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7. Abstract

This document identifies the documentation and programs associated with PUREX Deactivation Health and Safety.

8.

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PLUTONIUM-URANIUM EXTRACTION (PUREX) FACILITY
DEACTIVATION HEALTH & SAFETY DOCUMENTATION

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

PUREX is a nuclear fuel reprocessing plant which was used to chemically separate plutonium and uranium from Hanford Site nuclear reactor fuel elements. The plant was constructed between 1953 and 1955 and was operated until 1972. The plant was then placed in wet standby and restarted in 1983.

In October 1990, Department of Energy (DOE)-Richland Operations Office (RL) directed WHC to initiate transition-to-standby activities for PUREX. The standby condition was achieved in September 1992. In December 1992, the DOE Assistant Secretary for Environmental Restoration and Waste Management authorized the termination of PUREX and directed DOE-RL to proceed with shutdown planning and terminal cleanout activities.

At the completion of the Stabilization Campaign in 1990, the feedstock left in PUREX from the 1988 shutdown had been processed and removed from the plant. Bulk chemicals, solutions used to test the processing equipment, the PUREX process solvent, recovered nitric acid, and a small quantity of pre-1972 reactor fuel were left in the plant. During the deactivation project these materials will be removed from the facility.

1.2 PROJECT DESCRIPTION

The purpose of the PUREX Deactivation Project (Project) is to establish a passively safe and environmentally secure configuration of PUREX at the Hanford Site, and to preserve that configuration for a 10-year horizon. The 10-year horizon is used to predict future maintenance requirements and represents the typical time duration expended to define, authorize, and initiate the follow-on Decontamination and Decommissioning (D&D) activities.

The Project removes, reduces, and/or stabilizes the major remaining radioactive sources within the PUREX process buildings and the hazardous chemicals at PUREX. Completing these activities reduces the plant risk to workers and the public and allows for a reduced level of surveillance during the extended surveillance period following deactivation. During the period after deactivation, the plant will be surveilled routinely, the operating equipment and confinement barriers will be maintained, and final D&D will be planned.

When fully deactivated, the plant will be left unoccupied, empty, and locked. With the exception of the PUREX heating, ventilation, and air

conditioning (HVAC) system required to maintain the final confinement barrier, there will be no active systems or utilities within the process buildings. The PUREX HVAC confinement system will be operated from outside the process building.

Plant status will be monitored routinely from outside the process buildings. Approximately once a quarter the plant will be entered and inspected. Standard industrial security measures will protect the plant from unauthorized entry at other times.

PUREX is similar to several DOE canyon facilities that will enter the deactivation phase in the future. The Project is expected to be the reference model for these subsequent projects.

1.3 FACILITY HAZARDS AND CONTAMINATION

As a nuclear fuel reprocessing facility, there were a number of hazards associated with facility operations at PUREX. While the transition to standby activities decreased or eliminated some of these hazards, many will remain present during deactivation.

In general, facility personnel are familiar with these hazards through process and facility knowledge. These hazards include routine industrial safety and industrial hygiene hazards as well as radiological contamination concerns. A more detailed discussion of general facility hazards is discussed in Section 3.0 of this document and the results of a facility hazards baseline activity are in Appendix A of this document.

1.4 PROJECT ACTIVITIES

Table 1-1 identifies major activities associated with the PUREX deactivation project. This list, while not all inclusive and subject to changes, provides a good starting point for hazards identification, control and mitigation.

1.5 PURPOSE

This document was prepared to increase attention to worker safety issues during the deactivation project. This document was prepared following the guidelines of 29 Code of Federal Regulations (CFR) 1910.120 as a best management practice. The PUREX Deactivation Project does not fall under the requirements of 29 CFR 1910.120 (b) through (o) and as such does not require a Health and Safety Plan (HASP). Therefore, although the format of this document follows that of a HASP this document does not constitute a compliance mandatory HASP. Items included in the development of this document were carefully evaluated to determine the value added to worker safety during deactivation.

WHC-SD-CP-HSP-002, Rev. 0

The resulting document closely resembles a HASP and clearly identifies programs in place at WHC and PUREX to address worker safety issues. Additionally, the Hazards Baseline and Industrial Hygiene Baseline (appendices A and B respectively) identify a number of potential worker hazards associated with the deactivation project. These baselines will be used in the development of work instructions for deactivation.

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Table 1-1. PUREX Deactivation Activities. (3 sheets)

Deactivation activity
1. Tk-D5/E6 Pu solution disposal (co-precipitation option)
2. Aluminum clad fuel removal
3. Fuel storage basin layup
4. Removal of fuel elements from A-, B-, C-Cells
5. Disposal of dilute acid solution currently in plant
6. Tk-G5/R7 organic disposal
7. Recovered/ UO_3 contaminated acid disposal (sugar denitration)
8. N-Cell plutonium removal
9. Criticality alarm system
10. HNO_3 rail tankers
11. UNH truck tankers
12. E-F11 operation - demonstration
13. Tunnel part B closure plan
14. E-Cell floor debris
15. Silver reactors A, B, C, and F -Cell
16. Canyon lead waste pile
17. Miscellaneous Radioactive Mixed Waste
18. Miscellaneous hazardous waste
19. HVAC consolidation/air flow reduction
20. Electrical
21. 211-A chemical removal
22. 211-A tank heels
23. 211-A neutralization system
24. Demineralizer shutdown/resin removal
25. R-Cell layup
26. AMU layup
27. Auxiliary process building layup
28. Trap pit layup
29. Outdoor radiation zone stabilization
30. Loose asbestos stabilization
31. Process vessel flushes
32. Process cell flush
33. Process cell sealant
34. Pipe trench flush
35. Air tunnel flush
36. Air tunnel sealant

Table 1-1. PUREX Deactivation Activities. (3 sheets)

Deactivation activity
37. Crane Maintenance Platform layup
38. P&O Gallery layup
39. Tank farm route isolation
40. Liquid effluent systems shutdown/cleanout/isolation
41. Canyon interface system flushes (Tk-216-A-1, -2, -302)
42. Stabilize Zr heels
43. Flush/decon or strip Sample Gallery hood duct work
44. Layup N-Cell/PR Room
45. Deactivate storage gallery sumps
46. Stabilize contamination migration storage gallery hood duct work
47. Cleanout hot shop
48. Q-Cell layup
49. Process instrument deactivation
50. Process equipment deactivation
51. Surveillance monitoring provided
52. Pneumatic instrument conversion
53. Steam layup
54. Raw water layup
55. Sanitary water layup
56. Process air layup
57. Instrument air layup
58. HVAC systems, associated stacks and monitoring layup
59. Crane activities
60. Deactivate and state source term characterization
61. Fire protection system reduction
62. Radiation space monitoring reduction
63. Continuous air monitoring reduction
64. Emergency lighting system removal
65. Building penetrations sealed
66. Wooden structures razed
67. Roof inspected/repaired
68. Office furniture removed
69. Spare parts removed
70. Tools, portable equipment removed
71. Janitorial supplies removed

Table 1-1. PUREX Deactivation Activities. (3 sheets)

Deactivation activity
72. Barriers, access controls, administrative controls
73. Isolation notifications
74. Elevators deactivated
75. Removable hazardous waste removed
76. All removable radioactive and radioactive mixed waste removed
77. All temporary radiation zones removed
78. Office and support facilities disposition
79. Railroad tunnel structural integrity
80. P & O Gallery /sample gallery floor drains sealed
81. Exterior cover blocks sealed against water intrusion
82. Removable combustibles eliminated
83. Canyon crane layup
84. Designated surveillance pathway in plant
85. Electrical systems shutdown/consolidation
86. Final radiation survey
87. Relocate personnel

^aDepends on extent of equipment removal from N-Cell

2.0 KEY PERSONNEL

The key element in the safe completion of deactivation activities is the individual worker. There are, however, a number of personnel that are available to assist personnel in ensuring safety for all PUREX related tasks. These personnel are listed below by title, current names and telephone numbers of these individuals is posted throughout the facility. Any questions regarding facility safety can be addressed to these individuals or immediate management personnel.

PROJECT MANAGER	Doug Hamrick	373-4999
PUREX/B-Plant SAFETY MANAGER	Bob Skinner	373-2643
HEALTH PHYSICS MANAGER	Sylvia Albertin	373-2268
FIELD DEACTIVATION MANAGER	Charlie Merry	373-3495
SURVEILLANCE MANAGER	Bill Bailey	373-4494
SHIFT MANAGER	Shift Office	
EMERGENCY RESPONSE	911	

2.1 Roles and Responsibilities

Safety and PUREX organizational structures are shown on charts included in Appendix B. Organization roles, responsibilities, and interfaces are described in charters. Specific individual responsibilities are described in the position descriptions (PDs). An overview of these responsibilities is described below.

2.2 PUREX Management

PUREX management is responsible for ensuring all work is properly prioritized and planned, and then executed in a safe manner. In addition, management shall ensure that the PUREX staff possesses skills and resources to necessary safely conduct their assigned tasks.

2.3 PUREX Employees

PUREX employees are responsible for ensuring all work is conducted in a safe and healthy manner and that safety and health concerns are reported and understood. Employees shall report unsafe conditions or practices to their direct supervisor. The individual should take action to correct or mitigate the unsafe condition at the time it is discovered. Individual employees are responsible for following all written procedures, controls specified in permits (e.g., Confined Space Entry Permit, Radiation Work Permit), and additional safety instructions.

2.4 PUREX Technical Safety Support (TSS)

PUREX TSS personnel are responsible for ensuring close coordination between the PUREX and Safety organizations for the purpose of maintaining a safe and healthful workplace. Other responsibilities include developing and implementing this plan; ensuring the performance of Preliminary Hazards/Screening Assessments and additional hazards assessments as recommended; supporting the line organization in dealing with hazards, and establishing safety and health requirements.

2.5 PUREX/B-Plant Safety

Personnel in the PUREX/B-Plant Safety organization are responsible for assisting PUREX management in defining and resolving safety and health issues; aiding in the communication of hazards to PUREX employees; implementing safety and health requirements; providing evaluations of hazards; and verify compliance with this plan.

2.6 PUREX Transition Health Physics (HP)

The HP organization is responsible for monitoring for radiological hazards, providing radiological survey maps to support work planning, and performance, verifying compliance with established radiological procedures and invoking stop work authority for radiological hazards that could potentially jeopardize worker health and safety.

3.0 WORKSITE HAZARDS

Work activities in the PUREX facility pose a number of potential physical, chemical, biological and radiological hazards. Since the PUREX facility is being deactivated and a number of the hazards and hazardous materials associated with facility operations removed, most of these hazards are consistent with common industrial facility hazards.

Additionally, as part of the deactivation safety strategy, PUREX has developed and implemented a process for the activity specific evaluation of proposed activities. This process uses a screening to apply the graded approach in determining the appropriate level of additional analysis. This process will be described in detail in Section 3.2 of this document.

3.1 Hazard Information

Table 1-1 is a preliminary identification of planned PUREX deactivation activities. This list is not all inclusive and should be treated only as a starting point for consideration of potential hazards later in the work development process. The order of hazards discussion below is not related to potential risks represented from these hazards. Any of these hazards either alone or in combination could pose a potentially significant hazard to PUREX personnel and all hazards should be treated in that manner.

3.1.1 Temperature Extremes.

A number of the tasks identified in table 1-1 can potentially result in the exposure of facility personnel to temperature extremes. The potential for this hazard exists when any activity is performed outside of the PUREX climate controlled environment. The potential for heat related illnesses is particularly present given the fact that facility personnel performing activities outside in the summer will frequently be required to wear at least one level of personal protective equipment (PPE). A full discussion of heat and other temperature related hazards and the controls used to prevent or mitigate these hazards is contained in Section 6 of this document.

3.1.2 Cutting, Welding and Burning

Hazards from cutting and welding with electric arcs, oxy-fuel gas flames, and other forms of hot work (such as open flames, grinding, and brazing processes) include extreme heat, sparks, hot slag, fumes, gases, noise, and shock. WHC-CM-4-41, Section 5.3, provides the requirements and responsibilities for the control of these hazards. A formal hot work permit (A-6000-895.1) is required for all hazardous work being done outside of designated welding areas.

3.1.3 Chemical Exposure

The majority of bulk chemicals associated with PUREX operations have been removed from the facility. Two notable exceptions are recovered nitric acid (~46 wt%) and organic mixture (normal paraffin hydrocarbon ((NPH)) and tributyl phosphate(TBP)). Approximately 200,000 gallons of nitric acid is being stored at the facility, primarily in the P-Tanks. Approximately 20,000 gallons of the NPH/TBP mixture is stored in Tk-40. These materials and their storage in these tanks have been analyzed and the potential impacts to the facility worker and on and offsite personnel determined.

While these materials represent the most significant of the chemical exposure related hazards at PUREX there are other materials to which facility personnel could be exposed. These materials include previous process agents which, despite flushing activities may still be present in process equipment and the chemical agent used in routine maintenance activities. Systems and programs are in place at PUREX to address the proper handling and control of these materials to maintain personnel exposures ALARA.

A list of all materials/chemicals contained within a storage cabinet are identified on a list contained within the cabinet. These lists include the appropriate material safety data sheets (MSDS) numbers. Complete files of the MSDSs for materials used at PUREX are contained in the Shift Office and other defined locations. PUREX personnel are trained regarding the Hazards Communication program including obtaining the necessary information from an MSDS. Additionally, MSDSs for all materials in use at the Hanford Site are available through HEHF.

Personnel performing work activities within PUREX using a material will find a copy of the current MSDS for the material contained within the work authorization package used in the field. Personnel should take the time to become familiar with these MSDSs prior to use of the material. Additionally, the significant characteristics of materials should be discussed during the pre-job safety meeting.

Chemical exposure may occur through inhalation, absorption, ingestion, or injection.

- Inhalation of hazardous materials may occur from lack of or improper use of respiratory equipment, malfunctioning monitoring equipment, or the presence of either undetected chemicals or chemicals in quantities greater than respiratory equipment protection limits.
- Absorption through the skin or eyes of solid, liquid, or gaseous hazardous substances can occur by direct contact or through cuts and/or abrasions. Skin or eye absorption can occur when a worker does not wear the proper protective clothing or proper eye protection, when a break or a tear occurs in the protective clothing, or when unwashed hands come in contact with the eyes.

- Exposure by ingestion might occur and affect the digestive system if hazardous substances are ingested by workers who do not practice good personal hygiene habits (e.g., washing hands thoroughly after completion of work or before smoking, eating, drinking, or chewing gum or tobacco).
- Hazardous substances may be injected into the body through puncture wounds occurring from contaminated equipment with sharp edges, from protrusions, or pressurized hoses or air lines.

Controls commonly used to limit personnel exposures to chemical hazards include engineered controls (such as gloveboxes or process hoods), PPE, the ALARA program (WHC-CM-5-9, Section 1.7), the carcinogen control program (WHC-CM-5-9, Section 1.27) and the hazards communication program (WHC-CM-5-9, Section 1.16). Personnel with questions regarding the materials being used and/or their possible exposures are encouraged to discuss their concern with their immediate manager or an industrial hygiene professional.

3.1.4 Noise Exposure

If an employee is exposed to an 8-hour time-weighted average of 85 decibels or greater, or otherwise exceeds the noise exposure criteria, the employee shall be placed in a hearing conservation program and hearing protection shall be provided as stated in WHC-CM-4-3, *Industrial Safety Manual*, Section W-7, "Noise/Hearing Conservation". PUREX personnel may be exposed to high levels of noise generated by heavy equipment, exhaust fans, and other sources. For specific PUREX noise sources, refer to Appendix B, Industrial Hygiene Assessment.

When there is concern of high noise levels, a noise survey must be performed. Areas where the noise levels exceed 85 decibels are considered noise hazard areas. If stay times are used, they should be estimated conservatively.

Allowable stay times are identified in Section W-7 of WHC-CM-4-3. Appropriate hearing protection shall be provided, and all PUREX employees will be provided an audiogram at their medical examination. High noise areas will be designated and posted. A warning sign identifying the need to wear hearing protection is available as a store stock item, #37-8070-025.

3.1.5 Personal Protective Equipment (PPE)

Wearing PPE may reduce a worker's ability to move freely, see clearly, and hear directions or noise that might indicate a hazard. Also, PPE can increase the risk of heat stress. Personnel must adjust their work habits to accommodate the limitations created by the required PPE. Section 5.0 of this document deals with PPE requirements.

3.1.6 Illumination

PUREX personnel will likely encounter work areas with inadequate lighting levels. When there is concern of inadequate lighting, an illumination survey must be performed and improvements made to allow safe conduct of work activities.

Requirements for minimum illumination intensities (measured in foot-candles) have been established by the Code of Federal Regulations. Areas accessible to Purex employees shall be lighted to not less than the minimum intensities listed in Table 3-1.

