit: N/A
Additional Training: None
References: MAN-072-OS&IH PM, Chapter 34, *Head Protection*
Medical Monitoring: N/A
Process Guidance: Head protection will be required.
Lessons Learned: 9-17, SD-99-3285 Falling object hits worker; 11-2, SD-98-3836 Look out below

10	**Are compressed gas cylinders or systems to be used?**

Checklist / Permit: N/A
Additional Training: Pressure Safety Awareness for personnel and their supervisors who operate, maintain, inspect or transport 150 psig pressure systems and gas cylinders up to 4600 psig.
References: MAN-072-OS&IH PM Chapter 15, *Pressure Systems; Chemical Management Manual*
Medical Monitoring: N/A
Process Guidance: Compressed gas is considered a chemical and is a gas that is stored and used at pressures greater than normal atmospheric pressure (15 psia); supplied to users in cylinders or through piping systems. Contact Environmental & H&S for review because some compressed gases have specific storage, management, ventilation and piping requirements.
Lessons Learned: 5-19, SD-99-1809 Flashback during cutting operations;
6-4,SD-98-1797 Track-hoe counterweight strikes oxygen/acetylene bottles on cart at former Building 123 site

11	**Are pressure vessels, systems and relief devices included in the work scope, or is there exposure to pressurized vessels other than gas cylinders in the vicinity of the work area that are not protected by compliant pressure devices?**

Checklist / Permit: N/A
Additional Training: Pressure Safety Awareness for personnel and their supervisors who operate, maintain, inspect or transport 150 psig pressure systems and gas cylinders up to 4600 psig.
References: MAN-072-OS&IH PM Chapter 15, *Pressure Systems*; Chemical Management Plan; Integrated Tank Management Plan, SM-137, Inspection of Tanks or Piping Systems Pressure Vessels and Safety/Relief Devices
Medical Monitoring: N/A
Process Guidance: Cylinders and pressure vessels; interconnecting hardware (including piping and tubing); instrumentation, and devices such as valves pressure relief equipment that contains fluids (liquids and gases) operating at pressure greater than nominal atmospheric pressure (15 psia) are included. Minimize the number of personnel in the work area, and reduce exposure time in the area to that required for actual work task accomplishment. Pressure relief valves **SHALL** be visually inspected annually, and after the pressure relief valve has been shut down for maintenance. Unless like-for-like replacement or repair is being done contact H&S and Engineering for assistance. Contact Environmental for proper evaluation of air emissions consent order requirements, and tank standards. Contact Quality for all maintenance and/or replacement of pressure relief valves.
Lessons Learned: 12-6,SD-99-1121 Lockout/Tagout; 4-3, SD-99-1121 Pressurization during air fitting removal; 9-10, SD-98-3227 Pressure safety

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12	**Is the work to include movement of material, tools, or equipment. If "NO", then proceed to question #13.**
12a	**Is hoisting and rigging equipment to be used?**

Checklist / Permit: Required. Hoisting and Rigging checklist must be completed prior to commencement of activities. Additionally, a Lift Plan may be required (as determined by the Hoisting and Rigging checklist).
Additional Training: Hoisting Apparatus Training for personnel who operate hoists and cranes.
References: MAN-072-OS&IH PM Chapter 12, *Hoisting and Rigging,* DOE-STD-1090-99, *Hoisting and Rigging*
Medical Monitoring: Required. Operators of cab-operated or mobile cranes must be physically qualified.
Process Guidance: Hoisting Equipment, a general term used to indicate cranes or suspended machinery that is used for lifting or lowering a freely suspended, unguided load. Hoisting equipment is generally considered to be located above the hook to which rigging equipment or accessories are attached. Rigging Equipment, a general term used to indicate material handling devices such as slings (all types) or structural, mechanical, vacuum, or magnetic below-the-hook lifting devices used for lifting and moving material with hoisting equipment. Rigging equipment does not include those devices defined as rigging accessories. Rigging Accessories, a general term used to indicate devices used in conjunction with hoisting and rigging equipment, such as shackles, eyebolts, turnbuckles, or load-indicating devices. The equipment access **SHALL** be direct and the path of lift clear of obstructions and electric power lines. Refer to the Site Quality Assurance Manual and/or contact Quality Assurance to determine if their involvement is required. A lift **SHALL** be designated as a critical lift if collision, upset, or dropping could result in any one of the following:

- Damage that would result in unacceptable delay to schedule or other significant program impact, (e.g., loss of vital data).
- Significant release of radioactive/other hazardous material or other undesirable conditions.
- Unacceptable risk of personnel injury or significant adverse health impact (on-site or off-site).
- Undetectable damage that would jeopardize future operations or the safety of a facility.

NOTE: A lift should also be designated as critical if the load requires exceptional care in handling because of size, weight, close-tolerance installation, high susceptibility to damage, or other unusual factors.
Lessons Learned: 7-2, SD-98-2117 Crane/hoisting safety lessons; 6-15, SD-99-2016 Hoist cable failure; 12-10, SD-99-3989 Chain binders and cheater bars

12b	**Is a powered industrial truck (forklift) to be used?**

Checklist / Permit: Required. An operator's daily inspection checklist must be completed prior to using the powered industrial truck.
Additional Training: Industrial Truck Safety Training
References: MAN-072-OS&IH PM, Chapter 11, *Powered Industrial Trucks*
Medical Monitoring: Required. Powered industrial truck operators must be physically qualified.
Process Guidance: Refer to the Site Quality Assurance Manual and/or contact Quality Assurance to determine if their involvement is required. Use of accessories or attachments not approved by the manufacturer is not allowed. Consult with H&S and Engineering on all moves that are defined as "Critical". A lift **SHALL** be designated as a critical lift if collision, upset, or dropping could result in any one of the following:

- Damage that would result in unacceptable delay to schedule or other significant program impact, e.g., loss of vital data.
- Significant release of radioactive/other hazardous material or other undesirable conditions.
- Unacceptable risk of personnel injury or significant adverse health impact (on-site or off-site).
- Undetectable damage that would jeopardize future operations or the safety of a facility.

NOTE: A lift should also be designated as critical if the load requires exceptional care in handling because of size, weight, close-tolerance installation, high susceptibility to damage, or other unusual factors.
Lessons Learned: 11-1, SD-99-3447 Dropped loads; 7-13, SD-99-2533 Forklift truck modifications; 3-15, SD-99-1008 Forklift spotters

12c	**Will rollers (multi-tons), lift tables, jacks, or other material movement accessories be used?**

Checklist / Permit: N/A
Additional Training: Job Specific as determined by planning team
References: MAN-072-OS&IH PM, Chapter 50, *Material Storage, Handling and Towing*
Medical Monitoring: N/A
Process Guidance: Consult with H&S and Engineering on all moves that are defined as "Critical". See 12b criteria.
Lessons Learned: 9-2, SD-98-3030 Use the right stuff (people and equipment) for the job; 8-5, SD-99-2634 Mechanical jack replaced with stationary tool

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13	**Is spark, flame, or heat producing work, to include welding, cutting and/or brazing to occur? If "NO", then proceed to question #14.**

Checklist / Permit: Hot Work Checklist [unless work is to occur in a NS/FP pre-approved designated welding area (i.e., machine shop)]
Additional Training: Welding Safety for personnel who work around or use welding equipment for welding, cutting, or brazing and their supervisors; personnel who stand fire watch for welding operations and their supervisors. Workers will have verifiable welding craft competencies.
References: MAN-072-OS&IH PM Chapter 49, *Welding, Cutting and Brazing*, 1-W13-HSP-31.10, *Hot Work*
Medical Monitoring: N/A
Process Guidance: Ensure proper hot work permit is implemented. Proper grounding of electric equipment, guarding from flash and slag, engineering controls and special Personal Protective Equipment (PPE) are necessary. Contact Engineering and Quality, if welding is to be coded welding. Also ensure all Welders are qualified to perform coded welding per SM-126. Contact H&S for further guidance. Contact Fire Protection Engineering or Fire Department as appropriate for further guidance. Quality Assurance involvement is required if the welding is performed to verify conformance in accordance with the Site Quality Assurance Program. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual and the activity has the potential to impact fissile material.
NOTE: Ozone may be generated by ultraviolet radiation from welding arcs. This is particularly true with gas-shielded arcs, especially when argon is used, and during plasma-arc cutting operations. The effect is magnified if the welding materials or nearby surfaces reflect the arc. The ozone can be kept from the worker's breathing zone with a low-velocity, high-volume ventilation flow.
Lessons Learned: 12-2, SD-99-3872 Oxygen hazards; 6-16, SD-99-2017 Second degree burns; 3-1, SD-99-0677 Worker falls through unprotected opening

13a	**If welding, cutting or brazing is to be performed, is the material to be worked on contaminated with either fixed or removable radioactive material, or does the work surface or area have a radiological history?**

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations to assess Radiological Work Permit needs. Fire retardant Anti-C's **SHALL** be specified on Hot Work Permit as necessary based on the analysis of the work hazards. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual and the activity has the potential to impact fissile material.
Lessons Learned: 10-5, SD-98-3745 Appropriate response because of proper planning; 6-6, Essential: clear communication and understanding of welding safety requirements

13b	**Is spark, flame, or heat producing work, to include welding, cutting, and/or brazing, to occur in a nuclear facility, other than in a NS/FP pre-approved designated welding area (e.g., machine shop)?**

Checklist / Permit: Hot Work Permit
Additional Training: Welding Safety for personnel who work around or use welding equipment for welding, cutting, or brazing and their supervisor; personnel who stand fire watch for welding operations and their supervisor.
References: 1-X92-HSP-34.10, *Fire Dampers,* 1-W13-HSP-31.10, *Hot Work*
Medical Monitoring: N/A
Process Guidance: Hot Work requires a Hot Work Permit issued by the Fire Department! It also requires the posting of a qualified Fire Watch, accessibility of fire extinguishing equipment, and the control of combustibles in the hot work area. In a nuclear facility, such work may have additional restrictions of controls and requires that facility management (i.e., Shift Manager) be cognizant of the planned work and knowingly authorize the work through the Plan-of-the-Day. Contact Fire Protection Engineering or Fire Department as appropriate for further guidance. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual and the activity has the potential to impact fissile material.
Lessons Learned: 10-5, SD-98-3745 Appropriate response because of proper planning; 6-6, Essential: clear communication and understanding of welding safety requirements

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14	**Is there a beryllium exposure hazard** • **Is beryllium to be handled,** • **Are surfaces in the work area beryllium contaminated or suspected to be beryllium contaminated,** • **Will equipment (including process systems) be worked on that are suspected of being beryllium contaminated,** • **Will workers enter a beryllium operations area or a limited access beryllium operations area,** • **Or is there a potential beryllium inhalation exposure during the work activities?**

