

COMPLETE

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## ENGINEERING CHANGE NOTICE

Page 1 of 2

2. ECN Category (mark one)		3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
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Cog. Engineer Signature & Date				
12. Description of Change Complete re-write of Tank Farm Health and Safety Plan, which includes Rev. 13 of the Safe Work Practice, Section 2.9.				
13a. Justification (mark one)				
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13b. Justification Details This revision includes the latest health and safety requirements for Tank Farms, updated confined space tables, and a copy of the Comprehensive Baseline Hazard Findings for each facility. Also, this is a complete format and font change.				
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Conceptual Design Report	[ ]	Installation Procedure	[ ]	Component Index [ ]			
Equipment Spec.	[ ]	Maintenance Procedure	[ ]	ASME Coded Item [ ]			
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FSAR/SAR	[ ]	IEFD Drawing	[ ]	Process Control Manual/Plan [ ]			
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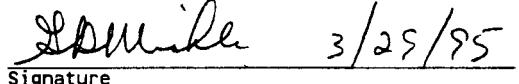
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**7. Abstract**

This Tank Farm Health and Safety Plan (HASP) for the conduct of all operations and work activities at the Hanford Site 200 Area Tank Farms is provided in order to minimize health and safety risks to workers and other onsite personnel. The HASP accomplishes this objective by establishing requirements, providing general guidelines, and conveying farm and facility-specific hazard communication information. The HASP, in conjunction with the job-specific information required by the HASP, is provided also as a reference for use during the planning of work activities at the tank farms.

This HASP applies to Westinghouse Hanford Company (WHC), other prime contractors to the U. S. Department of Energy (DOE), and subcontractors to WHC who may be involved in tank farm work activities. This plan is intended to be both a requirements document and a useful reference to aid tank farm workers in understanding the safety and health issues that are encountered in routine and nonroutine work activities. The HASP defines the health and safety responsibilities of personnel working at the tank farms. It has been prepared in recognition of and is consistent with National Institute of Safety and Health (NIOSH), and Occupational Safety and Health Administration (OSHA)/Unlimited State Coast Guard (USCG)/U. S. Environmental Protection Agency (EPA), Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH 1985); WHC-CM-4-3, Industrial Safety Manual, Volume 4, "Health and Safety Programs for Hazardous Waste Operations;" 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response; WHC-CM-1-1, Management Policies; and WHC-CM-1-3, Management Requirements and Procedures. When differences in governing regulations or policies exist, the more stringent requirements shall apply until the discrepancy can be resolved.

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## ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	Asbestos Containing Material
ALARA	As Low As Reasonably Achievable
BED	Building Emergency Director
CA	Contamination Area
CERCLA	<i>Comprehensive Environmental Response, Conservation, and Liability Act of 1980</i>
CRZ	Contamination Reduction Zone
DST	Double-Shell Storage Tank
DOE	Department of Energy
DOE/RL	Department of Energy/Richland Operations
DOT	Department of Transportation
EKG	Electrocardiogram
EPA	Environmental Protection Agency
EZ	Exclusion Zone
FY	Fiscal Year
HASP	Health and Safety Plan
HAZMAT	Hazardous Materials
HEPA	High Efficiency Particulate Air
HEG	Homogeneous Exposure Group
HEHF	Hanford Environmental Health Foundation
HLAN	Hanford Local Area Network
HPT	Health Physics Technician
HSM	Heat Stress Monitor
HWOP	Hazardous Waste Operations Procedure
HOEAP	Hanford Occupational Exposure Assessment Plan
HWW	Hazardous Waste Worker
ICF KH	ICF Kaiser Hanford Company
IDLH	Immediately Dangerous to Life and Health
IH	Industrial Hygiene
IHFS	Industrial Hygiene Field Services
IHS	Industrial Hygiene Services
JCS	Job Control System
JHA	Job Hazard Analysis
LEL	Lower Explosive Limit
LFL	Lower Flammability Limit
MSDS	Material Safety Data Sheet
NPH	Normal Paraffin Hydrocarbon
NIOSH	National Institute of Safety and Health

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ACRONYMS (continued)

OEL	Occupational Exposure Limit
OHE	Occupational Health Examiner
OSHA	Occupational Safety and Health Administration
OSD	Operating Specification Documents
OVM	Organic Vapor Meter
PD	Position Descriptions
PEL	Permissible Exposure Limit
PFT	Pulmonary Function Test
PIC	person-in-charge
POD	Plan-of-the-Day
POW	Plan-of-the-Week
PPE	Personal Protective Equipment
PWO	Physician's Written Opinion
RBA/URMA	Radiological Buffer Area/Underground Radioactive Material Area
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RL	Richland Operations Office
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SARR	Safety Analysis Report Revised
SCBA	Self-Contained Breathing Apparatus
SSHS	Site Safety and Health Supervisor
SSHR	Site Safety and Health Representative
SST	Single-Shell Storage Tank
SWP	Safe Work Practice
SZ	Support Zone
TLV	Threshold Limit Value
Tri-Party Agreement	<i>Hanford Federal Facility Agreement and Consent Order of 1994</i>
TWRHP	Tank Waste Remediation Health Physics
TWRS	Tank Waste Remediation System
TWRS-IH&S	Tank Waste Remediation System-Industrial Health and Safety
USCG	United State Coast Guard
WBGT	wet bulb globe temperature
WHC	Westinghouse Hanford Company
WRAM	Westinghouse Radiation Area Management

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## TANK FARM HEALTH AND SAFETY PLAN

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### 1.0 INTRODUCTION

This *Tank Farm Health and Safety Plan* (HASP) for the conduct of all operations and work activities at the Hanford Site 200 Area Tank Farms is provided in order to minimize health and safety risks to workers and other onsite personnel. The HASP accomplishes this objective by establishing requirements, providing general guidelines, and conveying farm- and facility-specific hazard communication information. The HASP, in conjunction with the job-specific information required by the HASP, is provided also as a reference for use during the planning of work activities at the tank farms.

General information relevant for all tank farms and facilities is presented separately from site-specific information relevant for specific tank farms or facilities. This two-part separation of interrelated information is presented in the HASP as follows.

- The main body of the HASP is organized according to subject matter and presents general information relevant for the planning and conduct of work at all tank farms and associated facilities. This information establishes baseline health and safety requirements and provides general guidelines.
- The appendices of the HASP are organized so that each tank farm or facility is addressed in a separate appendix, each containing site-specific hazardous waste operations and hazard identification and control information. This information provides a stand-alone hazard communication tool during work planning and pre-job briefings.

There are 149 single-shell storage tanks (SST) and 28 double-shell storage tanks (DST) at the Hanford Site tank farms, with tank capacity ranging from 208,197.65 L (55,000 gal) to 378,541,186 L (1,000,000 gal). It is estimated that the SSTs contain 47,317,648 L (12,500,000 gal) of sludge, 87,821,555 L (23,200,000 gal) of saltcake, and 26,119,342 L (6,900,000 gal) of drainable liquid. The 28 DSTs contain 76,465,319 L (20,200,000 gal) of liquid and 10,220,612 L (2,700,000 gal) of sludge and saltcake.

The waste contained in the SSTs and DSTs consists of highly radioactive, heat-producing, and chemically toxic wastes that are the result of processing spent reactor fuel from the nuclear weapons program. The unique characteristics of the waste create the potential for the generation of flammable gases, explosive mixtures, and/or vapors that are deleterious to the safety and health of workers. As a result of the nature of the waste and activities at the tank farms, workers may be exposed to a number of occupational hazards (e.g., heat stress, work in confined spaces, toxic chemicals, and physical hazards), some of which are typical

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of any large industrial facility where a significant percentage of the work is performed outdoors. Other hazards are unique to the work environment of the tank farms.

## 1.1 SCOPE

This HASP applies to Westinghouse Hanford Company (WHC), other prime contractors to the U.S. Department of Energy (DOE), and subcontractors to WHC who may be involved in tank farm work activities. This plan is intended to be both a requirements document and a useful reference to aid tank farm workers in understanding the safety and health issues that are encountered in routine and nonroutine work activities. The HASP defines the health and safety responsibilities of personnel working at the tank farms. It has been prepared in recognition of and is consistent with National Institute of Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA)/Unlimited State Coast Guard (USCG)/U.S. Environmental Protection Agency (EPA), *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH 1985); WHC-CM-4-3, *Industrial Safety Manual*, Volume 4, "Health and Safety Programs for Hazardous Waste Operations;" 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*; WHC-CM-1-1, *Management Policies*; and WHC-CM-1-3, *Management Requirements and Procedures*. When differences in governing regulations or policies exist, the more stringent requirements shall apply until the discrepancy can be resolved.

Normal tank farm operations are required to comply with 29 CFR 1910.120, a *Resource Conservation and Recovery Act* (RCRA) facility. Operations involving cleanup under the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) or Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA) past-practice sites listed in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1994) are outside the normal tank farm operations. When operations at the tank farms, as directed by DOE, move into the investigation and cleanup of hazardous waste, then tank farms will be managed as a hazardous waste operation, and the Hazardous Waste Operating Procedure (HWOP) will apply. Currently, the HWOP is used only in nonroutine operations where a potential exists for employees to come into direct contact with the waste. Over and above the requirements of 29 CFR 1910.120 paragraph (p), WHC has directed that in certain areas/circumstances additional precautions will be taken and respiratory protection zones established.

## 1.2 DESCRIPTION OF TANK FARM OPERATIONS

The tank farms manage the transfer, storage, and treatment of radioactive liquid wastes from process facilities. The primary routine work done in the tank farms includes surveillance, equipment maintenance, and waste transfers. Other routine work includes in-tank sampling and pumping of wastes to/from/within SSTs and DSTs. The liquid wastes are stored in underground tanks in the 200 East and West Area Tank Farms.

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Field work is performed using a zone concept comprised of Operations, Maintenance, Health Physics, Engineering, Quality, ALARA, and Safety personnel. These zones are responsible for work package planning and preparation, completion of corrective maintenance, surveillance, and calibration field activities, and support to project and construction activities.

Tank Farm Operations is chartered to manage, operate, and maintain the tank farms in a safe, healthful, and efficient manner. All activities will be conducted within the bounds of this HASP, current safety analysis reports (SARs), and in compliance with all applicable federal, state, and local regulations.

### **1.3 METHODS OF CONTROLLING WORK IN TANK FARMS**

Work activities in the tank farms fall into the following broad categories:

- Routine tank farms and facilities access activities having no written procedures required
- Corrective maintenance using the Job Control System (JCS) forms J-1/J-4
- Corrective maintenance using the JCS form J-2 and approved procedures
- Approved routine activities and some corrective maintenance activities using the JCS form J-3
- Activities performed in accordance with approved plant operating procedures.

The following sections describe these activities in more detail and how they relate to this plan. For detailed information on JCS implementation in tank farms, refer to WHC-IP-0842, Section 9.5, "Job Control System" (WHC 1992).

#### **1.3.1 Routine Tank Farms and Facilities Access Having No Written Procedures Required**

Typical activities that fall into this category include:

- Operator surveillance of tank farm equipment/instrumentation
- Health Physics Technician (HPT) radiation monitoring surveillance
- Work package preparer or engineering information gathering
- Industrial hygiene monitoring

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- Industrial safety or quality assurance surveillance.

These type of activities do not require a detailed written procedure to perform. The specific controls necessary to protect the worker are described in this plan and implemented by Operations.

### **1.3.2 Corrective Maintenance Using the J-1/J-4 Forms**

The most formal method of performing maintenance work uses the J-1 form. The J-4 form is approved before performance of the work. The hazards evaluation necessary to protect the worker is covered by the use of the Job Hazard Analysis (JHA) process described in Section 2.0 of this HASP.

Jobs for which performance of work is hazardous, very complicated, or has a higher potential of adversely affecting the environment or equipment operability may require more details in planning. Jobs in these categories may also require more approvals, stricter control of release to work and more control/overview during work. These complex or high risk jobs are sent to the work package preparers on the JCS J-1/J-4 form. The requirements associated with approvals are described in WHC-CM-3-5, Section 12.7.

### **1.3.3 Corrective Maintenance Using the J-2 Form**

Work instructions previously planned and approved for later or repeated use (pre-approved procedures) are sent to supervisor support on the J-2 form. This supervisor support process joins the appropriate pre-approved procedure and other required permits or documents to the J-2 form. Although planning within this process is much less rigorous than the J-1/J-4 planning process, it maintains a high level of control, including provisions for lockout/tagout, formal work release, when needed.

Only one approval signature is necessary on the J-2 form for the work package in which prior approval of the pre-approved procedure has been obtained. When a permit or other document is required, and obtaining it is a step specified in the pre-approved procedure or on the J-2 form, the additional approval signatures needed may be obtained after the work package is approved on the J-2 form. These additional approval signatures are placed on the permit or other document in the spaces provided. This allows time-sensitive permits or other documents to be obtained after a J-2 work package has been approved and sent to scheduling or to the maintenance manager.

The J-2 category of work package typically includes preplanned preventive and predictive maintenance, calibrations, and other periodic work that is recalled. However, pre-approved procedures should also be prepared for corrective maintenance work packages that may recur in the future. The planning and approval process for the first work package to use such a

procedure is the same as the J-1/J-4 process. The value added by this method is realized when the planning and approval processes is almost eliminated the second and subsequent times the same or similar jobs are performed.

Establishing a format for work instructions that can be used by the planner and/or cognizant engineer to develop pre-approved procedures allows them to prepare work instructions that can be used repeatedly, but approved only once. The format used must include provisions for the approval signatures and document controls; e.g., document control numbers and revision/date information. These pre-approved procedures (or work instructions) may then be retained on file and used with J-2 forms for future jobs. This eliminates the creation of a work instruction and processing it through approvals for the second and subsequent times these jobs are worked in the future.

#### **1.3.4 Routine Activities Using the J-3 Form**

The J-3 form is used to perform routine tasks (such as relamping incandescent and fluorescent lights, adding lubricating oils to rotating equipment, and changing out gas bottles). The controls necessary to protect the worker are described in this HASP.

The supervisory support process also includes the use of the J-3 form. Operations screening sends non-hazardous jobs to maintenance management on this J-3 form. These jobs are comprised of tasks that do not require detailed work instruction or require approvals as described in WHC-CM-3-5, Section 12.7. Work that requires lock and tag or work permits that have all the required approval signatures on the permit can be worked using the J-3 work request form. Most work in tank farms can be accomplished using the J-3 work request. The J-3 work request process is further described in Waste Tank Maintenance and Production Control Desk Instruction (DI.003) Use of J-3 Pre-Approved Support Requests.

#### **1.3.5 Activities Using Approved Operating Procedures**

Typical activities in this category include:

- Startup, operation, and shutdown of tank farms equipment using approved procedures
- Transfer of waste into or between tank farms.

The specific controls necessary to protect the worker are described in the specific procedure and this HASP.

## **1.4 ROLES AND RESPONSIBILITIES**

Organization roles, responsibilities, and interfaces are described in charters. Specific individual responsibilities are described in the position descriptions (PD). An overview of these responsibilities is described below.

### **1.4.1 Tank Farm Management**

Tank farm 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 tank farm staff possesses skills and resources necessary to safely conduct their assigned tasks.

### **1.4.2 Tank Farm Employees**

Tank farm 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 or the job supervisor/person-in-charge (PIC) during work performance. Employees should take personal action to correct or mitigate the unsafe condition at the time it is discovered. Employees are responsible for following all written procedures, controls specified in permits (e.g., Confined Space Entry Permit and Radiation Work Permit), and additional safety instructions contained in work control documents or conveyed by the job supervisor/PIC.

### **1.4.3 Tank Waste Remediation System Industrial Health and Safety Management**

The manager is responsible for ensuring close coordination between the tank farm and the organization for the purpose of maintaining a safe and healthful workplace. Other responsibilities include developing and implementing this HASP and auditing field activities, as appropriate, to verify compliance; ensuring the effective integration and involvement of safety and health professionals in daily tank farm activities to ensure hazards are identified and controlled; supporting the line organization in dealing with hazards and establishing safety and health requirements. The manager of Tank Waste Remediation System Industrial Health and Safety (TWRS-IH&S) will function as the Tank Farm Site Safety and Health supervisor (SSHS).

#### **1.4.4 Tank Waste Remediation System Industrial Health and Safety Personnel**

Personnel in the TWRS-IH&S organization are responsible for assisting tank farm management in defining and resolving safety and health issues; aiding in the communication of hazards to tank farm employees; implementing safety and health requirements; providing evaluations of hazards; and verifying compliance with this HASP. TWRS-IH&S personnel will function as the Site Safety and Health Representatives (SSHR).

#### **1.4.5 Site Safety and Health Supervisor**

The SSHS is responsible for designating personnel as SSHRs, ensuring that names of SSHRs are posted at tank farm access points, ensuring the HASP is implemented through the designated SSHRs, and verifying SSHR compliance with the requirements contained in the HASP.

#### **1.4.6 Site Safety and Health Representative**

The SSHR is responsible for ensuring all designated health and safety procedures and requirements are properly implemented in the field and providing technical assistance for all matters specifically related to worker health and safety. The SSHR will invoke stop-work authority for activities that could potentially jeopardize worker health and safety.

Additionally, the SSHR is responsible for evaluating the adequacy of prescribed health and safety procedures and the levels of protection provided for the actual conditions in the field. Where an obvious discrepancy exists between the hazards present and the level of personal protective equipment (PPE) specified, the SSHR will take immediate corrective action. If the level of PPE is inadequate for the actual site conditions, the SSHR will immediately notify the job supervisor/PIC, and ensure the job is discontinued until corrective actions are implemented.

#### **1.4.7 Tank Waste Remediation System Radiological Control**

The Tank Waste Remediation System Radiological Control 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.

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## 2.0 HAZARD EVALUATION

The tank farms pose potential physical, chemical, environmental, and radiological hazards. The radiological hazards associated with the tank farms have been documented extensively; however, this is not true for the analysis of other hazards.

Personnel may be exposed to a variety of chemical, physical, biological, and ergonomic agents while working at the tank farms. Worker exposure to hazards may result from contact with materials, use of equipment, or working conditions. These hazards must be identified, and personnel must be properly protected. The ongoing efforts identified above are aimed at reducing the risks of injury, property damage, or exposure to chemical or radioactive materials. Multiple hazards must be considered, such as vapor exposures; flammability; heat and cold stress; electrical hazards; excessive noise levels; encounters with snakes, spiders, and insects; poor lifting techniques; and slips, trips, and falls.

Tank farm personnel and the Tank Waste Remediation System-Industrial Health and Safety staff work together to identify hazards at the worksite. As hazards are identified and evaluated, controls are employed to eliminate or mitigate the potential risks. The measures employed are documented, and the documentation is then disseminated. This information on hazards is used for work location posting and for discussion at pre-job safety briefings and safety meetings.

This section of the Health and Safety Plan (HASP) provides information on safety and health hazards that may be present at tank farms. For information on specific hazards identified in each of the tank farms and major facilities, refer to Comprehensive Baseline Hazard Assessment description sheets. These sheets are located with the site specific appendices. Each year a Comprehensive Baseline Hazard Assessment is performed and the completed form is attached to the specific farm and facility appendix.

### 2.1 TANK FARM TASK RELATED HAZARDS

TWRS-IH&S conducted a preliminary evaluation of health and safety hazards present in tank farms. This qualitative assessment, known as the Tank Farm Baseline Hazard Assessment, identified and ranked various health and safety hazards in the tank farms. Although the depth of the assessment was limited by its qualitative nature, it served to identify major hazards and pinpoint areas needing future work. Three of the major hazards identified in this evaluation included (1) tank farm vapor exposure, (2) heat stress, and (3) confined spaces. Programs have been implemented to reduce these three major hazards to workers.

Subsequent to the Tank Farm Baseline Hazard Assessment, TWRS-IH&S implemented a program to better define hazards. This program, known as the Hanford Occupational Exposure Assessment Program (HOEAP), provides a comprehensive and integrated approach to characterize chemical, physical, biological, and ergonomic agents used to perform specific

tasks in the work place. During FY 1995, HOEAPs will be performed on selected tasks at tank farms to verify the HOEAP process while obtaining data on the hazards present. This information will be used to refine the HOEAP process and pinpoint tasks for future HOEAPs.

The highest likelihood of accident in the tank farms is linked to procedural errors. Tank operating procedures are complex and very effective when followed. However, major problems can occur if operational errors are made (turning wrong valves, mixing incompatible materials, etc). Tank farm operations cannot be made fail-safe. Safety must continue to rely on a rigorous conduct of operations. This requires a heavy commitment to training and administrative enforcement of proper conduct.

Some potential exposure risk exists with all tank farms hazardous waste tanks. While the exact composition of the contents of each tank is not currently known, the tanks do contain a combination of organic and inorganic chemicals and radionuclides.

WHC has a general knowledge of tank contents based on the method of transfer into specific tanks. Acids, inorganics, and solvents were neutralized and put into the tanks from the 1940s to the present. However, uncertainties about the contents result from the chemicals that are being generated through chemical and radiological reactions.

Initial characterization is currently underway for some of the waste tanks. These efforts will require several years to complete because of the large number of tanks involved and the complexity of the waste mixture. Data from initial characterization efforts are being routed to Industrial Hygiene for evaluation of hazards to employees working around waste tanks. The data, along with information from personal sampling and vapor release (source) monitoring, are being used to establish control measures for tank farm work.

Control measures currently implemented at the tank farms include the use of personal protective equipment, administrative controls in the form of barricaded areas, and monitoring requirements for ammonia and organic vapors. These measures should ensure that vapor exposure levels to employees working around the tanks are well within safe limits. Recent personal sampling results verify that employee exposures are below established standards for personnel exposure.

## **2.2 FIRE AND EXPLOSION**

Potential fire and explosion hazards exist at the tank farms. Fire hazards may be present during activities such as mixing incompatible chemicals or introducing an ignition source into an explosive or flammable environment. The fire and explosion hazards found in the tank farms are discussed in the following paragraphs.

### **2.2.1 Tank Vapor Space Hazards**

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As noted in Section 2.1, characterization of tank headspace vapors is an effort currently in process. Until characterization is completed, the assumption is maintained that all nonventilated tanks have the potential for producing a flammable gas mixture in the tank headspace. During work involving breaking containment on these tanks, monitoring is performed to verify headspace levels are less than 20 percent of the lower flammable limit (LFL). Based on historical records and core sampling of tank contents, some tanks are judged to pose a higher risk because of the potential for gas formation or chemical reaction.

Operating specifications are technical limits on a process that prevent injury to personnel or prevent damage to the facility or environment. One of these specifications affects four categories of tanks: (1) hydrogen/flammable gas, (2) ferrocyanide, (3) organic, and (4) high-heat tanks (WHC 1995). The first three categories pose unique hazards to personnel. The hazards discussed below and the Safe Work Practice (Section 2.9) has provisions to protect workers from these potential hazards.

### 2.2.2 Hydrogen/Flammable Gas Tanks

Although all tanks generate hydrogen gas, 25 tanks currently present a hydrogen gas buildup hazard (see Table 2-1). These tanks have the potential to retain and then periodically release hydrogen suddenly. The amount of flammable gas in these tanks can potentially exceed the lower explosive limit (LEL) during an episodic release (Wilson and Reep 1991). Hydrogen gas is highly flammable and explosive, with a LEL of 4 percent and an upper explosive limit of 75 percent. This gas is colorless, odorless, and tasteless. A significant radiological release could result if hydrogen gas and an oxidizer were ignited and the tank boundary was breached.

Any work in or on these tanks will follow the operating specifications in *Operating Specifications for Watchlist Tanks*, OSD-T-151-00030, Section 30.2.A, "Hydrogen/Flammable Gas Tank" (WHC 1995). If available, data from Standard Hydrogen Monitoring System (SHMS), should be evaluated prior to intrusive work or breach of containment. The controls specified in this document preclude the introduction of an ignition source into a tank or in an area that could potentially exceed the LEL of a flammable gas.

### 2.2.3 Ferrocyanide Tanks

Currently, 18 tanks present of ferrocyanide (FeCN) hazards inside the tanks. Ferrocyanide was added to these tanks to act as a precipitate carrier for <sup>137</sup>Cs. The hazards in these tanks result primarily from the radionuclides and heavy metals that could be released if an exothermic reaction of ferrocyanide occurred and the tank boundary was breached. Ferrocyanide is a stable ion that forms a nontoxic salt. Many cyanide compounds are described as having a bitter almond odor.

Table 2-1. Tank Farm Special Hazard Watch List.

Hydrogen/flammable gas	Ferrocyanide	Organic	High Heat
241-A-101	241-BY-103	241-A-101 <sup>a</sup>	241-C-106
241-AX-101	241-BY-104	241-AX-102	
241-AX-103	241-BY-105	241-B-103	
241-S-102 <sup>a</sup>	241-BY-106	241-C-102	
241-S-111 <sup>a</sup>	241-BY-107	241-C-103 <sup>b</sup>	
241-S-112	241-BY-108	241-S-102 <sup>a</sup>	
241-SX-101	241-BY-110	241-S-111 <sup>a</sup>	
241-SX-102	241-BY-111	241-SX-103	
241-SX-103 <sup>a</sup>	241-BY-112	241-SX-106 <sup>a</sup>	
241-SX-104	241-C-108	241-T-111	
241-SX-105	241-C-109	241-TX-105	
241-SX-106 <sup>a</sup>	241-C-111	241-TX-118 <sup>a</sup>	
241-SX-109 <sup>c</sup>	241-C-112	241-TY-104 <sup>a</sup>	
241-T-110	241-T-107	241-U-103 <sup>a</sup>	
241-U-103 <sup>a</sup>	241-TX-118 <sup>a</sup>	241-U-105 <sup>a</sup>	
241-U-105	241-TY-101	241-U-106	
241-U-107 <sup>a</sup>	241-TY-103	241-U-107	
241-U-108	241-TY-104 <sup>a</sup>	241-U-111	
241-U-109		241-U-203	
241-AN-103		241-U-204	
241-AN-104			
241-AN-105			
241-SY-101			
241-SY-103			
241-AW-101			

Notes:

<sup>a</sup>Tank found in more than one watchlist.<sup>b</sup>Tank 241-C-103 has a separable organic layer on the waste surface.<sup>c</sup>Tank 241-SX-109 has hydrogen potential; tanks 241-SX-101 through 241-SX-106 vent through 241-SX-109.

Ferrocyanide tanks are identified as tanks that contain greater than or equal to 1,000 gram-mole (180 lb/82 kg) of ferrocyanide. Ferrocyanide, in the presence of a near-stoichiometric amount of an oxidizing agent, can be explosive if exposed to high temperatures (above 190 °C [374 °F]) or sparks (Farley 1992).

Any work in or on these tanks will follow the operating specification in OSD-T-151-00030, Section 30.2.B, "Ferrocyanide Tank" (WHC 1995).

#### 2.2.4 Organic Tanks

Although many tanks contain some organic solids and liquids, 20 tanks currently present a special hazard from organic substances. Organic tanks listed in Table 2-1 contain amounts greater than or equal to 3 wt% of total organic carbon (equivalent to 10 wt% sodium acetate). High concentrations of organic compounds and chemicals could support an exothermic reaction at temperatures above 285°C (545°F) (Wilson and Reep 1991). Under certain scenarios involving overheating of a tank, such a mixture of organic solids could react rapidly, possibly breaching the tank boundary and allowing a release of radioactive materials.

Most organic chemicals are potentially combustible. Many organic chemicals have an odor that can be detected at relatively low concentrations; however, tributyl phosphate is odorless. The odor of organic chemicals varies; some are sweet smelling, others have a solvent-type odor, and methylamine smells like ammonia. Mixtures of organic salts and nitrates or nitrates may present a fire and/or explosion hazard.

Currently, tank vapor space analysis is preliminary; consequently, data for tank vapor space analysis are incomplete and lack accuracy and precision. Efforts are being developed to ensure the data are gathered more reliably and in a more scientific manner.

Any work in or on these tanks will follow the operating specification in OSD-T-151-00030, Section 30.2.C, "Organic Tank" (WHC 1995). These tanks have been identified as Watch List Tanks in accordance with *National Defense Authorization Act for Fiscal Year 1991* Public Law 101-510, Section 3137, "Safety Measures for Waste Tanks at Hanford Nuclear Reservation."

#### 2.2.5 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 Confined Space

Entry Permit (WHC form A-6000-895.1, available on JetForm for Hanford Local Area Network [HLAN] users) is required for all hazardous work being done outside of designated welding areas.

#### **2.2.6 Flammable/Combustible Material**

Flammable liquids shall be stored and dispensed from U.S. Department of Transportation (DOT)-approved shipping containers or approved safety containers. The vapors given off from these liquids are above their flash point and therefore are susceptible to any ignition source. WHC-CM-4-41, Section 5.5, provides the requirements for the use, storage, and handling of these liquids.

Flammable gases shall be stored at high pressures in DOT-approved shipping containers, which provide protection. Failure of such a container will release very large volumes of gas; therefore, expert attention to equipment design is needed in handling, transporting, and use of these materials. WHC-CM-4-3, Section PS-2, provides the requirements for the storage, transportation, identification, and use of compressed gases.

### **2.3 CHEMICAL AGENTS**

Exposure to chemical agents could result if personnel come in contact with gaseous, liquid, or solid materials at the tank farms. Some chemical hazards known to exist in waste tanks include normal paraffin hydrocarbon (NPH), ammonia, acetone, butanol, tributyl phosphate and formic acid. Personnel shall make every effort to avoid direct contact with tank contents or other hazardous materials.

The hazards associated with organic materials are described in Section 2.1.

A number of inorganic chemicals are also known to be present in tank waste. Among the compounds that have been detected are ammonia, nitrogen oxides, hydrogen, and acid gases (e.g., hydrogen sulfide, hydrogen cyanide, sulfur dioxide, sulfur trioxide, and hydrogen fluoride). Various nitrates and nitrites are also known to exist in the tank waste.

Many inorganic chemicals smell like ammonia. The sulfur-containing compounds all have a strong, unpleasant sulfur odor (i.e., rotten egg). Nitrogen oxides may smell slightly sweet or pungent and acrid.

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 while using contaminated equipment with sharp edges, from protrusions, pressurized hoses, or air lines.

To mitigate potentially harmful chemical exposure, administrative controls have been implemented at the tank farms until a full characterization can be completed and engineering controls implemented. These administrative controls are based upon the best currently available data, modeling, and worst-case scenarios to ensure that conservative levels of protection are achieved.

## 2.4 PHYSICAL AGENTS

### 2.4.1 Heat Stress

Workers who wear protective clothing and/or become exposed to elevated ambient temperatures may experience an increase in body temperature that may lead to the potential for heat stress disorders. This situation is worsened by the use of containment structures in addition to layers of protective clothing. Based on injury statistics, heat stress is considered the greatest occupational risk to tank farm workers. Administrative controls and monitoring are required to minimize exposure. The person-in-charge, supported by the SSHR and the Industrial Hygiene (IH), shall obtain and track the wet bulb globe temperature (WBGT) and make adjustments in the work/rest cycle based on the WBGT, the clothing ensemble, level of work effort, and degree of worker heat acclimatization. The PIC is responsible for complying with the requirements of this section after receiving training on the fundamentals of heat stress. Guidelines for a work/rest schedule, based on the WBGT, have been established by the American Conference of Governmental Industrial Hygienists (ACGIH). TWRS-IH&S has modified the ACGIH guidelines for use by the PICs and safety personnel in the tank farms (Heat Stress Control Procedure, Section 2.4.2). If the PIC and/or the SSHR determines that a heat stress potential exists, based on criteria contained in this section, an appropriate work/rest regimen should be implemented immediately. If the PIC makes the determination that a heat stress potential exists, the SSHR should be informed.

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High body temperatures can result in various heat stress disorders including physical discomfort, heat fatigue, 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 in the tank farms. Work scheduled for summer months requires special attention with respect to heat stress. In addition, work performed in nonventilated containment devices (e.g., greenhouses) will involve higher than ambient temperatures.

Workers shall be trained in recognizing the signs and symptoms of heat stress (24- and 40-hour hazardous waste training). PICs will reinforce this training in pre-job briefings during warm temperature conditions.

The symptoms of heat stress, listed below, require the affected worker to be immediately removed from the work area to a cool area and given attention appropriate for the symptoms present. Three of the listed heat stress symptoms marked with an asterisk (i.e., confusion, fainting, and slurred speech) indicate the affected worker requires emergency care.<sup>1</sup> The Hanford Fire Department (contact by dialing 911 plant telephone or 811 cellular telephone) shall transport any worker needing emergency care for heat stress. If any of the other heat stress symptoms listed (excluding confusion, fainting, or slurred speech) are present, the affected worker shall be provided cool water and be allowed to rest in a cool area. Workers may be taken to the Health Service Center on normal day shift for treatment and/or further evaluation.

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

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 may rest in a shaded area and drink water. There is a desk instruction that covers the allowance of drinking water inside the farms (*Drinking Water in a CA*, DI-33300-12). Ice vests are also available for use in the tank farms.

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<sup>1</sup>Confusion, fainting, and slurred speech are the most serious symptoms of heat stress. The presence of any of these three symptoms shall require the Hanford Fire Department transport the affected worker for emergency care (dial 911 on plant telephone or 811 on cellular telephone to contact the Hanford Fire Department).

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Glovebags may be an option for use during some work activities where a containment structure has previously been required. This option can be explored with the Tank Waste Remediation Health Physics (TWRHP) organization.

TWRS-IH&S is using a modified version of the ACGIH heat stress threshold limit values as a basis for monitoring and controlling heat stress in the tank farms. The heat stress control procedure, appearing in Section 2.4.2, is used by field supervisors (PICs) and TWRS-IH&S staff in prescribing appropriate work/rest limitations to control the potential for heat stress disorders. The PIC may institute additional administrative controls to alleviate the potential for heat stress disorders at their discretion.

Following is the tank farm heat stress control procedure. Individuals implementing this procedure must read and fully understand how the procedure is to be applied. Site Safety and Health representatives are available for consultation should questions or concerns arise.

#### 2.4.2 Heat Stress Control Procedure

This procedure is provided to supplement WHC-CM-4-3, *Industrial Safety Manual*, for heat stress protection for tank farms personnel. It provides guidance for implementing the ACGIH modified procedure for applying WBGT data to set safe work and rest times in the field. This procedure will be implemented by job supervisors (PICs) and TWRS-IH&S personnel. The following section defines common terms used in heat stress control, describes important heat stress disorders, assigns responsibilities, and provides guidance for applying modified ACGIH heat stress controls. Field work supervisors should read, understand, and implement this procedure in total. Any questions relating to the application of requirements or guidance should be directed to the Site Safety and Health representative (SSHR) or Industrial Hygiene (IH).

##### 2.4.2.1 Terms

**Acclimatization.** The psychological and physiological changes that occur as a result of working in a hot environment for at least two hours per day for seven to ten days. Acclimatization tends to reduce the strain created by environmental heat stress.

**Heat Stress.** The combination of environmental and physical work factors that constitute the total heat load imposed on the body. Environmental factors include the following:

- Air temperature
- Radiant heat exchange rate
- Air movement
- Relative humidity.

When working, the body adds to heat stress by creating body heat in proportion to the exertion expended to do the work. Clothing also influences heat stress. Heat stress evaluations should take into account all of these factors in order to provide a realistic picture of the heat stress experienced by workers.

**Personal Heat Stress Monitoring.** A method to collect physiological monitoring data, including core body temperature and heart rate.

**Rest.** Cessation of work in a shaded environment allowing the worker time to cool down between work periods.

**Contamination Area.** An area designated by Health Physics to contain radioactive contamination.

**Wet Bulb Globe Temperature.** A type of indicator to define human heat stress potential based on a combination of dry bulb, wet bulb, and globe temperature.

**Work Type.** Three categories have been established for exertion levels for use with the modified ACGIH heat stress guidelines: light, moderate, and heavy.

- Light work includes standing, walking, taking instrument readings, and writing.
- Moderate work includes lifting and moving small pieces of equipment and work that requires a moderate amount of moving around.
- Heavy work includes lifting or moving moderately heavy to heavy pieces of equipment and work that requires high levels of continuous motion.

**2.4.2.2 Personnel Responsibilities.** Personnel from several disciplines will be required to implement the Heat Stress Control Procedure.

**The Site Safety and Health Representative.** The SSHR will review work packages, attend plan-of-the-week (POW) and plan-of-the-day (POD) meetings, perform job walkdowns, and field incoming questions or concerns regarding heat stress for potential follow-up monitoring.

**TWRS-IH&S and Industrial Hygiene Field Services Personnel.** Personnel from TWRS-IH&S and Industrial Hygiene Field Services (IHFS) will track heat stress affected work, and implement work controls as necessary, in conjunction with the PIC, to reduce the potential for tank farm workers succumbing to heat stress disorders.

**Industrial Hygiene Personnel.** Personnel from IH will review work packages and field incoming questions or concerns regarding heat stress for potential follow-up monitoring. Industrial Hygiene personnel will track heat stress affected work, in conjunction with the SSHR and PICs, and implement further work controls as necessary to reduce the potential

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for tank farm workers succumbing to heat stress disorders. Industrial Hygiene personnel will monitor WBGT as necessary, under actual field conditions of the workers, to determine appropriate levels of work. Industrial Hygiene personnel will investigate all heat stress disorder cases. Industrial Hygiene will make notification to tank farm Operations regarding the potential for heat stress for the upcoming day based on a heat stress index available from the Battelle Weather Station.

**Industrial Hygiene Technicians.** IH technicians will collect WBGT data in the field upon request, and report findings to the SSHR or an industrial hygienist.

**Battelle Meteorologic Personnel.** Meteorologic personnel from Battelle will collect and dispense WBGT data and apparent temperature information to interested parties.

**The Person-In-Charge.** The PIC will schedule work and allow work breaks in a manner that will prevent employees from being exposed to undue heat. The PIC will also appropriately institute work/rest regimens including 100 percent work, 75 percent work/25 percent rest, and 50 percent work/50 percent rest. The PIC will contact the SSHR or an industrial hygienist to inform them when a work/rest regimen of 50 percent work/50 percent rest or above has been imposed. The PIC will also inform Industrial Hygiene whenever work will take place in a greenhouse between May 15 and September 30.

#### **2.4.2.3 General Heat Stress Control Strategy.**

1. **Know what the conditions are.** The Battelle Meteorologic and Climatologic Laboratory (located between the 200 East and 200 West Areas) can provide nearly current WBGT data. Call 373-2716 (or 373-2710 for emergencies only) to get this information anytime after 6 a.m.
2. **Apply the modified ACGIH guideline for heat stress protection.** Table 2-2 gives standard work/rest times for the kinds of work being performed, the WBGT, clothing ensemble, and the worker's level of acclimatization.
3. **Communicate the "apparent temperature" as reported from the Battelle Weather Station to interested parties.** During warm weather conditions, TWRS-IH&S will communicate the "apparent temperature" and a general heat stress index to key tank farm personnel via electronic mail. This communication is commonly titled "Heat Stress Alert."
4. **Training.**
  - a. Tank farms employees will be trained to recognize and respond to heat stress.
  - b. TWRS-IH&S staff will be instructed in the application of the tank farm heat stress control procedure.

Table 2-2. Modified American Conference of Governmental Industrial Hygienists Guidelines for Heat Stress Protection (for acclimatized workers).<sup>a</sup>

Work type	Clothing type	Percent ratio of work/rest for each hour based on threshold limit values in Table (expressed in °C and [°F])			
		100	75/25	50/50 <sup>b</sup>	25/75 <sup>b</sup>
Light	Street and summer clothing	30 (86)	30.6 (87)	31.4 (89)	32.2 (90)
	Anti-C with modesty clothing <sup>c</sup>	30 (86)	30.6 (87)	31.4 (89)	32.2 (90)
	Double Anti-C with modesty clothing <sup>c</sup>	28.3 (83)	28.9 (84)	30 (86)	30 (87)
	Anti-C with modesty clothing in greenhouse <sup>c,d</sup>	25 (77)	25.5 (78)	26.7 (80)	27.2 (81)
Moderate	Street and summer clothing	26.7 (80)	28 (82)	29.4 (85)	31.1 (88)
	Anti-C with modesty clothing <sup>c</sup>	26.7 (80)	28 (82)	29.4 (85)	31.1 (88)
	Double Anti-C with modesty clothing <sup>c</sup>	25 (77)	26.1 (79)	28 (82)	29.4 (85)
	Anti-C with modesty clothing in greenhouse <sup>c,d</sup>	21.6 (71)	22.8 (73)	24.4 (76)	26.1 (79)
Heavy	Street and summer clothing	25 (77)	25.9 (78)	27.9 (82)	30 (86)
	Anti-C with modesty clothing <sup>c</sup>	25 (77)	25.9 (78)	27.9 (82)	30 (86)
	Double Anti-C with modesty clothing <sup>c</sup>	23.3 (74)	23.9 (75)	26.1 (76)	28.3 (83)
	Anti-C with modesty clothing in greenhouse <sup>c,d</sup>	20 (68)	20.5 (69)	22.8 (73)	25 (77)

## Notes:

<sup>a</sup>For unacclimatized workers performing a moderate level of work, reduce the permissible heat exposure threshold limit value by 2.5 °C (4.5 °F) (i.e., subtract 2.5 °C (4.5 °F) from the wet bulb globe temperature in Table 2-2).

<sup>b</sup>For conditions in these columns (50/50 and 25/75), contact Tank Waste Remediation System Industrial Hygiene group for increased monitoring. Less stressful conditions (100 and 75/25 percent columns are monitored by the Site Safety and Health representative and the person-in-charge.

<sup>c</sup>Reduce the permissible heat exposure threshold limit value by 0.6 °C (1 °F) for summer clothing under Anti-Cs. Reduce the permissible heat exposure threshold limit value by 1.1 °C (2 °F) for street clothing under Anti-CS. Subtract 0.6 or 1.1 °C (1 or 2 °F) from the wet bulb globe temperature in Table 2-2.

<sup>d</sup>Threshold limit values are estimated for greenhouse work. Use actual wet bulb globe temperature values and clothing types when available.

5. **Work package review and field coverage.** TWRS-IH&S staff will review each tank farms work package to determine whether heat stress could be a concern for that job.

Where heat stress could be a factor, the reviewer will submit comments (using an RCR) to the cognizant engineer preparing the work package, specifying that a nonsignatory prerequisite be included in the package to ensure the SSHR is notified before the job starts. This stipulation also applies to all greenhouse work taking place between May 15 and September 30.

As an additional precaution, SSHRs will attend each plan-of-the-week (POW) and Plan of the Day (POD) meeting or communicate with the scheduler to note any other work that may create a heat stress concern. If such work is identified, the SSHR will collect the current WBGT data and, with the PIC, set the appropriate control levels.

6. **Extra monitoring during potentially high heat stress conditions.** If the control level reaches a 50 percent work/50 percent rest regimen (Table 2-2), the SSHR and/or the PIC must contact an industrial hygienist. Monitoring in the field may be performed to collect local job-site WBGT readings and implement further control(s) as necessary. Additional controls may include the following:

- Additional rest in a shaded area with fluid replenishment
- Personal protective equipment (such as ice vests)
- Changing aspects of the work environment
- Other control measures.

7. **Limit exposure based on clothing factors.** A study is being implemented to collect personal monitoring data about heat stress in the tank farms. This study will use homogeneous exposure groups (HEG) based on field clothing requirements. Personnel monitoring will be used to develop accurate exposure limits based on local conditions. Four HEGs will be defined initially based on clothing type: (1) street clothing, (2) anti-Cs, (3) double anti-Cs, and (4) anti-Cs worn in containment tents.
8. **Investigate/share lessons learned.** All reported heat stress cases in the tank farms will be individually investigated by TWRS-IH&S. The lessons learned from these investigations will be used to improve the tank farm heat stress control procedure.

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9. **Use appropriate monitoring equipment.** Metrosonics<sup>2</sup> heat stress monitors (HSM) will be made available to allow Industrial Hygiene personnel to monitor for potential heat stress concerns. Industrial Hygiene personnel will also collect personal heat stress data using Metrosonics personal heat stress monitors.
10. **Ensure water availability.** Water will be made available to tank farm employees working in a contamination area (CA) in accordance with the *Drinking Water Desk Instruction* (DI-333300-12, Rev. 1). The desk instruction calls for dispensing of water at the discretion of the PIC as soon as any administrative control has been put in place to prevent heat stress. In addition to providing drinking water to employees, necessary engineering and administrative controls are to be implemented as outlined in this procedure.

**NOTE:** Contact TWRS-IH&S should you have any question or concern about implementing this procedure. PICs may institute controls for 100 percent work, 75 percent work/25 percent rest, and 50 percent work/50 percent rest. The PIC is responsible for contacting an SSHR or industrial hygienist to inform them that a work/rest regimen of 50 percent work/50 percent rest or above has been instituted. The PIC is also responsible for informing TWRS-IH&S Industrial Hygiene whenever work will take place in a greenhouse between May 15 and September 30.

11. **Set work/rest levels to control heat stress based on WBGT Threshold Limit Values (TLVs).**
  - a. Estimate the work type (light, moderate, or heavy) using the definitions provided above.
  - b. Get the most current WBGT available (either local or from Battelle).
  - c. Read Table 2-2 from left to right and look across the row appropriate for the given work level and clothing type until the threshold limit value (TLV) that exceeds the local WBGT is identified.
  - d. Read up from the TLV found in "c" and find the work/rest ratio appropriate for the current WBGT, work load, and clothing, taking into account the notes at the bottom of Table 2-2. Anytime a work/rest regimen of 50 percent work/50 percent rest is instituted, the PIC shall notify TWRS-IH&S.

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<sup>2</sup>Metrosonics is a trademark of Metrosonics, Inc., Rochester, New York.

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### 2.4.3 Cold Exposure

Exposure to low temperatures may be a factor if work is done in the evening hours, if winds are high, if unpredictable weather moves in, or during the winter months (see Table 2-3 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 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 on plant telephone or 811 on cellular telephone.

Table 2-3. 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	-490	-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 In < hour with dry skin. Maximum danger of false sense of security			INCREASING DANGER Danger from freezing of exposed flesh within one minute			GREAT DANGER Flesh may freeze within 30 seconds					

### 2.4.4 Worker Fatigue

Worker fatigue can lead to a temporary decrease in physical and mental performance. When fatigued, a worker may feel tired, irritable, and experience general weakness and other nonspecific symptoms such as headache or indigestion. Fatigue has a protective function much like thirst or hunger. It is the body's way of telling a person that they need to rest and refrain from further stress to recover.

From time to time workers in the tank farms may experience symptoms of fatigue. Usually a night's rest will be all that is needed for a complete recovery. Some of the work conditions in the tank farms that are most likely to cause fatigue include the following: working long or consecutive shifts, working with supplied air respirators, performing particularly strenuous or static tasks, or a combination of these conditions.

Fatigue may be avoided by adjusting the work/rest schedule of workers who may be at risk. Workers at risk of fatigue should be taken into account when work assignments are made. Overtime should be controlled by the following guidance (any deviation from the overtime requirements shall be authorized on a case-by-case basis in accordance with company policy.):

- A person shall not be permitted to work more than 16 consecutive hours, excluding turnover time.
- A person shall not be permitted to work more than 24 cumulative hours in any 48-hour period, excluding turnover time.
- A person shall not be permitted to work more than 72 hours in a 7-day period, excluding turnover time.
- A person shall not be permitted to work more than 14 consecutive days without having 2 consecutive days off.

#### **2.4.5 Noise Hazards**

If an employee is exposed to an 8-hour time-weighted average of 85 decibels (dB) 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." Tank farm personnel may be exposed to high levels of noise generated by heavy equipment, exhaust fans, and other sources. For specific tank farm noise sources, refer to the appendices.

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

Allowable stay times are shown in Table 2-4. Appropriate hearing protection shall be provided, and all tank farms 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 WHC store stock item 37-8070-025.

Table 2-4. Exposure Limits for Continuous or Intermittent Noise.

Duration (hours per day)	Sound level (dBA)
16	80
8	85
4	90
2	95
1	100
.5	105
.25	110
.125	115*

\*Exposure in excess of 115 dBA is not permitted without hearing protection.

#### 2.4.6 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 4.0 of this HASP deals with PPE requirements.

#### 2.4.7 Illumination

Tank farm personnel will likely encounter areas in the tank farms 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 29 CFR 1910.120. Areas accessible to tank farm employees shall be lighted to not less than the minimum intensities listed in Table 2-5.

### 2.5 RADIOLOGICAL HAZARDS

The potential exists for personnel exposure to radioactive contamination and radiation fields while working at any of the tank farms. Sources of contamination include exhausters, exposed pipes, process pits, flake boxes, liquid level indicators, and other equipment during installation, operation, or removal.

The primary means of contamination control is containment. Areas where contamination has already spread are posted to warn personnel.

The Radiation Work Permit (RWP) is used to govern all entries to radiation zones or areas, all radiological work, and all storage of radioactive materials (see WHC forms A-6000-272 and A-6000-272.1).

Table 2-5. Minimum Illumination Intensities in Foot-Candles.

Foot-candles	Area or operation
5 Normal lighting	General site areas.
3 Nonemergency 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 are 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, indoor toilets, and workrooms).
30	First aid stations, infirmaries, and offices.

## 2.6 ERGONOMIC HAZARDS

The most common ergonomic hazard identified at the tank farms is manual lifting of tools, equipment, or materials necessary to perform operations. This hazard could and has resulted in back injuries--the predominant reportable injury in the tank farms.

The Hanford Environmental Health Foundation (HEHF) provides a back injury prevention program emphasizing back strengthening and flexibility. Job hazard evaluation in the tank farms should consider the ergonomic risks. The following is a guide for manual lifting activities:

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., dolly, hoist, and spring-loaded cart).

3. Male employees lifting over 29.5 kg (65 lb), or female employees lifting over 20.4 kg (45 lb), 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 Hanford 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 SSHR.

Other ergonomic hazards that have been identified and/or characterized by TWRS-IH&S as needing further observation include baseline work evaluations involving the extent of repetitive motion illnesses and lifting injuries.

## 2.7 BIOLOGICAL HAZARDS

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 before donning.

## 2.8 WORK ENVIRONMENT

Hazards discussed in this section may be encountered in routine job activities performed in the tank farms. Subsections 2.8.1 through 2.8.23 correlate with items listed for consideration on the JHA form required for use in planning of nonroutine work activities (see WHC-CM-4-3, Standard A-3).

### 2.8.1 Asbestos

Asbestos-containing materials (ACM) are found throughout the tank farms in thermal insulation, building materials, aboveground piping, floor tiles, siding, roofing, cement asbestos boards, and gasket material. When working on or disturbing 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, WHC 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.

### **2.8.2 Elevated Work Areas**

If workers are exposed to the hazard potential of falling 1.8 m (6 ft) 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 in the tank farms, 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.

### **2.8.3 Walking/Working Surfaces**

The walking/working surfaces in the tank farms present slip, trip, and fall hazards. Next to heat stress, this hazard has the highest potential (based on injury statistics) 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 the tank farms may not be adequate. Workers must be informed of these potential hazards during general tank farm orientation training, and in previous briefing in accordance with WHC-CM-4-3, *Industrial Safety Manual*.

### **2.8.4 Working in Proximity to Moving Equipment/Vehicles**

A variety of equipment may be used in the tank farms, 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 the *Hanford Site Hoisting and Rigging Manual* (DOE-RL 1993) and WHC-CM-4-3.

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 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 the cranes must wear hardhats and must never work or pass under lifted loads.

#### **2.8.5 Machine Guarding**

Further, those authorized to remove guarding, for any purpose, must follow WHC-IP-0842, *Waste Tank Project Administration*, Section 5.9.1, "Lock and Tag," (WHC 1992) 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 in the tank farms. Although all machinery shall be equipped with appropriate machine guarding, instances may occur when workers in the tank farm area might be exposed to unguarded drive shafts and couplers, chains and sprockets, v-belts and pulleys, and reciprocating parts, pinch points, or unexpected startups. 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."

#### **2.8.6 Electrical Hazards**

Overhead power lines, downed electrical wires, and buried cables all pose the danger of shock or electrocution. 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 in the tank farms, whether by hand or excavator, workers must first contact the tank farm 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.

#### **2.8.7 Natural Hazards**

Because most work performed in the tank farms is done out-of-doors, many environmental factors need to be considered. As identified in Sections 2.4.1 through 2.4.3, heat and cold stress can be a problem for workers. Inclement weather can make walking/working surfaces slippery. In addition, rain or melting snow can fill in low areas in normal walkways, causing workers to take new routes, where they may encounter other hazards.

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Thunderstorms and their resultant lightning are of particular concern at the tank farms. If lightning strikes more than 8 km (5 mi) away from the tank farms, people can continue to work. If lightning strikes within 8 km (5 mi), they should leave the tank farm; workers may return if no lightning strikes are observed within 30 minutes.

The impact of wind (dust storms/high winds with potential to resuspend contamination and reduce visibility) on work in outdoor areas containing nonfixed contamination will be controlled by the applicable RWP. Operations (via standing orders) will determine additional precautions to be taken in the tank farms in high wind and predicted high-wind conditions.

#### **2.8.8 Stored Energy Sources/Lock and Tag**

Stored energy sources pose a potential hazard to tank farm workers. These hazards include (but are not limited to) electrical, mechanical, hydraulic, pneumatic, chemical, radiation and thermal energies and various forms of potential energy (e.g., springs, compressed gases, or suspended objects). Lockouts/tagouts shall be used to protect workers from these energy sources. The lockout/tagout procedures are described in WHC-IP-0842, Section 5.9.1 "Lockout/Tagout," (WHC 1992) and are controlled by Tank Farms Shift Operations.

#### **2.8.9 Roof Work**

At various times in work activities at the tank farm supporting facilities, it is required that workers access and work on the roof of a facility. When it is necessary for these activities to occur, all safety practices in WHC-CM-4-3 must be observed. A visual inspection of the roof by qualified inspectors must have been made before workers may walk on the surface (ask the building administrator for the latest roof inspection). If potential weak spots not previously identified are discovered during conduct of work, these shall be reported to the building administrator. The load limits of the roof must be determined and/or known before a load is placed on the roof. When working on the outer 3.7 m (12 ft) of the roof, a fall protection plan is required.

#### **2.8.10 Fall Hazards**

All work areas, when possible, shall be free of all fall hazards. When it is not possible to secure the work area of fall hazards, the hazards have to be identified and reported to the PIC and/or facility representative. If the fall hazards involve elevations of more than 1.8 m (6 ft), the "Fall Protection Standard" (WHC-CM-4-3, Section CM-2) must be followed. Good housekeeping prevents many fall hazards.

### **2.8.11 Excavation, Trenching, and Shoring**

All excavation and trenching shall be planned in accordance with Standard WHC-CM-4-3, Section A-3, "Pre-job Safety Plan." An excavation permit (WHC form A-7400-373) is required in all areas before performing any excavation activities. The permit provides for the review, coordination, and supplemental approval of all excavation activities. The requirements for an excavation permit are specified in WHC-CM-4-3, Section CM-8, "Excavation, Trenching, and Shoring." The excavation permit may be used as a tool to identify all potential hazards.

The excavation shall be inspected by the PIC/supervisor before the entry of personnel. The inspection is necessary to identify any cracks, spills, or unintended load that can lead to instability. The excavation must be clearly marked to prevent accidental entry.

Excavations greater than 1.2 m (4 ft) deep shall be stabilized against collapse by shoring, sloping, or shielding. For excavations more than 6.1 m (20 ft) deep or where sloping/shoring systems cannot be met, a designed protective system must be implemented. Adequate means of exit shall be provided within 7.6 m (25 ft) of any work location. In addition, excavations  $\geq$  1.2 m (4 ft) must be reviewed for potential confined space issues as part of the permit planning process.

### **2.8.12 Scaffolding**

Scaffolding materials purchased, erected, and used shall meet the applicable OSHA and Washington Industrial Safety and Health Administration safety standards and the manufacturer's rules and instructions for safe use and erection. Upon completion of erection and before use, a "Scaffold Safety Checklist" (WHC BC-5600-167) and status tag shall be attached next to the access ladder. Scaffolding shall be inspected and recertified every 30 days.

When scaffolding is used in the tank farms, all requirements of WHC-CM-4-3, Section G-9, "Scaffolding Safety," shall be followed.

### **2.8.13 Aerial Lifts**

All requirements and responsibilities for the construction, inspection, maintenance, and operation of vehicle-mounted, boom-supported, and self-propelled elevating work platforms or aerial lifts shall be in compliance with WHC-CM-4-3, Section CM-12, "Elevating Work Platforms."

#### **2.8.14 Ladders**

Ladders purchased and used at the tank farms shall be appropriate for industrial applications and comply with the specifications of WHC-CM-4-3, Section CM-5, "Portable Ladders." Employees working with portable ladders shall know and follow established rules and safe practices for ladder use. Ladders shall be maintained in good condition at all times, inspected before each use, and stored properly.

#### **2.8.15 Vehicle Traffic**

All vehicle drivers in tank farms shall obey all posted signs and Washington State vehicle laws. Guidelines for transportation are provided in WHC-CM-4-3, Section T, "Transportation." Vehicles are not allowed in the tank farms unless the job requires the use of a vehicle.

Pedestrians in the tank farms shall be aware of all vehicle traffic and obey all safety rules.

#### **2.8.16 Heavy Equipment**

All heavy equipment operators shall obey all posted signs and Washington State vehicle laws. Heavy equipment shall be used in accordance with manufacturer's instruction for use. Guidelines for transportation are provided in WHC-CM-4-3, Section T, "Transportation."

#### **2.8.17 Rigging Operation**

For operation, inspection, maintenance, and repair requirements for cranes, hoists, fork trucks, and rigging equipment refer to DOE-RL-92-36, *Hanford Site Hoisting and Rigging Manual* (DOE 1993).

#### **2.8.18 Power Tools**

Tank farm employees who operate power tools shall be properly trained in the use of the equipment. Power tools should be operated in strict accordance with the manufacturer's instructions. Required personal protective equipment shall be worn as needed when operating power tools. The requirements and responsibilities for the use of power tools are located in WHC-CM-4-3, Section TE-3, "Portable Power Tools."

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#### **2.8.19 Pinch Points**

During certain work activities in the tank farms, a situation may arise exposing workers to moving machinery injury hazards. This situation may present a "pinch-point hazard." Pinch-point injury hazards can exist between unguarded rotating and fixed parts that create a shearing, crushing, or abrading action. For guidance of preventing pinch-point injuries refer to WHC-CM-4-3, Section CM-4, "Machine Guarding."

#### **2.8.20 Falling Objects**

During tank farm operations and maintenance elevated work activities, it is important to remember there is a potential for falling objects. Hard hats are required. No work shall be conducted beneath an elevated platform or load.

#### **2.8.21 Sharp Objects**

Certain work activities in tank farms may expose workers to hazards involving sharp object injuries. Sharp objects can be encountered as a result of mechanical failure, in the course of using tools and machinery, and in handling discarded waste materials. For guidance of preventing the encounter of sharp objects refer to WHC-CM-4-3, *Industrial Safety Manual*.

#### **2.8.22 Overhead Obstructions**

Some work activities will require passage beneath low hanging structures such as piping or conduit. Any repeated work activities requiring passage beneath low-hanging structures shall require the use of hardhats. If overhead obstructions are in areas where it is not feasible to reroute, the obstructions shall be marked with caution tape (yellow and black stripe) or signs. For general guidance, refer to the WHC-CM-4-3, *Industrial Safety Manual*.

#### **2.8.23 Sanitation**

Requirements for a sanitary work environment are located in WHC-CM-4-3, Section W-2, "Industrial Sanitation." All work places shall be kept clean and housekeeping shall be monitored regularly. At the end of each task/job, the work area will be clean with all work materials, tools, and equipment returned to appropriate storage locations. Adequate potable water and toilet facilities shall be provided.

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## 2.9 SAFE WORK PRACTICE (Rev. 13)

### REQUIREMENTS FOR ENTRY INTO TANK FARM RESPIRATORY PROTECTION ZONES, REV. 13

#### 1. PURPOSE

This safe work practice (SWP) implements requirements for entry into the 200 Area Tank Farms and establishes nonradiological respiratory protection and air monitoring control requirements for all work activities conducted at the 200 Area Tank Farms. These requirements are based on measured contaminant levels and good industrial hygiene practices. This SWP was developed by TWRS IH&S and the material presented is intended to be in agreement with other documents such as Operating Specification Documents (OSD) and Safety Analysis Report Revised (SARR). However, compliance with this SWP does not ensure compliance with other applicable documents.

#### 2. SCOPE

This SWP is used by Westinghouse Hanford Company (WHC) industrial hygienists and industrial hygiene and safety technicians (IHST) responsible for monitoring work areas and ensuring appropriate respiratory protection is worn at the 200 Area Tank Farms. This SWP is also used by tank farm operations personnel for planning, scheduling, and work package preparation.

The SWP is an integral part of the *Tank Farm Health and Safety Plan*. The SWP provides the guidelines by which the WHC industrial hygienist and IHST will determine specific monitoring and respiratory protection requirements for all work activities performed at the 200 Area Tank Farms.

All monitoring and respiratory protection prescribed by this SWP shall be performed by a WHC industrial hygienist or IHST. These persons follow the guidelines established in this SWP (Section 4) to determine requirements for monitoring and respiratory protection. Questions regarding interpretation of this SWP, including field determinations, should be addressed to these individuals.<sup>3</sup>

Monitoring requirements determined using the guidelines established in this SWP are based on hygiene concerns. In specific situations and as determined by following guidelines in Section 4, the WHC industrial hygienist or IHST can reduce or eliminate requirements;

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<sup>3</sup>Requests for additional protective respiratory equipment shall be referred to TWRS Industrial Health and Safety.

