PROJECT MANGEMENT PLAN EXAMPLES

Prepare Project Support Plans and Documentation - H&S Plan Examples

Example 46

9.2 HEALTH AND SAFETY STRATEGY

B Plant has integrated safety into its management, planning and work practices in order to protect the public, the environment and facility workers against nuclear and non-nuclear hazards associated with facility transition. Based upon the principles of DNFSB Recommendation 95-2, the Plant's approach to safety management includes:

- Applicable. standards and requirements specifically identified and implemented
- Safety integrated into baseline and detailed planning
- Workers and trained safety professionals use a team approach in hazard identification, analysis and control
- Graded approach used to tailor controls based upon hazard type and severity
- Hazard control integrated into work processes
- Safety management process integrates implementation of the various environmental, safety and health protection programs.

The key feature of the program is integration of safety management into all aspects of the project. The facility Standards/Requirements Identification Document (S/RID) management system provides a framework for compliance with applicable requirements. Initial planning includes screening for significant hazards and provisions for adequate analysis into baselines. Detailed planning and execution are accomplished by the multi-disciplined work teams in concert with experienced safety professionals. Through this integrated approach, B Plant effectively accomplishes its highest priority: safety protection.

In conjunction with the site-wide implementation of DNFSB 90-2, B Plant has developed an inventory of safety related requirements applicable to the plant. These requirements are listed in WHC-SD-MP-SRID-005, *B Plant Standards/Requirements Identification Document,* and implemented in various site and facility specific manuals and procedures. These implementing procedures provide a framework to ensure that work within the facility is accomplished in a manner consistent with the authorization basis.

9.2.1 Safety Basis Evaluation of Activities

Beginning early in the planning stage, deactivation activities are evaluated with respect to the approved safety basis to identify any potential "unreviewed safety questions" (USQs). If the activity is covered by the analysis in the safety basis, no additional safety basis documentation or evaluation is required. If the activity is not covered, then either the work plans must be modified to stay within the bounds of the existing safety basis or the safety basis must be modified through additional safety analysis. Once approved by RL, the new analysis would become part of the approved safety basis. Prior to transition, the B Plant safety authorization basis was contained within the following documents:

- WHC-SD-WM-SAR-013, "B Plant Safety Analysis Report"
- WHC-SD-WM-SAR-008, "212B Cask Station Facility Hazards Identification and Evaluation"
- WHC-SD-WM-TI-554, "B Plant Exhaust Filter Outlet Seal Analysis."

A new safety basis has been prepared which better reflects activities and the hazards associated with facility transition. This new "Basis for Interim Operation," or BIO, analyzes credible radiological and non-radiological accidents in order to identify restrictions and operating controls appropriate for transition activities. The new safety basis consists of the following documents:

- WHC-SD-WM-ISE-008, "B Plant Interim Safety Basis"
- WHC-SD-WM-SARR-030, "B Plant Interim Safety Basis Accident Analysis"
- WHC-SD-WM-TM-004, "B Plant Facility Description"
- "Safety Evaluation Report for the B Plant Basis for Interim Operation"

RL approved the first 3 above documents on October 25, 1996, adding its own safety evaluation to constitute a new safety authorization basis (SAE). Once the new SAE is fully implemented, BWHC will request relief from the provisions of the obsolete SAE documents.

The facility safety basis includes other documents which supplement the safety authorization basis. For example, the *Fire Hazards Analysis for B Plant,* WHC-SD-WM-FHA-02 1, provides a detailed review of fire protection requirements. The *B Plant Facility Safety Equipment List,* HNF-SD-WM-SEL-041, describes equipment important to plant safety as it relates to the accident analysis in the BIO.

The USQ process will continue to be used to ensure that deactivation activities are conducted within the bounds of the safety basis. As new deactivation activities are undertaken, the work plans will either be modified to satisfy the requirements of the updated safety basis or new analyses will be performed and incorporated into the safety basis to ensure adequate safety of transition activities.

9.2.2 Assessment of Hazards

Upon completion of the above safety basis evaluation, proposed deactivation activities will be evaluated for hazards and appropriate hazards mitigation measures will be incorporated into work plans.

Activity specific hazards screening and evaluation is performed for each work activity (or major work task) by the multi-disciplined team assigned the work. The screening will identify the characteristics of the task (complexity, hazard, process, etc.), the experience base at the plant for this or similar tasks, the real and/or perceived risks involved with the task, and the questions related to potential problems/accidents that could occur during the task. The screening will be performed using an automated Qualitative Job Analysis (QJA) tool, which provides a Preliminary Hazards/Screening Assessment (PHSA) as its initial screen.

This preliminary screen will provide the basis for the identification of the appropriate level of additional analysis/evaluation. Using the information on the PHSA form, the team will apply a graded approach to select the appropriate level of hazard analysis to be performed on the work activity:

Level 1 The minimal analysis (Level 1 - low risk/consequence) will involve completion of a hazards checklist and review/approval of the proposed work activity, as warranted by the hazards identified. If the work steps are covered by an existing, approved procedure, the team will review the procedure and the site conditions to ensure that the hazards associated with the work have been adequately addressed. If so, the team need not complete the checklist.