Table 3-1. Minimum Illumination Intensities in Foot-Candles

Foot-candles	Area or Operation
5 Normal Lighting	General site areas.
3 Non-Emergency Lighting	Excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors: Warehouses, corridors, hallways, and exitways.
5	Tunnels, shafts, and general underground work areas (Exception: Minimum of 10 foot-candles is required at tunnel and shaft heading during drilling mucking, and scaling).
10	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and workrooms).
30	First aid stations, infirmaries, and offices.

To determine if there is sufficient illumination one good rule of thumb is that if the light is adequate to read the work authorization package there is likely sufficient light to perform the activity. If there is not adequate light to read the work authorization document discuss the conditions with your immediate supervisor or industrial hygiene personnel.

3.1.7 Ergonomic

The most common ergonomic hazard identified at PUREX is manual lifting of tools, equipment, or materials necessary to perform operations. This activity can and has lead to back injuries.

The Hanford Environmental Health Foundation (HEHF) provides a back injury prevention program emphasizing back strengthening and flexibility. Job hazard evaluation at PUREX should consider the ergonomic risks.

A guide for manual lifting activities follows:

1. If available, use a material handling system when possible.
2. If the lifting activity occurs regularly, a material handling system or tool should be purchased (e.g., dollies, hoists, spring-loaded carts).
3. Male employees lifting over 65 pounds, or female employees lifting over 45 pounds, should seek assistance from coworkers (one-time lift only, not repetitive).
4. Employees who perform manual lifts should be instructed in proper lifting techniques (materials on manual lifting are available from the Shared Resource Center, listed in the Site phone directory).
5. Physical capabilities or limitations of potential employees should be considered. Any concerns about a potential employee's lifting ability should be discussed with the physicians at HEHF and/or with the Site Safety and Health Representative (SSHR).

Other ergonomic hazards associated with PUREX activities include, poor work position (both gloveboxes and office work), potential pinch points and work area setups that require repeated twisting (especially with loads). These potential hazards should be considered in the development and execution of work tasks.

3.1.8 Radiological

Radiological hazards exist in numerous areas of the PUREX facility. These hazards include potential airborne contamination areas, surface contamination zones, radiological control areas and radiological areas. There are specific limits regarding the potential exposure/contamination limits for classification of these areas.

PUREX facility personnel receive training and are familiar with potential radiological hazards. The completion of required training courses and physical examinations are verified by the Westinghouse Radiation Area Management (WRAM) System prior to personnel admittance to radiological zones.

Additional controls required to protect personnel from radiological exposures include engineered features, such as gloveboxes and hoods, PPE including respiratory protection and contamination control activities.

The current status of facility areas with regards to radiological classifications is posted in the PUREX Health Physics office. This status board and the applicable radiation work procedures (RWPs) are to be reviewed by all personnel prior to entry into a radiological zone. Additionally, personnel with questions regarding potential exposure to radiological hazards are encouraged to discuss their questions with either their management or health physics personnel.

3.1.9 Biological

Snakes, scorpions, bees, and spiders may hide under or inside of equipment, or in protective clothing storage areas. Workers disturbing them may be bitten or stung. The consequences of a bite or sting can be a severe reaction and, possibly, death. If an injury from a biological hazard occurs, prompt medical aid must be requested and provided. Workers with known extreme reactions to bee stings should consider carrying an anaphylaxis emergency treatment kit. Workers are advised to shake out all protective clothing prior to donning.

3.1.10 Asbestos

Asbestos containing materials (ACM) are found throughout PUREX in thermal insulation, building materials, aboveground piping, floor tiles, the siding and roofing of some buildings, cement asbestos boards, and in some gasket material. When working on or disturbing any ACM, controls as stated in WHC-CM-4-40, Industrial Hygiene Manual, Section 2.3, *Asbestos Control Program* must be used and followed. An asbestos work permit, form 54-6700-149 shall be completed before performing asbestos work.

ACM might present an inhalation hazard if it becomes damaged (friable). Chronic (long term) exposure can cause lung cancer, mesothelioma, digestive system cancer, and asbestosis. These risks are minimal when material is not disrupted.

Facilities with ACM have postings at each entrance, and known ACM is identified using ACM labels or pink coating. Only Washington State-certified asbestos workers may handle asbestos.

3.1.11 Elevated Work Surfaces

If workers are exposed to the hazard of falling 10 feet or more from work areas that are impractical to guard with guardrails, requirements and responsibilities in WHC-CM-4-3, *Industrial Safety Manual*, Section CM-2, "Fall Protection," shall be followed to protect personnel.

During the course of work at PUREX, personnel may be required to work in elevated positions on ladders, scaffolds, or equipment. When such work must be performed, a WHC fall protection work plan shall be developed and followed.

3.1.12 Slips, Trips & Falls

The walking/working surfaces in the PUREX facility present slip, trip, and fall hazards. This hazard has high potential for causing harm to employees. Hazards that may exist include uneven terrain, guy wires, stairs, ramps, wind blown soil, risers, conduit, ducts, well caps, electrical cords and hoses. Additional risks from walking/working surface hazards are present during inclement weather or during the evening when illumination (lighting) in PUREX may not be adequate. Workers must be informed of these potential hazards during general orientation training, in accordance with WHC-CM-4-3, Industrial Safety Manual. Additionally, these hazards should be discussed as part of the pre-job safety meeting.

3.1.13 Machines

A variety of equipment may be used at PUREX, including cranes, backhoes, personnel lifts, sample trucks, pickup trucks, and other vehicles. Spotters and/or signal persons must be used whenever there is a potential hazard from the movement or operation of machine or vehicle, in accordance with WHC-CM-4-3 and DOE-RL-92-36, Hanford Site Hoisting and Rigging Manual.

Government vehicles require a 360 degree walkaround before moving. Workers must pay close attention when working in areas where vehicles are operated. For instance, anyone working in proximity to an operating backhoe must wear a hardhat at all times. The drivers of the vehicles must also be aware of people and obstacles around them. Where a vehicle has a limited view to the rear, a spotter must be used when backing up. When cranes are used workers on the ground around them must wear hardhats and must stay out from under loads being lifted.

Further, those authorized to remove guarding, for any purpose, must follow WHC-CM-5-9, Section 3.3, "PUREX Implementation - Energy Control Program Lockout/Tagout," and then immediately replace the guards when their work is complete, in accordance with WHC-CM-4-3. A variety of electric motors, pumps, and other power-driven equipment is found or used at PUREX. Although all machinery shall be equipped with appropriate machine guarding, instances may occur when workers at PUREX might be exposed to unguarded drive shafts and couplers, chains and sprockets, v-belts and pulleys, as well as reciprocating parts, pinch points or unexpected start-ups. Workers must be aware of these potential hazards and must report them when observed as soon as possible so that they may be properly guarded in accordance with WHC-CM-4-3, Section CM-4, "Machine Guarding."

3.1.14 Electrical

Overhead power lines, downed electrical wires, and buried cables all pose the danger of shock or electrocution of workers. Electrical equipment may also pose a hazard to workers. Careful observation for overhead electrical hazards shall be performed by operating personnel before raising masts on drill rigs, booms on cranes, or when operating any equipment capable of coming into contact with electrical wires. Before drilling or digging at PUREX, whether by hand or excavator, workers must first contact the facility manager to determine safe clearances. Workers must also look for frayed cables, uncovered openings in boxes and switch centers, and any other defects in electrical equipment. These hazards must be reported to the line manager as soon as they are observed, in accordance with WHC-CM-4-3, Section E.

Temporary electrical power and lighting installations are not permitted except during periods of construction, remodeling, maintenance, repair, or demolition of buildings, structures and equipment, or for experimental or developmental work. Specific electrical related hazards are identified in the PUREX hazards baseline, Appendix A.

3.1.15 Egress

Since PUREX is an older facility, there are a number of areas of the facility that pose potential difficulties regarding egress. These include, stairwells that are not wide enough per current codes and more confined areas such as N-Cell. As in the case of N-Cell, scaffolding can make egress even more difficult. Personnel, prior to performing an activity at PUREX should familiarize themselves with potential egress paths for emergency situations and possible obstacles in the egress routes.

3.2 Hazards Analysis Process

The corner stone of the PUREX hazards analysis process is the activity specific hazards screening and evaluation process implemented at PUREX. This process is used in addressing each work activity and related facility modifications and is illustrated in figure 3-1, Hazards Assessment Process.

Each work activity, via an engineering study or the implementing work plan/procedure, will be screened by an experienced safety analyst with the cognizant facility personnel. This screening is documented on the Preliminary Hazards Screening/Assessment (PHSA) form and provides the basis for the identification of the appropriate level of additional analysis/evaluation.

Hazards Assessment Process

Figure 3-1

Level 3 Analysis

Level 2 Analysis

Level 1 Analysis

WHC Work Control Process

Figure 3-2

(a) = Technical Expertise

Industrial Safety
Industrial Hygiene
Nuclear Safety
Fire Protection
Workers

(b) = per WHC-CM-3-5, sect 12.7

(c) = Permits WHC-CM-4-3

Using the information on the PHSA form the analyst and cognizant engineer will recommend one of three levels of analysis be performed on the work activity. The minimal analysis (Level 1 on figure 3-1) will be the completion of the work activity per the current WHC requirements and procedures. This includes the completion of a hazards checklist, and review/approval of the proposed work activity by applicable safety professionals and other items as mandated by WHC procedures.

The next level of analysis (Level 2 on figure 3-1) is the performance of a Job Safety Assessment (JSA), in addition to the current WHC requirements. This process involves the formation of a small team that includes the cognizant engineer, nuclear safety professional, industrial safety/hygiene professional, worker and lead analyst. This team will then review the proposed work activity section by section and identify and specific hazards associated with the completion of that procedure section. Additionally, the team will identify any programs or systems that are particularly critical to the safe execution of this activity. The team will then make recommendations as to the appropriate controls and/or reviews to prevent, control or mitigate the identified hazards.

The highest level of analysis (Level 3 on figure 3-1) is the performance of a more formal and detailed hazards analysis technique such as a Hazard and Operability Study (HAZOP) or Process Hazards Assessment (PHA), again in addition to the WHC procedure requirements. This analysis will be performed by a team that will as a minimum include all personnel required for the job safety analysis (JSA) team. This process will be lead by a qualified experienced hazards analyst. In addition to completion of the hazards analysis, all of the S/RIDs functional areas will be evaluated on an item by item basis to determine any critical programs or systems for the safe execution of the work activity. The team will then make recommendations regarding the necessary controls to prevent, control or mitigate the identified hazards.

This process supplements the other programs and systems mandated by the WHC controlled manuals. In general, these requirements include the performance of a hazards evaluation on all work plans, a review and approval process that requires safety professional approval of all work activities with potential impact to the safety of the facility or workers, and performance of pre-job briefings prior to the execution of specific work activities. This process additionally identifies requirements related to the use of PPE, cutting and welding activities (permits), confined space entries (permits) and lock and tag implementation.

In that these requirements entirely include no less than six volumes of WHC controlled manuals (WHC-CM-4-3, Vol 1-3, WHC-CM-4-40, WHC-CM-1-6, WHC-CM-8-8, WHC-IP-0860 and numerous parts of others) a detailed description of the entire process is not warranted for this document. However, figure 3-2, Work Control Process, provides a graphical illustration of the overall process.

4.0 TRAINING

PUREX personnel are required to complete a number of training courses prior to being authorized for working at PUREX. The number and subject matter of these courses is, of course, dependent upon the duties of the individual. However, all PUREX personnel are required to complete the following course prior to entry in the PUREX facility. These include Hanford General Employee Training (HGET), PUREX general orientation, non-radiation worker, Criticality safety (either non-fissile or fissile depending upon task), Lock & Tag, Hazards Communication, facility emergency plan and HAZWOPER 24 or 40 hour training.

Additional training is required prior to entry into radiological areas of the facility. The completion of these courses is verified via the WRAM system prior to entry authorization. These courses and other requirements are identified in Table 4-1.

Table 4-1

Unescorted Access	Escorted Access
Dosimetry ¹	Dosimetry ¹
Bioassay ¹	Bioassay ¹
Respiratory Protection ¹	Visitor/Vending Training ³
Radiation Worker Training	Qualified Escort
Criticality Training ²	
Facility Orientation	

¹ As required on RWP

² Entry to N-Cell

³ May not enter high contamination, very high radiation, or airborne radioactivity areas without Rad Worker II qualifications or an equivalency as outlined in WHC-CM-1-6, Section 6 as determined by HP Management.

Additional training for specific duties includes certification programs for operators, asbestos handlers, power operators, waste handlers confined space training and the specific craft programs. Further, activity specific training may be required for specific work activities. The qualifications of personnel are verified prior to the start of work activities and are, in general, verified by QA/QC personnel.

Specific training requirements are identified for each specific job description. Completion of this training is required prior to performing related activities.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The purpose of personal protective equipment (PPE) is to shield or isolate individuals from the chemical, physical, biological, and radiological hazards that may be encountered at PUREX. The use of PPE to mitigate a hazard should be chosen only after a determination that engineered safeguards and/or administrative controls do not provide adequate protection. The specific PPE requirements will vary depending on the nature of the work being performed and the area of PUREX where the task is taking place. Requirements for PPE are itemized or noted in work control documentation and/or Radiation Work Permits (RWP), as applicable, and requirements should be discussed with PUREX workers when pre-job briefings are conducted.

5.1 SELECTION GUIDELINES

As part of the work authorization document planning process hazards are identified and evaluated. If engineered safeguards and/or administrative controls cannot be used, the work planning personnel working with Industrial Safety/Industrial Hygiene (IS/IH) personnel will select the appropriated PPE to protect employees from the known and potential hazards likely to be encountered during the proposed activity. Health Physics will identify PPE requirements for radiological hazards via the RWP. Where PPE is necessary to address both chemical and radiological concerns, the work planner/person-in-charge (PIC), IS/IH, and Health Physics will jointly determine requirements.

Employees who are engaged in activities at PUREX which require the use of PPE must meet all applicable training requirements specified in Section 4.0, and the medical surveillance requirements identified in Section 7.0 of this document.

Once a work activity has begun, if the level of PPE for the actual site conditions is found to be inadequate, the job supervisor/PIC will be notified immediately and the job will shut down until an evaluation is performed and approval to resume activities is granted.

5.2 LEVEL D PERSONAL PROTECTIVE EQUIPMENT

Level D PPE is the basic level of personal protection equipment utilized in PUREX for areas or operations where no air contaminants are present which would require respiratory protection. Specific PPE requirements will be determined by hazards associated with the work activity, and may include the following:

- Coveralls and/or street clothes
- Anti-Contamination clothing (as required by Health Physics if radiological hazards exist)

- Safety glasses or goggles or face shields (as required)
- Safety shoes (as required)
- Hardhat (as required)
- Hearing protection (as required)
- Gloves (as required)

5.3 LEVEL C PERSONAL PROTECTIVE EQUIPMENT

Level C PPE is required where conditions are known or characterized and a potentially hazardous atmosphere exists. Use of Level C PPE is not permitted in oxygen-deficient atmospheres (less than 19.5% oxygen), for contaminants with poor warning properties (odor detection level is greater than the threshold limit value (TLV)), or when contaminant concentrations exceed the respirator canister limits. Personnel working inside the PUREX and wearing Level C PPE shall wear, as a minimum:

- Full-face air-purifying respirator (with appropriate filters and prescription eye wear)
- Disposable chemical-resistant coveralls (as required)
- Anti-Contamination clothing (as required by Health Physics if radiological hazards exist)
- Safety shoes (as required)
- Chemical-resistant shoe covers (as required)
- Hardhat (as required)
- Inner chemical-resistant gloves (as required)
- Outer chemical-resistant gloves (as required)
- Hearing protection (as required)
- Eye protection (as required)
- Two-way radio communication (as required).

5.4 LEVEL B PERSONAL PROTECTIVE EQUIPMENT

Level B PPE is required where conditions are unknown and a potentially hazardous atmosphere exists. Level B PPE may be used only when it is unlikely that workers will be exposed to high concentrations of contaminants or

chemical splashes that will affect the skin or be absorbed by it. Level B is generally the same as Level C, except the respiratory protection is upgraded to air-supplied respirator or Self-Contained Breathing Apparatus (SCBA). Personnel working inside the PUREX with designated Level B PPE shall wear, as a minimum:

- Air supplied respirator or SCBA
- Disposable chemical-resistant coveralls (as required)
- Anti-Contamination clothing (as required by Health Physics if radiological hazards exist)
- Safety shoes (as required)
- Chemical-resistant shoe covers (as required)
- Hardhat (as required)
- Inner chemical-resistant gloves (as required)
- Outer chemical-resistant gloves (as required)
- Hearing protection (as required)
- Two-way radio communication (as required).