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however, these decisions have no impact on monitoring requirements prescribed in other documents (e.g., respiratory protection requirements as prescribed by the Radiation Work Permit to address radiological concerns).

### 3. DEFINITIONS

**Supplied air respiratory protection zones.** Posted areas, within single-shell tank farms, where supplied air use is required (See Section 4.A and Table 1). These zones are indicated on the respiratory protection boundary maps of the HASP appendices.

**Air monitoring zones.** Posted tanks, or barricaded portions of tanks, where potential vapor exposures could occur. Entry to the posted/barricaded areas requires either industrial hygiene monitoring<sup>4</sup> with appropriate air monitoring instrumentation or the use of supplied air (sampling locations and analytes are specified in Section 4.A).

**Breach of containment.** An action to create an opening through the outside of a tank to the tank internals (e.g., through a tank riser or equipment) resulting in a potential route for escape of tank vapors contained inside the tank.

**Waste intrusive work.** Work performed within the tank dome that penetrates into the waste. This does not apply to surface level measurements.

**IHST coverage.** Intermittent Industrial Hygiene air monitoring as determined necessary by a WHC Industrial Hygienist or IHST following guidelines established by this SWP (See Section 4.B). All monitoring activities prescribed by this SWP are conducted by a WHC industrial hygienist or IHST.

### 4. DETERMINING FACTORS FOR MONITORING AND RESPIRATORY PROTECTION REQUIREMENTS

Supplied air or air monitoring may be required based either on the work location or on the type of work to be performed. The correct level of monitoring and respiratory protection is based on the MOST STRINGENT of the two levels called for under the job and work location. Thus, a job may require supplied air because the tank to be worked on is located in an area where supplied air is required, even though the job does not involve breaking containment on the tank. Similarly, a job may require monitoring because of the work being performed, even though no monitoring is required for entry into the farm. ONLY BY CONSIDERING BOTH THE LOCATION OF THE WORK AND THE TYPE OF WORK BEING PERFORMED CAN THE PROPER LEVELS OF RESPIRATORY PROTECTION AND MONITORING BE SELECTED.

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<sup>4</sup>Supplied air must be used if a health and safety technician is not available to perform air monitoring.

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In order to reduce potential for exposures at the tank farms, the minimum contingent of employees necessary to perform the work scope should be used. Employees not needed to support the immediate work activity should stand well clear of the work area in the upwind direction if possible.

Any necessary monitoring shall be performed by a Westinghouse Hanford Company industrial hygienist or IHST before starting work activities. All monitoring will be conducted in accordance with the specifications provided in Section 5.

#### **A. WORK LOCATION**

Whenever a job involves entering an air monitoring or respiratory protection zone, air monitoring or respiratory protection must be used. (See Section 5 for further information regarding air monitoring.)

Respiratory protection involves the use of supplied air only. Generally, it is not necessary that BOTH air monitoring and supplied air be used except during initial monitoring; however, either the specified type of air monitoring or supplied air must be used for entry into an air monitoring or respiratory protection zone.

The size of an air monitoring or respiratory protection zone is defined for each farm and tank based on the history of exposure incidents and air monitoring data that has been collected. Depending on the tank farm, this area may be as small as a circle around a breather filter, or as large as an entire farm.

Defined air monitoring and respiratory protection zones are provided in Table 1. Air monitoring or supplied air respiratory protection must be afforded to employees working in these zones. Criteria for establishment of monitoring requirements in defined zones are specified in Table 1 and Section 4.

#### **B. WORK ACTIVITY PERFORMED**

**(1) Air Monitoring Necessary.** Breach of containment and waste-intrusive work activities require that air monitoring be done irrespective of the level of respiratory protection afforded employees. Specific variances may be granted for the use of a glove bag for breach of containment or waste-intrusive work (by a WHC industrial hygienist).

**(2) Glove Bag Use.** Although glove bags are used primarily for containment of radioactivity, they can also offer protection from vapor exposure if they are properly used. To provide vapor protection, a glove bag should meet the specifications for glove bags (WHC-S-0228), should be free from obvious holes or tears, and should have well-taped

seams. Any glove bag judged not to meet these requirements by the IH or IHST shall be considered as inadequate for vapor protection, and employee protection provided as if a glove bag was not being used.

A properly used glove bag will effectively contain low levels of vapors and respiratory protection for vapors should not be necessary for people working inside the glove bag. However, the degree of containment needs to be established for each glove bag use. The IH or IHST determines the degree of containment using an OVM and checking vapor levels both inside and outside (near a seam) of a glove bag. If these readings indicate vapor leakage from the glove bag (OV levels above 1 ppm outside bag), the bag must be immediately repaired or replaced, or employee protection provided as if a glove bag were not being used.

Based on initial containment readings, the IH or IHST will decide whether continuous monitoring is required for glove bag use. If initial readings inside the glove bag show OV levels below 2 ppm, continuous OVM monitoring is not required. If OV levels exceed 2 ppm, continuous monitoring of OV levels inside the glove bag should be performed, with occasional readings taken outside the glove bag to check for leakage. If the OV levels inside the bag exceed 25 ppm, supplied air must be used by employees working inside or next to the glove bag.

Vapor levels inside the glove bag should also be checked before the glove bag is removed. If OV levels exceed 2 ppm, supplied air must be worn during glove bag removal.

**(3) Inoperative ventilation system.** In the event a tank ventilation system is inoperable, the following precautionary measures apply.

- Work shall not be permitted on double-shell tanks.
- Work shall not be permitted on ventilated single-shell tanks that are on the flammable or organic watch list.
- Work shall be curtailed that cannot be completed within two hours of the tank ventilation system becoming inoperable.
- Work on ventilated single-shell tanks not on the flammable or organic watch lists shall be approved in writing by an IH from TWRS IH&S.
- Work shall not be permitted inside an inoperable ventilation system.

**(4) Opening Riser.** Initial monitoring shall be performed at the tank exhauster for ventilated tanks, and supplied air is not required. Initial monitoring shall be performed at the breather filter for nonventilated tanks, and supplied air is not required unless the breather filter is in an established respiratory zone. After the riser bolts sealing the riser flange are loosened enough to take a gas sample from the riser, a five minute pause shall be observed to allow accumulated gases to disperse.

Table 1. Defined Zones.

Tank	Breather filter 5-ft barricade	Pump pit 5-ft barricade	Saltwell pit 5-ft barricade	Distribution pit 5-ft barricade	Liquid level 5-ft barricade	Entire tank barricade	Partial farm barricade
A-101 B-101 BX-103 BX-104 BX-105 BX-107 BX-111 BY-110 S-101 S-102 S-110 TX-106 TX-107 TX-109 TX-110 TX-111 U-105	OVM/NH <sub>3</sub>						
A-101		OVM/NH <sub>3</sub>					
S-102 U-103 U-105 U-106 U-110 U-111				OVM/NH <sub>3</sub>			
BX-111			OVM/NH <sub>3</sub>				
A-101 BY-104 BY-102 BY-110					OVM/NH <sub>3</sub>		
C-102 C-103						SA	
C-101 C-104 C-105 C-106							OVM/NH <sub>3</sub>
BY-104 BY-107 BY-108	N <sub>2</sub> O/OVM/ NH <sub>3</sub>						

N<sub>2</sub>O = nitrous oxide air monitoring.  
 OVM = organic vapor meter monitoring.  
 NH<sub>3</sub> = ammonia air monitoring.  
 SA = supplied air.

On double-shell tanks not on the Flammable Gas Watch List, no further sampling is required for riser opening. On double-shell Flammable Gas Watch List tanks, combustible gas readings shall be taken from the exhaust line every 15 minutes. If any of these readings exceed 20% of the lower flammable limit, a gas sample shall be collected for analysis and work shall cease.

On single-shell tanks, monitoring shall be performed using supplied air for the compounds specified in Section 5.B at the riser opening. In addition, flammable gas measurements will be taken on single-shell Flammable Gas Watch List tanks as follows. After complete riser cover removal and before the activity proceeds in the tank, monitoring shall be conducted in the tank vapor space. If the combustible gas reading is less than 20% of the lower flammable limit, the work can proceed. If the reading exceeds 20%, a grab sample will be collected for analysis, the activity shall cease, and the tank shall be placed in safe shutdown mode. The activity shall not resume until results of the sample are known, and the appropriate Safety and Tank Farm Project Management approvals are received. The flammable gas readings shall be taken every 15 minutes during the in-tank activities.

Factors that vary with nature of work activities at the 200 Area Tank Farms include 1) whether or not the work activity involves penetration into the tank waste, 2) whether or not the tank is ventilated, and 3) whether or not the work activity involves breach of containment. The combination of these factors help form the basis for determining requirements for monitoring and use of respiratory protection.

**(5) Waste-Intrusive and Non-Waste-Intrusive Work on Ventilated Tanks with Breach of Containment.** Supplied air is not required for work on ventilated tanks. Monitoring shall be performed at the tank exhaust every 15 minutes for the compounds in Section 5-B for waste intrusive work.

**(6) Waste-Intrusive Work on Nonventilated Tanks.** Supplied air is required whenever there is a potential for employees to release significant amounts of trapped vapors and be exposed to the release of these vapors. Thus, supplied air will be used when working on Flammable Gas Watch List tanks unless a glove bag is used. For tanks not on the Flammable Gas Watch List, each activity must be evaluated based on the possibility of releasing vapors and the potential for exposure if the vapors are released. The following activities have been evaluated by TWRS Industrial Health and Safety, and the controls necessary to reduce the risk of exposure established. All other activities require the use of supplied air unless a written exemption is obtained from TWRS Industrial Health and Safety.

- **Grab Sampling.** Very low potential for vapor release, and large volume (tank headspace) to allow for vapor dilution. No supplied air required.
- **Auger Sampling.** Close tolerance between drill bit and pipe effectively seals tank. No supplied air required during sampling. Supplied air will be necessary when removing sampler unless tank atmosphere can be sampled.

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- **Push Mode Sampling.** Brief potential for exposure when removing sample. Need to verify that high levels of vapors are not released at these times or wear supplied air. Supplied air not required at other times. Supplied air will be necessary when removing sampler unless tank atmosphere can be sampled.
- **Rotary Mode Sampling.** Supplied air is not required as the valves on the sampler isolate the tank from the employee. Supplied air will be necessary when removing sampler unless tank atmosphere can be sampled.
- Supplied air is required during monitoring at the breather filter before breach of containment if the breather filter is in an area where supplied air is required (e.g., tanks 241-C-102 and 241-C-103).

All other activities require supplied air to be worn by all employees within 3.1m (10 ft) of an open riser. Supplied air is also required inside of a containment tent erected over an open riser.

For the duration of a waste-intrusive work activity on a nonventilated tank that the tank riser is open, monitoring will be performed at the riser every 15 minutes. Readings are taken using procedures outlined in Section 5.

#### **(7) Non-Waste-Intrusive Work with Breach of Containment on Nonventilated Tank.**

- Initial monitoring is required at the breather filter. Unless required for the area where the breather filter is located, supplied air is not required during this initial monitoring at the breather filter until breach of containment.
- Continuous monitoring may be required based on contaminant levels as specified in Section 5.

#### **(8) Non-Waste-Intrusive Work without Breach of Containment.** No special monitoring or respiratory protection is required for jobs that do not involve breach of containment on a tank unless the area in which work is taking place is located inside a respiratory protection zone.

All requirements discussed in Sections 4.A and 4.B must be observed.

### **5. MONITORING**

This section of the SWP provides a description of the specific monitoring methods used by the WHC industrial hygienist or IHST to monitor compounds of concern in accordance with the guidelines established in Section 3 for determining requirements. Also provided are the exposure standards limits and appropriate actions to be taken in the event that limits are exceeded.

## A. METHODS

Organic vapors are measured using an organic vapor meter (OVM) monitor to collect and read organic vapor samples taken at the work area. This type of monitoring is performed only by a trained technician.

Ammonia, nitrous oxide, and hydrogen cyanide levels are determined using colorimetric indicator tubes or direct-reading badges to measure samples taken in the work area. Hydrogen cyanide monitoring is performed at FeCN Watchlist Tanks during breaks in containment at the tanks.

Flammable gases are measured to determine their percent of lower flammability limit (LFL) and oxygen content using a Model 251 Industrial Scientific Combustible Gas Meter, or TMX-410 multi-gas monitor, or equivalent. Before LFL sample collection, the open riser is allowed to off-gas for a period of five minutes. Wire-coated Tygon tubing (or equivalent) is used for collecting LFL samples inside the riser of a Flammable Gas Watch List tank because of bonding issues.

## B. COMPOUNDS OF CONCERN

Air monitoring is required for breach of containment at all tanks. The air monitoring descriptions provided are in the appropriate order for the monitoring to be performed.

**(1) Flammability.** A grab sample shall be taken by the WHC industrial hygienist or IHST to determine flammability levels for flammable gases, in percent of LFL, and arrangements made for analysis.

- If levels exceed 20 percent of the LFL, work shall stop. Work will not continue until levels drop below 20 percent of the LFL.
- Work will not continue until results are received from grab sample analysis and management approval has been received.

**(2) Organic Vapors.** Levels of organics in parts per million (ppm) shall be determined using a Thermo Environmental 580B Organic Vapor Meter or equivalent.

If breathing zone OVM readings exceed the values shown in Table 2, either supplied air will be worn or the work will be discontinued as shown in the Table.

Operations will not resume until approval is received from the Facility Operations Manager and a TWRS IH&S industrial hygienist.

**(3) Ammonia, Nitrous Oxide, and Hydrogen Cyanide.** Ammonia and nitrous oxide levels are measured inside breather filter barricades and breach of containment locations for tanks 241-BY-104, 241-BY-107 and 241-BY-108. Hydrogen cyanide levels are measured for breach of containment for FeCN Watch List tanks. Initial readings taken at the riser or in the vapor space that exceed exposure standards shall require a WHC industrial hygienist or IHST to collect breathing zone samples for respiratory protection setting. If the values exceed the limits specified in Table 2, either supplied air will be worn or the work will be discontinued as shown in the Table.

Table 2

CONTAMINANT	SUPPLIED AIR Required if ANY of the following Levels are Exceeded:	STOP WORK and EVACUATE AREA if ANY Levels Exceed:
Org. Vapors (3 min)	2 ppm	
Ammonia	25 ppm	300 ppm
Nitrous Oxide	50 ppm	500 ppm
Hydrogen Cyanide	4.7 ppm	50 ppm

In the event that exceeded WHC breathing zone levels of ammonia, nitrous oxide, or hydrogen cyanide result in the stop of work and evacuation of the farm, operations at the farm will not resume until approval is received from the Facility Operations Manager and a TWRS IH&S industrial hygienist.

Table 3 lists the current status of each single- and double-shell tank.

## 6. REFERENCES

Unclassified Operating Specifications for the 241-AN, AP, AW, AY, AZ and SY Tank Farms; OSD-T-151-000007, Rev/Mod H-8.

Unclassified Operating Specifications for Single-Shell Waste Storage Tanks; OSD-T-151-000013, Rev/Mod D-4.

Operating Specifications For Watchlist Tanks; OSD-T-151-00030.

Waste Tank West Operations Standing Order - SX Tank Farm Vapor Restrictions During Active Exhaust Shutdown; 94-08, Rev 0.

Safety Basis for Activities in Double-Shell Flammable Gas Watch List  
Tanks; WHC-SD-WM-SARR-002, Rev. 0.

Safety Basis for Activities in Single-Shell Flammable Gas Watch List Tanks;  
WHC-SD-WM-SARR-004, Rev. 0.

A Safety Assessment for Proposed Pump Mixing Operations to Mitigate  
Episodic Gas Releases in Tank 241-SY-101: Hanford Site, Richland,  
Washington; LA-UR-92-3196.

Prepared by

  
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TWRS Industrial Health & Safety

3/29/95

Date

Approved by

  
M. T. Hughey, Manager  
TWRS Industrial Hygiene Field Services

3/29/95

Date

Approved by

  
TWRS Plant

3/29/95

Date

TABLE 3		WHC – TANK DESIGNATIONS & CONTROLS																					
FARM	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	201	202	203	204	
A	Sg <sub>1,3</sub>	S	S	S	S	S																	
AN	D	D	Dg	Dg	Dg	D	D																
AP	D	D	D	D	D	D	D	D															
AW	Dg	D	D	D	D	D																	
AX	Sg	So	Sg	S																			
AY	D	D																					
AZ	D	D																					
B	S1	S	So	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
BX	S	S	S1	S1	S1	S	S1	S	S	S	S	S1,3	S										
BY	S	S3	Sf	Sf <sub>3,4</sub>	Sf	Sf	Sf4	Sf4	S	Sf <sub>3,4</sub>	Sf	Sf											
C	S2	Sg	Sg	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	S2	
S	S1	Sg <sub>1,3</sub>	S	S	S	S	S	S	S	S1	Sg	Sg											
SX	Sg	Sg	Sog	Sg	Sg	Sgo	S	S	Sg	S	S	S	S	S	S	S	S	S	S	S	S		
SY	Dg	D	Dg																				
T	S	S	S	S	S	S	Sf	S	S	Sg	So	S							S	S	S	S	
TX	S	S	S	S	So	S1	S1	S	S1	S1	S1	S	S	S	S	S	S	S	Sf0				
TY	Sf	S	Sf	Sf0	S	S																	
U	S	S	Sog <sub>3</sub>	S	Sg <sub>1,1</sub>	S <sub>o3</sub>	Sgo	Sg	Sg	S3	S <sub>o3</sub>	S							S	S	So	So	

## LEGEND

D	Double Shell Tank	o	Organic Salt Watchlist Tank
S	Single Shell Tank	h	High Heat Watchlist Tank
g	Hydrogen Gas Watchlist Tank		Air Monitoring
f	Ferrocyanide Watchlist Tank		Supplied Air
	Actively Ventilated Tank		Air Purifying Respirator
1	OVM/Ammonia Monitoring within 5' breather filter barricade		
2	OVM/Ammonia Monitoring entire tank		
3	OVM/Ammonia Monitoring within 5' non-breather filter barricade		
4	OVM/Ammonia/Nitrous Oxide Monitoring within 5' breather filter barricade		

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## 3.0 TRAINING

### 3.1 GENERAL OVERVIEW

Tank Farm safety training is designed to provide employees with the necessary skills and knowledge to perform assigned duties and functions in a safe and healthful manner.

Training for tank farm personnel is dependent on the level and type of work each individual will be responsible for performing. At a minimum, each worker requires a general level of training to meet the Occupational Safety and Health Administration (OSHA) requirements of both 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," and 29 CFR 1910.1200, "Hazard Communication." Additional training that meets other regulatory requirements provides further safety and health training for tank farm operations [such as "Dangerous Waste Management" (WAC 173-303), *Radiation Protection for Occupational Workers* (DOE 1988), and *Accreditation for Performance Based Training for Category A Reactors and Nuclear Facilities* (DOE 1991)].

Normal tank farm operations are required to comply with 29 CFR 1910.120 because the tank farms are *Resource Conservation and Recovery Act* (RCRA) Hazardous Waste Facilities. Operations involving cleanup under the *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) past-practice or RCRA past practice sites listed in the Tri-Party Agreement (Ecology et al. 1994) are outside normal tank farm operations.

### 3.2 REQUIREMENTS

All employees working onsite who may be exposed to hazardous substances, or health or safety hazards shall receive appropriate training. All managers are responsible for ensuring that a training program is in place and that employees are properly trained. Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility. Worker qualification records are maintained by WHC Training Records. Entry qualifications into tank farm radiological control areas are verified through the Westinghouse Radiation Area Management (WRAM) system, which contains the employee hazardous waste worker training and medical history information. Entry to tank farm radiological control areas will be denied if entry requirements are not met (see Table 3-1).

Tank Farm Orientation and initial field experience received under escort will include discussion of applicable safe work practices. Applicable safe work practices and site-specific hazard communication information will be maintained at or near the point of entry for all tank farm RBA/URMA for review by employees. As part of the entry process through the WRAM stations, employees are required to acknowledge when they sign-in on the

Table 3-1. Tank Farm Facilities Required Training and Entry Requirements for 200 East/200 West Tank Farms.

Job Specific	Entry <sup>a</sup>	Course Number	Recertification/Requalification Course	Course Title	Frequency
	X	02006A	000001	Hanford Site Orientation	Initial
	X	000001	000001	Hanford General Employee Training	12 months
	X	350710	350760	Initial Facility Orientation--200 East/200 West	Initial
	X	350760	350760	Facility Orientation Retrain--200 East/West (HGET)	24 months
X		03E060	03E060	Building Emergency Plan Review Checklist for WHC-IP-0263-TF	12 months
	X	020001	020003	Radiation Worker II Safety Training	Initial
	X	020003	020003	Radiation Safety Requalification	24 months
X				Criticality Safety Training	
		02006G <sup>b</sup>	XXXXXX	Hazard Communication and Waste Management Awareness	Initial
	X	031220 <sup>c</sup>	032020	40-Hour Hazardous Waste Operations Training	Initial
	X	031110	032020	24-Hour Hazardous Waste Operations Training	Initial
	X	032020	032020	8-Hour Hazardous Waste Operations Refresher (W/SCBA, SCA PAK)	12 months
X		031310	XXXXXX	8-Hour Manager/Supervisor Hazardous Waste Training	Initial
X		020030	020030	Scott 4.5 SCBA--Annual (included in 032020)	12 months
X		020031	020031	Scott 4.5 SCBA--Quarterly	3 months
X		020032	020032	SKAPAK MSA-PAPR (included in 032020)	12 months
	X	XXXXXX	XXXXXX	Hazardous Waste Worker Physical	12 months
	X	XXXXXX	XXXXXX	Whole Body Count	12 months

Notes:

<sup>a</sup>Entry requirements verified through the WRAM system.

<sup>b</sup>Equivalent training through course number 031220 or 031110.

<sup>c</sup>Equivalent Training for 24-hour course numbers 020100, 170202, 031210, and vendor 100011 or 40-hour course numbers 020200, 170200, and vendor 100012.

WRAM that they have read and understand the applicable RWP. As part of the entry through the RBA access point, employees are required to sign the RBA access log.

Any person entering a tank farm RBA/URMA must first have a current hazardous waste worker physical that qualifies him/her as a hazardous waste worker. For WHC employees, this physical shall be performed by HEHF. The hazardous waste worker physical requirements are the same for both the 24- and 40-hour training categories. Access by the WRAM system verifies that the employee's hazardous waste worker physical requirements are met.

General hazards that pose health risks specific to the tank farms shall be discussed as part of the Tank Farm Orientation. Formal pre-job briefings, as described in WHC-IP-0842, 15.3 (WHC 1992), are required when the specific hazards require a JHA (WHC-CM-4-3, Standard A-3). Any person who feels he/she has been exposed to noxious vapors or suspect that he/she was exposed to a hazardous material or chemical that exceeded the established permissible exposure limit (PEL) and/or threshold limit value (TLV), shall report to their direct supervisor and first aid. The concerned worker will be evaluated by a designated doctor at HEHF. An entry will be made into the medical surveillance tracking log for continued follow-up, as appropriate.

### **3.3 TANK FARM WORKERS**

Workers involved in routine tasks and operations for the tank farms shall receive of 40 hours of hazardous waste operations training. Typical tank farm activities include maintenance and operations of the existing facilities to ensure their continued integrity and safety. Specific activities include surveillance, equipment maintenance, waste transfers, in-tank sampling and single-shell tank pumping. For tank farms operations, course number 031220, provided by Environmental Training, will meet this basic requirement. This training must be supplemented with a minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. The program shall include annual 8-hour refresher training.

Workers involved in activities for the tank farms that do not potentially expose individuals to direct contact with the waste shall receive 24 hours of hazardous waste operations training. For tank farms operations, course number 031110, provided by Environmental Training, will meet this basic requirement. This training must be supplemented with a minimum of 1 day of actual field experience under the direct supervision of a trained, experienced supervisor. The program shall include annual 8-hour refresher training.

### **3.3.1 Upgrading of Worker Status**

Workers with 24 hours of hazardous waste worker training who become general hazardous waste site workers can upgrade their training by obtaining an additional 16 hours of training and 2 days of actual field experience under the direct supervision of a trained, qualified supervisor.

### **3.3.2 Equivalent Training**

Tank farm employees who can document or certify that their work experience and/or training has resulted in training equivalent to a 24- or 40-hour course written to 29 CFR 1910.120 requirements, shall not be required to retake initial training. Responsibility for determination of equivalent training is with the Environmental Training organization. However, certified employees who are new to the Hanford Site shall receive appropriate site-specific training before site entry and shall have appropriate supervised field experience at the site to qualify for unescorted access.

### **3.3.3 Refresher Training**

All employees requiring 24- or 40-hour hazardous waste worker training shall receive 8 hours of refresher/retraining annually. This material is covered in "Hazardous Waste Site Refresher" (8-hour course number 032020/032030). Workers who do not complete the refresher training (such as those not assigned to hazardous waste operations for an extended period) must retake initial training if (1) they are reassigned to hazardous waste operations and (2) more than 3 years have passed since they completed the initial or refresher training.

## **3.4 ONSITE MANAGEMENT AND SUPERVISORS**

Onsite management and/or supervisors who supervise or are directly responsible for employees engaged in activities at the tank farms must be trained to the same level as the employees they supervise. Managers and supervisors are required to complete an additional 8 hours of hazardous waste training at the time of job assignment. This training is provided by course number 031310.

## **3.5 HEALTH AND SAFETY STAFF**

Personnel assigned to TWRS IH&S shall meet the most stringent of health and safety training requirements for the tank farms. This requirement allows field support to be provided under all conditions.

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### **3.6 VISITORS**

For the purposes of this HASP, visitors are defined as persons who are only occasionally at the tank farm site for limited periods solely to observe the tank farms. Visitors shall receive 24 hours of hazardous waste operations training. Visitors will not be directly engaged in any tank farms site activities that require entry into a controlled zone or activities that could result in exposure to hazardous substances or other health and safety hazards. Visitors shall never be permitted to enter a controlled (i.e., exclusion) zone or decontamination zone (i.e., contamination reduction zone and corridor), unless they meet all of the training requirements specified for the area they are to enter. Access is controlled by the WRAM system as described in Section 8.0, Site Control.

### **3.7 REGULATORS**

Personnel from regulatory agencies not falling under WHC oversight responsibilities shall be responsible for compliance with applicable federal, state, and local requirements for entry into the tank farms. When checking in with the WRAM entry station, they will be requested to verify that they have met appropriate training and physical requirements for tank farms entry by completing the WRAM Access Authorization Form (A-5400-319). Unless regulators have completed Tank Farm Orientation and met applicable tank farm supervised field experience requirements, they will require an escort.

### **3.8 RECORD OF TRAINING**

A record of training shall be kept and entered into the WRAM system database. If completed training for an individual has not been entered into the WRAM system, training may be documented using the WRAM Access Authorization Form (A-5400-319).

Training conducted as part of the Quality Training and Resource Center program is recorded upon receipt of course completion rosters. WHC Training Records enters the data, which includes employee payroll number, course number, course title, date taken, name of instructor, and recertification date (if required). This data is then entered into the Soft Reporting System where the Training Records Information System (employee training) can be accessed. Training information required by the WRAM system is forwarded electronically for incorporation into the WRAM database.

Personnel completing the 24-hour or 40-hour worker hazardous waste operations training are issued a card by the International Environmental Institute to reflect completion of OSHA 29 CFR 1910.120 hazardous waste operations training.

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## **4.0 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 the tank farms. 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 the tank farms where the task is taking place. Requirements for PPE are itemized or noted in work control documentation and/or Radiation Work Permits (RWPs), as applicable, and requirements should be discussed with tank farm workers when pre-job briefings are conducted.

### **4.1 PERSONAL PROTECTIVE EQUIPMENT SELECTION GUIDELINES**

The Site Safety and Health Representative (SSHR) must evaluate the hazards identified during site characterization and analysis. If engineered safeguards and/or administrative controls cannot be used, the SSHR, in concert with the PIC, will select PPE to protect employees from the known and potential hazards likely to be encountered in the tank farms. Health Physics will identify PPE requirements for radiological hazards via the RWP. Where PPE is necessary to address both chemical and radiological concerns, the SSHR, PIC, and Health Physics will jointly determine requirements.

Employees who are engaged in activities at the tank farms which require the use of PPE must meet all applicable training requirements specified in Section 3.0, and the medical surveillance requirements identified in Section 5.0 of this HASP.

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 work will stop until an evaluation is performed and approval to resume work activities is granted.

For specific PPE requirements, refer to Section 5.0 of the applicable appendix.

### **4.2 LEVEL D PERSONAL PROTECTIVE EQUIPMENT**

Level D PPE is the basic level of personal protection equipment used in the tank farms 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:

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- Coveralls and/or street clothes
- Anti-contamination clothing (as required by Health Physics if radiological hazards exist)
- Safety glasses or goggles (as required)
- Safety shoes (as required)
- Hardhat (as required)
- Hearing protection (as required)
- Gloves (as required).

#### **4.3 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 percent oxygen), for contaminants with poor warning properties (odor detection level is greater than the TLV), or when contaminant concentrations exceed the respirator canister limits. Personnel working inside the tank farms and wearing Level C PPE shall wear the following 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).

#### **4.4 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 tank farms with designated Level B PPE shall wear the following 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).

#### **4.5 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 tank farms 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 tank farms with designated Level A PPE shall wear the following as a minimum:

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

## 5.0 MEDICAL SURVEILLANCE

### 5.1 MEDICAL EXAMINATIONS

All employees who (1) require access to the tank farms; (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 before entry into tank farm radiological controlled areas.

The medical surveillance program, which is designed to assess, monitor, and maintain records for worker 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. The HEHF will be provided with information relative to the type of work being performed, potential and actual exposures, and expected contaminants.

### 5.2 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
- Urinalysis
- Complete blood count
- Pulmonary function test (PFT)
- Respirator fit test

- Electrocardiogram (EKG)
- Chest X-ray
- Visual acuity
- Hearing conservation audiogram (for individuals exposed to an 8-hour time-weighted average of 85 dBA or greater).

### **5.3 PERIODIC MEDICAL EXAMINATION**

The periodic medical examination will determine biologic trends that may mark early signs of adverse health effects, and thereby facilitate 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
- Urinalysis
- Complete blood count
- PFT (as determined by the OHE)
- Respirator fit test
- EKG (as determined by the OHE)
- Chest X-ray within 54 months (as determined by the OHE)
- Visual acuity
- Hearing conservation audiogram (for individuals exposed to an 8-hour time-weighted average of 85 dBA or greater).

#### **5.4 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.

#### **5.5 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 PEL and/or TLV), shall promptly notify their supervisor and 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.

#### **5.6 TERMINATION MEDICAL EXAMINATION**

A termination examination will be provided at the end of an 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.

## **5.7 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 (DOE form F1800.1) must be completed. This form can be obtained from the U.S. Department of Energy-Richland Operations Office.

HEHF provides the physician's 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.

The medical clearance form is forwarded to the employee and to the employee's manager by HEHF. A medical clearance indicates restrictions or provides full clearance for performing the work duties. 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.

## **5.8 SCHEDULING MEDICAL EXAMINATIONS**

The manager of the employee is responsible for requesting the hazardous waste worker (HWW) medical examination required for access to the tank farms. The request for the medical examination is made by contacting HEHF to set up an appointment.

In addition to the requirements for HWWs, employees may need a medical examination for other work activities (e.g., asbestos or carcinogens). The request for these special examinations must also be scheduled directly with HEHF.

WHC managers are required to schedule medical examinations as follows:

- Call WHC Medical Scheduling if changes are needed
- Change or cancel appointments that will not be met (at least 48 hours in advance).

## 6.0 MONITORING

### 6.1 OVERVIEW

The purpose of industrial hygiene monitoring is to assess employee exposure to chemical and physical agents in the work place. This monitoring effort is essential before instituting control measures, as the degree of control must be based on level of hazard present. Monitoring at the tank farms can be divided into monitoring for assessment purposes and monitoring for entry into tank farms. While both types of monitoring are necessary, they serve somewhat different purposes. The primary purpose of assessment monitoring is to evaluate the agents present and determine their levels as part of an industrial hygiene strategy. Entry monitoring is performed to evaluate agents at the time specific work is being performed. Entry monitoring is thus targeted more toward verifying that existing control measures are adequate, rather than identifying or quantifying contaminant levels. Entry monitoring will be discussed under control measures for specific agents.

Assessment monitoring is primarily directed toward identifying and quantifying specific chemical and physical agents present in the work place. This effort is being guided by the Hanford Occupational Exposure Assessment Program (HOEAP). This program, which is based on the Occupational Exposure Assessment Strategy issued by the American Industrial Hygiene Association, provides a mechanism for all phases of workplace evaluation including initial assessment. Subsequent monitoring, evaluation, and control will be based on HOEAP assessments.

Monitoring can be broken down into two basic subgroups: chemical and physical agents. Chemical agents primarily include gases and vapors being given off from the waste tanks, but could also include any chemical agents used in operations or maintenance activities at the farms. Physical agents include noise, heat, illumination, explosivity, confined spaces, asbestos, ergonomic and biologic factors, radiological agents, and others. Monitoring for both classes of occupational stressors is necessary to fully characterize the hazards associated with routine and nonroutine work within the tank farms. Radiation hazards are exclusively monitored by WHC Health Physics and will not be further discussed here.

Both routine and nonroutine tank farm activities have been identified as important for monitoring. Routine and nonroutine monitoring will be conducted to characterize worker exposure for these type of activities. Routine tank farm work includes all tank farm maintenance activities which are conducted on an ongoing basis as part of operations routine maintenance. Nonroutine tank farm work includes all activities requiring the generation of specific work control documents, and always includes activities where tank containment will be broken.

Monitoring will continue to be prioritized based on perceived need given the amount of available baseline monitoring data and a job hazard analysis. As of 1994, the need for

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collecting baseline vapor data has been considered of prime importance in downgrading personnel protection requirements in the tank farms. Future monitoring will emphasize nonroutine vapor monitoring and both routine and nonroutine physical agent monitoring.

Specific monitoring activities are discussed in the appendices.

## **6.2 CHEMICAL AGENTS**

Although it has been postulated that numerous organic and inorganic compounds could be emanating from underground waste storage tanks at the farms, personal monitoring has not shown levels of significant importance with regard to worker exposure. Source monitoring conducted to date indicates that ammonia and low levels of various volatile organic compounds are being released from farm tanks. Grab samples for hydrogen cyanide have shown levels below detection limits. Samples collected thus far demonstrate that employee exposure levels do not exceed any of the established protection criteria (permissible exposure limit (PEL), threshold limit value (TLV), recommended exposure limit (REL) and workplace environmental exposure levels (WEELs) commonly used in the industrial hygiene community.

Monitoring has proceeded along several lines to determine the likelihood for employee exposure. Monitoring has been conducted for personnel, area, source, and tank headspace monitoring.

## **6.3 PHYSICAL AGENTS**

Tank farms contain numerous physical hazards which can cause employee exposure and subsequent injury or disease. Physical agents at the farms include noise, heat, illumination, explosivity, confined spaces, asbestos, ergonomic and biologic factors, radiological agents, and others (see tables).

Sampling is routinely conducted for explosivity and oxygen content for source and area monitoring.

## **6.4 MONITORING STRATEGY**

The monitoring strategy, based on the HOEAP, involves performing baseline qualitative evaluations, defining homogeneous exposure groups (HEGs), conducting monitoring and sampling based on these evaluations, and recommending proper control methods. This strategy is followed for all work performed at the Hanford Site. The actual implementation, however, differs depending upon the work performed. Two types of work, that is, routine exposure monitoring and work package activity monitoring are discussed in the following subsections.

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#### **6.4.1 Routine Exposure Monitoring**

In cases where the exposure is routine, the HOEAP strategy can be followed closely. The initial step in the HOEAP process involves a baseline qualitative evaluation for potential hazards to be used in prioritizing necessary sampling efforts. The baseline hazard evaluation for the tank farms was completed in 1993 and involved a qualitative review of tank farm health hazards. This review is being used to define which hazards need additional evaluations and to conduct those evaluations. For each hazard being evaluated, a HEG can be defined, and monitoring or sampling performed to evaluate potential exposure levels. Once monitoring has been performed, recommendations for control measures and maintenance monitoring will be made.

Because of high levels of employee concern and mandatory use of supplied air, the decision was made to initiate the HOEAP process for tank farm vapors even before the process had been finalized. Because of previous exposure incidents, the baseline exposure assessment focused on gathering data on previous exposure incidents, as well as recent monitoring data in the farms. From this information, three HEGs were defined for each farm complex. (A tank farm complex was defined as one or more contiguous farms where routine entries are made.) Eight farm complexes were defined. It was decided to focus initial efforts on single-shell (nonventilated) tank farms, because previous exposure incidents were associated with these farms. Similarly, it was decided to concentrate initial efforts on determining exposure levels during routine tasks. This is because these tasks have the greatest potential for high levels of cumulative exposure caused by the high task frequency. Twenty-four HEGs were defined. To adequately assess routine vapor exposure levels, it was determined that six samples should be collected from each of the 24 HEGs. One hundred forty-four samples were defined as the initial goal of the sampling effort.

Choosing agents to sample was based on previous monitoring efforts and initial efforts at tank headspace characterization. Sampling equipment was chosen for ammonia, acetone, n-butanol and hydrogen cyanide. Sampling for hydrogen cyanide was performed because of a high level of concern associated with this agent and the presence of ferrocyanide in some of the waste tanks, not on previous sampling efforts.

The initial 144 samples were completed early in FY 1994, and, based on the results, changes to tank farm entry requirements have been made in nearly all single-shell tank farms. This sampling is continuing and has been expanded to cover double-shell tanks, selected work packages, and tank emission monitoring. This process will be expanded to include other agents based on the baseline hazard evaluation.

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#### **6.4.2 Work Package Activity Monitoring**

Although selected work packages are being evaluated as part of the sampling program, it is not practical nor desirable to sample all of them. For these jobs, a job hazard analysis (JHA) of planned work activities shall be performed and reviewed by the industrial hygienist and

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the SSHR. This review is to ensure that all hazards that might affect employee health have been considered before entry into the farm. This includes existing hazards present in the farm before entry, chemicals introduced during operation activities, and any expected reaction products.

The JHA consists of an evaluation for any potential exposure to contaminants based on where the work is to be performed and what operations are to be conducted. Thus, monitoring may be required on some operations because of the hazards located in the work vicinity. Other operations will require monitoring based on the nature of the work itself. This monitoring plan was developed to ensure that employee exposures to chemical and physical hazards are evaluated, and that appropriate controls are instituted to protect worker health and safety. There are four types of monitoring being used to assess exposure levels. Each of these is discussed below.

#### **6.4.3 Personnel Monitoring**

Personal sampling consists of attaching various sampling devices to an employee during their work tasks and evaluating any determinant exposures. Personal exposure monitoring is considered to be the closest measure of employee exposure.

#### **6.4.4 Area Monitoring**

Area monitoring involves the collection and analysis of samples in the general area where work is taking place. Area monitoring provides a general overview of the potential for employee exposure and is considered more representative than source monitoring discussed below. Area monitoring can include both entry and assessment monitoring, if entry monitoring has been defined as a control measure for the specific agent.

#### **6.4.5 Source Monitoring**

Source monitoring consists of the collection of samples at the supposed source. This type of monitoring is used to determine the highest potential for which employees could be exposed. Source monitoring is also useful in providing an estimate of the frequency and magnitude of any release.

#### **6.4.6 Tank Headspace Monitoring**

Headspace monitoring is currently being conducted to speciate and quantitate levels of volatile and semi-volatile organic contaminants, ammonia, hydrogen cyanide and acid gases, oxides of nitrogen and sulfur, hydrogen, methane and carbon dioxide in each tank for several farms. The process of sampling tank headspace began in August of 1992 and will continue

until 36 tanks have been sampled. Tank headspace sampling may continue after the initial sampling effort. This work is being conducted by tank farm operations personnel. The tank headspace monitoring data will be used to determine the potential for vapor release and subsequent exposure to employees. This program, titled *Program Plan for the Resolution of Tank Vapor Issues*; WHC-EP-0562, (Osborne 1994), is currently being managed under the Tank Vapor Issue Resolution Program.

## **6.5 SAMPLING AND MONITORING EQUIPMENT**

Monitoring equipment is currently maintained by WHC, HEHF, and ICF KH. Tables 6-1 and 6-2 describe the types of monitoring equipment available to assist in the characterization of employee exposures at the farms for both chemical and physical agents.

## **6.6 SAMPLING**

Under the direction of TWRS-IH&S, WHC, HEHF, and ICF KH staff will be responsible for sample collection and analysis. Sampling and analytical methods will adhere to standard operating procedures and will follow the Quality Assurance Program Plan for industrial hygiene monitoring and evaluation.

Sampling will be initiated by the WHC industrial hygienist who will review the work package and detail the sampling assignment to obtain the desired exposure profiles. Safety inspection/observation, which applies to many of the physical agent hazards, will be initiated by the SSHR or the industrial hygienist. These assessments will be based on hazard and baseline evaluations whenever possible. An industrial hygiene sampling plan will be prepared to document the purpose and desired endpoints for sampling. This strategy will follow the NIOSH decision-making scheme (or equivalent) and include sufficient sampling to ensure statistical validity for subsequent actions. Periodic sampling may be recommended to evaluate changing conditions and to increase confidence in any original sampling and decision making scheme.

## **6.7 MONITORING DATA REVIEW AND ACTION**

Monitoring data will be reviewed by a WHC industrial hygienist and compared to established safe levels. Safe levels for gas or vapor exposure have been established in the form of an administrative action level by TWRS-IH&S. This action level is known as an occupational exposure limit (OEL) which has been defined as one-half of the lower of either the PEL or the TLV. Engineering controls will be implemented or personal protective equipment issued if monitoring data suggests that workers could be exposed at a level exceeding the OEL. Data review/action for dermal exposure to chemical agents and exposure to physical agents in the tank farms will be completed using OSHA standards and ACGIH guidelines.

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Table 6-1. Chemical Agents - Monitoring Tool.

Contaminant	OVM	Sorbent tubes	Detector tubes	Toxilog	TMX 410	TDU	Other	MX251 LEL
Ammonia	X	X	X	X	X			
Organic Vapor	X	X	X	X	X	X		
HCN		X	X	X	X			
Acid Gasses		X	X	X				
NOx		X	X		X			
SOx		X	X		X			
Hydrogen		X	X		X			X
Methane		X	X		X			X
Carbon Dioxide		X	X					
Oxygen								X

Notes:

LEL = Lower Explosive Limit  
 TDU = Thermal Desorption Unit  
 OVM = Organic Vapor Monitor  
 TMX410 = Environmental Instruments multi-gas monitor.  
 MX251 = Industrial Scientific combustible gas meter.

Table 6-2. Physical Agents - Monitoring Tool.

Hazard	O2/LEL Meter	Observation	WBGT	Light Meter	SLM/Band Analyzer	Other
Oxygen/LEL	X					
Ergonomic		X				
Heat stress		X	X			
Cold stress		X				
Worker fatigue		X				
Asbestos						X
Noise						
Electrical		X				
Illumination		X		X		
Biological		X				

Notes:

LEL = Lower Explosive Limit  
 SLM = Sound Level Meter  
 WBGT = Wet Bulb Globe Thermometer

## **6.6 SAMPLING**

Under the direction of TWRS-IH&S, WHC, HEHF, and ICF KH, staff will be responsible for sample collection and analysis. Sampling and analytical methods will adhere to standard operating procedures and will follow the Quality Assurance Program Plan for industrial hygiene monitoring and evaluation.

Sampling will be initiated by the WHC industrial hygienist who will review the work package and detail the sampling assignment to obtain the desired exposure profiles. Safety inspection/observation, which applies to many of the physical agent hazards, will be initiated by the SSHR or the industrial hygienist. These assessments will be based on hazard and baseline evaluations whenever possible. An industrial hygiene sampling plan will be prepared to document the purpose and desired endpoints for sampling. This strategy will follow the NIOSH decision-making scheme (or equivalent) and include sufficient sampling to ensure statistical validity for subsequent actions. Periodic sampling may be recommended to evaluate changing conditions and to increase confidence in any original sampling and decision making scheme.

## **6.7 MONITORING DATA REVIEW AND ACTION**

Monitoring data will be reviewed by a WHC industrial hygienist and compared to established safe levels. Safe levels for gas or vapor exposure have been established by TWRS-IH&S in the form of an administrative action level. This action level is known as an occupational exposure limit which has been defined as one-half of the lower of either the PEL or the TLV. Engineering controls will be implemented or personal protective equipment issued if monitoring data suggests that workers could be exposed at a level exceeding the OEL. Data review/action for dermal exposure to chemical agents and exposure to physical agents in the tank farms will be completed using OSHA standards and ACGIH guidelines.

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## 7.0 DECONTAMINATION PROCEDURES

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Normal tank farm operations deal mainly with radiological decontamination. When unusual work is performed at the tank farms and a step-by-step decontamination protocol for site personnel and equipment is required, this protocol can be found in the task-specific HWOP. The HWOP will be incorporated as part of the work package when needed. When tank farm operations move into site investigation and cleanup work, a full-scale hazardous waste decontamination procedure will be implemented.

WHC general guidance and procedures for decontamination are found in WHC-CM-4-3, Volume 4 (HWO-1, and Appendix K). Where necessary for clarity or emphasis, WHC policy has been incorporated into the following policies, guidelines, and requirements for tank farms that amplify or are more stringent than WHC procedures.

Tank farm site activities will frequently require intrusion into areas of known chemical and/or radiological contamination. Consequently, it is possible that personnel and equipment will be contaminated with hazardous chemical and radiological substances in various ways, many of which are not readily apparent to the individual. Potential sources of contamination include airborne vapors, gases, dust, mists and aerosols, splashes, spills, walking through contaminated areas, and handling contaminated equipment.

Decontamination, the process of removing or neutralizing contaminants that have accumulated on personnel and equipment, is critical to the worker health and safety. Decontamination protects workers from contact with hazardous substances that may contaminate and eventually permeate protective clothing, respiratory equipment, tools, vehicles, and other equipment used on site. Decontamination (1) protects all site personnel by minimizing the transfer of harmful materials into clean areas; (2) helps prevent mixing of incompatible chemicals; and (3) protects the community by preventing uncontrolled transportation of contaminants from the site.

For tank farms, decontamination takes on additional significance in that most chemical contamination will be combined with radiological contamination, thus making the decontamination problem one of dealing with mixed wastes. If equipment or personnel are radiologically contaminated, decontamination procedures shall comply with guidelines established in HSRCM-1, Rev. 2, (WHC 1994). If radiological contamination is detected on skin or clothing by any means, an Health Physics technician (HPT) must be contacted. Contaminated personnel shall be decontaminated following WHC procedures. Easily detected radiological contamination serves as an indicator of potential chemical contamination when working with mixed wastes, similar to the use of radioactive tracers.

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## 7.1 PREVENTING CONTAMINATION

### 7.1.1 Minimizing Contamination

The amount of decontamination required can be minimized substantially 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 overpacks).

### 7.1.2 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). 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.

### **7.1.3 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.

### **7.1.4 Surveying of Instruments**

All instruments and equipment must be surveyed for radiological contamination control purposes 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).

### **7.1.5 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 Respiratory Protection Services.

### **7.1.6 Down-Hole Drilling Equipment**

Down-hole drilling equipment shall be decontaminated before it is used on another borehole and/or as required to ensure the safety of personnel, and/or to prevent sample cross-contamination.

### **7.1.7 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) are to be double bagged and taken to an appropriate facility for decontamination before reuse, to minimize personnel contamination potential and sample cross-contamination.

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## 7.2 TYPES OF CONTAMINATION

### 7.2.1 Physical States of Contaminants

Contaminants may be present in the form of solids, liquids, gases or vapors. Dust and dirt contaminated with radionuclides, toxic organic compounds, or metals may collect on the surface of personal protective equipment, or in cracks, crevices, folds, and seams. 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.

### 7.2.2 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).

### 7.2.3 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.

## 7.3 POLICIES FOR DECONTAMINATION PROCEDURES

### 7.3.1 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 buffer 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-C 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.

## 7.4 POLICIES FOR SPECIFIC DECONTAMINATION PROCEDURES

### 7.4.1 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. However, 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, and boot covers.

#### **7.4.2 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.

#### **7.4.3 Health and Safety of Decontamination**

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

#### **7.4.4 Change Rooms**

Anti-C clothing is stored at specific locations in the 200 East and West Area Tank Farm areas. 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. Most of the authorized change rooms are trailers that are used as exit-entry points to controlled areas. The location of the trailers and authorized change rooms are noted in Table 7-1.

#### **7.4.5 Showers**

Although there are various showers within tank farms that could be used in an emergency for decontamination, the only authorized fixed shower is located at each of the evaporator buildings, and the Plutonium Finishing Plant.

### **7.5 TESTING FOR DECONTAMINATION EFFECTIVENESS**

#### **7.5.1 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.

Table 7-1. Location of Trailers and Change Rooms.

## 200 East Area Change Rooms.

Location	Type	Access to
204-AR/244	Room	204 Unloading bay
A gate	Trailer (MO-825)	A, AY, AX, AZ
AN gate	Trailer (MO-820)	AN farm
AW gate	Trailer (MO-818)	AW farm
BX gate	Trailer (MO-824)	B, BX, BY farms
C gate	Trailer (MO-822)	C Farm, CR vault
242-A evaporator	Room	Evaporator, pump room, A farm, condenser room
Lift station	Trailer (MO-816)	Lift station
AP gate	Trailer (MO-815)	AP farm

## 200 West Area Change Rooms

Location	Type	Access to
T gate	Trailer (MO-821)	T farm
TX, TY gate	Trailer (MO-817)	TX, TY farms
U gate	Trailer (MO-823)	U farm
SX gate	Trailer (MO-819)	S, SY, SX farms
242-S evaporator	Room	Evaporator and pump rooms

### 7.5.2 Wipe Testing/Direct Reading Sampling

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.

### **7.5.3 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.

## **7.6 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.

## **7.7 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.

## **7.8 DISPOSAL METHODS**

All decontamination equipment must be properly decontaminated and/or disposed of (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.

## 7.9 PERSONAL PROTECTION

### 7.9.1 General Safe Work Practices

1. Eating, drinking, smoking, taking medications, and chewing gum 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 potentially contaminated items unless wearing protective gloves as specified in the JHA and RWP.
3. Be alert to potentially changing exposure conditions evidenced by perceptible odors, unusual appearance of excavated soils, or oily sheen on water. Whenever possible, approach from or stand upwind (as indicated by the required onsite windsock) of excavations, boreholes, well casings, and drilling spoils.
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.

### 7.9.2 Protection of Decontamination Personnel

1. All decontamination workers who are in a contaminated area must 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 Site Safety and Health Representative (SSHR), the RWP, or by the HPT.

## 7.10 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 buffer 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 buffer area for appropriate life saving/emergency procedures.

## 8.0 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. Applicable maps reflecting boundary controls shall be posted at the entry points (change trailers) for each tank farm. The SSHR shall be responsible for ensuring that the most current boundaries are displayed.

In addition to general training received concerning PPE, all employees entering tank farms shall receive training on the establishment of respiratory protection zones. As a minimum, all employees are required to read the Safe Work Practice (SWP), Task: Entry Into Tank Farm Respiratory Protection Zones. Specific PPE requirements shall be included as part of the work package and/or RWP.

Because many tasks at the tank farms involve radiological work, Contamination/Airborne Radioactivity Control Areas and/or Radiation Areas are established in accordance with the HSRCM-1, Rev. 2 (WHC 1994).

## 8.1 RADIOLOGICAL CONTROL ZONES

Radiation Areas are classified as follows:

- **Radiation 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.

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## 8.2 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.

## 8.3 HAZARDOUS WASTE OPERATIONS/CLEANUP WORK ZONES

The procedures addressed in this section are only required for those tasks which fall under nonroutine work requiring a HWOP. To reduce the accidental spread of hazardous substances from contaminated areas to clean areas, various zones shall be established. By defining work zones, work activities and contamination can be confined to the appropriate areas and personnel can be located and evacuated in an emergency. Hazardous waste operations and waste cleanup projects can be divided into as many different work zones as needed to meet operational and safety objectives. These zones will be specified in the HWOP. The three primary work zones that shall be established in the HWOP are the exclusion zone, contamination reduction zone, and the support zone.

NOTE: Such work zones shall not be confused with established radiation contamination control zones.

The appendices indicate the specific zones for each tank farm.

### 8.3.1 Exclusion Zone

The exclusion zone (EZ) is the area where contamination does exist or could occur. The primary activities performed in the exclusion zone are:

- Site characterization such as test boring or sampling.

- Installation of wells for groundwater monitoring.
- Cleanup work such as drum movement, drum staging or material consolidation.

The outer boundary of the exclusion zone shall be clearly marked by rope, barrier tape, fences or other physical barriers which include placards or signs. An access control point should be established at the periphery of the exclusion zone to regulate the flow of personnel and equipment into and out of the area. Personnel working in the exclusion zone may include the supervisor-in-charge, operators, other workers, and specialized personnel such as equipment operators. All personnel working in the exclusion zone must wear the level of personal protection clothing specified in the HWOP.

### **8.3.2 Contamination Reduction Zone**

The contamination reduction zone (CRZ) is a transition area between a contaminated area and the clean area. This zone is designed to reduce the probability that the clean support zone will become contaminated or be affected by hazardous substances from the exclusion zone. Decontamination should take place within a designated area of the CRZ with the access point located in close proximity to the access point for the exclusion zone. The degree of contamination should decrease as one moves away from the exclusion zone towards the support zone. Personnel protective clothing, equal to but not greater than that required in the exclusion zone, should be worn by everyone in the CRZ. Besides decontamination, the CRZ should be used to facilitate emergency equipment, equipment resupply, sample packaging, worker temporary rest areas and drainage or containment of water or other liquids used for decontamination.

### **8.3.3 Support Zone**

The support zone (SZ) is the location of the administration support functions needed to keep the other two zones operational and running smoothly. This can be used as a staging area for equipment, containers, and supplies. No special protective clothing is required in this area. Personnel exiting the CRZ should be monitored before entering the support zone to ensure they are free of all contaminates from the exclusion zone.

## **8.4 DEFINITION OF ZONE SIGNS**

- **Supplied Air Respiratory Protection Zones** are the areas within 8.5 m (28 ft) of single-shell tank release points and require the use of supplied air. Refer to Section 2.9 for specific details.

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- **Air Monitoring Zones** are the areas within 1.5 m (5-ft) around specific tank penetrations with access limited to those authorized by tank farm facility operations. Entry into air monitoring zones will require either industrial hygiene monitoring or supplied air.

Any work activity that breaches primary tank containment on passively ventilated tanks, including filter testing activities and pit cover removals, will be conducted on supplied air or accompanied by continuous monitoring throughout the duration of the activity. Monitoring will not be necessary during supplied air activities. Ventilated tanks will not require use of supplied air unless the exhauster is not functioning or waste intrusive work is taking place. Section 2.9 of the HASP dictates specific respiratory controls in Tank Farms in the form of a Safe Work Practice (SWP).

## 8.5 ACCESS CONTROL

Access control to tank farm 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 tank farms radiologically-controlled areas. Table 3-1 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.

## 8.6 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 tank farms, the buddy system is used in the following cases:

- Entry into confined spaces

- Activities requiring the use of supplied air or SCBA
- Work performed under a HWOP (see Section 1.1).

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.

## 8.7 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 by 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 and to dispatch emergency responders.

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## 9.0 EMERGENCY RESPONSE PLAN

### 9.1 PRE-EMERGENCY PLANNING AND COORDINATION WITH OUTSIDE PARTIES

The *TWRS Emergency Preparedness Program Plan*, WHC-IP-0971, is the primary emergency planning document for the 200 Area Tank Farm facilities. The plan contains descriptions of the (1) hazards, (2) potential emergency conditions, and (3) response plans for pre-identified potential emergency conditions.

The *TWRS Emergency Preparedness Program Plan* is an agreement among the three major Hanford Site contractors (i.e., an operations, engineering and construction contractor; a research and development contractor; and a medical and health services contractor) which 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 if an incident has offsite public health implications, or if an onsite emergency warrants offsite assistance.

### 9.2 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATION

The overall responsibility for implementation of the tank farm emergency response plan lies with the Building Emergency Director (BED). The BED is responsible for the safety of personnel in and around the tank farms during an emergency. A list of all BEDs is maintained at various locations throughout the facility. The tank farms shift managers act as BEDs, and these individuals can be reached 24-hours/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 (376-2689 East Area or 373-3475 West Area). 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 (by plant telephone at 911 or 373-3800, or by cellular telephone at 811) and has the responsibility to initiate notifications and to dispatch emergency responders (Hanford Fire Department, Hanford Patrol, or ambulance services). All emergency notifications to the BED and building managers 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 emergency event level (i.e., Alert Level Emergency or higher), other WHC Emergency Response organizations and the Richland Operations Office (RL) emergency organization are activated. The role of the WHC organization is to support the facility, assume notification responsibilities, and determine protective actions for the surrounding area. During a DOE-RL security event, the RL organization has overall control and is responsible for interfacing with onsite and offsite agencies and media (through the Joint Information Center).

### **9.3 EMERGENCY RECOGNITION AND PREVENTION**

Emergency recognition is primarily accomplished through a work force that is knowledgeable about 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 tank farms has in place an emergency procedure (WHC-CM-4-43, *Emergency Management Procedures*, Section 2.1A, "200 Area Tank Waste Recognition and Classification of Emergencies") that facilitates the rapid recognition and classification of an operational emergency as described in DOE emergency preparedness orders.

For spills of hazardous materials or dangerous waste, the BED ensures that trained personnel (e.g., from the Hanford Fire Department Hazardous Materials Team, or the Industrial Hygiene organization of TWRS-IH&S) 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) visually inspecting involved containers; (2) sampling; (3) referencing of inventory records, shipping manifests, or waste tracking forms; or (4) 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 used to help ensure 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.

### **9.4 SAFE DISTANCES AND PLACES OF REFUGE**

The *Tank Farm Facility Building Emergency Plan* (WHC 1994) identifies evacuation staging areas and routes for the tank farm facilities. In some cases personnel are required to evacuate to a safe upwind location. If a place of refuge is required, personnel have been trained to seek shelter in the nearest available building, office trailer, or change trailer.

## **9.5 SITE SECURITY AND CONTROL**

Initially, it is the responsibility of the discoverer of an emergency situation to ensure that other personnel do not enter the area of danger. 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 and direction to allow Hanford Patrol to establish effective controls. Examples of controls that may be established include closing a specific area or site, closing main gates, issuing a crash alarm telephone message, and activating 200 Area evacuation or take-cover sirens.

## **9.6 EVACUATION ROUTES AND PROCEDURAL GUIDELINES**

Facility-specific evacuation routes and processes are contained in the TWRS Emergency Preparedness Plan (WHC-IP-0971) (WHC 1994b) and in facility-specific emergency plans. The basic response for an area evacuation is for non-essential personnel to meet at the evacuation staging area for accountability. Essential personnel meet in a safe location for accountability. Relocation from the staging area to another location will be at the direction of the BED or as coordinated by the WHC Emergency Response organization.

## **9.7 EMERGENCY MEDICAL TREATMENT AND FIRST AID**

Health Service Centers are located at both the 200 East and 200 West Areas. The 200 East Area Health Service Center is located on the corner of 4th and Baltimore in Building 2719EA (telephone 373-2314). The 200 West Area Health Service Center is located on 20th street in Building 2719WB (telephone 373-2714). Both stations are staffed during normal day shift hours Monday through Friday.

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/day, 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 Medical Center, located in the city of Richland. Kennewick General Hospital, located in the city of Kennewick, and Our Lady of

Lourdes Hospital, located in the city of Pasco, are used as backup facilities. Agreements have been established between these hospitals and DOE-RL.

Employees are required to have Medic First Aid training. First aid kits are located in office buildings and change trailers.

## 9.8 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 summons the Hanford Fire Department. The BED has the authority to activate facility-specific warning systems and is authorized to order initiation of the area-wide alerting/warning signals through the single point-of-contact. Table 9-1 lists the standard warning signals and provides the appropriate meanings and responses.

Table 9-1. 200 Area Tank Farm Alarms and Appropriate Responses.

Alarm	Meaning	Response
Crash alarm telephone (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 or bell and flashing lights	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.

## 9.9 CRITIQUE OF RESPONSE AND FOLLOW-UP

In accordance with DOE Order 5000.3B (DOE 1990), an occurrence report is required for incidents occurring at the tank farms involving hazardous materials release and fire. The DOE reporting system establishes three levels of incidents. These descriptions, listed below, are provided in order of descending levels of severity.

- Emergencies--The most serious level of occurrence. Emergencies 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-0971, *TWRS Emergency Preparedness Program Plan* (WHC 1994); and WHC-CM-4-43, Section 2.1A, "200 Area Waste Tank 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 regarding occurrence reporting system are found in WHC-IP-0842, *Waste Tank Administration Manual*, Section 5.6.1, "Tank Farms Occurrence Reporting and Processing of Operations Information." (WHC 1992)

After the event is categorized, proper notifications are completed to onsite and offsite agencies (as required), including the operating contractor, DOE, and county and state organizations. The Tank Farm Occurrence Reporting System ensures compliance with the requirements for accident/incident reporting in accordance with DOE Order 5484.1 (DOE 1984).