Level 2 The intermediate level of analysis (Level 2 - medium risk/consequence) involves completion of the Qualitative Job Analysis (QJA). The QJA is performed by a small team (includes cognizant engineer, appropriate safety and environmental professionals, training representative, facility workers, and team lead) who review the proposed work activity section by section and identify any specific hazards associated with the completion of each procedure section. The team also identifies any programs or systems that are particularly critical to the safe execution of the proposed work activity and makes recommendations as to the appropriate controls and/or reviews necessary to prevent, control, or mitigate the identified hazards. These controls are then incorporated into job planning.

Level 3 The highest level of analysis (Level 3 - high risk/consequence) requires the performance of a more formal and detailed hazards analysis technique, (i.e. Hazards and Operability Study, Preliminary Hazard Analysis, or equivalent) in addition to following existing requirements and procedures. This analysis will be performed by a team similar to the QJA team with the addition of a qualified, experienced, hazards analyst. The team will include in their evaluation a review of the S/RIDs functional areas, on an item by item basis, to determine any critical programs or systems for the safe execution of the proposed work activity. The team will then make recommendations regarding the necessary controls to prevent, control, or mitigate the identified hazards.

9.2.3 Worker Safety

In addition to the hazards assessment program described above, a Comprehensive Baseline Hazards Assessment of the B Plant facility has been performed by BWHC safety professionals to examine all areas of the facility and determine the hazards in those areas.

This information will be used and expanded during 1996 to develop hazards recognition training for B Plant employees. This training will focus on hazard identification and how to safely plan and perform work activities within the facility.

The addition of a facility hazards baseline assessment and hazards recognition training will provide additional assurances that worker safety issues are identified as early as possible in the work development process. This will result in early identification of necessary controls to prevent or mitigate worker hazards and aid in the timely completion of the transition effort by reducing the number of injuries or work related safety issues.

Example 47

10.11 INDUSTRIAL HYGIENE/INDUSTRIAL SAFETY

The 9206 Complex conducts work under the Y-12 IH and IS programs. These programs assist in providing a safe working environment for employees. Controls are designed and established to prevent and/or minimize accidents and injuries. Control measures include administrative procedures, engineered systems, training and PPE. SH-140PD, *Lockheed Martin Energy Systems Hazard Communication Program Description,* provides guidance for all hazardous chemicals procured and generated at 9206 Complex and applies to all employees who may be exposed to hazardous chemicals. A list of unclassified hazardous materials is maintained on the HMIS. The 9206 operations staff perform inventory checks of hazardous materials in the building and provide updates to the HMIS list. To prepare for deactivation, surplus chemicals are being identified that can be utilized in others areas of LMES and will be placed on the Y-12 Plant HMIS listing. Hazardous material labeling is currently being reviewed for applicability to nuclear material storage and deactivation activities. Changes win be made accordingly. Nuclear related hazardous materials are tracked as a part of the 9206 nuclear material NMC&-A inventory. Safety showers and eye baths currently installed in 9206 and are inspected as a part of the ongoing building S&M program. This will continue until the hazardous materials have been removed and the IH staff determine that they are no longer needed.

There are currently no designated posted respiratory protection areas within 9206, 9510-2, 9768, 9720-17, 9723-26, and 9767-2. However, respiratory protection areas may arise as related to specific tasks and work. Proper respiratory protection is evaluated as part of the safety work permits and work plans and according to the SH-151PD, *Respiratory Protection Program Requirements*. This will be an integral part of deactivation work plan preparation and approval. A number of fresh air breathing stations (supplied air respirator) points are strategically located throughout 9206 Complex. There is sufficient supplied breathing air coverage in the building for anticipated activities (i.e., recovery furnace operations and deactivation activities). Presently several fresh air stations are out of service for which there is no anticipated use. Should these fresh air stations need to be reactivated, they can be placed back into service with minimal modifications and labor.

9206 Complex was constructed in the 1940's and contains lead-based paint on walls throughout the building. While this would represent an occupational hazard in a fully operational and occupied building, during the S&M phase the building will be locked and unoccupied. IH has determined that the paint will not require remediation during deactivation activities. Deactivation work will not disturb the existing paint. Records of sample analysis will be included in the post deactivation turnover package.

The continued presence of large numbers of pigeons and starlings pose a longstanding nuisance to the 9206 Complex. Once the building is placed in long term S&M status, this could pose a greater problem. A Y-12 Plant study is underway to evaluate and propose alternative methods of solution. The 9206 IH representative is a team member. **NOTE** : initial study results provide no long term permanent solution. The birds will be manually controlled, until another solution is found.

PCBs are present in small residual amounts specific to equipment such as elevators, reduction furnaces, etc. and will be removed as part of the system and equipment clean out. Asbestos is present in small amounts, specific to individual systems. Asbestos abatement will be conducted as required, e.g. waste water tank in outside diked area.

The 9206 Complex contains enclosed and confined spaces. The confined space inventory will be verified early during deactivation implementation to ensure proper posting for deactivation activities and the subsequent S&M phase. As specific equipment/systems are scheduled for cleaned out, the requirements for confined/enclosed space entry will be evaluated for and incorporated into the work plans. SH-138PD,

Lockheed Martin Energy Systems Confined Space Program Description provides guidance for reducing the safety and health risk for personnel entering confined spaces. The need for the degree of entry will be evaluated as activities are planned.