Checklist / Permit: Required. Complete the Beryllium Work Form according to the Chronic Beryllium Disease Prevention Program Implementation Plan.
Additional Training: According to the determination made by the project Industrial Hygienist, training is required for Incidental Beryllium Workers and Beryllium Workers. Incidental Beryllium Workers are required to complete the Beryllium Awareness Training course at least every two years. Beryllium Workers are required to complete the Beryllium Awareness Training Course and the Beryllium Worker Training Course every two years.
References: MAN-072-OS&IH PM, Chapter 28, *Chronic Beryllium Disease Prevention Program*
Medical Monitoring: According to the determination made by the project industrial hygienist, medical surveillance is required for Incidental Beryllium Workers and Beryllium Workers. Coordination must be made with the Occupational Medical Department at least one month prior to work in order to complete the required medical surveillance prior to initiation of work.
Process Guidance: Use the KH H&S Homepage, http://rfetshp/S&IH/berylliu.htm to determine if work is to be conducted in any of the beryllium areas listed, if items in areas listed on the to be removed from the areas, or if waste is to be generated for any of the areas listed. Refer to OS&IH PM Chapter 28 to determine if items defined as beryllium or beryllium articles to be handled? H&S is required to complete a beryllium work permit, beryllium hazard/risk assessment, a beryllium exposure assessment plan, and any other paperwork required by the OS&IH PM Chapter 28 during work planning. All documentation associated with an operation involving potential beryllium exposure must be maintained with the work package. Addition of new beryllium workers will require written approval from the cognizant Operation's K-H Vice President with concurrence from the K-H Vice President for safety. Complete the beryllium release form for equipment to be released from beryllium areas. Have Environmental determine appropriate actions for waste.
Lessons Learned:

15	**Is work to be performed on domestic (potable) water lines?**

Checklist / Permit: N/A
Additional Training: Job Specific as determined by planning team
References: ANSI/AWWA C651-86, *Disinfecting Water Mains*
Medical Monitoring: N/A
Process Guidance: All equipment will require disinfection prior to coming in contact with potable water. Only Colorado Department of Public Health and Environment Certified Technicians are allowed to perform work on Domestic Water Backflow Preventers. Notify Bldg. 124 Operations Officer of Responsible Charge that work is being performed on a Domestic Water Line. Refer to the Site Quality Assurance Manual and/or contact Quality Assurance to determine if their involvement is required.
Lessons Learned: 6-6, SD-99-1918 Communicate through a pre-job brief;
12-14, SD-98-4252 Communication failure

16	**Are lead, lead containing products, or painted surfaces being cut, scraped, recycled, sanded or melted?**

Checklist / Permit: N/A
Additional Training: Lead in the Workplace for personnel in jobs with potential lead contamination exposure above applicable threshold levels, as identified by H&S.
References: MAN-072-OS&IH PM Chapter 20, *Lead Exposure Program, Offsite Waste Management Program*
Medical Monitoring: Required for personnel identified as Lead Workers.
Process Guidance: Contact H&S and Environmental for guidance. Any material being offered for recycling, melting, etc., may only be managed by K-H approved facilities. Contact Environmental for a list of approved facilities. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 11-1, SD-99-3651 Respirator protection factor for lead exceeded;
3-14, SD-99-0989 Lead exposure (paint); 5-14, SD-99-1753 Off site contamination (lead bricks)

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17	**Is work to be performed on batteries?**

Checklist / Permit: N/A
Additional Training: Hazard Communication or Electrical Safety training may be required depending on battery type. Workers will have verifiable electrical craft competencies.
References: MAN-072-OS&IH PM, Chapter 38, *Batteries*
Medical Monitoring: N/A
Process Guidance: Many types and sizes of batteries are used at the Site. Emphasis is placed on flooded cell and sealed valve regulated batteries. These two types of batteries and battery systems have both chemical and electrical hazards. During charging of these batteries, hydrogen is generated. Hydrogen produces an explosive atmosphere that can be easily detonated. Ventilation of such an area is important. Review type of battery (wet or dry electrolyte) and associated hazards. PPE: Class III Eye Protection & Gloves.
Lessons Learned: 10-4, SD-99-3315 Gang box fire (batteries); 4-11, SD-99-1267 Complacency (corroded battery straps)

18	**Are explosives to be handled?**

Checklist / Permit: N/A
Additional Training: Hazard Communications. Workers will have verifiable explosive handling competencies.
References: MAN-072-OS&IH PM, Chapter 48, *Explosives Safety, Chemical Management Manual*
Medical Monitoring: N/A
Process Guidance: Only properly trained personnel are to handle explosives. Contact Fire Protection Engineering or Fire Department as appropriate for further guidance. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual.
Lessons Learned:

19	**Does the activity involve maintenance of a ventilation system or ducting where a fume hood or glovebox was vented and the potential for an explosion may exist due to residual perchlorates?**

Checklist / Permit: Environmental Checklist
Additional Training: Hazard Communications
References: RCRA permit dictates management of perchlorates if found.
Medical Monitoring: N/A
Process Guidance: Perchloric acid was used in fume hoods for metal analysis. The mists from the digestion process left residual perchlorate on the walls of the duct work. Once evaporated, perchlorate crystals may remain on the walls of the duct work. Perchlorate crystals are shock sensitive and may detonate if disturbed. Evaluate lessons learned and processes from the Building 123 demolition. Contact Environmental and H&S for guidance. Contact Fire Protection Engineering or Fire Department as appropriate for further guidance.
Lessons Learned: 10-5, SD-98-3745 Appropriate response because of proper planning

20	**Will an established and marked exit or egress route be blocked, rerouted, or changed while work is being performed?**

Checklist / Permit: Required. Complete the Request to Barricade an Egress Exit form in accordance with 1-PRO-184-HSP-32.09.
Additional Training: None
References: 1-PRO-184-HSP-32.09, *Exits (Means of Egress)*
Medical Monitoring: None
Process Guidance: Contact Fire Department, H&S, and the Shift Superintendent to evaluate and help establish alternative exits.
Lessons Learned:

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21	**Will the activity involve elevated work? If "NO", then proceed to question #22.**
21a	**Will ladders be used for this work?**

Checklist / Permit: N/A
Additional Training: Ladder Safety Awareness and/or Fall Protection Awareness
References: MAN-072-OS&IH PM, Chapter 39, *Ladder Safety*
Medical Monitoring: N/A
Process Guidance: Ladder usage requirements **SHALL** be complied with in accordance with OS&IH PM Chapter 39. Ladders are primarily designed to access a desired work location and may be used to perform work. However, depending on the nature of the work to be performed, use of a ladder to perform work at heights exceeding six feet is generally not considered desirable without first considering implementation of additional fall protection measures. When conditions dictate, and it is feasible to do so, alternative work methods or fall protection provisions which would provide a higher degree of employee protection are recommended. The use of elevated work platforms, scaffolds, aerial lifts, or requiring an employee working on the ladder to wear fall arrest equipment (attached to a proper anchorage), are all examples of options which should be considered.
Lessons Learned: 9-17, SD-99-3285 Falling object hits worker;
3-24, SD-98-1048 Worker in critical condition from injuries that resulted from clothing caught in rotating fan shaft

21b	**Is scaffolding required?**

Checklist / Permit: Required. Complete the Scaffold Permit/Log in accordance with OS&IH PM Chapter 40.
Additional Training: Scaffolding Safety for Builders/Erectors, Scaffolding Safety for Competent Persons, All Scaffold Users are required to attend Fall Protection Awareness.
References: MAN-072-OS&IH PM, Chapter 40, *Scaffolds*
Medical Monitoring: N/A
Process Guidance: Scaffolds are elevated temporary work surfaces (platforms) used to support workers in construction and maintenance tasks. Scaffolds **SHALL** be erected, moved, dismantled, or altered only under the supervision and direction of a competent person. Scaffolds and scaffold components **SHALL** be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity. Only trained and qualified workers **SHALL** erect, use, or dismantle scaffolds.
Lessons Learned: 7-8, SD-98-2881 Carpenter struck by scaffolding

21c	**Is fall protection required?**

Checklist / Permit: N/A
Additional Training: Fall Protection Awareness for personnel who work in areas that could result in a fall of 6 feet or more, either above or below ground level.
References: MAN-072-OS&IH PM, Chapter 42, *Fall Protection and Equipment*
Medical Monitoring: N/A
Process Guidance: Fall protection is required when employees are exposed to fall hazards of 6 feet or more. Fall protection requirements **SHALL** be complied with in accordance with OS&IH PM Chapter 42.
Lessons Learned: 5-4, SD-99-1510 Fall protection

21d	**Is an aerial work platform to be used?**

Checklist / Permit: Required. The Aerial Lift Checklist or the Powered and Non-Powered Vertical Lift Checklists **SHALL** be completed as applicable.
Additional Training: Aerial Lift Training for Aerial Lift Operators, Bucket Truck Safety for Alarm Technicians who operate bucket trucks. Lineman Bucket Truck Safety Training for linemen who operate bucket trucks.
References: MAN-072-OS&IH PM, Chapter 41, *Work Platforms*
Medical Monitoring: Required. Aerial Lift Operators must be physically qualified.
Process Guidance: Aerial work platforms are self and manually propelled, vehicle-mounted, elevated and/or rotating work platforms. Equipment is to be inspected on site, personnel receive special training, and maintenance schedule is current.
Lessons Learned: 9-17, SD-99-3285 Falling object hits worker; 10-5, SD-99-3316 In the ditch

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21e	**Is the work being performed on a roof?**

Checklist / Permit: N/A
Additional Training: Fall Protect Awareness
References: MAN-072-OS&IH PM, Chapter 42, *Fall Protection and Equipment*
Medical Monitoring: N/A
Process Guidance: A roof is the exterior surface on the top of a completed building. Low-slope roof means a roof having a slope less than or equal to a four foot rise in twelve horizontal feet with unprotected sides and edges six feet or more above lower levels. Employees **SHALL** be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. A steep roof is a roof having a slope greater than four feet rise and twelve horizontal feet with unprotected sides and edges six feet or more above lower levels. Employees **SHALL** be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems. S&S involvement is required if access to the roof of a nuclear building is required. Employees should pay particular attention to high wind warnings before working on a roof.
NOTE: If pitch or tar is to be used, request an MSDS. If the pitch or tar contains cresol or related compounds, additional PPE will be required.