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

## **9.10 PERSONAL PROTECTIVE EQUIPMENT (PPE) AND EMERGENCY EQUIPMENT**

PPE is located throughout the tank farm facilities. Specific locations of the emergency equipment are contained in the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF (WHC 1994). Change rooms contain protective clothing, air purifying respirators, and self-contained breathing apparatus. Spill kits and acid suits are located where hazardous materials are stored and handled. Fire extinguishers are located in all facilities. In addition, detection equipment for organic and explosive vapors is on hand. Emergency kits, intended for use by health physics personnel during radiological incidents, are located in response vehicles.

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## 10.0 CONFINED SPACE ENTRY POLICIES, GUIDELINES, AND REQUIREMENTS

Numerous confined spaces are found in and around the tank farm 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 tank farms as outlined below.

1. An incomplete listing of confined spaces in the tank farm areas has been compiled and is attached to each applicable farm appendix. Each of the spaces shall be posted with an appropriate warning sign.
2. All personnel who will be involved in confined space entry will be trained in the hazards associated with confined spaces, acceptable entry conditions, and their duties and responsibilities as part of the entry team.
3. Before a confined space entry, the PIC will initiate a Confined Space Entry Permit (Jetform # A-6000-895) to document pertinent information and safety requirements for the entry.
4. Before the entry begins, Health and Safety Technical Services will test the confined space atmosphere for adequate oxygen and potential air contaminants.
5. The following safeguards shall be established for each entry.
  - An attendant will be assigned to stand by outside the confined space in order to monitor activities in the space and call for help in an emergency.
  - The space will be isolated from potentially hazardous energy sources using an approved lock and tag procedure.
  - Mechanical ventilation will be provided, as necessary, to remove atmospheric contaminants and/or ensure adequate oxygen.
  - Appropriate personal protective equipment will be provided to entrants.
  - The emergency response team (Hanford Fire Department) will be notified in advance of high hazard entries as specified in WHC-CM-4-40, Section 3.1, "Confined Space Entry."
6. When all necessary safety actions have been completed, the PIC will sign the entry permit to authorize the entry.

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## 11.0 ENVIRONMENTAL PROTECTION AND RESPONSE

Because of the hazardous nature of many materials used and found in the tank farms, only trained personnel shall respond to a hazardous material or hazardous waste spill. Included in the initial and refresher Hazard Waste Training (see Section 3.0) are instructions for cleaning up small spills. Appropriate Material Safety Data Sheets (MSDSs) shall be referenced before performing cleanup.

It is the responsibility of the employee identifying the spill to notify the tank farms shift manager immediately in the event of a release to the environment, or if unexpected contaminated spills are encountered at the tank farms. The tank farms shift manager, after consulting with the appropriate WHC environmental group, will determine whether the spill is a reportable occurrence under DOE Order 5000.3B (DOE 1990). The requirements for notifying state or other regulatory agencies are included in the WHC reporting procedures. Substantial spills of hazardous materials may require response by the Hanford Fire Department Hazardous Materials (HAZMAT) Response Team.

### 11.1 SMALL CONTROLLED SPILLS

When the spill is a small, controlled amount and the identity of the spilled substance is known, the spill can be cleaned up by personnel at the tank farms who have received appropriate training. To clean-up a spill, the following actions and MSDS guidelines for the substance should be followed.

- Stop the spill.
- Warn other people of the spill.
- Isolate the area around the spill.
- Minimize personal exposure.
- Secure or redirect ventilation systems that might cause airborne contamination.

### 11.2 LARGE CONTROLLED/UNCONTROLLED SPILLS

When the spill is large, the Hanford Fire Department HAZMAT Response Team should be notified to clean-up the spill. The HAZMAT Team will develop a plan of action on each response (based on training), because every response to a spill is different.

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## **12.0 TANK FARM HAZARD COMMUNICATION**

The Tank Farm Hazard Communication Program implements the requirements stated in WHC-CM-4-40, Industrial Hygiene Manual, Section 2.1 Hazard Communication Program; and OSHA regulation 29 CFR 1910.1200, "Hazard Communication."

The purpose of this program is to communicate to tank farm workers the potential for illnesses and injuries related to the work environment. This program requires managers to inform their workers of the hazards in the work area and how they can protect themselves. The written program will be kept in various locations throughout the tank farms and will be available to all employees.

### **12.1 HAZARDOUS CHEMICAL INVENTORY**

A complete, current, hazardous chemical inventory will be maintained by each functional group or facility in the tank farms. Right-to-know stations will be located in various locations throughout the tank farms. The chemical inventory must include the MSDS number, may be cross-referenced by synonyms, and may include the Hanford Hazardous Materials Rating.

### **12.2 PHYSICAL AND BIOLOGICAL HAZARD INVENTORY**

A physical and biological hazard inventory will be included in the Tank Farm Hazard Communication Program. The physical agents considered include fire hazards, lighting hazards, noise hazards, temperature-extreme hazards, and ergonomic hazards. Biological hazards include venomous animals and pathogenic materials. Locations of the physical and biological hazard inventory will be in the right-to-know stations as indicated in Section 12.1.

### **12.3 CHEMICAL LABELING**

All hazardous materials will be labeled with manufacturers warning labels or with internally generated hazardous materials information system labels.

### **12.4 MATERIAL SAFETY DATA SHEETS**

Material Safety Data Sheets (MSDS) will be readily available to all employees. They will be retained at the right-to-know stations along with the chemical inventories.

## **12.5 HAZARDS TRAINING**

All employees will be trained to recognize and protect themselves from all hazards identified upon job assignment. All affected employees will be trained whenever a new hazard is introduced into their work areas.

### 13.0 REFERENCES

29 CFR 1910.120, 1991, "Hazardous Waste Operations and Emergency Response," *Code of Federal Regulations*, as amended.

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WHC, 1994b, *TWRS Emergency Preparedness Program Plan*, WHC-IP-0971, Westinghouse Hanford Company, Richland, Washington.

WHC, 1995, *Operating Specifications for Watchlist Tanks*, Section 30.2.A, "Hydrogen/Flammable Gas Tank," OSD-T-151-00030, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1-1, *Management Policies*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-1-3, *Management Requirements and Procedures*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-3, *Industrial Safety Manual*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-40, *Industrial Hygiene Manual*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-41, *Fire Protection Program Manual*, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-43, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-6-4, *Hanford Hoisting and Rigging Manual*, Westinghouse Hanford Company, Richland, Washington.

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**APPENDIX A**

**HEALTH AND SAFETY PLAN  
FOR THE A TANK FARM**

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## APPENDIX A

### HEALTH AND SAFETY PLAN FOR THE A TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The A farm consists of six single-shell tanks with a capacity of 3,785,412 L (1,000,000 gal) each. The tanks are numbered 241-A-101 through -106. The tanks were built from 1954 to 1955 and received high-level radioactive waste from the Plutonium Uranium Extraction Facility. Tank 241-A-101 is partially interim isolated, while the remaining five tanks are interim isolated (e.g., physical means have been implemented to reduce the potential for introducing liquids into the tank) and stabilized (e.g., liquid levels have been reduced to prescribed levels).

Tank 241-A-101 is on the Hydrogen/Flammable Gas Watch List because it has the potential to contain concentrations of flammable gases that exceed the lower flammability limit (LFL). These gases originate from the waste or are generated as a byproduct of the waste. As a result of the potential flammable nature of this tank, extreme caution must be exercised to avoid any ignition source near the tank.

Tanks 241-A-101 and -106 vent vapor/gas from their breather filter. These tanks present a confirmed vapor exposure hazard from organics and/or ammonia and possibly other gases/vapors.

Tanks 241-A-101, -102, and -103 are each ventilated using a passive ventilation system. Air for the passive ventilation system is supplied and exhausted through a common high-efficiency particulate air (HEPA) filter mounted on a riser. Air enters the tank when the pressure in the tank is less than that of ambient air. Conversely, air exits the tank when the pressure in the tank is greater than that of ambient air. Tank 241-A-105 is ventilated using an active (electrically powered) 198-m<sup>3</sup>/min (7,000-ft<sup>3</sup>/min) exhaust ventilation system. Supply air for the ventilation system is provided through air purge instruments, pit coverblocks or tank risers and is exhausted through a HEPA filtered tank riser. Air discharge from the 241-A-105 ventilation system also provides some airflow through tanks 241-A-104 and -106 because these tanks are connected to 241-A-105 via underground cascade lines.

All A farm tanks contain high-level radioactive waste and various chemical constituents. The A farm is classified as a surface contamination area (SCA) (radiological contamination).

Various A farm tanks may be leaking and therefore pose a hazard for any subsurface activities because of radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-825) and adjacent gate (AY) located on Buffalo Avenue. Personnel enter and exit A farm through the support trailer. Equipment such as motorized vehicles enter and exit A farm through the gate adjacent to the trailer.

## **C. WIND INDICATION**

A wind sock located at the southwest corner of A farm indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Facility manager: 373-0132

Shift manager: 373-2689 or 373-2396

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

East Area TWRS IH&S satellite office: 373-7200

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

## **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm Health and Safety Plan* (HASP), Section 1.0. Key responsibilities include the following:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S

- Exposure/area monitoring specified by TWRS
- Exposure/area monitoring conducted by Industrial Hygiene Field Services (IHFS).

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Hydrogen/Flammable Gas

Tank 241-A-101 is on the Hydrogen/Flammable Gas Watch List because of its potential to contain concentrations of flammable gases that exceed the LFL. These gases originate from the waste or are generated as a by product of the waste. As a result of the potential flammable nature of this tank, extreme caution must be exercised to avoid any ignition source near the tank.

##### 2. Vapor/gas

Venting of various vapors/gases to the atmosphere from the breather filter on tanks 241-A-101 and -106 has been documented. Possible gas/vapor constituents include organic vapors and ammonia; however, vapor/gas constituents of the tanks have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. Elevated area/source concentrations are localized to the breather filter vent. Extreme caution in the areas is recommended. For the specific controls and personal protective equipment (PPE), refer to the safe work practice (SWP). Controls around breather filter sources include the following:

- Barricaded interior exclusion zones are established at a 1.5-m (5-ft) radius around the pump pit and liquid level reel on tank 241-A-101.
- Organic vapor meter (OVM) monitoring or level B PPE (supplied-air respirator) is required within the barricaded interior exclusion zones around tank 241-A-101; and for any containment breaches on this tank.

To date, all personnel exposure to gases and vapors have been well within established standards; however, strict adherence to controls is mandatory.

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### **3. High-Level Radioactive Waste**

All A farm tanks store and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled according to specific operating and safe work practice procedures and work permit processes.

### **4. Surface Contamination Area**

The entire A farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

Noise levels from the 241-A-105 Exhauster Building may exceed the applicable regulatory limit, and hearing protection may be required for personnel in A farm. Requirements for hearing protection will be based on the length of exposure and the proximity to the noise source. Specific information regarding the use of hearing protection is provided in work packages, pre-job briefings, and on posted signs. Additional noise sources such as portable compressors, heavy equipment, portable ventilation exhaust systems, etc. may occasionally be temporarily located in A farm. Hearing protection requirements for temporary noise sources are described in the work package and during the pre-job briefing.

### **2. Chemicals**

No specific chemicals are required for A farm operations that are atypical of operations at other tank farms. Specific chemical use is discussed in the *Tank Farm HASP*, Section 2.0, and in WHC-CM-4-40, Section 2.

### **3. Confined Spaces**

A listing of confined spaces for A Tank Farm can be found in Table A-1 of this appendix. See Section 10.0 of HASP.

### **4. Asbestos**

Warning signs posted at A farm alert workers that asbestos is present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during A farm activities, unless specifically directed.

## **C. TASK-BASED HAZARDS**

Tasks common to many or all tank farms and their associated hazards evaluations are listed in the *Tank Farm HASP*, Section 2.0.

Task-specific hazards and their corresponding controls are described in the work permits developed for the specific task to be completed.

Tasks having additional task-based hazard controls specific to A farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers). These tasks must be conducted with Level B PPE (supplied-air respirators) to protect the confirmed vapor hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## **IV. SITE CONTROLS**

### **A. WORK ZONES**

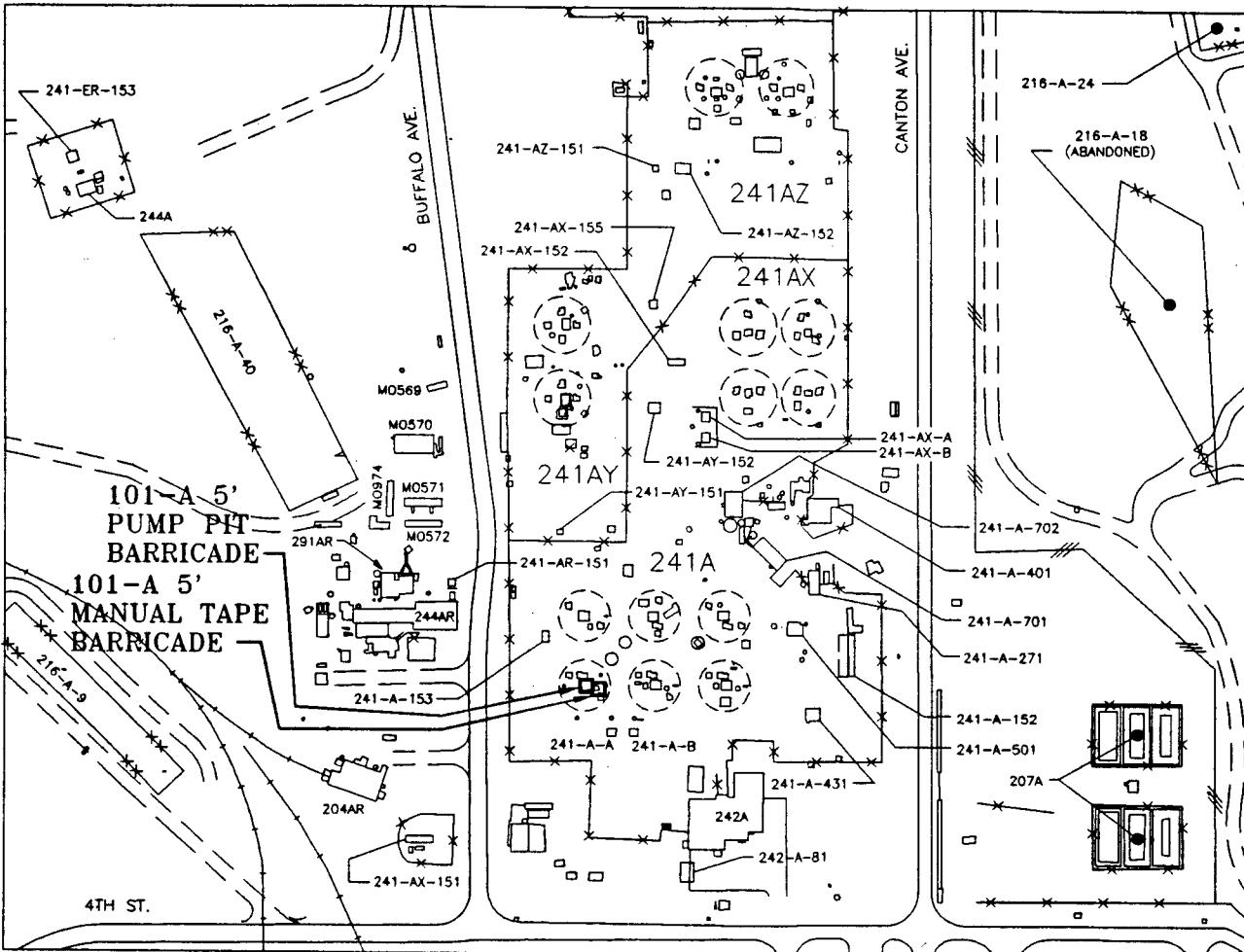
Work zones and controlled areas for A farm are shown on Figure A-1. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

#### **1. Perimeter Exclusion Zone**

A perimeter fenceline has been established and serves as both a RBA/URMA and a controlled area for nonradiological hazards.

Figure A-1. A Tank Farm Site Plan.

A-8



AIR MONITORING OR  
RESPIRATORY PROTECTION ZONE

241A/AX/AY/AZ

REV 0

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

NOTE: THIS MAP IS TO BE USED FOR  
REFERENCE PURPOSES ONLY.

Westinghouse Hanford Co.  
TWRS IH&S

CADFILE: 241AAXAY

DATE: 2-06-95

CUSTOMER: DAVID CARLS

DRAWN BY: NICK BARILO

TITLE:

241A/AX/AY/AZ TANK FARMS  
RESPIRATORY MONITORING

## **2. Interior Exclusion Zones**

Interior barricaded exclusion zones have been established at a 1.5-m (5-ft) radius around the pump pit and liquid level reel on tank 241-A-101. (Note: There is one breather filter for each tank.) This zone is controlled with OVM monitoring or level B PPE.

## **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway adjacent to the graveled area, and the area from the vehicle entry gate to approximately 9.1 m (30 ft) into the tank farm. Two decontamination lines exit within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE and scan for radiological contamination; (2) the vehicle/equipment decontamination line is through the vehicle gate where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at A farm, the only significant skin and clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the Hanford Site Radiological Control Manual.

## **4. Support Zone**

This zone consists of the portion of the trailer outside the RBA/URMA and also the area outside the perimeter fenceline. No controls other than normal WHC Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

## **B. ACCESS CONTROL**

Access to A farm is to occur only through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for A farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

Level D PPE is required for all work performed in A farm. Additional respiratory protection may be required as specified in the SWP of this document.

### **A. EXCLUSION ZONES**

Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.

### **B. CONTAMINATION REDUCTION ZONE/CONTAMINATION REDUCTION CORRIDOR**

Required Level D PPE consists of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zones. Any additional task-specific PPE requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or work packages and work permits developed for the specific task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the fenceline or into an RBA/URMA, external dosimetry is required as specified in the RWP.

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For any containment breach on all tanks, see the *Tank Farm HASP*, Section 2.9, Safe Work Practice, and Section 6.0.

Monitoring is conducted before entry and as directed for oxygen, explosivity, organic vapors, ammonia, and other hazards specified on work permits, are to be conducted. See confined space entry permit for requirements.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing 241-A-101 or -106 containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located in the A farm complex in building 241-A-701.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## VII. DECONTAMINATION PROCEDURES

Currently, radiological contamination is the only significant decontamination issue at A farm. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## VIII. EMERGENCY RESPONSE

This section summarizes emergency information specific to A farm. For additional emergency response information, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992) and the *Tank Farm HASP*, Section 9.0.

Operational emergencies could include industrial accidents and injuries, fires, or other sudden threats. In case of power failure, a emergency generator is located in building 241-A-701. Loss of power at the A farm complex may result in the loss of the following equipment:

- All transfer pumps connected with the 241-A receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 241-A Building
- The 241-A vessel vent exhauster

- Air sampling and stack monitor
- Instrument process air.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of A farm be required, personnel should assemble either at the 200 East Area Tank Farm staging area located on the south side of the parking lot below AP farm at Canton Avenue just above First Street, or at an alternate location upwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT A FARM**

The A Tank Farm Fire Plan is posted on the wall of the change trailer.

The following emergency equipment is available at A farm:

- First aid and bloodborne pathogen kits
- Wind sock (located in southwest corner of A farm)
- Fire alarm buttons (located just inside doors to buildings 241-A-701 and 241-A-271) (Note: The yellow flashing light indicates that tank pumps are operating.)
- Two self-contained breathing apparatuses (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

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Table A-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-A	AA & AB	Active		Valve pits	Cover block(s)	N		P F. Zak	
241-A	AA & AB	Active		Flush pits	Metal cover	Y	Hinged lid	P F. Zak	AA-24 ft N of AA valve pit AB-24 ft N of AA valve pit
241-A	101	Active		Central pump Pit	Cover block(s)	N		P F. Zak	
241-A	A-350	Active		Catch tank	Cover block(s)	N		P F. Zak	
241-A		Active		Isolated valve pit	Metal cover	N		P F. Zak	
241-A		Active		Lateral cassin	Metal cover	Y	Hinged lid	P F. Zak	Ground level
241-A	417-A	Active	Electrical/ Pipe/pump	Service pit	Metal cover	Y	Hinged lid	P F. Zak	~24 ft N of A-417 tank instrumentation enclosure
241-A	F-562	Active	Piping	Valve pit to 417-A	Metal cover/5 ft dia open x 12 ft deep	Y	Hinged lid	P F. Zak	Next To 417-A tank instrumentation enclosure panel
241-A	K-1-5-1 K-1-5-2	Active		De-Entrainner drain pit to 152 x -Ax catch tank		N		P F. Zak	
241-A	110	Active	Piping	Seal pot		Y		P F. Zak	~12 ft N of 241-A-702 isolation valve pit
241-A		Active		Pit	Metal cover/6 ft dia open	N		P F. Zak	~18 ft W of 241-A-501 Bldg
241-A		Active	Piping/ electrical	Water meter pit	Metal cover/5 ft dia open x 6 ft deep	Y	Hinged lid	P F. Zak	E of 241-A-501 Bldg.

Table A-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-A		Inactive		241-A-501 Bldg	Door	Y		P F. Zak	Bldg. has not been opened for years, possible contamination
241-A	701-A	Active	Air trap	Compressor Bldg blowdown drywell	Metal cover/3 ft dia open x 5 ft deep	Y		P F. Zak	
241-A	701-A	Active		Compressor Receiver Tank Air Trap	Metal cover/3 ft dia open x 5 ft deep	Y		Np F. Zak	
241-A	H-2-74721			Pit	Metal cover/7 ft 2 in. dia open x 24 ft 3 in. deep	Y	Hinged lid	P F. Zak	Extension ladder in pit must be removed due to safety standards
241-A		Active		Valve Pit	Metal cover/5 ft dia open x 7 ft deep	Y		P F. Zak	~51 ft NW of valve pit A-A south end of farm
241-A	LLW-A LLW-B	Active	Fixed ladder	Pit	Metal cover/4 ft dia open x 6 ft deep	Y		NP F. Zak	
241-A	H-2-79857 Rev 0 Assy 1	Active		Pit	Metal cover/2 ft x 3 ft open x >50 ft deep	Y		P F. Zak	~24 ft NE of No. 1 leak detection lateral bldg 101A, 102A, 104A
241-A	EV-702-4	Active	Electrical	Solenoid Valve Pit	Metal cover/4 ft dia open x 5 ft deep	Y		P F. Zak	1 ft south of isolatiion valve pit 702A (behind Bldg. 241-A-702)
241-A		Active		Service pit	Wooden cover/4 ft x 4 ft	Y		P F. Zak	On top deck of 241-A-501 Bldg.
241-A		Active		Lateral caisson		Y	Hinged lid	P F. Zak	Bldg. over caisson

**Table A-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT****DATE OF ASSESSMENT:** 1/5/95**2 Page****DATE OF REPORT:** 3/7/95**IS AND IH REPRESENTATIVES:** ED PONN**ASSESSMENT NUMBER:****AREA:** 200E **FACILITY:** 241A**OTHER EMPLOYEES:** STACE BAKER

A-15

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
A-104	Trips/falls: improper storage of dismantled containment tent	Housekeeping: remove and store/dispose	Y	.141	BIIz	4C
	Rodent and pest harborage	Housekeeping	Y	.141	BIIz	4C
	Unprotected excavation	Walking/working surfaces	Y	.22	BIIk	2B
West fence	Trips/falls: improper storage of unistrut	Housekeeping	Y	.141	BIIz	4c
	Trips/falls: electrical: unprotected cable partially buried	Remove	Y	.303	BIIq	2A
A-101	Hazard warning misplaced/on ground	Restore	Y	.1200	AIIC	3*
A-105	Electrical: cord passed through wall penetration unprotected	Protect or remove	Y	.303	BIIq	3B
	Defective ladder improperly stored/tagged	Destroy and remove	Y	.26	BIII	2B
A-501	Confined space unlabeled	Classify/label	Y	.120	AIig	2B
A-701	Confined space unlabeled	Classify/label	Y	.120	AIig	2B
CBHA. AFARM						

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**APPENDIX B**

**HEALTH AND SAFETY PLAN FOR  
THE AN TANK FARM**

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## APPENDIX B

### HEALTH AND SAFETY PLAN FOR THE AN TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The AN farm consists of seven double-shell tanks numbered 241-AN-101 through -107. Each tank has a maximum capacity of 4,391,078 L (1,160,000 gal). The seven tanks are essentially identical except tank 241-AN-101, which has two additional concrete process pits (01D and 01E), and tank 241-AN-107, which has 80 risers because of the 21 airlift circulator assemblies installed in the tank. The AN farm is an integrated facility with dedicated service and ventilation equipment. The tanks are specifically designed with slurry bottoms for storage of double-shell slurry produced at the 242-A Evaporator. Tank 241-AN-107 can also serve as a receiver for Plutonium Uranium Extraction Facility high-heat aging waste.

Ventilation for AN farm consists of a primary K1 system for the tanks and a K2 system for the annulus. This ventilation is provided to remove heat and vapors from the stored materials.

The primary exhaust system for AN tank farm has an electrical backup with an automatic switchover should power failure occur.

The AN farm has three tanks (241-AN-103, -104, and -105) on the Hydrogen/Flammable Gas Watch List.

##### B. PERIMETER AND SUPPORT FACILITIES

The perimeter of AN farm is secured by a chain-link fence with access controlled at the support trailer (MO-820 change trailer). Personnel enter and exit AN farm through the MO-820 change trailer. Equipment such as motorized vehicles enter and exit AN farm through the gate adjacent to MO-820.

The following are support facilities located at AN farm.

- Control Building 241-AN-271 is the center for all alarms and monitors for ventilation, temperature, and leak detection. Electrical power for AW farm is also routed from 241-AN-271. All AN farm instrumentation and electrical supplies are distributed through this building. Signals are transmitted from this building to the 242-A Evaporator control room.
- Water Service Building 241-AN-273 houses instrumentation and backflow prevention devices for raw water, steam, and flushing lines.
- Compressor Building 241-AN-701 houses an air compressor that supplies AN farm instrument air.
- Change Building MO-820 is a change room and fenceline entry and exit point for AN farm workers.

### **C. WIND INDICATION**

A wind sock located at the perimeter fenceline just north of MO-820 indicates wind direction to aid in planning onsite work activities, positioning structures and equipment, and planning approach routes.

## **II. ORGANIZATION AND POINTS OF CONTACT**

### **A. KEY POINTS OF CONTACT**

Facility manager: 373-0132

Shift manager: 373-2689 or 373-2396

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

East Area TWRS IH&S satellite office: 373-7200

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call the shift manager 373-2689 and 911

### **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm Health and Safety Plan (HASP)*, Section 1.0.

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Key responsibilities include the following:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### **III. HAZARD EVALUATION AND CONTROLS**

#### **A. TANK CHARACTERISTICS**

The AN farm has three tanks on the Hydrogen/Flammable Gas Watch List (tanks 241-AN-103, -104, and -105); therefore, any work procedures and monitoring conducted at these tanks must be accomplished in accordance with the *Tank Farm HASP*, Section 2.9, Safe Work Practice.

#### **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

##### **1. Flammability**

Tanks 241-AN-103, -104, and -105 are on the Hydrogen/Flammable Gas Watch List because of their potential to contain concentrations of flammable gases that exceed the lower flammability limit. These gases originate from the waste or are generated as a by product of the waste. As a result the potentially flammable nature of these tanks, extreme caution must be exercised to avoid any ignition source near the tanks.

##### **2. Confined Spaces**

A listing of confined spaces for AN Tank Farm can be found in Section VII of this appendix. See Section 10.0 of HASP.

### **3. Noise**

Noise may be excessive if work must be done in or near double-shell tank exhausters. Ear protection may be required depending on the time and exposure levels encountered. The K1 and K2 units in AN farm are not especially loud; however, workers must follow information posted on signs and instructions from the supervisor.

### **4. Chemicals**

No specific chemicals are used at AN farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **5. Asbestos**

Warning signs posted at AN farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during AN farm activities unless specifically directed. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII and also the *Tank Farm HASP*, Section 10.0, for more information.

### **6. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

## **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms, and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

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## IV. SITE CONTROLS

### A. WORK ZONES

#### 1. Perimeter Exclusion Zone

A perimeter fenceline has been established and serves as both a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA) and a controlled area for nonradiological hazards.

#### 2. Radiological Control Area

Within AN farm, RBA/URMAs are indicated on the map of AN farm posted in the MO-820 change trailer (see Figure B-1).

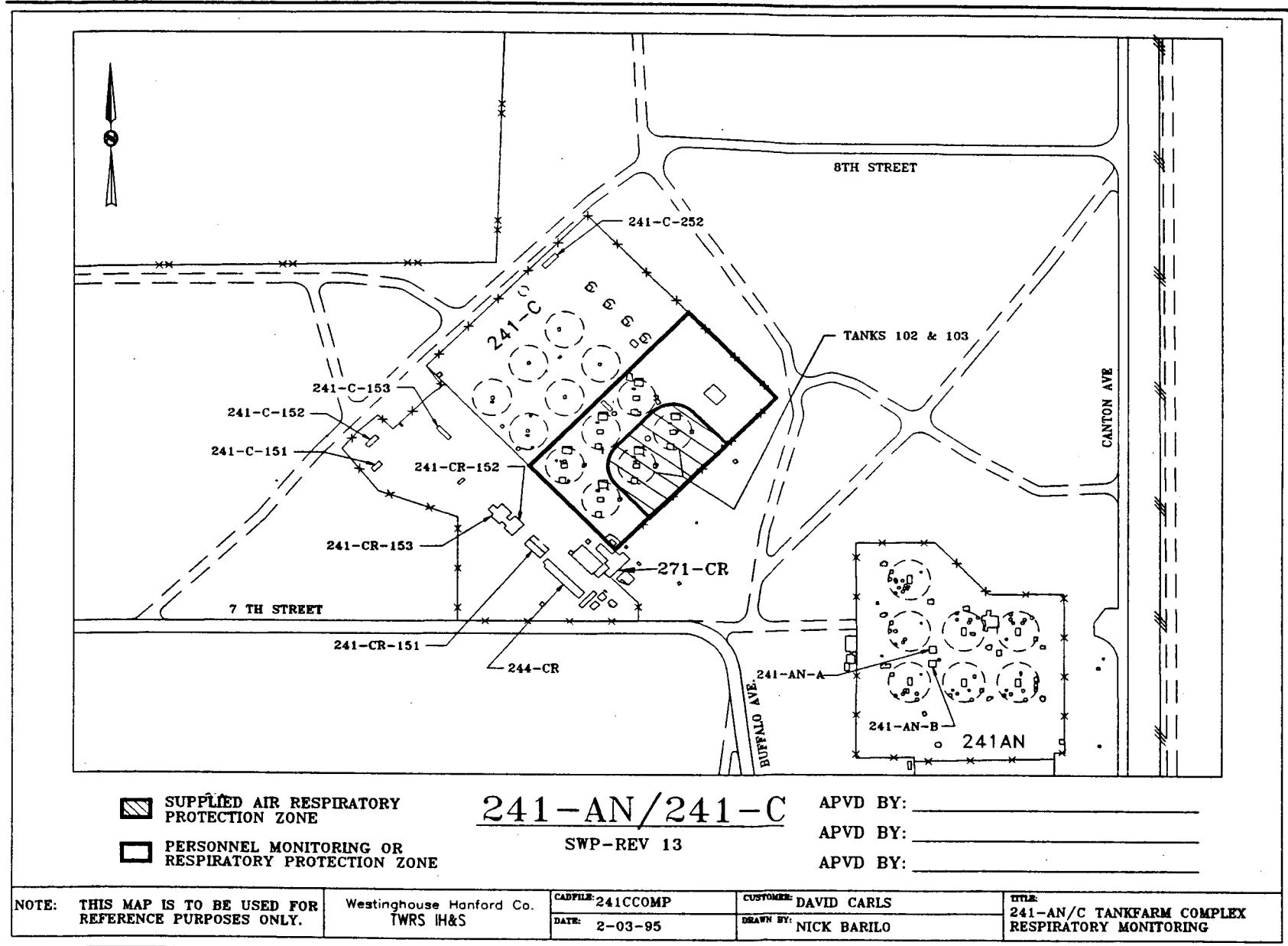
#### 3. Contamination Reduction Zone/Contamination Reduction Corridor

This work zone consists of the RBA/URMA portion of MO-820, the landing and stairway outside the trailer leading into AN farm, and the immediately adjacent graveled area from the vehicle entry gate into AN farm. Two decontamination lines exit within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of MO-820 where workers don and doff personal protective equipment (PPE), scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle decontamination line is through the vehicle gate where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

### B. ACCESS CONTROL

Access to AN farm is to occur only through the contamination reduction zone (CRZ)/CRC (MO-820 and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

Figure B-1. AN Tank Farm Site Plan.



### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for AN farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

PPE for any interior areas controlled for radiological hazards will be identified on the Radiation Work Procedures (RWP).

### **A. EXCLUSION ZONES**

Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.

Required Level B PPE consists of the same protective clothing/equipment as Level D PPE plus headcover and supplied-air respiratory protection with a 5-minute escape bottle.

### **B. CONTAMINATION REDUCTION ZONE/CONTAMINATION REDUCTION CORRIDOR**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zones. Additional task-specific requirements will be specified in the RWP or by the site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the specific task.

## VI. MONITORING REQUIREMENTS

External dosimetry is required, as specified by the RWP, for entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA.

Monitoring is conducted before entry into a confined space. The confined space entry permit shall specify the hazards to be monitored, (i.e., oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide).

Monitoring for all tasks or operations shall be accomplished in accordance with the *Tank Farm HASP*, Section 2.9, Safe Work Practice.

## VII. DECONTAMINATION PROCEDURES

Currently at AN farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures. The list below identifies some confined spaces that are present at AN farm. See Table B-1 for locations of confined spaces. This list should not be considered an all inclusive list of confined spaces at AN farm; additional spaces must be identified, characterized, and posted.

- Central pump pits
- Annulus pump pits
- Leak detection pump pits
- Ventilation instrument pits
- Valve pits
- Flush pits
- Condensate receiver pits
- Supernatant receiver pits.

## VIII. EMERGENCY RESPONSE

This section summarizes emergency information specific to AN farm. For additional information regarding emergency response, consult the *Tank Farms Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of AN farm be required, personnel should assemble either at the 200 East Area Tank Farm staging area located on the south side of the parking lot below AP farm at Canton Avenue just above First street, or at an alternate location upwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT AN FARM**

The AN Tank Farm Fire Plan is posted on the wall of the MO-820 change trailer.

The following emergency equipment is available at AN farm:

- First aid and bloodborne pathogen kits
- Panic button and fire alarm (located outside 241-AN-271; yellow light outside 241-AN-271 indicates that tank pumps are operating)
- Two self-contained breathing apparatuses (located on the wall in MO-820)
- Protective clothing (available in MO-820)
- Radiological monitoring equipment (located in MO-820).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See Section the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table B-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AN	01A to 07A	Active		Central pump pit	Cover block(s)	N		P F. Zak	
241-AN	01B to 07B	Active		Annulus pump pit	Cover block(s)	N		P F. Zak	
241-AN	01C to 07C	Active		Leak detection pit	Cover block(s)	N		P F. Zak	
241-AN	OLD	Active		Supernatant rec-pit	Cover block(s)	N		P F. Zak	
241-AN	01E	Active		Supernatant rec-pit	Cover block(s)	N		P F. Zak	
241-AN	TK.101-10 7 Press-probe	Active		Caisson	Metal cover	Y	cover-lid	P F. Zak	
241-AN	02D	Active		Drain pit	Cover block	N		P F. Zak	TK. 102 Only
241-AN	1 thru 3	Active	Room with exhaust piping	Vent/inst-pit	Metal cover	Y	hinged lid	NP F. Zak	TK. 101 Thru 106
241-AN	4	Active	Room with exhaust piping	Vent/inst-pit	Metal cover	Y	hinged lid	NP F. Zak	TK. 107 Only
241-AN	AN-A	Active		Valve pit	Cover blocks	N		P F. Zak	
241-AN	AN-B	Active		Valve pit	Cover blocks	N		P F. Zak	

Table B-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AN	AN-801	Active		Service bldg/pit	Building	Y	door	P/below grade F. Zak	Building above pit
241-AN		Active		Flush pit	Metal cover	Y	hinged lid	P F. Zak	Located ~3 ft E. O valve pit 241-AN-B/ ~9 ft deep, 4 ft dia open.
241-AN	WST-RIS-1 28 (A-G)	Active	Riser	Pressure pit RIS-13A	Metal cover	Y		NP F. Zak	TK101(128A)/102(128B)/103(12 8C)/104(128D)/105(128E)/106(1 28F)/107(128G). Pits ~7 ft deep, 4 ft dia opening.
241-AN		Active	Trap	Steam trap	Metal cover	Y		P F. Zak	Located SW end, SE of tk103/ ~8 ft 7 in. deep, 4 ft dia opening
241-AN		Active		De- entrainment vault	Metal cover	N		P F. Zak	Crane to remove lid

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**APPENDIX C**

**HEALTH AND SAFETY PLAN  
FOR THE AP TANK FARM**

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## APPENDIX C

### HEALTH AND SAFETY PLAN FOR THE AP TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The AP farm contains 8 double-shell tanks with a capacity of 4,391,078 L (1,160,000 gal) each. The tanks are numbered 241-AP-101 through -108. The AP farm is located northeast of the Plutonium Uranium Extraction Facility and approximately 243.8 m (800 ft) east of the 242-A Evaporator on 4th Street. Active ventilation is used on all AP farm tanks. The ventilation systems are the K1 exhaust system and the K2 annulus exhauster.

The AP farm tanks contain the following:

- Complexed waste--high concentrations of chelating agents, ethylenediametetraacetic acid (EDTA) and N-(hydroxyethyl)-ethylenediaminetriacetic acid (HEDTA) stored separately from other wastes
- Concentrated complexant--product of concentrating complexed waste
- Noncomplexed waste--sulphate and phosphate from the 100 N Area, concentrated sodium aluminate, diluted saltwell liquor, and process and laboratory waste
- Hanford facility waste--high-phosphate concentrations from 100 N Area.

The AP farm has been designed to operate in a manner similar to AW farm. Liquid wastes are transferred to or from AP farm via AW farm facilities or to 102-AP via the 241-A-B valve pit. Two 3-in. lines connect the AP valve pit to the central pump pit at 241-AW-102. Two 2-in. lines connect the AP valve pit to AW-A and AW-B valve pits. From the AP valve pit, waste may be routed to any tank within AP farm. Waste is transferred to the grout facility from tank 241-AP-102. No watch list tanks exist in AP farm.

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## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the change trailer (MO-815) and adjacent gate located in the center of the fence on the north side of AP farm along 4th Street. Personnel enter and exit AP farm through the change trailer. Equipment such as motorized vehicles enter and exit AP farm through the gate adjacent to the trailer.

The following support facilities are located at AP farm.

- Raw Water Service and Flush Building 241-AP-801 is located outside the west fence of AP farm across from 272-AW.
- Compressor Building 241-AP-273 is located outside the north fence of AP farm on 4th Street. Compressed air is provided for process and instrument requirements.
- Control Room and Instrument Building 241-AP-271 is located outside the north fence on 4th Street. Process and radiological indications are monitored.

## **C. WIND INDICATION**

A wind sock located near the northwest corner of AP farm indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Facility manager: 373-0132

Shift manager: 373-2689 or 373-2396

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

East Area TWRS IH&S satellite office: 373-7200

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

Control board operator of 242-A Evaporator: 373-2737

## B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm HASP*, Section 1.0. Key responsibilities include the following:

- Site access is controlled by the shift supervisor
- Work is authorized and controlled by the facility manager
- Safety and health oversight/support is provided by TWRS IH&S
- Exposure/area monitoring is specified by TWRS IH&S
- Exposure/area monitoring is conducted by IHFS

## III. HAZARD EVALUATION AND CONTROLS

### A. TANK CHARACTERISTICS

The entire AP farm, as defined by the perimeter exclusion zone, is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

### B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS

#### 1. Noise

No stationary high-noise sources are present in AP farm. Hearing protection is required in the compressor building and as specified in work packages or permits for the control intermittent noise sources from any equipment brought into AP farm.

#### 2. Chemicals

No specific chemicals are used at AP farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

A listing of confined spaces for AP Tank Farm can be found in Table C-1 of this appendix. See Section 10.0 of HASP.

### **4. Asbestos**

Warning signs posted at AP farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during AP farm activities unless specifically directed.

## **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permit(s) developed for the specific task as part of the work control process.

## **IV. SITE CONTROLS**

### **A. WORK ZONES**

Work zones and controlled areas for AP farm are shown on Figure C-1 and are listed below.

#### **1. Perimeter Exclusion Zone**

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

#### **2. Interior Exclusion Zones**

There are no interior exclusion zones in AP farm. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

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### 3. Radiological Control Area

The zone consists of the RBA/URMA portion of the change trailer. The personnel decontamination line if required exits the RBA/URMA through the portion of the change trailer where workers don and doff personal protective equipment (PPE), scan for radiological contamination, and perform any necessary decontamination. There is no established vehicle/equipment decontamination line but can be set up if required during certain evolutions.

An RMA area also serves as a location for storage of hazardous and radiological waste. A wood-framed storage container is used for storage of contaminated waste. A portable metal building is used for hazardous chemical wastes, mixed wastes. The soiled laundry storage area is a wood-framed shed and is located west of the change trailer outside the fence.

Currently at AP farm, the only significant skin or clothing contamination potential is for radiological contamination from specific work activities; therefore, procedures are implemented and the contamination reduction corridor and change trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

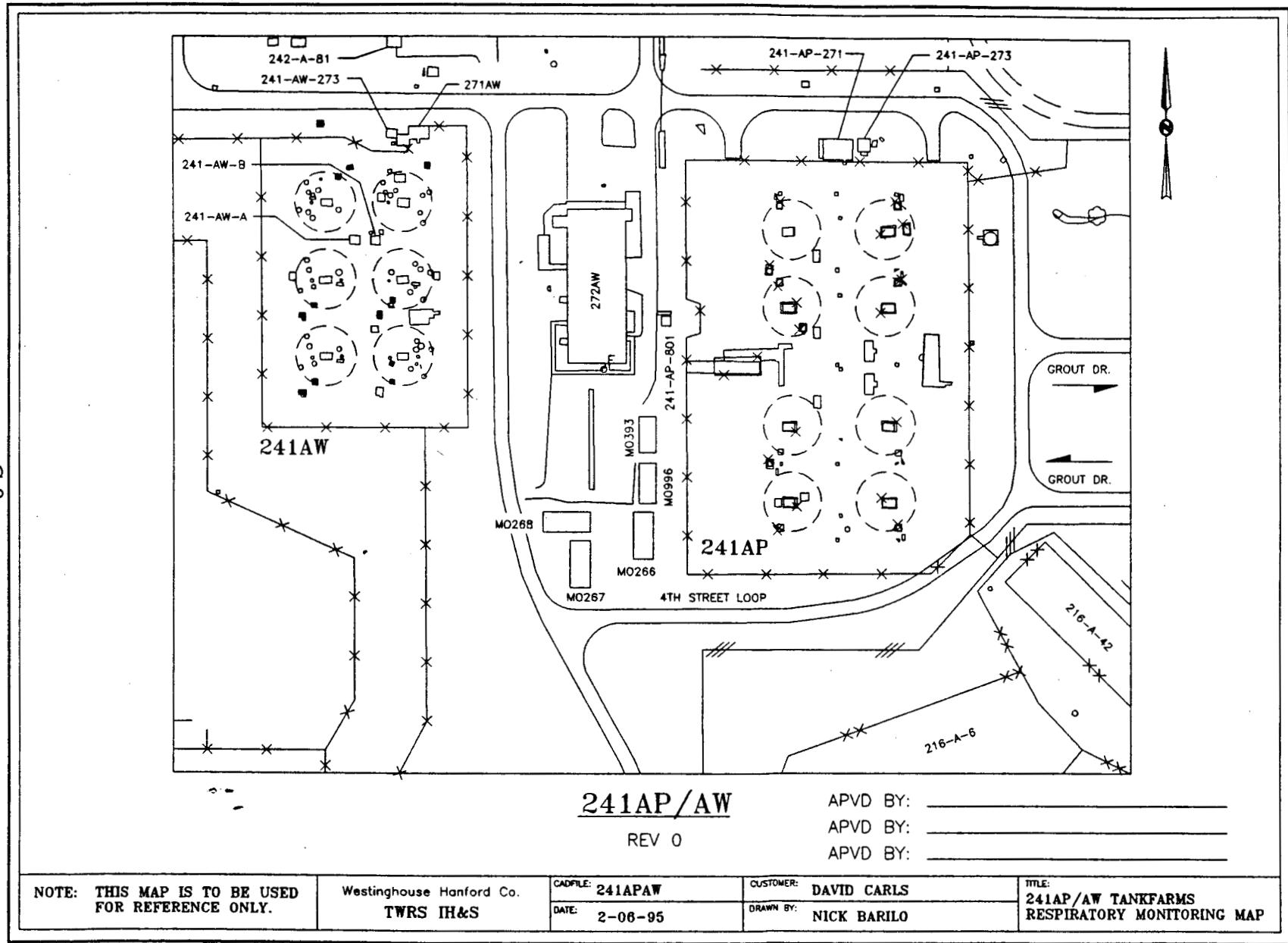
### 4. Support Zone

The support zone consists of the portion of the change trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

## B. ACCESS CONTROL

The AP farm access point is through the contamination reduction zone/contamination reduction corridor (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization and keys for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager or the 242-A/AP/AW/LERF shift manager. Any work activities must be coordinated with the 242-A Evaporator control board operator.

Figure C-1. AP Tank Farm Site Plan.



### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for AP farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

### **A. EXCLUSION ZONE**

Required PPE for any interior areas controlled for radiological hazards will be identified on the RWPs for specific work activities.

### **B. RBA/URMA ZONE**

Required Level D PPE consists of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE. Any additional task-specific PPE requirements will be specified in the RWP or by the site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the RBA/URMA inside the fenceline, external dosimetry may be required as specified in the RWP.

For any tank containment breach, see the *Tank Farm HASP*, Sections 2.9, Safe Work Practice, and 6.0.

Before entry and possibly periodically or continuously during entry into confined spaces, sampling must be conducted for oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide, and other hazards as specified on work permits. See the confined space entry permit for requirements.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located in the instrument control room, 241-AP-271.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards and by Health Physics for radiological hazards.

## VII. DECONTAMINATION PROCEDURES

Currently at AP farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## VIII. EMERGENCY RESPONSE

This section summarizes emergency information specific to AP farm. For further information regarding emergency response, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the AP farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 241-AP transfer operation
- All control and instrument systems for 241-AP-271
- The K1 primary tank exhausters
- The K2 annulus exhausters
- The air sampling and stack monitor
- The continuous air monitors
- Instrument and process air.

Loss of water would result in the loss of system flushing capabilities and fire fighting ability. There is no emergency backup for loss of water.

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## **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of AP farm be required, personnel should assemble at the 200 East Area Tank Farm staging area located southwest of AP farm along Canton Avenue.

## **B. EMERGENCY EQUIPMENT AVAILABLE AT AP FARM**

Currently at AP farm, no fire plan or map is in the change trailer. Fire extinguishers are located in AP farm (1) in the center of the west side of the farm on a light pole, (2) in the center of the east side of the farm on the K1 primary tank exhauster structure (3) in the change trailer, (4) inside the instrument building.

The following equipment is available:

- First aid and bloodborne pathogen kits
- Cardiopulmonary resuscitation (CPR) microshield (located on the wall near the main entrance of change trailer MO-815)
- Wind sock (located just west of change trailer)
- Panic button and fire alarm (located just outside 241-AP-271 Control Room)
- Fire pull box (located inside near rear door of control room)
- Two self-contained breathing apparatuses (located in the change trailer)
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer)
- Portable radio (located in the change trailer).

## **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

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Table C-1. 241-AP Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AP	01A to 08A	Active	Transfer lines/ Pump(s)	Central pump pit	Cover block(s)	N		P Gary Mickle	
241-AP	03C and 05C	Active	Transfer lines/ Pump(s)	Leak det. Pit	Cover block(s)	N		P Gary Mickle	
241-AP	07D, E, F	Active		Mixer pump pits	Metal cover(s)	N		P Gary Mickle	
241-AP	02D	Active	Transfer lines/ Pump(s)	Feed pump pit	Cover block(s)	N		P Gary Mickle	
241-AP		Active	Transfer lines	Valve pit	Cover block(s)	N		P Gary Mickle	
241-AP	Pits 1 and 2	Active	Vent lines	Vent. Pits	Metal covers/3 ft x 3 ft open x 13 ft deep	Y		NP F. Zak	Located in the center of AP farm
241-AP		Active	Water line/ electric	Flush pit	Metal cover/5 in. dia open x 4 ft deep	Y	Hinged lid	NP Gary Mickle	Located 36 ft NW of central valve pit Note: needs label
241-AP		Active	Riser top R	Riser access	Metal covers (double doors)	N	Hinged lid	P Gary Mickle	See below for locations
241-AP	Pits 1 thru 20	Active	Electric Wires	Elec. Pull boxes	Concrete covers	Y	Hinged metal lid	P Gary Mickle	See below for locations and size
241-AP	-	Active	Vent line/pumps/ seal pot	Primary seal pot pit	Cover block(s)	N		P Gary Mickle	
241-AP	01B to 08B	Active	Transfer lines/pumps	Annulus pump pit	Cover block(s)	N		P Gary Mickle	
241-AP	03D	Active	Drain lines	Drain pit	Cover block(s)	N		P Gary Mickle	

Table C-1. 241-AP Tank Farm Confined Spaces.

## ELECTRIC PULL BOX LOCATIONS AND SIZE:

1)	~12 ft N OF PUMP PIT 241-AP-02B (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)	7)	~15 ft S OF PUMP PIT 241-AP-05B (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)
2)	~12 ft N OF PUMP PIT 241-AP-04B (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)	8)	~32 ft E OF AP VALVE PIT (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)
3)	~36 ft W OF PRIMARY SEAL POT PIT (4 ft X 4 ft OPEN., 7 ft 3 in. DEEP)	9)	~10 ft N OF PUMP PIT 241-AP-03B (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)
4)	~12 ft S OF PUMP PIT 06B (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)	10)	~15 ft N OF 241-AP-01A (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)
5)	~FACING N CENTER OF AP FARM **SEE CHART BELOW	11)	~15 ft S OF PUMP PIT 241-AP-08B (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)
6)	~15 ft S OF PUMP PIT 241-AP-07B (4 ft X 4 ft OPEN., 5 ft 8 in. DEEP)		

## \*\* NORTH

1	7 ft 3 in.	6	5 ft 8 in.
2	5 ft 8 in.	7	7 ft 3 in.
3	7 ft 3 in.	8	5 ft 8 in.
4	5 ft 8 in.	9	7 ft 3 in.
5	7 ft 3 in.	10	5 ft 8 in.

## DOUBLE DOORS (METAL COVER) LOCATIONS:

1)	~15 ft N OF PUMP PIT 241-AP-02A	7)	~15 ft S OF PUMP PIT 241-AP-08A
2)	~3 ft W OF PUMP PIT 241-AP-02D	8)	~18 ft S OF PUMP PIT 241-AP-05A
3)	~15 ft N OF PUMP PIT 241-AP-04A	9)	~6 ft W OF PUMP PIT 241-AP-05A
4)	~6 ft E OF PUMP PIT 241-AP-06A	10)	~15 ft N OF PUMP PIT 241-AP-03A
5)	~15 ft S OF PUMP PIT 241-AP-06A	11)	~6 ft W OF PUMP PIT 241-AP-01A
6)	~6 ft E OF PUMP PIT 241-AP-08A	12)	~15 ft N OF PUMP PIT 241-AP-01A
		13)	~6 ft E OF PUMP PIT 241-AP-04A
		14)	~6 ft W OF PUMP PIT 241-AP-03A

## C-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

**DATE OF ASSESSMENT: 12/21/94**

1 PAGE

DATE OF REPORT: 3/7/95

IS AND IH REPRESENTATIVES: ED PONN

**ASSESSMENT NUMBER:**

AREA: 200E      FACILITY: 241-AP

## OTHER EMPLOYEES: STACE BAKER

## C-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 12/21/94

1 PAGE

DATE OF REPORT: 3/7/95

IS AND IH REPRESENTATIVES: ED PONN

ASSESSMENT NUMBER:

AREA: 200E    FACILITY:241-AP

OTHER EMPLOYEES: STACE BAKER

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
ALL	Excess tumbleweed accumulation	Housekeeping	Y	.141	BIIz	4*

C-15

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**APPENDIX D**

**HEALTH AND SAFETY PLAN  
FOR THE AW TANK FARM**

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## APPENDIX D

### HEALTH AND SAFETY PLAN FOR THE AW TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The AW farm contains six double-shell tanks with a capacity 4,315,370 L (1,140,000 gal) each. The tanks are numbered 241-AW-101 through -106. The AW farm is located at the intersection of 4th Street and Canton Avenue across from the 242-A Evaporator. Active ventilation is used on all AW farm tanks via the K1 exhauster and K2 annulus exhauster. The AW farm double-shell tanks store Plutonium Uranium Extraction Facility low-heat radioactive liquid waste. Stored low-heat wastes include:

- Double-shell slurry
- Decladding waste
- Organic waste
- Cell drainage
- Laboratory waste
- Saltwell liquors pumped from single-shell tanks.

Tank 241-AW-101 is on the Hydrogen/Flammable Gas Watch List because of its potential to contain concentrations of flammable gases that exceed the lower flammability limit (LFL). These gases originate from the waste or are generated as a by product of the waste. As a result of the potential flammable nature of this tank, extreme caution must be exercised to avoid any ignition source near the tank. Check SHMS on 101-AW (when available) when conducting intrusive work or breaching containment on the tank or its associated primary vent system.

Tank 241-AW-102 is used to feed the 242-A Evaporator for all waste concentration activities. Tank 241-AW-102 is connected to AP farm.

The AW farm fenceline is classified as a RBA/URMA.

Controlled areas are established for radiological hazards. There are no chemical hazard areas in AW farm.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the change trailer (MO-818) and adjacent gate located at the northeast corner of AW farm along Canton Avenue. Personnel enter and exit AW farm through the change trailer. Equipment such as motorized vehicles enter and exit AW farm through the gate adjacent to the trailer.

The following support facilities are located at AW farm.

- Raw Water Service and Flush Building 241-AW-801 is located outside the north fence of AW farm on 4th Street.
- Compressor Building 241-AW-273 is located outside the north fence of AW farm on 4th Street. Compressed air is provided for process and instrument requirements.
- Control Room and Instrument Building 241-AW-271 is located in the fenceline along the north fence on 4th Street. Process and radiological indications are monitored.

## **C. WIND INDICATION**

A wind sock located at the northeast corner of AW farm indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

## **II. ORGANIZATION AND POINTS OF CONTACT**

### **A. KEY POINTS OF CONTACT**

Facility manager: 373-4565

Shift manager: 373-2689 or 373-0104

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

Health Physics supervisor: 373-2526

Emergency point-of-contact: Call shift manager 373-2689 and 911

Control board operator of 242-A Evaporator: 373-2737

## B. KEY RESPONSIBILITIES

For detailed responsibilities see the *Tank Farm Health and Safety Plan (HASP)*, Section 1.0. Key responsibilities include:

- Site access controlled by the shift manager
- Work authorized and controlled by the facility manager or delegate
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

## III. HAZARD EVALUATION AND CONTROLS

### A. TANK CHARACTERISTICS

#### 1. Hydrogen/Flammable Gas

Hydrogen/Flammable Gas Watch List 241-AW-101 contains a slurry that produces hydrogen gas and other flammable constituents. Other hazards are toxicity of the gas, and surface crust flammability. Hazard control requirements are currently in place and include the following:

- All work in this tank must be in accordance with OSD-T-151-00030
- Spark-resistant tools and other safeguards are necessary to reduce the chance of fire or explosion
- Work in and around this tank must be done in accordance with the *Tank Farm HASP*, Section 2.9, Safe Work Practices.

#### 2. Vapor/Gas

No vapor hazards have been identified in AW farm.

### **3. Radiological Contamination**

Radiological areas and levels of exposure are posted in the change trailer and documented on radiation work permits for specific activities.

The AW tank farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an RBA/URMA. Specific controls for activities within the perimeter exclusion zone (also in the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

### **4. Surface Contamination**

Contamination areas or high contamination areas may be located through AW farm in pits, near riser, near exhausters, or other areas.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present in AW farm. Hearing protection is required in the compressor building and as required, in accordance with work packages or permits, to control intermittent noise sources from any equipment brought into AW farm.

### **2. Chemicals**

No specific chemicals are used at AW farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

A list of confined spaces for AW Tank Farm can be found in Table D-1 of this appendix. See Section 10.0 of HASP.

#### **4. Asbestos**

Warning signs posted at AW farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

#### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when major operations activities are to be performed in low light situations.

### **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks requiring additional task-based hazard controls specific to AW tank farm include the replacement of primary tank filters, and any other containment breach (e.g., opening of risers) on tank 241-AW-101. These tasks may be required to be conducted with Level B PPE (supplied-air respirators) to protect against the confirmed vapor hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

### **IV. SITE CONTROLS**

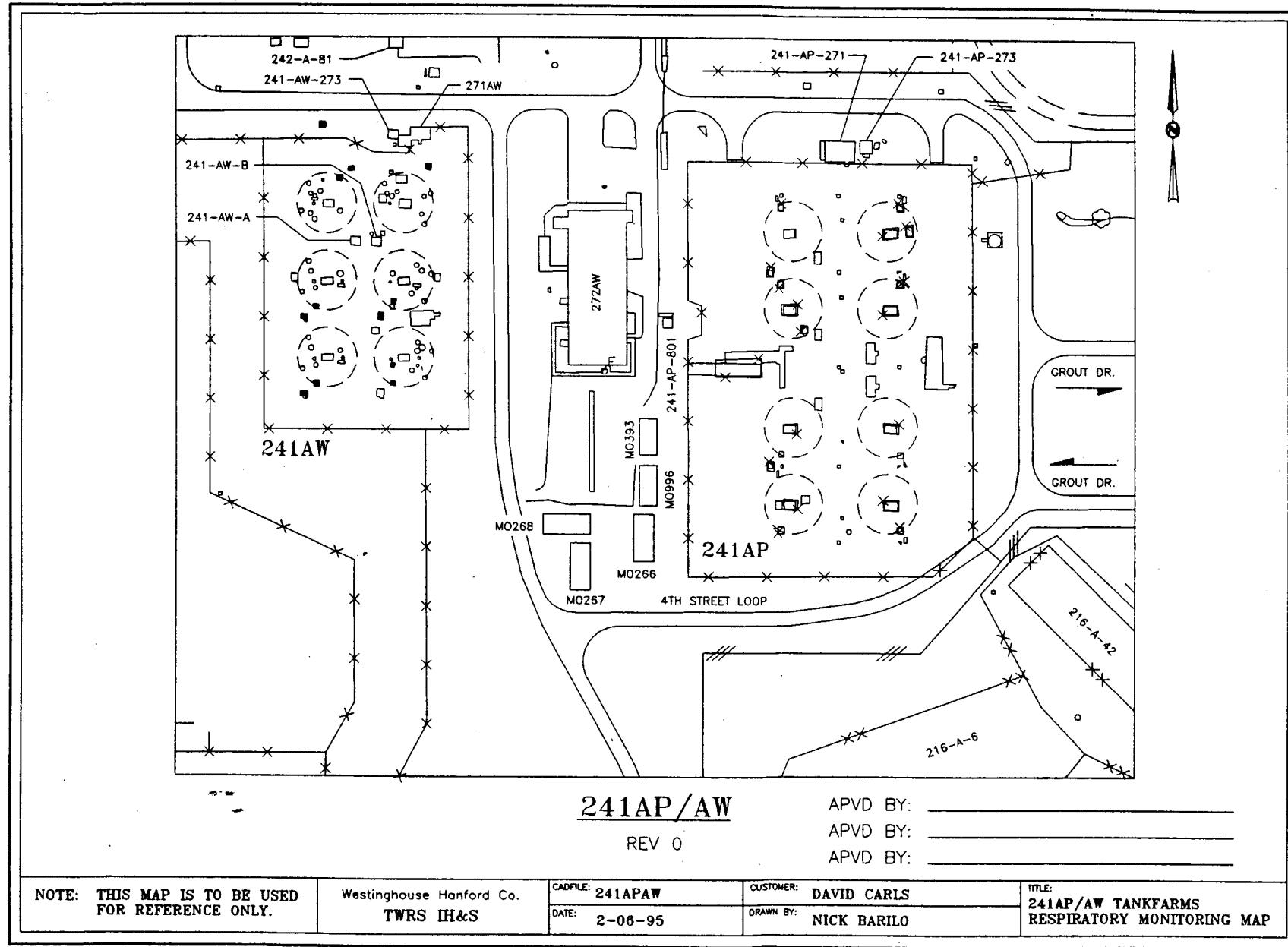
#### **A. WORK ZONES**

Work zones and controlled areas for AW farm are shown on Figure D-1 and are listed below.

##### **1. Perimeter Exclusion Zone**

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

Figure D-1. AW Tank Farm Site Plan.



## **2. Interior Exclusion Zones**

Interior barricaded exclusion zones are not required at AW farm. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

## **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of the RBA/URMA portion of the change trailer. The personnel decontamination line if required exits through the RBA/URMA portion of the change trailer where workers don and doff personal protective equipment (PPE), scan for radiological contamination, and perform any necessary decontamination. There is no established vehicle/equipment decontamination line, but can be set up if required during certain evolutions.