The 9206 IH and IS representatives will participate as part of the subteam evaluations for post deactivation S&M ventilation and lighting needs. IH and IS guidelines and requirements will be reviewed for deactivation tasks as a part of ISMS implementation.

Deactivation of the 9206 Complex will involve de-energizing equipment and systems. Y-12 Plant procedures give the requirements and guidance for work involving energized sources.

11.1 IMPLEMENTATION OF ISM PROGRAM

The 9206 Complex is implementing the ISM process under the Y- 12 ISM program implementation guidelines to support deactivation project activities and other 9206 operations. The 9206 ISM process is comprised of three management levels; institution/site level; facility level; and task level. The three levels function together as an integrated system. This implementation will formalize a process already being utilized at the 9206 Complex.

Work associated with nuclear safety functions will be planned, authorized, and performed following approved technical standards, instructions, procedures, and other control documentation commensurate with the complexity, experience, and risk posed by the task. Y10-202, *Integrated Safety Management Program* provides guidance, procedures, and checklists for evaluating, planning, and conducting nuclear safety related work.

In FY-1998 an OSB charter for 9206 was approved, membership appointed, and initial working sessions held. The chartered membership includes 9206 management, technical and operations staff; a facilitator; and representatives from the ES&H disciplines. Others are added as needed. The OSB role is to ensure that the guiding principles for integrated safety management are implemented in 9206 Complex activities. The OSB provides integrated reviews, technical support, assessments, and advisement to the operations manager. The board holds regular and "upon-need" meetings, which are documented with attendance, notes, and action items. The board continues to mature and will play a key role in deactivation.

Several key elements of the Y-12 ISMS program are already in effect for 9206 operations, such as plan-of-the-day, daily crew briefs, pre-job briefs, hazard identification, work planning, review of lessons learned, worker involvement, walkdowns of areas on a daily basis by the 9206 shift managers and other Conduct of Operations program elements as appropriate. Self-assessment programs continually evaluate safety practices and provide feedback for improvement. It is expected that these functions will continue during deactivation implementation. As a part of ISM implementation, these elements will be evaluated for adherence to the Y-12 ISMS program requirements.

11.2 INTEGRATED SAFETY MANAGEMENT STRATEGY

The following discussion identifies the process to be used by the 9206 Complex Phase Out / Deactivation Project to ensure that the safety of the workers, the public, and the environment are adequately addressed before and during deactivation activities. The key activities outlined in this section follow the guiding principles and core functions contained in DOE-STD-1 120-98. Key activities involved in ensuring a strong safety strategy include:

Defining Scope of Work (Work Planning and Hazard Identification)

- This plan describes at the program level the work that will be performed and the methods that will be used to accomplish it. Subprojects are defined and will be scoped in detail as work is prioritized and funded.
- The project mission, goals and objectives, including definition of a "9206 Facility End-State," are established.
- "End Points Criteria" are defined which integrates applicable health, safety, environmental, NMC&A, and security requirements.
- The 9206 Complex areas/spaces/systems are identified, walked down and evaluated to determine the deactivation activities necessary to meet the end-state criteria and goals.

- A multi-disciplinary team is formed to plan deactivation. The ES&H disciplines are a part of the integrated hazard identification and analysis.
- Safety Basis Documentation is upgraded. A PHA, FHA, BIO and OSR are developed for the 9206 Complex to identify existing and potential hazards and appropriate controls. Scope is expanded to include current conditions and expected deactivation activities.
- The workers, technical support staff, retirees, and those with process knowledge are involved in all phases of deactivation (i.e., hazards analysis, deactivation walkdowns, and work planning).
- Work packages are prepared with input form the workers involved in the deactivation task.

Analyze Hazards (Integrated Hazard Analysis)

- Facility hazards are analyzed during development of the PHA, FHA, BIO and OSR for the 9206 Complex to identify existing and potential hazards and appropriate controls. Scope is expanded to include current conditions and expected deactivation activities.
- A multi-disciplinary team performs the facility hazard analysis. A combination of walkdowns, CIP photographs, operations and retiree interviews, historical files and documents, engineering records, and existing safety basis documents are utilized.
- Task-specific hazards will be analyzed, where applicable, using YI 0-0 1 *2, Hazard Identification Planning for Maintenance and New Work Tasks,* based upon the graded approach.

Develop and Implement Controls (Hazard Controls and ES&H Documentation)

- An upgraded OSR is developed with the BIO to identify appropriate controls for existing and potential hazards.
- The FHA identifies controls needed for fire protection during deactivation, including implementation of a Combustible Management Control Program.
- Deactivation tasks, new work activities, and work plans will be prepared according to Y10-012, *Hazard Identification Planning for Maintenance and New Work Tasks.*
- Y10-190 will be used where appropriate. For other deactivation subprojects grading criteria will be developed and concurred upon by DOE.
- A revised authorization agreement will be developed and submitted to DOE.