Exception: The provisions for this subpart do not apply when employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or after all construction work has been completed.
Lessons Learned: 6-15, SD-99-2016 Hoist cable failure; 3-17, SD-99-1014 Some repairs can hurt you

22	**Are pinching hazards and/or sharp edges present?**

Checklist / Permit: N/A
Additional Training: Job Specific as determined by planning team
References: None
Medical Monitoring: N/A

Process Guidance: Use engineered controls or PPE (e.g., leather or Kevlar™ gloves) to reduce or eliminate this problem.
Lessons Learned: 3-8, SD-99-0869 Seventy stitches (man-hole cover); 7-12, SD-98-2368 Worker's finger cut when cart rolls during loading; 7-2, SD-98-2117 Crane/hoisting safety lessons

23	**Are ergonomic hazards present? (i.e., does the activity involve working in awkward postures, repetitive motion, and/or the use of force to complete the task)?**

Checklist / Permit: N/A
Additional Training: Job Specific as determined by safety SME/planning team
References: MAN-072-OS&IH PM Chapter 26, *Ergonomics*, Draft OSHA Standard
Medical Monitoring: N/A
Process Guidance: Ergonomic Hazard, a physical state of the work environment which is incompatible with the physical or psychological capabilities and limitations of people and which may cause injury to employees. Ergonomic hazards include but are not limited to:

- Repetitive motion of body parts required to perform work.
- Excessive force applied and required to perform work.
- Awkward body postures required to perform work.
- Static body postures while performing work.
- Contact stress on body parts while performing work.
- Vibration of equipment, tools, or work environment.
- Work systems which do not make reasonable accommodations for the physical limitations of qualified employees who are disabled.
- Work systems which are incompatible with individual employee anthropometry (i.e., the study of human body measurements on a comparative basis to the job being performed).

Look for alternate locations, alternate equipment, or limit time an employee performs a given task. Contact H&S for assistance.
Lessons Learned: 8-5, SD-99-2634 Mechanical jack replaced with stationary tool;
6-7, SD-99-1924 Contaminated wound; 9-7, SD-99-3096 ALARA and ergonomics - team players

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24	**Does this activity involve areas where temperature or humidity extremes exist or there will be changes in ventilation that could affect human habitability?**

Checklist / Permit: N/A
Additional Training: None
References: MAN-072-OS&IH PM Chapter 16, *Heat and Cold Stress Prevention*
Medical Monitoring: N/A
Process Guidance: Heat stress results from the body being prevented from releasing sufficient heat to maintain proper body temperature. This can be caused by working in a hot environment or wearing of PPE. H&S must individually evaluate each case. Any extreme work conditions should be reviewed. During hot weather, be aware of signs of heat stress or exhaustion. Drink plenty of fluids. Cold stress results from exposure to low temperatures without the proper clothing or protection. Cold stress must be given consideration during the winter months when outside work is to be performed. Besides outside work during the winter months, some unusual conditions exist as work inside a large freezer. During cold weather, dress appropriately and watch for signs of hypothermia. Radiological Operations involvement is required if the work involves radioactive material or contamination. Air changes in a room or building must be adequate to remove heat or humidity generated by new or modified equipment, odors, or flammable gasses, and fumes from process operations, restrooms, or stored waste. Zone I, II, or III supply and exhaust must not be interconnected, or overloaded so as to affect flow to existing rooms or gloveboxes. Operations that exhaust chemical vapors to other than Zone I may require elimination of recirculation for the duration. Exhausting of particulates may require the use of prefilters.
Lessons Learned: 7-11, SD-99-2432 Trailer fire; 8-13, SD-99-2990 More is not always better!!; 7-5, SD-98-2278 Freeze protection program lessons learned

25	**Will the activity involve any penetrations into or through, walls, ceilings (including removal of ceiling tiles), floors, slabs, or pads, or demolition of any of these? If "NO", then proceed to question #26.**

Checklist / Permit: Asbestos Abatement Plan may be required
Additional Training: Lockout/Tagout required for LO/TO Managers, Operations Managers, System Managers, Supervisors, Foremen, LO/TO Isolators and Verifiers. Lockout/Tagout Worker Workshop required for workers and subcontractors. Electrical Safety for Non-Electrical Workers for personnel who are at risk of electrical shock. Electrical Safety for Electrical Workers.
References: MAN-072-OS&IH PM, Chapter 36, *Electrical Safety Program*, and MAN-072-OS&IH PM Chapter 9, *Lockout/Tagout,* Chapter 19, *Asbestos Management Program*
Medical Monitoring: N/A
Process Guidance: For ceiling tiles that are credited within a facility AB, ensure the activity complies with applicable AB controls. Nuclear Safety involvement and an Unreviewed Safety Question Determination is required for modification to nuclear facilities. LO/TO any systems per the effective procedure. Refer to the Site Quality Assurance Manual and/or contact Quality Assurance to determine if their involvement is required. If the wall being penetrated is a firewall, contact Fire Protection for instructions. For penetrations into concrete, masonry, or asphalt, a drawing search and utility locate **SHALL** be conducted, if feasible. The following, at a minimum, **SHALL** be conducted for all penetrations regardless of material type (i.e., concrete, drywall, metal, etc.):

- If surface being penetrated is a firewall, contact Fire Protection for additional instructions.
- Specify the activities or equipment involved, potential hazards, and protective measures to be used.
- Conduct a visual inspection of the area to be penetrated for electrical utilities and other potentially hazardous encumbrances.
- Ensure all power tools or equipment (electrical or pneumatic) used are grounded, of the double insulated type or battery operated.
- Ensure all electrical "cord and plug" power tools used are supplied by Ground Fault Circuit Interrupter protected circuits.
- Ensure approved rubber-insulating gloves (approved for the maximum potential voltage) are used.
- Where feasible (for hollow surfaces), use a "drill-stop" or drill and exploratory hole and observe/inspect for obstructions.
- For penetrations with a specified depth, such as anchor bolt installations, use a drill stop to prevent inadvertent penetration through the wall, slab, ceiling, etc.

Lessons Learned: 1-4, SD-00-0332 Electrical conduit breach; 9-3, SD-99-3063 Penetration work planning

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25a	**Is the material being penetrated in a radiologically posted area or will the penetration protrude into a radiologically controlled area?**

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering for evaluation of additional controls.
Lessons Learned: 8-12, SD-98-2885 Inaccurate drawing history results in near miss

25b	**Is there record, evidence or suspicion that the material being penetrated could have come in contact with radioactive material?**

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering for evaluation of additional controls.
Lessons Learned: 8-12, SD-98-2885 Inaccurate drawing history results in near miss

25c	**Has the surface of the material being penetrated been treated in any way such that absorbed contamination could be hidden (e.g., painted, scabbled, or other decon efforts)?**

Checklist / Permit: Radiological Work Permit. May be governed under the RCRA permit if RCRA contaminants are present.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course. RCRA generator training
References: Radiological Control Manual, RCRA
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering for evaluation of additional controls.
Lessons Learned: 8-12, SD-98-2885 Inaccurate drawing history results in near miss

25d	**Will the activity involve any penetrations into a Material Access Area?**

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering and Safeguards & Security for evaluation of additional controls.
Lessons Learned: 8-12, SD-98-2885 Inaccurate drawing history results in near miss

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25e	**Will the activity involve penetrating or cutting a hole through the tertiary confinement of a nuclear building?**

Checklist / Permit: If one is necessary, a Justification for Continued Operations is required to be approved by the Department of Energy
Additional Training: None
References: Nuclear Safety Manual, 1-MAN-018-NSM
Medical Monitoring: N/A
Process Guidance: If one is necessary ensure a Justification for Continued Operations is prepared and approved in time for the activity. Contact Nuclear Safety for guidance.
Lessons Learned: 9-3, SD-99-3063 Penetration work planning

26	**Does this activity involve a configuration change or modification?**

Checklist / Permit: N/A
Additional Training: None
References: Site Engineering Requirements Manual and DES-210.
Medical Monitoring: N/A
Process Guidance: Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual. Criticality engineering should determine if the proposed change will impact any criticality safety requirements including neutron detectors associated with the Criticality Accident Alarm System. For facilities with Facility Nuclear Accident Dosimeters, Radiological Engineers should ensure the Facility Nuclear Accident Dosimeters are still in an appropriate position relative to any permanent building shielding (equipment, GBs, etc) based upon the proposed design configuration change. Nuclear Safety support is required for buildings that are governed by the Nuclear Safety Manual. Refer to the Site Quality Assurance Manual and/or contact Quality Assurance to determine if their involvement is required.
Lessons Learned: 1-4, SD-00-0332 Electrical conduit breach; 7-5, SD-98-2278 Freeze protection program lessons learned

26a	**Does this activity add equipment that could generate substantial heat, noise, or vibration?**

Checklist / Permit: N/A
Additional Training: None
References: Site Engineering Requirements Manual and DES-210.
Medical Monitoring: N/A
Process Guidance: Addition of equipment or processes that generated heat, noise or vibration may require engineering controls to lesson the effects, such as increased ventilation, sound absorbing covers or barriers, vibration isolators, or addition of cooling systems. Signs for administrative controls, such as requiring hearing protection may also be needed.
Lessons Learned: 1-4, SD-00-0332 Electrical conduit breach; 7-5, SD-98-2278 Freeze protection program lessons learned

26b	**Does this activity add equipment or systems that could bring in large amounts of flammable or potentially asphyxicant gasses (i.e., propane, Ar, He, H_2, N_2, CO_2, etc.) or venting of significant quantity of such gasses inside of buildings?**

Checklist / Permit: N/A
Additional Training: None
References: Site Engineering Requirements Manual and DES-210.
Medical Monitoring: N/A
Process Guidance: Analysis must be completed to show whether the maximum credible leak or overpressure venting could drive oxygen levels below 19.5%, or if under any circumstances a flammable or explosive mixture could exist. Either of these situations could require increased ventilation, or electrical classification as a hazardous area, requiring special electrical equipment to comply with the National Electrical Code. Stratification of gas or collecting in low spots is also a possibility.
Lessons Learned: 1-4, SD-00-0332 Electrical conduit breach; 7-5, SD-98-2278 Freeze protection program lessons learned

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26c	**Does this activity involve structural modifications to buildings, substantial change in floor loading, drilling in pre-cast beams, cutting a significant number of re-bar, supporting or removing large loads, or moving heavy equipment?**

Checklist / Permit: N/A
Additional Training: None
References: Site Engineering Requirements Manual and DES-210.
Medical Monitoring: N/A
Process Guidance: When adding new equipment or moving heavy loads, floor loading must be checked. All areas must have floor loading signs clearly posted. Installations that require drilling in concrete, particularly pre-stressed beams, must be called out by structural engineer, to avoid cutting critical re-bar or cable, and seriously weakening the structure. Large or heavy loads must be checked for seismic response and anchoring in buildings handling fissionable material.
Lessons Learned: 1-4, SD-00-0332 Electrical conduit breach; 7-5, SD-98-2278 Freeze protection program lessons learned

27	**Does the activity involve movement, interaction or removal of fissile material?**

Checklist / Permit: N/A
Additional Training: Nuclear Material Handlers and Transporters, Nuclear Criticality Safety Training for Fissionable Material Handlers, Nuclear Criticality Safety Training for Supervisors and Designers, and Nuclear Criticality Safety Training for Support Personnel
References: Safeguards & Accountability Manual (1-MAN-010-S&A) and Nuclear Material Safeguards Manual (MAN-010-NMS
Medical Monitoring: N/A
Process Guidance: Contact Nuclear Material Safeguards for guidance and requirements. Nuclear Material Safeguards has the Safeguards & Accountability Manual (1-MAN-010-S&A) that addresses the safeguards for radioactive material activities onsite. The manual requirements are consistent with DOE 5633.3B order compliance criteria. There is specific measurement, surveillance and documentation requirements that are needed to ensure activities with radioactive materials go as planned. Fissile material handling and storage must be in compliance with building NMSM. Work Control document must receive a Safety Evaluation Screen (SES)/Unreviewed Safety Question Determination (USQD). Each WCD step that implements an administrative control from a Criticality Evaluation **SHALL** be identified with the circle CS symbol (CS) to the left of the step number.