The RBA/URMA also serves as the location for storage of soiled laundry and hazardous waste. A wood-framed storage shed is used for storage of bags of soiled/contaminated clothing. A portable metal building is used for hazardous chemical waste/mixed waste. A wood framed storage container is used for storage of contaminated waste.

Currently in AW farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented, and the CRC and change trailer is equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

## **4. Support Zone**

The support zone consists of the portion of the change trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Tank Farm safety and health requirements are specified in the support zone.

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## B. ACCESS CONTROL

The AW farm access point is through the CRZ/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization and keys for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager or the 242-A/AP/AW/LERF shift manager. Any work activities must be coordinated with the 242-A Evaporator control board operator.

## C. COMMUNICATIONS/BUDDY SYSTEM

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements beyond those specified in the *Tank Farm HASP*, Section 8.0, have been identified for AW farm.

# V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

## A. EXCLUSION ZONES

Two levels of PPE are required in designated exclusion zones of AW farm.

- Level D PPE is required inside the perimeter fenceline. Required Level D PPE consists of general work clothes. Any additional task specific PPE requirements or entries into any CA's or RA's will be specified in the RWP or by the site safety and health representative and/or health physic technician.
- Level B PPE, may be required when conducting containment breaches and intrusive activities for tank 241-AW-101, a Hydrogen Watch List tank and its associated primary tank vent system. Level B PPE consists of the same protective clothing/equipment as Level D plus headcover and supplied-air respiratory protection with a 5-minute escape bottle.

## B. CONTAMINATION REDUCTION ZONES

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zone. Any additional task-specific PPE requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### C. TASK-SPECIFIC HAZARDS

Required task-specific PPE requirements are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or work packages and work permits developed for the task.

### VI. MONITORING REQUIREMENTS

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry may be required as specified in the RWP.

For any containment breach on tank 241-AW-101, organic vapor meter (OVM) and LFL monitoring is required even though supplied-air respirators may be used. In addition to other area monitoring, OVM and LFL monitoring must be conducted in all greenhouses and structures near primary tank filters, risers, or other potential emission sources on 101-AW.

Before any containment breach on tank 241-AW-101 and continuously until the activity is completed, vapor and flammability monitoring are required.

For any containment breach on tanks other than 241-AW-101, see the *Tank Farm HASP*, Sections 2.9, Safe Work Practice, and 6.0.

Before entry and possibly periodically or continuously during entry into confined spaces, sampling must be conducted for oxygen, explosivity, organic vapors, ammonia, and others hazards specified on work permits. See confined space entry permit for requirements.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing tank 241-AW-101 containment breaches, intrusive work on any tank, asbestos work, and other activities involving credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous area monitor for airborne radiological monitoring is located in Instrument Control Room 241-AW-271.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## **VII. DECONTAMINATION PROCEDURES**

Currently at AW farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **VIII. EMERGENCY RESPONSE**

This section summarizes emergency information specific to AW farm. Consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the AW farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 241-AW pumping operations
- All control and instrument systems for the 241-AW-271 Building
- The K1 primary tank exhausters
- The K2 annulus exhausters
- Air sampling and stack monitor
- Continuous air monitors
- Instrument and process air.

Loss of water would result in the loss of system flushing capabilities and fire fighting ability. There is no emergency backup for loss of water.

### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of AW farm be required, personnel should assemble at the 200 East Area Tank Farm staging area located south side of the AW farm along Canton Avenue.

## **B. EMERGENCY EQUIPMENT AVAILABLE AT AW FARM**

Currently at AW farm, no fire plan or map is posted in the change trailer. Fire extinguishers are located (1) in the center of the west side of AW farm on a light pole, (2) in the center of the east side of AW farm on a light pole, (3) inside the instrument building, (4) outside the instrument building (two extinguishers), and (5) inside the change trailer.

The following emergency equipment is available at AW farm:

- First aid and bloodborne pathogen kits
- Cardiopulmonary resuscitation (CPR) microshield (located on the wall near the main entrance of change trailer MO-818)
- Wind sock (located just outside change trailer MO-818)
- Panic button and fire alarm (located just outside 241-AW-271 Control Room)
- A fire pull box (located near the rear door of the control room; yellow flashing light indicates AW farm is an active CA)
- Two self-contained breathing apparatuses (SCBA) (located in the change trailer)
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer)
- Portable radio (located in the change trailer).

## **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table D-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/ not permitted	Comments
241-AW	01A to 06A	Active		central pump pit	Cover block(s)	N		P F. Zak	
241-AW	01B to 06B	Active		Annulus pump pit	Cover block(s)	N		P F. Zak	
241-AW	01C to 06C	Active		Leak det. Pit	Cover block(s)	N		P F. Zak	
241-AW	02D	Active		Drain pit	Cover block(s)	N		P F. Zak	
241-AW	02E	Active		Feed pump pit	Cover block(s)	N		P F. Zak	
241-AW	AW-A	Active		Valve pit	Cover block(s)	N		P F. Zak	
241-AW	AW-B	Active		Valve pit	Cover block(s)	N		P F. Zak	
241-AW		Active		De-ent. Vault	Metal cover	N		P F. Zak	Crane to remove lid
241-AW	AW-273	Active	Piping	Water service bld/pit	Building	Y	Door	P/below grade F. Zak	Building above pit
241-AW		Active	Piping	Flush pit	Metal cover	Y	Hinged lid	P F. Zak	
241-AW		Active	Elect. wires	Elect. pull box	Metal cover	Y	Hinged lid	P F. Zak	Could not open lid
241-AW	Pits 1 thru 3	Active	Elec. wire exh. pipes (vapor) water	Vent/inst. pit	Metal cover	Y	Hinged lid	NP F. Zak	Pit 1 through 3

Table D-1. East Tank Farm Confined Spaces.

Vent/instrumentation pit locations:

1. W side of AW farm
2. S end of AW farm
3. E side of AW farm

## D-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 12/21/94

1 PAGE

DATE OF REPORT: 3/8/95

IS AND IH REPRESENTATIVES: ED PONN \_\_\_\_\_

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 241-AW    OTHER EMPLOYEES: STACE BAKER \_\_\_\_\_ BRIAN BIDDLE \_\_\_\_\_

D-16

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Supply trlr, 206B, central pump pit	Electrical: Improper use of temporary cords.	Install permanent wiring	Y	.303	BIIQ	1B
MO818, AW-104/106	Fire and contamination hazard from debris accumulation	Housekeeping	Y	.141	BIIQ	4B
	Confined spaces unlabeled	Classify and label	Y	.120	AIHQ	2B
	Walking/working surfaces: capped pipes protruding from ground unprotected	remove or hi-lite for visibility	Y	.22	BIIK	3B

**APPENDIX E**

**HEALTH AND SAFETY PLAN  
FOR THE AX TANK FARM**

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## APPENDIX E

### HEALTH AND SAFETY PLAN FOR THE AX TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The AX farm consists of four single-shell tanks with a capacity of 3,785,412 L (1,000,000 gal) each. The tanks are numbered 241-AX-101 through -104. The AX farm tanks, completed in 1964, were the last single-shell tanks built at the Hanford Site. When active, these tanks received high-level radioactive waste from B Plant (tanks 241-AX-101 and -102) and the Plutonium Uranium Extraction Facility (tanks 241-AX-101, -103 and -104). Tanks 241-AX-101, -102, and -103 also received evaporator slurry. Tank 241-AX-104 is partially interim isolated (e.g., physical means have been implemented to reduce the potential for introducing liquids into the tank) and stabilized (e.g., liquid levels have been reduced to prescribed levels).

Tanks 241-AX-101 and -103 are on the Hydrogen/Flammable Gas Watch List because of the potential for concentrations of flammable gases that exceed the lower flammability limit. These gases originate from the waste or are generated as a by product of the waste. As a result of the potential flammable nature of these tanks, extreme caution must be exercised to avoid any ignition source near the tanks.

All tanks in AX farm are ventilated using a passive ventilation system. Air for the passive ventilation system is supplied and exhausted through a common high-efficiency particulate air filter mounted on a riser. Air enters the tank when the pressure in the tank is less than that of the ambient air. Conversely, air exits the tank when the pressure in the tank is greater than that of ambient air.

All AX farm tanks contain high-level radioactive waste and various chemical constituents. The AX farm is classified as a surface contamination area (SCA) (radiological contamination).

Various AX farm tanks may be leaking and therefore pose a hazard for any subsurface activities because of radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-825) and adjacent gate (AY) located on Buffalo Avenue. Personnel enter and exit AX farm through the support trailer. Equipment such as motorized vehicles enter and exit AX farm through the gate adjacent to the trailer.

## **C. WIND INDICATION**

No wind sock is present on AX farm. A wind sock located on AY farm, adjacent to the change trailer and clearly seen from AX farm, indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Facility manager: 373-0132

Shift manager: 373-2689

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

## **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm Health and Safety Plan* (HASP), Section 1.0. Key responsibilities include the following:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Hydrogen/Flammable Gas

Hydrogen/Flammable Gas Watch List tank 241-AX-101 contain slurries that produces hydrogen gas and other flammable constituents. Other hazards are toxicity of the gas, and surface crust flammability. Hazard control requirements are currently in place and include the following:

- All work in this tank must be in accordance with OSD-T-151-00030
- Spark-resistant tools and other safeguards are necessary to reduce the chance of fire or explosion
- Work in and around this tank must be done in accordance with the *Tank Farm HASP*, Section 2.9, "Safe Work Practices."

##### 2. High-Level Radioactive Waste

All AX farm tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

##### 3. Surface Contamination

The entire AX tank farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present in AX farm. However, since AX farm is located in close proximity to A farm and, since the noise levels from the 241-A-105 Exhauster Building may exceed the applicable regulatory limit, hearing protection may be required for personnel in AX farm. Requirements for hearing protection will be based on the length of exposure and the proximity to the noise source. Specific information regarding the use of hearing protection is provided in work packages, pre-job briefings, and on posted signs. Additional noise sources such as portable compressors, heavy equipment, portable ventilation exhaust systems, etc., may occasionally be temporarily located in AX farm. Hearing protection requirements for temporary noise sources are described in the work package and during the pre-job briefing.

### **2. Chemicals**

No specific chemicals are used on AX farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

A listing of confined spaces for AX Tank Farm can be found in Table E-1 of this appendix. See Section 10.0 of HASP.

### **4. Asbestos**

Warning signs posted at AX farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

## **C. TASK-BASED HAZARDS**

Tasks common to many or all tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to AX farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers). These tasks must be conducted with Level B personal protective equipment (PPE) (supplied-air respirators) to protect against the potential vapor hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## **IV. SITE CONTROLS**

### **A. WORK ZONES**

Work zones and controlled areas for the AX farm are shown on Figure E-1 and are listed below. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite with controls specified in RWPs.

#### **1. Perimeter Exclusion Zone**

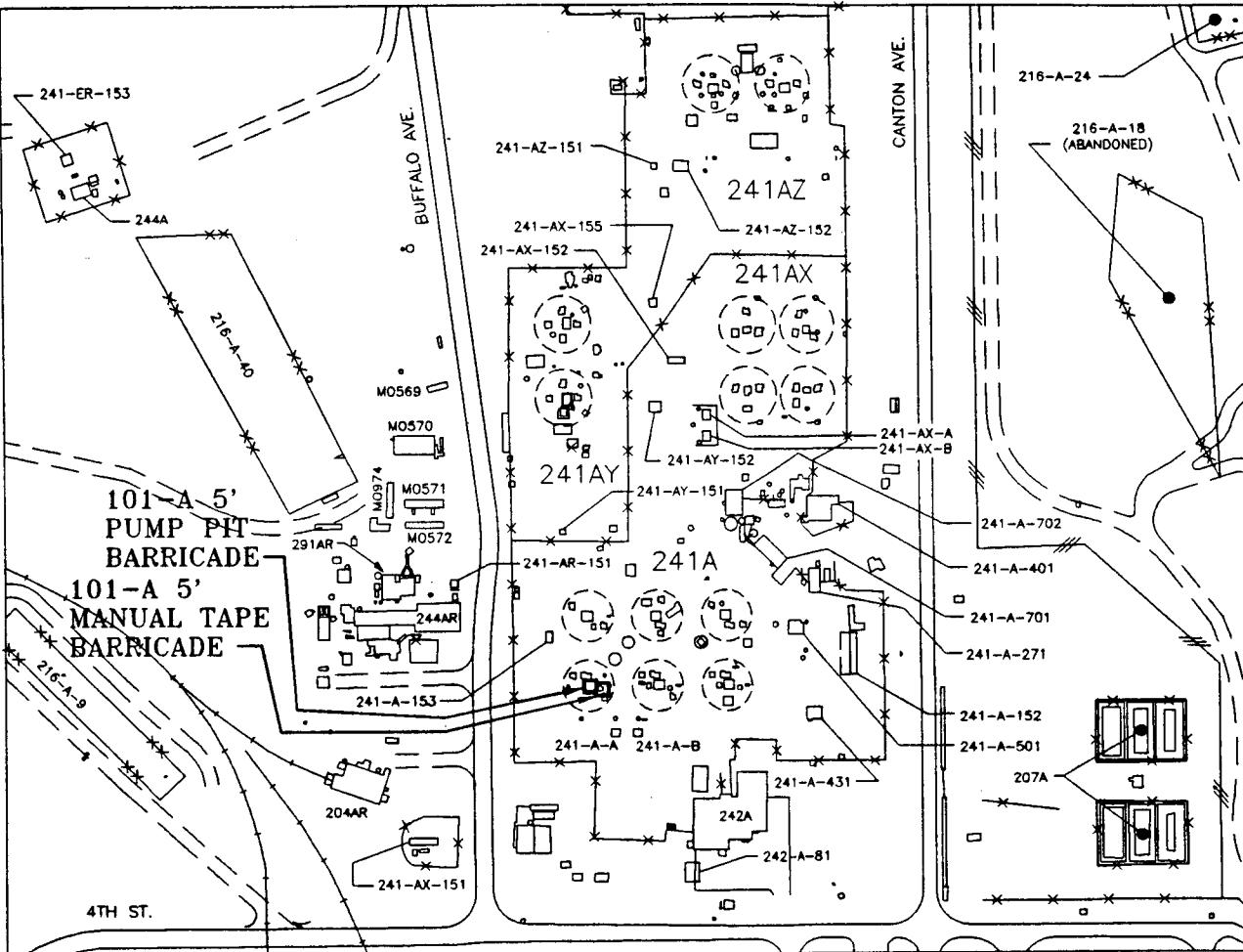
A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

#### **2. Interior Exclusion Zones**

Currently, no interior exclusion zones are required at AX farm.

Figure E-1. AX Tank Farm Site Plan.

E-8

241A/AX/AY/AZ

REV 0

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

AIR MONITORING OR  
RESPIRATORY PROTECTION ZONE

NOTE: THIS MAP IS TO BE USED FOR  
REFERENCE PURPOSES ONLY.

Westinghouse Hanford Co.  
TWRS IH&S

CADFILE: 241AAXAY

CUSTOMER: DAVID CARLS

TITLE:

241A/AX/AY/AZ TANK FARMS  
RESPIRATORY MONITORING

DATE: 2-06-95

DRAWN BY: NICK BARILLO

### **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway adjacent to the graveled area and from the vehicle entry gate to approximately 9.1 m (30 ft) into the tank farm. Two decontamination lines exit within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE and scan for radiological contamination, (2) the vehicle/equipment decontamination line is through the vehicle gate where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at AX farm, the only significant skin and clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

### **4. Support Zone**

The support zone consists of the portion of the trailer outside the RBA/URMA and also the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

## **B. ACCESS CONTROL**

Access to AX farm is through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

## **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for AX farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

Level D PPE is required for all work performed in AX farm. Work requiring a different levels of PPE will be stated in work permits.

### **A. EXCLUSION ZONES**

Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.

### **B. CONTAMINATION REDUCTION ZONE/CONTAMINATION REDUCTION CORRIDOR**

Required level D PPE consists of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zone. Any additional task-specific PPE requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE requirements are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or work packages and work permits developed for the specific task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the fenceline or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For any containment breach on any AX farm tank, see the *Tank Farm HASP*, Section 2.9, "Safe Work Practice," and Section 6.0.

Before entry and possibly periodically or continuously during entry into confined spaces, sampling is conducted for oxygen, explosivity, organic vapors, ammonia, and other hazards as specified on work permits. See confined space entry permit for requirements.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches on tanks 241-AX-101 or -103, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located in the A farm complex in building 241-A-701.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## **VII. DECONTAMINATION PROCEDURES**

Currently at AX farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **VIII. EMERGENCY RESPONSE**

This section summarizes emergency information specific to AX farm. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, fires, or other sudden threats. In case of power failure, an emergency generator is located in building 241-A-701. Loss of power at A Farm Complex may result in the loss of the following equipment:

- All transfer pumps connected with the 241-AX receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 241-AX Building
- The 241-AX vessel vent exhauster
- Air sampling and stack monitor
- Instrument process air.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of AX farm be required, personnel should assemble either at the 200 East Area Tank Farm staging area on the south side of the parking lot below AP farm at Canton Avenue just above First Street, or at an alternate location upwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT AX FARM**

Figure E-1 shows the location of fire extinguishers and fire alarms at AX farm. The AX Tank Farm Fire Plan is posted on the wall of the change trailer.

The following equipment is available:

- First aid and bloodborne pathogen kits
- Wind sock (located just outside the AY change trailer)
- Fire alarm buttons (located just inside doors to buildings 241-AX-801A and -801B; yellow flashing light indicates that tank pumps are operating)
- Two self-contained breathing apparatuses (SCBA) (located in the change trailer)
- Ladder
- Protective anti-C clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table E-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AX	01A	Active		Dist. pit	Cover block(s)	N		P F. ZAK	
241-AX		Active		Leak detection Pit	Cover block	N		P F. ZAK	
241-AX	AX-A	Active		Valve pit	Cover block(s)	N		P F. ZAK	
241-AX	AX-B	Active		Valve pit	Cover block(s)	N		P F. ZAK	
241-AX		Active	Valve	Service pit	Metal cover\4 ft dia open X 6 ft deep	Y	Hinged lid	P F. ZAK	~15 ft SE of 152-AX Diverter
241-AX	AX-A	Active	Valve/electrical	Raw water pit	Metal cover\3 ft x 3 ft open x 7 ft deep	Y	Hinged lid	P F. ZAK	~27 ft SE of 152-AX Diverter
241-AX	AX-B	Active	Contaminated	Flush pit	Metal cover	Y	Hinged lid	P F. ZAK	~4 ft SW of AX-B valve pit
241-AX	152	Active		Flush pit	Concrete/metal	Y	Hinged lid	P F. ZAK	
241-AX	501	Active		Valve pit	Cover block(s)	N		P F. ZAK	
241-AX		Active		Water pit	Metal cover/3 ft dia. (depth unknown)	N		P F. ZAK	
241-AX	V713	Active		Valve drain pit	Metal cover/4 ft dia open. (Depth unknown)	N		P F. ZAK	~21 ft from diverter station (PP-152-AX)
241-AX		Active	Raw water hookup	Service pit	Metal cover/3 ft x 3 ft open x 7 ft deep	Y		P F. ZAK	South of PP-152-AX diverter station (catch tank). Hookup for 152-AX transfer.

Table E-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AX		Active		Inst. Air valve pit	Metal cover/4 ft dia open x 7 ft deep	Y		P F. ZAK	~9 ft East of 152-AX diverter
241-AX				Big hole		Y		P F. ZAK	~6 ft North of 152 diversion box
241-AX		Active	Electrical/water/steam	Service pit	Metal cover/5 ft dia open x 6 ft deep	Y		P F. ZAK	~9 ft NW of AX-B valve pit
241-AX	505	Active		Valve pit	Cover block(s)	N		P F. ZAK	

## E-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 12/21/94

1 PAGE

DATE OF REPORT: 3/8/95

IS AND IH REPRESENTATIVES: FRED ZAK/  
ROGER MITCHELL

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 241-AX

OTHER EMPLOYEES: CLIFF MYERS

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
All	Walking/working surfaces: numerous capped pipes extending approximately 18 in. above grade unprotected	Remove or hi-lite	Y	.22	BIIz	3B

E-15

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**APPENDIX F**

**HEALTH AND SAFETY PLAN  
FOR THE AY TANK FARM**

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## APPENDIX F

### HEALTH AND SAFETY PLAN FOR THE AY TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The AY farm consists of two double-shell tanks. The maximum operating capacity of each of the tanks is 3,785,412 L (1,000,000 gal). These aging waste tanks are different from other double-shell tanks because they are equipped with support systems that allow storage of high-heat generating waste. The major equipment, associated with these support systems includes steam coils, airlift circulators, and an exhaust condenser system used to control condensate.

The tanks in AY farm presently hold low-level mixed waste. As system requirements change, the type of waste stored can also vary because of the uniqueness of these tanks.

The 702-A ventilation system reduces the level of radioactivity entering the environment below present airborne discharge limits by drawing the tank vapors through an extensive particle removal system before discharging to the atmosphere.

The system also maintains a vacuum within each tank to prevent radioactive leakage to the environment.

The main components of the 702-A system include two deentrainers buried in caissons, three surface condensers in the 241-A-701 building, a steam heater, and 12 high-efficiency particulate air (HEPA) filters in the 241-A-702 building.

In the 241-AY Annulus Vent System, air is drawn into the ventilation units by the exhaust fan, heated, filtered by two banks of filters, and fed into the annulus. The air is divided into two portions that are distributed (1) at the bottom of the annulus, and (2) in air slots below the inner tanks.

The air circulates in the annulus and is drawn out of the annulus through a duct. The air is monitored by a radiation probe heated by an electric heater, filtered by two banks of HEPA filters, and then released through a 99.1-m<sup>3</sup>/min (3,500-ft<sup>3</sup>/min) exhaust fan and stack to the environment.

No watch list tanks exist in AY farm.

Occasionally at AY farm, odors may be noticeable. In the few reported cases ammonia has been the probable contaminant identified. At times, the action of the airlift circulators may overload the ventilation systems and contaminants could be evolved from the tanks. If odors such as ammonia are detected, follow the information set forth the *Tank Farm Health and Safety Plan (HASP)*, Section 2.9, "Safe Work Practice."

## B. PERIMETER AND SUPPORT FACILITIES

The perimeter of AY farm is secured by a chain-link fence with access controlled at the support trailer (MO-825 change trailer). Personnel enter and exit AY farm through MO-825. Equipment, such as motorized vehicles, enter and exit AY farm through the gate adjacent to MO-825.

The following support facilities are in AY farm.

- Support Building MO-825 is used by workers at AY farm worker as a change room and as the entry/exit point through the fence.
- Control Room 241-A-271 houses controls, instruments, and alarms that monitor and control activities in AY farm. The Computer-Automated Surveillance System (CASS) substation, located opposite the instrument panels, relay essential operational information and alarms to a central computer located in the 2750-E building.
- Instrument Building 241-AY-801, which is located between the two tanks in AY farm, contains the piping and control valves for airlift circulators, instrumentation, and the MCCs for other AY farm equipment. Process-air and raw-water headers join in the manifolds feeding twenty-two airlift circulators inside each tank. Panels in 241-AY-801 provide local instrument readouts and alarms.
- Ventilation Building 241-A-702 contains the AY farm primary ventilation system steam heater, HEPA filters, deentrainer flush spray controls, and exhaust fans.

## C. WIND INDICATION

A wind sock located at the perimeter fenceline just south of MO-825 indicates wind direction to aid in planning onsite work activities, positioning structures and equipment, and planning approach routes.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Facility manager: 373-0132

Shift manager: 373-2689

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

### B. KEY RESPONSIBILITIES

For detailed responsibilities, see *Tank Farm HASP*, Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

## III. HAZARD EVALUATION AND CONTROLS

### A. TANK CHARACTERISTICS

Special surveillance requirements have been developed to monitor these tanks and their associated equipment. Instrumentation is installed for measuring liquid level, pressure, temperature, weight factor, and sludge level.

Venting of vapors/gases to the atmosphere from the breather filter on AY farm tanks has been documented. Possible vapor/gas constituents include organic vapors such as petroleum hydrocarbons and inorganic vapors/gases such as ammonia. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. If such odors (e.g., ammonia) are detected, follow the guidelines of the *Tank Farm HASP*, Section 2.9, "Safe Work Practice."

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present on AY farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into AY farm.

### **2. Chemicals**

No specific chemicals are used at AY farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

A listing of confined spaces for AY Tank Farm can be found in Table F-1 of this appendix. See Section 10.0 of HASP.

### **4. Asbestos**

Warning signs posted at AY farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during AY farm activities unless specifically directed.

### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

## **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

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Tasks requiring additional task-based hazard controls specific to the AY tank farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers). These tasks must be conducted with level B personal protective equipment (PPE) (supplied-air respirators) to protect against the potential vapor hazards. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## IV. SITE CONTROLS

### A. WORK ZONES

#### 1. Perimeter Exclusion Zone

A perimeter fenceline has been established and serves as both a radiological control area (RBA/URMA) and a controlled area for nonradiological hazards. (See map in MO-825).

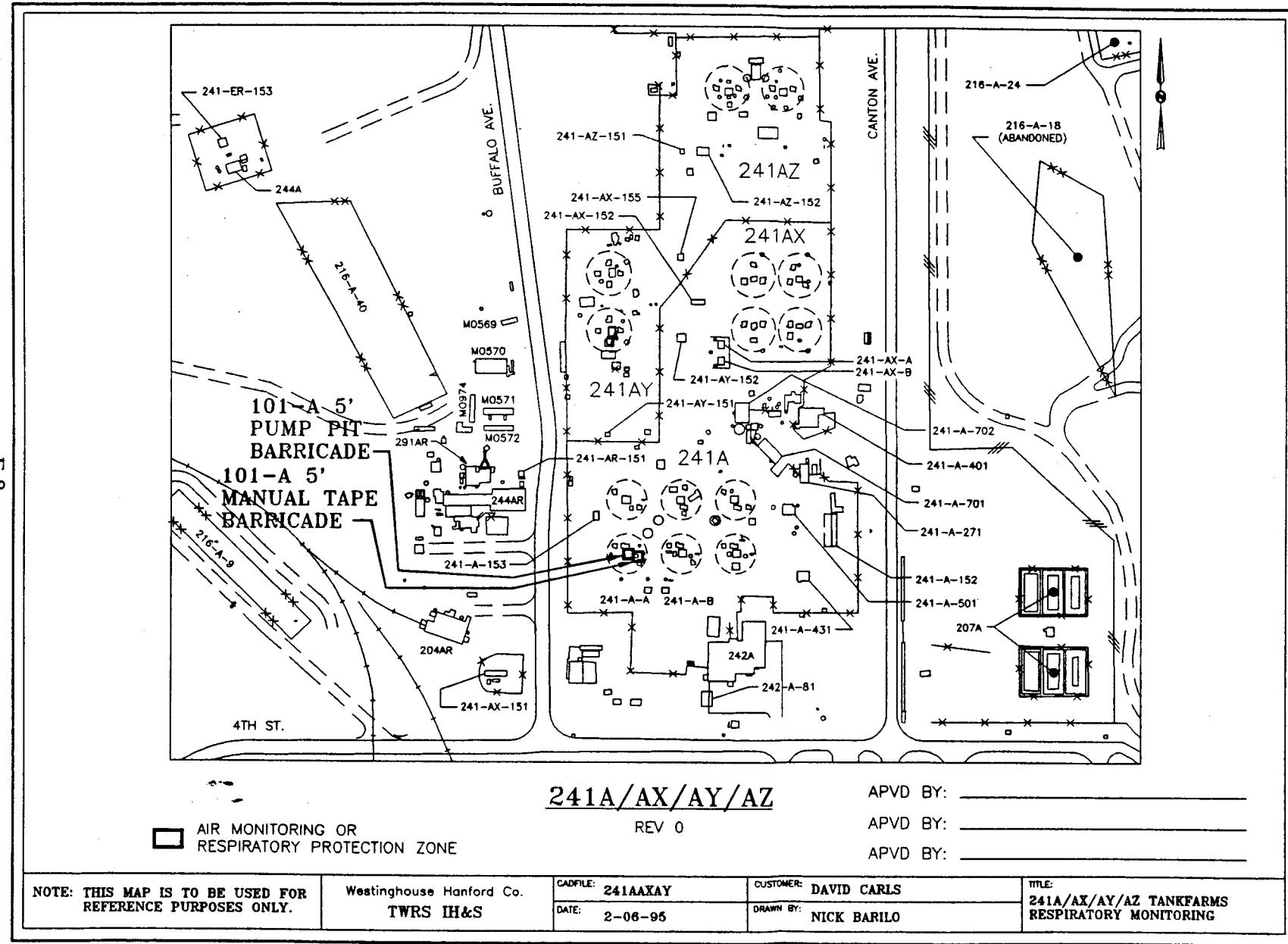
#### 2. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of MO-825, the landing and stairway outside the trailer leading into the AY farm, and the immediately adjacent graveled area from the vehicle entry gate into AY farm. Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of MO-825 where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle decontamination line is through the vehicle gate where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

### B. ACCESS CONTROL

The AY farm is accessed only through the contamination reduction zone (CRZ)/CRC (MO-825 and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

Figure F-1. AY Tank Farm Site Plan.



### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements for AY farm have been identified beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

PPE for any interior areas controlled for radiological hazards will be identified on the Radiation Work Procedures (RWP).

### **A. EXCLUSION ZONES**

Two levels of PPE are required in designated exclusion zones of AY farm.

- Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.
- Required Level B PPE consists of the same protective clothing/equipment as Level D described above plus headcover and supplied-air respiratory protection with a 5-minute escape bottle.

### **B. CONTAMINATION REDUCTION ZONE/CONTAMINATION REDUCTION CORRIDOR**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D PPE such as that worn in the exclusion zone. Any additional task-specific requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or work packages and work permits developed for the task.

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## VI. MONITORING REQUIREMENTS

External dosimetry is required as specified by the RWP for entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA. Monitoring for all tasks or operations shall be accomplished in accordance with the *Tank Farm HASP*, Section 2.9, "Safe Work Practice."

## VII. DECONTAMINATION PROCEDURES

Currently at AY farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## VIII. EMERGENCY RESPONSE

For specific information regarding emergency response, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992). For additional emergency response information, see the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

### A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of AY farm be required, personnel should assemble at the 200 East Area Tank Farm staging area on the south side of the parking lot below AP farm at Canton Avenue just above First Street, or at an alternate location upwind of AY farm.

### B. EMERGENCY EQUIPMENT AVAILABLE AT AY TANK FARM

The AY Tank Farm Fire Plan is posted on the wall of MO-825.

The following emergency equipment is available at AY farm:

- Two self-contained breathing apparatuses (located on the wall in MO-825)
- Protective clothing (available in MO-825)

- Radiological monitoring equipment (located in MO-825)
- Fire extinguisher (located in MO-825).

**C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES,  
PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID,  
ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table F-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AY	01A & 02A	Active		Central pump pit	Cover block(s)	N		P F. Zak	
241-AY	01B, C, D & E	Active		Sluice pits	Cover block(s)	N		P F. Zak	
241-AY	02B, C, D & E	Active		Sluice pits	Cover block(s)	N		P F. Zak	
241-AY	01F & 02F	Active		Annulus pump pits	Cover block(s)	N		P F. Zak	
241-AY	02A	Active		Leak det. Pit	Cover block(s)	N		P F. Zak	
241-AY	101A & 101B	Active		Leak det. Pits	Cover block(s)	N		P F. Zak	Dual pits
241-AY	501	Active		Cond. Valve pit	Cover block(s)	N		P F. Zak	
241-AY	101 & 102	Active	Vent line	Annulus vent crossti	Metal cover/4 ft dia open x 7 ft 2 in. deep	Y	Removable cover (by hand)	P F. Zak	101) 3 ft S of 101-AY Tank transmitter enclosure 102) 3 ft N of 102-AY tank transmitter enclosure
241-AY		Active	Electrical/ water line/valve	Raw water pit	Metal cover/3 ft dia open x 4 ft deep	Y		P F. Zak	Located 30 ft E of leak detection pit AY-101-B
241-AY		Active	Electrical/ water line/ valve	Raw water pit	Metal cover/3 ft dia open x 4 ft deep	Y		P F. Zak	Located 39 ft E of leak detection pit AY-101-B
241-AY		Active	Electrical/ water line/valve	Raw water pit	Metal cover/3 ft dia open x 3 ft deep	Y		P F. Zak	Located 24 ft N of leak detection conversion box

Table F-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AY		Active	Electrical/ water line/valve	Raw water pit	Metal cover/4 ft dia open x 4 ft deep	Y		P F. Zak	Located 9 ft N of leak detection conversion box
241-AY	101 & 102	Active	Steam line/valve	Steam trap pits	Metal cover/4.5 ft Dia open x 6 ft deep	Y	Removable cover (by hand)	P F. Zak	Located 21 ft S of the 241-AY (801) Bldg.
241-AY	601 Caisson	Inactive		Airlift cir.	Unknown	N	Unknown	NP F. Zak	Unable to locate

**F-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 2/14/95

1 PAGE

DATE OF REPORT: 3/8/95

IS AND IH REPRESENTATIVES: ED PONN/FRED ZAK/  
ROGER MITCHELL

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 241-AY

OTHER EMPLOYEES: STACE BAKER/CLIFF MYERS

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
All	Walking/working surfaces: numerous capped pipes extending from ground unprotected	Remove or hi-lite	Y	.22	BIIz	3B
Stile over steam line	Inaccessible	Repair/replace	Y	.22	BIIz	4C
All	Extensive debris accumulation	Housekeeping	Y	.141	BIIz	4C
CBHAY						



**APPENDIX G**

**HEALTH AND SAFETY PLAN  
FOR THE AZ TANK FARM**

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## APPENDIX G

### HEALTH AND SAFETY PLAN FOR THE AZ TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The AZ farm consists of two double-shell tanks. The maximum operating capacity of each of the tanks is 3,785,412 L (1,000,000 gal).

These aging-waste tanks are different from typical double-shell tanks because they are equipped with support systems that allow for storage of high-heat generating waste. The major equipment, associated with these support systems includes steam coils, airlift circulators, and an exhaust condenser system to control condensate.

Tanks in AZ farm currently store waste from past Plutonium Uranium Extraction Facility operations. As system requirements change, the type of waste stored in AZ farm tanks can also be changed because of the unique storage capability of the tanks.

The AZ farm uses the 702-A Ventilation System to reduce radioactivity entering the environment to levels that are below current airborne discharge limits. The tank vapors are drawn through an extensive particle removal system before being discharged to the atmosphere. The system maintains a vacuum in each tank that also prevents radioactivity from leaking to the environment.

The main components of the 702-A Ventilation System include two deentrainers buried in caissons, three surface condensers in the 241-A-701 Building, a steam heater, and 12 high-efficiency particulate air (HEPA) filters in the 241-A-702 Building.

In the 241-AZ Annulus Vent System, tanks 241-AZ-101 and -102 are served by a common annulus ventilation system. Air is drawn into the system by an exhaust fan, heated, filtered by three filter banks, and divided into four separate ducts. Two of the ducts lead to the annulus of each tank while the other two ducts lead to air slots below each inner tank. The distributed air then flows into a common 16-in. duct which leads to two filter boxes. The air passes a radiation probe, flows by electric heaters, and passes through two banks of HEPA filters. From each tank, the filtered air flows

from a duct that connects to a common rectangular underground duct. The air is released through a 198-m<sup>3</sup>/min (7,000-ft<sup>3</sup>/min) exhaust fan and stack to the environment.

Neither tank at AZ farm is on any tank farm watch list.

Occasionally, odors may be noticeable at AZ farm. In the few reported cases of odors, ammonia was identified as the probable contaminant. The action of the airlift circulators may overload the ventilation systems and result in odors from contaminants evolved from the tanks. If odor is detected (e.g., such as ammonia odor), follow the information set forth in the *Tank Farm Health and Safety Plan* (HASP), Section 2.9, "Safe Work Practice."

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter of AZ farm is secured by a chain-link fence with access controlled at the support trailer (MO-820 change trailer). Personnel enter and exit AZ farm through MO-820. Equipment such as motorized vehicles enter and exit AZ farm through the gate adjacent to MO-820.

The following support facilities are at AZ farm.

Support Building MO-820 is a change room facility and also is the entry/exit point through the perimeter fenceline.

Control Room 241-A-271 contains controls, instruments, and alarms, and is the center for monitoring and control activities at AZ farm. A computer-automated surveillance system substation, located opposite the instrument panels, relays essential operational information and alarms to a central computer located in the 2750-E Building.

Instrument Building 241-AZ-801, located between the two tanks in AZ farm, contains the piping and control valves for airlift circulators, the instrumentation, and the need to spell out acronym (MCCs) for other AZ farm equipment. In this building, process-air and raw-water headers join in manifolds that feed the airlift circulators (22 for each tank). Control panels located in the building provide instrument readouts and alarms.

Ventilation Building 241-A-702 contains the AZ farm primary ventilation system steam heater, HEPA filters, deentrainer flush spray controls, and exhaust fans.

### **C. WIND INDICATION**

A wind sock, located at the perimeter fenceline on the west side of AZ farm, indicates wind direction to aide in planning onsite work activities, positioning structures and equipment, and planning approach routes. In the event evacuation is required, the wind sock will aid in locating an up-wind location.

## **II. ORGANIZATION AND POINTS OF CONTACT**

### **A. KEY POINTS OF CONTACT**

Facility manager: 373-0132

Shift manager: 373-2820

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

### **B. KEY RESPONSIBILITIES**

The following list represents key responsibilities for AZ farm. For further information regarding responsibilities, see the *Tank Farm HASP*, Section 1.0:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and Health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

Special surveillance requirements have been developed to monitor the AZ farm tanks and associated equipment. Instrumentation is installed for measuring liquid level, pressure, temperature, weight factor, and sludge level.

Venting of vapors/gases to the atmosphere from the breather filter on the AZ farm tanks has been documented. Possible vapor/gas constituents include organic vapors such as petroleum hydrocarbons and inorganic vapors/gases such as ammonia. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. If odors such as ammonia are detected, follow the guidelines of the *Tank Farm HASP*, Section 2.9, "Safe Work Practice."

#### B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS

##### 1. Noise

No stationary high-noise sources are present on AZ farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from equipment brought into the farm.

##### 2. Chemicals

No specific chemicals are used at AZ farm that are atypical of operation at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

##### 3. Confined Spaces

A listing of confined spaces for AZ Tank Farm can be found in Table G-1 of this appendix. See Section 10.0 of HASP.

#### 4. Asbestos

Warning signs at AZ farm alert workers that asbestos materials are present. Asbestos is found in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during AZ farm activities, unless specifically directed.

### C. TASK-BASED HAZARDS

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks requiring additional task-based hazard controls specific to AZ farm included replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on the tanks. These tasks must be conducted with level B personal protective equipment (PPE) (supplied-air respirators) to protect against the potential vapor hazards. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## IV. SITE CONTROLS

### A. WORK ZONES

#### 1. Perimeter Exclusion Zone

A perimeter fenceline has been established and serves as both a radiological control area (RBA/URMA) and a controlled area for nonradiological hazards (See map in MO-820).

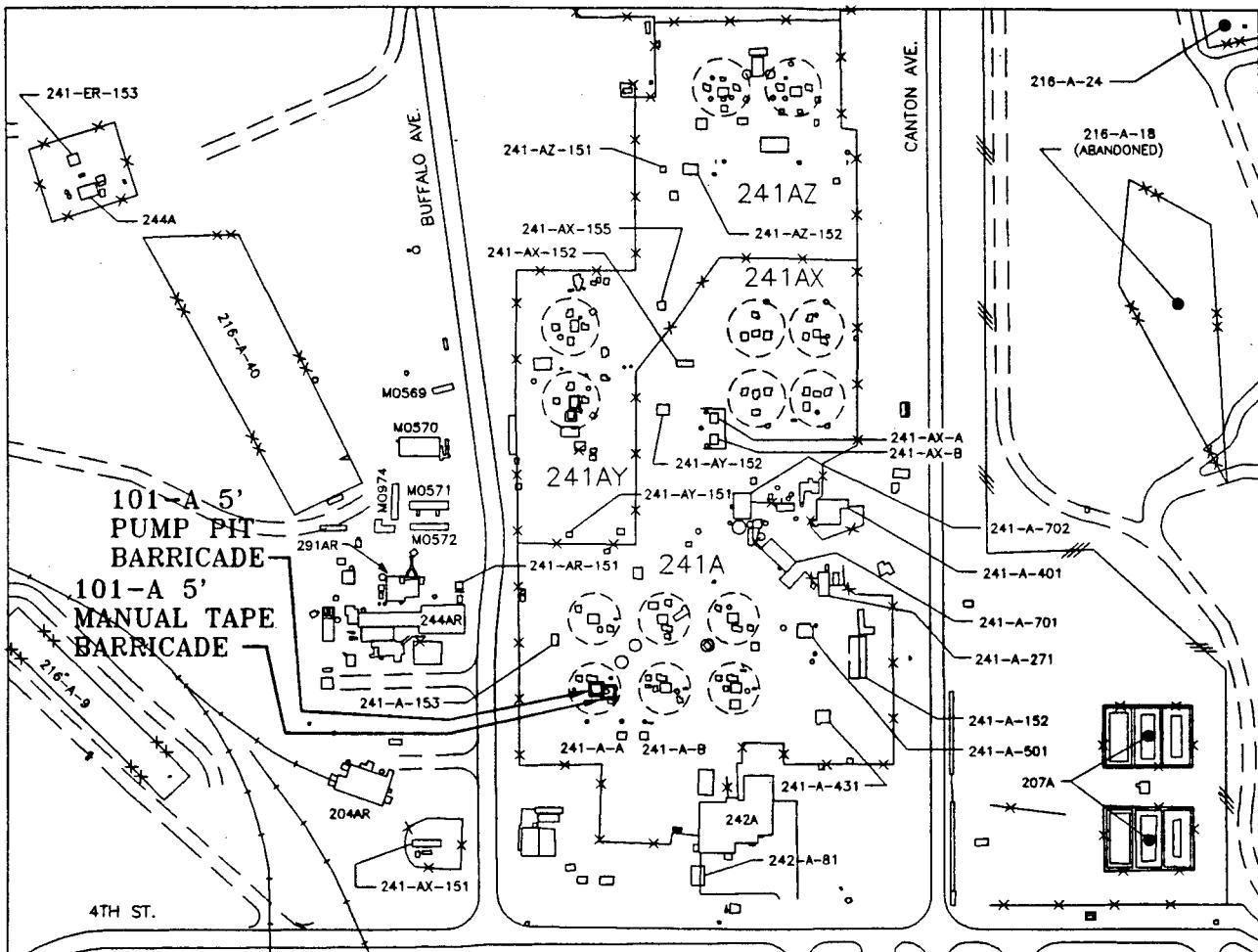
#### 2. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of MO-820, the landing and stairway outside the trailer leading into the AZ farm, and the immediately adjacent graveled area from the vehicle entry gate into AZ farm. Two decontamination lines exist within the contamination reduction corridor (CRC):

WHC-SD-WM-HSP-002, Rev. 2

Figure G-1. AZ Tank Farm Site Plan.

८



241A/AX/AY/AZ

REV 0

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

AIR MONITORING OR  
RESPIRATORY PROTECTION ZONE

NOTE: THIS MAP IS TO BE USED FOR  
REFERENCE PURPOSES ONLY.

Westinghouse Hanford Co.  
TWRS IH&S

CADFILE: 2011-070100

CUSTOMER: DAVID CARIS

**TITLE:**  
**241A/AX/AY/AZ TANK FARMS  
RESPIRATORY MONITORING**

(1) the personnel decontamination line is through the RBA/URMA portion of MO-820 where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle decontamination line is through the vehicle gate where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

## B. ACCESS CONTROL

The AZ farm may be accessed only through the contamination reduction zone (CRZ)/CRC (MO-820 and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

## C. COMMUNICATIONS/BUDDY SYSTEM

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for AZ farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

### A. EXCLUSION ZONES

PPE for any interior areas controlled for radiological hazards will be identified on the Radiation Work Procedures (RWP).

Two levels of PPE are required in designated exclusion zones of AZ Farm.

- Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.
- Required Level B PPE consists of the same protective clothing/equipment as Level D described above plus headcover and supplied-air respiratory protection with a 5-min. escape bottle.

## **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D protective clothing such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the site Safety and Health representative and/or Health Physics technician.

## **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

External dosimetry is required as specified by the RWP for entry into the CRZ/CRC, inside the fenceline, or into a RBA/URMA. Monitoring for all tasks or operations shall be accomplished in accordance with the *Tank Farm HASP*, Section 2.9, "Safe Work Practice."

## **VII. DECONTAMINATION PROCEDURES**

Currently at AZ farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information regarding decontamination procedures.

## **VIII. EMERGENCY RESPONSE**

For specific information regarding emergency response consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which presents information that applies to all tank farms.

### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of AZ farm be required, personnel should assemble at the 200 East

Area Tank Farm staging area on the south side of the parking lot below AP farm at Canton Avenue just above First Street, or at an alternate location upwind of AZ farm.

**B. EMERGENCY EQUIPMENT AVAILABLE AT AZ TANK FARM**

The AZ Tank Farm Fire Plan is posted on the wall of the MO-820 change trailer.

The following emergency equipment is available at AZ farm:

- First aid and bloodborne pathogen kits
- Two self-contained breathing apparatuses (located on the wall in MO-820)
- Protective clothing (available in MO-820)
- Radiological monitoring equipment (located in MO-820)
- Fire extinguisher (located in MO-820).

**C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

G-12

Table G-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AZ	01A & 02A	Active		Central pump pit(s)	Cover block(s)	N		P F. ZAK	
241-AZ	01B & 01C	Active		Sluice pit(s)	Cover block(s)	N		P F. ZAK	
241-AZ	02B & 02C	Active		Sluice pit(s)	Cover block(s)	N		P F. ZAK	
241-AZ	01F	Active		Annulus pump pit	Cover block(s)	N		P F. ZAK	
241-AZ	02F	Active		Annulus pump pit	Cover block(s)	N		P F. ZAK	
241-AZ	101	Active		Leak det. pit	Cover block(s)	N		P F. ZAK	
241-AZ	101/102	Active		Leak det. pits	Cover block(s)	N		P F. ZAK	Dual pits
241-AZ	155	Active		Contam. storage pit	Cover block(s)	N		P F. ZAK	
241-AZ	154	Active		Cond. Pump pit	Cover block(s)	N		P F. ZAK	
241-AZ	152	Active		Divers. Box	Cover block(s)	N		P F. ZAK	
241-AZ	152	Active	PIPE	Pit	Metal cover/4 ft dia open x 10 ft 8 in. dp	Y		P F. ZAK	Located 36 ft E of 152-AZ transfer box
241-AZ	101	Active		Seal loop drain valve pit	Metal cover/3 ft dia open x 20 deep	Y		P F. ZAK	Located in SW corner of AZ farm note: contamination found

Table G-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-AZ		Active	PIPE	Steam trap pit	Metal cover/5 ft dia open x 6 ft 9 in. deep	Y		NP F. ZAK	
241-AZ		Active	PIPE/VAL VE	Valve pit	Metal cover/5 ft dia open x 12 ft 4 in. deep	Y		P F. ZAK	Located 8 ft S of steam trap SE corner of AZ farm
241-AZ		Active	Steam lines and valves	Steam trap pit	Metal cover/5 ft dia open x 7 ft 8 in. deep	Y		P F. ZAK	Located 8 ft N of valve pit in SE corner of AZ farm
241-AZ	161	Active	Electrical/ water line	Check valve caisson	Metal cover 3 ft x 3 ft open x 10 ft 2 in. deep	Y	Hinged lid	NP F. ZAK	Located 4 ft E of the instrumentation house 241-AZ (801A)
241-AZ	162	Active	Electrical/ water line	check valve caisson	metal cover/3 ft x 3 ft open x 10 ft 2 in. deep	Y	Hinged lid	NP F. ZAK	Located 4 ft W of the instrumentation house 241-AZ (801A)

**G-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 2/14/95

1 PAGE

DATE OF REPORT: 3/8/95

IS AND IH REPRESENTATIVES: ED PONN/FRED ZAK/  
ROGER MITCHELL

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 241-AZ

OTHER EMPLOYEES: CLIFF MYERS

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
AZ-801	Noise: no warning/no available protection for small compressor bldg	Post warning provide hearing protection	Y	.95	AIII	2B
Exhauster	Exceeds 85DBA	post warning/provide protection	Y	.95	AIII	2B
Chg trlr	HASP not available	Provide HASP	Y	.120	AIIb	2B
AZ-801	Electrical (instrument) panel open and unattended with exposed contacts	Secure the panel	Y	.303	BIIq	1B
	Defective wooden ladders untagged/improper storage	Destroy and remove	Y	.25	BIII	3B

**APPENDIX H**

**HEALTH AND SAFETY PLAN  
FOR THE B TANK FARM**

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## APPENDIX H

### HEALTH AND SAFETY PLAN FOR THE B TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The B tank farm contains 12 single-shell tanks with a capacity of 1,892,706 L (500,000 gal) each. Also present are four smaller tanks rated at 208,198 L (55,000 gal). The tanks are numbered 241-B-101 through -112 and 241-B-201 through -204, respectively, and are located just east of the BX/BY farms.

The B farm was one of the first built from 1943 to 1944. All of the tanks in B farm have been interim stabilized, and nine are interim isolated. Tanks 241-B-101 and 241-B-202 have been shown to be a potential source of organic vapor/ammonia venting to the atmosphere. Tank 241-B-103 is on the Organic Watch List because of the relative high concentration of organic waste and oxidizing agents present in the tank. Under certain conditions, the organic waste materials and oxidizing agents (e.g., sodium nitrate, sodium nitrite, etc.) may result in a potentially hazardous exothermic reaction. Passive ventilation is used on all tanks at B farm. The high organic and vapor source tanks are identified below.

All B tanks contain low-level radioactive waste and various chemical constituents. The receiver tank (double-contained) for B farm is 241-BX-244, located in BX farm. The B tank farm is classified as a surface contamination area (SCA) (radiological contamination).

All B tanks are assumed to be leaking and therefore pose a hazard for all subsurface activities due to radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

##### B. PERIMETER AND SUPPORT FACILITIES

The perimeter is secured by a chain-link fence with access controlled at a small support enclosure across from BX farm and an adjacent gate located at the west side of B farm along Baltimore Avenue. Personnel enter through the gate and exit the farm through the enclosure. Equipment such as motorized vehicles enter and exit the farm through the same access gate.

### C. WIND INDICATION

A wind sock, located at the west side of B farm, indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Facility manager: 373-0132

Shift manager: 373-2689

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

East Area TWRS IH&S satellite office: 373-7200

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

### B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm Health and Safety Plan (HASP)*, Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

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#### A. TANK CHARACTERISTICS

##### 1. Organic Vapors

Tank 241-B-103 is on the Organic Watch List and may present a special hazard because of the volume of organic substances contained in the tank. Fire and explosion are always a concern. Hazard control requirements are currently in place.

- All work done at this tank must be in accordance with OSD-T-151-00030.
- Spark-resistant tools and other safeguards are necessary to reduce the chance of fire or explosion.
- All work in T farm is done in accordance with the *Tank Farm HASP*, Section 2.9, "Safe Work Practice."

##### 2. Vapor/Gas

Venting of various vapors/gases to the atmosphere from the breather filters of Tanks 241-B-101 and -202 has been documented. Possible gas/vapor constituents include organic vapors such as petroleum hydrocarbons and inorganic gases/vapors such as ammonia. However, vapor/gas constituents of the tanks have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. Elevated area/source concentrations are localized to the proximity of the breather filter vent. Extreme caution in these areas is recommended. For the specific controls and DPE, refer to the SWP. Controls around breather filter sources include:

- Barricaded interior exclusion zone established at A 1.5-m (5-ft) radius around the breather filter on tank 241-B-101
- Organic vapor meter (OVM) monitoring or respiratory protection required within interior exclusion zones
- Supplied-air used for all intrusive work (unless approved by TWRS IH&S) before breaking tank containment.

All personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

### **3. Low-Level Waste**

All B tanks store low-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

### **4. Surface Contamination**

The entire B tank farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP) and the ALARA (as low as reasonably achievable) Management Worksheets.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present on B farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

### **2. Chemicals**

No specific chemicals are used on B farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

A listing of confined spaces for B Tank Farm can be found in Table H-1 of this appendix. See Section 10.0 of HASP.

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#### **4. Asbestos**

Warning signs posted at the B farm complex (MO-824), alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

#### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

### **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Task having additional task-based hazard controls specific to B farm include replacement of breather filters, change out of seal loop fluid, and any other containment breach (e.g., opening of risers) on tank 241-B-101. These tasks must be conducted with Level B personal protective equipment (PPE) (supplied-air respirators) to protect against the confirmed vapor hazard. This level of protection shall not be reduced for containment breaches on this tank regardless of monitoring results.

## **IV. SITE CONTROLS**

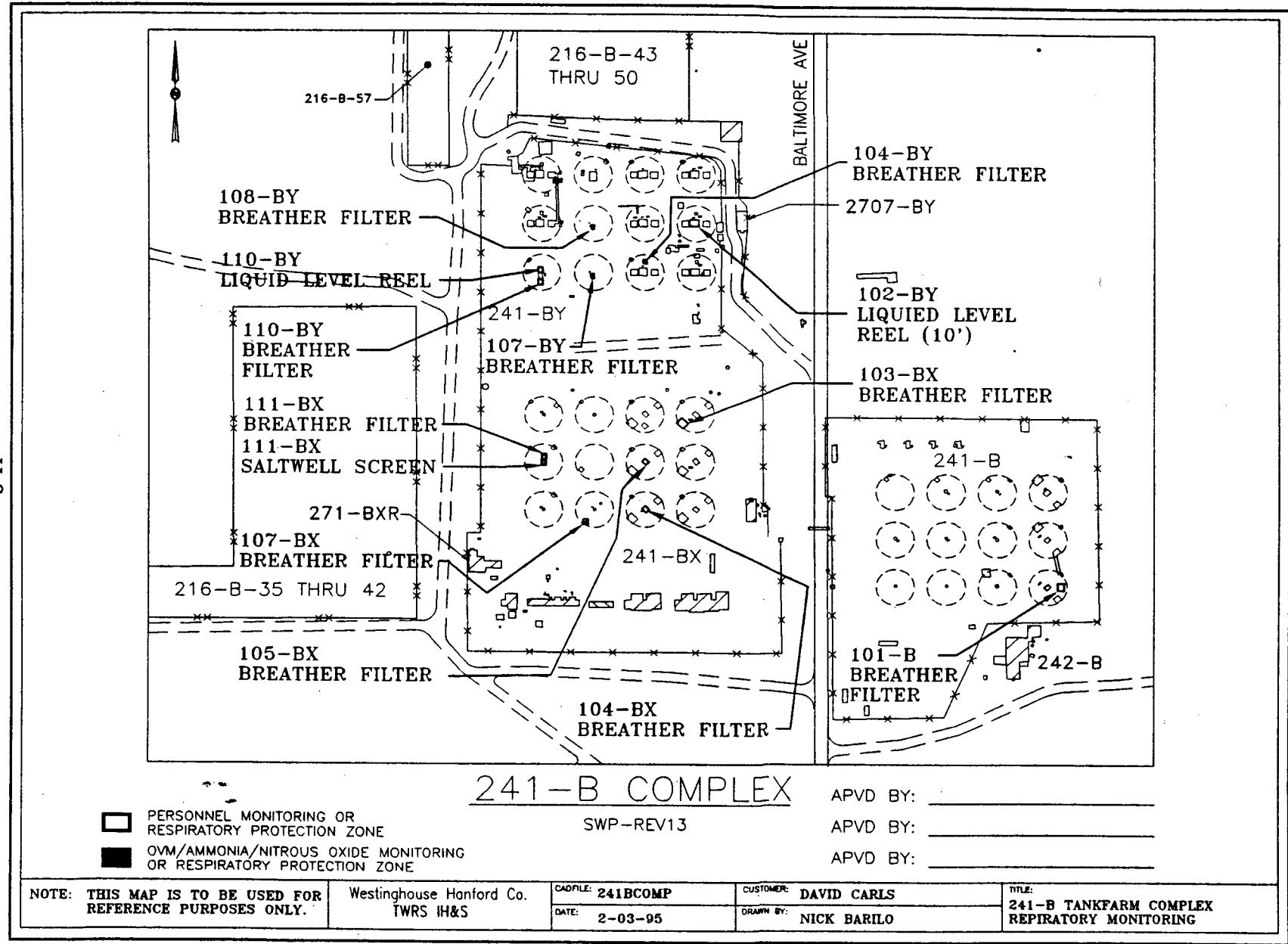
### **A. WORK ZONES**

Work zones and controlled areas for B farm are shown on Figure H-1 and are listed below.

#### **1. Perimeter Exclusion Zone**

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

Figure H-1. B Tank Farm Site Plan.



## **2. Interior Exclusion Zones**

Interior barricaded exclusion zones have been established around individual tanks, groups of tanks, and point-source emissions to deal with specific hazards. Interior exclusion zones are established at a 1.5-m (5-ft) radius around the breather filters (one each) on tank 241-B-101 and are controlled with Level B PPE. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

## **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of the immediately adjacent graveled area from the vehicle entry gate to approximately 12.2 m (40 ft) into the tank farm (see Figure H-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the small support enclosure where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontaminated; (2) the vehicle/equipment decontamination line is through the vehicle gate where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at B farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

## **4. Support Zone**

The support zone consists of the portion of the farm outside the RBA/URMA at the access gate and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company (WHC) Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

## **B. ACCESS CONTROL**

The only access point to B farm is through the contamination reduction zone (CRZ)/CRC at the vehicle gate unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for B farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

### **A. EXCLUSION ZONES**

Two levels of PPE are required in designated exclusion zones of B farm.

- Level D PPE is required inside the perimeter fenceline. Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.
- Level B PPE is required inside the interior barricaded area around the breather filter on tank 241-B-101 unless under OVM monitoring, or during a breach in containment of any tank unless a waiver is authorized by TWRS IH&S. Required Level B PPE consists of the same protective clothing/equipment as Level D plus headcover and supplied-air respiratory protection with a 5-minute escape bottle.

### **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are to be listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## VI. MONITORING REQUIREMENTS

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For entry into the interior barricaded areas around tank 241-B-101, OVM/HN<sub>3</sub> monitoring is required unless supplied-air respiratory protection is used. In addition to general area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on tank 241-B-101, OVM/HN<sub>3</sub> monitoring is required even though supplied-air respirators must be used. In addition to other area monitoring, OVM/HN<sub>3</sub> monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on tanks other than 241-B-101, see the *Tank Farm HASP*, Section 2.9, "Safe Work Practice," and Section 6.0.

Before entry and possibly periodically or continuously during entry into confined spaces, sampling must be conducted for oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide, and other hazards specified on work permits. See confined space entry permit for requirements.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches on tank 241-B-101, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. There are five area radiation detectors in B farm. The nearest continuous air monitor for airborne radiological monitoring is located north of B/BY farms at the intersection of 12th and Baltimore.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## VII. DECONTAMINATION PROCEDURES

Radiological contamination is the only significant decontamination issue at B farm at this time. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **VIII. EMERGENCY RESPONSE**

This section summarizes emergency information specific to B farm. For further information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the B farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 244-B receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 244-B Building
- The 244-B vessel vent exhauster
- Air sampling and stack monitor
- Instrument process air.

### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of B farm be required, personnel should assemble either at the 200 East Tank Farm staging area on the south side of the parking lot below AP farm at Canton Avenue just above First Street, or at an alternate location upwind.

### **B. EMERGENCY EQUIPMENT AVAILABLE AT B FARM**

Figure H-1 shows the location of fire extinguishers and fire alarms at the site. The B Tank Farm Fire Plan is posted on the wall of the change trailer. The following equipment is available:

- First aid and bloodborne pathogen kits
- Cardiopulmonary resuscitation (CPR) microshield (located on the wall near the main entrance of the change trailer)

- Wind sock (located just outside the change trailer)
- Panic button and fire alarm (located in the control room; yellow flashing light indicates that tank pumps are operating)
- Two self-contained breathing apparatuses (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

**C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table H-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-B	Caisson	Inactive	No ladder	Steam trap pit	Metal cover	Y		P F. Zak	Outside of fence/located on left at entrance/ ~9 ft deep 6 in. dia. opening/trap is isolated.

## H-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 1/17/95

1 PAGE

DATE OF REPORT: 3/8/95 IS AND IH REPRESENTATIVES: ED PONN/FRED ZAK

ASSESSMENT NUMBER:

AREA: 200E FACILITY: 241-B OTHER EMPLOYEES:

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Changeout booth	Surface contamination: surface grade allows water to drain from hot stepoff to cold stepoff pad	seal roof and doors check and adjust grade	Y	.22	IIk	3B
B-105, B-112	Uncontrolled trash/debris creates fire/tripping/rodent hazards	Housekeeping	Y	.141	BIIz	4C
Unlabeled enclosure	NE corner of farm lacks asbestos identification and warnings	Color code as required	Y	.1001	BIId	2C
B-203 et al.,	Sink holes and washouts in various locations create slip/trip and fall hazards	Backfill to grade	Y	.22	IIk	3B

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**APPENDIX I**

**HEALTH AND SAFETY PLAN  
FOR THE BX TANK FARM**

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## APPENDIX I

### HEALTH AND SAFETY PLAN FOR THE BX TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The BX farm contains 12 single-shell tanks with a capacity of 1,892,706 L (500,000 gal) each. The tanks are arranged in a cascade fashion (flow arrangement) with four cascades of three tanks each. The tanks are numbered 241-BX-101 through -112. Tanks 241-BX-102 and -106 are on the Ferrocyanide Watch List and therefore have a possible, although unlikely and undetected, hydrogen cyanide (HCN) occupational exposure potential. Four tanks cascade with the two Ferrocyanide Watch List tanks and therefore also have a possible, but even less likely, HCN exposure potential. Tanks 241-BX-104, -105, and -111 vent vapor/gas to the atmosphere from their breather filters and have a confirmed vapor exposure hazard from organics and/or ammonia and possibly other gases/vapors. Passive ventilation is used on all tanks in BX farm.