Perform Work Within Controls (Work Performance)

- The DOE approved authorization basis and USQ process will be utilized to determine if deactivation activities are within the defined safety envelope and, if not, to obtain the appropriate authorization.
- A facility-level readiness review will be scoped, planned, and executed.
- Readiness grading criteria are being developed, for concurrence by DOE YSO and win be used to evaluate readiness to perform deactivation subprojects. The strategy for development of the DRAFT, "Deactivation Activity Start-up Evaluation," (Appendix E) and "Pilot Screening" test results are documented in Section 8.
- Tasks will be screened to identify the appropriate administrative controls and approval authority needed to perform the work.
- The 9206 OSB and the deactivation team will evaluate the ISM procedures for applicability to deactivation activities, develop and recommend a working set of criteria, and develop work plans according to the approved criteria.
- Task hazard analyses will be conducted throughout the life of the project as the deactivation tasks are planned and scheduled.
- Movement of hazardous materials within the facility prior to shipment, as well as from the facility will be evaluated via OSB.
- Criteria will be developed to determine when, and if, it is appropriate to retire a safety control.

Feedback and Continuous Improvement (Feedback and Evaluation)

- Formalizing and implementing the ISM program for 9206 activities will provide a key mechanism for continuous feedback, e.g. via OSB. The 9206 Complex routinely involves health, safety, environmental NCS, and other functional disciplines 'in the day-to-day planning and execution of activities. This established practice will continue for deactivation work planning and execution.

- Updates for the BIO, OSR, and FHA will be conducted jointly. Hazard reduction progress and changes that affect the safety basis will be incorporated.
- A multi-disciplinary team will remain in place for deactivation implementation.
- Lessons learned are incorporated into work planning and execution. Other DOE sites which have undergone deactivation while utilizing task based job performance criteria win provide valuable lessons learned for the 9206 Complex.
- End points criteria adherence and documented end points closure provide feedback to ES&H disciplines.
- Interface with the Y-12 Facility Transition Team.
- The required safety documentation will be provided for the S&M period.

11.3 WORKER SAFETY AND EVALUATION OF ACTIVITIES

The controls necessary for the protection of the 9206 facility deactivation workers are being developed using a multi-disciplinary team as a part of the safety basis upgrade, deactivation subproject and task planning, and work implementation. Controls are expected to include, at a minimum, a combination of hazard elimination, engineering controls, administrative controls, PPE, monitoring, qualification and training.

The existing authorization basis that will support the 9206 Phase Out/Deactivation Project is described in Section 9.0 of this plan. It is currently being updated to reflect the changing 9206 activities and mission. Anticipated deactivation tasks are being factored into the PHA and BIO development.

A multi-tier, comprehensive USQ evaluation process has been in effect for Y-12 Plant Nuclear Operations and EUO since 1992. This program has matured since the 1994 Y-12 Plant stand down of operations and will support the 9206 deactivation and risk reduction activities, e.g. SNM removal. The process includes an evaluation of work activities and associated potential administrative/physical changes that trigger subsequent USQ screenings and USQD evaluations and approvals.

Example 48

5 Health & Safety

This section describes the work controls associated with the 771/774 Closure Project. As prescribed in DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees, the project must comply with the OSHA construction standards for Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120 and 1926. Under these standards, a Building 771/774 Closure Project-Specific HASP has been prepared to address the safety and health hazards of each phase of operations. In addition, the DOE Order for Construction Project Safety and Health Management, 5480.9A, applies to this project. This order requires the preparation of JHAs to identify each task, the hazards associated with each task, and the precautions necessary to mitigate the hazards. Finally, procedures for control of lead, Beryllium and toxic chemicals, contained in the HSP Manual, are also applicable.

To comply with the health and safety standards specified, an Integrated Safety Management (ISM) process has been initiated and will be continuously implemented. The ISM process is illustrated in Figure 5-1 and structured around five core principles:

(1) define the scope of work,

(2) analyze hazards,

(3) develop and implement controls,

(4) per-form work within controls, and

(5) provide feedback and continuous improvement.

The objectives of the ISM and HASP are to:

- Protect the employees, co-located workers, the public and environment from hazards during decontamination and decommissioning.
- Ensure appropriate safety management is administered throughout decontamination and decommissioning.
- Develop and maintain a high level of health and safety awareness that is practiced by all levels of management, supervision, and employees.
- Meet the goal of zero lost time accidents for the entire decontamination and decommissioning process.
- Foster excellent safety communications between all Site work groups that are affected by the decontamination and decommissioning of the 771/774 Closure Project to ensure the intent and goals of RFCA are met.
- Train project personnel so they are capable of completing assigned tasks safely and in compliance with the applicable environmental and safety regulations.

Enhanced Work Planning (EWP) is the natural implementing vehicle to involve workers, and to incorporate the five key elements of the ISM process. The RFETS Enhanced Work Planning program is designed to provide a safer, more efficient work environment by:

- Encouraging worker participation in the initial work planning process to enhance the effectiveness of safety and work efficiency.
- Ensuring hazard analysis and controls are appropriate for the job.
- Improving worker knowledge of safety requirements.
- Fostering teamwork between hourly and salary personnel.
- Improving the technical accuracy and workability of work packages.
- Balancing the degree of work instruction, skill-of--raft, and worksite supervision.
- Reducing the overall time to plan, review, and approve work packages.
- Promoting realistic resource-loaded schedules.
- Enhancing job coordination and improving the efficient execution of the work.
- Continuous improvement through real-time feedback.