5.5 LEVEL A PERSONAL PROTECTIVE EQUIPMENT

Level A PPE is required where atmospheric conditions are Immediately Dangerous to Life and Health (IDLH). In rare circumstances, it may be necessary for personnel in the PUREX to wear Level A PPE. Level A PPE has the same maximum respiratory protection as Level B; however, the highest available skin and eye protection are required for Level A. Personnel working inside the PUREX and wear Level A PPE shall wear, as a minimum:

- Air supplied respirator or SCBA
- Fully encapsulating, chemical-resistant suit (suit material must be compatible with substances involved)
- Additional anti-contamination clothing (as required by Health Physics if radiological hazards exist)
- Safety shoes (as required)
- Chemical-resistant shoe covers (if applicable)
- Hardhat (if applicable)

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- Inner chemical-resistant gloves
- Hearing protection (as required)
- Two-way radio communication (as required).

Additional information and requirements related to chemical exposure PPE are identified in WHC-CM-4-3 Volume 1, *Industrial Safety Manual Safety Standards*, Sections PP-1 to PP-7 and WHC-CM-4-40, *Industrial Hygiene Manual*, Section 5. Information and requirements related to radiological PPE are contained in WHC-CM-1-6, *WHC Radiological Control Manual*, Chapter 3.325.

6.0 TEMPERATURE EXTREMES

6.1 HEAT STRESS

Workers wearing protective clothing may experience an increase in body temperature. This situation is exacerbated at PUREX by the use of containment structures in addition to layers of protective clothing. Special emphasis is required to maintain exposures as low as reasonably achievable. The PIC is responsible for complying with the requirements in WHC-CM-4-40. Guidelines for the work/rest schedule have been established by the American Conference of Governmental Industrial Hygienists (ACGIH), and used as a baseline work/rest schedule (see Table 6-1).

High body temperatures can result in heat fatigue, physical discomfort, and, in extreme cases, heat stroke and even death. Workers must be informed of the signs and symptoms of heat stress to preserve safe work conditions at PUREX. Work scheduled for summer months requires greater attention than in winter. In addition, work performed in non-ventilated containment devices (e.g., greenhouses) will have higher than ambient temperatures.

Workers shall be taught the following signs and symptoms of heat stress and then reminded in pre-job briefings during warm temperature conditions:

- Confusion*
- Fatigue
- Fainting*
- Nausea
- Slurred speech*
- Profuse sweating
- Clammy skin
- Skin color change
- Dizziness
- Vision problems.

For individuals manifesting these signs and symptoms noted with an asterisk, 911 or 811, cellular shall be called for the Hanford Fire Department ambulance.

Workers who exhibit any of these symptoms will be removed immediately from the work area. Individuals showing any of the symptoms **not** indicated above with an asterisk (*) will be provided cool water and allowed to rest. The worker may be brought to the Health Service Center for treatment and/or further evaluation.

When working under environmental conditions conducive to heat stress (or temperature extremes in general) workers are encouraged to employ the buddy system to monitor each other for potential temperature related illnesses. The buddy systems is discussed in greater detail later in this document, however, for heat related disorders employees are encouraged to closely watch each other for symptoms and to pace themselves.

Many methods are available to minimize the effects of heat stress besides personnel monitoring and varying the work/rest schedule. For example, work can be scheduled to begin early in the day or later at night to avoid high temperatures encountered in the afternoon. During breaks, each worker rest in a shaded area and drink water. Ice vests are also available for use in PUREX deactivation activities.

Table 6-1. Heat Stress Guides.

One pair coveralls	
Temperature (°F)	Work time limit*
Less than 90	No limit (normal breaks only)
90-95	45 minutes per hour
96-100	30 minutes per hour
101-120	15 minutes per hour
121-140	10 minutes per hour
141-150	5 minutes per hour
Over 150	Contact supervisor
Two pair coveralls	
Temperature (°F)	Work time limit*
Less than 85	No limit (normal breaks only)
85-90	45 minutes per hour
91-95	30 minutes per hour
96-100	15 minutes per hour
101-120	10 minutes per hour
121-130	5 minutes per hour
Over 130	Contact supervisor
Plastic or rubber clothing (rain gear)	
Temperature (°F)	Work time limit*
30 or less	8 hours per day
31-50	5 hours per day
51-60	3 hours in a 4-hour period
61-70	2 hours in a 4-hour period
71-80	90 minutes in a 4-hour period
81-85	60 minutes in a 4-hour period
86-90	30 minutes in a 4-hour period
91-100	15 minutes in a 4-hour period
Over 100	Contact supervisor

*If ice vests are worn under protective clothing, work time may be extended until ice packs thaw.

6.2 COLD EXPOSURE

Exposure to low temperatures may be a factor if outside work is performed in the evening hours, if winds are high, if unpredictable weather moves in, or during the winter months (see Table 6-2 for wind chill factors). Extra care must be exercised while working in these environments. Workers should observe each other's facial extremities (ears and nose) and exposed skin for signs of frostbite (whitening of the skin surface). Decreased mental coherence and body movements are also signs of hypothermia. If individuals demonstrate evidence of hypothermia or other significant cold injuries (e.g., frostbite), coworkers should notify the Hanford Fire Department ambulance by calling 911 (811 Cellular).

Table 6-2. Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (Under Calm Conditions).

Estimated wind speed (in mph)	Actual temperature reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent chill temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-122
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect)	LITTLE DANGER			INCREASING DANGER				GREAT DANGER				
	In < hour with dry skin. Maximum danger of false sense of security			Danger from freezing of exposed flesh within one minute				Flesh may freeze within 30 seconds				

7.0 MEDICAL SURVEILLANCE

7.1 MEDICAL EXAMINATIONS

All employees who (1) require access to PUREX; (2) may potentially be exposed to hazardous materials at or above the Threshold Limit Value (TLV) and/or Permissible Exposure Limit (PEL) for 30 or more days per year; or (3) are required to wear a respirator will participate in the medical surveillance program as required by 29 CFR 1910.120. The hazardous waste worker physical requirements are the same for both 24 and 40 hour training categories. The WRAM system contains employee medical clearance information which shall be verified prior to entry into PUREX radiological controlled areas.

The medical surveillance program, which is designed to assess, monitor, and maintain records for workers' health and fitness for employment, consists of a pre-employment screening, periodic medical examination, follow up exposure physicals [as required by the Occupational Health Examiner (OHE)], and a termination examination.

The Hanford Environmental Health Foundation (HEHF) is the medical contractor for the Hanford Site and provides medical services for WHC and will be provided with information relative to the type of work being performed, potential and actual exposures, and expected contaminants.

7.2 PRE-EMPLOYMENT SCREENING FOR HAZARDOUS WASTE WORKERS

Pre-employment screening will determine the individual's fitness for duty, including the ability to work while wearing PPE, and provide baseline data for comparison with future medical data.

The pre-employment screening consists of the following:

- Occupational and medical history
- Physical examination
- Chemical Panel
- Pulmonary Function Test (PFT)
- Respirator Fit Test
- Electrocardiogram (EKG)
- Chest X-Ray
- Hearing conservation audiogram (for individuals exposed to an 8 hour time weighted average of 85 dBA or greater).

7.3 PERIODIC MEDICAL EXAMINATION

The periodic medical examination will determine biologic trends that may mark early signs of adverse health effects, and thereby facilitating appropriate protective measures. The frequency of the periodic medical examination will depend upon the extent of potential or actual exposures as determined by the OHE, but shall be provided at least annually.

The annual examination consists of the following:

- Updated medical history
- Physical examination
- Chemical Panel
- PFT (as determined by the OHE)
- Respirator Fit Test
- EKG (as determined by the OHE)
- Chest X-Ray (as determined by the OHE)
- Hearing conservation audiogram (for individuals exposed to time weighted average of 85 dBA or greater).

7.4 FOLLOW UP EXPOSURE PHYSICAL

Potential job-related symptoms or illnesses must be reported as soon as possible to the employee's supervisor and HEHF. The OHE will perform a follow up physical to evaluate the symptoms or illness in the context of the employee's exposure to hazardous substances.

Based upon the results of the pre-employment or periodic medical examinations the OHE may determine that follow up examinations or consultations are medically necessary. It is the responsibility of the employee to participate in the follow up examinations as directed by the OHE.

Personnel identified through any medical examination as having a work restriction will have the restriction reported to their immediate supervisor. The individuals work activities will be adjusted to fulfill the restrictions. HEHF will schedule a followup (or series of followup) examinations to assess removal of the restriction.

7.5 EMERGENCY MEDICAL SURVEILLANCE

Employees must notify their supervisor and report to an HEHF Health Service Center for an evaluation. The contents of the evaluation will be determined by the OHE based upon the circumstances of the incident.

Employees who feel they may have been exposed to noxious vapors, or suspect that they received an over exposure to a hazardous material or chemical [which exceeded the established Permissible Exposure Limit (PEL) and/or Threshold Limit Value (TLV)], shall report to first aid. An OHE will evaluate the employee and based upon the evaluation, enter the individual into the medical surveillance tracking log for continued follow-up as appropriate.

7.6 TERMINATION MEDICAL EXAMINATION

A termination examination will be provided at the end of the individual's employment unless; (1) the individual has had a complete examination within the last six (6) months, (2) no exposure has occurred since the last examination, and (3) no symptoms associated with exposure have developed since the last examination.

The termination examination protocol consists of the following:

- Updated medical history
- Physical examination
- Chemical Panel
- PFT
- EKG
- Chest X-Ray (as determined by the OHE)
- Hearing conservation audiogram.

7.7 RECORD KEEPING

Employee medical records are maintained by HEHF for the duration of employment plus 30 years.

Copies of the medical examinations can be made available to the employee as requested. Employees or their designated representative may request a copy of their medical records by completing the Request for Information form from HEHF. For records older than 2 years, the Privacy Act Information Request form (DOE #F1800.1) must be completed. This form can be obtained from the DOE Richland office.

HEHF provides the Physicians Written Opinion (PWO) to the employee and a copy to Industrial Hygiene. The PWO contains information regarding the employee's fitness for work, including the ability to wear PPE, and the results of the examinations and tests. The PWO is maintained in the employee's medical file.

A medical clearance form is forwarded to Medical Scheduling by HEHF. The medical clearance indicates restrictions or provides full clearance for performing the work duties. The medical clearance form is forwarded to the employee and to the employee's manager by Medical Scheduling (e.g., if an employee is injured or exposed to a toxic material, a medical clearance must be evaluated by HEHF and signed before the employee is authorized to return to work).

7.8 SCHEDULING MEDICAL EXAMINATIONS

The manager of the employee is responsible for requesting the medical examination required for access to the PUREX. The request for the medical examination is made by completing the Appointment for Medical Services form (#54-8800-060.)

In addition to the general requirements for medical examinations, employees may need a medical examination for other work activities, (e.g., asbestos, carcinogens, etc.). The request for these special examinations must also be checked on the Appointment for Medical Services form.

WHC requirements for scheduling medical examinations are as follows:

- Managers check the medical services appointment form and ensure all required examinations are marked
- Call WHC Medical Scheduling if changes are needed
- Sign the medical services appointment form in the authorized box
- Change or cancel appointments that will not be met (at least 48 hours in advance)
- Send the medical services appointment form with the employee to a medical examination appointment at HEHF.

8.0 EXPOSURE MONITORING & AIR SAMPLING

8.1 OVERVIEW

Monitoring and sampling activities are performed at PUREX to address a number of potential situations, including personal/activity monitoring, air monitoring and environmental monitoring. These programs are designed to keep worker exposures As Low As Reasonably Achievable (ALARA) and are included in the PUREX ALARA program as described in WHC-CM-5-9, *PUREX/UO₃ Plant Administration*, Section 1.7, "PUREX/UO₃ ALARA Program".

In addition to the current monitoring programs and the ALARA program, as part of the hazards baselining activity, an industrial hygiene assessment of the PUREX facility was performed. This assessment is included as Appendix B of this HASP.

8.2 PERSONAL/ACTIVITY MONITORING

A) Radiological - Personal and activity monitoring for radiation exposure at PUREX is performed on a routine basis as required by WHC-CM-1-6, *WHC Radiological Control Manual, Chapter 5* and the PUREX specific implementing procedures. This monitoring is in addition to personal dosimetry requirements. These activities are implemented to ensure that the personnel dose limits as identified in Chapter 2 of WHC-CM-1-6 are not exceeded.

All personnel entering the PUREX facility are required to have specific personal radiation dosimeters. Additionally, the radiation work permits (RWPs) identify additional monitoring or dosimetry on an area by area or case by case basis. These requirements may include items such as health physics technician (HPT) monitoring of the activity or pencil or ring dosimeters. Dosimetry requirements are defined in Chapter 5 of WHC-CM-1-6, parts 1 and 2.

Additional techniques or processes used at PUREX to monitor or prevent unnecessary personnel exposures to radiation include the ALARA management worksheet, and HPT hold points in work activities. Guidance for these activities is contained in WHC-CM-5-9, Section 1.7 and WHC-CM-1-6, Chapter 3.

B) Non-Radiological - WHC-CM-5-9, *PUREX/UO₃ Plant Administration*, Section 1.8, "NO₂ Monitoring - PUREX", identifies specific activities that require the use of personal NO₂ monitoring devices. For activities not identified in this procedure the need for non-radiological monitoring of individuals and activities is evaluated on an activity by activity basis as required by WHC-CM-5-9, Section 1.16, paragraphs 5.13 through 5.15 and Section 1.27 paragraph 5.1.

These requirements are implemented both by industrial hygiene review of proposed work packages/plans and by the performance of JSAs. The industrial hygiene review and JSAs performed in support of PUREX activities will consider the specific recommendations for monitoring identified in the industrial hygiene assessment (Appendix B) as well as other factors influencing potential exposures.

For each activity, specific consideration shall be given to monitoring for explosivity, oxygen and toxic substances. The specific procedures and monitoring equipment to be used shall be specified for each work plan. Where monitoring is indicated, the plan shall specify the frequency, location and numbers of samples to be taken. Instruments shall be calibrated according to manufacturer's instructions on the day of sampling under similar ambient conditions as the area to be monitored.

8.3 AREA MONITORING

Air monitoring for radiological hazards is accomplished at PUREX by the use of Continuous Air Monitors (CAMs). Both alpha and beta/gamma CAMs are used in the PUREX facility. Should airborne concentrations exceed the alarm point a red flashing light and alarms will sound. As part of both general employee and facility specific training personnel are instructed as to the proper response to these alarms.

Discussion as to the specific instrumentation and placement of the CAMs throughout the PUREX facility is contained in SD-HS-SAR-001, Rev 3, *PUREX Plant Final Safety Analysis Report*, Section 8.3.4. Additional information on the current placement configuration and the analysis to support this placement is contained in SD-SQA-PP-001, Radiological Facility Air Surveillance Upgrade Program, Battelle Evaluation of Air Sampling & Monitoring Equipment Locations in Selected 200 Area Facilities (June 12, 1987, T. P. Lynch), SD-SQA-CSD-001, Criteria for Rockwell Hanford Operations Workplace Air Sampling Program, and WHC-SD-SQA-TA-20004, Technical Assessment of Compliance with Workplace Air Sampling Requirements - PUREX Facility.

8.4 ENVIRONMENTAL SAMPLING

A) Radiological - PUREX provides for gaseous and liquid effluent release point sampling and monitoring as defined in Section 2 of WHC-CM-7-5, *Environmental Compliance* and WHC-EP-0468-2, *Facility Effluent Monitoring Plan for the Plutonium-Uranium Extraction Facility*. Additional monitoring and sampling requirements implemented at PUREX are identified in WHC-CM-7-4, *Operational Environmental Monitoring*. The data received from this equipment is tracked, trended and reported as required in these references.

B) Non-Radiological - PUREX has implemented an effluent sampling program to ensure that effluent streams meet the criteria identified in

WHC-CM-7-5 for non-radiological criteria as well. This program is defined in WHC-EP-0468-2.

C) Compliance - The Westinghouse mandated programs to ensure compliance with environmental requirements are defined in WHC-CM-7-6, *Environmental Compliance Verification Program Manual*.

8.5 INSTRUMENTATION AND CALIBRATION

Instrumentation and calibration requirements for radiological survey instruments in use at PUREX are defined in WHC-CM-1-6, *WHC Radiological Control Manual*, Section 5. All fixed facility monitoring equipment is identified and calibrated per the requirements of the Component-Based Recall System (CBRS) systems as defined in WHC-IP-0869, *Component Based Recall Systems Data Elements*.

9.0. SITE CONTROL

The purpose of site control is to minimize the potential contamination of workers, protect the public from hazards and prevent unauthorized entry. Site boundary controls are established to limit access to areas of hazard concerns. Based on the expected levels of contamination and work activity, appropriate zones must be established and entry controlled. Unnecessary personnel shall be excluded.

Since many tasks at PUREX involve radiological work, Contamination/Airborne Radioactivity Control Areas and/or Radiation Areas are established in accordance with the WHC-CM-1-6, Rad-Con Manual.

9.1 ACCESS CONTROL

Access control to PUREX areas containing radiological and chemical hazards is performed by two separate means. The Westinghouse Radiation Area Management (WRAM) system is used to verify entry requirements are met for individuals requiring access to PUREX radiologically-controlled areas. Table 4-1 identifies the WRAM entry requirements.