All BX farm tanks contain high-level radioactive waste and various chemical constituents. In addition to the tanks, a double-contained receiver tank (241-BX-244) is present in BX farm, serving the entire B complex (B, BX, and BY farms). The BX farm is classified as a surface contamination area (SCA) (radiological contamination).

Various BX farm tanks may be leaking and therefore pose a hazard for any subsurface activities because of radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

##### B. PERIMETER AND SUPPORT FACILITIES

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-824) and adjacent gate located at the southeast corner of BX farm along Baltimore Avenue. Personnel enter and exit the farm through the support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate adjacent to the trailer.

### C. WIND INDICATION

A wind sock located at the southeast corner of BX farm indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Facility manager: 373-0132

Shift manager: 373-2689

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

East Area TWRS IH&S satellite office: 373-7200

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

### B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm Health and Safety Plan* (HASP), Section 1.0. Key responsibilities include:

- Site access controlled by shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Ferrocyanide

Ferrocyanide Watch List tanks include 241-BX-102 and -106. The possible but unconfirmed hazard is exposure to HCN gas. To date, no detectable HCN exposures or area concentrations have been found. Removal of the HCN controls is under consideration. Nevertheless, exposure control requirements to protect against possible exposures are currently in place and include the following:

- A controlled interior exclusion zone (barricaded area) around breather filters on tanks 241-BX-103, -104, -105, -107 and -111 requires OVM/HN<sub>3</sub> monitoring for entry or use of Level B PPE if no monitoring is performed.

##### 2. Vapor/Gas

Vapor/gas emitting tanks include 241-BX-103, -104, -105 and -111. Venting of various vapors/gases to the atmosphere from the breather filter on these tanks has been documented. Possible gas/vapor constituents include organic vapors such as petroleum hydrocarbons and inorganic gases/vapors such as ammonia. However, vapor/gas constituents of the tanks have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. Elevated area/source concentrations are localized to the proximity of the breather filter vent. Extreme caution in these areas is recommended. Controls around breather filter sources include the following:

- Barricaded interior exclusion zones are established at a 1.52 m (5-ft) radius around the breather filters on tanks 241-BX-103, -105, -107, and -111. (Note: one breather filter is present for each tank).
- OVM/HN<sub>3</sub> monitoring or the use of Level B PPE (supplied-air respirator) is required within these interior exclusion zones, and for any containment breaches on these tanks.

To date, all personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

### **3. High-Level Radioactive Waste**

All BX tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

### **4. Surface Contamination**

The entire BX farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present on BX farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

### **2. Chemicals**

No specific chemicals are used on BX farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

A listing of confined spaces for BY Tank Farm can be found in Table I-1 of this appendix. See Section 10.0 of HASP.

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#### **4. Asbestos**

Warning signs posted at BX farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

#### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

### **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permit(s) developed for the specific task as part of the work control process.

Tasks having additional task-specific hazard controls specific to BX farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on tanks in BX farms. These tasks must be conducted in accordance with the *Tank Farm HASP*, Section 2.9, "Safe Work Practice."

## **IV. SITE CONTROLS**

### **A. WORK ZONES**

Work zones and controlled areas for BX farm are shown on Figure I-1 and are listed below.

#### **1. Perimeter Exclusion Zone**

A perimeter fenceline has been established and serves as both a RBA/URMA and a controlled area for nonradiological hazards.

## 2. Interior Exclusion Zones

Interior barricaded exclusion zones have been established around point source emissions to deal with specific hazards.

- Barricades are erected in a 1.52-m (5-ft) radius around the breather filters on tanks 241-BX-103, -104, -105, -107 and -111. Controls include OVM monitoring or Level B PPE
- In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

## 3. Contamination Reduction Zone/Contamination Reduction Corridor

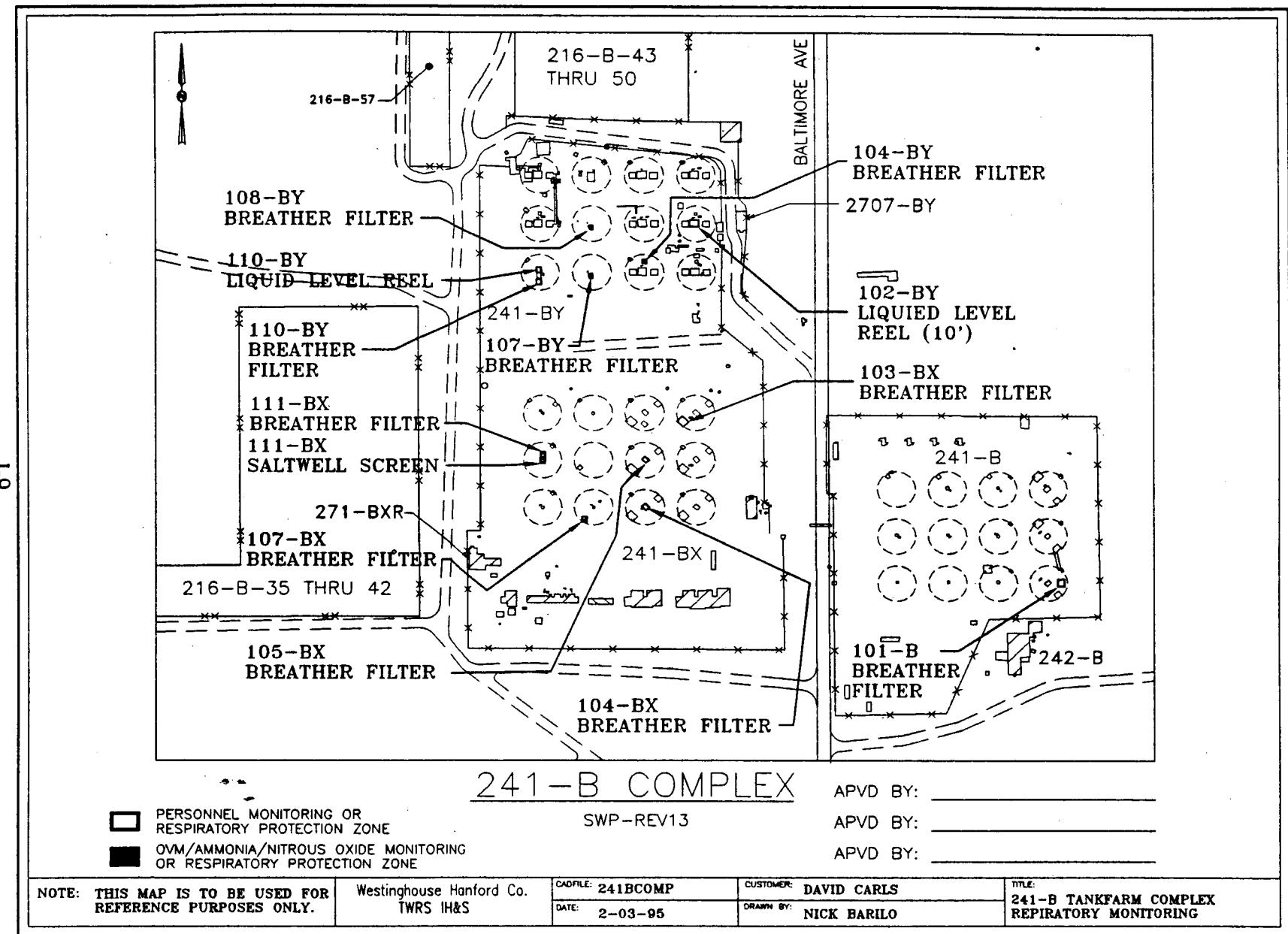
This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 12.19 m (40 ft) into the tank farm (see Figure I-1). Two decontamination lines exist within the CRC: (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at BX farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the contamination reduction corridor (CRC) and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

## 4. Support Zone

The support zone consists of the portion of the trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

Figure I-1. BX Tank Farm Site Plan.



## B. ACCESS CONTROL

Access to BX tank farm is to occur only through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

## C. COMMUNICATION/BUDDY SYSTEM

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for BX farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

# V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

## A. EXCLUSION ZONES

One level of PPE are required in designated exclusion zones of BX farm.

- Level D PPE is required inside the perimeter fenceline. Level D with OVM and ammonia monitoring is required within a (5-ft) radius of the breather filters on tanks 241-BX-103, 241-BX-104, 241-BX-105, 241-BX-107 and 241-BX-111. Required level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.
- Level D PPE is required with OVM/Ammonia ( $\text{NH}_3$ ) monitoring within 5-ft of the non-breather filter on tank 241-BX-111.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

## **B. CONTAMINATION REDUCTION ZONE**

Level D PPE is required, which consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D PPE clothing such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health Representative and/or Health Physics technician.

## **C. TASK-SPECIFIC HAZARDS**

Task-specific PPE requirements are to be listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For entry into the interior barricaded areas around tanks 241-BX-102, -104, -105, -106 and -111, OVM/HN<sub>3</sub> and monitoring are required unless supplied-air respiratory protection is used. In addition to general area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on tanks 241-BX-104, -105, or -111, OVM monitoring or supplied-air respirator use is required. In addition to other area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on tanks other than 241-BX-103, -104, -105 -107 or -111, See the *Tank Farm HASP*, Section 2.9, "Safe Work Practice," and Section 6.0.

Before confined space entry and possibly periodically or continuously during entry, sampling for oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide, and others is conducted. Monitoring requirements are specified on confined space entry permits.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing 241-BX-103, -104, -105, -107 and -111 containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. There are five area radiation detectors in BX farm. The nearest continuous air monitor (CAM) for airborne radiological monitoring is located north of BX/BY farms at the intersection of 12th and Baltimore.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by health physics for radiological hazards.

## VII. DECONTAMINATION PROCEDURES

Currently at BX farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## VIII. EMERGENCY RESPONSE

This section summarizes emergency information specific to BX farm. For additional information regarding emergency response issues, consult the WHC *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the B farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 244-BX receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 244-BX Building
- The 244-BX vessel vent exhauster
- Air sampling and stack monitor
- Instrument process air.

## **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of BX farm be required, personnel should assemble either at the 200 East Area Tank Farm staging area on the south side of the parking lot below AP farm located at Canton Avenue just above First Street, or at an alternate location upwind.

## **B. EMERGENCY EQUIPMENT AVAILABLE AT BX FARM**

The BX Tank Farm Fire Plan is posted on the wall of the change trailer.

The following equipment is available:

- First aid and bloodborne pathogen kits
- Cardiopulmonary resuscitation (CPR) microshield (located on the wall near the main entrance of the change trailer)
- Wind sock (located just outside the change trailer)
- Panic button and fire alarm (located just outside the 244-BX Control Room; yellow flashing light indicates that tank pumps are operating)
- Two self-contained breathing apparatuses (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

## **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

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Table I-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
244-BX	01A	Active		Central pump pit	Cover block(s)	N		P F. Zak	
244-BX	Caisson	Active		244-BX inst. pit	Metal cover	Y	Hinged lid	P F. Zak	North of central pump pit.
244-BX	Caisson	Active	Air line (pipe)	Inst. air pull box	Metal cover 4 ft dia. open x 4 ft deep	Y	Hinged lid	N F. Zak	East of 244-BX central pump pit instrument shack.
244-BX		Active	Heater	Inst. Pit	Metal cover 4 ft dia open x 8 ft deep fixed ladder	Y	Hinged lid	P F. Zak	~1 ft N of central pump pit/4 ft dia. open x 8 ft deep/fixed ladder
241-BX		Active	Water pipe	Water service pit	Metal cover 5 ft dia. open x 5 ft deep	Y		P F. Zak	~15 ft E of pit cover with ID H-2-74721
241-BX		Active	Water pipe/ unsecured ladder	Service pit	Metal cover	Y		P F. Zak	~15 ft W of pit cover with ID H-2-75140
241-BX		Active	Heater/ electrical	Heater control station service pit	Metal cover/fixed ladder	Y		P F. Zak	NE side of BX
241-BX		Active	Steam valve	Exhaust condensate steam valve pit	Metal cover/5 ft dia. open x 6 ft deep	Y		P F. Zak	~42 ft NW of FIC 106-BX
241-BX		Active	Steam pipes	Steam service pit	Metal cover/4 ft dia. open x 8 ft deep	Y		P F. Zak	~12 ft NW of FIC 112-BX

Table I-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-BX	107-BX 109-BX 110-BX 111-BX 112-BX	Active		Salt-well pump pits		N		P F. Zak	111-BX Wiring covers the pit, so a permit sign was attached with wire.
241-BX	107-B	Active	Heater/rise r/fixed ladder	Service pit	Metal cover/4 ft dia open x 5 ft deep	Y		P F. Zak	1) ~15 ft NE of 241-BX-107 saltwell pump pit 2) ~30 ft SW of 241-BX-107 saltwell pump pit
241-BX		Active		Catch tank	Metal cover/5 ft 6 in. dia. open 5 ft deep	Y		P F. Zak	~12 N of phosphoric acid prototype control center SW side of farm
241-BX		Active		Drainage pit	Metal cover/3 ft dia. open x 6 ft 9 in. deep	Y		P F. Zak	SW (BX-R) Side
244-BX	Caisson	Active		Flush pit	Metal cover	Y	hinged lid	P F. Zak	Next to 244-BX shack.

## I-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 2/15/95

1 PAGE

DATE OF REPORT: 3/8/95

IS AND IH REPRESENTATIVES: ROGER MITCHELL/FRED ZAK/  
ED PONN

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 241-BX

OTHER EMPLOYEES: STACE BAKER    LISA HARTLEY

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
BX-111/110	Confined spaces improperly identified	classify and label	Y	.146	AIlg	2B
All	Capped pipes extend 18 in. above grade creating tripping hazards	Remove or hi-lite	Y	.22	BIIk	3B
NRAF	Improper use/protection of electrical cables and cord creates electrical and tripping hazards	correct installation per NEC	Y	.303 .22	BIIq	2B
BX-107	Lock #84 on pump switch box without required tag	install proper lock and tag	Y	.147	BIIq	2A
BX-104	Small enclosure contains ACBM which is unlabeled	Color code and label	Y	.1001	AIIC	2C
	Small pink structure between BX and BY contains open electrical panels unprotected from contact.	Secure panel and lock building post for authorized personnel only	Y	.303	BIIq	2A

All	HAZCOM: phosphoric acid tank improper label warning signs misplaced storage cabinet labeled "flammable" contains unlabeled materials.	Correct storage label as required	Y	.1200	AIIc	2B
	Rigging slings and wire ropes improper storage out of certification	Properly store/test and certify or destroy	Y	.184	AIIr	1A
DCRT	Guardrailing partially dismantled creates tripping hazard	Repair/replace	Y	.22	BIIj	2A
CBHBX						

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**APPENDIX J**

**HEALTH AND SAFETY PLAN  
FOR THE BY TANK FARM**

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## APPENDIX J

### HEALTH AND SAFETY PLAN FOR THE BY TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The BY tank farm contains 12 single-shell tanks with a capacity of 2,839,059 L (750,000 gal) each. The tanks are arranged in a cascade fashion (flow arrangement) with four cascades of three tanks each. The tanks are numbered 241-BY-101 through -112. Nine of the 12 tanks (i.e., 241-BY-103, -104, -105, -106, -107, -108, -110, -111, and -112) are on the Ferrocyanide Watch List and therefore have a possible, although unlikely, hydrogen cyanide (HCN) occupational exposure potential. Ferrocyanide serves as a scavenger of radiocesium and other soluble radionuclides and as such was added to tanks to reduce the volume of radioactively contaminated liquids in the tanks. In the presence of oxidizing agents such as nitrates/nitrites and high temperatures ( $> 285^{\circ} \text{ C}$ ), ferrocyanides have the potential to explode. Additionally, under special conditions such as high radiation and  $\text{pH} < 10.5$ , ferrocyanide may be converted to HCN. One tank is in the cascade with a Ferrocyanide Watch List tank and therefore also has a possible, but even less likely, HCN exposure potential. Passive ventilation is used on all tanks in BY farm.

All BY farm tanks contain high-level radioactive waste and various chemical constituents. In addition to the tanks, a double-contained receiver tank (241-BX-244) is present in the BX farm, serving the entire B complex (B, BX, BY). The BY tank farm is classified as a surface contamination area (SCA) (radiological contamination).

Various BY tanks may be leaking and therefore pose a hazard for any subsurface activities due to radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

##### B. PERIMETER AND SUPPORT FACILITIES

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-824) and adjacent gate located at the southeast corner of BX farm along Baltimore Avenue. Personnel enter and exit the farm through the support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate adjacent to the trailer.

### C. WIND INDICATION

Wind socks located at the southeast and northeast fences of BY farm indicate wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Facility manager: 373-0132

Shift manager: 373-2689

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242  
East Area TWRS IH&S satellite office: 373-7200

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

### B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm HASP*, Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS-IH&S
- Exposure/area monitoring specified by TWRS-IH&S
- Exposure/area monitoring conducted by TWRS-IH&S

### III. HAZARD EVALUATION AND CONTROLS

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#### A. TANK CHARACTERISTICS

##### 1. Ferrocyanide

Ferrocyanide Watch List tanks include 241-BY-103, -104, -105, -106, -107, -108, -110, -111 and -112. The possible, but as yet unconfirmed hazard, is exposure to HCN gas. To date, no detectable HCN exposures or area concentrations have been found. Removal of the HCN controls is under consideration. Nevertheless, exposure control requirements to protect against possible exposures include the following.

- A controlled interior exclusion zone (barricaded area) established at a 1.52-m (5-ft) radius around breather filters on tanks 241-BY-104, -107, and -108 requiring OVM/NH<sub>3</sub>/N<sub>2</sub>O monitoring or respiratory protection for entry within the barricades. Barricades at tank 241-BY-110 requires OVM/NH<sub>3</sub> monitoring.
- A controlled interior exclusion zone (barricaded area) established at a 1.52 m (5-ft) radius around the breather filter and liquid level reel on tank 241-BY-102, -104, and -110 requiring OVM monitoring or respiratory protection for entry within the barricades
- Level B personal protective equipment (PPE) (supplied-air respirator) is required for initial containment breaches on all BY tanks or continuous when OVM monitoring is not available at containment breach or thereafter. For waste intrusive work OVM monitoring is required every 15 minutes.

To date, all personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

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## **2. High-Level Radioactive Waste**

All BY farm tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

## **3. Surface Contamination**

The entire BY farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP) and the ALARA (as low as reasonably achievable) Management Worksheets.

# **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

## **1. Noise**

No stationary high-noise sources are present on BY farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

## **2. Chemicals**

No specific chemicals are used on BY farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

## **3. Confined Spaces**

A listing of confined spaces for BY Tank Farm can be found in Table J-1 of this appendix. See Section 10.0 of HASP.

#### **4. Asbestos**

Warning signs posted at BY farm alert workers that asbestos materials are present. Asbestos can be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

#### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

### **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to BY farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on tanks 241-BY-103 through -108 and 241-BY-110 through -112. These tasks must be conducted with Level B PPE (supplied-air respirators) to protect against the confirmed vapor hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## **IV. SITE CONTROLS**

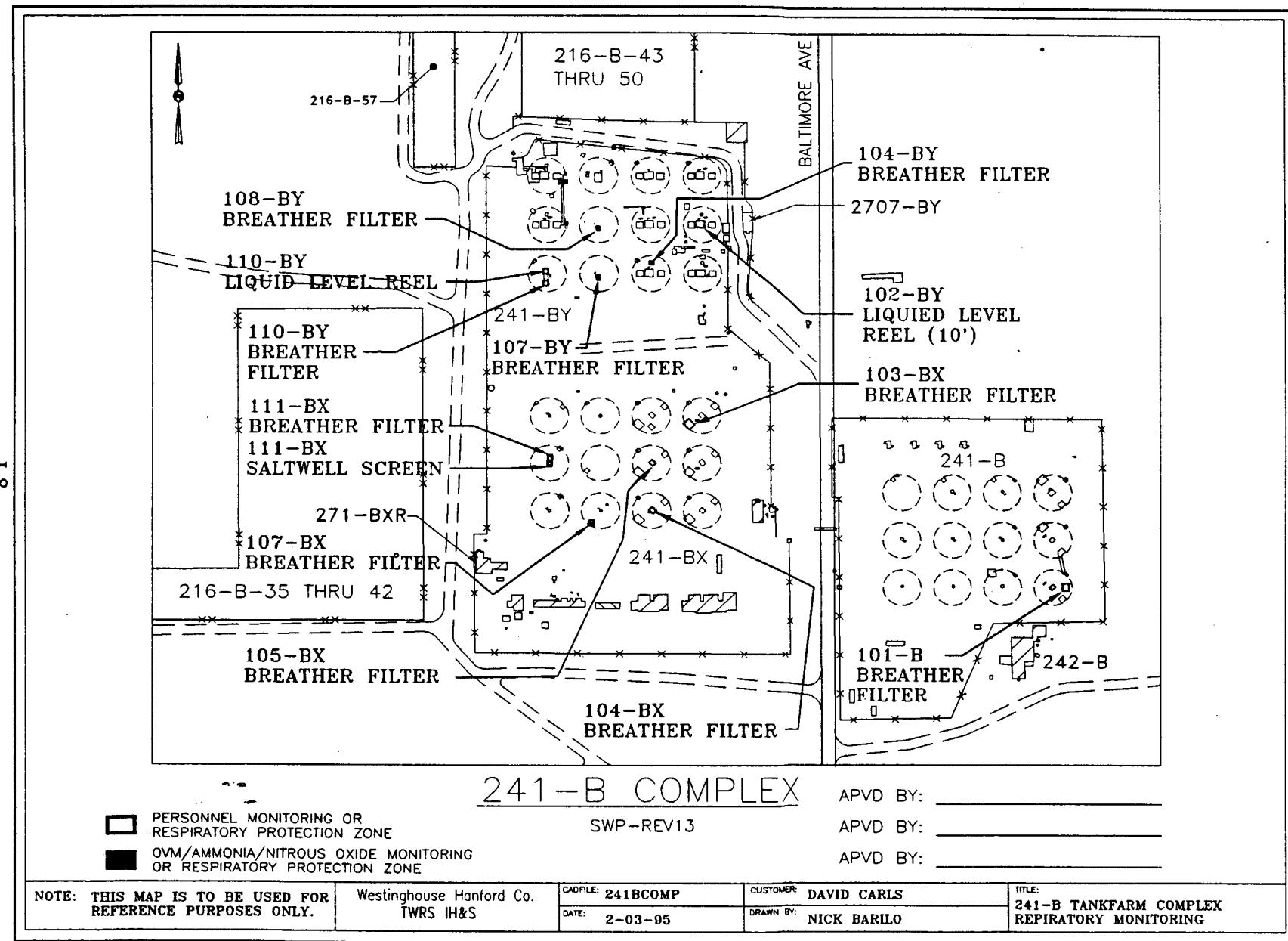
### **A. WORK ZONES**

Work zones and controlled areas for BY farm are shown on Figure J-1 and are listed below.

#### **1. Perimeter Exclusion Zone**

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

Figure J-1. BY Tank Farm Site Plan.



## 2. Interior Exclusion Zones

Interior barricaded exclusion zones have been established around individual tanks, groups of tanks, and point source emissions to deal with specific hazards.

- The zones around breather filters on tanks 241-BY-104, -107 and -108 are controlled with Level B PPE or OVM/NH<sub>3</sub>/N<sub>2</sub>O monitoring tank 241-BY-110 does require OVM/NH<sub>3</sub> monitoring.
- The zones around liquid level reels on tanks 241-BY-102, -104 and -110 are controlled with OVM/NH<sub>3</sub> monitoring or Level B PPE.
- In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

## 3. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 12.19 m (40 ft) into the tank farm (see Figure J-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at BY farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

#### 4. Support Zone

This zone consists of the portion of the trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

### B. ACCESS CONTROL

Access to BY farm is to occur only through the CRZ/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

### C. COMMUNICATIONS/BUDDY SYSTEM

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for BY farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

### A. EXCLUSION ZONES

Two levels of PPE are required in designated exclusion zones of BY farm as follows.

- Level D PPE is required inside the perimeter fenceline and also inside exclusion zones with OVM/NH<sub>3</sub>/N<sub>2</sub>O monitoring. Required Level D PPE consists of anti-C protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hardhat, or safety glasses.
- Level B PPE is required (1) inside the interior barricaded area around tanks 241-BY-104, -107, -108 and -110 if OVM/NH<sub>3</sub>/N<sub>2</sub>O monitoring is not available, (2) inside the barricades at liquid level reels on tanks 241-BY-102, -104, and -110 OVM/NH<sub>3</sub>/N<sub>2</sub>O is not available.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

## **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health Representative and/or Health Physics technician.

## **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the contamination reduction zone (CRZ)/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For entry into the interior barricaded areas on tanks 241-BY-102, -104, -107, -108 and -110, OVM and NH<sub>3</sub>/N<sub>2</sub>O monitoring are required unless supplied-air respiratory protection is used. In addition to general area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on any BY farm tanks other those listed in the previous paragraph, See the *Tank Farm HASP*, Section 2.9, "Safe Work Practice," and Section 6.0.

Before entry and possibly periodically or continuously during entry into confined spaces, sampling is conducted for oxygen, explosivity, organic vapors, ammonia, HCN, and other hazards specified on work permits. See the confined space entry permit for requirements.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches on tanks 241-BY-102, -104, and -110, and for workers performing intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. There are five area radiation detectors in BY farm. The nearest continuous air monitor for airborne radiological monitoring is located north of BX/BY farms at the intersection of 12th and Baltimore.

Any task-based monitoring requirements in addition to those specified above are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## **VII. DECONTAMINATION PROCEDURES**

Currently at BY farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **VIII. EMERGENCY RESPONSE**

This section summarizes emergency information specific to BY farm. For additional information regarding emergency response, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at B farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 244-BX receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 244-BX Building
- The 244-BX vessel vent exhauster
- Air sampling and stack monitor
- Instrument process air.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of BY farm be required, personnel should assemble either at the 200 East Area Tank Farm staging area on the south side of the parking lot below AP farm located at Canton Avenue just above First Street, or at an alternate location upwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT BY FARM**

The BY Tank Farm Fire Plan is posted on the wall of the change trailer. The following equipment is available:

- First aid and bloodborne pathogen kits
- Cardiopulmonary resuscitation (CPR) microshield (located on the wall near the main entrance of the change trailer)
- Wind sock (located just outside the change trailer)
- Panic button and fire alarm (located just outside the 244-BX Control Room; yellow flashing light indicates that tank pumps are operating)
- Two self-contained breathing apparatuses (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

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Table J-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-BY	LLW-B	Active	Piping	Water service pit	Metal cover/3 ft dia. open x 3 ft deep	Y	Hinged lid	NP F. Zak	Outside fence, SE corner
241-BY		Active		Pit	Cover block	N		P F. Zak	South of pit 101-BY
241-BY	101-BY thru 112-BY	Active		Saltwell pump pit	Cover block	N		P F. Zak	
241-BY	105-BY	Active	Water pipe	Water line service pit	4 ft dia. open x 5 ft deep	Y		NP F. Zak	~15 ft W of evaporator steps
241-BY	106-BY	Active	Pipe/valves	Steam line trap pit	Metal cover/3 ft dia. open x 4 ft 7 in. deep	Y		P F. Zak	NE corner of BY farm. Pit cover is damaged and should be replaced.
241-BY		Active		Evaporator pit		N		P F. Zak	Above ground
241-BY		Active		WFT caisson	Steel cover block	N		P F. Zak	NW corner in 112-BY area
241-BY		Active	Piping	Steam trap pit	Metal cover/5 ft dia. open x 8 ft deep	Y		P F. Zak	SE corner of 107-BY

## J-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 2/15/95

1 PAGE

DATE OF REPORT: 3/8/95

IS AND IH REPRESENTATIVES: ED PONN/FRED ZAK/  
ROGER MITCHELL

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 241-BY

OTHER EMPLOYEES: STACE BAKER    LISA HARTLEY

J-15

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
All	Deteriorating/damaged asbestos	Abatement	Y	.1001	AIId	2B
ENRAFS	Wiring installation creates tripping hazards	Install per NEC	Y	.303 .22	BIIq	2A
All	Electrical cords/cables damaged, improper use and distribution	Repair/replace/protect	Y	.303 .22	BIIq	1A
BY-107/110	Open shed with open/unsecured electrical panels	Close and secure panel and door	Y	.303	BIIq	1A
	Improper storage of ladders and scaffolds	Remove and store/housekeeping	Y	.26/.28	BIIm	3A
BY-254	Damaged portable light stand not tagged out of service open electrical panels/exposed wire blocked egress inner door with damaged crash bar MCC panel inaccessible/door damaged	Tag out and dispose or repair secure panels remove obstructions repair or replace repair or replace	Y	.303 .137 .36	BIIq	2A
BY-254	Lead-lined hallway displays signs of oxidation with possible exposure to airborne particulate	Reseal and protect surfaces	Y		AIIC	1C
CBHBY						

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**APPENDIX K**

**HEALTH AND SAFETY PLAN  
FOR THE C TANK FARM**

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## APPENDIX K

### HEALTH AND SAFETY PLAN FOR THE C TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. DESCRIPTION

The C farm contains 12 single-shell tanks, numbered 241-C-101 through -112, with a capacity of 1,892,706 L (500,000 gal) each. The tanks are arranged in a cascade fashion (flow arrangement) with four cascades of three tanks each. Also present are four smaller tanks, numbered 241-C-201 through -204, with volumes of 208,198 L (55,000 gal) each. Tanks 241-C-108, -109, -111, and -112 are on the Ferrocyanide Watch List and therefore have a possible, although unlikely, hydrogen cyanide (HCN) occupational exposure potential. Ferrocyanide serves as a scavenger of radiocesium and other soluble radionuclides and as such was added to tanks to reduce the volume of radioactively contaminated liquids in the tanks. In the presence of oxidizing agents such as nitrates/nitrites and high temperatures(> 285°C), ferrocyanides have the potential to explode. Additionally, under special conditions such as high radiation and pH < 10.5, ferrocyanide may be converted to HCN. Other tanks cascade with the four Ferrocyanide Watch List tanks and therefore also have a possible, but even less likely, HCN exposure potential. Tanks 241-C-102 and -103 have been placed on the Organic Watch List and also have been restricted because of a common breather arrangement. Tank 241-C-106 is included on the High-Heat Watch List.

Passive ventilation is used on all tanks in C farm except for High-Heat Watch List tanks 241-C-105 and -106 which have active ventilation.

All C farm tanks contain high-level radioactive waste and various chemical constituents. In addition to the tanks, a double-contained receiver tank (241-C-244) is present in C farm, serving the farm for saltwell pumping activities. The C farm is classified as a surface contamination area (SCA) (radiological contamination).

Tank 241-C-110 may be leaking and therefore poses a hazard for any subsurface activities because of radiological and chemical agents. Controlled areas are established for both radiological and chemical hazards.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-822) and adjacent gate located at the southwest corner of C farm along 7th Street. Personnel enter and exit the farm through the support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate adjacent to the trailer.

## **C. WIND INDICATION**

Wind socks located at the southwest and northeast corners of C farm indicate wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Facility manager: 373-0132

Shift manager: 373-2689

Site safety representative or officer: TWRS Industrial Hygiene and Safety: 372-3242

East Area TWRS IH&S satellite office: 373-7200

Health Physics supervisor: 373-2973

Emergency point-of-contact: Call shift manager 373-2689 and 911

## **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm Health and Safety Plan (HASP)*, Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by Industrial Hygiene Services.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Ferrocyanide

Ferrocyanide Watch List tanks include 241-C-108, -109, -111 and -112. The possible, but as yet unconfirmed hazard, is exposure to HCN gas. To date, no detectable HCN exposures or area concentrations have been found. Removal of the HCN controls is under consideration. Nevertheless, exposure control requirements to protect against possible exposures are currently in place.

##### 2. Vapor/Gas

Venting of various vapors/gases to the atmosphere from sources other than the breather filter on tanks 241-C-102 and -103 has been documented. Possible gas/vapor constituents include organic vapors such as petroleum hydrocarbons and inorganic gases/vapors such as ammonia. However, vapor/gas constituents of the tanks have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. Elevated area/source concentrations are normally localized to the proximity of the breather filter vent. Tank 241-C-102 and -103 are venting vapor/gas at locations (pits) adjacent to the filters. Controls around vapor/gas sources include:

- Vapor/gas venting from breather filters and other locations around 241-C-102 and -103 make it necessary to use supplied air and barricades when working on these tanks.
- Vapor/gas venting within the farm makes OVM/NH<sub>3</sub> monitoring a requirement in 241-C-101, C-104, C-105, C-106. If monitoring is not available, supplied air must be used.

To date, all personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

### **3. High Heat**

High-heat emitting tank 241-C-106 has heat loading > 40,000 Btu/hour. High-heat tanks have the potential to release high-level nuclear waste because of the overheating and structural degradation of the waste tank concrete. Tank 241-C-106 requires more than active ventilation to keep the temperature below the 148.9 °C (300 °F) limit. Water is added periodically to maintain a liquid cover (supernate) over the sludge for enhanced thermal conductivity and evaporative cooling.

### **4. High-Level Radioactive Waste**

All C farm tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

### **5. Surface Contamination**

The entire C farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP) and the ALARA (as low as reasonably achievable) Management Worksheets.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present in C tank farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

### **2. Chemicals**

No specific chemicals are used on C farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

A listing of confined spaces for C Tank Farm can be found in Table K-1 of this appendix. See Section 10.0 of HASP.

### **4. Asbestos**

Warning signs at C farm alert workers that asbestos materials are present. Asbestos can be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

## **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permit(s) developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to C farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on all C farm tanks. These tasks must be conducted in accordance with the *Tank Farm HASP*, Section 2.9, "Safe Work Practice."

## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for C tank farm are shown on Figure K-1 and are listed below.

#### 1. Perimeter Exclusion Zone

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

#### 2. Interior Exclusion Zones

Supplied air is a requirement for the interior exclusion zone comprised of tanks 241-C-102 and -103.

In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

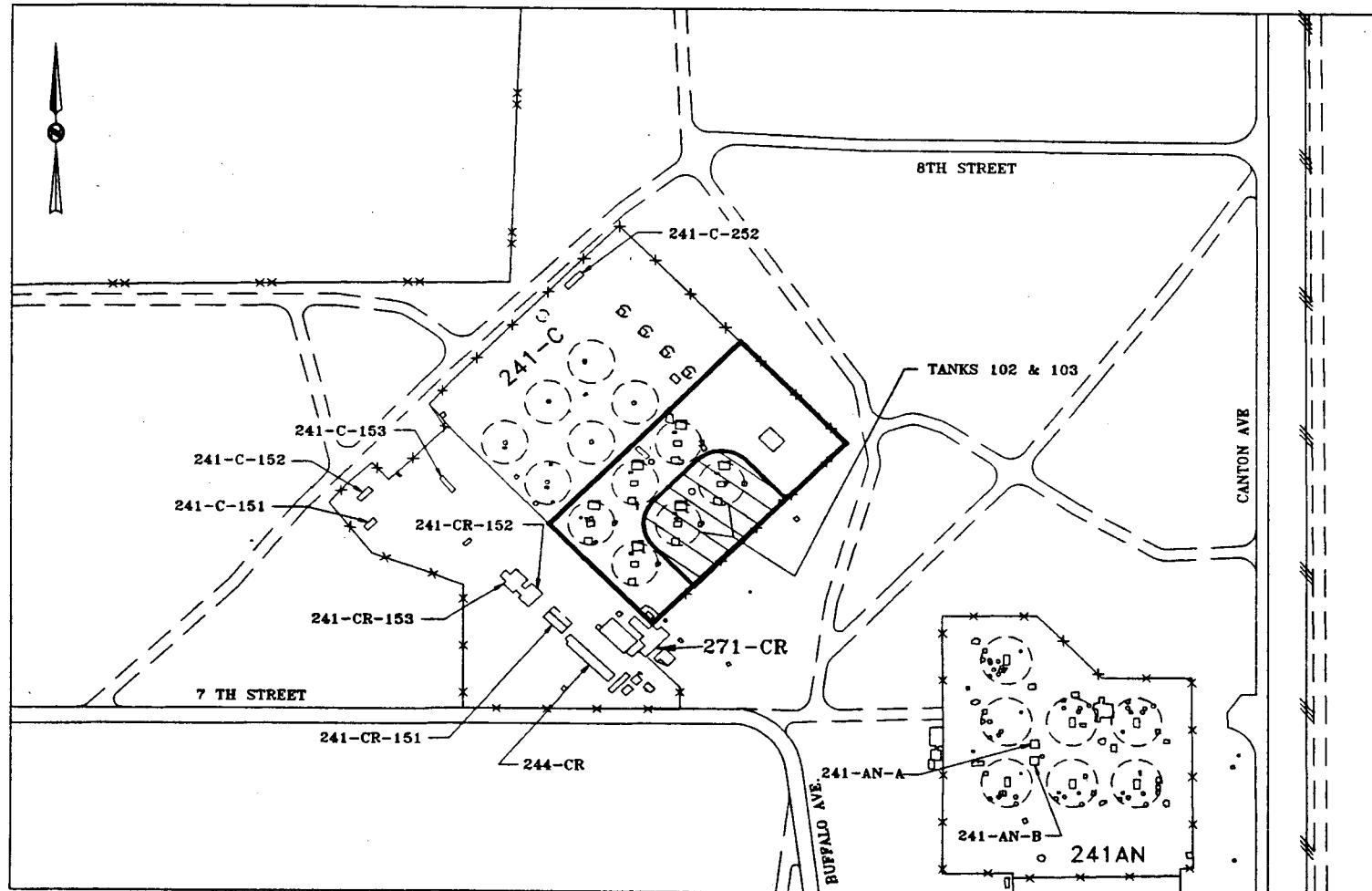
#### 3. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 6.1 m (20 ft) into the tank farm (see Figure K-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff personal protective equipment (PPE), scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at C farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

Figure K-1. C Tank Farm Site Plan.

K-9



SUPPLIED AIR RESPIRATORY PROTECTION ZONE

PERSONNEL MONITORING OR RESPIRATORY PROTECTION ZONE

241-AN/241-C

SWP-REV 13

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

NOTE: THIS MAP IS TO BE USED FOR  
REFERENCE PURPOSES ONLY.

Westinghouse Hanford Co.  
TWRS IH&S

CADFILE: 241CCOMP  
DATE: 2-03-95

CUSTOMER: DAVID CARLS  
DRAWN BY: NICK BARILO

TITLE: 241-AN/C TANKFARM COMPLEX  
RESPIRATORY MONITORING

#### **4. Support Zone**

The support zone consists of the portion of the trailer outside the RBA/URMA and also the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

#### **B. ACCESS CONTROL**

Access to C tank farm is to occur only through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 East Area shift operations manager.

#### **C. COMMUNICATIONS/BUDDY SYSTEM**

No specific communications or buddy system requirements have been identified for C farm beyond those specified in the *Tank Farm HASP*, Section 8.0. Any task-based requirements will be shown on task-based permits or work packages.

### **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

#### **A. EXCLUSION ZONES**

Two levels of PPE are required in C farm:

- Level D PPE is required inside the C farm fenceline to the barricaded sections around specific tanks (not included as part of the exclusion zone). Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves must be taped to coveralls to seal seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hard hat, or safety glasses.
- Level B PPE is required inside interior barricaded areas, at tanks 241-C-102 and C-103. All other tanks in C farm require central OVM/NH<sub>3</sub> monitoring. Level B PPE consists of the same protective clothing/equipment as Level D, plus headcover and supplied-air respiratory protection with a 5-minute escape bottle.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

## **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

## **C. TASK-SPECIFIC HAZARDS**

For specific tasks, PPE requirements are to be listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the contamination reduction zone (CRZ)/CRC, inside the fenceline or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For entry into the interior barricaded areas around C farm tanks, OVM/NH<sub>3</sub> monitoring or supplied-air respiratory protection is required. In addition to general area monitoring within the barricades, OVM/NH<sub>3</sub> monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources unless supplied air is being worn.

For any containment breach on C farm tanks, OVM/NH<sub>3</sub> monitoring is required even though supplied-air respirators must be used. In addition to other area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

Before entry and possibly periodically or continuously during entry into confined spaces, sampling is conducted for oxygen, explosivity, organic vapors, ammonia, HCN, and other hazards specified on work permits. See confined space entry permit for requirements.

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. There are five area radiation detectors in C farm. The nearest continuous air monitor for airborne radiological monitoring is located at the southeast fenceline of C farm.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## **VII. DECONTAMINATION PROCEDURES**

Currently at C farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **VIII. EMERGENCY RESPONSE**

This section summarizes emergency information specific to C farm. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992) and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the C farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 244-C receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 271-CR Building
- The 244-C vessel vent exhausted
- Air sampling and stack monitor
- Instrument process air.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of C farm be required, personnel should assemble either at the 200 East Area Tank Farm staging area, or at an alternate location upwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT C FARM**

The C Tank Farm Fire Plan is posted on the wall of the change trailer.

The following equipment is available:

- First aid and bloodborne pathogens kits
- Cardiopulmonary resuscitation (CPR) microshield (located on the wall near the main entrance of the change trailer)
- Wind sock (located just outside the change trailer)
- Two self-contained breathing apparatuses (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table K-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-C	102-C 103-C	Active		Saltwell pump pit	Cover block	N		P F. Zak	
241-C	107-C 110-C 112-C	Active		Saltwell pump pit	Cover block	N		P F. Zak	
241-C	107-C	Active	Heater/ water line	LLW-A	Metal cover	Y	Hinged lid	P F. Zak	Fixed ladder/8 ft x 4 ft dia. opening
241-C	107-C	Active	Water lines	Service pit	Metal cover	Y	Hinged lid	P F. Zak	NW of 107-C saltwell pump pit 6 ft x 5 ft dia. opening/note: change label (reads: 241-AN service pit)
241-C	107-C	Active	Heater/ water line	LLW-B	Metal cover	Y	Hinged lid	P F. Zak	Fixed ladder/W of 107-C saltwell pump pit/8 ft x 4 ft dia. opening
241-C	CR Vault	Active		Receiver tanks	Cover block/metal cover	N		P F. Zak	HI radiation safety concerns/SW end behind 271CR control bldg.
		Active		Exhauster filter pit	Cover block	N		P F. Zak	South of CR vaults
		Active		Old filter pit	Cover block	N		P F. Zak	10 ft E of new filter pit
		Active		Exhauster pit	Metal cover	N		P F. Zak	18 ft S of old filter pit
		Active		Valve pit	Cover block	N		P F. ZAK	ID as 241-C West of 103-C
241-C	106-C	Active		Pump pit	Cover block	N		P F. ZAK	
241-C		Active		105/106 exhauster pit	Metal cover	Y		P F. Zak	5.5 ft x 4 ft dia. opening

## K-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 2/14/95

1 PAGE

DATE OF REPORT: 3/8/95

IS AND IH REPRESENTATIVES: FRED ZAK/  
ROGER MITCHELL

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 241-C

OTHER EMPLOYEES: DEL SPAULDING

K-15

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
CHNG TRLR	HAZCOM: obsolete HASP/SWP	Provide HASP/SWP	Y	.1200	AIIB	2A
C-105	Tripping: cable and trash accumulated	Housekeeping/remove and dispose	Y	.22	BIIz	4B
C-Vault	Improperly stored scaffolding	Housekeeping/remove and store	Y	.28	BIIz	3B
Portable exhauster	Deteriorating asbestos from outdoor storage	Asbestos abatement or dispose	Y	.1001	AIId	2C
CBHC						

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**APPENDIX L**

**HEALTH AND SAFETY PLAN  
FOR THE S TANK FARM**

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## APPENDIX L

### HEALTH AND SAFETY PLAN FOR THE S TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The S farm contains 12 single-shell tanks with a capacity of 2,839,059 L (750,000 gal) each. The tanks are arranged in a cascade fashion (flow arrangement) with four cascades of three tanks each. The tanks are numbered 241-S-101 through -112. The S farm was built from 1950 to 1951 and the tanks are similar to the original design but are deeper. Tanks 241-S-101 and -104 are interim stabilized. The S Tank Farm originally received salt waste and first-cycle condensate from the Reduction Oxidation (REDOX) plant. They also received 242-S evaporator waste.

Tanks 241-S-102, -111, and -112 are on the Hydrogen/Flammable Gas Watch List because of their potential to contain concentrations of flammable gases that exceed the lower flammability limit. These tanks have a possible, although unlikely, explosive potential. The gases originate from the waste or are generated as a byproduct of the waste. As a result of the potential for explosion, extreme caution must be exercised to avoid any ignition source near the tanks.

241-S-102 has been shown to be a source of organic vapor/ammonia venting to the atmosphere. This tank vents vapor/gas from breather filter and has a confirmed vapor exposure hazard from organics and/or ammonia and possibly other gases/vapors.

Passive ventilation is used on all tanks in the S farm.

All S farm tanks contain high-level radioactive waste and various chemical constituents. The chemical contents include but are not limited to nitrates, nitrites, ammonium fluoride, potassium permanganate, sodium carbonate, acid gases, phosphates, organics, and ammonia. A tank waste characterization program has been developed to provide a more comprehensive evaluation of the tank contents. The S farm is classified as a surface contamination area (SCA) and Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA).

Tank 241-S-104 tank may be leaking and therefore poses a hazard for any subsurface activities because of radiological and chemical agents. Controlled areas are established for both radiological and chemical hazards.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the Shift Managers Office and vehicle gate located at the southwest side of SX farm. Personnel enter and exit the farm through the SX or SY Change Trailers.

## **C. WIND INDICATION**

A wind sock, located at the west edge of S farm, indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Shift manager: 373-3475

Site Safety representative or officer: TWRS IH&S: 372-3242

West Area TWRS-IH&S Satellite Office: 372-1779

Health Physics supervisor: 373-1365 (back shifts use radio)

Emergency point-of-contact: Call shift manager and 911

DACs trailer (SY farm): 373-4850/4250/2630

## **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see Section 1.0 of the HASP. Key responsibilities include:

- Site access controlled by the shift manager
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Hydrogen/Flammable Gas

Hydrogen/Flammable Gas Watch List tanks include 241-S-102, -111, and -112. Explosive potential exists and all safe work practices must be followed.

##### 2. Vapor/Gas

Venting to the atmosphere of various vapors/gases from the breather filter on tank 241-S-102 has been documented. Possible gas/vapor constituents include organic vapors such as petroleum hydrocarbons and inorganic gases/vapors such as ammonia. However, vapor/gas constituents of the tanks have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. Elevated area/source concentrations are localized to the proximity of the breather filter vent. Controls around breather filter sources include the use of Level B PPE (supplied-air respirator) for any containment breaches.

To date, all personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

##### 3. High-Level Radioactive Waste

All S farm tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

##### 4. Surface Contamination

The entire S tank farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and an RBA/URMA. Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP) and the

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ALARA (as low as reasonably achievable) Management Worksheets.  
Reference the current Radiation Maps posted in the Change Trailers.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present on S farm. There is a high-noise source on the south side of 242-S. The heating, ventilation, and air-conditioning system runs at 89.4 dB. Hearing protection is required working around this source and should be specified in work packages or permits to control intermittent noise sources. This is also required for any equipment brought into the farm that may generate a high-noise environment.

### **2. Chemicals**

No specific chemicals are used on S farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

Table L-1 lists confined spaces for S farm. These spaces are labelled in the tank farm, and include such areas as utility vaults, flush and valve pits, and saltwells. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII and also the *Tank Farm HASP*, Section 10.0, for more information.

### **4. Asbestos**

Warning signs at S farm alert workers that asbestos materials are present. Asbestos can be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

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### **5. Lighting**

The illumination of the farm in the evening and night shifts has been determined to be well below the recommended levels. Adequate lighting shall be provided to workers when working in low light situations.

## **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to S tank farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on tank 241-S-102 must be conducted with Level B PPE (supplied-air respirators) to protect against the confirmed vapor hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## **IV. SITE CONTROLS**

### **A. WORK ZONES**

Work zones and controlled areas for S farm are shown on Figure L-1 and are listed below.

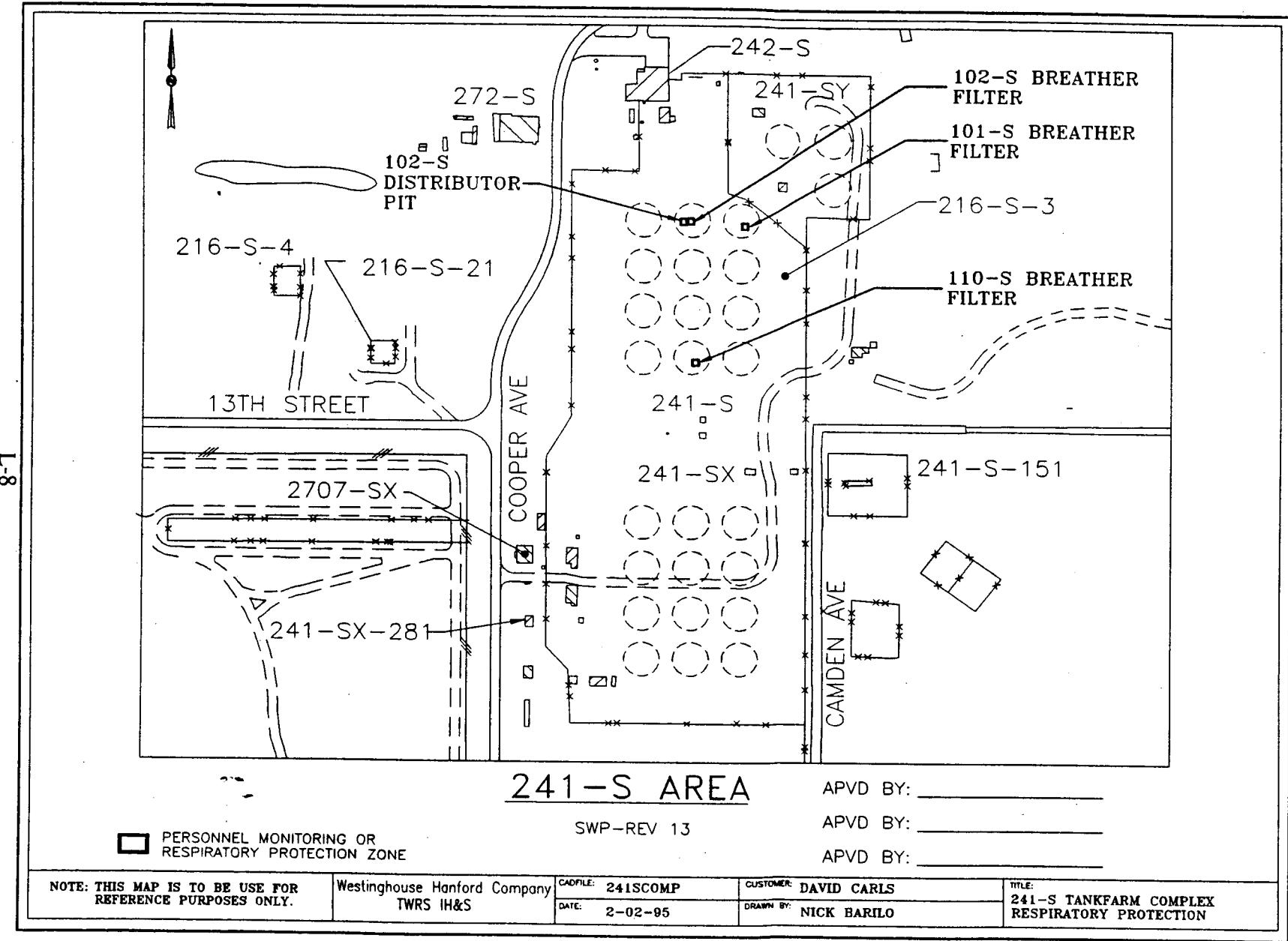
#### **1. Perimeter Exclusion Zones**

A perimeter fenceline has been established and serves as a boundary for both an RBA/URMA and a controlled area for nonradiological hazards.

#### **2. Interior Exclusion Zones**

Interior barricaded exclusion zones have been established around individual areas of high radiation. They include two separately barricaded areas (plywood enclosures) in the "center" of the S farm. These areas are easily identified and entered only with an appropriate work package.

Figure L-1. S Tank Farm Site Plan.



### **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of a corridor along the north and west edges of the SY farm and an area immediately in front of the SX vehicle gate. In the S farm, there is another area which has been designated a satellite accumulation area and used only for the accumulation of waste. There is a gate associated with this area designated for use with a forklift. The personnel line is through the SY farm RBA/URMA and the SY or SX Change Trailers where personal protective equipment (PPE) can be donned and doffed. The necessary scanning for radiological contamination and any necessary decontamination is performed at an approved decontamination station. The vehicle/equipment line is through the SX vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and may be decontaminated, if necessary.

Currently at S farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the contamination reduction corridor (CRC) and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

### **4. Support Zone**

The support zone consists of the portion of the SY or SX Change Trailers outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 West Area Tank Farm safety and health requirements are specified in the support zone.

## **B. ACCESS CONTROL**

Access to S farm is to occur only through the contamination reduction zone (CRZ)/CRC (SY or SX Change Trailer and the SX vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 West Area Tank Farm shift operations manager.

## **C. COMMUNICATIONS/BUDDY SYSTEM**

No specific communications or buddy system requirements have been identified for S farm beyond those specified in the *Tank Farm HASP*, Section 8.0. Any additional requirements are included in task-based permits or work packages.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

### **A. EXCLUSION ZONES**

Vapors have been detected leaking from tanks in S farm. Those areas which have a potential for vapor accumulation should be approached with caution. This would include greenhouses, and other structures such as cabinets located over or near to tank risers. The vapor releases are infrequent and of such a low level that respiratory protection and monitoring are not required.

Personnel are recommended to approach any areas that require opening as though accumulated vapors are present, and to ventilate before entry.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

### **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D protective clothing. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For any containment breach on tanks, see the *Tank Farm HASP*, Section 2.9, Safe Work Practice, and Section 6.0.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

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No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located north of the S and SY farms and east of the SX farm.

Any task-based monitoring requirements in addition to those specified above are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## **VII. CONFINED SPACE ENTRY**

Confined spaces for this tank farm are shown on Table L-1. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## **VIII. DECONTAMINATION PROCEDURES**

Currently at S farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **IX. EMERGENCY RESPONSE**

This section summarizes emergency information specific for S farm. For additional information regarding emergency response, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the S farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 244-S receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 244-S building
- The 244-S vessel vent exhauster

- Air sampling and stack monitor
- Instrument process air.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of S farm be required, personnel should assemble either at the 242-S building on the north side of S farm at the SX change trailer, or at an alternate location upwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT S FARM**

The S Tank Farm Fire Plan is posted on the wall of the change rooms.

The following equipment is available:

- First Aid Kit and Bloodborne Pathogen kit (located on the wall near the main entrance of the change trailer)
- Wind sock (located on the west side of S farm)
- Panic button and fire alarm (located just outside 242-S Control Room; yellow flashing light indicates that tank pumps are operating)
- Two self-contained breathing apparatus (located in the change room)
- Ladder
- Protective clothing (available in the change room)
- Radiological monitoring equipment (located in the change room)
- Fire extinguishers (located in buildings 241-S, 271-S and 242-S).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

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Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	101-01A	Inactive, PI, weather covered	Pump pit	14 ft W x 8 ft L x 5 ft, 9 in. deep	Cover block(s)	N	None	Permit	H-2-46148
241-S	101	Inactive, PI, weather covered	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-21787, H-2-73181
241-S	101	Inactive, PI, weather covered	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	101-01B		Saltwell pump pit			Y	Hinged cover	Permit	
241-S	east of 101-S	Cut, capped & filled	Caisson	8 ft dia	None	Y	None	NA	Cut 12 in. below grade filled w/rock
241-S	102-02A	Inactive, PI, weather covered	Pump pit	7 ft, 6 in. SQ x 7.71 ft deep	Cover block(s)	N	None	Permit	Hydrogen/High Organic Watch List
241-S	102-02B	Inactive, PI	Distributor pit	6 ft W x 7 ft L x 5.75 ft deep	Cover block(s)	N	None	Permit	Hydrogen/High Organic Watch List, H-2-46521
241-S	101-02B	Inactive	Saltwell pump pit	6-ft dia		N	Hinged cover	Permit	H-2-46149

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	102	Inactive,PI	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	Hydrogen/High Organic Watch List, H-2-1787
241-S	102	Inactive,PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	Hydrogen/High Organic Watch List, H-2-1787
241-S	N. of 102-S	Inactive	Flush pit	4 ft dia x 5 ft deep	Cover block(s)	N	None	NA	Filled w/rock
241-S	NW of 102-S	Inactive	Caisson & steam trap	4 ft dia x 5 ft deep	Aluminum plate 4 ft, 4 in. x 3/16 in. deep	Y		Permit	H-2-46194
241-S	SW of 102-S	Inactive	Utility station	4 ft dia x 5 ft deep	Aluminum plate 4 ft, 4 in. x 3/16 in. deep	Y		Permit	H-2-46194
241-S	103-03A	Inactive,PI	Pump pit	14 ft W x 8 ft L x 5 ft, 9 in. deep	Cover block(s)	N	None	Permit	H-2-46148
241-S	103	Inactive,PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	101-03B	Inactive	Saltwell pump pit	6 ft dia		N	Hinged cover	Permit	
241-S	104-04A	Inactive, IS/II	Saltwell pump pit	6 ft dia		N	Hinged cover	Permit	H-2-34961
	104	Inactive, IS/II, weather covered	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
	104	Inactive, IS/II, weather covered	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
	105-05A	Inactive, IS/II	Saltwell pump pit, weather covered	14 ft W x 8 ft L x 5 ft, 9 in. deep		N	Hinged cover?	Permit	H-2-46148
	105	Inactive, IS/II	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	105	Inactive, IS/II	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia. pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	106-06A	Inactive, PI, weather covered	Saltwell pump pit	14 ft W x 8 ft L x 4.7 ft deep		N	Hinged cover?	Permit	H-2-46148
241-S	106	Inactive, PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	107-07A	Inactive, PI, weather covered	Pump pit	14 ft W x 8 ft L x 5 ft, 6 in. deep	Cover block(s)	N	None	Permit	H-2-46148
241-S	107	Inactive, PI	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	107	Inactive, PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	108-08A	Inactive, PI	Pump pit	14 ft W x 8 ft L x 5 ft, 9 in. deep	Cover block(s)	N	None	Permit	H-2-46148
241-S	108	Inactive, PI	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	108	Inactive, PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	NW of 108-S	Inactive	Caisson and steam trap	4 ft dia x 5 ft deep	Aluminum plate 4 ft, 4 in. x 3/16 in. deep	N			H-2-46194
241-S	S of 109-S	Inactive	Utility station	4 ft dia x 5 ft deep	Aluminum plate 4 ft, 4 in. x 3/16 in. deep				H-2-46194
241-S	109-09A	Inactive, PI, weather covered	Pump pit	14 ft W x 8 ft L x 5 ft, 9 in. deep	Cover block(s)	N	None	Permit	H-2-46148
241-S	109	Inactive, PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	110-10A	Inactive, PI, weather covered	Pump pit	14 ft W x 8 ft L x 5 ft, 9 in. deep	Cover block(s)	N	None	Permit	H-2-46148
241-S	110	Inactive, PI	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	110	Inactive, PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	H-2-1787
241-S	SW of 110-S	Inactive	Meter pit		Manhole?				H-2-46192
241-S	SW of 110-S	Inactive, cut & cap	Utility station	4 ft dia. x 5 in. deep	None	N	None	None	Filled with sand
241-S	111-11A	Inactive, PI, weather covered	Pump pit	14 ft W x 8 ft L x 5 ft, 9 in. deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, H-2-3403, H-2-46148
241-S	111	Inactive, PI	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit	Hydrogen Watch List, H-2-1787

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Type of cover	Permit/Not permitted	Comments
241-S	111	Inactive, PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway		Permit	Hydrogen Watch List, H-2-1787
241-S	112-12A	Inactive, PI, weather covered	Pump pit	14 ft W x 8 ft L x 5 ft, 9 in. deep	Cover block(s)	N	None	Permit
241-S	112	Inactive, PI	South condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 12 ft deep open into a 2-ft dia pipe with 90° Bend, ~12 ft L, open to tank	Hatchway	N	Bolted cover	Permit
241-S	151		Diversion box, nozzle pit	6 ft W x 41 ft L x 17.25 ft deep	Cover block(s)	N	None	Permit
241-S	151		Diversion box, jumper storage	6 ft W x 9 ft, 10.5 in. L x 17.25 ft deep	Cover block(s)	N	None	Permit
241-S	151	Active	Diversion box, pipe pit	12 ft, 2 in. W x 42 ft, 4 in. L x 9.75 in. deep	None, underground	N	None	NA
241-S	304	Active	tank/annulus	16 ft dia x D		Y	Ladder	Permit
241-S	304	Active	Pump pit	10 ft, 10 in. SQ. x 8 ft, 9 in. deep	Cover blocks	N	None	Permit
								H-2-46151?