EWP considers the entire work process and continually asks the questions necessary to implement a safer, more efficient work control process. However, in the traditional approach to the work control process, technical specialists, management, and workers are given work packages for review during various phases of the work planning process. When changes are made by one or more of the reviewers, the package must be reviewed again by all parties. This sequential review process is inefficient and tends to create conflict between planners, reviewers, and workers. EWP is designed to improve the traditional work control process, primarily through extensive communication and feedback from the appropriate mix of personnel responsible for the work.

5.1 Preliminary Hazard Analysis

During the initial planning for the project, a Preliminary Hazard Analysis Overview (Tables 5-1 through 5-4) was produced to evaluate the potential health and safety hazard baseline for the project. This Preliminary Hazard Analysis includes an evaluation of the types of hazards associated with each phase of the project. The process will facilitate work by identifying preliminary key hazards up front (Tables 5-1 through 5-4) and incorporating risk management into the job planning process. The development and use of a JHA for specific activities developed during the planning and engineering phase of the project will be used to meet the need for continuously updated documentation of Preliminary Hazard Analysis baseline information.

All operations shall be conducted in accordance with the guidance of the Health & Safety Plan (HASP). The HASP will be revised as required by project operations and facility configuration changes at each step to ensure compliance. The Preliminary Hazard Analysis baseline information will be continuously updated and augmented using the JHA process.

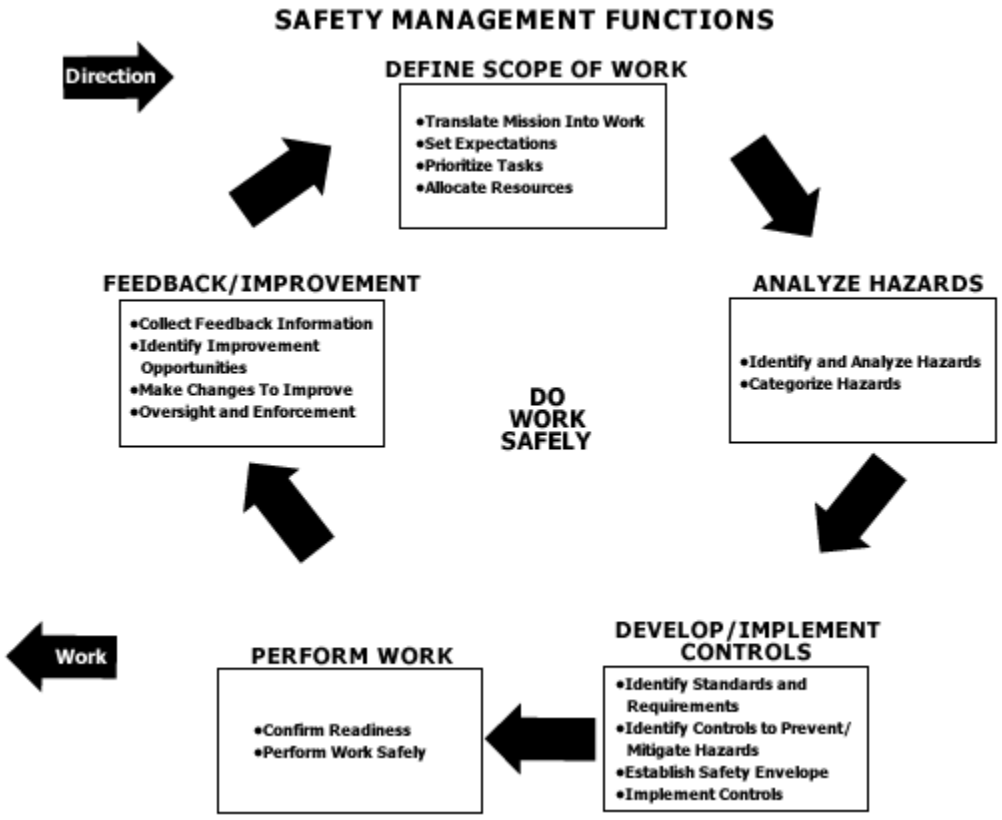

Figure 5-1 Integrated Safety Management Process

Table 5-1 Planning and Engineering Phase

Major Work Task	Hazard	Cause	Preventative Measures
Perform building walkdowns to identify IWCP work steps and engineering order requirements.	Tripping, falling, exposure to chemicals, hazardous substances and/or radioactive materials. Also exposure to noise hazards.	No planning, lack of communicating between work groups, improper use of RWPs, not following room or building instructions.	▪ Develop JHAs and IWCP Work Packages ▪ Conduct effective pre-evolution briefings ▪ Follow all building instructions ▪ Ensure all personnel have been properly trained before entry ▪ Adequate RWPs are developed and followed
Move office equipment and furniture to prepare for D&D activities.	Back strains, pinch points, extremity injuries due to falling objects or moving vehicles.	Improper lifting of equipment, careless handling of equipment, improper planning and walkdowns. No continuing observations or use of the buddy system.	▪ Proper training conducted and documented ▪ Use of the buddy system ▪ Proper use of forklifts and trucks including operating alarm

			systems and brakes ▪ Planning meetings and briefings completed ▪ Proper use of JHA and IWCP Work Package ▪ Adequate RWPs are developed and followed
Perform hazard analysis characterization activities. This includes asbestos, chemical, lead and radiological sampling.	Overexposure to substances, accidental inhalation of substances, absorption into skin of substances, eye and skin irritation. Exposure to radiological contamination.	Improper or no use of prescribed PPE, RWP lack of proper planning, not following sampling procedures correctly, improper transport or handling of sampling.	▪ Follow JHA and IWCP Package ▪ Wear prescribed PPE properly ▪ Conduct planning meetings and briefings ▪ Follow RWP ▪ Ensure all required training has been completed