At each radiological controlled area access point, an entry log is maintained. Employees entering these areas are required to review the facility radiological status map and the respiratory requirements and acknowledge understanding of the entry requirements by signing the log. On exiting the area, the log entry must be completed.

9.2 RADIOLOGICAL CONTROL ZONES

Radiation Areas are classified as follows:

- **Radiation Control Area - Buffer area.** A boundary area around other radiological areas containing greater radiological hazards.
- **Radiation Area -** Any area that is accessible to personnel in which radiation exists at such levels that a major portion of the body could receive in one hour a dose in excess of 5 mRem but less than 100 mRem.
- **High Radiation Area -** Any area that is accessible to personnel in which radiation exists at such levels that a major portion of the body could receive in one hour a dose of 100 mRem to 5,000 mRem.
- **Very High Radiation Area -** Any area that is accessible to personnel in which radiation exists at such levels that a major portion of the body could receive in one hour a dose of 5,000 mRem or greater.

9.3 CONTAMINATION/AIRBORNE RADIOACTIVITY CONTROL AREAS

- **Contamination Area** - An area where contamination levels exceed specific limits.
- **High Contamination Area** - An area where contamination levels are greater than the Contamination Area.
- **Fixed Contamination Area** - An area with no detectable removable contamination but contains fixed contamination levels exceeding specified limits.
- **Soil Contamination Area** - An area where surface or subsurface contamination levels exceed specified limits. A Soil Contamination Area may be located outside an Radiological Controlled Area.
- **Airborne Radioactivity Area** - An area where airborne radioactivity exceeds specified limits.

9.4 HAZARDOUS WASTE OPERATIONS/CLEAN-UP WORK ZONES

The standard approach under 29 CFR 1910.120 to control and limit access to hazardous waste operations or clean-up work zones is to establish exclusion zones. This approach is not appropriate for PUREX which is a controlled access facility. Additionally, the facility is a production site, not an uncontrolled waste site. Consequently, where activities warrant additional access controls a regulated area consistent with the approach used for asbestos or lead work will be established.

9.5 BUDDY SYSTEM

The purpose of the buddy system is to:

- Provide personnel with assistance, if needed
- Observe co-worker for signs of chemical or heat exposure
- Periodically check the integrity of a co-worker's PPE
- Notify the supervisor if help is needed.

Under the buddy system, an attendant (provided with the required PPE) must be capable of observing the worker performing the task. For PUREX, the buddy system is used in the following cases:

- Entry into confined spaces
- Activities requiring the use of supplied air or SCBA

Enforcement of the buddy system is the responsibility of the supervisor/ Person In Charge. Personnel shall not be allowed to proceed beyond the Exclusion Zone access point unless accompanied by a companion worker.

9.7 COMMUNICATIONS

Communications are essential to all smoothly run operations. Personnel should be provided with the appropriate equipment to facilitate the transmission of information necessary to support work activities, report emergencies and receive emergency information. This does not require that each person be in possession of a transmitting or receiving device but that such instruments be accessible to workers within the assigned work area. Information can be received by one person and given to other individuals by any recognized direct means. The primary means for communicating to and from the field is use of radios and cellular phones. A single point-of-contact is available at all times (911 or 811, cellular). This single point-of-contact once notified, has the responsibility to initiate notifications as well as to dispatch emergency responders.

Normal PUREX operations deal mainly with radiological decontamination. When unusual work is performed at PUREX and a step-by-step decontamination protocol for site personnel and equipment is required, this protocol can be found in the task-specific work plan. The work plan will be incorporated as part of the work package when needed. This process will include a determination about the necessity of chemical decon and will specify: location, training, qualifications of decon operators, decon fluids, final cleanup levels.

10.0 DECONTAMINATION PROCEDURES

10.1 PREVENTING CONTAMINATION

10.1.1 Minimizing Contamination

The amount of decontamination required can be substantially minimized by adhering to the following operating guidelines and requirements.

1. Observe work practices that minimize contact with hazardous substances (e.g., do not walk through areas of known contamination; do not directly touch potentially hazardous substances).
2. Use remote sampling, handling, and container-opening techniques (e.g., drum grapplers, pneumatic impact wrenches).
3. Protect monitoring and sampling instruments by bagging the instrument bodies and probes and wrapping cords in appropriate material (such as cellophane or plastic). Make openings in the bags for sample ports and sensors that must contact site materials.
4. Wear disposable outer garments and use disposable equipment where appropriate.
5. Cover equipment and tools with a strippable coating that can be removed during decontamination.
6. Encase the source of contaminants (e.g., with plastic sheeting or over-packs).

10.1.2 Proper Dressing Procedures

Adherence to proper procedures for dressing before entering a radiation area minimizes the potential for contaminants to bypass the protective clothing and escape decontamination. In general, all fasteners should be used (i.e., zippers fully closed, all buttons used, all snaps closed, etc.). Gloves and boots should be tucked under the sleeves and legs of outer clothing, and hoods (if not attached) should be worn outside the collar. Another pair of tough outer gloves is often worn over the sleeves. All open joints should be taped to prevent contaminants from running inside the gloves, boots, and jackets (or suits, if one-piece construction). Specific requirements shall be addressed by the applicable RWP.

10.1.3 Personal Protective Equipment Checks

PPE shall be checked before each use to ensure that it contains no cuts or punctures that could expose workers to contaminants. Injuries to the skin (such as cuts and scratches) may enhance the potential for chemicals, radioactive contaminants, or infectious agents that directly contact the worker's skin and penetrate into the body. Workers with open cuts or damaged skin should be kept from working until the skin heals or the area is protected with an approved covering.

10.1.4 Surveying of Instruments

All instruments and equipment must be surveyed for radiological contamination control purposes and visually inspected for chemical contamination, such as residues before being removed from a surface contamination zone. Items with detectable levels of contamination must be controlled as radioactive material (or controlled or regulated equipment).

10.1.5 Respiratory Protection

When using supplied air, there is a high potential for air hoses to become contaminated. Where possible, hoses should be covered with plastic. Cleaning and decontamination of face pieces is performed by the mask cleaning station (i.e., laundry). Maintenance of special respiratory protection equipment (e.g., Ska-Pak, MSA-PAPR) is performed by the Health and Safety Technical Services group.

10.1.6 Heavy Equipment

All possible measures to prevent or limit the contamination of heavy equipment shall be taken. Those parts of drilling or other equipment that become contaminated (such as auger flights, etc.), are to be double bagged and taken to an appropriate facility for decontamination before reuse, in order to minimize personnel contamination potential and sample cross-contamination.

10.2 TYPES OF CONTAMINATION

10.2.1 Physical States of Contaminants

Contaminants may be present in the form of solids, liquids, gases or vapors. Dust and dirt contaminated with radionuclides, polychlorinated biphenyls (PCBs), toxic metals (etc.), may collect on the surface of personal protective equipment, or in cracks, crevices, folds, seams (etc.). Specific contaminants (when known) will be addressed as part of the site specific characterization and analysis. Specific task-related concerns should be addressed in the RWP.

10.2.2 Liquids and Gases

Liquid and gaseous contaminants (such as organic liquids or vapors) may be limited to the surface of personal protective equipment, or may permeate the PPE material. Surface contaminants may be easy to detect and remove; however, contaminants that have permeated a material are difficult or impossible to detect and remove. If contaminants that have permeated a material are not removed by decontamination, they may continue through the material until they reach the inner surface, where they can cause an unexpected exposure (breakthrough). This is one advantage of the use of disposable protective clothing (provided that the clothing is changed at intervals that are less than the chemical "breakthrough time").

10.2.3 Breakthrough Time

Five major factors that affect the breakthrough time.

1. Contact time

The longer a contaminant is in contact with an object, the greater the probability and extent of permeation. For this reason, minimizing contact time is one of the most important objectives of a decontamination program.

2. Concentration

Molecules tend to flow from areas of high concentration to areas of low concentration. As concentrations of wastes increase, the potential for permeation of personal protective clothing also increases.

3. Temperature

An increase in temperature generally increases the permeation rate of contaminants.

4. Size of Contaminant Molecules and Pore Space

Permeation increases as the contaminant molecules becomes smaller, and as the pore space of the material to be permeated increases.

5. Physical State of Wastes

As a rule, gases, vapors, and low-viscosity liquids tend to permeate more readily than high-viscosity liquids or solids.

10.3 POLICIES FOR DECONTAMINATION PROCEDURES

10.3.1 General Guidance

1. Decontamination procedures shall be developed, communicated to employees, and implemented before any employees or equipment may enter onsite areas where potential for exposure to hazardous substances exists. Decontamination procedures shall be incorporated as part of the RWP.
2. A step-off pad shall be established between the radiation area and the radiation control area for each task. Disposable clothing is to be removed (outer layers are removed first) and placed in containers. Non-disposable clothing (such as Anti-Cs clothing) that can be cleaned will be removed, bagged, and sent to the laundry. After removing outer protective clothing, each team member must be surveyed before being permitted to go into an uncontrolled area.
3. If radioactive skin or clothing contamination is detected, decontamination must be performed under the direction of the HPT.
4. The RWP should be revised whenever the type of personal protective clothing or equipment changes, the site conditions change, or the site hazards are reassessed based on new information.

10.4 POLICIES FOR SPECIFIC DECONTAMINATION PROCEDURES

10.4.1 Objectives

The primary objective of decontamination procedures is to minimize the risk of personnel exposure to hazardous substances. Historically, decontamination of personnel has involved a successive removal sequence, from outermost to innermost layers of protective clothing. In many instances, the objectives of decontamination can be accomplished most effectively by the use of disposable protective clothing, combined with the systematic removal and disposal of multiple layers of protective coveralls, gloves, boot covers, etc.

10.4.2 Decontamination Required

All personal, non-disposable clothing, equipment, and samples leaving the contaminated area must be decontaminated or properly packaged to prevent the spread of any harmful chemicals, or radioactive contamination that may have adhered to them.

10.4.3 Health and Safety of Decontamination

Normal radiation decontamination procedures provide adequate decontamination for known chemical agents that are evaluated for health and safety aspects.

10.4.4 Change Rooms

Anti-C clothing is stored at specific locations in PUREX. The storage locations are designated change areas, and are the only areas where personnel are authorized to don Anti-Cs. At special access points (step off pads), change rooms are frequently set up for special tasks. Personnel who have reason to don Anti-Cs in areas other than the change rooms shall contact Health Physics before obtaining or transporting the Anti-Cs.

10.4.5 Showers

There are various emergency showers within PUREX that could be used for emergency decontamination.

10.5 TESTING FOR DECONTAMINATION EFFECTIVENESS

10.5.1 Visual Observation

In some cases the effectiveness of decontamination can be estimated by visual observation. Discolorations, stains, corrosive effects, visible dirt, or alterations in clothing fabric may indicate that contaminants have not been removed. It is important to remember that not all contaminants leave visible traces. Many contaminants can permeate clothing and are not easily observed.

10.5.2 Wipe Sampling/Direct Reading

Wipe-testing/direct reading sampling provides after-the-fact information on the effectiveness of decontamination. For this procedure a dry or wet cloth, glass fiber filter paper, or swab is wiped over the surface of the potentially contaminated object and then analyzed in a laboratory. For direct reading a geiger counter or a Personal Contamination Monitor (PCM-1B) may be used for a whole body survey. Both the inner and outer surfaces of protective clothing should be tested.

10.5.3 Testing for Permeation

Testing for the presence of permeated contaminants requires that pieces of the protective garment(s) be sent to a laboratory for analysis.

10.6 HEALTH AND SAFETY HAZARDS

While decontamination is performed to protect health and safety, it can pose hazards under certain circumstances. Decontamination methods may:

- Be incompatible with the hazardous substances being removed
- Be incompatible with the clothing or equipment being decontaminated
- Pose a direct health hazard to workers.

The chemical and physical compatibility of the decontamination solutions or other decontamination materials must be determined before they are used. A qualified health professional should assess the benefits and risks associated with the use of decontamination methods at a waste site.

10.7 DECONTAMINATION EQUIPMENT SELECTION

In selecting decontamination equipment, it is important to consider whether the equipment itself can be decontaminated for reuse or disposed of easily.

10.8 DISPOSAL METHODS

All decontamination equipment must be properly decontaminated and/or disposed (as necessary). All spent solutions and wash water should be collected and disposed of properly. Incompletely decontaminated clothing should be placed in plastic bags or radiation boxes, pending further decontamination and/or disposal. The WHC Solid Waste Engineering group provides technical support for designating and disposing of hazardous wastes.

10.9 PERSONAL PROTECTION

10.9.1 General Safe Work Practices

1. Eating, drinking, smoking, taking medications, chewing gum (etc.), are normally prohibited within the radiation area. Under special conditions drinking may be allowed under high-heat conditions.
2. Do not handle soil, waste samples, or any other potential contaminated items unless wearing protective gloves as specified in the job hazard analysis (JHA), RWP (etc.).
3. Be alert to potentially changing exposure conditions evidenced by perceptible odors, unusual appearance of excavated soils, oily sheen on water (etc.). Whenever possible, approach from or stand

upwind (as indicated by the required onsite windsock) of excavations, boreholes, well casings, drilling spoils (etc.).

4. At the end of the work day, or each job, disposable clothing shall be removed and placed in drums (chemical contamination) or plastic lined radioactive waste containers as appropriate. Clothing that can be cleaned shall be sent to the Hanford Site laundry facility.
5. Thoroughly wash hands and face before eating (or putting anything in the mouth) to avoid hand-to-mouth contamination.

10.9.2 Protection of Decontamination Personnel

1. All decontamination workers who are in a contaminated area and must themselves be decontaminated before entering the clean support zone. The extent of their decontamination should be determined by the types of contaminants they may have contacted and the type of work they performed.
2. Decontamination workers who come in contact with personnel and equipment at the first decontamination station require more protection from contaminants than decontamination workers who are assigned to the last station in the decontamination line.
3. The level of protection required will vary with the decontamination equipment used. Appropriate equipment and clothing for protecting decontamination personnel should be addressed by the job supervisor, the RWP or by the HPT.

10.10 EMERGENCY DECONTAMINATION

In an emergency, the primary concern is to prevent the loss of life or severe injury to personnel. Personnel must contact the onsite emergency response organizations by calling 911 (by site telephone), Station 1 (by radio), or 811 (by cellular telephone). If immediate medical treatment is required to save a life, decontamination should be delayed until the victim's condition is stabilized. Kadlec Medical Center does have an emergency room and procedures for handling contaminated personnel. If decontamination can be performed without interfering with essential life-saving techniques or first aid, or if a worker has been contaminated with an extremely toxic or corrosive material that could itself cause severe injury or loss of life, decontamination must be performed immediately. If an emergency due to a heart-related illness develops, protective clothing should be removed from the victim as soon as possible to reduce the heat stress. During an emergency, provisions must also be made for protecting medical personnel and disposing of contaminated clothing and equipment.

If possible, first responders should (1) move the person into the radiological control area and remove the person's outermost layer of protective clothing; (2) place the person on a clean blanket or plastic sheet; and (3) then remove their own outermost layer of protective clothing. Ideally, the person's next layer of protective clothing should be removed by rescue personnel, who enter the radiological control area for appropriate life saving/emergency procedures.

11.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

11.1 PRE-EMERGENCY PLANNING AND COORDINATION WITH OUTSIDE PARTIES

The Westinghouse Hanford Company Emergency Plan For PUREX, WHC-IP-0263-202A, is the primary emergency planning document for the PUREX facility. The plan contains descriptions of the hazards, descriptions of potential emergency conditions, and description of response plans for pre-identified potential emergency conditions.

An agreement among the three major Hanford Site contractors (an operations, engineering and construction contractor, a research and development contractor, and a medical and health services contractor) defines the interfaces and notifications required during an emergency. Agreements have been established with a number of offsite authorities, including law enforcement, fire departments, and local hospitals, to reduce the impact to human health and the environment in the event that an incident has offsite public health implications, or if an onsite emergency warrants offsite assistance.

11.2 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION

The overall responsibility for implementation of the PUREX emergency response plan lies with the Building Emergency Director (BED) or designated alternates. The BED is responsible for the safety of personnel in and around PUREX during an emergency. A list of all BEDs and alternates is maintained at various locations throughout the facility. The PUREX Shift Manager acts as the BED and these individuals can be reached 24 hours per day. The BEDs have the authority to commit all necessary resources (both equipment and personnel) to respond to any emergency. Additional responsibilities have been delegated to the Hanford Fire Department personnel. These Hanford Fire Department personnel have the authority to commit all necessary resources (both equipment and personnel) to respond to any emergency.

Response by a BED is obtained through radio or telephone communications to the shift office (373-4055). The Patrol Operations Center has been designated as the single point-of-contact to mobilize responses from support organizations to any emergency. The single point-of-contact is available at all times (911 or 811, cellular), and has the responsibility to initiate notifications as well as to dispatch emergency responders (Hanford Fire Department, Hanford Patrol, or ambulance services). All emergency notifications to the BED, building managers (etc.), can be made directly from the affected facility or through a single point-of-contact. The primary methods of communicating to, from, and at the event scene are radios and cellular telephones.