Lessons Learned: 11-13, SD-99-3766 Incorporate lessons learned; 9-7, SD-99-3096 ALARA and ergonomics - team players

28	**Are flammable/explosive gases involved in or required for the work in a nuclear facility, other than in an approved area (e.g., maintenance shop)?**

Checklist / Permit: N/A
Additional Training: Hazard Communication
References: Applicable Authorization Basis (AB) Document
Medical Monitoring: N/A
Process Guidance: Work Control document must receive a Safety Evaluation Screen (SES)/Unreviewed Safety Question Determination (USQD). Contact Fire Protection Engineering or Fire Department as appropriate for further guidance.
Lessons Learned: 12-2, SD-99-3872 Oxygen hazards; 6-11, SD-99-1994 !Call before you dig!;
5-19, SD-99-1809 Flashback during cutting operations

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29	**Is the work activity occurring within a building or structure that currently has or previously had radioactive material? If "NO", then proceed to question #30.**
29a	**Is the work being conducted in a posted Radiation Area, High Radiation Area, or Very High Radiation Area?**

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course. RCTs will have verifiable radiological control competencies.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Work in Radiation Areas, High Radiation Areas, or Very High Radiation Areas may require special training and use of secondary, multiple or supplemental dosimeters. Contact Radiological Engineering for guidance. Work should involve time reduction techniques such as pre-work preparation of paperwork/tools and use of remote tools and/or handling equipment, quick assembly scaffolding and/or ladders, and temporary shielding.
Lessons Learned: 2-14, SD-98-0569 Changing work conditions were not incorporated into work package leading to a near miss situation; 10-1, SD-99-3310 !DOSIMETERS! face front

29b	**Is the work conducted in a posted Contamination Area?**

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course. RCTs will have verifiable radiological control competencies.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Consider use of contamination reduction techniques including pens/pans, glovebags, and ventilation control as primary control. Respiratory protection should be considered when engineering controls don't reduce contamination to acceptable levels.
Lessons Learned: 9-7, SD-99-3096 ALARA and ergonomics - team players; 11-13, SD-99-3766 Incorporate lessons learned

29c	**Is the work being conducted in a posted High Contamination Area?**

Checklist / Permit: Radiological Work Permit, ALARA Review
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course. RCTs will have verifiable radiological control competencies.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Read and follow the Radiological Work Permit. ALARA review required.
Lessons Learned: 9-16, SD-99-3284 Inspection works; 6-7, SD-99-1924 Contaminated wound

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29d	Is the work conducted in a posted airborne radioactivity area?

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course. RCTs will have verifiable radiological control competencies.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Read and follow the Radiological Work Permit. Respiratory protection will be required. Contact Radiological Engineering for a respiratory evaluation.
Lessons Learned: 11-13, SD-99-3766 Incorporate lessons learned; 9-16, SD-99-3284 Inspection works; 7-4, SD-99-2224 Ionex air movers

29e	Has the area ever been designated as a radiological area?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations to assess Radiological Work Permit needs.
Lessons Learned: 3-2, SD-99-0689 D&D Electrical safety lessons learned

29f	Does the area's history indicate a past presence of radioactive materials or operations?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations to assess Radiological Work Permit needs.
Lessons Learned: 9-11, SD-98-3250 Lockout/Tagout rule violations; 3-2, SD-99-0689 D&D electrical safety lessons learned

29g	Is there a potential for the activity to release radioactive material to the air through mechanical, chemical or other means?

Checklist / Permit: Radiological Work Permit, RCRA Permit, Environmental Checklist
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course. RCTs will have verifiable radiological control competencies.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Release to the air is defined as air that workers can breath (i.e., release to air that could pose a health threat to workers, co-located workers, or the public). Read and follow the Radiological Work Permit. Radiological Engineering assessment needed for respiratory protection required. Contact Environmental for review regarding air emissions and potential monitoring requirements.
Lessons Learned: 3-2, SD-99-0689 D&D electrical safety lessons learned

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29h	Does the area contain, or is it bounded by any radiological postings, barriers, signs or labels?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual; Chemical Management Manual – Spill/Release Management
Medical Monitoring: N/A
Process Guidance: Radiological Engineering/Operations required to assess any radiological controls.
Lessons Learned: 3-2, SD-99-0689 D&D electrical safety lessons learned; 5-17, SD-99-1790 Read the signs: follow instructions

29i	Will the activity involve the transfer, pumping, or draining of radioactive or radioactively contaminated liquids?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Consider use of containment pens/pans, sleeving, and/or glovebags for contamination control. Contact Radiological Engineering/Operations for guidance. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 7-3, SD-98-2259 Hose ruptures: modesty clothing contaminated;
10-5, SD-98-3745 Appropriate respo9nse because of proper planning

29j	Does the work activity involve equipment containing a sealed radioactive source or on equipment capable of generating radiation?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual, Administration, Inspection, and Control of Radiation Generating Devices, PRO-I83-HSP-18.05
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations for guidance.
Lessons Learned: 3-13, SD-98-0772 Radiological engineering provides information for control and safe handling of radiological sources

29k	Does the work involve penetration into systems, or surfaces containing or suspected of containing radioactive materials or contamination?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Consider use of shrouded tools, sleeving, and/or ventilation controls for control of airborne radioactivity/contamination. Contact Radiological Engineering/Operations for guidance.
Lessons Learned: 10-5, SD-98-3745 Appropriate response because of proper planning

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29l	Does the work involve removal or addition of shielding?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations for guidance.
Lessons Learned: 5-6, SD-98-1586 Work performed was not included in work package

29m	Does the activity involve removal of equipment, ducts, piping, gloveboxes, plenums or tanks from a radioactive area?

Checklist / Permit: Radiological Work Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Safeguards & Accountability Manual (1-MAN-010-S&A)
Medical Monitoring: N/A
Process Guidance: Contact Nuclear Material Safeguards for guidance and requirements.
Nuclear Material Safeguards has the Safeguards & Accountability Manual that addresses the safeguards for radioactive material activities onsite. The manual requirements are consistent with DOE 5633.3B order compliance criteria. There are specific measurement, surveillance and documentation requirements that are needed to ensure activities with radioactive materials go as planned and any criticality issues are resolved. The activity may involve a potential change to Clean Air Act reported venting locations. Contact Environmental for guidance and any regulatory permit requirements. Work Control document must receive a Safety Evaluation Screen (SES)/Unreviewed Safety Question Determination (USQD). Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 10-5, SD-98-3745 Appropriate response because of proper planning; 3-2, SD-99-0689 D&D electrical safety lessons learned; 11-3, SD-99-3766 Incorporate lessons learned; 9-10, SD-99-3177 Deluge system activation

30	Does this activity involve the use of "NEW" processes, equipment, or tools used in the work process? If "NO", then proceed to question #31.

30a	Will this new tool, process or equipment be used for radioactive materials?

Checklist / Permit: Radiological Work Permit
Additional Training: Job Specific as determined by planning team
References: Safeguards & Accountability Manual, 1-MAN-010-S&A
Medical Monitoring: N/A
Process Guidance: Contact Nuclear Material Safeguards for guidance and requirements.
Nuclear Material Safeguards has the Safeguards & Accountability Manual (1-MAN-010-S&A) that addresses the safeguards for radioactive material activities onsite. The manual requirements are consistent with DOE 5633.3B order compliance criteria. There are specific measurement, surveillance and documentation requirements that are needed to ensure activities with radioactive materials go as planned. Work Control document must receive a Safety Evaluation Screen (SES)/Unreviewed Safety Question Determination (USQD). Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual.
Lessons Learned: 4-14, SD-99-1294 Cost savings; 5-6, SD-98-1586 Work performed was not included in work package; 10-5,SD-98-3745 Appropriate response because of proper planning

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30b	Has the user of this new tool, process, or equipment require additional training?

Checklist / Permit: N/A
Additional Training: Specific training may need to be developed for using the new tool, process or equipment. Refer to the Training Users Manual (Training Users Manual) for guidance.
References: Training Users Manual
Medical Monitoring: N/A
Process Guidance: None
Lessons Learned: 4-14, SD-99-1294 Cost savings

31	Will this activity be conducted outside of a building? If "NO", then proceed to question #32.
31a	Is the work being conducted in a soil contamination area?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual, RFCA; MAN-072-OS&IH PM, Chapter 45, *Excavation and Trenching*
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations and Environmental for guidance. Any activity resulting in soil disturbance or removal must be evaluated and, if required, a soil disturbance permit will be issued.
Lessons Learned: 9-11, SD-99-3182 Pre evolution briefing problems

31b	Will the work involve excavation in an area adjacent to an under-building contamination area?

Checklist / Permit: Possible Radiological Work Permit needed.
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual; MAN-072-OS&IH PM, Chapter 45, *Excavation and Trenching*
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations and Environmental for guidance. Any activity resulting in soil disturbance or removal must be evaluated and, if required, a soil disturbance permit will be issued
Lessons Learned: 9-11, SD-99-3182 Pre evolution briefing problems

31c	Does the activity involve soil probing or well installation?