Table 5-2 Decontamination Phase

Major Work Task	Hazard	Cause	Preventative Measures
Perform radiological decontamination operations.	Exposure to radioactive materials internally and externally. Cell damage and damage to internal body organs can occur with acute overexposure to radioactive materials. Improper use of scabbling or other decontamination equipment can injure extremity or other limbs of workers by causing gash or cutting wounds.	Improper clean up techniques including: Improper containment, decontamination or PPE usage. Improper ventilation usage. Improper waste disposal and handling. No or improper training in the proper use of decontamination equipment.	▪ Ensure all workers are trained as Rad Worker II ▪ Ensure all RFETS radiological prerequisites are met prior to job commencing ▪ Develop and implement JHAs and IWCP Work Package for the job ▪ Ensure all medical, equipment, training, and PPE req. are met ▪ Ensure that proper radiological monitoring is

			performed ▪ Follow the RWP instructions, including ALARA review if required ▪ Follow established Site Be procedures

Table 5-3 Dismantlement Phase

Major Work Task	Hazard	Cause	Preventative Measures
De-energize work areas and remove cables and wiring.	Electrical shock to body, cutting of extremities or body parts using wire strippers or other hand tools, falling off ladder or scaffolding, if used. Exposure to radiological contamination.	LO/TO not used properly, all workers not informed of LO/TO status. Improper use of hand tools, ladders or scaffolding. Improper lighting in room can cause improper use of equipment as well. Improper or no use of RWPs.	▪ Utilize lockout and tagout procedures properly ▪ Inspect all hand tools before use ▪ Ensure all workers are trained in ladder, scaffolding and fall protection measures before using this equipment ▪ Develop and utilize IWCP Work Packages and task specific JHAs ▪ Perform work area walkdown and conduct proper planning meetings and briefings ▪ Ensure all worker training is current ▪ Adequate RWP developed and followed
Move equipment out of rooms or area and transport utilizing forklifts, pallet jacks, or pick up trucks.	Back injuries, pinching, and extremity damage by dropping or falling objects. Internal and external body injuries by vehicle impact. Eye injuries by poking or dust particles in eye. Noise hazards. Exposure to radiological contamination.	Improper lifting techniques, job flow not planned properly, pre job walkdowns not performed, vehicle alarm systems not working, buddy system not used, lack of attention to detail, worker fatigue or no use or improper use of PPE. Improper or no use of RWP.	▪ Perform pre job walkdowns ▪ Develop JHAs for job ▪ Use buddy system ▪ Ensure vehicle alarm and braking systems are working properly ▪ Utilize PPE properly ▪ Perform proper lifting techniques ▪ Perform pre job warm up exercises

			before lifting ▪ Do not attempt to move items that are stacked too high ▪ Cover all sharp edges with taping material ▪ Adequate RWP developed and followed
Cut out piping systems in rooms or work areas.	Cutting of body limbs or body parts with mechanical equipment. Piping falling on feet, pinch points of rolling pipe, liquid splashes if piping is not drained, springing of piping into body when cut. Exposure to radiological contamination.	Improper use of mechanical equipment including no training of equipment being used, piping not rigged or restrained properly, piping not drained prior to cutting. Improper or no use of RWP.	▪ Proper training with cutting equipment ▪ Develop and utilize IWCP Work Packages and JHA for job tasks ▪ Rig and restrain piping properly ▪ Utilize pipe caps after cutting to keep debris from falling out and cover sharp edges of pipes after cutting ▪ Ensure piping has been properly taken out of service ▪ Utilize proper PPE as described in the JHA and RWP ▪ Adequate RWP/ALARA review developed and followed ▪ Awareness of possibility of encountering 'hidden' contamination and adequate characterization to identify such contamination
Rig piping and equipment out of rooms.	Bodily injuries due to falling objects or pinching of workers due to space limitations. Exposure to radiological contamination.	No rigging plan, improper rigging techniques, improper worker body positioning. Improper or no use of RWPs.	▪ Develop rigging plan ▪ Comply with all RFETS standards for rigging ▪ Develop JHA and implement ▪ Perform pre job walkdown and conduct pre-evolution ▪ Walkdown rigging path – all phases ▪ Perform pre and post job inspections