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	S-302-A	Isolated	Catch tank	9 ft dia. x 39 ft, 9.5 in. L	Access Pit 5 ft dia x 5 ft, 3 in. deep	N	Ladder	Permit	H-2-2338-50, H-2-71664, H-2-1796
241-S	301-A	Inactive, abandoned	Catch tank	20 ft dia x 15 ft deep	None	N	None	NA	H-2-1795
241-S	302-B	Inactive	Catch tank	9 ft dia x 33 ft L	None	N	No access pit	NA	H-2-1820, NE of 101-S, drains encasement
241-S	152		Diversion box	6 ft W x 8 ft L x .7 ft deep	Cover block(s)	N	None	Permit	H-2-37318, H-2-2338-62
241-S	A	Active	Valve pit	10 ft W x 12 ft L x 6 ft deep	Cover block(s)	N	None	Permit	H-2-46151
241-S	A	Active	Flush pit	5 ft dia x ~4 ft deep	Hinged cover	N		Permit	H-2-46151
241-S	B	Active	Valve pit	10 ft W x 12 ft L x 6 ft deep	Cover block(s)	N	None	Permit	H-2-46151
241-S	B	Active	Flush pit	5 ft dia x ~4 ft deep	Hinged cover	Y		Permit	H-2-46151
241-S	C	Active	Valve pit	10 ft W x 12 ft L x 6 ft deep	Cover block(s)	N	None	Permit	H-2-46151
241-S	C	Active	Flush pit	5 ft dia x ~4 ft deep	Hinged cover	Y		Permit	H-2-46151
241-S	D	Active	Valve pit	10 ft W x 12 ft L x 6 ft deep	Cover block(s)	N	None	Permit	H-2-46151
241-S	D	Active	Flush pit	5 ft dia x ~4 ft deep	Hinged cover	Y		Permit	H-2-46151
241-S			Service pit		Hinged cover	Y			
241-S			Service pit east of 241-S		Hinged cover	Y			

Table L-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-S	702	Active	Turbine pipe/equip. pit	2.5 ft W x 5 ft, 6 in. L x 5 ft deep	Grating	Y	None		H-2-46268
241-S	244-S	Active	DCRT, pump pit	20 ft SQ X 11 ft deep	Cover block(s)	N	None	Permit	H-2-46151
241-S	244-S	Active	DCRT, flush pit	5 ft dia x 7 ft deep	Metal grating	Y	None	Permit	H-2-46151
241-S	244-S	Active	DCRT, tank vault (annulus)	Caisson 20 ft dia x ~21 ft, 3 in. deep	Coverblocks to first level, metal grate to lower level	N	None	Permit	H-2-46151
244-S	244-S	Active	Filter pit	11 ft SQ x 11 ft deep	Coverblock(s)	Y	Ladder	Permit	H-2-46151

Notes:

PI = Partially Interim Isolated

II = Interim Isolated

IS = Interim Stabilized ~

valve boxes on individual tanks are 18 in. x 22 in. x 40 in. D H-2-1788

**Table L-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/12/95

1 PAGE

DATE OF REPORT: 3/2/95

IS AND IH REPRESENTATIVES: MATTHEW E. NOLEN,  
GARY D. MICKLE, DAVID CARLS

ASSESSMENT NUMBER:

AREA: 200W    FACILITY: S    OTHER EMPLOYEES: INEX AUSTIN

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
2712/2711 Bldg.	Wires of unknown type enter ground.	Determine type of signal/current. Remove if not needed.	Y	1910.303	AIIb	3C
Exhauster (Boarded up)	Old exhauster is boarded up with out any type of hazard notification posted.	Post appropriate hazard signs.	Y	.1200	AIIIb	4D
90 Day Pad	Emergency Equipment: Spill Control Station not secured off of the ground.	Secure unit off of the ground.	Y	.120	AIIIi	2C
	Evening Illumination: The illumination of the farm falls between 0.1 to .9 ft candles. (1 to 9 LUX)	Provide workers with illumination when actions must be performed in low light situations.	Y	.120(m)	BIq	3B

**APPENDIX M**

**HEALTH AND SAFETY PLAN  
FOR THE SX TANK FARM**

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## APPENDIX M

### HEALTH AND SAFETY PLAN FOR THE SX TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The SX farm consists of 15 single shell-tanks with a capacity of 3,785,412 L (1,000,000 gal) each. The tanks are numbered 241-SX-101 through -115. The tanks are ventilated through an underground duct header that connects tanks 241-SX-101 to -106 to -109. Above-ground ducts connect tanks 241-SX-107 to -112 and tank 241-SX-114 to the exhausted unit (296-S-15). Tanks 241-SX-113 and -115 have passive ventilation.

Tanks 241-SX-101, -102, -103, -104, -105, -106, and -109 are on the Hydrogen/Flammable Gas Watch List because of their potential to contain concentrations of flammable gases that exceed the lower flammability limit. These tanks have a possible, although unlikely, explosive potential. The gases originate from the waste or are generated as a byproduct of the waste. As a result of the potential for explosion, extreme caution must be exercised to avoid any ignition source near the tanks.

Tank 241-SX-106 is on the organic watch list. This tank vents vapor/gas to the atmosphere from its breather filter and has a confirmed vapor exposure hazard from organics and/or ammonia and possibly other gases/vapors.

All SX farm tanks contain high-level radioactive waste and various chemical constituents. Other materials may be defined by the waste characterization program. The SX tank farm is classified as a surface contamination area (SCA) (radiological contamination).

Various SX farm tanks may be leaking and therefore pose a hazard for any subsurface activities as a result of radiological and chemical agents.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-819) and adjacent gate located on the west side of SX farm along Cooper Avenue. Personnel enter and exit the farm through the SX or SY support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate along Cooper Avenue adjacent to the trailer.

## **C. WIND INDICATION**

Wind socks are located near the south end of SX farm on the east and west fenceline and also near the north end of SX farm on the west fenceline. These wind socks indicate wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Facility manager: 373-3475

Shift supervisor: 373-3475

Site safety representative or officer: TWRS IH&S at 372-3242

West Area TWRS IH&S Satellite Office: 327-1779

Health Physics supervisor: 373-2557

Emergency point-of-contact: Call shift supervisor and 911

## **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm HASP*, Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by Industrial Hygiene Field Services (IHFS)

### **III. HAZARD EVALUATION AND CONTROLS**

#### **A. TANK CHARACTERISTICS**

##### **1. High-Level Radioactive Waste**

All SX tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

##### **2. Surface Contamination**

The entire SX farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Work sheets.

##### **3. Organic Waste and Oxidizing Agents**

Tank 241-SX-106 is on the Organic Watch List because of the relative high concentration of organic waste and oxidizing agents present in the tank. Under the appropriate conditions, the organic waste materials and oxidizing agents (e.g. sodium nitrate and sodium nitrite) may result in a potentially hazardous exothermic reaction.

#### **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

##### **1. Noise**

No stationary high-noise sources are present at SX farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

## **2. Chemicals**

No specific chemicals are used at SX farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

## **3. Confined Spaces**

Table M-1 lists confined spaces for SX farm. These spaces are labelled in the tank farm, and include such areas as utility vaults, flush and valve pits, and saltwells. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII and also the *Tank Farm HASP*, Section 10.0, for more information.

## **4. Asbestos**

Warning signs at SX farm alert workers that asbestos materials are present. Asbestos can be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

## **5. Lighting**

The illumination of the farm in the evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations must be performed in low light situations.

## **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to SX farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on tanks 241-SX-113 and -115. These tasks must be conducted with Level B personal protective equipment (PPE) (supplied-

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air respirators) to protect against the confirmed vapor hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for SX tank farm are shown on Figure M-1 and are listed below.

#### 1. Perimeter Exclusion Zone

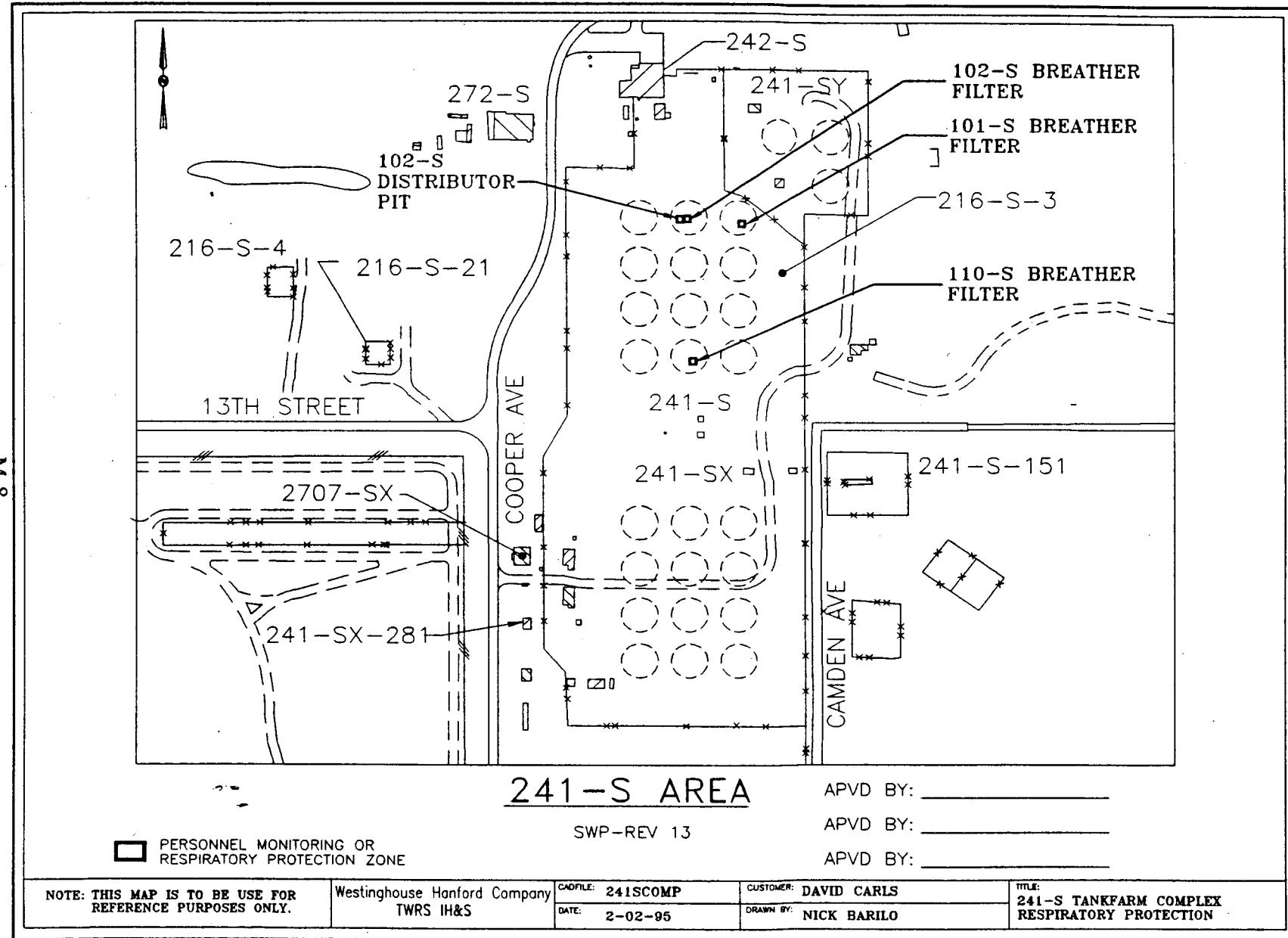
A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

#### 2. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 12.2 m (40 ft) into the tank farm (see Figure M-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at SX farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

Figure M-1. SX Tank Farm Site Plan.



### **3. Support Zone**

The support zone consists of the portion of the trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 West Area Tank Farm safety and health requirements are specified in the support zone.

## **B. ACCESS CONTROL**

Access to SX farm is to occur only thorough the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 West Area Tank Farm shift manager.

## **C. COMMUNICATIONS/BUDDY SYSTEM**

No specific communications or buddy system requirements have been identified for SX farm beyond those specified in the *Tank Farm HASP*, Section 8.0. Any additional requirements are included in task-based permits or work packages.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

### **A. PERIMETER EXCLUSION ZONE**

Level D PPE is required inside the perimeter fenceline. Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe cover, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as head cover, double coveralls, hard hat, or safety glasses.

Required Level B PPE is specified within a 3-m (10 ft) radius of breach of containment when intrusive work (work within the tank dome that penetrates into the waste) is being performed. Level B PPE is also specified when a containment breach is performed on a nonventilated tank (i.e., tanks 241-SX-113 and -115). Level B PPE is not required for containment breaches on ventilated tanks when the work is considered nonintrusive. Level B PPE consists of the same protective clothing/equipment as Level D described above plus head cover and supplied-air respiratory protection with a 5-minute escape bottle.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

### **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional protective clothing such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For any containment breach on any SX tank, organic vapor meter (OVM) monitoring is required even though supplied-air respirators may also be required. In addition to other area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on any SX tanks, see the *Tank Farm HASP*, Section 2.9, Safe Work Practice, and Section 6.0.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing all SX tank containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. Continuous air monitors and samplers monitor the ventilation system.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## VII. CONFINED SPACE ENTRY

Confined spaces for this tank farm are shown on Table M-1. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## VIII. DECONTAMINATION PROCEDURES

Currently at SX farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## IX. EMERGENCY RESPONSE

This section summarizes emergency information specific for SX farm. For additional information regarding emergency response issues, consult the *Tank Farm Facility building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats.

In the event of loss of power to SX farm, a red light and horn will be activated in the 200 West Area Powerhouse.

### A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of SX farm be required, personnel should assemble at the 242-S staging area 61 m (200 ft) west of the 242-S main entrance.

**B. EMERGENCY EQUIPMENT AVAILABLE AT SX FARM**

The SX Tank Farm Fire Plan is posted on the wall of the change trailer. The following equipment is available:

- Panic button and fire alarm (located just outside the SX farm gate on the southeast corner of 2707-SX)
- Two self-contained breathing apparatus (located in the change trailer)
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).
- First Aid and Bloodborne Pathogen Kits

**C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
Between 241-SX and S Service pit	241-SX	Inactive	Water service pit/steam trap	5 ft dia x 5 ft deep	Manhole cover	Y	Fixed ladder	Permit	ENE of 241-SX, H-2-93618, H-2-46192
South of 2707-SX	TK-2901-SX-1	Inactive	Emergency water tanks	24 ft H x 30 ft dia	Manhole w/ cover at top of ladder	Y	Fixed ladder	Permit	H-2-39930, H-2-39934
South of 2707-SX	TK-2901-SX-2	Inactive	Emergency water tanks	24 ft H x 30 ft dia	Manhole w/ cover at top of ladder	Y	Fixed ladder	Permit	H-2-39930, H-2-39934
241-SX	701	Inactive	Compressor house, condensate pit	3 ft W x 4 ft, 8 in. L x 5 ft deep	Wooden cover	Y	Ladder	Non-Permit	H-2-39955
241-SX	101-01A	Inactive, PI, weather covered	West pump pit (saltwell pump pit)	7 ft W x 12 ft, 3 in. L x 6 ft deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, P, RW, P, H-2-46248
241-SX	101	Inactive, PI, weather covered	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	Hydrogen Watch List, H-2-39514, H-2-70609
241-SX	101	Inactive, PI,	Self concentrator	8 ft W x 8 ft L Pad Only	None	NA	None	NA	Hydrogen Watch List, H-2-39599
241-SX	Utility Station	Inactive	Water service pit, Northwest of 101-SX	4 ft dia x 6 ft deep	Manhole cover	Y	Ladder	Permit	H-2-46242, H-2-46194

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	102-02A	Inactive, PI, weather covered	East pump pit	5 ft W x 6 ft, 6 in. L x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, H-2-3403
241-SX	102-02B	Inactive, PI, weather covered	West pump pit (saltwell pump pit)	12 ft, 3 in. W x 7 ft L X 7.5 ft deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, P, RW, P, H-2-46248, H-2-46150
241-SX	102	Inactive, PI, weather covered	North condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514, Hydrogen Watch List
241-SX	Flush pit, between 102 and 103	Inactive	Water flush pit/caisson and trap assy.	4 ft dia x 4 ft deep	Hinged lid	N	None	Non-Permit	H-2-46188/89,
241-SX	103-03A	Inactive, PI, weather covered	Pump pit	5 ft W x 6 ft, 6 in. L x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, H-2-3403
241-SX	103-03B	Inactive	Saltwell pump pit	12 ft, 3 in. W x 7 ft L x 5.2 ft deep	Cover block(s)	N	None	Permit	H-2-46248, H-2-46150
241-SX	103	Inactive, PI,	Distributor pit	5 ft, 8 in. W x 6 ft, 6 in. L x 8 ft, 1 in. deep	Cover block(s)	N	None	Permit	Hydrogen Watch List

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	103	Inactive, PI, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~ 18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514, Hydrogen Watch List
241-SX	Utility Station SE. of 103-SX	Inactive	Water service pit	4 ft dia x 6 ft deep	Manhole cover	Y	Ladder	Non- Permit	H-2-46242, H-2-46194
241-SX	104-04A	Inactive, PI,	Saltwell pump pit	7 ft W x 12 ft, 3 in. L x 5.2 ft deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, H-2-46248, H-2-46150
241-SX	104	Inactive, PI, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~ 18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	Hydrogen Watch List, H-2-39514
241-SX	105-05A	Inactive, PI,	Sting tank pump pit (saltwell pump pit)	5 ft W x 7 ft L x 7.6 ft deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, H-2-3403
241-SX	105-05B	Inactive, PI, weather covered	Distributor pit	5 ft, 8 in. W x 5 in. L x 8 ft, 1 in. deep	Cover block(s)	N	None	Permit	Hydrogen Watch List, H-2-46150
241-SX	105	Inactive, PI, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~ 18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	Hydrogen Watch List, H-2-39514

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	No. 1	Inactive	Lateral caisson (105/107-S X)	12 ft dia x 66 ft deep	Manhole cover	Y	Fixed ladder that stops 12 ft from bottom	Permit	Landing platforms made of pipe supports spaced ~22 ft apart
241-SX	106-06A	Inactive, PI,	Central pump pit (saltwell pump pit)	7 ft W x 12 ft, 3 in. L x 5.25 ft deep	Cover block(s)	N	None	Permit	Hydrogen/High Organic Watch List, H-2-46248, H-2-46150
241-SX	106	Inactive, PI, weather covered	Condensate pump pit	4 ft W x 9 ft, 2.5 in. L x 4 ft deep	Cover block(s)	N	None	Permit	Hydrogen/High Organic Watch List, H-2-39588
241-SX	106	Inactive, PI, weather covered	Condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 9 ft deep w/ ~ 18 in. pipe w/90 deg bend halfway 11 ft L direct to tank	Hatchway	N	Bolted cover	Permit	Hydrogen/High Organic Watch List, H-2-39514
241-SX	NW of 106	Inactive	Filter and stack	7.5 ft W x 7.5 ft L x 10 ft, 9 in. D	Cover block	N	None	Permit	H-2-39949
241-SX	106	Inactive	401 Inst. valve pit	5 ft W x 7 ft, 3 in. L x 8 ft, 9 in. deep	Cover blocks	Y	Wooden access hatch	Permit	H-2-39578
241-SX	106	Inactive	401 Condensate sampler pit	2 ft, 4 in. W x 4 ft L x 4 ft deep	Cover block	Y	Wooden access hatch	Non- Permit	H-2-39578
241-SX	106	Inactive	401 Drywell	28 in. dia x ~10 ft deep	Wooden cover	N	None	Permit	H-2-39578
241-SX	107	Inactive, IS/II	Instrument bldg pit	Filled w/concrete	None	NA	None	NA	H-2-39956

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	107-07B	Inactive, IS/II, weather covered	East pump pit	Pit has been filled with dirt, had dirt floor.	Cover block(s)	N	None	NA	H-2-3403, H-2-73210
241-SX	107-07A	Inactive, IS/II,	West pump pit	5 ft W x 6 ft, 6 in. L x 8 ft deep	Cover block(s)	N	None	Permit	H-2-3403
241-SX	107	Inactive, IS/II, weather covered	condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~ 18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-SX	108	Inactive, IS/II, weather covered	Instrument bldg.	Filled w/concrete	None	N	None	NA	H-2-39956
241-SX	108-08A	Inactive, IS/II	Pump pit	5 ft W x 6 ft, 6 in. L x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	H-2-3403
241-SX	108	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~ 18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-SX	No. 2	Inactive	Lateral caisson (108/109-S X)	12 ft dia x 66 ft deep	Manhole cover	Y	Fixed ladder that stops 12 ft from bottom	Permit	Landing platforms made of pipe supports spaced ~22 ft apart
241-SX	-108	Inactive	Sludge level caisson, SE of tank	10 ft dia x 24 ft deep	None	N	None	NA	Cut off below grade and filled w/dirt, rocks, H-2-33907, H-2-73211

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	109	Inactive, IS/II	Instrument bldg.	Filled w/concrete	None	N	None	NA	Hydrogen Watch List, H-2-39956
241-SX	109-09A	Inactive, IS/II	Pump pit	5 ft W x 6 ft, 6 in. L x 9 ft deep	Coverblock(s)	N	None	Permit	Hydrogen Watch List, H-2-3403
241-SX	109	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514, Hydrogen Watch List
241-SX	110	Inactive, IS/II	Instrument bldg.	Filled w/concrete	None	N	None	NA	H-2-39956
241-SX	110	Inactive, IS/II	Pump pit	5 ft, W x 6 ft, 6 in. L x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	H-2-3403
241-SX	110	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-S	Water Meter Box, SW of 110-S		Water meter pit	5 ft dia x ~4 ft deep	Manhole cover	N	None	Permit	H-2-46192
241-S	Utility Station S of 110-S	Inactive, abandoned	Water service pit	4 ft dia x 6 ft deep	Manhole cover	N	None	NA	Filled with sand, H-2-93618

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	No. 3	Inactive	Lateral caisson (110/111/113-SX)	12 ft dia x 66 ft deep	Manhole cover	Y	Fixed ladder that stops 12 ft from bottom	Permit	Landing platforms made of pipe supports spaced ~22 ft apart
241-SX	111	Inactive, IS/II	Instrument bldg.	Filled w/concrete	None	N	None	NA	H-2-39956
241-SX	111-11A	Inactive, IS/II, weather covered	Pump pit	5 ft W x 6 ft, 6 in. L x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	H-2-3403
241-SX	111	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-SX	112	Inactive, IS/II	Instrument bldg.	Filled w/concrete	None	N	None	NA	H-2-39956
241-SX	112-12A	Inactive, IS/II, weather covered	Pump pit	5 ft W x 6 ft, 6 in. x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	H-2-3403
241-SX	112	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-SX	112	Inactive	Condensate valve pit	7 ft W x 14 ft, 3 in. L x 6 ft, 6 in. deep	Cover blocks over the 5 ft W x 7 ft, 6 in. Opening	N	None	Permit	H-2-39910

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	No. 4	Inactive	Lateral caisson (112/114/115-SX)	12 ft dia x 66 ft deep	Manhole cover	Y	Fixed ladder that stops 12 ft from bottom	Permit	Landing platforms made of pipe supports spaced ~22 ft apart
241-SX	113	Inactive, IS/II	Air circulator	42 in. Riser	Cover block(s)				
241-SX	113-13A	Inactive, IS/II, weather covered	Pump pit	5 ft W x 6 ft, 6 in. x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	H-2-3403
241-SX	113	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-SX	E of 113	Inactive	Caisson	8 ft dia	None	N	None	NA	Cut off below grade and filled w/dirt, rocks, H-2-73215
241-SX	W of 113	Inactive	Caisson	8 ft dia	None	N	None	NA	Cut off below grade and filled w/dirt, rocks, H-2-73215
241-SX	114	Inactive, IS/II	Instrument bldg.	Filled w/concrete	None	N	None	NA	H-2-39956
241-SX	114-14A	Inactive, IS/II, weather covered	Pump pit	5 ft W x 6 ft, 6 in. L x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	H-2-3403

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	114	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-SX	W of 114	Inactive	Caisson	10 ft dia??	None	N	None	NA	Cut off below grade and filled w/dirt, rocks, H-2-33907??
241-SX	115	Inactive, IS/II	Instrument bldg.	Filled w/concrete	None	N	None	NA	H-2-39956
241-SX	115-15A	Inactive, IS/II, weather covered	Pump pit	5 ft W x 6 ft, 6 in. L x 9 ft, 3 in. deep	Cover block(s)	N	None	Permit	H-2-3403
241-SX	115	Inactive, IS/II, weather covered	Condenser pit	5 ft, 9 in. W x 3 ft, 3 in. L x 9 ft deep w/ ~18 in. Pipe w/90° Bend Halfway 11 ft L Direct to Tank	Hatchway	N	Bolted cover	Permit	H-2-39514
241-SX	W of 115	Inactive	Caisson	10 ft dia??	None	N	None	NA	Cut off below grade and filled w/dirt, rocks, H-2-33907??
241-SX	241-SX-A	Active	Valve pit	10 ft W x 12 ft L x 6 ft deep	Cover block(s)	N	None	Permit	H-2-71639
241-SX	241-SX-A	Active	Flush pit	5 ft dia x ~5 ft deep	Hinged cover	N	None	Non Permit	H-2-71639
241-SX	241-SX-B	Active	Valve pit	10 ft W x 12 ft L x 6 ft deep	Cover block(s)	N	None	Permit	H-2-71639
241-SX	241-SX-B	Active	Flush pit	5 ft dia x ~5 ft deep	Hinged cover	N	None	Non Permit	H-2-71639

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	241-SX-1 51	Isolated, weather covered	Diversion box, nozzle pit	6 ft W x 52 ft L x 18 ft deep	Cover block(s)	N	None	Permit	H-2-2338-50, H-2-39446
241-SX	241-SX-1 51	Isolated, weather covered	Diversion box, jumper storage pit	6 ft W x 12 ft L x 18 ft deep	Cover block(s)	N	None	Permit	H-2-2338-50, H-2-39446
241-SX	241-SX-1 51	Isolated, weather covered	Diversion box, pipe pit	39 ft, 6 in. L x 5 ft, 6 in. W X 6 ft, 3 in. deep	None, underground	N	None	NA	H-2-2338-50, H-2-39546
241-SX	241-SX-1 52	Isolated, weather covered	Diversion box	10 ft W x 18 ft L x 12 ft deep	Cover block(s)	N	None	Permit	H-2-3404, H-2-2338-53
241-SX	241-SX-3 04	Isolated	Catch tank (1961)	9 ft dia x 40 ft L	None	N	None	NA	Referenced in 1961 catch tank document, now SD-RE-TI-057
241-SX	302	Inactive, abandoned	Catch tank (1953)	9 ft dia x 35 ft, Access pit 5 ft dia x 5 ft, 3 in. deep	Hinged cover	Y	Ladder	Permit	H-2-39537, H-2-71653, H-2-2338-53
241-SX			Pump house						
241-SX	SE of 113-SX	Inactive	Caisson	8 ft dia					
241-SX	401	Inactive	Condenser bldg.	31 ft W x 19 ft L x 24 ft deep	Stairwell and landing	Y	Stairwell	Non Permit	H-2-39580
241-SX	401	Inactive	Inst. xmtr pit	4 ft W x 7 ft, 10 in. L x 7 ft, 4 in. deep	Metal covered wooden cover	N	None	Permit	H-2-39583
241-SX	401	Inactive	Condensate sampler pit	3 ft W x 3 ft, 8 in. L x 4 ft deep	Metal covered wooden cover	N	None	Non- Permit	H-2-39583

Table M-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SX	-401	Inactive	Valve pit	4 ft W x 6 ft L x ~5 ft deep	Metal covered wooden cover	N	None	Permit	H-2-39583
241-SX	402	Inactive	Condenser bldg.	31 ft W x 19 ft L x 24 ft, 6 in. deep	Stairwell and landing	Y	Stairwell	Non Permit	H-2-39915
241-SX	402	Inactive	Inst. xmtr pit	4 ft W x 7 ft, 10 in. L x 7 ft, 4 in. deep	Metal covered wooden cover	N	None	Permit	H-2-39915
241-SX	402	Inactive	Condensate sampler pit	3 ft W x 3 ft, 8 in. L x 4 ft deep	Metal covered wooden cover	N	None	Non- Permit	H-2-39915
241-SX	-402	Inactive	Valve pit	4 ft W x 12 ft, 8 in. L x ~5 ft deep	Metal covered wooden cover	N	None	Permit	H-2-39915
241-SX	SE of 402	Inactive	Valve pit	7 ft, 6 in. W x 9 ft L x ~15 ft deep	Metal covered wooden cover	Y	2 ft, 6 in. W x 3 ft L Hatchway and Ladder	Permit	H-2-39948, H-2-39952

PI = Partially Interim Isolated

II = Interim Isolated

IS = Interim Stabilized

COB (clean out boxes) have not been included they are 2 ft, 7-1/2 in. W x ~3.9 ft deep.

**Table M-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/12/95

4 PAGE

DATE OF REPORT: 3/2/95 IS AND IH REPRESENTATIVES: MATTHEW E. NOLEN,  
GARY D. MICKLE, DAVID CARLS

ASSESSMENT NUMBER:

AREA: 200W    FACILITY: SX    OTHER EMPLOYEES: INEX AUSTIN

M-24

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Vent. Equipment	Storage: Scaffolding improperly made/maintained. Several sections adrift.	Remove improper scaffolding, secure those that are improperly placed/stored. Hang correct tags.	Y	1910. .28	BIIm	3B
115 Inst Bldg	Storage: Ladders (2) improperly stored.	Store ladders in approved manner.	Y	.25 and .26	AIIG	3B
115 Inst Bldg	Storage: Four 5-Gallon buckets improperly stored in building.	Remove unnecessary waste from farm.	Y	.120	AIIO	4D
111 Inst Bldg	Storage: Radiation Labeled Waste left in building.	Dispose of waste properly.	Y	.120	BIIi	3B
Buildings Adjacent to S-115	Electrical: Old electrical heaters with cardboard plug covers.	Remove units from farm.	Y	.305 .306	BIIq	2A
114 Inst Bldg	Electrical: Old electrical heaters with cardboard plug covers.	Remove units from farm.	Y	.303	BIIq	2A
110 Inst Bldg	Electrical: Old electrical heaters with cardboard plug covers.	Remove units from farm.	Y	.303	BIIq	2A

**Table M-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/12/95

4 PAGE

DATE OF REPORT: 3/2/95 IS AND IH REPRESENTATIVES: MATTHEW E. NOLEN,  
GARY D. MICKLE, DAVID CARLS

ASSESSMENT NUMBER:

AREA: 200W FACILITY: SX OTHER EMPLOYEES: INEX AUSTIN

M-25

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
107 Inst Bldg	Electrical: Old electrical heaters with cardboard plug covers.	Remove units from farm.	Y	.303	BIIq	2A
105 Inst Bldg	Electrical: Electrical cord plugged into socket, routed through a ragged hole in metal wall (very sharp edges) connected to nothing. Energized and not in use.	Disconnect and reroute when needed for actual use.	Y	.303	BIIq	2A
108 Inst Bldg	Electrical: Bare wiring of unknown type.	Determine need and update or remove.	Y	.303	BIIq	3B
108 Inst Bldg	Electrical: Open electrical light socket.	Fill open socket with bulb or blank or remove.	Y	.303	BIIq	3B
North East corner of SX Farm	Electrical and Tripping: Post with wires in traffic route. No apparent use.		Y	.22 - .30	BIIk	4C
North East corner of SX Farm	Tripping: Pad with bolts sticking out.	Remove bolts and/or pad.	Y	.22 - .30	BIIk	4C

**Table M-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/12/95

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DATE OF REPORT: 3/2/95 IS AND IH REPRESENTATIVES: MATTHEW E. NOLEN,  
GARY D. MICKLE, DAVID CARLS

ASSESSMENT NUMBER:

AREA: 200W FACILITY: SX OTHER EMPLOYEES: INEX AUSTIN

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Between SX-115 and -114	Tripping: Bent pipe protruding from ground. No apparent use.		Y	.22 - .30	BIIk	4C
Adjacent to SX-115 (Excavations in several places in farm)	Tripping: Excavations not barricaded or covered.	Fill in or barricade and cover.	Y	.22 - .30	BIIk	4C
111 Pump Pit	Misc: Cover sealant/paint flaking/damaged.	Repaint/repair cover sealant.	Y	.120 and .1001	AIIx	4D
108 Inst Bldg	Misc: Door will not open.	Repair Door.	Y		BIIaa	4C
North East corner of SX Farm	Fire: Building adjacent to Gantry Crane a moderate fire hazard.	Remove building.	Y	DOE	BIn	3B
North East Corner of SX Farm	Asbestos: Transite siding damaged.	Remove or seal siding. Remove building.	Y	.1001	AIId	2D

**Table M-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/12/95

4 PAGE

DATE OF REPORT: 3/2/95 IS AND IH REPRESENTATIVES: MATTHEW E. NOLEN,  
GARY D. MICKLE, DAVID CARLS

ASSESSMENT NUMBER:

AREA: 200W FACILITY: SX OTHER EMPLOYEES: INEX AUSTIN

M-27

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Exhauster	Fire and Unknown: Boarded up Exhauster.	Moderate fire hazard from wood, Unknown hazards due to lack of signage.	Y	.DOE	BIn	3B
	Evening Tripping and working hazards: Lighting in farm ranges from 0.0 to 1.9 Foot Candles. (0.0 to 19 LUX)	Illuminate Farm or provide workers with illumination while working in subdued lighting situations.		.120(m)	AIi	3C
Saltwell Pump and Valve Pits (multiple)	Vapor Release: Metal tape cracked allowing the possibility of vapor leaks.	Seal or replace tape.	Y	.120	AIIX	
AS-V-3423 Steam Valve	Asbestos: Lagging damaged.	Seal lagging or remove asbestos material.	Y	.1001	ALLd	2D

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**APPENDIX N**

**HEALTH AND SAFETY PLAN  
FOR THE SY TANK FARM**

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## APPENDIX N

### HEALTH AND SAFETY PLAN FOR THE SY TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The SY farm contains three double-shell tanks with a capacity of 3,785,412 L (1,000,000 gal) each. The tanks are all separate (flow arrangement) and are numbered 241-SY-101 through -103. The tanks were originally built from 1974 to 1977. They are similar in design to the 200 East Area double-shell tanks. Tanks 241-SY-101 and -103 are on the Hydrogen/Flammable Gas Watch List and therefore have a possible, although unlikely explosive potential. Ventilation used on SY farm is provided by primary (K1) and secondary (K2) annulus systems.

All SY tanks contain high-level radioactive waste and various chemical constituents. The SY farm is classified as a surface contamination area (SCA) (radiological contamination).

Controlled areas are established for both radiological and chemical hazards.

##### B. PERIMETER AND SUPPORT FACILITIES

The perimeter is secured by a chain-link fence with access controlled through the SY Change Trailer and a vehicle gate located at the southwest corner of SX farm. Personnel enter and exit the farm through the SY Change Trailer. Equipment such as motorized vehicles enter and exit the farm through the SX vehicle gate.

##### C. WIND INDICATION

A wind sock, located on the DACs trailer, indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Shift manager: 373-3475

Site safety representative or officer: Tank Waste Remediation System-Industrial Health and Safety (TWRS IH&S) at 372-3242

West Area TWRS IH&S Satellite Office: 372-1779

Health Physics supervisor: 373-1365 (Back shifts make radio call)

Emergency point-of-contact: Call shift manager and 911

### B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm Health and Safety Plan* (HASP), Section 1.0. Key responsibilities include:

- Site access controlled by the shift manager
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

## III. HAZARD EVALUATION AND CONTROLS

### A. TANK CHARACTERISTICS

#### 1. Hydrogen/Flammable Gas

Hydrogen/Flammable Gas Watch List tanks include 241-SY-101 and -103. Explosive potential exists and all safe work practices must be followed.

## **2. High-Level Radioactive Waste**

All SY tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

## **3. Surface Contamination**

The entire SY farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA, a radiation area (RA), and as a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, in the Radiation Work Procedures (RWP) and the ALARA (as low as reasonably achievable) Management Worksheets.

# **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

## **1. Noise**

Two stationary high-noise sources are present on SY farm (1) the air compressor outside the DACs trailer (98.8 dB), and (2) the heating, ventilation, and air-conditioning system (89.4 dB) behind the 242-S building. Hearing protection is only required if working near these sources and should be specified in work packages or permits to control intermittent noise sources. This is also required for any equipment brought into the farm that may generate a high-noise environment.

## **2. Chemicals**

The systems in the SY complex require Nitrogen. There is a Cryogenic Nitrogen Dewar outside the farm. Extreme caution is required when working around this enclosure. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### 3. Confined Spaces

Table N-1 lists confined spaces for SY farm. These spaces are labelled in the tank farm, and include such areas as utility vaults, flush and valve pits. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII and also the *Tank Farm HASP*, Section 10.0, for more information.

### 4. Asbestos

Warning signs at SY farm alert workers that asbestos materials are present. Asbestos can be present in materials such as pipe lagging, wall panels, transit, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

## C. TASK-BASED HAZARDS

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to SY farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers). These tasks must be conducted with Level B personal protective equipment (PPE) (supplied-air respirators) to protect against the confirmed vapor hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for SY tank farm are shown on Figure N-1 and are listed below.

#### 1. Perimeter Exclusion Zone

A perimeter fenceline has been established and serves as both an RBA/URMA outer boundary and a controlled area for nonradiological hazards. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

#### 2. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of a corridor along the east, north, and west edges of the SY farm and an area immediately in front of the SX vehicle gate. There is another area with the RBA/URMA designation located on S farm by the vehicle gate; however, it is a satellite accumulation area and used only as such (used only for removal of materials.) The personnel line is through the SY farm RBA/URMA and the SY Change Trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination at an approved decontamination station. The vehicle/equipment line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and may be decontaminated, if necessary.

Currently at SY farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the contamination reduction corridor (CRC) and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

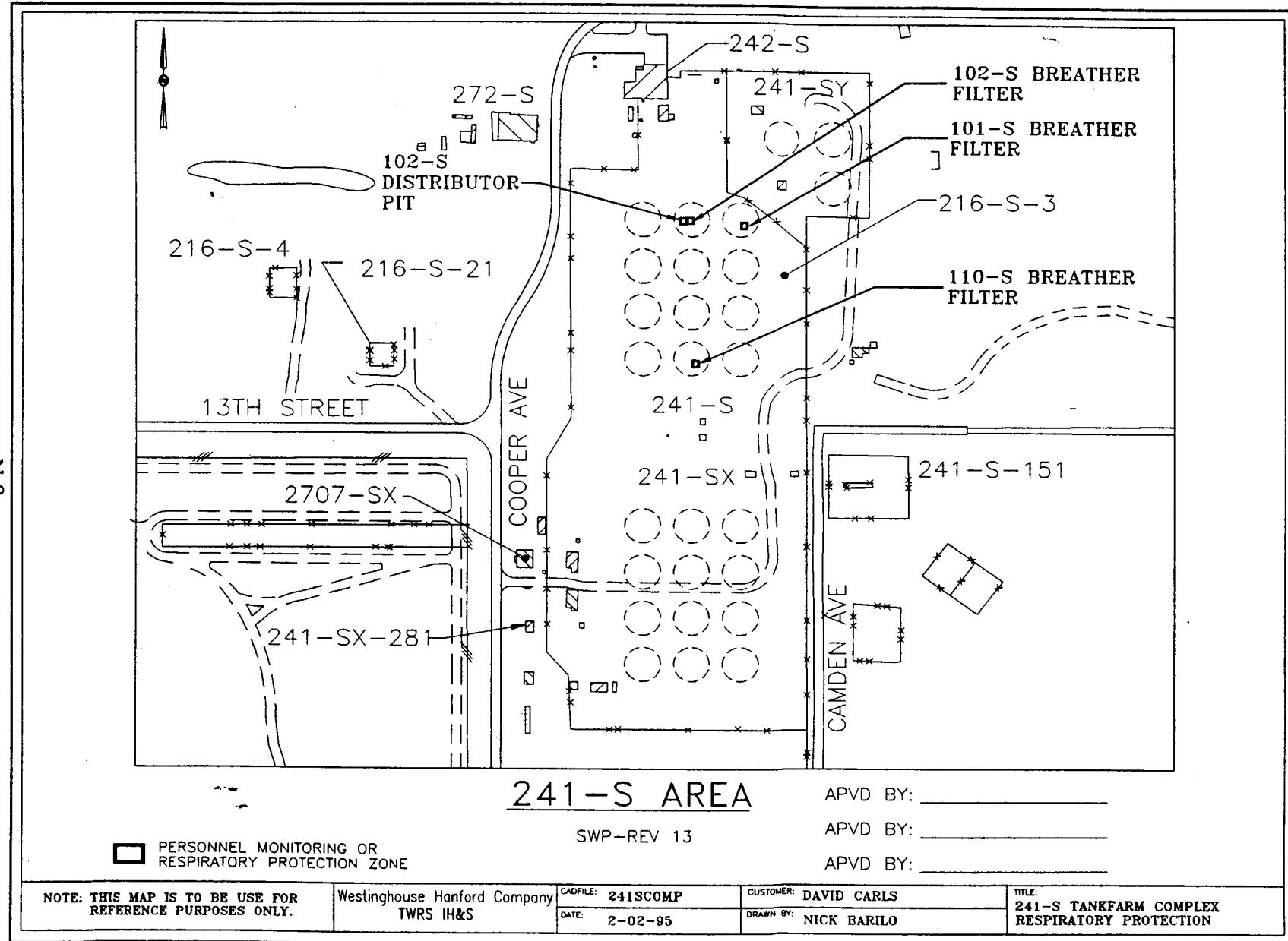
#### 3. Support Zone

The support zone consists of the SY Change Trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 West Area Tank Farm safety and health requirements are specified in the support zone.

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Figure N-1. SY Tank Farm Site Plan.



## B. ACCESS CONTROL

Access to SY farm is to occur only through the contamination reduction zone (CRZ)/CRC (SY and SX change trailers and SX farm vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 West Area Tank Farm shift operations manager.

## C. COMMUNICATIONS/BUDDY SYSTEM

No specific communications or buddy system requirements have been identified for SY farm beyond those specified in the *Tank Farm HASP*, Section 8.0. Any additional requirements are shown on task-based permits or work packages.

## V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

### A. CONTAMINATION REDUCTION ZONE

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D PPE. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### B. TASK-SPECIFIC HAZARDS

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## VI. MONITORING REQUIREMENTS

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

There are several different types of monitor and alarm systems for the SY farm.

- The standard hydrogen monitoring system (SHMS) uses four separate monitors; two located to the south (6 O'Clock position) and two to the southeast (8 O'Clock position). Each monitor has two colored beacons, red and amber, approximately 2.4 m (8 ft) above the surface.
- An area radiation monitor (five are located throughout the area) is located approximately at the center of tank 241-SY-101. This monitor has a single red beacon 3 m (10 ft) above the surface.
- The tank 241-SY-101 mixer pump running light is located approximately on the center of tank 241-SY-101. It has an amber beacon approximately 7.6 m (25 ft) above the surface.
- A high ammonia alarm will be located on the top of the GMS-2 trailer.
- Airborne radiological monitoring and other tank related systems are located at the 242-S building or the DACs trailer north of the SY farm.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## VII. CONFINED SPACE ENTRY

Confined spaces for this tank farm are shown on Table N-1. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## VIII. DECONTAMINATION PROCEDURES

Currently at SY farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## IX. EMERGENCY RESPONSE

This section summarizes emergency information specific to SY farm. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. There is a backup generating facility. However, loss of utilities at the SY farm complex may result in loss of the operating capacity of the equipment.

Equipment not affected by loss of utility power includes the following:

- All exhaust systems
- All sampling systems
- All systems attached to the Exhaust Pad Electrical Panel A.

### A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of SY farm be required, personnel should assemble either at the 242-S building on the northwest side of the SY farm, or at an alternate location upwind.

### B. EMERGENCY EQUIPMENT AVAILABLE AT SY FARM

The SY Tank Farm Fire Plan is posted on the wall of the change room.

The following equipment is available:

- First Aid and Bloodborne Pathogen Kits (located on the wall near the main entrance of the change room)
- Wind sock (located just outside the DACs)
- Fire alarm (located just outside 242-S Control Room; yellow flashing light indicates that tank pumps are operating)
- Two self-contained breathing apparatus (SCBA) (located in the SCBA shack adjacent to the 271-SY Control Room. Note: Four additional SCBAs are located in the DACs trailer)

- Ladders (located in several places on the farm)
- Protective clothing (available in the change room)
- Radiological monitoring equipment (located in the 242-S change room)
- Fire extinguishers are located at buildings 244-S, 241-S, 271-S, and 242-S Evaporator.
- Ammonia Specific Air Purifying Respirators (located in the DACS trailer.)

**C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table N-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SY	01A	Active	8 ft W x 14 ft L x 6 ft, 2 in. D	Pump pit	Cover block(s)	N	None	Permit	H-2-37783-4, Hydrogen watch tank
241-SY	01B	Active	5 ft Sq. x 10 ft D	Annulus pump pit	Cover block(s)	N	None	Permit	H-2-37710, Hydrogen watch tank
241-SY	01C	Active	5 ft Sq. x 10 ft, 7 in. D	Leak detection pit	Cover block(s)	N	None	Permit	H-2-37709, Hydrogen watch tank
241-SY	02A	Active	8 ft W x 14 ft L x 6 ft, 2 in. D	Pump pit	Cover block(s)	N	None	Permit	H-2-37783-4
241-SY	02B	Active	5 ft Sq. x 10 ft D	Annulus pump pit	Cover block(s)	N	None	Permit	H-2-37710
241-SY	02C	Active	5 ft Sq. x 10 ft, 7 in. D	Leak detection pit	Cover block(s)	N	None	Permit	H-2-37709
241-SY	02D	Active	6 ft W x 6 ft L x 8 ft, 9 in. D	Drain pit	Cover block(s)	N	None	Permit	H-2-37713
241-SY	02E	Active	7 ft Sq x 10 ft, 1 in. D	Feed pump pit	Cover block(s)	N	None	Permit	H-2-37717
241-SY	02E	Active	4 ft dia x 8 ft, 7 in. D	Feed pump flush pit	Hinged cover	N	None	Non- Permit	H-2-37812-3
241-SY	03A	Active	8 ft W x 14 ft L x 6 ft, 2 in. D	Pump pit	Cover block(s)	N	None	Permit	H-2-37783-4, Hydrogen watch tank

Table N-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-SY	03B	Active	5 ft Sq. x 10 ft D	Annulus pump pit	Cover block(s)	N	None	Permit	H-2-37710, Hydrogen watch tank
241-SY	03C	Active	5 ft Sq. x 10 ft, 7 in. D	Leak detection pit	Cover block(s)	N	None	Permit	H-2-37709, Hydrogen watch tank
241-SY	SY-A	Active	10 ft W x 12 ft L x 6 ft, 7 in. L	Valve pit	Cover block(s)	N	None	Permit	H-2-37712
241-SY	SY-B	Active	10 ft W x 12 ft L x 6 ft, 7 in. L	Valve pit	Cover block(s)	N	None	Permit	H-2-37712
241-SY	SY-A	Active	5 ft dia x 5 ft, 3 in. D	Flush pit	Hinged cover	N	None	Permit	H-2-37793-2
241-SY	SY-B	Active	5 ft dia x 6 ft, 3 in. D	Flush pit	hinged cover	N	None	Permit	H-2-37793-2
241-SY	N of fence	Active	6 ft dia x 4.1 ft D	Service pit	hinged cover	N	None	Permit	H-2-37778-3
241-SY	Near 271-SY	Active	4 ft dia x ~4 ft D	Steam trap station	hinged cover	N	None	Permit	H-2-37775

PI = Partially Interim Isolated

II = Interim Isolated

IS = Interim Stabilized

## Table N-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 12 December 1995

2 PAGES

DATE OF REPORT: 2 March 95

IS & IH REPRESENTATIVES: Matthew E. Nolen, Gary D. Mickle,  
David R. Carls \_\_\_\_\_

ASSESSMENT NUMBER:

AREA: 200 W FACILITY: SY

OTHER EMPLOYEES: Inez Austin \_\_\_\_\_

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Entire Farm	Tripping: Multiple tripping hazards from cables run between different pieces of equipment.	Cover or remove lines.	Y	1920.22 TO .30	BIIC	3C
Area between tanks	Tripping: Old lightning protection system anchor points.	Remove the old attachment points from farm.	Y	.22 - .30	BIIC	3C
103 SY	Tripping: Excavations open without barricades or coverings for dirt.	Cover and Barricade or fill in.	Y	.22 - .30	BIIC	4C
271-SY	Noise: Compressor needs to be labeled for noise hazard.	Monitor and determine Personal Protective Equipment / Administrative control levels.	Y	.95	AIIC	3C
Nitrogen Dewar	Labeling: Dewar unlabeled.	Label Dewar for potential hazard rating and emergency contact information.	Y	.1200	AIIC	4D

**Table N-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12 December 1995

2 PAGES

DATE OF REPORT: 2 March 95

IS & IH REPRESENTATIVES: Matthew E. Nolen, Gary D. Mickle,  
David R. Carls

ASSESSMENT NUMBER:

AREA: 200 W FACILITY: SY

OTHER EMPLOYEES: Inez Austin

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
TK-312-C	Labeling: Not labeled.	Label the acid storage tank with appropriate hazard and emergency information.	Y	.1200	AIIc	4D
	Fire: There is no redundancy to the firewater supply.	Provide a back-up water supply to the 200-W Area.	Y	DOE 6430.1A, DOE 5480.7A, DOE RLIP 5480.7	AId	2C
242-S	Obsolete Safe Work Practice posted.	Keep safety board current.	Y	.1200	AIIc	4C

**APPENDIX O**

**HEALTH AND SAFETY PLAN  
FOR THE T TANK FARM**

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## APPENDIX O

### HEALTH AND SAFETY PLAN FOR THE T TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The T farm contains 12 single-shell tanks with a capacity of 1,892,706 L (500,000 gal) each. The tanks are arranged in a cascade fashion (flow arrangement) with four cascades of three tanks each. The tanks are numbered 241-T-101 through -112. Tank 241-T-107 is on the Ferrocyanide Watch List and therefore has a possible, although unlikely, hydrogen cyanide (HCN) occupational exposure potential. Two tanks cascade with tank 241-T-107 and therefore also have a possible, but even less likely, HCN exposure potential. Tank 241-T-111 vents organic vapor/ammonia from the breather filter to the atmosphere producing a vapor exposure hazard. Tank 241-T-110 is on the Hydrogen/Flammable Gas Watch List because of the potential to contain concentrations of flammable gases that exceed the lower flammability limit. These gases originate from the waste or are generated as a byproduct of the waste. As a result of the potential flammable nature of tank 241-T-110, extreme caution must be exercised to avoid any ignition source near the tank.

All T farm tanks contain high-level radioactive waste and various chemical constituents. The T farm is classified as a surface contamination area (SCA) (radiological contamination).

Various T farm tanks may be leaking and therefore pose a hazard for any subsurface activities because of radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

##### B. PERIMETER AND SUPPORT FACILITIES

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-821) and adjacent gate located southwest of the trailer along 23rd Street. Personnel enter and exit the farm through the support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate adjacent to the trailer.

### C. WIND INDICATION

A wind sock, located at the south fenceline of T farm, indicates wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Facility manager: 372-2226

Shift manager: 373-3475

Site safety representative or officer: TWRS IH&S at 372-3242

West Area TWRS IH&S Satellite Office: 372-1779

Health Physics supervisor: 373-1765 (backshift make radio call)

Emergency point-of-contact: Call shift manager 373-3475 and 911

### B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm HASP*, Section 1.0. Key responsibilities include the following:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and Health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Ferrocyanide

Tank 241-T-107 is on the Ferrocyanide Watch list. There is a remote possibility hydrogen cyanide occupational exposure. The exposure control requirements to protect against possible exposures are stated the Safe Work Practice (SWP) Section 2.9 of this document.

##### 2. Vapor/Gas

Venting of various vapors/gases from the breather filter on tank 241-T-107 to the atmosphere has been documented. Possible gas/vapor constituents include organic vapors such as petroleum hydrocarbons and inorganic gases/vapors such as ammonia. However, vapor/gas constituents of the tanks have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. Elevated area/source concentrations are localized to the proximity of the breather filter vent. Extreme caution in these areas is recommended. For the specific controls and PPE, reference the SWP.

To date, all personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

##### 3. Hydrogen/Flammable Gas

Hydrogen/Flammable Gas Watch List Tank 241-T-110 contains a slurry that produces hydrogen gas and other flammable constituents. Other hazards are toxicity of the gas, and surface crust flammability. Hazard control requirements are currently in place and include the following.

- All work in this tank must be in accordance with OSD-T-151-00030.
- Spark-resistant tools and other safeguards are necessary to reduce the chance of fire or explosion.
- Work in and around this tank must be done in accordance with the *Tank Farm HASP*, Section 2.9, Safe Work Practices.

#### **4. High-Level Radioactive Waste and Chemicals**

All T farm tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

#### **5. Surface Contamination**

The entire T tank farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP) and the ALARA (as low as reasonably achievable) Management Worksheets.

### **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

#### **1. Noise**

No stationary high-noise sources are present on T farm. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

#### **2. Chemicals**

No specific chemicals are used on T farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

#### **3. Confined Spaces**

Confined spaces for T farm are listed in Table O-1. These spaces are labelled in the tank farm, and include such areas as utility vaults, flush and valve pits, and saltwells. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII, and also the *Tank Farm HASP*, Section 10.0, for more information.

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#### **4. Asbestos**

Warning signs posted at T farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

#### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

#### **6. Engulfment**

There are three wooden cribs buried on the west side of the farm. Avoid the posted areas. Engulfment may occur if area is disturbed.

### **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to T farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breaches. (See SWP for specifics)

## **IV. SITE CONTROLS**

### **A. WORK ZONES**

Work zones and controlled areas for T farm are shown on Figure O-1 and are listed below.

#### **1. Perimeter Exclusion Zone**

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

## **2. Interior Exclusion Zones**

Interior barricaded exclusion zones have been established around individual tanks, groups of tanks, and point-source emissions to deal with specific hazards. These areas are specified in the SWP. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

## **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 12.19 m (40 ft) into the tank farm (see Figure O-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Another RBA/URMA has been established inward from the north fence and is accessed from a gate on the northwest corner of the farm.

Currently at T farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

## **4. Radiological Buffer Area**

A RBA exists around the T-111 pump skid and the support building on the south side of the farm. Hand and foot survey is required to exit this area.

## **5. Support Zone**

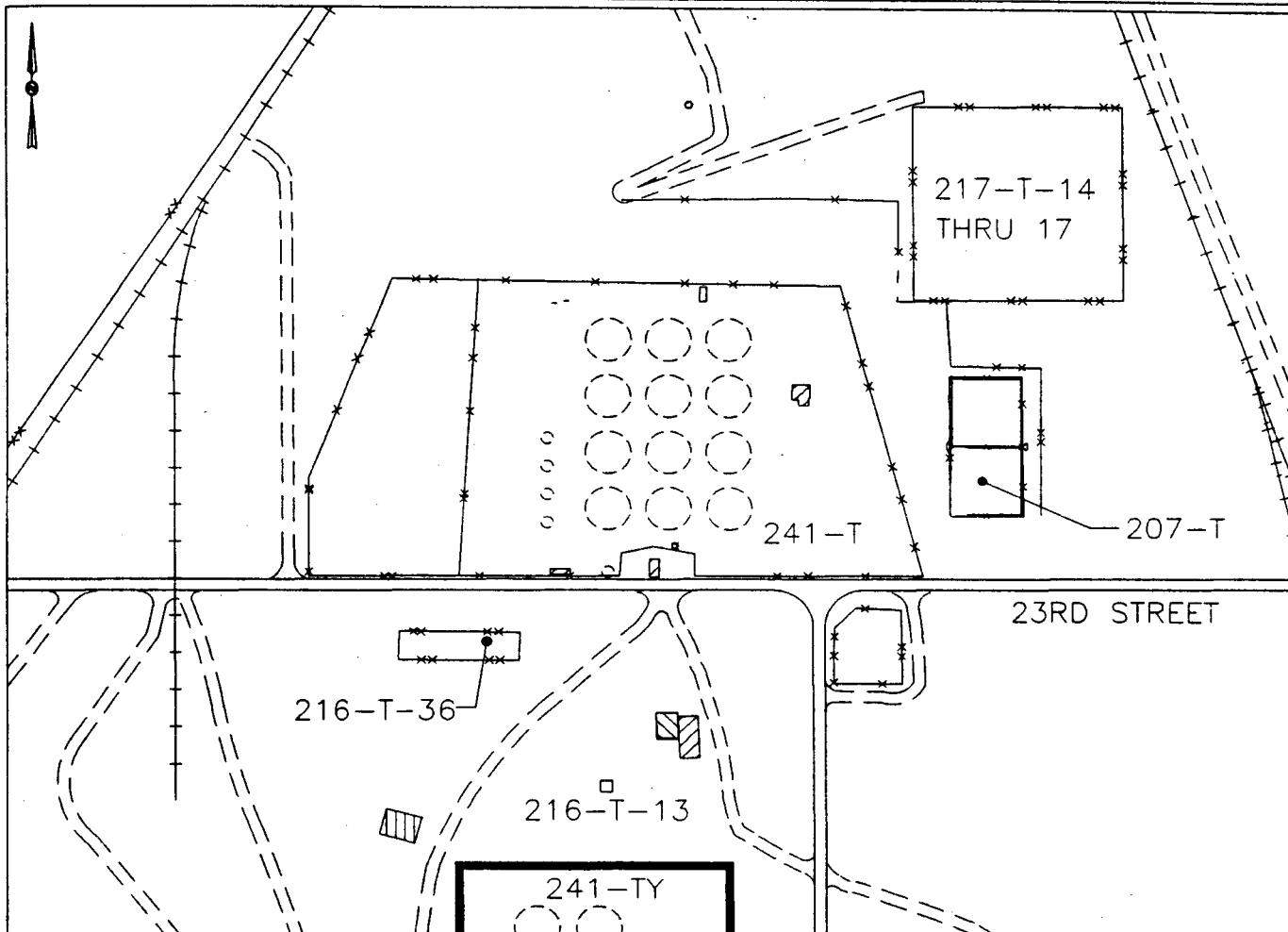
The support zone consists of the portion of the trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

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Figure O-1. T Tank Farm Site Plan.

0-9



241-T  
SWP-REV 13

APVD BY: \_\_\_\_\_  
APVD BY: \_\_\_\_\_  
APVD BY: \_\_\_\_\_

NOTE: THIS MAP IS TO BE USED FOR  
REFERENCE PURPOSES ONLY.

Westinghouse Hanford Co.  
TWRS IH&S

CADFILE: 241TCOMP  
DATE: 2-03-95

CUSTOMER: DAVID CARLS  
DRAWN BY: NICK BARILO

TITLE: 241-T TANFARM COMPLEX  
RESPIRATORY MONITORING

## B. ACCESS CONTROL

Access to T farm is to occur only through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 West Area shift operations manager.