Checklist / Permit: Possible Radiological Work Permit needed, Soil Disturbance Permit
Additional Training: The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to RBAs, RAs, or HRAs. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual; Environmental Checklist; MAN-072-OS&IH PM, Chapter 45, *Excavation and Trenching*
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations and Environmental for guidance.
Lessons Learned:

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31d	**Will this activity involve excavations, trenching, drilling, geoprobe sampling or any other disturbances of soil to occur?**

Checklist / Permit: Soil Disturbance Request and an Excavation Permit, Environmental Checklist
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: MAN-072-OS&IH PM, Chapter 45, *Excavation and Trenching*
Medical Monitoring: RFCA
Process Guidance: Complete a Soil Disturbance Request and an Excavation Permit prior to soil disturbance. Read and follow the Radiological Work Permit, if required. Radiological Engineering **SHALL** assess the need for posting and work control requirements. Complete requirements of the Environmental Approval Process Procedure for Construction/Excavation Activities. Complete the Hazardous Waste Determination Form found in this procedure. Prior to returning the removed soil to the excavation, ensure that the soil has been sampled, as necessary, and that the soil to be replaced is evaluated in accordance with the containment concentrations identified in the Rocky Flats Cleanup Agreement (RFCA). K-H Environmental written approval is required for all soil dispositions where radiological constituents exceed background, or hazardous constituents at any contamination level is involved. Refer to the Site Quality Assurance Manual and/or contact Quality Assurance to determine if their involvement is required.
Lessons Learned: 9-11, SD-99-3182 Pre evolution briefing problems; 8-6, SD-99-2662 Plume project near miss; 11-4, SD-98-3837 Slip sliding away

31e	**Will the activity disturb an Individual Hazardous Substance Site and result in potential worker exposure to hazardous substances?**

Checklist / Permit: Soil Disturbance Request and an Excavation Permit, Environmental Checklist
Additional Training: Job Supervisor **SHALL** refer to Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: MAN-072-OS&IH PM, Chapter 45, *Excavation and Trenching*; RFCA
Medical Monitoring: RFCA
Process Guidance: Complete a Soil Disturbance Request and an Excavation Permit prior to soil disturbance. Contact Environmental, H&S & Radiological Engineering for guidance. An Individual Hazardous Substance Site is used at RFETS as a single term which combines CERCLA remediation and RCRA corrective action units. Individual Hazardous Substance Site-specific considerations must be incorporated into the radiological determinations for soils and structures within Individual Hazardous Substance Site.
Lessons Learned:

32	**Is there a potential for pyrophoric material to be handled, processed, or encountered during the work activity, including generation, transfer or storage of any plutonium metals, solutions, residues, or salts that are within the scope of HSP 31.11?**

Checklist / Permit: RCRA Permit, Possible Radiological Work Permit needed, Environmental Checklist
Additional Training: Hazard Communication. The following training may be required, and should be determined by the Job Supervisor based on the specific tasks: 1) General Employee Radiological Training for personnel who require access to the site and are not qualified Radiological Workers or RCTs. 2) Radiological Worker Level 1 for all workers (except RCTs) who require unescorted access to Radiological Boundary Areas, Radiation Areas, or High Radiation Areas. 3) Radiological Worker Level 2 for all workers (except RCTs) who require unescorted access to contamination and high contamination areas, soil contamination areas, radiation, or very high radiation areas. Radiological work planner must also complete this course.
References: Radiological Control Manual; Chemical Management Manual, PRO-W89-HSP-31.11, *Transfer and storage of Plutonium for Fire Safety*; 6 DDR 1007.3 Parts 261-265
Medical Monitoring: N/A
Process Guidance: Contact Radiological Engineering/Operations for guidance and notify Environmental. Contact Fire Protection Engineering or Fire Department as appropriate for further guidance. Refer to RCRA regulations and permit when handling metals or other regulated wastes.
Lessons Learned: 10-5, SD-98-3745 Appropriate response because of proper planning

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33	**Will there be a new air emission or a change in the quantity of an existing air emission to the atmosphere (including radionuclide National Emission Standard for Hazardous Air Pollutants)?**

Checklist / Permit: Title V Air Permit, Environmental Checklist
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: None
Medical Monitoring: N/A
Process Guidance: Air emission means any air pollution agent or combustion of such agents, including any physical, chemical biological, radioactive substance or matter which is emitted during or from the activity. Air emission source means any device, article or equipment that emits or has the potential to emit pollutants to the atmosphere including those that do not discharge directly to the atmosphere through a stack, vent or duct. A source is not necessarily associated with or serviced by a discrete single source. Contact Environmental for monitoring and emission tracking requirements.
Lessons Learned: 4-18, SD-99-1371 Communicate; 3-2, SD-99-0689 D&D electrical safety lessons learned

34	**Is this work activity being conducted in accordance with a Decommissioning Operations Plan, a Proposed Action Memorandum, an Interim Measures/Interim Remedial Action document, consent orders, Federal Facility Compliance Agreement, or other CERCLA decision document under the Rocky Flats Cleanup Agreement?**

Checklist / Permit: Title V Air Permit, Environmental Checklist; Agency Documents
Additional Training: N/A
References: RFCA; Decommissioning Operations Plan; Proposed Action Memorandum; Interim Measures/Interim Remedial Action; Compliance Orders, Federal Facility Compliance Agreement, etc.
Medical Monitoring: N/A
Process Guidance: Ensure the work is conducted and appropriate notifications are made in accordance with the RFCA/CERCLA decision document. Ensure that appropriate decision documents are submitted to the Administrative Record files. Contact Quality for guidance on those Decommissioning Operations Plans, Proposed Action Memorandums, or Interim Measures/Interim Remedial Actions that reference quality data objectives. Contact Environmental to ensure planned scope of work is in accordance is in accordance with consent orders or Federal Facility Compliance Agreement if applicable.
Lessons Learned: 9-1, SD-99-3016 Mercury spill
6-1, SD-98-1770 774 CERCLA tanks plutonium intake event text from an RMRS lessons learned document

35	**Will this activity install, modify, move, or impact an Underground or Aboveground Storage Tank?**

Checklist / Permit: Potential RCRA Permit
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: 7-CCR-1101-14, Tank II Database; Integrated Tank Management Plan
Medical Monitoring: N/A
Process Guidance: Contact Environmental for guidance. Designated Underground Storage Tank or Aboveground Storage Tank Systems must be designed and installed in accordance with 7-CCR-1101-14.
Lessons Learned:

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36	**Will this activity modify a current RCRA-regulated hazardous waste unit, relocate all or part of a unit, or otherwise impact a unit?**

Checklist / Permit: RCRA Permit
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: 40 CFR 261; 7-CCR-1007.3 Part 261
Medical Monitoring: N/A
Process Guidance: RCRA-regulated hazardous waste units include accumulation, storage, and treatment units, the containers and tanks within the units, and the associated building structures. Impacts to a unit may include disconnecting power to a unit, excavating nearby which results in infiltration of groundwater into a unit, removing lighting in a unit, or changing the egress route from a unit. Contact the Unit Custodian and Environmental during the planning process to ensure that the RCRA Part B Permit and the regulatory requirements are met throughout the duration of the work activities. Environmental will prepare any necessary permit modifications. Aisle space for inspections and emergency response personnel access to containers and tanks of hazardous waste must be maintained. Copies of the pertinent portions of the IWCP must be placed in the unit's operating record as modifications or repairs are made. Updates to Waste & Environmental Management System will be required for the relocation of containers, and the relocation of Satellite and 90-day accumulation areas. If the work activity will modify a permitted unit, a permit notification may be required prior to initiating work. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned:

37	**Does the activity include closure of a RCRA hazardous waste unit or placing it in a RCRA stable configuration?**

Checklist / Permit: RCRA Permit
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: RCRA/RFCA
Medical Monitoring: N/A
Process Guidance: Evaluate if the activity will result in partial or full closure of the RCRA unit or place the unit in a RCRA stable condition. Review RCRA Permit Closure Plan to ensure that planned activities meet the requirements of the Plan and a Closure Description Document must be submitted to the Colorado Department of Public Health and Environment for approval or requirements incorporated into a decision document. Contact Environmental for guidance.
Lessons Learned:

38	**Will this activity generate waste? If "NO", then proceed to question #39.**
38a	**Will this activity generate polychlorinated biphenyl (PCB) ballasts or other Toxic Substance Control Act governed waste types, including PCB bulk product or bulk waste?**

Checklist / Permit: N/A
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific Waste Handling training and qualifications.
References: PCB Management Plan, Offsite Waste Management Facility Approval Procedure.
Medical Monitoring: N/A
Process Guidance: If the facility/project does not have a Waste Generating Instruction for waste generated by this activity, contact Environmental for guidance. Storage of any generated waste must be done in compliance with Site procedures. All generated wastes must be tracked in Waste & Environmental Management System to ensure management within regulatory defined timeframes. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 2-1, SD-99-0326 Waste container contents can be subject to biodegradation effects

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38b	Will this activity generate a liquid sanitary waste (non-radioactive, non-hazardous aqueous waste)?

Checklist / Permit: N/A
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: Sanitary Waste Procedure
Medical Monitoring: N/A
Process Guidance: If the facility/project does not have a Waste Stream & Residue Identification & Characterization process for sanitary wastewater generated by this activity, contact Customer Service for guidance. If this is a routine waste generation activity (e.g., repair of personnel showers which generate non-radioactive non-hazardous wastewater), or if this wastewater is routinely transferred to the Sanitary Treatment Plant for treatment, THEN no additional approvals are required. If not, THEN coordinate of approvals through the Sewage Treatment Plant. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned:

38c	Will this activity generate solid sanitary waste which falls into the category of "special sanitary wastes"?

Checklist / Permit: N/A
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: Sanitary Waste Offsite Disposal Procedure (1-PRO-573-SWODP); PCB Management Plan
Medical Monitoring: N/A
Process Guidance: Examples of "Special Sanitary Wastes" include non-radioactive sludges, chemicals, some PCB contaminated wastes as defined in the management plan, waste materials from spills which are non-hazardous wastes, and non-friable asbestos. Solid sanitary waste is non-radioactive, non-hazardous, and passes the paint filter test for free liquids. Contact Sanitary Waste Programs to dispose of these wastes in the sanitary waste landfill. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned:

38d	Will this activity generate solid sanitary waste (excluding prohibited items)?