			on all rigging equipment ▪ Ensure all workers are properly trained ▪ Adequate RWP developed and followed
Packaging waste into containers for storage and shipment.	Pinching of extremities on container lids, barrels rolling on feet, back strains, foot injuries as vehicle wheels impact or roll onto extremities, cuts/gashes of hands by tooling. Exposure to radiological contamination.	Improper lifting and handling techniques, wrong tooling used to put lids on containers, pallet jack or forklift ramming into workers, job rushed or not planned properly. Improper or no use of RWPs.	▪ Develop JHA and implement ▪ Review lessons learned from previous waste handling operations ▪ Develop proper tool list before starting job ▪ Ensure all waste containers are properly staged before starting job ▪ Ensure all building notifications are made before moving and handling waste ▪ Follow all RFETS requirements for waste handling and movement ▪ Adequate RWP developed and followed
Cut out and remove gloveboxes and tanks in rooms or work areas.	Pinch points, foot and hand injuries, cutting of hands/arms, eye and head injuries, burning of skin or extremities. Exposure to radiological contamination.	Improper use of grinders or no guards on grinders, cramped working conditions, bad lighting, limited vision, breaking of leaded glass, plasma slag burns through clothing, improper use of PPE. Improper or no use of RWPs.	▪ Proper training with cutting equipment ▪ Develop and utilize JHA for job tasks ▪ Rig and restrain gloveboxes properly ▪ Utilize pipe caps on glovebox piping after cutting ▪ Ensure gloveboxes have been properly taken out of service before work starts ▪ Utilize proper PPE as described in the JHA ▪ Perform tooling inspections before each use ▪ Adequate RWP/ALARA review developed and followed

Construct and utilize scaffolding to perform job tasks.	Fall hazards, workers struck by falling objects, hand injuries. Exposure to radiological contamination.	No use of fall protection, improper training, no use of PPE, improper use of tooling, improper rigging and transport of scuffling pieces, no scaffold inspections, scaffold collapse. Improper or no use of RWPs.	▪ Proper training for scaffold erection and use ▪ Fall protection and rigging training ▪ Proper use of PPE ▪ Develop JHA ▪ Perform documented scaffolding inspections ▪ Ensure all scaffolding is tagged properly ▪ Ensure all toe boards and side rails are in place ▪ Adequate RWP developed and followed
Perform decontamination operations.	Extremity injuries of hand and feet by gouging, cutting or impact. Inhalation, ingestion or skin exposure to radioactive materials and ammonia vapors. Electrocution. Falls.	Improper or no training on equipment used for decontamination, improper work area ventilation, improper use of PPE, no job planning. NO LO/TO of work area. NO fall protection.	▪ Conduct mock up training on decontamination equipment and stripcoat operations ▪ Develop JHA for job tasks ▪ Ensure work area is properly ventilated before applying stripcoat ▪ Ensure LO/TO operations have been performed ▪ Wear prescribed PPE as determined by IH&S and Rad Protection ▪ Utilize fall protection, when required ▪ Follow all JHA and RWP requirements ▪ Use appropriate engineering controls to reduce possible airborne contamination
Perform final cleanup of building/structure.	Tripping, falls, head wounds, pinch points, punctures, contusions, skin contamination, inhalation, absorption of radioactive materials.	Housekeeping, falling objects, non-use of PPE, improper use of PPE, sharp edges or sharp objects not protected, no fall protection, improper ladder use.	▪ Perform weekly housekeeping inspections ▪ Utilize fall protection, when applicable ▪ Develop JHA for job task ▪ Utilize PPE ▪ Follow all ALARA

			reviews, JHAs, and RWP
Perform final survey of building.	Falls, head wounds, electric shock, abrasions, cuts, pinches. Radiological contamination.	No fall protection, improper use of instrumentation, working in tight spaces, tripping hazards, bad housekeeping, improper termination of wiring. Prior operations exposing contaminated surfaces during decommissioning.	▪ Develop JHA ▪ Perform pre job walkdowns ▪ Utilize fall protection, when required ▪ Complete ladder training, as required ▪ Utilize two person rule when working in elevated locations ▪ Procure confined space permits and training, when required ▪ Follow all JHA, RWP and Final Survey Plan requirements ▪ Survey in accordance with approved site procedures ▪ PPE per RWP ▪ Train personnel

Table 5-4 Demolition Phase

Major Work Task	Hazard	Cause	Preventative Measures
Perform demolition activities of building/structure.	Body contusions, head injuries, suffocation, fatalities, breathing hazards.	Wetting of concrete surfaces not utilized, barriers not used properly, through inspections of work area not performed prior to demolition activities, lack of attention to detail.	▪ Develop job JHA and IWCP Work Packages ▪ Perform pre job walkdowns ▪ Utilize PPE as prescribed by IH&S ▪ Maintain wetting of debris with fire hoses as demolition occurs

5.2 Job Hazard Analysis

The detailed technical approach to decommission an area/room will be developed and approved in accordance with the IWCP process. The IWCP Work Package contains detailed instructions for performing work on site and contains specific controls and requirements to ensure protection of the workers, public, and environment. Given the tasks identified in the specific IWCP Work Package and consistent with the ISM process and the HASP, the work supervision, craft and industrial hygiene

personnel will conduct an EWP session to evaluate all work tasks for the potential to injure or damage personnel, property or the environment. This JHA will describe the hazards as well as the actions necessary to eliminate or mitigate those hazards (i.e., training requirements, protective control measures, monitoring requirements and special equipment needed for specific job steps).