Depending on the event, other WHC Emergency Response Organizations and the RL Emergency Organization may be activated. The role of the WHC organization is to support the facility, assume notification responsibilities, and determine protective actions for the surrounding area. The RL organization is responsible for interfacing with offsite agencies (if required).

11.3 EMERGENCY RECOGNITION AND PREVENTION

Emergency recognition is primarily accomplished through a work force that is knowledgeable of potential emergency conditions associated with their jobs. This is accomplished through the review of the emergency plan, job specific hazardous worker training, facility orientation, and operator qualification training. In addition to training, the PUREX has in place a procedure that will facilitate the rapid recognition and classification of an "Operational" emergency as described in the DOE Emergency Preparedness orders.

For spills of hazardous materials or dangerous waste, the BED ensures that trained personnel identify the character, source, amount, and extent of the hazardous material or dangerous waste involved in the incident to the fullest extent possible. Identification of waste can be made by (1) visual inspection of involved containers; (2) by sampling; (3) by reference to inventory records, shipping manifests, or waste tracking forms; or (4) by consulting with other operations personnel. Samples of materials involved in an emergency will be analyzed as appropriate.

Prevention of emergencies is the goal. The two primary methods to help assure prevention are training and procedural compliance. All work in the facility is governed by procedures that take into account possible hazards and potential emergency conditions.

11.4 SAFE DISTANCES AND PLACES OF REFUGE

The building emergency plan identifies staging areas and evacuation routes for the PUREX facilities. In some cases personnel are required to evacuate to a safe upwind location. In the event a place of refuge is required, personnel have been trained to seek shelter in the nearest available building or office trailer.

11.5 SITE SECURITY AND CONTROL

Initially, it is the responsibility of the discoverer of an emergency situation to ensure that other personnel do not enter into the danger area. If required, the BED requests security and site control support from Hanford Patrol by making the request through the single point-of-contact. The BED provides sufficient information to allow Patrol to establish effective controls.

11.6 EVACUATION ROUTES AND PROCEDURAL GUIDELINES

Facility specific evacuation routes and processes are contained in the Facility Emergency Plan. The basic process is to evacuate to the staging area for accountability. Relocation from the staging area to another location will be at the direction of the BED, or may be coordinated with a total area evacuation directed by the WHC Emergency Response Organization.

11.7 EMERGENCY MEDICAL TREATMENT AND FIRST AID

A Health Service Center is located in 200E Area on the corner of 4th and Baltimore, Building 2719EA, phone 373-2314. This center is staffed 24 hours per day.

Ambulance service is provided by the Hanford Fire Department, which uses paramedics and emergency medical technicians as attendants. This service is available from area fire stations on a 24-hour, 7-day basis. Additional ambulance service is available from other local city fire departments through mutual aid agreements.

Professional medical help is provided onsite by the Hanford Environmental Health Foundation. Doctors and nurses are available for emergency assistance at all times. These medical personnel are trained in procedures to assist personnel contaminated with hazardous and/or radioactive material. Emergency call lists are maintained to provide professional medical consultation at all times.

Referral to offsite hospital facilities is made by the Hanford Environmental Health Foundation physician providing emergency assistance by telephone or in person. The primary hospital used in emergencies is Kadlec Hospital, Richland. Kennewick General Hospital, Kennewick, and Our Lady of Lourdes Hospital, Pasco, are used as backup facilities. Agreements have been established between these hospitals and DOE-RL.

11.8 EMERGENCY ALERTING AND RESPONSE

The discoverer of an emergency condition is responsible for immediately providing the initial alert, either in person or by telephone or radio. In the case of a fire, the discoverer activates the fire alarm, which sounds the alarm and summons the Hanford Fire Department. The BED has the authority to activate facility specific warning systems and is authorized to order the initiation of the area wide alerting/warning signals through the single point-of-contact. Following are the standard warning signals and the appropriate responses.

Signal	Meaning	Response
Crash Alarm Telephones (steady ringing phone)	Emergency message	Lift receiver, do not speak, listen to caller and relay message(s) to building occupants and BED or alternate.
Gong (2 gongs/second)	Fire	Evacuate building. Move upwind. Keep clear of emergency vehicles.
Siren (steady blast)	Area evacuation	Proceed promptly to accountability area. Follow instructions.
Wavering Siren	Take cover	Close all exterior doors, turn off all intake ventilation and notify manager of whereabouts. Request call back for status and monitor portable radios.

11.9 CRITIQUE OF RESPONSE AND FOLLOW-UP

Under DOE Order 5000.3B, an occurrence report is required for incidents occurring at the PUREX involving hazardous materials release, fire (etc.). In the DOE reporting system, three levels of incidents are described, in descending order of severity: emergency, unusual occurrence, and off normal occurrences. The following is a general description of those categories:

- **Emergencies**--The most serious occurrences that require an increased alert status for onsite personnel and, in specified cases, for offsite authorities. The detailed definitions and classifications of emergencies and appropriate emergency responses are provided in WHC-IP-0263-202A, Westinghouse Hanford Company Emergency Plan For PUREX; and WHC-CM-4-43, Section 2-2.10 (PUREX Facility Recognition and Classification of Emergencies).
- **Unusual Occurrences**--Non-emergency occurrences that have significant impact or potential for impact on safety, environment, health, security, or operations.
- **Off-Normal Occurrences**--Normal or unplanned events or conditions that adversely affect, potentially effect, or are indicative of degradation in the safety, security, environmental, or health protection performance or operation of a facility.

Specific details of this reporting system are found in WHC-CM-5-9, PUREX/UO, Operation Manual. The event is categorized and proper notifications are completed to onsite and offsite agencies (as required) to include the operating contractor, DOE, county and state organizations. The PUREX

Occurrence Reporting System included the accident/incident reporting requirements of DOE Order 5484.1.

Occurrences are investigated, reported, and analyzed promptly to ensure that effective corrective actions are taken in compliance with contractual and statutory requirements.

11.10 PERSONAL PROTECTIVE EQUIPMENT AND EMERGENCY EQUIPMENT

PPE is located throughout the PUREX facility. Specific locations of the emergency equipment are contained in the building emergency plan. Change rooms contain protective clothing, air purifying respirators, and self contained breathing apparatus. Spill kits and acid suits are located at locations where hazardous materials are stored and handled. Fire extinguishers are located throughout the facility. There is also an emergency kit intended for use in radiological incidents.

12.0 CONFINED SPACE ENTRY POLICIES, GUIDELINES, AND REQUIREMENTS

Numerous confined spaces are found in and around the PUREX facilities. These include but are not limited to storage tanks, valve pits, pump pits, underground vaults, and caissons. The hazards of entering and working in these confined spaces will be reduced by following the requirements and procedures prescribed in WHC-CM-4-40, Section 3.1, "Confined Space Entry." These procedures will be implemented at the PUREX facility per WHC-CM-5-9, Section 1.13. A list of confined spaces at PUREX is maintained in the Shift Office. Any work activities requiring entry into a confined space will be clearly identified.

13.0 SPILL CONTAINMENT

The handling of hazardous materials or solutions was a routine activity associated with PUREX operations. Inherent in the handling of such materials was the development of procedures to address the containment and clean-up of such spills. PUREX currently uses two procedures to address the handling of spilled materials in the facility. Spills of a larger magnitude, such as the failure of a nitric acid storage tank are covered by the facility emergency plan.

Perform Spill Response and Clean Up of Hazardous Chemicals, PO-020-290, Rev A-2, addresses the general clean up of chemical spills. This procedure includes sections addressing general response, inorganic liquids, organic liquids, nitric/sulfuric acids, potassium or sodium hydroxide, dry chemicals and mercury.

Handle Spills in AMU, P&O Gallery and Sample Gallery, PO-020-285, Rev. B-1, address the handling of spills in specific facility areas. This procedure is based on the previous make-up of and operations with facility chemical solutions. However, it has not be voided since it must be assumed that, at least, trace amounts of these chemicals may be present in these facility areas.

Spills which are identified in the facility emergency response plan would be handled by trained HAZMAT team personnel. Spills of all magnitudes are evaluated and reported per the criteria in WHC-CM-1-3, MRP 5.14, *Occurrence Reporting and Processing of Operations Information*. This MRP also determines the appropriate level of post event review and evaluation.

Appendix A

INDUSTRIAL HYGIENE ASSESSMENT

PUREX FACILITY/200E

Purpose/Strategy:

The major purpose of this industrial hygiene effort was to secure information on PUREX operations and tasks which can be useful in evaluating occupational exposures to potentially hazardous chemicals and physical agents. This is the basis for the Hanford Occupational Exposure Assessment Program (HOEAP). To develop an industrial hygiene "profile" for PUREX, the following actions were taken:

- Performed a general walkthrough of PUREX 202-A and associated facilities
- Reviewed past survey/monitoring reports, operating documents, illness/injury log, work packages, related manuals and other records
- Interviewed various operations and support personnel

This assessor had performed a similar survey at PUREX back in 1991 (see "Chemical/Physical Hazards Evaluation 200 East Area, PUREX Operations", November 1991, Don Quilici, Environmental Health Sciences). At that time, the report concluded that potential exposures to chemical (nonrad) hazards were very limited. This appears to be even truer now, based on all available evidence.

General Findings:

WALKTHROUGH-

Overall, the walkthrough exercise did not provide much chance to adequately evaluate potential industrial hygiene hazards. No actual work of any IH significance was observed at that time. Facility oriented inspection activities do have value, especially when looking at safety-related items. However, the most important factor in adequately recognizing and evaluating worker exposure to potential health hazards is the ability to **observe** the work actually being performed. Program elements such as good written procedures, adequate personal protective equipment, copious MSDSs and mountains of other documents can assist the assessor in forming opinions regarding potential risk. However, definitive industrial hygiene conclusions usually require detailed observations of the work involved with specific operations. The HOEAP form functions best when used under working conditions.

Much of the facility-related information contained in the 1991 report is still relevant and there is no point in repeating those observations. A copy of that report should be attached to this document. Comments regarding the present walkthrough experience include:

- Evidence of prior asbestos removal was observed in several areas. Some remaining debris was noted on pipes/valves in limited locations on the second floor of AMU, including piping into a coil at the air duct behind tank 153, and piping behind tank 150 (under the stairs). This may not be asbestos (perhaps new insulation or encapsulant) but leaving loose residue is a poor abatement practice. Open ends of suspect asbestos insulation on piping were also observed in the AMU basement above the pump to tank 108, and another section on piping behind tank 107. A few isolated spots of open suspect asbestos were also present in the process blower room. These should be covered, but overall the bulk of asbestos materials throughout PUREX are in good condition at this time and pose no problem for normal building operations (this issue is also addressed in the INDUSTRIAL HYGIENE RISK ASSESSMENT form with subsequent comments).
- On the first and second floors of AMU, the tanks are now placarded with the new confined space entry signs, stating that permit entry only may occur. In addition to the Hazardous Material Sign posted on each tank, there are identical signs suspended above the tanks (even though the tanks are empty).
- In the service blower room, new confined space signs are also now on the distilled water tank (TK-V84-1) and the doors into the air washer units (nonpermit).
- Also in the service blower room, microbicide and water scale inhibition chemicals previously containing a carcinogen (ethylene dichloride) have been replaced. Now, Dearcide 735 and Dearborn 878 are used for water treatment.
- The service blower and compressor areas are properly posted with warning signs requiring hearing protection, depending upon length of stay in specific rooms. Several boxes of ear plugs were observed at the entry doors. Concern had arisen regarding the sound level in the power control room. Measurements were taken and the level found much lower than the permissible limit. Some find the type of sound energy here (low frequencies) tends to be irritable, but there is no danger of hearing loss. All power operators participate in the WHC hearing conservation program.
- Many of the chemicals previously noted in 2714-A have been eliminated and remaining materials are awaiting takers.

- No analytical activity was observed throughout the laboratory. Chemical usage appears minimal and no air monitoring for potential exposures is suggested (mostly, acids are still used). The X-Ray Spectra Unit, formerly used for uranium analysis in room 58, is no longer used. The power is off and the unit is disconnected. Apparently, the lab presently supports tank farm waste characterization, but the ultimate fate of the facility seems unknown at this time.
- Vent and Balance personnel are still active in PUREX since they must perform in-place HEPA testing. The previous penetrant challenge aerosol (DOP) has been replaced with EMERY and presents no significant exposure hazard.

INDUSTRIAL HYGIENE SAMPLING-

Many of the industrial hygiene sampling tasks recommended in past reports have either been completed or there is no longer need for the specific testing. From 1989-1991, HEHF performed sampling for a variety of chemicals, including:

- ONitrogen dioxide/oxides (acid pumping, handling, TIG welding, NOx monitor calibrations)
- OHydrazine (bulk transfers)
- OSodium carbonate (dumping bags)
- OSodium nitrite (dumping bags)
- OPotassium permanganate (scooping, weighing)
- OOzone (TIG welding)
- OParticulate (dust) (welding, grinding)
- OMetals (welding fume)
- OCadmium (replacing filter trap)
- O1,1,2,2-Tetrabromomethane (spill)
- ODioctyl sebacate (HEPA testing)
- OSulfamic acid (sulfamic addition)

All of the test results for the above chemicals indicated average employee exposures much less than permissible concentrations (PELs).

Also, noise measurements were completed in the blower and compressor rooms, including dosimetry testing on power operators. Results were used to establish appropriate stay times in each area without ear protection.

Other recommendations for sampling certain plant operations still stand but again depend on frequency and duration of tasks.. For example, painting can present industrial hygiene exposures, especially when acrylics and other volatile coatings are used. If this should occur to any significant extent, sampling is of course justified. Work package 2A-92-00310 describes 1-5 year painting

goals for PUREX. During this time, a variety of painting tasks are indicated, using enamels and latex. These are the kinds of work that the resident industrial hygienist should be familiar with.

ILLNESS/INJURY RECORDS-

The illness/injury log for PUREX operations was reviewed over the past two and one-half years. For calendar year 1992, there were 33 first aid cases, 13 recordables, and 6 lost workday cases. Industrial hygiene related causes involved only three of the first aid claims. In one, two crane operators were potentially exposed to HALON when the fire control system was activated in the canyon. The other case occurred when a nuclear operator taking dip samples of nitric acid breathed potential NO₂ while opening the lid to a tank.

During 1993, 43 first aid cases were reported, along with 11 recordables with 3 lost workday instances. One first aid case alleged skin burn from an unknown source, while another situation involved possible inhalation of unknown chemical vapors in the White Room. A recordable case occurred when an HPT was exposed to Elektrokleen vapors while obtaining a smear sample in a small area.

So far in 1994, one recordable case involving a cumulative trauma disorder claim has been claimed and is being investigated.

This data is unremarkable in regards to industrial hygiene type concerns. It provides no significant indication or trend of any particular kind of problems occurring at PUREX.

WORK PACKAGES-

A general review of a random sampling of work packages (30-40) was conducted. Few packages had been seen by industrial health and safety and limited comments were noted. However, most of the work indicated would be expected to have minimal hygiene (nonrad) concerns. Where any possible exposures to chemicals could occur, MSDSs were present as part of the work package. Most safety statements were generic in nature, referring to applicable RWPs, relevant Control Manuals and specific MSDSs.

One work package reviewed included "N-Cell Small Equipment Removal" (#WP-P-93-039). This work involved removal of equipment, piping, and other items from wet and dry gloveboxes. Decontamination with damp rags or brushes was required prior to removal as waste.

Safety considerations discussed in the package were understandably mostly radiation oriented, with specific attention to criticality safeguards. Proper cautions were stated regarding glove safety and potential contamination. No industrial hygiene monitoring needs were apparent and PPE appeared appropriate for handling and loading TRU and TRU-Mixed wastes. HPT Hold Points were contained in the

package, requiring HPT initialing at specific checklist points. NO specific nonrad IH recommendations appeared appropriate for these tasks.

Another package reviewed was "PUREX Organic Solvent Transfer to Tank 40" (#WP-P-93-051). This work consisted of transferring an organic mixture of NPH and TBP from tanks G5 & R7 (plus a tanker trailer) to tank 40 at 211-A. To accomplish this, above ground flexible transfer lines were routed from 203-A and the trailer directly to tank 40. After transfer, the route was flushed with water to remove residual organic.

The safety review in this package primarily addressed the applicability of existing operational safety requirements (OSRs). It was decided that transferring flammable organic solvents is adequately controlled by the PUREX Process Control Manual, and applicable sections were listed in the package. HPT check points were designated. Potential health concerns mainly focused on possible spills or leaks in the transfer lines. General warnings (evacuate, wear appropriate PPE as specified by Supervisor or MSDS) were given regarding proper action if a spill or leak were found. In the "TOOLS AND EQUIPMENT" list for the work, full-face respirators were specified but appropriate cartridges were not. For example, should a leak or spill occur, HEPA cartridges (normally supplied on the respirators) would not offer protection against organic vapors- dual filters would be necessary.