Checklist / Permit: N/A
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: Sanitary Waste Offsite Disposal Procedure (1-PRO-573-SWODP)
Medical Monitoring: N/A
Process Guidance: Solid sanitary waste is non-radioactive, non-hazardous, and passes the paint filter test for free liquids. Prohibited items are identified in the Sanitary Waste Offsite Disposal Procedure (1-PRO-573-SWODP). Routine solid sanitary wastes can be placed in a dumpster. Non-routine industrial wastes must be shipped to the sanitary landfill with waste acceptance criteria (see Sanitary Waste Disposal Guide). Contact Sanitary Waste Programs for assistance in completing the waste determination and any required documentation for this waste. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 2-11, SD-99-0460 Unauthorized waste disposal off-site by Sandia employee has consequences

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38e	**Will this activity generate hazardous, radioactive, or mixed waste?**

Checklist / Permit: RCRA Permit
Additional Training: Job Supervisor **SHALL** refer to the Training Users Manual for specific RCRA and Waste Handling training and qualifications. All other training will need to be determined by the Job Supervisor, based on the known hazards (e.g., respiratory, HazCom).
References: Chemical Management Manual, Offsite Waste Management Facility Approval Procedure, Waste Certification Procedures, Waste Acceptance Criteria
Medical Monitoring: N/A
Process Guidance: If the facility or project does not have a Waste Generating Instruction for the waste being generated by this activity, contact Customer Service for guidance. Management in Containers or Tanks: Plan in advance for approval to pour aqueous wastes meeting the Building 374 waste acceptance criteria down the process drains. Management in Containers: Plan in advance for accumulation of waste in an appropriate area, and transfer of the waste to a proper accumulation or storage area. Ensure approvals for Satellite or 90-day Accumulation areas are received prior to generating the waste. Ensure that the waste meets the Waste Acceptance Criteria for the storage or treatment area, prior to waste transfer into those areas. If immediate treatment of a hazardous or mixed waste is required, contact Environmental for preparation, submittal, and approval of a generator treatment notification, prior to initiation of waste generation activities. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 1-3, SD-00-0310 Mixed waste in package discovered after shipment to Nevada Test Site; 7-5, SD-99-2276 Improper movement of hazardous waste

39	**Is the work being conducted in an area covered by a Criticality Accident Alarm System that has been determined to not meet Life Safety / Disaster Warning (LS/DW) system audibility criteria or that has not been tested for LS/DW audibility and Criticality Accident Alarm System beacons are not visible from or within the affected area?**

Checklist / Permit: N/A
Additional Training: The job supervisor and planning team may determine that additional training is required based upon the required compensatory measures.
References: The applicable documents from the Authorization Basis Documentation List for the facility where the work will be performed.
Medical Monitoring: N/A
Process Guidance: Specific Criticality Accident Alarm System and/or LS/DW Compensatory Measures are required by the facility Authorization Basis in areas where criticality alarm annunciation is considered inoperable. The work activity **SHALL** comply with the applicable AB compensatory measures. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual.
Lessons Learned: 11-12, SD-99-3733 Work control

40	**Does this activity impact other facilities outside of the facility where the work is being performed (i.e.: work on the radio feed into the LS/DW system in Building 121 affects other buildings required to broadcast music)?**

Checklist / Permit: N/A
Additional Training: The specific training will need to be determined by the Job Supervisor depending on the hazard.
References: None
Medical Monitoring: N/A
Process Guidance: The specific requirements will need to be determined on a case-by-case basis. Ensure the appropriate Subject Matter Expert is involved with the Control Measure development and that the activity has been properly planned and coordinated with line management from the other affected facilities. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual. Contact Fire Protection Engineering or Fire Department as appropriate for further guidance. Nuclear Safety support is required for buildings that are governed by the Nuclear Safety Manual. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned: 2-3, SD-99-0335 Communication = Success No communication = Failure; 11-4, SD-99-3509 Unity system issues

APPENDIX 3.3 - JOB HAZARD IDENTIFICATION TOOL/JOB HAZARD ANALYSIS GUIDE

41	**Will the proposed work involve liquid of any types in areas which currently or formerly had fissile solutions?**

Checklist / Permit: N/A
Additional Training: N/A
References: Nuclear Criticality Safety Manual
Medical Monitoring: N/A
Process Guidance: Any liquid system in a processing or former processing area has the potential to contain fissionable material (i.e., reagent lines, process water lines, etc.). A review by Criticality Safety is needed to determine whether double contingent controls are required to ensure that the liquids drained are not fissionable.
Lessons Learned: Y-12 had a criticality accident in 1958 when process specialists were leak testing a pencil tank with water. This operation was not expected to involve fissionable material in any way; however, a criticality occurred. DOE/NCT-04, "A Review of Criticality Accidents," March 1989.

42	**Work with reactive, shock sensitive, explosive (*e.g., natural gas, hydrogen, propane*) or incompatible chemicals or materials, including decomposition and radiolysis byproducts?**

Checklist / Permit: N/A
Additional Training: N/A
References: Applicable facility / company requirements
Medical Monitoring: N/A
Process Guidance: Contact Health & Safety, Engineering, Fire Protection Engineering or Fire Department, and Environmental for additional guidance. Explosive is defined as any chemical compound or mechanical mixture that, when subjected to heat, impact, friction, shock, or other suitable initiation stimulus, undergoes a very rapid chemical change with evolution of large volumes of highly heated gases that exert pressures in the surrounding medium. The term applies to materials that either detonate or deflagrate. (6430.1A) For example, natural gas, hydrogen, propane
Shock sensitive is defined as a material which undergoes visible reaction when mechanically shocked, for example, potassium superoxide.
Radiolysis is defined as a reaction produced by radiation (usually decomposition).
Include contingency planning in the work control planning process to maintain the work in a safe condition if the work is stopped or cancelled before completion. Comply with the applicable MSDS.
Lessons Learned: Y-12 Building 9201-5 Type A Accident Investigation, 12/8/99

43	**Do any Standing Orders, Operations Orders, or company/facility specific directives/instructions containing additional health and safety requirements apply to the work activity?**

Checklist / Permit: N/A
Additional Training: N/A
References: Applicable facility / company requirements
Medical Monitoring: N/A
Process Guidance: Contact the facility and company management for any applicable guidance. Ensure the appropriate Subject Matter Expert is involved with the Control Measure development and that the activity has been properly planned and coordinated. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual. Nuclear Safety support is required for buildings that are governed by the Nuclear Safety Manual. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned:

44	**Does this activity involve any other hazards not previously identified or could this activity introduce any new hazards?**

Checklist / Permit: N/A
Additional Training: The specific training will need to be determined by the Job Supervisor depending on the hazard.
References: None
Medical Monitoring: N/A
Process Guidance: The specific requirements will need to be determined on a case-by-case basis. Ensure the appropriate Subject Matter Expert is involved with the Control Measure development and that the activity has been properly planned and coordinated. Criticality Engineering support is required whenever work is for buildings that are governed by the Nuclear Criticality Safety Manual. Nuclear Safety support is required for buildings that are governed by the Nuclear Safety Manual. Contact Fire Protection Engineering or Fire Department as appropriate for further guidance. The Environmental planning function may be performed by the Environmental Coordinator or Waste Manager as necessary.
Lessons Learned:

APPENDIX 3.4 - JOB HAZARD ANALYSIS (Low & Medium Planning)

WCF/Procedure No.:	Title/Description:	Date:
Company/Organization	Location:	Page 1 of ____.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARD (FROM WALKDOWN & JHIT)	REQUIRED CONTROLS

Team Leader (Name / Signature / Date)	Planner (Name / Signature / Date)	H&S (Name / Signature / Date)
Engineer (Name / Signature / Date)	RAD (Name / Signature / Date)	Quality (Name / Signature / Date)
Criticality Engineer (Name / Signature / Date)	Nuclear Safety (Name / Signature / Date)	Environmental and/or Waste (Name / Signature / Date)
Fire Protection (Name / Signature / Date)	Lead Craft / Operator (Name / Signature / Date)	**APPROVED**: RM (Name / Signature /Date/Organization)

Signature indicates concurrence and approval of the JHIT and the JHA for those programs identified in the JHIT as necessary for planning and that the work control document adequately contains all of the required controls.

APPENDIX 3.4 - JOB HAZARD ANALYSIS (Low & Medium Planning)

Continuation Sheet

WCF/Procedure No.:	Title/Description:	Date:
Company/Organization	Location:	Page ___ of ___.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARD (FROM WALKDOWN & JHIT)	REQUIRED CONTROLS

APPENDIX 3.5 - JOB HAZARD ANALYSIS (High Planning)

WCF/Procedure No.:	Title/Description:	Date:
Company/Organization	Location:	Page 1 of ____.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARD (FROM JHIT)	WHAT IF? / ADDITIONAL ANALYSES PERFORMED	POTENTIAL CONSEQUENCES	REQUIRED CONTROLS

Team Leader (Name / Signature / Date)	Planner (Name / Signature / Date)	H&S (Name / Signature / Date)
Engineer (Name / Signature / Date)	RAD (Name / Signature / Date)	Quality (Name / Signature / Date)
Criticality Engineer (Name / Signature / Date)	Nuclear Safety (Name / Signature / Date)	Environmental and/or Waste (Name / Signature / Date)
Fire Protection (Name / Signature / Date)	Lead Craft / Operator (Name / Signature / Date)	**APPROVED**: RM (Name / Signature /Date/Organization)

Signature indicates concurrence and approval of the JHIT and the JHA for those programs identified in the JHIT as necessary for planning and that the work control document adequately contains all of the required controls.

APPENDIX 3.5 - JOB HAZARD ANALYSIS (High Planning)
Continuation Sheet

WCF/Procedure No.:	Title/Description:	Date:
Company/Organization	Location:	Page ____ of ____.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARD (FROM JHIT)	WHAT IF? / ADDITIONAL ANALYSES PERFORMED	POTENTIAL CONSEQUENCES	REQUIRED CONTROLS

APPENDIX 3.6 - PLANNING TEAM CREDENTIALS REPORT FORM
(Medium and High Level Planning)

ACTIVITY TITLE: _____ **WORK CONTROL NO.** _____

NAME	ROLE & JUSTIFICATION FOR BEING SELECTED ON TEAM OR OTHER COMMENTS

The above personnel have been assigned to the planning team and are adequately qualified to perform their functions.

RESPONSIBLE MANAGER APPROVAL:

NAME (Printed) _____ **SIGNATURE** _____ **EXT.** _____ **DATE**_____

APPENDIX 3.7 - INTEGRATED HAZARD ASSESSMENT PROCESS

This section provides guidelines for completing IHAs for radiological, chemical, and industrial hazards likely to be encountered in performing activities at the Site. An IHA is required for work activities that require a High planning level based upon the ASF results.

An IHA of specific activities **Should** be graded, commensurate with the nature of the hazards and potential environmental impacts, to understand impacts from worker interactions with hazards that could be introduced as a result of specific work tasks/activities. This assessment supports the development of integrated work control packages, procedures, or other methods used in developing implementing documents for work.

Hazard assessments are performed at different points and at different levels of rigor during the planning of work to support an activity. The level of hazard assessment is limited in the ASF to a qualitative profiling of hazards. This hazard assessment profile determines the general nature of the work activity hazards, identifies unique or unusual hazards, and determines the expected number of hazards related issues that need to be addressed in planning the work activity. This latter determination is used to assist in the selection of an appropriate work planning process. Once the work planning process has been selected, either qualitative, semi-quantitative, or quantitative hazard assessment techniques will be applied, commensurate with the inherent hazards of the work activity. The assessment should be accomplished by evaluating each step in the work activity, work instruction for workplace hazards, environmental impacts, and for hazards introduced from chosen work methods. Performing a walkdown of the work with the workers who will perform the task most effectively supports this process. The assessment **Should** involve reviewing job steps associated with a task and evaluating radiological and industrial hazards. The assessment **Should** involve managers, engineers, environmental, health, and safety personnel, and workers.