5.3 Monitoring

Occupational monitoring requirements for individual work tasks will be identified during the EWP session and documented in the JHA. Typical monitoring activities are summarized on Table 5-5.

5.3.1 Chemical Hazard Monitoring

Per the HASP, the need for chemical hazard monitoring will be determined by the Project Safety Officer or designee. All air sampling and monitoring will be performed in accordance with approved National Institute of Occupational Safety and Health or OSHA sampling methods using either direct reading instrumentation or personal air sampling as directed by the IH&S lead or designee. All instrumentation used will be calibrated in accordance with factory recommendations.

Table 5-5 Typical Monitoring Activities

Hazard	Exposure Control Limit	Monitoring Method	Frequency of Monitoring
Exposure to hazardous substances such as lead, asbestos or any other material(s) identified that are respirable.	Permissible Exposure Limits (PEL's) are based on 8 hour Time Weighted Average (TWA) exposure and Short Term Exposure Limits (STEL's) set forth by the Occupational Safety and Health Administration (OSHA) or the American Conference of Governmental Industrial Hygienists (ACGIH), whichever is more conservative.	Many hazardous substances are monitored using a personal air sampling pump such as a Gilair or SKC to obtain a continuous sample of the most at-risk worker's breathing zone. The sample media, sampling technique and analysis method are unique to the substance being monitored and are specified by OSHA or the National Institute for Occupational Safety and Health (NIOSH).	Continuously during work; short term samples as required to document STEL's. Continuous area monitoring and clearance sampling as required.
Silica dust.	0.05 mg/m³.	Aerosol monitor such as an MIE PDM-3.	As required by the JHA.
Heat Stress.	The need to regulate periods of work and rest are determined using worker dress-out, work activity and thermal environment.	Monitor the thermal environment with a wet bulb temperature monitoring device such as a WBGT. Worker condition can be checked using body temperature, pulse and visual assessment.	Varies by conditions and work tasks.
Noise.	85 dB continuous for an 8hr exposure period; expressed as a Threshold Limiting Value (TLV).	Monitor work environment using a sound level monitor. Use noise dosimeters on highest risk workers.	Daily and as required during tasks by the JHA or conditions.

Radiological Hazard Monitoring

Per the HASP, air monitoring within the work areas will be performed using portable Continuous Air Monitors (CAMs), high volume and low volume air sampling. The use of portable CAMs allows the project flexibility in monitoring locations, resulting in more effective monitoring. Training on the use and response of these monitors will be provided to all project personnel. Personnel monitoring for radiological hazards

will be identified in RWP's and the ALARA job reviews. All radiological monitoring will be performed in accordance with the procedures contained in the RFETS HSP Manual, RFETS Radiological Control Manual, and the Radiological Safety Procedures (RSPs).

The requirements for monitoring radiological hazards from the RFETS Radcon Manual are individualized to a particular work task and are documented in the RWP. Typical monitoring for radiological hazards will include:

- Airborne - Monitored using high or low volume sampling pumps. Sample media is typically glass fiber filter and must be counted for alpha and/or beta-gamma activity to determine the exposure. Exposure is measured in Derived Air Concentrations (DAC's) and is dependent upon the particular radionuclide(s) present (e.g., Pu-239 DAC is 2E-12 microcuries per milliliter [µCi/ml]). The frequency of monitoring is dependent upon the work task and contamination levels and is specified in the RWP.
- Contamination - Monitored by smear sample and/or direct measurement with a frisking instrument such as a Bicron Frisktech. Limits for contamination are listed in the PFETS Radiological Control Manual and are dependent upon the particular radionuclide present and are expressed in units of dpm/100 cm^2 . Frequency of monitoring will include routine surveys (shiftly, daily, etc.), as required by the RWP and at the discretion of Radiological Controls personnel.
- Radiation - Radiation surveys are performed using instrumentation that is capable of detecting the type and energy of emitted energy present and is expressed in units of mrem/hr. These exposure rates are used to determine personnel exposure estimates, provide data to ensure that all exposure is As Low As Reasonably Achievable (ALARA), and to properly control areas of potential exposure to personnel. Personnel exposure is monitored using Thermal Luminescent Dosimeters (TLDs) and the results become permanent exposure records. Frequency of monitoring will include routine surveys, as required by the RWP and at the discretion of the Radiological Controls personnel.

Air Monitoring

The K-H Air Quality Management (AQM) organization provides monitoring support for RFETS. The existing Radioactive Ambient Air Monitoring Program (RAAMP) continuously monitors for potential airborne dispersion of radioactive materials from the site to the surrounding environment. Thirty-one samplers compose the RAAMP network. Twelve of these samplers are deployed at the site perimeter and are commonly used to measure potential off-site impact. The others are used should there be a need to assess local (i.e., on-site) impacts. During demolition activities, on-Site samplers located near the demolition area will be used to characterize the contaminants that may have become airborne due to the demolition activities. Samples will be collected weekly and will be screened to identify any periods that may have yielded higher than expected emissions. The screening analysis will allow quicker feedback to project staff than is possible when the samples are subjected only to the more time-intensive routine isotopic analysis.