There is no indication that this proposed work was reviewed by any safety or health person. A four-page "HAZARD ANALYSIS CHECKLIST" was prepared, but it suggested no potentially significant consequence could likely occur from this work (even though approximately 21,000 gallons of organics is involved). In fact, the checklist sheet noting "FACILITY SPECIFIC HAZARDS" states "N/A." This is questionable.

WHC-CM-5-9, "WORK PACKAGE PREPARATION" is the PUREX administrative procedure used for the preparation and processing of work documents. As appropriate, industrial health and safety is required to review these documents. For example, all LEVEL 1-3 work must be reviewed by IS&H (but not LEVEL 4 documents). Also, section 4.9.1 states that North Facilities Safety Assurance shall review "...WCNs that involve hazardous material, fire protection, industrial hygiene, industrial safety concerns, or nuclear safety...." The end result of all this appears to be that the work planner and/or cognizant engineer still makes many of the decisions regarding the necessity of further review by professional IS&H personnel. Certainly, it must be recognized that the temptation may exist to declare work LEVEL 4, thus expediting the work package. It is also rather difficult to imagine many upcoming tasks which do not meet any of the "concerns" criteria expressed in 4.9.1. This problem has been addressed in other areas- for example, all work packages for tank farms are now reviewed by

safety and health. For pre-approved maintenance work procedures (PAPs) at PUREX, IS&H must sign off on a checklist.

ALARA-

The ALARA section of the PUREX administrative manual addresses nonradiological concerns. It appears that the total ALARA concept, as applied to nonrad potential hazards, is in a certain stage of confusion at this and other DOE sites. This disarray seems to be an outcome of the inappropriate application of (historically) radiation terminologies, procedures, and control methodologies to the general chemical and physical hazards now in the spotlight (per the new environmental mission). A detailed discussion of ALARA and its philosophical importance to occupational health is outside the scope of this report. However, it does merit some mention when considering how nonradiological hazards may be addressed and best communicated to workers.

For example, the safety directives in CM-5-9 for PUREX state that when a special RWP is needed for work, an ALARA Management Worksheet (AMW) shall be initiated by an HP. It is then reviewed by a designated person, who shall be an HP analyst, HP engineer, OP plant engineer, or PUREX OPS & Outage Planner. Although the AMW provides for yes/no responses to the question "Can additional nonrad hazards be identified and planned for?", no professional IS&H reviewer is designated. Perhaps this is not often necessary since the special RWP is radiation-protection driven. However, it seems that a logical way to cover both rad and potential nonrad hazards would be to address them on the same RWP. With some simple modifications, the RWP could be used as a checklist and advisory document for all hazards. Since the RWP must be present at every task site and must be read by all participants, this would serve a dual purpose and be an important part of the overall hazard communication effort. Again, this would necessitate input from both HP and IS&H disciplines.

CARCINOGENS-

Industrial hygiene concerns are addressed in the PUREX manual section on carcinogen control. According to this document, IH is required to provide a baseline survey of all suspect PUREX areas for carcinogens, monitor as necessary, determine if control areas and actions are necessary, and review/approve procurement of carcinogens. This is a new and detailed document which nicely enhances requirements of the general carcinogen control program contained in the WHC IH manual (CM-4-40). However, it is unclear how much real participation WHC IH has had to date in working with PUREX on this program. In fact, no signoff by IH on the PUREX control document is indicated. Also, in Appendix B the statement is made that "CURRENT CARCINOGENS USED IN THE FACILITY ARE CONSUMER ITEMS. THE QUANTITY OR FREQUENCY OF USE DOES NOT REQUIRE OPERATING PROCEDURES AT THIS TIME." Appendix C goes on to claim "CARCINOGENS

ARE NOT BEING USED IN QUANTITIES, FREQUENCY, OR FIXED AREAS THAT WOULD REQUIRE CONTROLS AT THIS TIME." There is no indication who made these determinations (see also attached HOEAP form and item discussion).

Discussion:

Besides the obvious need for present IH input into the above situations, the industrial hygiene effort at PUREX should focus on all operations and tasks associated with the deactivation and surveillance programs. This is not a production facility and must be approached accordingly- meaning, on any given day the work scenario may be quite different. Simply observing the facility may be beneficial if actual work is being done that specific day. Otherwise, little is learned (as opposed to production where any given day may be expected to be at least similar to the day before or the day after observations for IH related exposures). Industrial hygiene should review all work packages and make appropriate comments on any that suggest worker exposure to chemical and/or physical agents. Then, the field hygienist should arrange to observe the work, sample as necessary to document exposure, complete the HOEAP forms for the specific operation, and make pertinent recommendations. For example, hygiene review would have been appropriate for the work involving the transfer of the organic solvents, and more specific requirements could have been included in the package, such as specified type of respiratory cartridges and PPE.

In first reviewing the deactivation Project Management Plan for PUREX (PMP), it appeared that the following tasks should be considered for review by industrial hygiene to determine what health concerns (other than rad) are associated with the work:

- Decontamination of permanent radiation zones to be entered for surveillance (long term)
- Packaging rad & mixed waste
- Decontaminating/sealing gloveboxes
- Removing/stabilizing friable asbestos (ongoing)
- Removing fissile materials
- Draining/flushing tanks, piping
- Collecting/disposing hazardous materials used for deactivation & cleanup
- Drastic reworking of HVAC system
- Isolation of water/electrical systems
- Deactivation of building steam
- Disposal of remaining bulk chemicals, cleaning 211-A storage tanks
- Waste transfers
- Retrieval of N-reactor fuel from cells
- Flushing Canyon
- Operating E-F11 process evaporator

- Disposing solvent in tanks G5 & G7
- Cleaning cells
- Deactivating ancillary buildings
- Fixing contamination in White Room
- Removing/disposing laboratory chemicals
- Disposing concentrated nitric acid held in 203-A & U1, U2 (denitration may produce potential NOx exposure problems)
- Performing waste minimization activities (segregation, compaction, concentrating, diluting liquid wastes)

Then, to further understand the types of potential industrial hygiene exposures that could be significant with deactivation, one of the prime team leaders for the project was interviewed. As he explained, no tasks are underway at this time since they are awaiting approval from the Washington State Department of Ecology and other regulators. In discussing and reviewing the PMP and present status of onsite chemicals, some salient observations included:

- Nitric acid (180,000 gallons) is now stored in tanks P2, P3, P13, & P14. This acid was shipped back to PUREX following the recent campaign in which the remaining UNH in the tanks was sent to UO3 for oxide reclamation. An additional 28,00 gallons of concentrated nitric acid is stored in tanks U1 and U2 in the U cell area. The PMP indicated that denitration of the acid solutions would be part of the disposal activities. This process would release considerable amount of oxides of nitrogen and thus present a significant potential hazard to operators should exposures occur.

However, it now appears that the nitric acid will be sent to England using several batches of eight stackable tanks. This certainly reduces the exposure potential to NOx compared to denitration. Still, the shipping process will require sampling tanks via manual dipping. This presents a possible exposure hazard to the worker as the sample is taken. Past experience in securing such samples has been investigated with industrial hygiene testing done to determine airborne NOx concentrations. Results indicate that the brief exposures encountered may often exceed the short-term permissible exposure level for an unprotected worker.

In fact, section 1.8 of PUREX manual WHC-CM-5-9 specifically addresses requirements for monitoring NOx. NOx monitors have been used routinely at PUREX. They are calibrated in the instrument lab and available from maintenance for use in specified areas. Alarm settings are below the allowable exposure level. Should the alarm occur, evacuation is mandated and reentry requires supplied air (SCBA) respiratory protection or sampling

and release by an RPT. Opening the tanks of remaining nitric acid should be considered a significant (higher) potential area and appropriate precautions used. Calibrating the monitors presents a low exposure potential for technicians. Previous sampling in the instrument tech shop has indicated that the airborne concentration of NO_x is less than the acceptable exposure level during typical calibrations.

- Since the PMP was completed, about 22,000 gallons of contaminated solvent has been transferred from canyon tanks G5 & R7 to Tank 40 in the 211-A area (also, organic from a tanker trailer). This solvent contains tributyl phosphate (TBP) and normal paraffin hydrocarbons (NPH). Originally, one of the proposed methods of disposal for this solvent was to ship it to INEL at the Idaho Falls DOE facility for use in the calcining process. Now, it appears this will not happen. Instead, PUREX will continue to look for a user or possible incineration at a commercial facility. Industrial hygiene concerns with the solvent is discussed under a separate section of this report reviewing the work package for the solvent transfer.
- The E-F11 concentrator will operate but not as extensively as earlier predicted. It is now planned to use much of the flush solution to dilute the plutonium-uranium solution in tanks D5 and E6 prior to disposal. Storage of concentrated PUREX liquid wastes will depend on restart of the 242-A evaporator and subsequent reduction of dilute waste now in the double-shell tanks.
- Gross removal of asbestos materials will not occur. Nonfriable material in good condition will be identified and left intact, as proposed in the PMP. Prior to that, any disturbed asbestos will be repaired or removed, as necessary. This of course poses potential industrial hygiene exposures, but the work with asbestos throughout PUREX and the entire Hanford site continues to be strictly monitored in accordance with all regulations.
- Many of the tanks and lines throughout PUREX have been emptied and flushed, although the tanks in AMU are still considered "contaminated" as they may contain residues. In 211-A, caustic, sodium nitrite, and acid are still present in tanks, plus ion exchange resin. Not all pumps have been disconnected. These materials are kept for pH adjustment and corrosion inhibition. Health concerns

mainly involve potential exposures to skin and eyes, as the remaining materials must be handled. Airborne exposure should be minimal.

In the P&O gallery, approximately 11 gallons of mercuric nitrate still remains in one small tank. Removal procedures should require approval and possible sampling by industrial hygiene.

In AMU, carcinogen control zones are still identified around tanks formerly containing cadmium nitrate and hydrazine. The tanks have been emptied and flushed. It is doubtful that any significant exposures could thus occur in the area, but management believes it is a good idea to keep the area posted at this time.

- Some industrial hygiene concerns may arise as certain solid wastes must be handled for disposal, including lamp ballasts, expired chemicals, paints, oils, aerosol cans, solvent-wetted rags. This work should be observed by hygiene and sampling initiated, if significant exposures are indicated.
- Once major deactivation work can begin, an apparently urgent task will be the removal of spent fuel that still remains in PUREX. Several disposal/handling options are being explored at this time. Again, although the apparent real concerns are rad-related, industrial hygiene should be involved in the approval process, focusing on any IH-related exposures which could surface during removal of the fuel.
- Section 7.1.3.2 of the PMP addresses "Industrial Safety and Hygiene". Routine deactivation work will be according to instructions in the WHC hygiene and safety manuals. Although the intent of this statement is obvious, it is somewhat misleading. Health and safety manuals really do not give "instructions" on how to do work- rather, they mandate what precautions and safeguards must be in place when doing the work. It is recommended that this section be rewritten to reflect this discrepancy. Also, it should be policy (detailed elsewhere in this report) that industrial hygiene review all proposed tasks associated with deactivation and provide appropriate interpretation of the applicability of those regulations pertinent to health concerns.

Summary/Recommendations:

Limited industrial hygiene (nonrad) concerns for the present operations at PUREX were noted during the course of this assessment. The major recommendation, based on all the above information, is that industrial hygiene establish a firm presence at PUREX and become proactively involved in the upcoming deactivation operations. IH review of all work packages will seem excessively cumbersome to some. In fact, much of the work will have few (nonrad) health concerns so the review should be expedient. This presumes the IH is at the site and is available on a daily basis to complete these chores. When tasks develop where real health hazards are possible, the IH should provide specific input which is then incorporated into the work package and procedures (beyond the rather generic approach that has been the rule). The work should then be observed and monitored (as necessary) through completion. Concurrent with this responsibility, the hygienist can assist in other ongoing programs (carcinogen control, HazCom, HOEAP completions, etc).

Specific recommendations are given in the detailed discussion of items summarized on the HOEAP form- INDUSTRIAL HYGIENE BASELINE HAZARD ASSESSMENT.

INDUSTRIAL HYGIENE BASELINE HAZARD ASSESSMENT

The following details expand the description of items noted on the attached form for the HOEAP assessment of PUREX (94-0041):

ITEMS:

1. Evidence of leftover debris from prior removal of asbestos thermal insulation on piping, located on second floor of AMU, behind tank 153 (debris on piping into coil on air duct). Also observed debris on floor and piping behind tank 150 (under the stairs). Often, this kind of debris is not asbestos but the replacement material. However, it is difficult to know this and thus the material is always suspect. Also, it is poor abatement practice to leave debris after removal and violates the intent of applicable codes (WAC 296-62007723, Housekeeping). It should be noted that, overall, all observations indicate that the ongoing asbestos removal/repair effort at PUREX has been excellent.

RECOMMENDATION: Clean up debris, as per asbestos requirements

2. In the AMU basement, an open end of exposed insulation is on a pipe above the pump to tank 108. An exposed section of insulation is also noted on piping behind tank 107. The material appears to be asbestos. Again, these are isolated observations considering the amount of asbestos insulation still in PUREX and in good repair.

RECOMMENDATION: Encapsulate/remove the exposed insulation if it is asbestos.

3. At the time of this assessment, a temporary greenhouse was present at the fan units for the 291A exhaust stack (Units EF-V11-1,2,3) out behind PUREX. Evidently, repairs were being made to the fan units. The HPTs had expressed some concern with possible excessive noise while they had to be at the greenhouse. No work was happening at this time, but the greenhouse was observed. An RWP was posted at the site, but no mention of noise levels or hearing protection required was on the permit. The Work Package (WP 2A-93-00209) had been signed off by IS&H but there was no indication that noise exposure may be a problem around the fan units and that ear protection was necessary, either for the maintenance personnel or HPTs surveying the work.

RECOMMENDATION: This type of potential exposure problem should be addressed during pre-approval

review. Sound-level measurements then could have been taken to verify the necessity of hearing protection and time limitations for exposures, as necessary. This is a minor example of the kind of impact a resident IH may have when able to review all work packages.

4. Industrial hygiene testing should be done if and when any extensive painting is done at PUREX involving acrylics, epoxies, or enamels. This testing would help characterize typical airborne exposure levels for painters.

RECOMMENDATION:

Industrial hygiene should be aware of any future painting projects whereby sampling is indicated. Proper sampling arrangements may then be made and the hygienist can adequately complete a HOEAP evaluation.

5. Welding on stainless steel materials produces airborne nickel and chromium fumes which should be sampled to evaluate worker exposures. Galvanized work should also be tested since airborne zinc oxide is produced. There is no evidence at this time suggesting that such work occurs anymore to any extent in the 202A shop. It is perhaps likely to occur during certain deactivation tasks throughout the facility.

RECOMMENDATION:

Industrial hygiene should be aware of any welding projects whereby sampling is indicated. Proper sampling arrangements may then be made and the hygienist can adequately complete a HOEAP evaluation.

6. The PUREX Plant Administration Manual, CM-5-9, has a new section on carcinogen control. It is detailed and a nice addition to the WHC general carcinogen requirements. Industrial hygiene is given specific responsibilities in the document (determining airborne levels, reviewing procedures, approving carcinogen procurements, identifying regulated areas). Then, in the Appendices, statements are made indicating that neither operating procedures or regulated areas (as per the carcinogen standard) are required at this time due to the small quantities and use duration of carcinogens at PUREX. It is not clear how much industrial hygiene input went into this document and these subsequent conclusions. The document is not signed by anyone in WHC IS&H.

RECOMMENDATION: WHC IS&H (specifically industrial hygiene) should sign off on any and all documents relating to carcinogens and should approve such determinations as stated in the Appendices in CM-5-9. Actually, observations during this assessment tend to support the conclusions that only small amounts of significant carcinogens are infrequently used anymore at PUREX. So, this hazard does not appear to be high risk but some administrative clarification is suggested (IH proactive input).

7. Due to the sporadic work nature of tasks at PUREX (and most the Hanford site), it is difficult to gather data which represents typical potential exposure concerns over a period of time for given crafts. Simply walking through the buildings periodically provides little input regarding the true nature of the work being done.

RECOMMENDATION: A resident IH could work closely with the crafts (pipefitters, millwrights, electricians, technicians, etc) to gain information which would allow development of an exposure "profile" over a representative period of time. For example, the IH may choose to observe pipefitter operations over a two-week period, prepared to evaluate given tasks (per the HOEAP form) and take necessary samples to document exposure levels.

8. Same idea as item 7- as deactivation tasks develop, IH should be plugged into "front" end of work, assisting in development of procedures, actual observation of work, and necessary sampling, as the need arises for such IH input.