The following discussion provides guidance and information on screening processes to identify the hazards, analyze the hazards, and generally identify the controls to prevent or mitigate the hazards posed by the activities under consideration.

Site activities require commensurate controls to prevent or mitigate the impacts/hazards posed by the activities. Some activities (e.g., those that pose significant nuclear or radiological hazards) require a rigorous control set, as provided by nuclear safety AB documents such as a SAR, Basis for Interim Operations, or Basis For Operations, and Environmental Checklist.

Activities that do not pose a nuclear or radiological hazard still require a graded control set, but do not require a nuclear safety AB if they are not conducted within a nuclear facility. Activities in this latter category do, however require a graded hazards analysis to be performed, or to have been performed. Also, the impact of hazards for these activities upon nuclear activities or facilities needs to be identified and assessed.

Hazards analyses and controls development in both of the above instances are graded to:

- The relative importance to safety
- The magnitude of any hazard involved
- The programmatic mission and particular characteristics of the facility, including regulatory compliance requirements
- The verified design basis documentation available
- Environmental impact

APPENDIX 3.7 - INTEGRATED HAZARD ANAYLSIS PROCESS

HAZARD ASSESSMENT TOOLS

Once hazards and impacts have been identified and assigned to the appropriate Site infrastructure personnel, the individual will use programmatic-specific standards based hazard assessment tools (procedures) to evaluate the impact of the hazard, the interaction of the hazard on other programs/activities, and the appropriate controls needed to address the hazard. However, these individual evaluations must then be reviewed together by the team to determine if:

- There are conflicting hazards or impacts
- There are any synergistic impacts from the hazards that could cause additional hazards or impacts
- The control set can be integrated and does not conflict with one another
- The control set can be implemented

Many variations of assessment techniques exist and are used in evaluating hazards. These techniques help identify conditions or faulty procedures or processes that could lead to accidents, injuries, property damage, or environmental impact. However, regardless of the variation in available tools, each hazards assessment process tool or technique provides the following elements:

- Work Activity Definition
- Characterization, Categorization, and Classification of Hazards/Impacts
- Identification of Scenarios of Concern
- Evaluation of Consequence
- Identification of Controls to Prevent and Mitigate Hazards
- Documentation of the Assessment

Site infrastructure programs use several different techniques to conduct hazards/impact assessments. Table A3-2, Site Hazard Assessment Tools and Techniques, identifies those techniques, where they reside within the site's infrastructure programs, and their purpose or regulatory driver. The level of effort and techniques used to perform an integrated hazard assessment will vary, depending on the complexity of the disposition project work scope and the hazards present. For each technique listed, the purpose and application, as well as a reference to additional information for each technique, is provided. For purposes of performing an IWCP hazard assessment, the JHA is the only approved hazard analysis method. The Job Safety Analysis tools and techniques described in Table A3-2 may be used to assist in preparing the JHA/IHA. Controls identified during efforts described in Table A3-2 must be documented in the JHA/IHA. The JHA meets the requirements and is considered equivalent to completing hazard analyses identified/required in other site documents.

APPENDIX 3.7 - INTEGRATED HAZARD ANAYLSIS PROCESS

Table A3-2 Site Hazard Assessment Tools and Techniques

Tool/Techniques	Infrastructure Program(s)	Purpose / Driver
As Low as Reasonably Achievable Review (ALARA)	Radiological Protection	Used for assessing Radiological hazards only. Some DOE facilities have extended the ALARA review to include non-radiological hazards. *10 CFR 835*
Auditable Safety Analysis	Nuclear Safety/Radiological Protection [for radiological facilities]	A defensible safety analysis (similar to a SAR but with much reduced content and requirements) which is developed for a radiological facility. *DOE-EM-STD -5502-94*
Criticality Safety Evaluation	Nuclear Criticality Safety	Operations with fissionable materials which pose a criticality accident hazard are evaluated and documented to demonstrate that the operation will be subcritical under both normal and credible abnormal conditions. *DOE Order 420.1*
Fire Hazard Analysis	Fire Protection Program	Fire hazards analysis for all nuclear facilities, significant new facilities and facilities that represent unique or significant fire safety risks. The conclusions of the fire hazards analysis shall be incorporated in the Safety Analysis Report Accident Analysis and shall be integrated into design basis and beyond design basis accident conditions. *DOE Order 420.1*
Failure Modes and Effects Analysis	Nuclear Safety	An assessment of each component for its potential modes of failure, effects of failure, and detection methods. May be undertaken before initiating operations or during operations.
Health & Safety Plan	Occupational Safety & Industrial Hygiene; Environmental Compliance and Management	Health and Safety Plan provides a safety analysis, hazard assessment and controls identification for the work activity to be performed. *29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.*
Hazard and Operability Study	Nuclear Safety	A critical assessment of component capabilities and system configurations. Used in the chemical industry, rigor and formality based upon the level of risk of operation.
Job Safety Analysis	Occupational Health & Safety	Occupational Safety and Health Administration, U.S. Department of Labor, *Job Hazard Analysis, OSHA 3071, 1988 (Reprint)* An assessment of each step in a job work activity that is undertaken before initiating work activities to identify needed controls or after incidents to identify needed improvements in controls. Variants of this technique are often used in evaluating hazards associated with work packages or for walk-throughs of facility to identify conditions or faulty procedures that could lead to accidents, injuries, property damage, or environmental impact.
Nuclear Safety Authorization Basis Safety Analysis, e.g., NS AB docs including SARs, Basis for Interim Operations, Basis for Operations, FSAs, TSRs, OSRs; Use of Safety Analysis and Risk Assessment Handbook methodology.	Nuclear Safety	Graded approach to assess hazards, analyze accident scenarios, and develop nuclear safety authorization basis controls for Site > or = Hazard Category 3 nuclear facilities. *DOE Orders 420.1, 425.1, 5480.21, 5480.22, 5480.23*
Environmental Checklist	Environmental Stewardship & Systems	Used for assessing new or modified projects potential subject to issues that may have an impact on the environment.
Integrated Environmental Manual	Environmental Stewardship & Systems	Used to review projects to ensure regulatory drivers have been addressed and required management systems have been incorporated.

CONDUCTING AN INTEGRATED HAZARDS ASSESSMENT

In order to provide a hazard assessment, an evaluation is needed to determine the selection of an appropriate hazard assessment methodology. Hazard assessments are mainly qualitative and are conducted by a team of workers, using current Site procedures.

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A wide range of hazards and potential environmental impacts exists at the Site related to past nuclear weapons component production operations and the current Site closure activities. These hazards range from standard industrial hazards/impacts to unique hazards/impacts associated with storage of nuclear materials and decommissioning of nuclear weapon component production facilities. At the Site, Environmental and Safety & Health programs are tailored to the specific hazards on-Site and are implemented in individual facilities using a graded approach. The graded approach is based upon the facility (a) programmatic mission, (b) magnitude of hazards involved and potential impacts, and (c) relative importance to safety and compliance, as well as the Sitewide infrastructure requirements and regulatory requirements.

Hazard/impact assessments provide insight on the severity of consequences, an understanding of how controls mitigate or prevent the consequences, and how controls are promulgated into work control documents. Controls identified in the assessment are implemented or changes to the controls are reevaluated for impacts against the original assessment.

It is incumbent on Site RMs to recognize what comprises the safety basis for the Site facilities and activities for which they have line management responsibility. Activities outside a given nuclear facility also need to be evaluated for impact on the Site SAR as well as the AB of that facility. Safety bases for Site facilities and activities are derived in a graded approach, commensurate with the hazards presented for these facilities. Integrated hazard assessments, coordinated between cognizant Site SMEs, are performed to evaluate these hazards. Figure A3-1 depicts the general process flow for developing hazard/impact assessments to support establishing safety controls and safety bases.

NOTE: *The Integrated Hazard Assessment process described in this section is intended to satisfy multiple hazard assessment requirements and programmatic drivers from various site safety management programs. The intent is to assess hazards based on information available from work activity hazard identification profile information documented in Screen 2 of the ASF, as well as using knowledge of the work scope for a work activity. These assessments provide a "baseline" of anticipated hazards and their potential consequences.*

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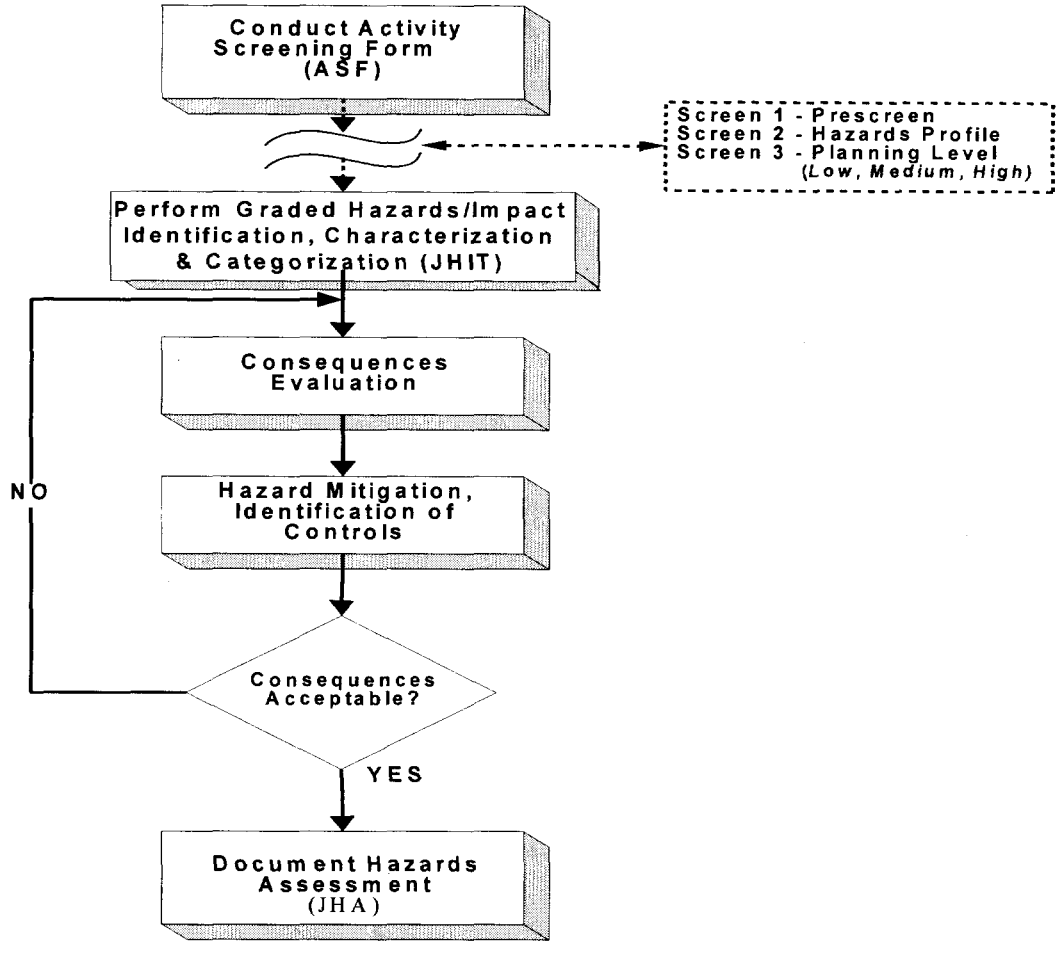
Figure A3-1 Hazard Assessment Process



The assessment **Should** evaluate radiological (including nuclear and criticality issues), environmental, and industrial hazards, as applicable, using a multi-disciplined team of Site personnel. Furthermore, reviewers **Should** be involved in the early phases of the assessment.