## C. COMMUNICATIONS/BUDDY SYSTEM

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for T farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

# V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

## A. EXCLUSION ZONES

Two levels of PPE are required in designated exclusion zones of T farm and include the following:

- Level D PPE is required inside the perimeter fenceline. Level D PPE with OVM and HCN monitoring is required as specified in the SWP of this document. Level D PPE consists of anti-C protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hard hat, or safety glasses.
- Level B PPE without monitoring is required inside the interior barricaded areas. Required Level B PPE consists of the same protective clothing/equipment as Level D described above plus headcover and supplied-air respiratory protection with a 5-minute escape bottle.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

## B. CONTAMINATION REDUCTION ZONE

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D protective clothing such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

## C. TASK-SPECIFIC HAZARDS

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## VI. MONITORING REQUIREMENTS

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For entry into the interior barricaded areas around tanks, OVM and HCN monitoring are required unless supplied-air respiratory protection is used. (See SWP) In addition to general area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on tanks, see the *Tank Farm HASP*, Section 2.9, Safe Work Practice, and Section 6.0.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located at the northeast corner of TY farm along Camden Avenue.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## VII. CONFINED SPACE ENTRY

Confined spaces for this tank farm are shown on Table O-1. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## VIII. DECONTAMINATION PROCEDURES

Currently at T farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## IX. EMERGENCY RESPONSE

This section summarizes emergency information specific to T farm. For additional information regarding emergency response, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at T farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 244-TX receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 242-T building
- The 244-TX vessel vent exhauster
- Air sampling and stack monitor and the 244-TX air exhaust sampler
- Instrument process air.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of T farm be required, personnel should assemble either at the 200 West Area Tank Farm staging areas or at an alternate location upwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT T FARM**

The T Tank Farm Fire Plan is posted on the wall of the change trailer. The following equipment is available:

- First Aid and Bloodborne Pathogen kits
- Wind sock (located just outside the change trailer)
- Two self-contained breathing apparatus (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table O-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-T	101-01B	inactive - PI - weather covered	central heel pit	6 ft W x 9 ft L x 4 ft 1 in. D	coverblocks	N	none	Permit	H-2-42618
241-T	101-01A	inactive- PI- weather covered	SW. pump pit	11 ft W x 14 ft 6-1/2 in. L x 5 ft 11 in. D	coverblocks	N	none	Permit	H-2-42617
241-T	101-01C	inactive - PI - weather covered	sluice pit	8 ft 6 in. W x 9 ft L x 9 ft 8 in. D	coverblocks	N	none	Permit	H-2-42619
241-T	101	inactive - PI - weather covered	North condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe with 90° bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743
241-T	102-02A	inactive -IS/II- weather covered	SW pump pit	11 ft W x 14 ft 6-1/2 in. L x 5 ft 11 in. D	coverblocks	N	none	Permit	H-2-42617
241-T	102-02B	inactive -IS/II- weather covered	central heel pit	6 ft W x 9 ft L x 4 ft 1 in. D	coverblocks	N	none	Permit	H-2-42618
241-T	102	inactive -IS/II- weather covered	North condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe with 90° bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743

Table O-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-T	102-02C	inactive -IS/II- weather covered	E. sluice pit	8 ft 6 in. W x 9 ft L x 9 ft 8 in. D	coverblocks	N	none	Permit	H-2-42619
241-T	103-03B	inactive -IS/II- weather covered	central heel pit	6 ft W x 9 ft L x 4 ft 1 in. D	coverblocks	N	none	Permit	H-2-42618
241-T	103-03A	inactive -IS/II- weather covered	SW. pump pit	11 ft W x 14 ft 6-1/2 in. L x 5 ft 11 in. D	coverblocks	N	none	Permit	H-2-40191, H-2-42617
241-T	103-03C	inactive -IS/II- weather covered	E. sluice pit	8 ft 6 in. W x 9 ft L x 9 ft 8 in. D	coverblocks	N	none	Permit	H-2-40193, H-2-42619
241-T	103	inactive -IS/II- weather covered	W. condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe with 90° bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743, H-2-73054
241-T	104	inactive - PI - weather covered	saltwell pump pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. thick	N	no ladder	Permit	H-2-38597

Table O-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-T	104	inactive - PI - weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe with 90° bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743
241-T	105	inactive -IS/II- - weather covered	saltwell pump pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	H-2-38597
241-T	105	inactive-IS/II - weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe with 90° bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743
241-T	106	inactive-IS/II - weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe with 90° bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743
241-T	107	inactive - PI - weather covered	saltwell pump pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	ferrocyanide watch list, H-2-38597
241-T	108	inactive -IS/II- - weather covered	no pits	none	none	N	none	NA	H-2-73056
241-T	109	inactive-IS/II - weather covered	saltwell pump pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	H-2-38597

Table O-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-T	110	inactive - PI - weather covered	saltwell pump pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	hydrogen watch list, H-2-38597
241-T	111	inactive - PI - weather covered	saltwell pump pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	H-2-38597
241-T	112	inactive-IS/II -	no pits	none	none	N	none	NA	H-2-72903
241-T	201	inactive-IS/II -	receiver tank	20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	H-W-72742
241-T	201-T	Inactive-IS/I I- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-T	201-T	Inactive-IS/I I- weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-T	201	Inactive -IS/II- weather covered	saltwell storage pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	H-2-38597
241-T	202	inactive-IS/II -	receiver tank	20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	H-W-72742

Table O-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-T	202-T	Inactive-IS/I I- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-T	202-T	Inactive-IS/I I- weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-T	202	Inactive -IS/II- weather covered	saltwell storage pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	H-2-38597
241-T	203	inactive-IS/II -	receiver tank	20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	H-W-72742
241-T	203-T	Inactive-IS/I I- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-T	203-T	Inactive-IS/I I- weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742

Table O-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-T	203	Inactive -IS/II- weather covered	saltwell storage pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	H-2-38597
241-T	204	inactive-IS/II	receiver tank	20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	H-W-72742
241-T	204-T	Inactive-IS/I I- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-T	204-T	Inactive-IS/I I- weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 dia. pipe, w/90° bend ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-T	204	Inactive -IS/II- weather covered	saltwell storage pit	6 ft dia. x 5 ft D	metal plate cover 6 ft 8 in. dia. x 1 in. D	N	no ladder	Permit	H-2-38597
241-T	-151	Inactive/wea ther covered	diversion box	6 ft W x 16 ft L x 12 ft D	coverblocks	N	none	Permit	H-2-2338 sht 1, H-W-72183-1
241-T	-152	Inactive/wea ther covered	diversion box	6 ft W x 24 ft L x 14 ft D	coverblocks	N	none	Permit	H-2-2338 sht 2, H-W-72183-1
241-T	-153	Inactive/wea ther covered	diversion box	6 ft W x 30 ft L x 15.4 ft D	coverblocks	N	none	Permit	H-2-2338 sht 3, H-W-72184
241-T	-252	Inactive/wea ther covered	Diversion box for 201 thru 204	6 ft W x 32 ft L x 11.8 ft D	coverblocks	N	none	Permit	H-2-2338 sht 4

Table O-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-T	-301	abandoned?	catch tank	20 ft dia. x 15 ft D	manhole on top below grade	N	none	Permit	H-2-1748, HW-72182
241-T	-301-B	isolated	catch tank	15 ft 6 in. H x 20 ft dia.	none	N	none	NA	H-2-72903
241-TR	-152	Inactive/wea ther covered	Diversion box - nozzle pit	9 ft W x 33 ft L x 8 ft 4 in. D	coverblocks	N	none	Permit	H-2-2338-27, H-2-42383
241-TR	-152	Inactive/wea ther covered	Diversion box - pipe storage	6 ft W x ~16 ft 9 in. L x 10 ft 4 in. D	coverblocks	N	none	Permit	H-2-2338-27, H-2-42383
241-TR	-152	Inactive/wea ther covered	Diversion box - pipe pit	13 ft 6 in. W x ~22 ft L x 10 ft D	coverblocks	N	none	Permit	H-2-2338-27, H-2-42383/84/85
241-TR	-153	Inactive/wea ther covered	Booster pump pit	11 ft W x 24 ft 9 in. L x 13.1 ft D	coverblocks	N	none	Permit	H-2-2338-28, H-2-42384
241-TR	153	Inactive	Valve pit	3 ft Sq x 4 ft 6 in. D	metal cover	N	none	Non-Permit	H-2-42748, H-2-42745
241-TR	F-TR-153	Inactive	Filter pit	5 ft 11 in. W x 6 ft 7 in. L x 7 ft 7 in. D	coverblock	N	none	Permit	H-2-42744
241-T	-361	Inactive	settling tank	20 ft dia. x 15 ft D	manhole on top below grade	N	none	Permit	H-2-1748,
241-T-207	caisson N of 361-T	active -Belongs to T-plant	process sewer line access	24 in.	manhole	N	none	Permit	M-2904-W sht 11
241-T	caisson NE side of 241-T	active -Belongs to T-plant	process sewer line access	24 in.	Manhole	N	none	Permit	M-2904-W sht 11

Table O-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 14 December 1995

2 PAGES

DATE OF REPORT: 2 March 95 IS AND IH REPRESENTATIVES: Matthew E. Nolen,  
David S. Carls

ASSESSMENT NUMBER:

AREA: 200 W FACILITY: T OTHER EMPLOYEES: Inez Austin

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
SW-T-1 Pole near Change Trailer	Electrical: Temporary ID Tag is nine months old. (Telephone Pole Box)	Properly remove box or reinstate power.	Y	1910. 303	BIIq	3*
241T-101 Pump Pit	Electrical and Rigging: Power and rigging lines left on Pit Cover.	Remove items from farm. Items unusable.	Y	.303	BIIq	3D
MFN Readout 204T Salt Well Pump	Electrical: Potential electrocution hazard.	Remove line.	Y	.303	BIIq	2B
	Evening Farm work: The lighting of the farm ranges from 0.0 to 0.4 Foot Candles (0.0 to 40 LUX)	Provide lighting for tasks to be performed in low light situations.	Y	.120(m)	B1g	3B
Change Trailer	Obsolete Safe Work Practice Posted.	Keep safety board current.	Y	.1200	AIIC	4D
South Border of Fence Line	Tripping: A metal choker is protruding from ground.	Remove or guard area.	Y	.22 - .30	BIIk	4C

South West of T-112	Tripping: Metal wire and railroad track protruding from ground.	Remove or guard area.	Y	.22 - .30	BIIk	4C
154-T Filter Pit	Tripping: Protruding bolts from cement pad.	Cut off bolts or remove pad.	Y	.22 - .30	BIIk	4C
Adjacent to CMCC Station	Asbestos: Green transite box is damaged. Box is unlabeled as Asbestos.	Seal damage or remove cabinet.	Y	.1001	AIIX	2D
CMCC Station	Storage: Ladder improperly stored		Y	.26 and .27	BIII	4C
South West side of T Farm	Storage: Ladder improperly stored		Y	.26 and .27	BIII	4C
West Side of T Farm	Cave - In/Fall: Three wooden cribs are buried and covered.	Fill cribs in or place substantial barriers around them and label area as to hazard present.	Y	.1200 and .22 - .30	BIIk AIIC BIk	1C
Saltwell Pit for T-105	Damage: Pit cover damaged	Replace or repair cover.	Y	.120	AIIX	3D

**APPENDIX P**

**HEALTH AND SAFETY PLAN  
FOR THE TX TANK FARM**

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## APPENDIX P

### HEALTH AND SAFETY PLAN FOR THE TX TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The TX farm contains 18 single-shell tanks with a capacity of 2,839,059 L (750,000 gal) each. The tanks are arranged in a cascade fashion (flow arrangement) with three cascades of four tanks each and two cascades of three tanks each. The tanks are numbered 241-TX-101 through -112 and 241-TX-113 through -118 respectively. Tank 241-TX-118 is on the Ferrocyanide Watch List and contains organic salts. Ferrocyanide serves as a scavenger of radiocesium and other soluble radionuclides and as such was added to tanks to reduce the volume of radioactively contaminated liquids in the tanks. In the presence of oxidizing agents such as nitrates/nitrides and high temperature ( $> 285^{\circ}\text{C}$ ), ferrocyanides have the potential to explode. Additionally, under special conditions such as high radiation and  $\text{pH} < 10.5$ , ferrocyanide may be converted to hydrogen cyanide (HCN). The tank therefore has a possible, although unlikely, HCN occupational exposure potential. Tanks 241-TX-105 and -118 are on the High Organic Watch List because they contain organic salts. Under the appropriate conditions, the organic waste and the oxidizing agents (e.g., sodium nitrate, sodium nitrite, etc.) may result in a potentially hazardous exothermic reaction causing fire or explosion. Passive ventilation is used on all tanks in TX farm.

All TX tanks contain high-level radioactive waste and various chemical constituents. The TX tank farm is classified as a surface contamination area (SCA) (radiological contamination).

Various TX farm tanks may be leaking and therefore pose a hazard for any subsurface activities because of radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the support trailer MO-817 and adjacent gate located north of the trailer off a gravel access road. Personnel enter and exit the farm through the support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate adjacent to the trailer.

## **C. WIND INDICATION**

Wind socks located at the east and west fencelines of TX farm indicate wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Facility manager: 372-2226

Shift manager: 373-3475

Site safety representative or officer: Tank Waste Remediation System-Industrial Health and Safety (TWRS IH&S) at 372-3242

West Area TWRS IH&S Satellite Office: 372-1779

Health Physics supervisor: 373-1765 (backshift make radio call)

Emergency point-of-contact: Call shift manager 373-3475 and 911

## **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm Health and Safety Plan* (HASP), Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

---

#### A. TANK CHARACTERISTICS

##### 1. Ferrocyanide

Tank 241-TX-107 is on the Ferrocyanide Watch List. There is a remote possibility of the possibility of a hydrogen cyanide (HCN) occupational exposure. The control requirements to protect against possible exposures are stated in the Safe Work Practice (SWP) Section 2.9 of this document.

##### 2. Vapor/Gas

The venting of various vapors/gases to the atmosphere from the breather filters on tanks 241-TX-106, -107, -109, -110, and -111 has been documented. Possible gas/vapor constituents include organic vapors such as petroleum hydrocarbons and inorganic gases/vapors such as ammonia. However, constituents of tank vapors/gases have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0. Elevated area/source concentrations are localized to the proximity of the breather filter vent. Controls have been established around breather filter sources. (See SWP)

To date, all personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

##### 2. High Concentrations of Organic Compounds and Chemicals

High Organic Watch List tanks 241-TX-105 and -118 contain high concentrations of organic compounds/chemicals. Safety issues of most concern for high-organic tanks are: (1) uncontrolled reactions between air and flammable gases, (2) uncontrolled reactions between a flammable liquid and air (a pool fire) in tanks that have a floating liquid layer or solid waste saturated with liquid at the air/waste interface, and (3) uncontrolled reactions between

organic materials and nitrate/nitrite oxidizers (runaway and propagating reactions) in solid waste. Hazard controls are currently in place.

- All work in this tank must be done in accordance with OSD-T-151-00030, *Operating Specifications for Watch List Tanks*, and the *Tank Farm HASP*, Section 2.9, Safe Work Practices
- Spark-resistant tools and other safeguards necessary to reduce the chance of fire or explosion must be used.

### **3. High-Level Radioactive Waste**

All TX tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

### **4. Surface Contamination**

The entire TX farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this Appendix, in the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present on TX farm. Adjacent to the farm is a CONEX box with a compressor inside. Hearing protection is only required if work is to be performed inside while compressor is running. Additional work packages and projects may introduce noise sources to the farm. These packages will specify the required hearing protection.

## 2. Chemicals

No specific chemicals are used on TX farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

## 3. Confined Spaces

Confined spaces for TX farm are listed in Table P-1. These spaces are labelled in the tank farm, and include such areas as utility vaults, flush and valve pits, and saltwells. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII, and also the *Tank Farm HASP*, Section 10.0, for more information.

## 4. Asbestos

Warning signs posted at TX farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

## 5. Lighting

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when operations are to be performed in low light situations.

## C. TASK-BASED HAZARDS

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to TX farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on tanks 241-TX-118. These tasks must be conducted in accordance with the *Tank Farm HASP*, Section 2.9, Safe Work Practice.

## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for TX farm are shown on Figure P-1 and are listed below.

#### 1. Perimeter Exclusion Zone

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

#### 2. Interior Exclusion Zones

Interior barricaded exclusion zones have been established around individual tanks, groups of tanks, and point-source emissions to deal with specific hazards. The Safe Work Practice specifies the areas designated as Respiratory Protection Zones. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

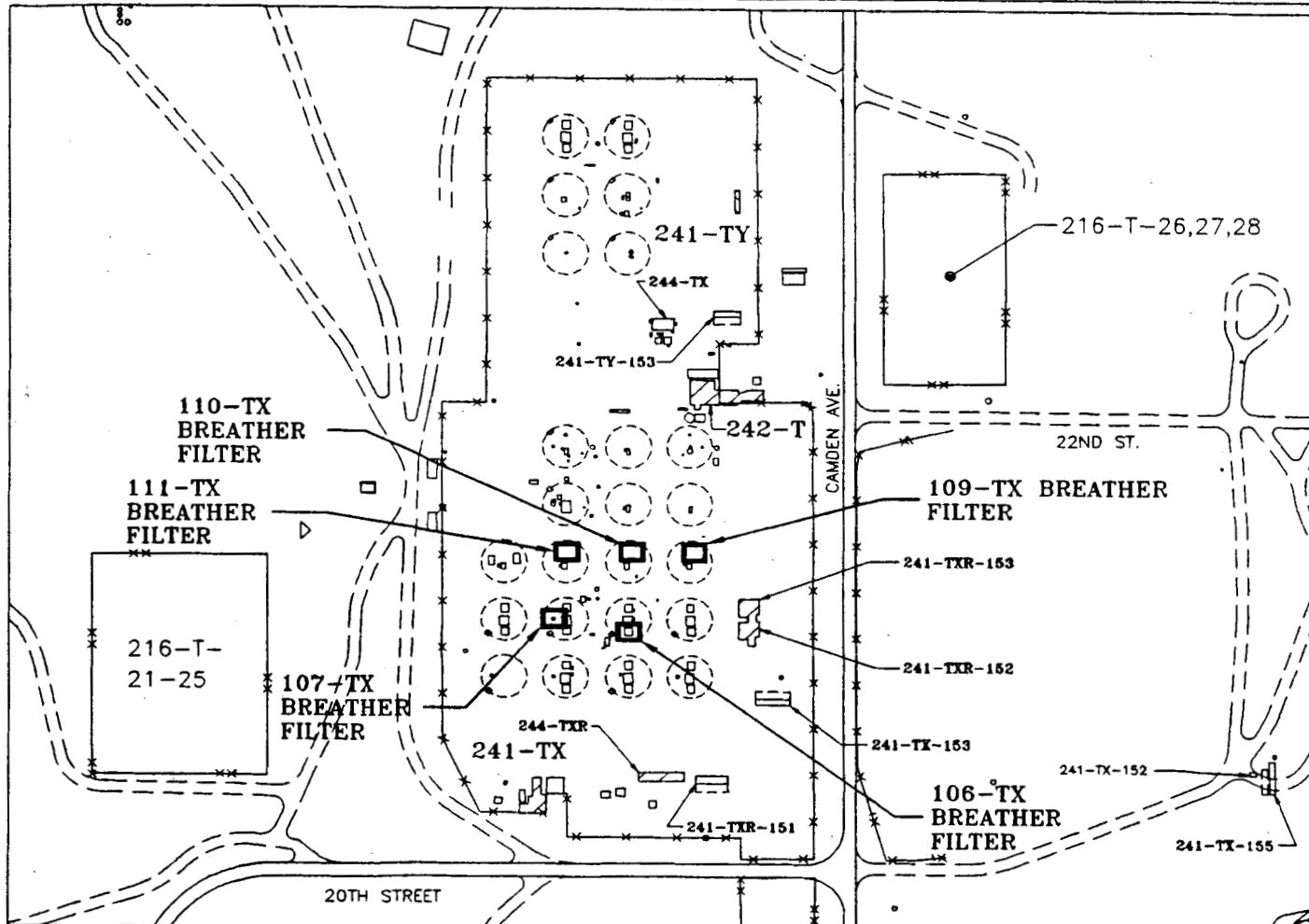
#### 3. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 12.19 m (40 ft) into the tank farm (see Figure P-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at TX farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

Figure P-1. TX Tank Farm Site Plan.

P-9



241-TX/TY

SWP-REV 13

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

APVD BY: \_\_\_\_\_

NOTE: THIS MAP IS TO BE USED FOR  
REFERENCE PURPOSES ONLY.Westinghouse Hanford Co.  
TWRS IH&SCADFILE: 241TXY  
DATE: 2-03-95CUSTOMER: DAVID CARLS  
DRAWN BY: NICK BARILLOTITLE: 241-TX/TY TANKFARM COMPLEX  
RESPIRATORY MONITORING

#### **4. Radiological Buffer Area**

The area around the T-Evaporator is an RBA. Access is via the personnel gate or the vehicle gate directly adjacent to the evaporator. Exit hand and foot survey is required.

#### **5. Support Zone**

The support zone consists of the portion of the trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

### **B. ACCESS CONTROL**

Access to TX farm is to occur only through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 West Area Tank Farm shift operations manager.

### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for TX tank farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

### **A. EXCLUSION ZONES**

Two levels of PPE are required in designated exclusion zones of TX farm.

- Level D PPE is required inside the perimeter fenceline. Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hard hat, or safety glasses.

- Level B PPE is required by several different situations by the SWP. Required Level B PPE consists of the same protective clothing/equipment as Level D described above plus headcover and supplied-air respiratory protection with a 5-minute escape bottle.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

## **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

## **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

In addition to other area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on tanks, see the *Tank Farm HASP*, Section 2.9, Safe Work Practice, and Section 6.0.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located at the northeast corner of TY farm along Camden Avenue.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## **VII. CONFINED SPACE ENTRY**

Confined spaces for this tank farm are shown on Table P-1 of this Appendix. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## **VIII. DECONTAMINATION PROCEDURES**

Currently at TX farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **IX. EMERGENCY RESPONSE**

This section summarizes emergency information specific to TX farm. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the TX farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the receiver operation
- All control and instrument systems for saltwells
- The vessel vent exhauster

- Air sampling and stack monitor
- Radiation detectors
- Instrument process air.

#### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of TX farm be required, personnel should assemble either at the 200 West Area Tank Farm staging area or at an alternate location downwind.

#### **B. EMERGENCY EQUIPMENT AVAILABLE AT TX FARM**

The TX Tank Farm Fire Plan is posted on the wall of the change trailer.

The following equipment is available:

- First Aid and Bloodborne Pathogen Kits (located in change trailer)
- Wind sock (located just outside the change trailer)
- Two self-contained breathing apparatus (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).
- Air Compressor (located in the CONEX box outside the farm).

#### **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP* Section 9.0, for information on these and other emergency response issues.

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Table P-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
216-TY	201	inactive - isolated	flush tank	8 ft W x 25 ft L x 7 ft 6 in. D	2 manholes below grade, one on NW and one on SE corner, ~30 in. dia	N	none	NA	H-2-2760
241-TY	101-01A	Inactive-I S/II- weather covered	pump pit w/saltwell	11 ft W x 14 ft 6 in. L x 7 ft 7-3/4 in. D	Coverblock(s)	N	hatch 2 ft x 2 ft 6 in.	Permit	ferrocyanide watch tank, H-2-2294, H-2-36320, H-2-36271
241-TY	101-A	Inactive-I S/II- weather covered	North sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblock(s)	N	none	Permit	ferrocyanide watch tank, H-2-42619, H-2-2295
241-TY	101-B	Inactive-I S/II- weather covered	S. sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblock(s)	N	none	Permit	ferrocyanide watch tank, H-2-42618, H-2-2295
241-TY	101	Inactive-I S/II	flush pit	5 ft dia. x 4 ft D	Hinged cover	N	none	Non-Permit	H-2-36270, H-2-36320, ferrocyanide watch tank
241-TY	101	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/24 in. pipe w/90° bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	ferrocyanide watch tank, H-2-2248
241-TY	102-02A	Inactive-I S/II- weather covered	pump pit	11 ft W x 14 ft 6 in. L x 7 ft 7-3/4 in. D	Coverblock(s)	N	hatch 2 ft x 2 ft 6 in.	Permit	H-2-2294, H-2-36320, H-2-36271

Table P-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	102-A	Inactive-I S/II- weather covered	North sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblocks	N	none	Permit	H-2-22953, H-2-2295
241-TY	102-B	Inactive-I S/II- weather covered	S. sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblocks	N	none	Permit	H-2-2248, H-2-2295
241-TY	102	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/24 in. pipe w/90° bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	H-2-2295, H-2-2248
241-TY	102	Inactive-I S/II- filled w/dirt and rock	flush pit	5 ft dia. x 4 ft D	none	N	none	NA	H-2-36270,
241-TY	W of 102-TY	Inactive	valve box	22 in. SQ x 56 in. D	coverblock	N	none	Non-Permit	H-2-2249-1
241-TY	E of 102	inactive	steam trap pit	4 ft dia. x 6 ft 2 in. D	3/16 in. metal plate	Y	ladder	Permit	H-2-36325
241-TY	103	Inactive-I S/II- weather covered	caisson R13	42 in. rise ~6 ft 2 in. D	7 ft 4 in. SQ concrete cap	N	none	Permit	ferrocyanide watch tank, H-2-36318

Table P-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	103-03A	Inactive-I S/II- weather covered	pump pit w/ saltwell casing	11 ft W x 14 ft 6 in. L x 8 ft 1-1/2 in. D	Coverblocks	N	hatch 2 ft x 2.5 ft	Permit	H-2-36270, H-2-2294, H-2-36318, H-2-36271
241-TY	103	Inactive-I S/II-	flush pit	5 ft dia. x 4.5 ft D	hinged cover	N	none	Permit	ferrocyanide watch tank, H-2-36270, H-2-36318
241-TY	103	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/24 in. pipe w/90° bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	ferrocyanide watch tank, H-2-2218, H-2-2248
241-TY	N of 103-TY	Inactive - isolated, filled with rock	valve box	~ 2.5 ft SQ x 3.5 ft D	none	N	none	NA	H-2-2913, H-2-73088
241-TY	104-04A	Inactive-I S/II- weather covered	pump pit	11 ft W x 14 ft 6 in. L x 8 ft 1-1/2 in. D	Coverblocks	N	hatch 2 ft x 2.5 ft	Permit	ferrocyanide watch tank, H-2-36270, H-2-2294, H-2-36271
241-TY	104	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/24 in. pipe w/90° bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	ferrocyanide watch tank, H-2-2248
241-TY	104	Inactive-I S/II- cut off below grade	flush pit	5 ft dia. x 4.5 ft D	hinged cover	N	none	NA	ferrocyanide watch tank, H-2-36270

Table P-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	104, below grade?	Inactive-I S/II- weather covered	caisson R13	42 in. riser	7 ft 4 in. SQ concrete cap	N	none	Permit	H-2-2244, H-2-73089
241-TY	W of 104-TY	Inactive-	valve box	22 in. SQ x 56 in. D	coverblock	N	none	Non-Permit	H-2-2249-1
241-TY	105	Inactive-I S/II- weather covered	saltwell pump pit	6 ft dia. x 4 ft 10 in. D	hinged cover	N	none	Permit	H-2-34961
241-TY	105	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/24 in. pipe w/90° bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	H-2-2248
241-TY	105	Inactive-I S/II-riser is plugged, cut off below grade?	Caisson R13	42 in. riser, 6 ft 2 in. D	7 ft 4 in. SQ concrete cap	N	none	Permit	H-2- 2244, H-2-73089
241-TY	~75 ft E of 105-TY	Inactive	caisson	8 ft dia. x 20 ft D	hinged cover	N	none	Permit	H-2-35586
241-TY	W of 105-TY	Inactive	valve box	3 ft W x 4 ft L x 4 ft D	coverblock	N	none	Non-Permit	H-2-2249-1, H-2-2913

Table P-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	106	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/ 24 in. pipe w/90 deg bend halfway 12 ft L direct to tank	Hatchway	N	none	Permit	H-2-2248
241-TY	106	Inactive-I S/II- weather covered	caisson R13	42 in. riser 6 ft 2 in. D	7 ft 4 in. SQ concrete cap	N	none	Permit	H-2-
241-TY	W of 106 -TY	Inactive	Caisson	8 ft dia. x	hinged cover			Permit	H-2-
241-TY	W of 106-TY	Inactive	valve box - 2 ft below grade	22 in. SQ x 56 in. D	Coverblock	N	none	Non-Permit	H-2-2249-1, H-2-34961
241-TY	~46 ft SSW of 106	Inactive	Steam trap assy	6 ft dia. x 7 ft 2 in. D	hinged cover	N	none	Permit	H-2-36325 det VIII, H-2-36311
241-TY	153	Inactive - weather covered	Diversion Box - nozzle pit	6 ft W x 29 ft L x ~17 ft D	Coverblocks	N	none	Permit	H-2-2338 - 32, H-2-2231
241-TY	153	Inactive - weather covered	Diversion Box - jumper storage	6 ft W x 9 ft- 10 1/2 in. L x ~17 ft D	Coverblocks	N	none	Permit	H-2-2338 - 32, H-2-2231
241-TY	153	Inactive - weather covered	Diversion Box - pipe pit	12 ft 2 in. W x 41 ft 4 in. L x ~9.85 ft D	none - underground	N	none	Permit	H-2-2338 - 32, H-2-2231

Table P-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	-302-A, aka 241-TY-32 1-A	isolated	catch tank	40 ft L x 9 ft dia.	no access pit	N	none	NA	H-2-2733
241-TY	-302-B, aka 241-TY-32 1-B, 241-TY-30 4-B	isolated	encasement drain catch tank	9 ft dia. x 32 ft 4.75 in. L	no access pit	N	none	NA	H-2-71655, H-2-44501 sht 126

PI = Partially Interim Isolated

II = Interim Isolated

IS = Interim Stabilized

COBs are isolated and filled with dirt

**Table P-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT****DATE OF ASSESSMENT:** 19 December 1995**1 PAGE****DATE OF REPORT:** 2 March 95**IS AND IH REPRESENTATIVES:** Matthew E. Nolen, David C. Carls,  
Gary D. Mickle**ASSESSMENT NUMBER:****AREA:** 200 W **FACILITY:** TX & TY**OTHER EMPLOYEES:** Inez Austin

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Change Trailer	Safety Board: Current Safe Work Practice is not posted.	Keep Safety Board current.		1910. 1200	AIIc	4C
TY-103	Asbestos: Green Transite box damaged. Possible exposure. Not labeled.	Seal or remove box. If sealed, then label.	Y	.1001	AIIx	2D
TY Farm	Evening Illumination: The illumination of the Farm falls between 0.0 to 2.7 Foot Candles. (0.0 to 27 LUX)	Provide workers with illumination when actions must be performed in low light situations.		.120(m)	BIq	3B
TX Farm	Evening Illumination: The illumination of the Farm falls between 0.0 to 6.1 Foot Candles. (0.0 to 61 LUX)	Provide workers with illumination when actions must be performed in low light situations.		.120(m)	BIq	3B
CONEX between TX and TY	Noise: The compressor located in the CONEX box has the potential to damage hearing if personnel are to work in the area while compressor is running.	Post a Noise Hazard Warning sign on the door to the CONEX and directly within the CONEX if the sign on the door can be obstructed/ hidden when door is open. (See noise survey by D.R. Carls)	Y	.95	AIII	4B

**APPENDIX Q**

**HEALTH AND SAFETY PLAN  
FOR THE TY TANK FARM**

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## APPENDIX Q

### HEALTH AND SAFETY PLAN FOR THE TY TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The TY farm contains six single-shell tanks with a capacity of 2,839,059 L (750,000 gal) each. The tanks are numbered 241-TY-101 through -106 and are located north of TX farm. All six tanks are interim stabilized and isolated. Tanks 241-TY-101, -103, and -104 are on the Ferrocyanide Watch List because of relative high concentrations of ferrocyanide. Ferrocyanide serves as a scavenger of radiocesium and other soluble radionuclides and as such was added to tanks to reduce the volume of radioactively contaminated liquids in the tanks. In the presence of oxidizing agents such as nitrates/nitrites and high temperatures ( $> 285^{\circ}\text{C}$ ), ferrocyanides have the potential to explode. Additionally, under special conditions such as high radiation and  $\text{pH} < 10.5$ , ferrocyanide may be converted to hydrogen cyanide (HCN). Ferrocyanide Watch List tanks therefore have a possible, although unlikely, HCN occupational exposure potential. Tank 241-TY-104 is on the High Organics Watch List. Under the appropriate conditions, the organic waste and the oxidizing agents (e.g., sodium nitrate, sodium nitrite, etc.) may result in a potentially hazardous exothermic reaction causing fire or explosion. Passive ventilation is used on all tanks in the TY farm. The ferrocyanide and high organic tanks are identified below.

All TY tanks contain low-level radioactive waste and various chemical constituents. The TY tank farm is classified as a surface contamination area (SCA) (radiological contamination).

Various TY tanks may be leaking and therefore pose a hazard for any subsurface activities because of radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-817) and adjacent gate located north of the trailer off a gravel access road. Personnel enter and exit the farm through the support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate adjacent to the trailer.

## **C. WIND INDICATION**

Wind socks located at the west fence of TY farm indicate wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

# **II. ORGANIZATION AND POINTS OF CONTACT**

## **A. KEY POINTS OF CONTACT**

Facility manager: 372-2226

Shift manager: 373-3475

Site Safety representative or officer: Tank Waste Remediation System-Industrial Health and Safety (TWRS IH&S) at 372-3242

West Area TWRS IH&S Satellite Office: 372-1779

Health Physics supervisor: 373-1765 (backshift make radio call)

Emergency point-of-contact: call shift manager 373-3475 and 911

## **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm Health and Safety Plan* (HASP), Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Ferrocyanide

Tanks 241-TY-101, -103, and -104 are on the Ferrocyanide Watch list. There is a remote possibility of hydrogen cyanide (HCN) occupational exposure. The respiratory control requirements to protect against possible exposures are stipulated in the SWP.

- All work in the tanks must be conducted in accordance with OSD-T-151-00030.
- Spark-resistant tools and other safeguards shall be employed as necessary to reduce the chance of fire or explosion.

##### 2. Low-Level Radioactive Waste

All TY tanks store low-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

##### 3. Surface Contamination

The entire TY tank farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP) and the ALARA (as low as reasonably achievable) Management Worksheets.

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## **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

### **1. Noise**

No stationary high-noise sources are present on TY farm. There is a CONEX box with a compressor inside adjacent to the farm. If work is to be performed inside while compressor is running, hearing protection is required. Work packages or projects may introduce other noise sources into the farm area. The hearing protection requirements will be as stipulated in their packages.

### **2. Chemicals**

No specific chemicals are used on TY farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

Confined spaces for TY farm are listed in Table Q-1. These spaces are labelled in the tank farm, and include such areas as utility vaults, flush and valve pits, and saltwells. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII and also the *Tank Farm HASP*, Section 10.0, for more information.

### **4. Asbestos**

Warning signs at TY farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended level. Adequate light shall be provided if work is to be performed during low light situations.

### C. TASK-BASED HAZARDS

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to TY farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of risers) on tanks in TY farm. These tasks must be conducted in accordance with the *Tank Farm HASP*, Section 2.9, Safe Work Practice.

## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for TY farm are shown on Figure Q-1 and are listed below.

#### 1. Perimeter Exclusion Zone

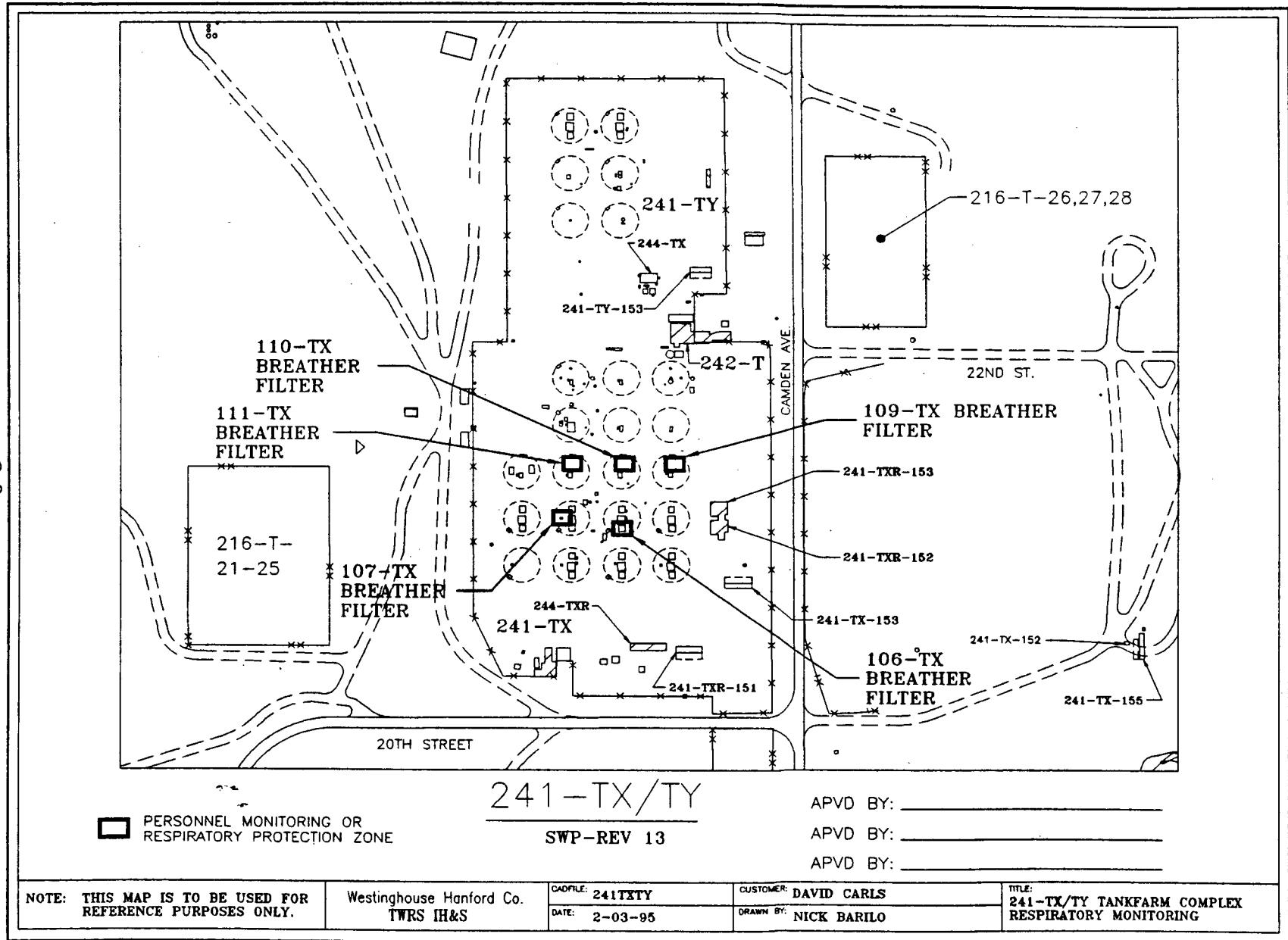
A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

#### 2. Interior Exclusion Zones

Interior barricaded exclusion zones have been established around individual tanks, groups of tanks, and point-source emissions to deal with specific hazards. These interior exclusion zones are identified and controlled as written in the SWP. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

Figure Q-1. TY Tank Farm Site Plan.

Q-8



### **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 12.19 m (40 ft) into the tank farm (see Figure Q-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at TY farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

### **4. Support Zone**

The support zone consists of the portion of the trailer outside the RBA/URMA and the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

## **B. ACCESS CONTROL**

Access to TY farm is to occur only through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the 200 West Area Tank Farm shift operations manager.

## **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for TY farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT**

### **A. EXCLUSION ZONES**

Two levels of PPE are required in designated exclusion zones of TY tank farm and include the following:

#### **1. Perimeter Exclusion Zone**

Level D PPE is required inside the perimeter fenceline. Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hard hat, or safety glasses.

#### **2. Interior Exclusion Zones**

Level B PPE is required for different situations in the SWP. Required Level B PPE consists of the same protective clothing/equipment as Level D described above plus headcover and supplied-air respiratory protection with a 5-minute escape bottle. PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

### **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional PPE such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or on work packages and work permits developed for the task.

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## VI. MONITORING REQUIREMENTS

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

In addition to general area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

For any containment breach on tanks, see the *Tank Farm HASP*, Section 2.9, Safe Work Practice, and Section 6.0.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located at the northeast corner of TY farm along Camden Avenue.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## VII. CONFINED SPACE ENTRY

Confined spaces for this tank farm are shown on Table Q-1. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## VIII. DECONTAMINATION PROCEDURES

Currently at TY farm, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

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## IX. EMERGENCY RESPONSE

This section summarizes emergency information specific for TY farm. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at the TY farm complex may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the receiver operation
- All control and instrument systems for saltwells
- All control and instrument systems for the 242-T building
- The 244-TX vessel vent exhauster
- Air sampling and stack monitor
- 244-TX air exhaust sampler
- Instrument process air.
- Air Compressor (located in the CONEX box outside the farm)

### A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of TY farm be required, personnel should assemble either at the 200 West Area Tank Farm staging area, or at an alternate location upwind.

### B. EMERGENCY EQUIPMENT AVAILABLE AT TY FARM

The TY Tank Farm Fire Plan is posted on the wall of the change trailer.

The following equipment is available:

- First Aid and Bloodborne Pathogen Kit (located in the change trailer)
- Wind sock (located just outside the change trailer)
- Two self-contained breathing apparatus (located in the change trailer)
- Ladder
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer).

**C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table Q-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
216-TY	201	Inactive, isolated	Flush tank	8 ft W x 25 ft L x 7 ft 6 in. D	2 manholes below grade, one on NW and one on SE corner, ~ 30 in. dia.	N	none	NA	H-2-2760
241-TY	101-01A	Inactive-I S/II- weather covered	pump pit w/saltwell	11 ft W x 14 ft 6 in. L x 7 ft 7-3/4 in. D	Coverblock(s)	N	hatch 2 ft x 2 ft 6 in.	Permit	ferrocyanide watch tank, H-2-2294, H-2-36320, H-2-36271
241-TY	101-A	Inactive-I S/II- weather covered	N. sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblock(s)	N	none	Permit	ferrocyanide watch tank, H-2-42619, H-2-2295
241-TY	101-B	Inactive-I S/II- weather covered	S. sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblock(s)	N	none	Permit	ferrocyanide watch tank, H-2-42618, H-2-2295
241-TY	101	Inactive-I S/II	flush pit	5 ft dia. x 4 ft D	Hinged cover	N	none	Non-Permit	H-2-36270, H-2-36320, ferrocyanide watch tank
241-TY	101	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/ 24 in. pipe w/90 deg bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	ferrocyanide watch tank, H-2-2248
241-TY	102-02A	Inactive-I S/II- weather covered	pump pit	11 ft W x 14 ft 6 in. L x 7 ft 3/4 in. D	Coverblock(s)	N	hatch 2 ft x 2 ft 6 in.	Permit	H-2-2294, H-2-36320, H-2-36271

Table Q-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	102-A	Inactive-I S/II- weather covered	N. sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblocks	N	none	Permit	H-2-22953, H-2-2295
241-TY	102-B	Inactive-I S/II- weather covered	S. sluice pit	9 ft W x 10 ft 10 in. L x 8 ft 5-1/2 in. D	Coverblocks	N	none	Permit	H-2-2248, H-2-2295
241-TY	102	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/ 24 in. pipe w/90 deg bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	H-2-2295, H-2-2248
241-TY	102	Inactive-I S/II- filled w/dirt and rock	flush pit	5 ft dia. x 4 ft D	none	N	none	NA	H-2-36270,
241-TY	W of 102-TY	Inactive	valve box	22 in. SQ x 56 in. D	coverblock	N	none	Non-Permit	H-2-2249-1
241-TY	E of 102	inactive	steam trap pit	4 ft dia. x 6 ft 2 in. D	3/16 in. metal plate	Y	ladder	Permit	H-2-36325
241-TY	103	Inactive-I S/II- weather covered	caisson R13	42 in. riser ~6 ft 2 in. D	7 ft 4 in. SQ concrete cap	N	none	Permit	ferrocyanide watch tank, H-2-36318

Table Q-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	103-03A	Inactive-I S/II- weather covered	pump pit w/ saltwell casing	11 ft W x 14 ft 6 in. L x 8 ft 1-1/2 in. D	Coverblocks	N	hatch 2 ft x 2.5 ft	Permit	H-2-36270, H-2-2294, H-2-36318, H-2-36271
241-TY	103	Inactive-I S/II-	flush pit	5 ft dia. x 4.5 ft D	hinged cover	N	none	Permit	ferrocyanide watch tank, H-2-36270, H-2-36318
241-TY	103	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/ 24 in. pipe w/90 deg bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	ferrocyanide watch tank, H-2-2218, H-2-2248
241-TY	N of 103-TY	Inactive - isolated, filled with rock	valve box	~2.5 ft SQ x 3.5 ft D	none	N	none	NA	H-2-2913, H-2-73088
241-TY	104-04A	Inactive-I S/II- weather covered	pump pit	11 ft W x 14 ft 6 in. L x 8 ft 1-1/2 in. D	Coverblocks	N	hatch 2 ft x 2.5 ft	Permit	ferrocyanide watch tank, H-2-36270, H-2-2294, H-2-36271
241-TY	104	Inactive-I S/II- weather covered	condenser pit	5 ft 9 in. W x 3 ft 3 in. L x 12 ft D w/ 24 in. pipe w/90 deg bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	ferrocyanide watch tank, H-2-2248

Table Q-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	104	Inactive-I S/II- cut off below grade	flush pit	5 ft dia. x 4.5 ft D	hinged cover	N	none	NA	ferrocyanide watch tank, H-2-36270
241-TY	104, below grade?	Inactive-I S/II- weather covered	caisson R13	42 in. riser	7 ft4 in. SQ concrete cap	N	none	Permit	H-2-2244, H-2-73089
241-TY	W of 104-TY	Inactive-	valve box	22 in. SQ x 56 in. D	coverblock	N	none	Non-Permit	H-2-2249-1
241-TY	105	Inactive-I S/II- weather covered	saltwell pump pit	6 ft dia. x 4 ft 10 in. D	hinged cover	N	none	Permit	H-2-34961
241-TY	105	Inactive-I S/II- weather covered	condenser pit	5 ft9 in. W x 3 ft3 in. L x 12 ft D w/ 24 in. pipe w/90 deg bend halfway 12 ft L direct to tank	hatchway	N	none	Permit	H-2-2248
241-TY	105	Inactive-I S/II-riser is plugged, cut off below grade?	Caisson R13	42 in. riser, 6 ft2 in. D	7 ft4 in. SQ concrete cap	N	none	Permit	H-2- 2244, H-2-73089
241-TY	~75 ft E of 105-TY	Inactive	caisson	8 ft dia. x 20 ft D	hinged cover	N	none	Permit	H-2-35586

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Table Q-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	W of 105-TY	Inactive	valve box	3 ft W x 4 ft L x 4 ft D	coverblock	N	none	Non-Permit	H-2-2249-1, H-2-2913
241-TY	106	Inactive-I S/II- weather covered	condenser pit	5 ft9 in. W x 3 ft3 in. L x 12 ft D w/ 24 in. pipe w/90 deg bend halfway 12 ft L direct to tank	Hatchway	N	none	Permit	H-2-2248
241-TY	106	Inactive-I S/II- weather covered	caisson R13	42 in. riser 6 ft2 in. D	7 ft4 in. SQ concrete cap	N	none	Permit	H-2-
241-TY	W of 106-TY	Inactive	Caisson	8 ft dia. x	hinged cover			Permit	H-2-
241-TY	W of 106-TY	Inactive	valve box - 2 ft below grade	22 in. SQ x 56 in. D	Coverblock	N	none	Non-Permit	H-2-2249-1, H-2-34961
241-TY	~46 ft SSW of 106	Inactive	Steam trap assy	6 ft dia. x 7 ft2 in. D	hinged cover	N	none	Permit	H-2-36325 det VIII, H-2-36311
241-TY	153	Inactive - weather covered	Diversion Box - nozzle pit	6 ft W x 29 ft L x ~17 ft D	Coverblocks	N	none	Permit	H-2-2338 - 32, H-2-2231
241-TY	153	Inactive - weather covered	Diversion Box - jumper storage	6 ft W x 9 ft- 10 1/2 in. L x ~17 ft D	Coverblocks	N	none	Permit	H-2-2338 - 32, H-2-2231

Table Q-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-TY	153	Inactive - weather covered	Diversion Box - pipe pit	12 ft2 in. W x 41 ft4 in. L x ~9.85 ft D	none - underground	N	none	Permit	H-2-2338 - 32, H-2-2231
241-TY	-302-A, aka 241-TY-32 1-A	isolated	catch tank	40 ft L x 9 ft dia.	no access pit	N	none	NA	H-2-2733
241-TY	-302-B, aka 241-TY-32 1-B, 241-TY-30 4-B	isolated	encasement drain catch tank	9 ft dia. x 32 ft4.75 in. L	no access pit	N	none	NA	H-2-71655, H-2-44501 sht 126

## Table Q-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 12/19/95

2 PAGES

DATE OF REPORT: 3/2/95

IS AND IH REPRESENTATIVES: ME NOLAN, DC CARLS,  
GD MICKLE

ASSESSMENT NUMBER:

AREA: 200W    FACILITY: TX &amp; TY

OTHER EMPLOYEES: INEZ AUSTIN

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Change Trailer	Safety Board: Current Safe Work Practice is not posted.	Keep Safety Board current.		1910. 1200	AIIc	4C
TY-103	Asbestos: Green Transite box damaged. Possible exposure. Not labeled.	Seal or remove box. If sealed, then label.	Y	.1001	AIIx	2D
TY Farm	Evening Illumination: The illumination of the Farm falls between 0.0 to 2.7 Foot Candles. (0.0 to 27 LUX)	Provide workers with illumination when actions must be performed in low light situations.		.120(m)	BIq	3B
TX Farm	Evening Illumination: The illumination of the Farm falls between 0.0 to 6.1 Foot Candles. (0.0 to 61 LUX)	Provide workers with illumination when actions must be performed in low light situations.		.120(m)	BIq	3B
CONEX between TX and TY	Noise: The compressor located in the CONEX box has the potential to damage hearing if personnel are to work in the area while compressor is running.	Post a Noise Hazard Warning sign on the door to the CONEX and directly within the CONEX if the sign on the door can be obstructed/ hidden when door is open. (See noise survey by D.R. Carls)	Y	.95	AIII	4B

**APPENDIX R**

**HEALTH AND SAFETY PLAN  
FOR THE U TANK FARM**

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## APPENDIX R

### HEALTH AND SAFETY PLAN FOR THE U TANK FARM

#### I. TANK FARM DESCRIPTION

##### A. GENERAL

The U farm consists of twelve (12) single-shell tanks with a capacity of 1,892,706 L (500,000 gal) each. The tanks are arranged in a cascade fashion (flow arrangement) with four cascades of three tanks each. The tanks are numbered 241-U-101 through -112. Four smaller tanks, 241-U-201 through -204, are also present and will hold 208,198 L (55,000 gal) each. Tanks 241-U-103, -105, -107, -108, and -109 are on the Hydrogen/Flammable Gas Watch List. Tanks 241-U-103, -105, -106, -107, -111, -203, and -204 are on the High Organics Watch List because of the volume of suspect organics within the tanks. Tank 241-U-106 vents vapor/gas around the distributor pit, and is a confirmed vapor hazard from organics and/or ammonia and possibly other gases/vapors. Several tanks have been shown to vent organic vapors to the atmosphere from several penetrations including both breather and nonbreather penetrations. Passive ventilation is used on all tanks in U farm.

All U farm tanks contain high-level radioactive waste and various chemical constituents. Other materials may be defined by the waste characterization program. The U tank farm is classified as a surface contamination area (SCA) (radiological contamination).

Various U farm tanks may be leaking and therefore pose a hazard for any subsurface activities due to radiological and chemical agents.

Controlled areas are established for both radiological and chemical hazards.

##### B. PERIMETER AND SUPPORT FACILITIES

The perimeter is secured by a chain-link fence with access controlled at the support trailer (MO-823) and adjacent gate(s) located on the east side of U farm along Camden Avenue. Personnel enter and exit the farm through the support trailer. Equipment such as motorized vehicles enter and exit the farm through the gate(s), along Camden Avenue, adjacent to the trailer.

### **C. WIND INDICATION**

Wind socks located midway along the west and east fenceline of U farm indicating wind direction to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

## **II. ORGANIZATION AND POINTS OF CONTACT**

### **A. KEY POINTS OF CONTACT**

Shift manager: 373-3475

Site safety representative or officer: Tank Waste Remediation System-Industrial Health and Safety (TWRS IH&S) at 372-3242

TWRS IH&S West Turnaround Office: 372-1799

Health Physics supervisor: 373-2557

Emergency point-of-contact: call shift supervisor and 911

### **B. KEY RESPONSIBILITIES**

For detailed responsibilities, see the *Tank Farm HASP*, Section 1.0. Key responsibilities include:

- Site access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

### III. HAZARD EVALUATION AND CONTROLS

#### A. TANK CHARACTERISTICS

##### 1. Vapor/Gas

Vapor/gas emitting tanks has been narrowed to 241-U-106 by sealing of source emission points. Venting of various vapors/gases to the atmosphere from the distributor pits on tank 241-U-106 has been documented. Possible gas/vapor constituents include organic vapors such as petroleum hydrocarbons and inorganic gases/vapors such as ammonia. However, vapor/gas constituents of the tanks have not been fully characterized. Area, source, and personal exposure monitoring have been conducted in accordance with the *Tank Farm HASP*, Section 6.0.

To date, all personal exposures to gases and vapors have been well within established standards; however, strict adherence to the controls listed is mandatory.

##### 2. Organic Waste

Tanks 241-U-103, -105, -106, -107, -111, -203, and -204 are on the High Organics Watch List because of the relative high concentration of organic waste and oxidizing agents present in the tanks. Under the appropriate conditions, the organic waste materials and oxidizing agents (e.g. sodium nitrites and sodium nitrates) may result in a potentially exothermic reaction.

##### 3. Hydrogen/Flammable Gas

Tanks 241-U-103, -105, -107, -108, and -109 are on the Hydrogen/Flammable Gas Watch List because of the potential to contain concentrations of flammable gases that exceed the lower flammability limit. These gases originated from the waste or are generated as a byproduct of the waste. As a result of the potential flammable nature of these tanks, extreme caution must be exercised to avoid an ignition source near the tanks.

#### **4. High-Level Radioactive Waste and Chemicals**

All U farm tanks store high-level radioactive waste and contain various chemical constituents that are not yet fully characterized. Activities involving containment breaches and intrusive work must be handled in accordance with specific operating and safe work practice procedures and work permit processes.

#### **5. Surface Contamination**

The majority of U farm, as defined by the perimeter exclusion zone of the tank farm, is classified as an SCA and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). The South West corner is a Radiological Buffer Area. Entry and Exit can be accomplished with only hand and foot survey. Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

### **B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS**

#### **1. Noise**

No stationary high-noise sources are present on U farm. There is a compressor in the 701-U building. Hearing protection is required when working in the building and the compressor is running. Hearing protection is may be required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

#### **2. Chemicals**

No specific chemicals are used on U farm that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

### **3. Confined Spaces**

Confined spaces for U farm are listed in Table R-1. These spaces are labelled in the tank farm, and include such areas as utility vaults, flush and valve pits, and saltwells. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII and the *Tank Farm HASP*, Section 10.0, for more information.

### **4. Asbestos**

Warning signs at U farm alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

### **5. Lighting**

The illumination of the farm during evening and night shifts is below the recommended levels. Adequate lighting shall be provided when working in low light situations.

## **C. TASK-BASED HAZARDS**

Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to U tank farm include replacement of breather filters, changeout of seal loop fluid, and any other containment breach (e.g., opining of risers) on all U farm tanks. These tasks must be conducted in accordance with the *Tank Farm HASP*, Section 2.9, Safe Work Practice.

## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for U farm are shown on Figure R-1 and are listed below.

#### 1. Perimeter Exclusion Zone

A perimeter fenceline has been established and serves as both an RBA/URMA and a controlled area for nonradiological hazards.

#### 2. Interior Exclusion Zone

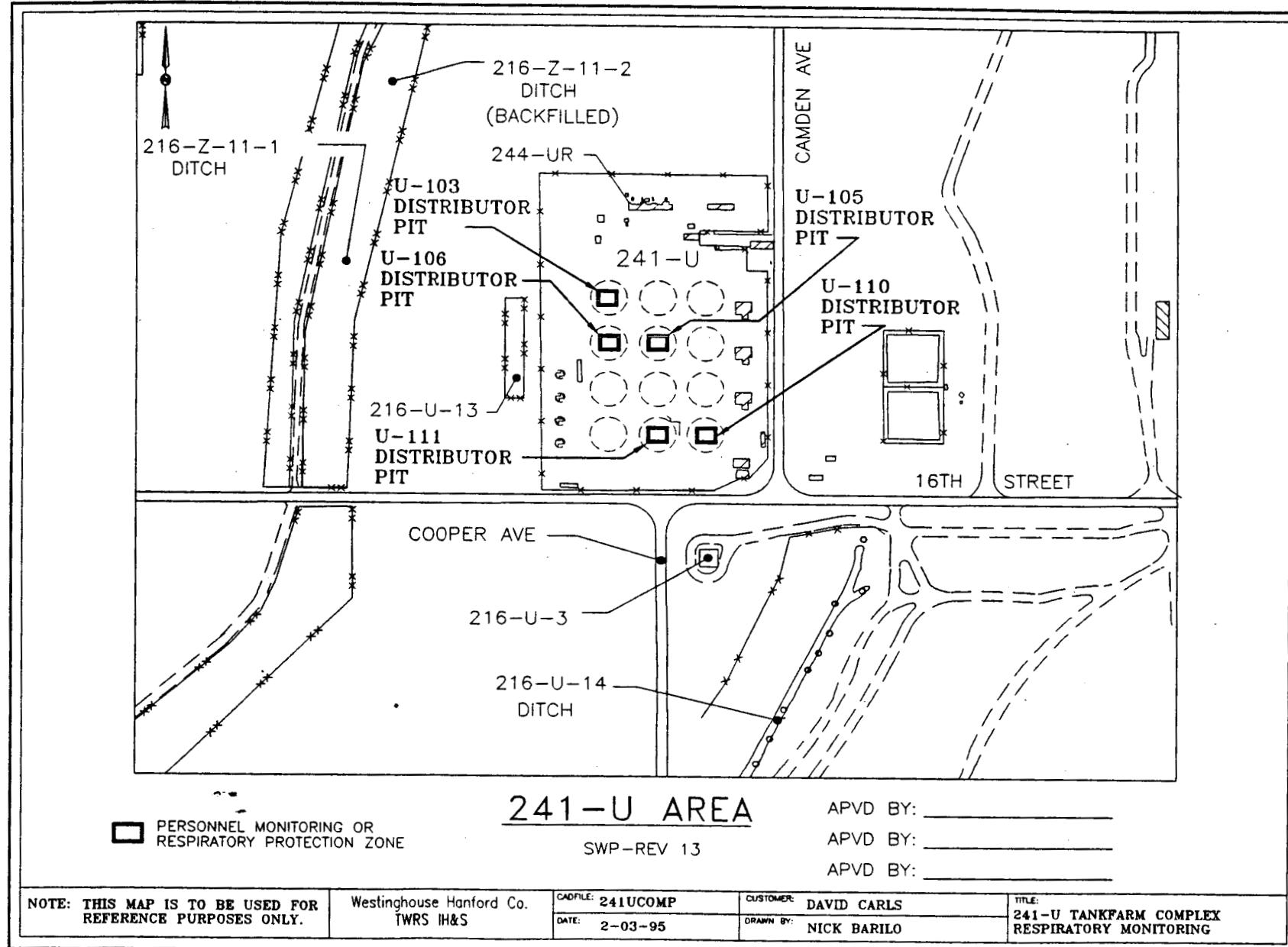
Any interior barricades/exclusion zones established in farm are specified in the SWP. In addition to the RBA/URMA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

#### 3. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of the support trailer, the landing and stairway outside the trailer leading into the tank farm, and the immediately adjacent graveled area from the vehicle entry gate to approximately 12.19 m (40 ft) into the tank farm (see Figure R-1). Two decontamination lines exist within the contamination reduction corridor (CRC): (1) the personnel decontamination line is through the RBA/URMA portion of the trailer where workers don and doff PPE, scan for radiological contamination, and perform any necessary decontamination; (2) the vehicle/equipment decontamination line is through the vehicle gate, where motorized vehicles or other equipment are scanned for radiological contamination and decontaminated, if necessary.

Currently at U farm, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support trailer are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

Figure R-1. U Tank Farm Site Plan.



#### 4. Support Zone

The support zone consists of the portion of the trailer outside the RBA/URMA as well as the area outside the perimeter fenceline. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 West Area Tank Farm safety and health requirements are specified in the support zone.

### B. ACCESS CONTROL

Access to U farm is to occur only through the contamination reduction zone (CRZ)/CRC (change trailer and adjacent vehicle gate(s) unless otherwise specified in an approved work package. Authorization for entry/access must be obtained from the West Area Shift Operations Manager.

### C. COMMUNICATIONS/BUDDY SYSTEM

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for U farm beyond those specified in the *Tank Farm HASP*, Section 8.0.

## V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

### A. EXCLUSION ZONES

Two levels of PPE are required in designated exclusion zones of U farm.

- Level D PPE is required inside the perimeter fenceline, excluding the RBA. Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hard hat, or safety glasses.
- Level B PPE is required within barricades established or if OVM monitoring is not available or if containment on any of the U farm tanks is breached. (See SWP for specifics) Required Level B PPE consists of the same protective clothing/ equipment as Level D described above plus headcover and supplied-air respiratory protection with a 5-minute escape bottle. PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

## **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional protective clothing such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

## **C. RADIOLOGICAL BUFFER AREA**

There is an RBA on the south east corner of the farm. This area requires only hand and foot survey to exit.

## **D. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the fenceline, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

For entry into interior exclusion zones, the SWP will stipulate monitoring and required respiratory protection to be used.

For information on containment breached, see the *Tank Farms HASP*, section 2.9, and Section 6.0. In addition to other area monitoring, OVM monitoring must be conducted in all greenhouses and structures near breather filters, risers, or other potential emission sources.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

No permanent area monitors are in place for vapors/gases. The nearest continuous air monitor for airborne radiological monitoring is located north of the farms at the intersection of 12th and Baltimore.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## **VII. CONFINED SPACE ENTRY**

Confined spaces for this tank farm are shown on Table R-1. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## **VIII. DECONTAMINATION PROCEDURES**

Radiological contamination is the only significant decontamination issue at tank farms at this time. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## **IX. EMERGENCY RESPONSE**

This section summarizes emergency information specific for U farm. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats.

### **A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY**

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of U farm be required, personnel should assemble at the nearest upwind staging area.

## **B. EMERGENCY EQUIPMENT AVAILABLE AT U FARM**

The U Tank Farm Fire Plan is posted on the wall of the change trailer.