INDUSTRIAL HYGIENE BASELINE HAZARD ASSESSMENT

HANFORD OCCUPATIONAL EXPOSURE ASSESSMENT PROGRAM (HOEAP)

Date of Assessment: March 16, 1994

Page 1 of 1

Date of Report: July 19, 1994

Hygiene Representative: Don G. Quilici

Assessment Number: 94-0041

Area: 200E Facility: 202A/PUREX

Reviewed/Approved By: Linda Duthie

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT CODE/PRIORITY PLANNING GRID	OSHA SUBPART OR CONSENSUS STANDARD	ESTIMATED CONTROL DATE
1	Asbestos	Asbestos inhalation	AMU, 2nd Floor	Debris from previous asbestos removal on floor, piping.	4	Z	
2	Asbestos	Asbestos inhalation	AMU, basement	Exposed, suspect asbestos pipe insulation (ends).	4	Z	
3	Noise	Hearing loss	Stack exhaust fans	Noise in greenhouse from fan units.	3	G	
4	Inhalation	Vapor inhalation	Varies	Perform Industrial Hygiene sampling during painting with acrylics, epoxies or enamels.	TBD	G, Z	TBD
5	Inhalation	Fume inhalation	Maintenance shop and plant	Perform Industrial Hygiene sampling during welding with stainless steel and/or galvanized metal.	TBD	Q, Z	TBD
6	Carcinogen	Cancer	Laboratory	Industrial Hygiene should review PUREX Carcinogen Control Program.	2	Z	TBD
7	Other	Varies	Varies	Characterize Industrial Hygiene hazards for Crafts during typical maintenance activities.	TBD	G, Q, Z	TBD
8	Other	Varies	Varies	Characterize Industrial Hygiene hazards during deactivation operations, as relevant tasks are planned and occur.	TBD	G, Q, Z	TBD

A-15

Appendix B

PUREX HAZARDS BASELINE DOCUMENT

Prepared for
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Prepared by
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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to define the generic or routine potential hazards identified during the walk-through of the Plutonium Uranium Extraction (PUREX) Plant. This document also identifies controls that can be used by PUREX personnel to prevent or mitigate these potential hazards.

1.2 BACKGROUND

A comprehensive walk-through appraisal of potential hazards was conducted by Los Alamos Technical Associates (LATA) personnel throughout the assigned Westinghouse Hanford Company PUREX facilities. The walk-through took place March 14 - 28, 1994 and encompassed the entire plant, with the exception of the Canyon, L-Cell, and PR Facility. These areas had limited entry due to radiological training requirements and were viewed by videotape.

The audit was conducted on an as-operational basis, which included maintenance and surveillance. No actual repair functions were being performed during the audit; however, videos of actual repair operations were provided to demonstrate the activities in the area. Correlations could be established between the equipment, operations, and personnel that were viewed and potential hazards.

1.3 BASES

This baseline document, based on the *Industrial Safety and Health Comprehensive Baseline Hazard Assessments Instruction*, WHC-IP-0030, summarizes the potential industrial safety hazards noted during the walk-through of the PUREX plant, excluding industrial hygiene risks. The elements reported are all potential hazards per OSHA 29CFR1910, *Industrial Hazards*. Radiological hazards were not in the scope of this assignment. This report is not intended to serve as the Comprehensive Baseline Hazard Assessment (CBHA) of the PUREX plant, but as a baseline document that may contribute to the CBHA.

1.4 LIMITATIONS

This hazard assessment identifies only the potential industrial safety hazards existing during current operations and in no way implies that it encompasses all the hazards within the plant. During the process of the plant walk-through, LATA personnel encountered restrictions on room-entry in specific areas requiring radiological training. Thus, the walk-through was limited to accessible locations. In addition, a separate walk-through of the PUREX plant was conducted by another consultant for the purpose of identifying industrial hygiene risks; therefore, those risks were not noted in the walk-through conducted by LATA, nor do they appear in this report.

It should be noted that this document is intended for identification of generic or routine hazards identified during the walk-through of the PUREX facility. The purpose of this document is not to provide a detailed list of corrective actions for the identified hazards.

1.5 SCOPE

The sections that comprise this document and the topics they cover are outlined briefly below:

Section 2.0 identifies the observations that were made by Los Alamos Technical Associates during the walk-through of the PUREX plant.

Section 3.0 contains the industrial safety hazard assessment reports that identify the potential safety hazards, location and description of the hazards, the OSHA subpart or consensus standard and the abatement for each of the areas within the PUREX plant. Also contained in this section is a list of employee comments compiled during the walk-through regarding plant safety.

Section 4.0 lists the references used in the writing of this document.

2.0 OBSERVATIONS

The following observations were made by Los Alamos Technical Associates personnel during the PUREX facility walk-through:

- a. Employees and supervisors were ignoring safety rules and regulations.
- b. Complacency was noted in the use of provided safety requirements.
- c. Employee-created safety hazards were noted.
- d. Supervisor was exposed to known safety hazard.
- e. Personnel protective equipment was not worn properly.
- f. Protective equipment requirements are not consistent in different areas for the same hazard.
- g. Pregnant women were in Radiologically Controlled Areas.

In addition to the observations noted above, corroded receptacle faces and corroded conduit were noted by the team in many of the plant areas. Though neither of these items are a hazard in themselves, either may present a potential hazard.

Use of corroded receptacles could result in a spalling of the bakelite surface which could result in exposure to live parts. Badly chipped receptacles should be reported and the receptacles should be replaced. If the receptacle is a non-grounding type, it must be replaced with a grounding type in accordance with Section 210-7(d) of the National Electrical Code. Ground-fault circuit interrupter protected receptacles must be provided where replacements are made at receptacle outlets as required by Section 210-8 of the National Electrical Code.

Hanford Standards require the use of corrosion resistant materials suitable for the environment in which they are to be installed. Over time these materials will still become corroded in a corrosive environment. Such is the case with much of the electrical conduit within the PUREX plant. Both mechanical and electrical continuity of metal raceways (conduit) and enclosures are required, as well as connection of this interconnected system to the system grounding electrode at the building electrical service. This ensures the safety of personnel coming in contact with the noncurrent carrying parts of the circuit (conduit, enclosures, etc.) and assures proper operation of overcurrent devices in the event of an electrical fault. Suspect badly corroded conduit should be tested for electrical continuity and mechanical strength.

Another potential hazard observed was "aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure." The requirement of 1910.22 is to maintain aisles and walkways such that floors are clean and dry, safe clearances are allowed for in aisles, permanent aisles and passageways are appropriately marked, and floor loading plates of approved design are securely affixed in a conspicuous place.

3.0 INDUSTRIAL SAFETY HAZARD ASSESSMENT

The Worker Protection Program Industrial Safety Hazard Assessment reports generated from the PUREX facility walk-through are contained in this section. Each table identifies the potential hazard, location and description of the potential hazard, the OSHA subpart or consensus standard, and the abatement for a specific area within the PUREX plant. The areas of the PUREX plant as they appear in the tables are: Pipe and Operations (P&O) Gallery, White Room, Sample Gallery, Storage Gallery and PIV Area, Aqueous Make-up Unit (AMU), Laboratories, Main Building Support Operations, Control Rooms, Maintenance Shop, Shop Areas, Change Rooms, 206-A Fractionator Building, 203-A Building, 211-A Building, 292-AB Mainstack Building, Effluent Shacks, Offices, Q-Cell, R-Cell Vault, U-Cell Vault, Canyon Proper, Product Removal (PR) Room, and N-Cell. The final table contains employee's comments regarding plant safety that were noted during the plant walk-through.

4.0 REFERENCES

Westinghouse Hanford, 1993. *Industrial Safety and Health Comprehensive Baseline Hazard Assessments Instruction*, WHC-IP-0030, Rev. 1, December 15, 1993, Westinghouse Hanford Company, Richland, Washington.

29 CFR Part 1910, Industrial Hazards.

National Electrical Code.

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WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: P&O Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Main Gallery	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Main Gallery	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Main Gallery	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Main Gallery	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area and fix leaks
5		Not being able to exit safely	Main Gallery	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Not being able to exit safely	Main Gallery	Exits blocked with materials and equipment		29 CFR 1910, Subpart E (Means of Egress)	Clear blockage
7		Exit into hazard	Main Gallery	Exit leads through or to Radiological Controlled Area		29 CFR 1910, Subpart E (Means of Egress)	Reroute
8		Slip, trips, falls	Main Gallery	Bolts and stubs protruding from floor, uneven surfaces, floor opening not properly guarded or identified		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove bolts and stubs, mark or cover, guard and/or post signs
9		Falls, struckby	Main Gallery	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: P&O Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
10		Run into, fall, struckby, blockage	Main Gallery	Scaffolding not removed from completed jobs		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove
11		Run over, fall, struck by	Main Gallery	Scaffolding not properly checked		29 CFR 1910, Subpart D (Walking Working Surfaces)	Check and repair or remove
12		Fall	Main Gallery	Scaffolding without proper guardrailing		29 CFR 1910, Subpart D (Walking Working Surfaces)	Install guardrailing
13		Struck by	Main Gallery	Sling inspection out of date		29 CFR 1910, Subpart N (Materials Handling and Storage)	Follow existing procedure
14		Damaged slings	Main Gallery	Slings not stored properly		29 CFR 1910, Subpart N (Materials Handling and Storage)	Pick-up, inspect and store
15		Lost loads and/or equipment failure	Main Gallery	Pallet movers not inspected		29 CFR 1910, Subpart N (Materials Handling and Storage)	Inspect
16		Electrical shock, chemical burn	Main Gallery	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure
17		Hit by, burnt by	Main Gallery	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: P&O Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
18		Electrical shock or poor workmanship	Main Gallery	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover junction boxes and openings
19		No emergency control	Main Gallery	Access blocked to electrical panels		29 CFR 1910, Subpart S (Electrical)	Clear access
20		Electrical shock, equipment failure, damage to extension cord	Main Gallery	Use of temporary wiring, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
21		Electrical shock or poor workmanship	Main Gallery	Exposed conductors, ungrounded plugs		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit, repair plugs
22		Electrical shock	Main Gallery	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover receptacles
23		Electrical shock	Main Gallery	Wires not enclosed in raceway		29 CFR 1910, Subpart S (Electrical)	Repair
24		Electrical shock	Main Gallery	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
25		Fire	Main Gallery	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove
26		Trips, falls, and damaged tools	Main Gallery	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: P&O Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Gallery Mezzanine	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Gallery Mezzanine	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Slip, trips, falls	Gallery Mezzanine	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
4		Slip, trips, falls	Gallery Mezzanine	Bolts and studs protruding from floor, uneven surfaces, floor openings not properly guarded or identified		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove bolts and studs, mark or cover, guard and/or post signs
5		Falls, struck by	Gallery Mezzanine	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
6		Run into, fall, struck by, blockage	Gallery Mezzanine	Scaffolding not removed from completed jobs		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove
7		Run over, fall, struck by	Gallery Mezzanine	Scaffolding not properly checked		29 CFR 1910, Subpart D (Walking Working Surfaces)	Check and repair or remove
8		Fall	Gallery Mezzanine	Scaffolding without proper guardrail		29 CFR 1910, Subpart D (Walking Working Surfaces)	Install guardrail

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: P&O Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
9		Hit by, burnt by	Gallery Mezzanine	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
10		Electrical shock or poor workmanship	Gallery Mezzanine	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover junction boxes and openings
11		No emergency control	Gallery Mezzanine	Access blocked to electrical panels		29 CFR 1910, Subpart S (Electrical)	Clear access
12		Electrical shock, equipment failure	Gallery Mezzanine	Use of temporary wiring; improper use of extension cords		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment
13		Electrical shock or poor workmanship	Gallery Mezzanine	Exposed conductors, ungrounded plugs		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit, repair plugs
14		Electrical shock	Gallery Mezzanine	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover receptacles
15		Electrical shock	Gallery Mezzanine	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
16		Fire	Gallery Mezzanine	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove
17		Trips, falls, and damaged tools	Gallery Mezzanine	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: P&O Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Drum Compactor and Waste Separator	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Drum Compactor and Waste Separator	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Slip, trips, falls	Drum Compactor and Waste Separator	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
4		Not being able to exit safely	Drum Compactor and Waste Separator	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
5		Slip, trips, falls	Drum Compactor and Waste Separator	Bolts and stubs protruding from floor, uneven surfaces, floor openings not properly guarded or identified		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove bolts and stubs, mark or cover, guard and/or post signs
6		Falls, struck by	Drum Compactor and Waste Separator	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
7		Run into, fall, struck by, blockage	Drum Compactor and Waste Separator	Scaffolding not removed from completed jobs		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove
8		Run over, fall, struck by	Drum Compactor and Waste Separator	Scaffolding not properly checked		29 CFR 1910, Subpart D (Walking Working Surfaces)	Check and repair or remove

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: P&O Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
9		Fall	Drum Compactor and Waste Separator	Scaffolding without proper guardrailing		29 CFR 1910, Subpart D (Walking Working Surfaces)	Install guardrailing
10		Hit by, burnt by	Drum Compactor and Waste Separator	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
11		Electrical shock or poor workmanship	Drum Compactor and Waste Separator	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
12		Electrical shock, equipment failure	Drum Compactor and Waste Separator	Use of temporary wiring instead of having wiring fixed; improper use of extension cords		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment
13		Electrical shock	Drum Compactor and Waste Separator	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
14		Electrical shock	Drum Compactor and Waste Separator	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
15		Fire	Drum Compactor and Waste Separator	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove
16		Trips, falls, and damaged tools	Drum Compactor and Waste Separator	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM
INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
Facility: PUREX Area: White Room

	KEYWORD <small>(for assessment office use only - database tracking)</small>	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		None	White Room	None		None	None

WORKER PROTECTION PROGRAM INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Sample Gallery

	KEYWORD (for assessment, office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Sample Gallery	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Sample Gallery	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Slip, trips, falls	Sample Gallery	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
4		Not being able to exit safely	Sample Gallery	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
5		Slip, trips, falls	Sample Gallery	Uneven surfaces		29 CFR 1910, Subpart D (Walking Working Surfaces)	Mark or cover
6		Falls, struck by	Sample Gallery	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
7		Run into, fall, struck by, blockage	Sample Gallery	Scaffolding not removed from completed jobs		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove
8		Struck by	Sample Gallery	Sling inspection out of date		29 CFR 1910, Subpart N (Materials Handling and Storage)	Follow existing procedure

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:

July 1, 1994

Facility: PUREX

Area: Sample Gallery

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
9		Damaged slings	Sample Gallery	Slings not stored properly		29 CFR 1910, Subpart N (Materials Handling and Storage)	Pick-up, inspect and store
10		Electrical shock or poor workmanship	Sample Gallery	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
11		Electrical shock, equipment failure, damage to extension cord	Sample Gallery	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
12		Electrical shock	Sample Gallery	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
13		Electrical shock	Sample Gallery	Ungrounded plugs		29 CFR 1910, Subpart S (Electrical)	Repair
14		Electrical shock	Sample Gallery	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
15		Trips, falls, and damaged tools	Sample Gallery	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Storage Gallery and PIV Area

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Storage Gallery and PIV Area	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Storage Gallery and PIV Area	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Slip, trips, falls	Storage Gallery and PIV Area	Housekeeping needs improvement, liquid puddles on-floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
4		Not being able to exit safely	Storage Gallery and PIV Area	Exits not marked properly and signs not lit.		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
5		Exit into hazard	Storage Gallery and PIV Area	Exit leads through or to Radiologically Controlled Area		29 CFR 1910, Subpart E (Means of Egress)	Re-route
6		Falls, struck by	Storage Gallery and PIV Area	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
7		Run into, fall, struck by, blockage	Storage Gallery and PIV Area	Scaffolding not removed from completed jobs		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove
8		Electrical shock, chemical burn	Storage Gallery and PIV Area	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure
9		Hit by, burnt by	Storage Gallery and PIV Area	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Storage Gallery and PIV Area

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
10		Electrical shock or poor workmanship	Storage Gallery and PIV Area	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
11		Electrical shock, equipment failure, damage to extension cord	Storage Gallery and PIV Area	Use of temporary wiring instead of having wiring fixed, Improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, Remove temporary equipment, store properly
12		Electrical shock	Storage Gallery and PIV Area	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
13		Electrical shock	Storage Gallery and PIV Area	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
14		Trip, fall and damaged tools	Storage Gallery and PIV Area	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping
15		Fall, Struck by	Storage Gallery and PIV Area	Material stacked too high in storage racks		29 CFR 1910, Subpart N (Material Handling Storage)	Distribute loads
16		Injured feet	Storage Gallery and PIV Area	Material falling on feet		29 CFR 1910, Subpart I (Protective Equipment)	Require safety shoes
17		Back strains	Storage Gallery and PIV Area	Heavy materials stored awkwardly		29 CFR 1910, Subpart I (Protective Equipment)	Provide back support

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Aqueous Make-Up Unit

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Basement AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Basement AMU	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Basement AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Basement AMU	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Not being able to exit safely	Basement AMU	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Electrical shock	Basement AMU	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
7		Electrical shock	Basement AMU	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
8		Trapped, suffocation	Basement AMU	Confined spaces		29 CFR 1910, Subpart G (Environmental Control)	Replace access port lid