In cases where hazardous substances or conditions are present, analyses **Should** evaluate (1) the type, form, quantity, and concentrations; (2) location; (3) conditions under which hazards could occur; and (4) the hazards' inherent harmful characteristics (for example, toxicity).

The hazards evaluation team determines the consequences of the impacts of normal operations and abnormal events if given controls are not in place. The evaluator has to assess whether or not the identified impacts are within safety basis decision thresholds. If the controls identified do not reduce the potential for the impacts to occur or reduce personnel exposure to the hazards, additional controls are implemented to reduce the consequences to an acceptable level. Iteration on identification of additional controls is required when safety basis decision thresholds are exceeded.

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Consequences of interest include those adverse occurrences which threaten the health or safety of the public, the workers, or the environment, the regulatory compliance posture of the Site, or the mission of the facility(s).

Facilities and projects should rely on the existing hazard assessment (includes original/modified environmental checklists and AB safety assessments performed for nuclear facilities) from the previous phase of a facility's life cycle, (as appropriate), as a "baseline" for the work activity when the following conditions apply:

- The assessment was previously approved by the required level of management
- The assessment bounds hazards expected during the planned work activity
- No update of the assessment is needed, that is, it is applicable to the planned activities
- Task hazard analyses are performed for tasks
- Planned tasks and associated hazards are screened against the existing hazard assessment to ensure that the existing hazards assessment and their associated controls are applicable
- No changes have been made to impact the environment or compliance requirements

Activity Identification
The first step in preparing a hazards assessment is to determine the objective of the work activity(s) which will be covered by the assessment. The operations to be accomplished **Should** be specifically identified along with the areas (locations) in which the operations will be accomplished. [**NOTE**: This information can exist in a nuclear or non-nuclear facility AB documentation. For example, in SAR, Basis for Interim Operation, Basis for Operations, or Facility Safety Assessment documents; current environmental checklists, or in Project Management Plans, and Health and Safety Plans.]

Hazard Identification, Characterization, and Classification
The second step is to identify and describe the current hazards/impacts associated with the work activity to take place. The following are examples of information required:

- Hazardous Material Inventories
- Facility Design
- Facility Systems and Components
- Industrial Hazards
- Radiation and Contamination Levels
- Environmental Impacts

Information Gathering
Information needed for this process includes two levels of detail:

1. Determination of applicable procedures, OSRs, TSRs, SARs, and any other requirements which apply to the activities
2. Characterization of the facility

Baseline data for each project work activity should be collected to support a thorough physical, chemical, and radiological characterization. This baseline data should include:

- Drawings/records reflecting as-built and as-modified condition of the facility
- The current condition of all systems, components, and structures including existing protective barriers and/or modes of operation which could affect (directly or indirectly) the activities being assessed (**may** require walkdowns to cover areas where information is unknown or incomplete)

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- The type, form, quantity, and location of regulated wastes, hazardous chemicals, and radioactive materials and of any other physical hazards in the area affected by the work

This step should be thoroughly documented and should include listings of applicable documents and documentation of any pertinent information obtained verbally.

Hazards/Impacts Identification
The objective of this step is to identify any radiological, chemical, environmental, and industrial hazards or impacts which might pertain to the work activity or activities in question. For chemicals and radioactive materials, the types, forms, concentrations, quantities, and locations are identified. Industrial hazards are identified as applicable. Environmental impacts include potential harm to flora and fauna, water and air quality. Any special considerations relating to containment, explosion, fire, reactivity, health, etc. should be identified here.

Once the hazards/impacts are identified, they are screened to determine the appropriate hazard assessment method to be applied. Screening consists of determining the level of hazard which will be addressed or which there is cause for concern. DOE Standard 1027-92, *Hazard Categorization & Accident Analysis Techniques for Compliance with DOE Nuclear Safety Analysis Reports,* provides additional guidance on performing hazard assessments.

Estimate Source Terms
Source terms that bound the magnitude of the hazard or impact (e.g., amount of hazardous chemical, radiation exposure level, potential for release) are then determined. These source terms allow one to define what potential for adverse consequences exists.

Identification of Existing Controls
Administrative controls, physical controls, regulatory/permit controls, and design controls that exist are then determined. Controls could be found in the facility operating basis documentation, such as nuclear facility AB documentation, (e.g., in SARs, Basis for Interim Operations, Basis for Operations), or Facility Safety Assessment documents. Controls for less-than-nuclear-Hazards Category 3 facilities controls are found typically in operational controls, ALARA reviews, ASAs, HASPs, etc.

Identification of "Scenarios of Concern"
Identify the scenarios of concern (for example, spills or fires) that could cause adverse impacts from normal and reasonably expected abnormal events. The evaluator has to keep in mind what would be considered normal and reasonably expected abnormal events or "accidents". An "accident" is defined as an unexpected and undesirable event. The intent in performing the hazard assessment is to identify those normal and/or unexpected and undesirable events that might occur and to assist in identifying those controls necessary to mitigate the potential negative impacts to the health of workers or public or that harm the facility or environment. The evaluator should use a level of sophistication necessary to define the approach for the hazard assessment, keeping in mind the consequences of the event. The following are examples of how the evaluator might approach the hazard assessment:

- Assume no controls in place
- Apply Deterministic approach (assume event will happen) as appropriate
- Move towards a Probabilistic Risk Assessment technique for assessment of very high risk activities

The safety basis decision thresholds will guide the evaluator to the level of sophistication and level of hazard assessment rigor needed to develop the safety basis for the work activity or facility assessed.

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Scenario of Concern Determination

Scenario of Concern includes conditions which could adversely affect someone or something. They could be due to normal process-related radiation exposures (which could potentially be averted), potential inhalation of toxic materials due to spills or accidents, environmental damage due to spills or releases, energy sources or other hazard dispersion mechanisms.

All scenarios of concern which could have an adverse impact should be considered in development of safety features to address hazards and accident scenarios.

Develop Scenarios

For adverse effects to occur from an accident, there would be an initiating event which could be accompanied by one or more failures of equipment or personnel. The chain of events which could potentially result in an adverse consequence is called a scenario. A full and complete hazards assessment will include all credible scenarios and their attendant consequences.

Hazard assessments **Should** include considerations of human factors which can influence events or cause events to occur. Work environmental factors that might degrade the reliability of operations personnel in performing tasks should be described and analyzed.

Hazard Mitigation Identification

With the identification of hazards and potential negative impacts, the next step is to identify the necessary and sufficient controls (engineering and administrative) necessary to mitigate the hazards and potential impacts associated with the work activity(s). The hazard assessment evaluator should identify only the necessary and sufficient controls (use of protective clothing, shielding, limit the number of containers handled at any one time, etc.) to be used, relative to the hazards and potential negative impacts associated with the work activity(s). The hazard assessment evaluator **may** solicit other SMEs when decision thresholds are exceeded.

Define Controls to Meet Acceptance Criteria

For those potential impacts which are determined to be unacceptable, additional controls should be proposed to reduce the potential impacts. The scenarios and events then need to be reevaluated to determine if the additional controls will yield an acceptable level of impact (per the acceptance criteria). If the impacts cannot be lowered by the imposition of controls to meet the acceptance criteria, or, if the cost of necessary controls is excessive, document these results and present them to management.

Establish Event Trees, As Necessary

For more complicated scenarios, event trees **Should** be developed which analyze the chain of events described. Assessment of these event trees **Should** include estimation of the probability of each separate event leading to adverse consequences.

Consequences Evaluation

Determine the consequences of the impacts of normal operations and abnormal events given controls are in place. The hazards assessment evaluator has to assess whether or not the identified impacts are within the guidelines. If the controls identified do not reduce the potential for the impacts to occur or reduce personnel exposure to the hazards, additional controls **SHALL** be implemented to reduce the consequences to an acceptable level. Iteration on identification of additional controls is required when guidelines are exceeded.

Consequences of interest include those adverse occurrences which threaten the health or safety of the public, the workers, the environment, or property, the regulatory compliance posture, or the mission of the Site.

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Hazard Assessment Documentation

The hazard assessment **Should** be formally documented, including the following minimum documentation, and filed in accordance with approved document control procedures. The following is a list of minimum documentation requirements:

- Unique Hazard Assessment Document Identification Number
- Requester, Evaluator or Assessor, and Independent Reviewer
- Activity Scope
- Requirements Identified
- Assumptions
- Hazard Assessment Methodology Utilized
- Hazard Assessment Checklists, Tables, Reports, etc.
- Scenarios Developed
- Consequences Developed
- Frequencies Determined for Consequences
- Assessment Results
- Comparison to decision thresholds
- Control Measures

Documentation used in the development of results, e.g., hazard assessment checklists, JHAs, Job Safety Analysis, Failure Mode and Effect Analysis, process notebooks, database information, **Should** be retained in a controlled method.

CHANGE CONTROL

Hazard assessments **Should** be updated throughout the duration of the work activity. This involves evaluation of the hazard any time a change in a facility disposition phase occurs. This would include, for example, deactivation to long-term surveillance and maintenance or when there is a change during a life cycle phase (e.g., building support utilities modification or termination during long-term surveillance and maintenance). The hazard baseline is reevaluated to ensure that 1) new hazards or energy sources have not been introduced, and 2) assumptions and commitments associated with the hazard baseline are still valid. If either condition is not true, the hazard assessment **Should** be updated, and all of the subsequent hazard controls examined and modified to ensure that they still provide an adequate and effective level of worker and public protection.