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Aqueous Make-Up Unit

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	First Floor AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	First Floor AMU	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	First Floor AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	First Floor AMU	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Not being able to exit safely	First Floor AMU	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Fall or trip	First Floor AMU	Floor openings not properly guarded or identified		29 CFR 1910, Subpart D (Walking Working Surfaces)	Cover, guard, and/or post signs
7		Hit by, burnt by	First Floor AMU	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
8		Electrical shock or poor workmanship	First Floor AMU	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:

July 1, 1994

Facility: PUREX

Area: Aqueous Make-Up Unit

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
9		Electrical shock, equipment failure, damage to extension cord	First Floor AMU	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
10		Electrical shock	First Floor AMU	Exposed conductors		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit
11		Electrical shock	First Floor AMU	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
12		Fire	First Floor AMU	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove
13		Trips, falls, and damaged tools	First Floor AMU	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping
14		Trapped, suffocation	First Floor AMU	Confined spaces		29 CFR 1910, Subpart G (Environmental Control)	Replace access port lid

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Aqueous Make-Up Unit

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Second Level AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Second Level AMU	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Second Level AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Second Level AMU	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Not being able to exit safely	Second Level AMU	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Fall or trip	Second Level AMU	Floor openings not properly guarded or identified		29 CFR 1910, Subpart D (Walking Working Surfaces)	Cover, guard, and/or post signs
7		Electrical shock, chemical burn	Second Level AMU	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure
8		Hit by, burnt by	Second Level AMU	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
9		Electrical shock or poor workmanship	Second Level AMU	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Aqueous Make-Up Unit

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
10		Electrical shock, damage to extension cord	Second Level AMU	Improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Remove temporary equipment or replace with fixed wiring, store properly
11		Electrical shock	Second Level AMU	Exposed conductors		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit
12		Electrical shock	Second Level AMU	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
13		Electrical shock	Second Level AMU	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
14		Trip, fall and damaged tools	Second Level AMU	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping
15		Trapped, suffocation	Second Level AMU	Confined spaces		29 CFR 1910, Subpart G (Environmental Control)	Replace access port lid

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994

Facility: PUREX

Area: Aqueous Make-Up Unit

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Upper Level AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Upper Level AMU	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Upper Level AMU	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Upper Level AMU	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Fall or trip	Upper Level AMU	Floor openings not properly guarded or identified		29 CFR 1910, Subpart D (Walking Working Surfaces)	Cover, guard, and/or post signs
6		Electrical shock, chemical burn	Upper Level AMU	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure
7		Hit by, burnt by	Upper Level AMU	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
8		Electrical shock, or poor workmanship	Upper Level AMU	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Aqueous Make-Up Unit

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
9		Electrical shock, equipment failure, damage to extension cord	Upper Level AMU	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
10		Electrical shock	Upper Level AMU	Exposed conductors		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit
11		Electrical shock	Upper Level AMU	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
12		Electrical shock	Upper Level AMU	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
13		Fire	Upper Level AMU	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove
14		Trip, fall and damaged tools	Upper Level AMU	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping
15		Fibrosis, asbestosis	Upper Level AMU	Friable asbestos exposure		29 CFR 1910, Subpart G (Environmental Control)	Follow existing procedures

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Laboratories

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Upper Level	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Upper Level	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Slip, trips, falls	Upper Level	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
4		Falls, struck by	Upper Level	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
5		Electrical shock or poor workmanship	Upper Level	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
6		Electrical shock, equipment failure, damage to extension cord	Upper Level	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords laying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
7		Electrical shock	Upper Level	Exposed conductors		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit
8		Electrical shock	Upper Level	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
9		Electrical shock	Upper Level	Ungrounded plugs		29 CFR 1910, Subpart S (Electrical)	Repair

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Laboratories

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
10		Electrical shock	Upper Level	Wires not enclosed in raceway		29 CFR 1910, Subpart S (Electrical)	Repair
11		Electrical shock	Upper Level	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
12		Fire	Upper Level	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove
13		Trips, falls and damaged tools	Upper Level	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping
14		Hearing damage	Upper Level	Possible excessive noise for 8 hr exposure		29 CFR 1910, Subpart G (Environmental Control)	Survey noise

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994

Facility: PUREX

Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Service Blower Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Service Blower Room	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Service Blower Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Service Blower Room	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Not being able to exit safely	Service Blower Room	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Falls, struck by	Service Blower Room	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
7		Electrical shock, chemical burn	Service Blower Room	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994

Facility: PUREX

Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
8		Hit by, burnt by	Service Blower Room	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
9		Electrical shock or poor workmanship	Service Blower Room	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
10		Electrical shock, equipment failure, damage to extension cord	Service Blower Room	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
11		Electrical shock	Service Blower Room	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Process Blower Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Process Blower Room	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Process Blower Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Process Blower Room	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Not being able to exit safely	Process Blower Room	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Falls, struck by	Process Blower Room	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
7		Electrical shock, chemical burn	Process Blower Room	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure
8		Hit by, burnt by	Process Blower Room	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
9		Electrical shock or poor workmanship	Process Blower Room	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
10		Electrical shock, equipment failure, damage to extension cord	Process Blower Room	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
11		Electrical shock	Process Blower Room	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water
12		Fire	Process Blower Room	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove
13		Trips, falls, and damaged tools	Process Blower Room	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Compressor Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Compressor Room	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Compressor Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Compressor Room	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Not being able to exit safely	Compressor Room	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Falls, struck by	Compressor Room	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
7		Electrical shock, chemical burn	Compressor Room	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:

Facility: PUREX

Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
8		Hit by, burnt by	Compressor Room	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
9		Electrical shock or poor workmanship	Compressor Room	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
10		Electrical shock, equipment failure, damage to extension cord	Compressor Room	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
11		Electrical shock	Compressor Room	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Aisles not properly marked to avoid hazardous equipment, chemical burns, and radiation exposure	Switchgear Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart D (Walking Working Surfaces)	To be maintained
2		Escape from hazards	Switchgear Room	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
3		Exposure to possible hazards and to avoid hazards of equipment and possible chemical burns	Switchgear Room	Aisle and walkways not properly marked		29 CFR 1910, Subpart E (Means of Egress)	To be maintained
4		Slip, trips, falls	Switchgear Room	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
5		Not being able to exit safely	Switchgear Room	Exits not marked properly and signs not lit		29 CFR 1910, Subpart E (Means of Egress)	Evaluate and repair
6		Falls, struck by	Switchgear Room	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
7		Electrical shock, chemical burn	Switchgear Room	Electrical equipment removed, not tagged, or locked. Same with gas and liquid piping valves		29 CFR 1910, Subpart J (General Environmental)	Implement existing procedure

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Main Building Support Operations

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
8		Hit by, burnt by	Switchgear Room	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
9		Electrical shock or poor workmanship	Switchgear Room	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
10		Electrical shock, equipment failure, damage to extension cord	Switchgear Room	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
11		Electrical shock	Switchgear Room	Water around electrical equipment		29 CFR 1910, Subpart S (Electrical)	Fix water leaks and clean up water

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Control Rooms

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Trip, slip	Head-End	General housekeeping		29 CFR 1910, Subpart D (Work Walking Surfaces)	To be maintained
2		Escape from hazards	Head-End	No emergency evacuation maps		29 CFR 1910, Subpart E (Means of Egress)	Post maps
3		Trip, slip	Operational	General housekeeping		29 CFR 1910, Subpart D (Work Walking Surfaces)	To be maintained
4		Escape from hazards	Operational	No emergency evacuation maps		29 CFR 1910, Subpart E (Means of Egress)	Post maps
5		Trip, slip	Central	General housekeeping		29 CFR 1910, Subpart D (Work Walking Surfaces)	To be maintained
6		Escape from hazards	Central	No emergency evacuation maps		29 CFR 1910, Subpart E (Means of Egress)	Post maps
7		Trip, slip	N-Cell	General housekeeping		29 CFR 1910, Subpart D (Work Walking Surfaces)	To be maintained
8		Escape from hazards	N-Cell	No emergency evacuation maps		29 CFR 1910, Subpart E (Means of Egress)	Post maps

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:

July 1, 1994

Facility: PUREX

Area: Maintenance Shop

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Possible Missile	Compressed Gas Storage Area	Compressed gas cylinders not secured properly		29 CFR 1910, Subpart H (Hazardous Materials)	Secure
2		Electrical Shock	Tool Crib	Bad cord on hand tool		29 CFR 1910, Subpart P (Hand Held Equipment)	Tag out and repair

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Shop Areas

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	Instrument Shop	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Slip, trips, falls	Instrument Shop	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
3		Escape from hazards	Weld Shop	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
4		Slip, trips, falls	Weld Shop	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
5		Escape from hazards	Electrical Shop	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
6		Slip, trips, falls	Electrical Shop	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
7		Escape from hazards	Millwright Shop	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: Shop Areas

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
8		Slip, trips, falls	Millwright Shop	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
9		Escape from hazards	Tool Crib	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
10		Slip, trips, falls	Tool Crib	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
11		Escape from hazards	Pipefitters Shop	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
12		Slip, trips, falls	Pipefitters Shop	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
13		Escape from hazards	Compressed Gas Storage Area	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
14		Slip, trips, falls	Compressed Gas Storage Area	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area

WORKER PROTECTION PROGRAM
INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
Facility: PUREX Area: Change Rooms

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Slip, trip	Change Rooms	Water on floors, housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, maintain housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994

Facility: PUREX

Area: 206-A Fractionator Building

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	206-A Fractionator Building	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Slip, trips, falls	206-A Fractionator Building	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
3		Electrical shock, equipment failure	206-A Fractionator Building	Use of temporary wiring instead of having wiring fixed		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: 203-A Building

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	203-A Building	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Slip, trips, falls	203-A Building	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
3		Falls, struck by	203-A Building	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
4		Electrical shock or poor workmanship	203-A Building	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
5		Electrical shock, equipment failure, damage to extension cord,	203-A Building	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: 211-A Building

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	211-A Building	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Falls, struck by	211-A Building	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
3		Run into, fall, struck by, blockage	211-A Building	Scaffolding not removed from completed jobs		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove
4		Run over, fall, struck by	211-A Building	Scaffolding not properly checked		29 CFR 1910, Subpart D (Walking Working Surfaces)	Check and repair or remove
5		Fall	211-A Building	Scaffolding without proper guardrailing		29 CFR 1910, Subpart D (Walking Working Surfaces)	Install guardrailing
6		Electrical shock or poor workmanship	211-A Building	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
7		Electrical shock, equipment failure, damage to extension cord	211-A Building	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
8		Electrical shock	211-A Building	Exposed conductors		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit
9		Falling	211-A Building	No ladder climbing device or guards		29 CFR 1910, Subpart	Install ladder climbing device or guard

WORKER PROTECTION PROGRAM
INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:
Facility: PUREX

July 1, 1994
Area: 211-A Building

	KEYWORD <small>(for assessment office use only - database tracking)</small>	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
10		Pinch points	211-A Building	Electric motor fan guards not adequate		29 CFR 1910, Subpart S (Electrical)	Install new guards

WORKER PROTECTION PROGRAM
INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
Facility: PUREX Area: 292-AB Mainstack Building

	KEYWORD <small>(for assessment office use only - database tracking)</small>	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Fire	Main Gallery	Flammable liquids storage not adequate		29 CFR 1910, Subpart L (Fire Protection)	Repair or remove

WORKER PROTECTION PROGRAM
INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
Facility: PUREX Area: Effluent Shacks

	KEYWORD <small>for assessment office use only - database tracking</small>	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		None	ASD	None		None	None
2		None	CWL	None		None	None
3		None	PDD	None		None	None
4		None	SCD	None		None	None

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Offices

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Electrical Shock	Offices	Misuse of extension cords		29 CFR 1910, Subpart S (Electrical)	Use correct extension cords
2		Falling	Offices	Stacking file boxes too high		29 CFR 1910, Subpart N (Materials Handling and Storage)	Store properly
3		Falling	Offices	File cabinets top heavy		29 CFR 1910, Subpart N (Materials Handling and Storage)	Distribute load

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: Q-Cell

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	Q-Cell	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Slip, trips, falls	Q-Cell	Housekeeping needs improvement		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area
3		Falls, struck by	Q-Cell	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
4		Fall or trip	Q-Cell	Floor openings not properly guarded or identified		29 CFR 1910, Subpart D (Walking Working Surfaces)	Cover, guard, and/or post signs
5		Hit by, burnt by	Q-Cell	Physical hazards not identified		29 CFR 1910, Subpart J (General Environmental)	Post signs
6		Electrical shock or poor workmanship	Q-Cell	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
7		Electrical shock, equipment failure, damage to extension cord	Q-Cell	Use of temporary wiring instead of having wiring fixed, improper use of extension cords, extension cords lying around		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment, store properly
8		Electrical shock	Q-Cell	Exposed conductors		29 CFR 1910, Subpart S (Electrical)	Enclose in junction box or cap off conduit

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: R-Cell Vault

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	R-Cell Vault	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Slip, trips, falls	R-Cell Vault	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
3		Falls, struck by	R-Cell Vault	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
4		Electrical shock or poor workmanship	R-Cell Vault	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
5		Electrical shock, equipment failure	R-Cell Vault	Use of temporary wiring instead of having wiring fixed, improper use of extension cords		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment
6		Electrical shock	R-Cell Vault	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
7		Trips, falls, and damaged tools	R-Cell Vault	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: U-Cell Vault

	KEYWORD <small>(for assessment office use only - database tracking)</small>	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	U-Cell Vault	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Slip, trips, falls	U-Cell Vault	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
3		Falls, struck by	U-Cell Vault	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
4		Electrical shock or poor workmanship	U-Cell Vault	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
5		Electrical shock, equipment failure	U-Cell Vault	Use of temporary wiring instead of having wiring fixed, improper use of extension cord		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment
6		Electrical shock	U-Cell Vault	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
7		Trips, falls, and damaged tools	U-Cell Vault	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report:

July 1, 1994

Facility: PUREX

Area: Canyon Proper

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Escape from hazards	Canyon Proper	No emergency evacuation maps posted		29 CFR 1910, Subpart E (Means of Egress)	Make and post maps
2		Slip, trips, falls	Canyon Proper	Housekeeping needs improvement, liquid puddles on floor		29 CFR 1910, Subpart D (Walking Working Surfaces)	Clean up area, fix leaks
3		Falls, struck by	Canyon Proper	Portable ladders not inspected or properly stored and use questionable		29 CFR 1910, Subpart D (Walking Working Surfaces)	Remove, repair, inspect
4		Electrical shock or poor workmanship	Canyon Proper	Covers off junction boxes and unsealed openings		29 CFR 1910, Subpart S (Electrical)	Cover
5		Electrical shock, equipment failure	Canyon Proper	Use of temporary wiring instead of having wiring fixed, improper use of extension cords		29 CFR 1910, Subpart S (Electrical)	Replace with fixed wiring, remove temporary equipment
6		Electrical shock	Canyon Proper	Uncovered receptacles		29 CFR 1910, Subpart S (Electrical)	Cover
7		Trips, falls, and damaged tools	Canyon Proper	Tools not properly stored		29 CFR 1910, Subpart P (Hand-Held Equipment)	Practice good housekeeping

WORKER PROTECTION PROGRAM

INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: July 1, 1994
 Facility: PUREX Area: PR Room/N Cell

	KEYWORD (for assessment office use only - database tracking)	POTENTIAL HAZARD	LOCATION	DESCRIPTION	RISK ASSESSMENT	OSHA SUBPART OR CONSENSUS STANDARD	ABATEMENT
1		Fall, equipment failure	PR Room	Manlifts, no inspection		29 CFR 1910, Subpart F (Manlifts)	Inspect
2		Fall, equipment failure	PR Room	Manlifts not secured		29 CFR 1910, Subpart F (Manlifts)	Secure
3		Fall, struck by	PR Room	Manlifts not adequately guarded. Guards missing		29 CFR 1910, Subpart F (Manlifts)	Install guards

WORKER PROTECTION PROGRAM
INDUSTRIAL SAFETY HAZARD ASSESSMENT

Date of Report: PUREX

July 1, 1994
Area: Employee Comments

Employee Comments

1.	Too many rules and regulations.
2.	Too much complacency among employees.
3.	Supervisors' and management's philosophy is "do as I say not as I do".
4.	Safety training very good, but there is little or no follow up.
5.	Some safety requirements are too strict for job task and may present hazard rather than eliminate.
6.	Do not fully understand SWP requirements.
7.	Employees have little or no knowledge or experience in plant process.
8.	Protective equipment is most always available, but not used effectively.
9.	Most experienced employees are moving to more secure positions on site, thus the plant is losing personnel with a lot of awareness.
10.	Some procedures are too involved to implement proper corrective action immediately.
11.	Radiological hazards are paramount and overshadow any non-radiological industrial hazards.

Appendix

C

WHC-SU-LP-HSP-002, Rev.0 PUREX/UO₃ TRANSITION PROJECT