The following equipment is available:

- First Aid and Bloodborne Pathogen Kits (located in the change trailer)
- Panic button and fire alarm (located just outside the 244-U Control Room on the southeast corner of U farm; the yellow flashing light indicates that tank pumps are operating)
- Fire extinguishes
- Two self-contained breathing apparatus (located in the change trailer)
- Protective clothing (available in the change trailer)
- Radiological monitoring equipment (located in the change trailer)
- Wind socks (located midway along the east and west fencelines).

## **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	101-UR-01 B	Inactive-IS/II-weather covered	distributor pit	6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	(cascade heel pit) H-2-40192
241-U	101-UR-01 A	Inactive-IS/II-weather covered	sludge pump pit	16 ft W x 11 ft L x 8 ft-5 in. D	coverblocks	N	none	Permit	(cascade pump pit) H-2-40191
241-U	101-UR-01 C	Inactive-IS/II-weather covered	sluice pit	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	(cascade sluice pit) H-2-40193, H-2-2338-89
241-U	101-UR	Inactive-IS/II-weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft 9 in. dia. pipe with 90° bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-2-581
241-U	W of 101-U	Inactive - cut/capped	caisson	8 ft dia.	none	N	none	N/A	cut off ~ 12" below grade and filled with dirt/rock. H-2-35588
241-U	SE of 101-U	Inactive	caisson	8 ft dia.	hinged cover	Y	ladder		<u>may be</u> cut off ~ 12" below grade and filled with dirt/rock.
241-U	102-UR-02 B	Inactive- PI - may be covered with plywood	distributor pit	6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	(cascade heel pit) H-2-40192
241-U	102-UR-02 A	Inactive- PI - weather covered	sludge pump pit	11 ft W x 16 ft L x 8 ft-5 in. D	coverblocks	N	none	Permit	(cascade pump pit) H-2-40191

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	102-UR-02 C	Inactive- PI - weather covered	sluice pit	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	(cascade sluice pit), H-2-40193, H-2-2338-89
241-U	102-U	Inactive- PI - weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743
241-U	102	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	103-UR-03 B	Inactive- PI - distributer pit		6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list, (cascade heel pit),H-2-40192
241-U	103-UR-03 A	Inactive- PI - weather covered	sludge pump pit	11 ft W x 16 ft L x 8 ft-5 in. D	coverblocks	N	none	Permit	hydrogen watch list, (cascade pump pit), H-2-40191
241-U	103-UR-03 C	Inactive- PI - weather covered	sluice pit	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list, (cascade sluice pit), H-2-40193, H-2-2338-89
241-U-SP	between 103-U and 106-U	Inactive	service pit	5 ft dia. x 5 ft6 in. D	hinged cover	Y	ladder	Non-Permit	H-2-37364

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Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	103-U	Inactive- PI - weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	hydrogen watch list, HW 72743
241-U	SW of 103-U	Inactive- PI - weather covered?	service pit	5 ft dia. x 5 ft6 in. D	hinged cover	Y			steam has been isolated, H-2-37364
241-U	103	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	104-UR-04	Inactive- IS/II-	heel pit	6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	H-2-40193
241-U	104-UR-04	Inactive-IS/II- weather covered	sludge pump pit	11 ft W x 16 ft L x 8 ft-5 in. D	coverblocks	N	none	Permit	H-2-40191
241-U	104-UR-04	Inactive- IS/II-	sluice pit	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	H-2-40193, H-2-2338-89
241-U	104-U	Inactive-IS/II-	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743, H-2-581
241-U	W of 104-U	Inactive - cut/capped	caisson	8 ft dia.	none	N	none	N/A	cut off ~12 in. below grade and filled with dirt. H-2-35589

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	SE of 104-U	Inactive	caisson	8 ft dia.	hinged cover	Y	ladder		
241-U	105-UR-05 B	Inactive- PI	distributor pit	6 ft W x 9 ft L x ~4 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list, H-2-40192
241-U	105-UR-05 A	Inactive- PI weather covered	sludge pump pit	9 ft W x 8 ft-6 in. L x ~7 ft D	coverblocks	N	none	Permit	hydrogen watch list H-2-40191
241-U	105-UR-05 C	Inactive- PI weather covered	pump pit (modified sluice pit)	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list H-2-40193, H-2-2338-89
241-U	105-U	Inactive- PI weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	hydrogen watch list, H-W-72743
241-U	105	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	106-UR-06 B	Inactive- PI	Distributor pit	6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	high organic watch list H-2-40192
241-U	106-UR-06 A	Inactive- PI weather covered	sludge pump pit	9 ft W x 8 ft-6 in. L x ~7 ft D	coverblocks	N	none	Permit	high organic watch list H-2-40191
241-U	106-UR-06 C	Inactive- PI weather covered	pump pit (modified sluice pit)	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	high organic watch list H-2-40193, H-2-2338-89

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	106-U	Inactive- PI weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	high organic watch list, H-W-72743
241-U		Inactive	Service pit	5 ft dia. x 6 ft D	hinged cover	N	none	Non-Permit	H-2-37364
241-U	106	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	107-UR-07 B	Inactive- PI	distributor pit	6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	high organic watch list H-2-40192
241-U	107-UR-07 A	Inactive- PI weather covered	sludge pump pit	11 ft W x 16 ft L x 8 ft-5 in. D	coverblocks	N	none	Permit	high organic watch list H-2-40191
241-U	107-UR-07 C	Inactive- PI weather covered	sluice pit	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	high organic watch list H-2-40193, H-2-2338-89
241-U	107-U	Inactive- PI	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	high organic watch list, H-W-72743
241-U	107	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	108-UR-8B	Inactive- PI	Distributor pit	6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list H-2-40192

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	108-UR-08 A	Inactive- PI weather covered	sludge pump pit	11 ft W x 16 ft L x 8 ft-5 in. D	coverblocks	N	none	Permit	hydrogen watch list H-2-40191
241-U	108-UR-08 C	Inactive- PI weather covered	sluice pit	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list H-2-40193, H-2-2338-89
241-U	108-U	Inactive- PI weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	hydrogen watch list, H-W-72743
241-U	108	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	109-UR-09 B	Inactive- PI	Distributor pit	6 ft W x 9 ft L x 4 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list H-2-40192
241-U	109-UR-09 A	Inactive- PI weather covered	sludge pump pit	11 ft W x 16 ft L x 8 ft-5 in. D	coverblocks	N	none	Permit	hydrogen watch list H-2-40191
241-U	109-UR-09 C	Inactive- PI weather covered	sluice pit	8 ft-6 in. W x 9 ft L x 9 ft-9 in. D	coverblocks	N	none	Permit	hydrogen watch list H-2-40193, H-2-2338-89
241-U	109-U	Inactive- PI weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	hydrogen watch list, H-W-72743

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	109	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	110-U-10B	Inactive- IS/PI	Distributor pit	6 ft-6 in. W x 6 ft L x ~4.5 ft D	coverblocks	N	none	Permit	H-2-37319
241-U	110-U- 10A	Inactive- IS/PI weather covered	pump pit	6 ft W x 6 ft L x ~6 ft D	coverblocks	N	none	Permit	H-2-37319
241-U	110-U	Inactive- IS/PI weather covered	condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72743
241-U	NE of 110-U	Inactive	Shielded vault w/ steam condenser	6 ft W x 15 ft L x 7 ft6 in. D, w 3 ft dia. x 11 ft6 in. L tank	2 ea. coverblocks	N	each coverbloc k is 6 ft W x 7 ft10 in. L	Permit	H-2-44076, H-2-44002
241-U	S side of 110-U	Inactive	caisson	6 ft dia.	hinged cover	Y	ladder	N/A	<u>may be</u> cut off ~12 in. below grade and filled with dirt/rock. H-2-37344
241-U	110	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	111-U- 11B	Inactive- PI	Distributor pit	6 ft-6 in. W x 6 ft L x ~4.5 ft D	coverblocks	N	none	Permit	high organic watch list
241-U	111-U- 11A	Inactive- PI weather covered	pump pit	6 ft W x 8 ft L x 5 ft- 7.5 in. D	coverblocks	N	none	Permit	high organic watch list

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	111	Inactive	CMP pit	4 ft dia. x ~6 ft D	metal cover	Y	ladder	Permit	H-2-73722/ H-2-73050
241-U	112-U	Inactive-IS/II- weather covered	saltwell pump pit	6 ft dia.	hinged cover	N	none	Permit	H-2-34961
241-U	NW of 112-U	Inactive	steam trap station	4 ft dia. x 6.5 ft D	metal cover	Y	ladder	Permit	H-2-37344, H-2-37353
241-U	E of 112-U, cut and capped	Inactive	caisson	8 ft dia.	hinged cover	N	none	N/A	cut and capped
241-U	201-U	Inactive-IS/II- weather covered	receiver tank	20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	
241-U	201-U	Inactive-IS/II- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-U	201-U	Inactive-IS/II- weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-U	202-U	Inactive-IS/II- weather covered	receiver tank	20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	H-W-72742

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	202-U	Inactive-IS/II- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-U	202-U	Inactive-IS/II- weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-U	203-U	Inactive-IS/II- weather covered	receiver tank	20 ft dia. x 25 ft D 20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	H-W-72742

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	203-U	Inactive-IS/II- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-U	203-U	Inactive-IS/II- weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-U	204-U	Inactive-IS/II- weather covered	receiver tank	20 ft dia. x 25 ft D 20 ft dia. x 25 ft D	manhole below grade	N	none	Permit	H-W-72742
241-U	204-U	Inactive-IS/II- weather covered	E condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	204-U	Inactive-IS/II-weather covered	W condenser pit	5 ft-9 in. W x 3 ft-3 in. L x 7 ft D opening into a 1 ft9 in. dia. pipe with 90 deg. bend, ~10 ft L, open to tank	hatchway	N	bolted cover	Permit	H-W-72742
241-U	UA	inactive	valve pit	12 ft W x 10 ft L x 6 ft D	coverblocks	Y	2- 2 ft SQ manholes	Permit	H-2-37320
241-U	UA	inactive - sealed	flush pit	5 ft dia. x 5 ft D	hinged metal cover	N	none	Permit	H-2-37365
241-U	UB	inactive	valve pit	12 ft W x 10 ft L x 6 ft D	coverblocks	Y	2- 2 ft SQ manholes	Permit	H-2-37320
241-U	UB	inactive - sealed	flush pit	5 ft dia. x 5 ft D	hinged metal cover	N	none	Permit	H-2-37365
241-U	UC	inactive	valve pits	12 ft W x 10 ft L x 6 ft D	coverblocks	Y	2- 2 ft SQ manholes	Permit	H-2-37320
241-U	UC	inactive	flush pit	5 ft dia. x 5 ft D	hinged metal cover	N	none	Permit	H-2-37365
241-U	UD	inactive	valve pits	12 ft W x 10 ft L x 6 ft D	coverblocks	Y	2- 2 ft SQ manholes	Permit	H-2-37320
241-U	UD	inactive	flush pit	5 ft dia. x 5 ft D	hinged metal cover	N	none	Permit	H-2-37365
241-U	151	Active	Diversion box	6 ft W x 16 ft L x 15.62 ft D	Coverblocks	N	none	Permit	H-2-2338-8, H-W-72183
241-U	152	Active	Diversion Box	6 ft W x 24 ft L x 15.63 ft D	Coverblocks	N	none	Permit	H-2-2338-9

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	153	Inactive - weather covered	Diversion Box	6 ft W x 30 ft L x 20.61 ft D	Coverblocks	N	none	Permit	H-2-2338-10, H-W-72184, H-2-34554
241-U	252	Inactive - weather covered	Diversion box for 201-204 tanks	6 ft W x 32 ft L x 13.04 ft D	coverblocks	N	none	Permit	H-2-2338-11, H-W-72184
241-U	301-U (aka U- 301-B)	active	catch tank	20 ft dia. x 15 ft D	pump pit 5 ft dia. x 5 ft3 in. D	N	none	Permit	H-2-1748/9, H-2-71653 also shows manhole on top, below grade
241-UR	151	inactive - weather covered	master diversion box - uranium recovery - nozzle pit	9 ft W x 50 ft l w/~ 4 ft wall 10 ft from east end. x 13 ft3 in. D	coverblocks	N	none	Permit	H-2-2338-33, H-2-40165
241-UR	151	inactive - weather covered	master diversion box - uranium recovery - pipe pit	13 ft11 in. W x 52 ft L x 6 ft9 in. D	none-undergroun d	N	none	Permit	H-2-2338-33, H-2-40165
241-UR	152	Inactive and weather covered	cascade diversion box - nozzle pit	9 ft W x 33 ft L x 8 ft2 in. D	coverblocks	N	none	Permit	H-2-2338-34, H-2-40140

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-UR	152	Inactive and weather covered	cascade diversion box - pipe pit	13 ft 6 in. W x 22 ft L x D	precast cover	N	none	Permit	H-2-2338-34, H-2-40140
241-UR	152	Inactive and weather covered	cascade diversion box - pipe pit	6 ft 6 in. x 16 ft x D	precast cover	N	none	Permit	H-2-2338-34, H-2-40140
241-UR	153	Inactive - weather covered	Cascade diversion box - nozzle pit	9 ft W x 33 ft L x 8 ft D	coverblocks	N	none	Permit	H-2-2338-35, H-2-40565
241-UR	153	Inactive and weather covered	cascade diversion box - pipe pit	6 ft 6 in. x 16 ft x 8 ft D	precast covers	N	none	Permit	H-2-2338-35, H-2-40565
241-UR	153	Inactive and weather covered	cascade diversion box - pipe pit	13 ft 6 in. W x 22 ft L x 8 ft D	precast covers	N	none	Permit	H-2-2338-35, H-2-40565
241-UR	154	Inactive and weather covered	cascade diversion box - nozzle pit	9 ft W x 33 ft L x 8 ft D	coverblocks	N	none	Permit	H-2-40566
241-UR	154	Inactive and weather covered	cascade diversion box - pipe pit	6 ft 6 in. x 16 ft x 8 ft D	precast covers	N	none	Permit	H-2-40566

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-UR	154	Inactive and weather covered	cascade diversion box - pipe pit	13 ft 6 in. W x 22 ft L x 8 ft D	precast covers	N	none	Permit	H-2-40566
241-U	244-U	inactive	DCRT - pump pit	17 ft W x 19 ft L x 10 ft D	coverblocks	N	none	Permit	H-2-73786
241-U	244-U	inactive	DCRT - filter pit	17 ft W x 19 ft L x 10 ft D	coverblocks	N	none	Permit	H-2-73786
241-U	244-U	inactive	DCRT -flush pit	~4.5 ft dia. x 4 ft D	hinged cover	Y	none	Permit	H-2-76616, H-2-73910
241-U	244-U	inactive	DCRT -instrument pit	4 ft dia. x 8 ft D	manhole	Y	ladder	Permit	H-2-73793
241-U	244-U	inactive	DCRT - tank vault (annulus)	~16 ft - 4 in. W x 44 ft - 2 in. L x 26 in. D (10 in. + 16 ft)	coverblocks	N	none	Permit	H-2-73786
241-UR	244-UR	inactive - weather covered	uranium recovery vault - jumper pit	3 ft W x 6 ft L x 5 ft D	metal cover	N	none	Permit	H-2-40218
241-U	244-UR-00 1	inactive - weather covered	uranium recovery vault - pump pit	9.5 ft W x 42 ft L x 13 ft-6 in. D	coverblocks	N	none	Permit	H-2-40218, pump pit runs the length the vault except for 004.

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	244-UR-001	inactive - weather covered	uranium recovery vault - tank vault	13 ft W x 16 ft L x 29 ft-6 in. D	none	N	none	Permit	H-2-40218, 40 in. duct work along the N side of vault underground (plenum chamber), 30 in. ductwork along S side of vault underground (to 291-UR), both sealed with a concrete plug
241-U	244-UR-002	inactive - weather covered	uranium recovery vault - abandoned tank	20 ft dia. x 20 ft D	~3 ft manhole opening into pump pit	N	none	Permit	H-2-40218
241-U	244-UR-002	inactive - weather covered	uranium recovery vault - jumper pit	~1.75 ft W x 5 ft L x 4 ft-6 in. D	metal cover	N	none	Permit	H-2-40218
241-U	244-UR-002	inactive - weather covered	uranium recovery vault - pump pit	9.5 ft W x 42 ft L x 13 ft-6 in. D	coverblocks	N	none	Permit	H-2-40218, pump pit runs the length the vault except for 004.
241-U	244-UR-002	inactive - weather covered	uranium recovery tank vault	9.5 ft W x 12 ft L x 19 ft D	none	N	none	Permit	H-2-40218
241-U	244-UR-002	inactive - weather covered	uranium recovery vault - abandoned tank	14 ft dia. x 12 ft D	~3 ft manhole opening into pump pit	N	none	Permit	H-2-40218

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	244-UR-00 3	inactive - weather covered	uranium recovery vault - jumper pit	~1.75 ft W x 5 ft L x 4 ft-6 in. D	metal cover	N	none	Permit	H-2-40218
241-U	244-UR-00 3	inactive - weather covered	uranium recovery vault - pump pit	9.5 ft W x 42 ft L x 13 ft-6 in. D	coverblocks	N	none	Permit	H-2-40218, pump pit runs the length the vault except for 004.
241-U	244-UR-00 3	inactive - weather covered	uranium recovery tank vault	9.5 ft W x 12 ft L x 19 ft D	none	N	none	Permit	H-2-40218
241-U	244-UR-00 3	inactive - weather covered	uranium recovery vault - abandoned tank	14 ft dia. x 12 ft D	~3 ft manhole opening into pump pit	N	none	Permit	H-2-40218
241-U	244-UR-00 4	inactive - weather covered	uranium recovery vault - pump pit	9.5 ft W x 8.5 ft L x 13 ft 6 in. D	coverblocks	N	none	Permit	H-2-40218
241-U	244-UR-00 4	inactive - weather covered	uranium recovery tank vault	9.5 ft W x 8.5 ft L x 18 ft D	none	N	none	Permit	H-2-40218
241-U	244-UR-00 4	inactive - weather covered	uranium recovery vault - abandoned tank	10 ft dia. x 14 ft D	~3 ft manhole opening into pump pit	N	none	Permit	H-2-40218

Table R-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
241-U	-361	Inactive	settling tank	20 ft dia. x 15 ft D	none	N	none	Permit	H-2-951, H-2-1748/9
241-U		Inactive	septic tank	700 gal, no other dimensions	?	?	?	?	H-2-40241
241-U		Inactive	french drain	54 in. dia x ?	wooden cover	N	none	Permit	H-2-40241

**Table R-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/14/95

2 PAGES

DATE OF REPORT: 2/15/95

IS AND IH REPRESENTATIVES: ME NOLAN, GD MICKLE,  
DC CARLS

ASSESSMENT NUMBER:

OTHER EMPLOYEES: INEZ AUSTIN

AREA: 200W    FACILITY: 241-U

R-31

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
271-U	Access: Unlocked door allows uncontrolled direct access to farm	Keep door locked and control key(s)		1910.120	AIIIf	4D
U-701	Noise: No PPE for posted eye/hearing protection area	Survey area for noise levels and post as required	Y	.95	AIII	3A
CHNG TRLR	Obsolete SWP posted	Keep board current		.1200	AIIlc	4D
244-UR Vault	Labeling: Valve pit confined space unlabeled	Level space	Y	.1200	AIIlc	3C
241-U-A Valve pit	Cutting: Greenhouse has sharp metal strips protruding	File down burrs/edges or remove from farm	Y			3B
U-B Flush PIT and U-A Valve pits	Contamination: Pit cover openings unsealed	Seal to protect from vapor exposure	Y	.120	AIIx	3B
ALL	Tripping: Numerous low level trip hazards unflagged	Remove those possible	Y	.22 - .30	BIIk	4C
271-UR	Carcinogen: C854 substation transformers unlabeled for PCB	Sample and label as "PCB Containing" or "PCB Free"	Y	.120	AIIx	2D

**Table R-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/14/95

2 PAGES

DATE OF REPORT: 2/15/95

IS AND IH REPRESENTATIVES: ME NOLAN, GD MICKLE,  
DC CARLS

ASSESSMENT NUMBER:

AREA: 200W FACILITY: 241-U

OTHER EMPLOYEES: INEZ AUSTIN

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
U-106	Labeling: Respiratory signs not present	Label respiratory protection zone	Y	.1200	AIIc	3B
Flush pit U-B	Contamination: Open holes in pit cover	Seal holes	Y	.120	AIIx	4C
	Fire plan is dated 1981	Contact Hanford Fire Department and schedule a pre-fire plan for this facility	Y	.1200 and DOE	BIIaa	3C
	Evening illumination: Light levels are between 0.0 To 1.1 foot candles (0.0 To 11 LUX)	Workers required to perform duties at night or in low light situations will require additional lighting.		.120(m)	BIq	3B

**APPENDIX S**

**HEALTH AND SAFETY PLAN  
FOR THE 242-A EVAPORATOR**

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## APPENDIX S

### HEALTH AND SAFETY PLAN FOR THE 242-A EVAPORATOR

#### I. TANK FARM FACILITY DESCRIPTION

##### A. DESCRIPTION

The 242-A Evaporator is the fourth evaporator to be constructed at Hanford. The first three evaporators (B, T, and S) have been removed from service. The 242-A Evaporator was built in 1973 with operations starting in 1977. In 1989, the evaporator was shut down due to environmental concerns and modified to ensure that the 242-A Evaporator could be operational through the year 2000. This modification included a new control room and monitoring equipment, raw water service building, and other support equipment. Also included in the modification is the Liquid Effluent Retention Facility (LERF) and the Effluent Treatment Facility. These facilities will be used to process the process condensate from the 242-A Evaporator before it is released to the environment.

Liquid wastes with a high water content are blended together in a double shell underground storage tank (TK-102-AW). Tk-102-AW is called the evaporator feed tank. When the liquid feed has been blended, it is sampled and analyzed to establish the parameters (temperature and specific gravity) that will be used to process it.

Evaporator feed is processed in the evaporator recirculation loop. The recirculation loop includes the reboiler, the vapor/liquid separator, the recirculation pump, and the 28-inch piping that ties the components together. There are also several other components that support the operation of the recirculation loop.

The vapor for the vapor/liquid separator is drawn through the deentrainer pads into the 42-inch vapor header. The vapors pass through the vapor header to the primary condenser. In the primary condenser, the vapors pass around water cooled tubes. As the vapors contact the cooled surfaces of the tubes, they condense and return to liquid. The liquids cooled in the primary condenser drain to the condensate collection tank (C-100). The remaining vapors then pass onto the inter-condenser and then to the after-condenser.

The vessel vent system draws the condensable gases from the after-condenser through a deentrainment pad and pre-filter to remove moisture and large particles. After the pre-filter, the gases pass through an electric heater to further reduce moisture. A two stage High Efficiency Particulate Filter Assembly (HEPA filter) removes any remaining fine particles. From the HEPA filters, the gases are discharged to the atmosphere by the vessel vent exhauster through the vessel vent stack.

The condensate collection tank (TK-C-100) is a 17,800 gallon stainless steel tank that receives liquids from the three condensers. When enough condensate has been collected in TK-C-100, the condensate is pumped from TK-C-100 through the condensate filter. Any particles larger than five one-thousandth of a millimeter are removed from the condensate stream and held in the filter. This prevents any particles in the condensate stream from clogging the ion exchange column (IX column) if used.

The IX column is used to remove additional Cesium 137 and Strontium 90 that may be present in the condensate stream. As condensate passes through the ion exchange medium, Cesium and Strontium will chemically bond with the medium material and remain in the resin bed. After passing through the IX column the condensate stream is sampled by a continuous monitoring system for radioactivity and hazardous material. The IX column is often bypassed due to the non-contaminated nature of the process condensate stream.

In the past, evaporator process condensate was sent to retention basins where it was sampled for radiological and chemical analysis. If the analysis met the guidelines for safe disposal, the condensate was released to the soil. Process condensate has been listed as a potentially hazardous substance. Consequently, the condensate stream has been rerouted and after passing through the monitoring system, the condensate stream is routed from the evaporator in specially designed pipes to LERF.

## **B. PERIMETER AND SUPPORT FACILITIES**

The perimeter of the 242-A Evaporator is the structure of the building, which is located on the corner of 4th St and Buffalo Ave.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Facility Manager: Call 373-4565

Shift Manager: Call 373-2689 or 373-0104

Site Safety Representative or Officer: Call TWRS IH&S at 372-9427

Health Physics Supervisor: Call 373-2526

Emergency Point of Contact: Call Shift Manager 373-2689 and 911

### B. KEY RESPONSIBILITIES

For detailed responsibilities, see Section 1.0 of the HASP. Key responsibilities include:

- Site access controlled by Shift Manager
- Work authorized and controlled by Facility Manager or delegate
- Safety and health oversight/support provided by WTSS
- Exposure/area monitoring specified by WTSS
- Exposure/area monitoring conducted by IH Services.

## III. HAZARD EVALUATION AND CONTROLS

### A. BUILDING CHARACTERISTICS:

The majority of the 242-A Evaporator Building, as defined by the perimeter exclusion zone of the tank farm, is classified as a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific areas that can be entered in level D work clothes/street clothes: AMU and HVAC, common areas accessible. Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the HASP and this Appendix, the Radiological Work Permits (RWP), and the ALARA Management Worksheets (AMW).

## B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS

1. Stationary high noise sources are present in the 242-A Evaporator AMU room, HVAC room, and condenser room. Hearing protection is required as indicated by the posting located at the entrances to these areas.
2. A specific chemical that may pose as a health hazard in the 242-A Evaporator is mercury. Mercury has been detected in the condenser room and a "Mercury Control Program" has been established. Chemical use is limited and is discussed in Section 2.0 of the HASP.
3. A listing of confined spaces for the 242-A Evaporator is in Table 1 of this Appendix. These spaces are labelled in the evaporator, and include such areas as utility vaults rooms, flush and valve pits, and tanks. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place prior to entry. See Section 10.0 of the HASP as well as Section VII of this document for more information.
4. Signs at the 242-A Evaporator warn that asbestos materials are present, including pipe lagging, wall panels, transite, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during facility activities unless specifically directed.
5. Safety hazards common to all tank farms and facilities are found in Section 2.0 of the HASP.
6. Falling hazards are located throughout the 242-A Evaporator. Access to all these areas are controlled in some manner. Areas in the condenser room contain physical barriers to protect personnel from fall hazards. Areas in the pump room will be controlled administratively by the use of pre-job briefings and fall hazard awareness prior to entry to that area. Entries to this area are few and average approximately 2 time/year. Installation of physical fall protection barriers in this area is not practical nor ALARA considering the administrative barriers currently in place, such as work control, access control, pre-job briefings and entry permit requirements.

## C. TASK-BASED HAZARDS

Task based hazards will be identified in each work package.

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## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for the 242-A Evaporator are shown on the site map attached to this Appendix and are listed below.

1. Exclusion zones The exclusion zone (hot zone) includes the condenser room, evaporator room, pump storage room, truck loadout room, and IX column room. The hot zone is supplied with ventilation from an intake fan and in-leakage at the loading dock. Negative pressure in the hot zone is normally maintained by operation of the electric exhaust fan.
2. A contamination reduction zone/corridor (CRZ/CRC) or "cold zone" consists of the HVAC room, AMU room, survey area and corridor, soiled clothes area, and change area.
3. The support zone consists of the office area, control room, rest rooms, lunchroom, and corridor.

### B. ACCESS CONTROL

Access to the 242-A Evaporator Building is to occur through the main entrance. Access to the 242-A Evaporator exclusion zones can be performed at the 272-AW WRAM station and the control room operator. All personnel who enter the 242-A Evaporator must notify the control room operator. Authorization for early morning or late evening entries can be done by using the phone by the main door.

### C. COMMUNICATIONS/BUDDY SYSTEM

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements beyond those specified in Section 8.0 of the HASP have been identified for the 242-A Evaporator.

## **V. PERSONAL PROTECTIVE EQUIPMENT (PPE)**

### **A. PPE REQUIREMENTS FOR EXCLUSION ZONES**

Two levels of PPE are required in designated exclusion zones of the 242-A Evaporator and include the following:

Level D PPE that is specified for designated 242-A Evaporator exclusion zone(s) consists of street clothes. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hard hat, safety glasses, or others.

Level B PPE that is specified for designated 242-A Evaporator exclusion zone(s) consists of the same protective clothing/equipment as Level D described above plus Anti-C clothing, headcover and supplied air respiratory protection with 5-minute escape bottle.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

### **B. PPE REQUIREMENTS FOR CONTAMINATION REDUCTION ZONE (CRZ)**

Level D PPE is required, which for the CRZ/CRC consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D protective clothing such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health Representative (SSHR) and/or Health Physics Technician (HPT).

### **C. PPE REQUIREMENTS FOR TASK SPECIFIC HAZARDS**

For specific tasks, PPE requirements are to be listed in Sections 2.0 and 4.0 of the HASP and/or work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

Entry into the CRZ/CRC or into an RBA/URMA - External dosimetry may be required as specified in the RWP.

**Entry into confined spaces** - Oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide, and others as specified on work permits are conducted prior to entry and possibly periodically or continuously during entry. See confined space entry permit for requirements.

An ammonia area monitor is in place for vapors/gases. There are six area radiation detectors in the 242-A Evaporator. The monitors are located (Figure S-1) in the following rooms: AMU room, HVAC room, evaporator room, loadout room, and condenser room basement and fourth level. There are also continuous air monitors (CAMS) located in the 242-A Evaporator. The CAM locations (Figure S-1) are: AMU room, HPT corridor, and the condenser room (on the fourth level).

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the SSHR or other designated TWRS IH&S representative for chemical and physical hazards, and by health physics for radiological hazards.

## **VII. CONFINED SPACE ENTRY**

Confined spaces for this tank farm are shown on Table 1 of this Appendix. See Section 10.0 of the HASP for information on how to gain entry to and conduct work in confined spaces. **DO NOT ENTER CONFINED SPACES WITHOUT: 1) VERIFYING THAT ENTRY REQUIREMENTS ARE IN PLACE, AND 2) OBTAINING SAFETY AND HEALTH AND OPERATIONS OVERSIGHT/SUPPORT.**

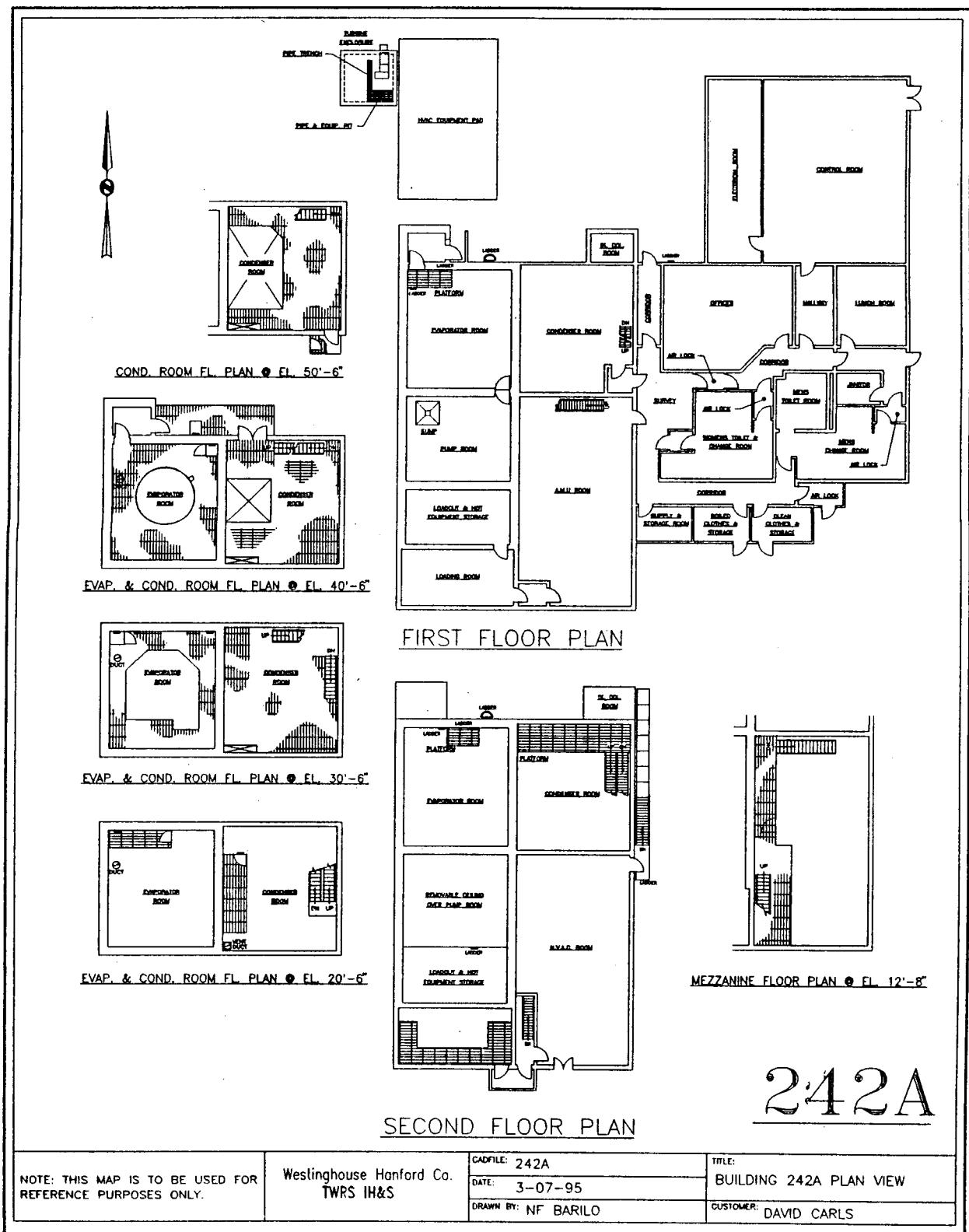
## **VIII. DECONTAMINATION PROCEDURES**

Radiological contamination is the only significant decontamination issue at tank farms at this time. See Section 7.0 of the HASP for information on decontamination procedures.

## **IX. EMERGENCY RESPONSE**

This section summarizes 242-A Evaporator specific emergency information. Consult the WHC Building Emergency Plan, Appendix D, WHC-IP-0263-TF, for more details, as well as Section 9.0 of the HASP that applies to all tank farms and facilities.

Figure S-1. 242-A Evaporator Site Plan.



## **A. EVACUATION, ASSEMBLY AND ACCOUNTABILITY**

Situations requiring evacuation are described in Section 9.0 of the HASP. Should evacuation of the 242-A Evaporator be necessary, the general staging area is located approximately 600 feet south of the building. In the event of an evacuation, proceed to the staging area for a head count.

## **B. EMERGENCY EQUIPMENT AVAILABLE AT THE 242-A EVAPORATOR**

The 242-A Evaporator has a variety of fixed and portable emergency equipment. They are summarized below.

### Fixed Emergency Equipment

<u>Type</u>	<u>Location</u>	<u>Capabilities</u>
Fire Control System	242-A	Assist in the control of a fire
Wet Pipe Sprinkler		
Eyewash/Shower Stations		Assist in flushing unwanted chemical material

### Portable Emergency Equipment

<u>Type</u>	<u>Location</u>	<u>Capabilities</u>
Fire Extinguishers		Use on Class A, B, & C fires
Dry Chemical		Use on Class A or B fires

## **C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, VAPOR RELEASES**

See Section 9.0 of the HASP for information on these and other emergency response issues.

Table S-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
242-A AMU room	A1	Active	NaNO <sub>3</sub>	TK E-101 Eluant tank	46 in. bolt on flange	Y	ladder	P J. Harvey	O <sub>2</sub> Deficiency Heat Stress RBA/URMA
242-A condenser room	A2	Active	Water	TK C-100 condensate tank	16 in. bolt on flange	N		P J. Harvey	O <sub>2</sub> Deficiency Heat Stress RBA/URMA
242-A CONDENSOR ROOM	A3	Active	Ion exchange column	IX column room	2 ft x 2 ft door	Y		P J. Harvey	Heat Stress SCA
242-A evaporator room	A4	Active	Evaporator Pot	Evaporator room	Door	Y	Door	NP J. Harvey	Heat Stress SCA
242-A PUMP ROOM	A5	Active	Pump Jumpers	Pump room	Door	Y	Door	NP J. Harvey	Heat Stress SCA
242-A condensor room	A6	Active	Water	C-103 Weir box	Lid on Box	N		NP J. Harvey	Mechanical hazards Heat Stress RBA/URMA
242-A Condensor room	A7	Active	Air	Space under tank C-100	Cutouts in shell support	Y		P J. Harvey	O <sub>2</sub> Deficiency Heat Stress RBA/URMA Insects Illumination
242-A/207-A Valve pit	A8	Active	Empty	207-A valve pit	Hatch on pit cover	Y		NP J. Harvey	Heat Stress SCA
242-A Hot equipment room	A9	Active	Empty	Hot equipment room sumps	Cover in floor opening	Y		P J. Harvey	Heat Stress SCA

Table S-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
242-A Condensor room	A10	Active	Air	Exhaust duct wall opening	Duct opening	Y		P J. Harvey	Heat Stress SCA
242-A HVAC room	A11	Active	Air	K1/K2 plenum doors	14 in. x 72 in. door	Y		NP J. Harvey	Heat Stress Insects
242-A HVAC/rig ht of K2-5-1 fan	A12	Active	Air	K2 Plenum door/right side	14 in. x 72 in. door	Y		P J. Harvey	Mechanical hazard Heat Stress RBA/URMA
242-A Turbine building	A13	Active	Air	Steam condensate pit	Grating	Y	ladder	NP J. Harvey	Steam lines insects
South of 242-A back-up generator	A14	Active	Air	Diesel fuel storage tank	22 in. bolt on flange	Y		P J. Harvey	Vapors illumination small opening
242-A AMU room		Active	Air/Water	TK E-104 decon tank		Y		P J. Harvey	O <sub>2</sub> Deficiency Heat Stress RBA/URMA

**S-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 2/1/95

2 PAGES

DATE OF REPORT: 3/13/95

IS AND IH REPRESENTATIVES: FRED ZAK/  
ROGER MITCHELL

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 242-A

OTHER EMPLOYEES: STEVE BURT

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Pump Room	Floor grating not labeled for load.	Label.	Y	.22	AIIc	3C
Pump Room	Crane inspection out of date.	Inspect and record.	Y	.179	BIIw	2B
HVAC Room	Temporary scaffolding has been in place several months.	Replace or remove.	Y	.28	BIIm	1B
HVAC Room	Area behind blowers dark.	Lighting survey.	Y	.120	Blg	3B
HVAC	Head bump hazard on A-6 vent line.	Pad and post sign.	Y	.22	AIIc	3A
Roof	Air inlets close to sewer drain could lead to introduction of effluent gasses into building.	Ventilation assessment.	Y	ASHRAE 62-1989	AIh	3b
Roof of HVAC	Ladder exits near edge, handrail may be needed.	Extend ladder height and/or add hand rail.	Y	.23 and .27	BIII	1A
HVAC Room	K1 fan has sharp edges on housing.	Pad and post.	Y	.22	AIIc	3A
AMU Room	General housekeeping.	housekeeping.	Y	.141	BIIz	4B
Pump Room and HVAC	Large valve wheels present ergonomic hazard.	Re-engineer.	Y	Gen. Duty Clause	Alli	4C

## S-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 2/1/95

2 PAGES

DATE OF REPORT: 3/13/95

IS AND IH REPRESENTATIVES: FRED ZAK/  
ROGER MITCHELL

ASSESSMENT NUMBER:

AREA: 200E    FACILITY: 242-A

OTHER EMPLOYEES: STEVE BURT

S-15

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Condenser Room	Mercury contamination needs to be remediated.	Continue cleanup and reassess	Y	.1000	AIIx	1B
AMU	Carcinogens located in flammable cabinets, no carcinogen use justifications. Chemical inventory needs to be revised and updated.	Remove carcinogens	Y	.1200	A1z	2C
AMU	Water running down east wall of AMU room and behind electrical panels.	Locate/seal water leak.	Y	.333	BIIq	1A
Condenser Room - 3rd floor	VV inlet bleed line tripping hazard.	Redesign or stripe as hazard.	Y	.22	BIIk	3B
Condenser Room - 2nd floor	Conduit and bracket sticking into aisle way.	Re-engineer or pad.	Y	.22	AIIIc	3A
Condenser Room - 1st level	Head bump hazards (several).	Pad and post.	Y	.22	AIIIc	3A
condenser Room - Main floor	Exit door difficult to open.	Repair.	Y	.37	AIIIi	1B

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**APPENDIX T**

**HEALTH AND SAFETY PLAN FOR THE  
242-S EVAPORATOR BUILDING**

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## APPENDIX T

### HEALTH AND SAFETY PLAN FOR THE 242-S EVAPORATOR BUILDING

#### I. BUILDING DESCRIPTION

##### A. GENERAL

The 242-S Evaporator Building is a five-story building which is no longer in use as an evaporator. The building is now used as a monitoring station for S and SY farms.

As a result of activities originally performed in the building, many areas are highly contaminated. Specific areas require different levels of protection.

The 242-S building is located adjacent to SY, S, and SX farms, which have tanks that vent organic vapor/ammonia to the atmosphere and tanks that produce high heat and hydrogen/flammable gas.

Controlled areas are established for both radiological and chemical hazards.

##### B. WIND INDICATION

Wind socks located at the north side of S farm adjacent to the Data Acquisiton and Control System (DACS) trailer and on the west side of S farm indicate wind direction and to aid in locating onsite work activities, positioning structures and equipment, and planning approach routes.

#### II. ORGANIZATION AND POINTS OF CONTACT

##### A. KEY POINTS OF CONTACT

Control room: 373-5528

Shift manager: 373-3475

Site safety representative or officer: TWRS IH&S at 372-3242

West Area TWRS IH&S Satellite Office: 372-1779

Health Physics supervisor: 373-1765 (back shift make radio call)

Emergency point-of-contact: call shift manager and 911  
DACs trailer (SY farm): 373-4854/2630/4250

## B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm Health and Safety Plan (HASP)*, Section 1.0.

- Site access controlled by the shift manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

## III. HAZARD EVALUATION AND CONTROLS

### A. BUILDING CHARACTERISTICS

The majority of the 242-S Evaporator Building, as defined by the perimeter exclusion zone of the tank farm, is classified as a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific areas that can be entered with Level D personal protective equipment (PPE) include Aqueous Makeup Room (AMU); heating, ventilation, and air-conditioning (HVAC) (via north service entrance); and common areas accessible via the main entrance. Specific controls for activities within the perimeter exclusion zone (also the RBA/URMA) are specified in the *Tank Farm HASP*, this Appendix, the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

### B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS

#### 1. Noise

Stationary high-noise sources are present near the 242-S Evaporator Building. The HVAC and compressor on the south east edge of the evaporator require protective measures when in operation. Hearing protection is also required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the farm.

## **2. Chemicals**

No specific chemicals are used on the 242-S Evaporator Building that are atypical of operations at other tank farms. Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

## **3. Confined Spaces**

Confined spaces for the 242-S Evaporator Building are listed in Table T-1. Some of these spaces are labelled in the building. Hazard controls must be specified in a confined space entry permit, and controls must be verified as in place before entry. See Section VII, and the *Tank Farm HASP*, Section 10.0, for more information.

## **4. Asbestos**

Warning signs posted at the 242-S Evaporator Building alert workers that asbestos materials are present. Asbestos may be present in materials such as pipe lagging, wall panels, transit, flange gaskets, and roof felt. Anything painted pink must be assumed to contain asbestos. Such materials must not be disturbed during tank farm activities unless specifically directed.

## **5. Fall Hazards**

The roofs of the evaporator require caution when working near the edge. (See Fall Protection Program, WHC-CM-4-3) The area adjacent to the ladder head on the intermediate roof poses an immediate hazard to the worker. The entire intermediate roof and main roof edges of the evaporator where there is no railing require caution and protective measures.

## **C. TASK-BASED HAZARDS**

The proximity of the 242-S building makes the tasks performed in the tank farms potentially hazardous to building occupants. Tasks common to all or many tank farms and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

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## IV. SITE CONTROLS

### A. WORK ZONES

Work zones and controlled areas for the 242-S Evaporator Building are clearly marked in the building. Because of the size of the building and the infrequency of entry to most of it, specific areas will not be addressed.

#### 1. Contamination Reduction Zone/Contamination Reduction Corridor

This zone consists of the RBA/URMA portion of the change room and the air lock leading into the hot side of the building Curr. Currently at the 242-S Evaporator, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the CRC and support room are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

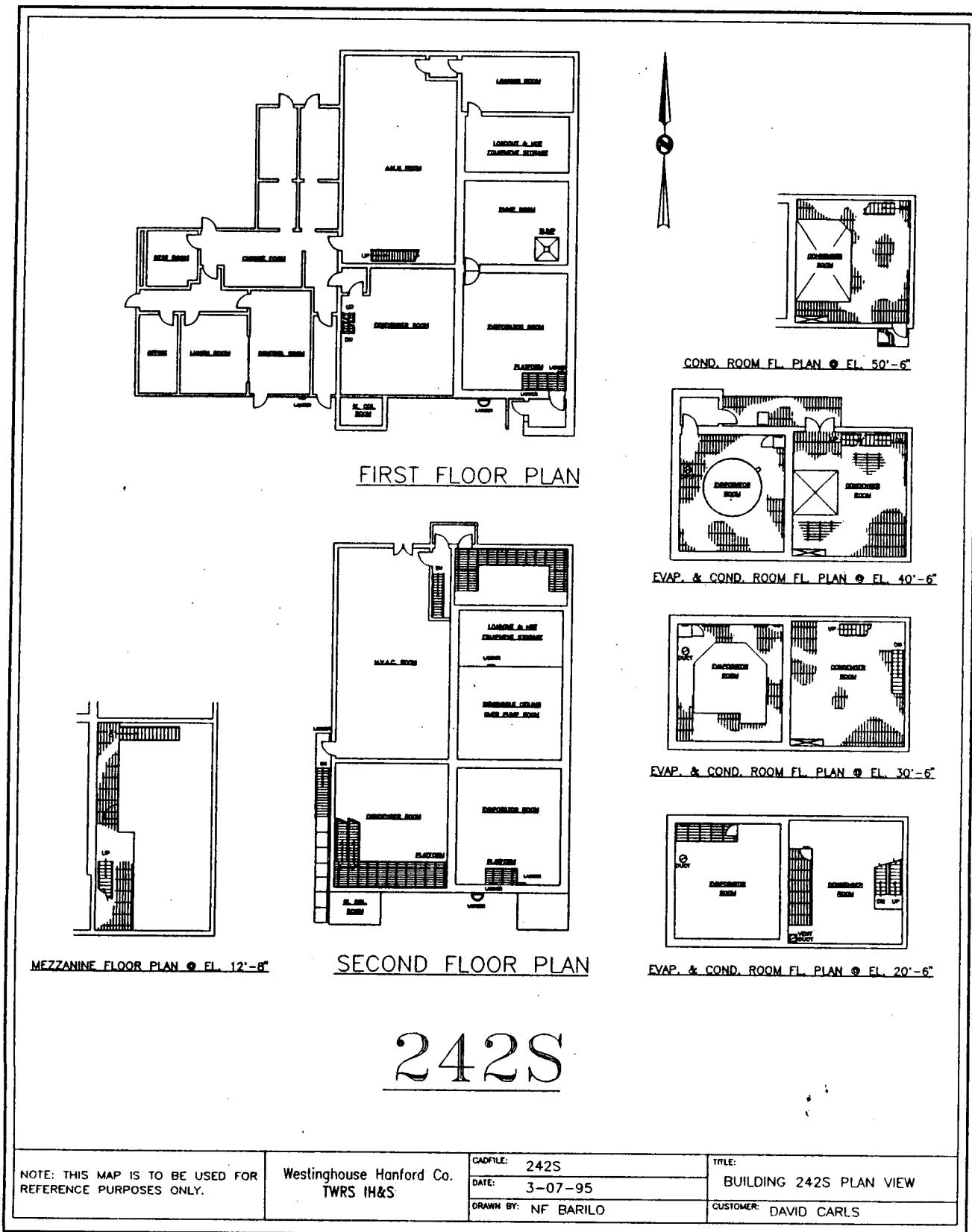
#### 2. Support Zone

The support zone consists of the portion of the change room outside the RBA/URMA and the remaining common areas of the building. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 West Area Tank Farm safety and health requirements are specified in the support zone.

### B. ACCESS CONTROL

Access to the 242-S Evaporator Building is to occur through the main entrance. There are two other doors that open to the support zone portions of the building, but they are not to be used for normal entrance. A separate entry for the AMU room can be used by personnel who have duties requiring them to be there. All personnel who enter must notify the Control Room Operator. The change room will be used for entry into the 242-S only.

Figure T-1. 242-S Evaporator Site Plan.



### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for the 242-S Evaporator Building beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

### **A. EXCLUSION ZONES**

Two levels of PPE are required in designated exclusion zones of the 242-S Evaporator Building and include the following:

- Normal street clothing or coveralls can be worn in the common, AMU and HVAC areas within the building (i.e., lunch room, offices, control room, and a portion of the change room).
- Level D PPE is required inside the "contaminated" portion of the change room and beyond to the tank farms or other surface contamination area (SCA) portions of the building. Required Level D PPE consists of anti-contamination (anti-C) protective clothing. RWPs may specify additional Level D PPE requirements as necessary.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

### **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Anything else which may require other PPE will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

### **C. TASK-SPECIFIC HAZARDS**

Required task-specific PPE are listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## VI. MONITORING REQUIREMENTS

For entry into the contamination reduction zone (CRZ)/CRC, or into an RBA/URMA, external dosimetry is required as specified in the RWP.

Monitoring is conducted before entry into confined spaces. The Confined Space Entry Permit shall specify the frequency and the hazard(s) to be monitored. (i.e. oxygen, explosivity, organic vapors, ammonia, hydrogen cyanide.)

As determined by TWRS IH&S, personal exposure monitoring will be conducted for representative workers performing tank farm containment breaches, intrusive work on any tank, asbestos work, and other activities with credible exposures.

The nearest continuous air monitor for airborne radiological monitoring is located on the building exhaust system.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

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## VII. CONFINED SPACE ENTRY

Confined spaces for this building are shown on Table T-1. See the *Tank Farm HASP*, Section 10.0, for information on gaining entry to and conducting work in confined spaces. Do not enter confined spaces without: (1) verifying that entry requirements are in place, and (2) obtaining Safety and Health and Operations oversight/support.

## VIII. DECONTAMINATION PROCEDURES

Currently at the 242-S Evaporator Building, radiological contamination is the only significant decontamination issue. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## IX. EMERGENCY RESPONSE

This section summarizes emergency information specific for the 242-S Evaporator Building. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires or other sudden threats. Because there is no backup generating facility, loss of utilities at the 242-S Evaporator Building may result in loss of the operating capacity except for the following equipment:

- Control and instrument systems for SY farm (DACS backup monitoring).

### A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of the 242-S Evaporator Building be required, personnel should assemble either at a point 182.88 m (200 yd) west of the 242-S building or at an alternate location upwind.

### B. EMERGENCY EQUIPMENT AVAILABLE AT 242-S EVAPORATOR BUILDING

The 242-S Evaporator Building Fire Plan is posted on the wall of the change room.

The following equipment is available:

- First Aid and Bloodborne Pathogen kits (located on the wall near the main entrance of the change area)
- Wind sock (located just outside the SY DACs trailer)
- Panic button and fire alarm (located just outside 242-S Control Room; yellow flashing light indicates that tank pumps are operating)
- Two self-contained breathing apparatus (located in the change room)
- Ladder (located in adjacent CONEX)
- Protective clothing (available in the change room)

- Radiological monitoring equipment (located in the change trailer)
- Fire extinguishers are located at
  - The hallway adjacent to the lunchroom
  - Control Room
  - AMU
  - HVAC
  - 3rd and 5th Floor Condenser rooms
  - 4th Floor Condenser room (on catwalk)
  - Buildings 271-SY, 244-S, and 271-A (tank farms)
  - Turbine building (outside).

**C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES,  
PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID,  
ALARMS, VAPOR RELEASES**

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Table T-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
242-S		active	acid storage tank	20 ft H x 15 ft dia.				Permit	currently used for water storage
242-S		active	acid storage berm		ladder	Y		Non-Permit	
242-S		Inactive	loading dock room	12 ft W x 23 ft 10 in. L x 21 ft 6 in. H	door to AMU	Y	door	NA	H-2-46269, H-2-46272
242-S		Inactive	loadout and hot equip. room	12 ft W x 22 ft 2 in. L x 32 ft H	hatch in ceiling	N	none	Non-permit	H-2-46269, H-2-46272, H-2-46270
242-S		Inactive	Hot equipment room sump	35.5 in. dia. x 53 in. D	none	N	none	Permit	H-2-46366
242-S		Inactive	pump room	18 ft W x 22 ft 2 in. x 21 ft 6 in. H	door from evap room	Y	ladder to bottom level	Non-permit	H-2-46269, H-2-46272
242-S		Inactive	evaporator room	22 ft 2 in. W x 25 ft 4 in. L x 71 ft 5.5 in. H (10 ft below grade, 61 ft 5.5 in. above grade)	4 levels - enter at ground level via door on S side outside 242-S, door to outside at 40 ft 6 in. level w/ catwalk and ladder	Y	ladders w/platforms to all levels	Non-permit	H-2-46269, H-2-46272, H-2-46270, H-2-46271, H-2-46272

Table T-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
242-S	CA-1	Inactive	evaporator vessel	12 ft 5 in. dia., 14 ft OD liquid section, 11 ft 6 in. OD vapor section, 41 ft 1-3/4 in. OA height, 100 ft-42.8 in. bottoms circ. loop.	none	N	none	Permit	Struthers Wells Corp. DWG No. 71-05-101-32 F1
242-S		Inactive	AMU	24 ft W x 44 ft 10 in. L x 21 ft H	2 levels - access via dbl doors from N side 242-S, and to SWP lobby	Y	stairs to mezzanine on second floor (elev. 12 ft 8 in.)	NA	H-2-46269, H-2-46272
242-S	S side	Inactive	cleanout box	4 ft dia. x ? D	1/4 in. manhole cover	N	none	Non-permit	H-2-46269, H-2-46272
242-S		Inactive	crane Service platform access to loadout and hot equip. room	12 ft W x 24 ft 5 in. L platform open to 22 ft 2 in. x 31 ft 10 ft x 32 ft H room over loadout and hot equip room	door from HVAC room	Y	door	Non-Permit	H-2-46269, H-2-46272, H-2-46270
242-S	E-C-1	Inactive	Primary condenser tank	85 in. ID x 17 ft 5-1/8 in. OA length.	none	N	none	Permit	Struthers Wells Corp. Dwg. No. 71-04-30917 D11
242-S	E-C-2	Inactive	Inter-Condenser tank	16 in. ID x 87 in. OA length	none	N	none	Permit	Schuttle and Koerting Co. Dwg. No. 72-X-E-001-J
242-S	E-C-3	Inactive	After Condenser tank	8 in. ID x 93-7/8 in. OA length	none	N	none	NA	Schuttle and Koerting Co. Dwg. No. 72-X-E-001-J

Table T-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
242-S	E-A-1	Inactive	Reboiler	40.5 in. OD x 15 ft OA length	none	N	none	Permit	Struthers Wells Corp., Drwg. No. 71-04-31000 D1
242-S		Inactive	condenser room	24 ft W x 27 ft L x 66 ft 5.5 in. H	door to SWP lobby, door to outside at 40 ft6 in. level w/ catwalk and ladder, door to outside at 50 ft6 in. level.	Y	stairs to other levels.	Non-Permit	H-2-46269, H-2-46272, H-2-46270, H-2-46271, H-2-46272
242-S	C-100	Inactive	condensate collection tank	21 ft H x 14 ft dia.	36 in. agitator port	N	none	Permit	H-2-46357
242-S	C-103	Inactive	Flow measureme nt tank	42 in. W x 72 in. L x 36 in. H	none	N	none	NA	H-2-46370
242-S AMU	TK E-101	Inactive	eluent tank	9 ft H x 9 ft dia.	36 in. agitator port	N	none	Permit	H-2-46355
242-S	RE-1	Inactive	air receiver tank	3-4 ft dia.??	none	N	none	NA	
242-S		Inactive	ion exchange room	9 ft W x 6 ft L x 18 ft9 in. H	hatch on top, door at grade into condenser room	Y	ladder to top hatch on outside of 242-S	Permit	H-2-46269, H-2-46272
242-S	IX-D-1	Inactive	Ion exchange column	4 ft dia. x 13.5 ft H	none	N	none	Permit	H-2-46359
242-S		inactive	HVAC room	23 ft 6 in. x 34 ft 10 in. x 8 ft H	door to AMU, door to outside at 1st floor roof level	Y	doors	NA	H-2-46270

Table T-1. West Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
242-S AMU	TK E-104	Inactive	decon tank	4 ft 6 in. dia. x 5 ft 3 in. H	10 in. chemical cleanout	N	none	NA	H-2-46365, H-2-74637
242-S	E-102	Inactive	Anti-foam tank	2.5 ft x 2.5 ft	none	N	none	NA	H-2-46365
272-S	2607-WC	active	siphon chamber	5 ft W x 6 ft L x 3 ft D via 2 ft pipe from manhole	2 ft manhole	Y	1/4 in. thk manhole cover w/bail	Permit	H-2-74637
272-S	2607-WC	active	septic tank	5 ft W x 14 ft 4 in. L x 7 ft D via 2 ft pipe from manhole	2 ft manhole	Y	1/4 in. thk manhole cover w/ bail, ladder	Permit	H-2-74637

**Table T-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT**

DATE OF ASSESSMENT: 12/12/95

2 PAGES

DATE OF REPORT: 3/2/95

IS AND IH REPRESENTATIVES: MATTHEW E. NOLAN,  
GARY D. MICKLE, DAVID R. CARLS

ASSESSMENT NUMBER:

AREA: 200 W    FACILITY: 242-S

OTHER EMPLOYEES: INEZ AUSTIN

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Change Room	Current Safe Work Practice not posted.	Keep Safety Board current.		1910.1200	AIIc	4C
Change Room /Step Off Pad	Electrical: Two electrical extension cords running around wall. One use for radio, one for nothing.	Remove extension cords and hardwire radio.	Y	.303	BIq	3B
AMU Room	Labeling: Safety Shower not posted as Out Of Service.	Post shower or remove.	Y	.1200 and .147	AIIc	4D
AMU Room	Fire: Flammable cabinet is being used for storage of miscellaneous materials.	Storage not authorized in this area. Remove cabinet and Spill Kit.	Y	.120	BIc	2C
AMU Room/ Second Floor	Slipping: Water on floors	Mop up regularly and seal leak.	Y	.22 - .30	BIIk	3D
AMU Room/ Second Floor	Fire: Exit blocked by scaffolding.	Remove Scaffolding.	Y	LIFE SAFETY CODE	BIIf	3D
AMU Room/ Second Floor	Tripping / Falling: Scaffolding floor not wired down.	Wire floor boards or remove scaffolding.	Y	.22 - .30	BIIk	4C

Table T-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 12/12/95

2 PAGES

DATE OF REPORT: 3/2/95

IS AND IH REPRESENTATIVES: MATTHEW E. NOLAN,  
GARY D. MICKLE, DAVID R. CARLS

ASSESSMENT NUMBER:

AREA: 200 W FACILITY: 242-S

OTHER EMPLOYEES: INEZ AUSTIN

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
Roof (intermediate)	Falling: Area adjacent to header of ladder is not guarded properly.	A rope is used to guard open roof edge. Provide proper railing or fall protection when working near edge of roof.	Y	.22 - .30	BIIk	2C
Roof (Top)	Falling: Roof edges not all guarded.	Provide proper railing or fall protection when working on edge of roof.	Y	.22 - .30	BIIk	1C

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**APPENDIX U**

**HEALTH AND SAFETY PLAN  
FOR THE 204-AR FACILITY**

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## APPENDIX U

### HEALTH AND SAFETY PLAN FOR THE 204-AR FACILITY

## I. FACILITY DESCRIPTION

### A. DESCRIPTION

The 204-AR facility serves as a railcar and tanker trailer unloading facility for tank farms. The 204-AR facility is located near the northwest corner of 4th Street and Buffalo Avenue. Liquid radioactive wastes from Hanford Site facilities are delivered to 204-AR via 75,708.24-L (20,000-gal) railcars and tanker trailers. The tanker liquids are pumped to tank farm storage tanks for later processing. The facility is fully enclosed, heated, and has an active ventilation system. The electric ventilation system is backed up by a diesel-powered emergency generator. Railcars are specifically designed for unloading in this facility and for decontamination after the unloading process.

### B. SUPPORT FACILITIES

The only support facility is a shed attached to the 204-AR facility that houses a compressor which provides process and instrument air.

### C. WIND INDICATION

No wind indication is required for the operation of this facility.

## II. ORGANIZATION AND POINTS OF CONTACT

### A. KEY POINTS OF CONTACT

Facility manager: 373-2689

Shift supervisor: 373-2820

Site safety representative or officer: 372-2681

Health Physics supervisor: 373-2526

Emergency point-of-contact: call shift supervisor and 911

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## B. KEY RESPONSIBILITIES

For detailed responsibilities, see the *Tank Farm Health and Safety Plan* (HASP), Section 1.0. Key responsibilities include:

- Building access controlled by the shift supervisor
- Work authorized and controlled by the facility manager
- Safety and health oversight/support provided by TWRS IH&S
- Exposure/area monitoring specified by TWRS IH&S
- Exposure/area monitoring conducted by IHFS.

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## III. HAZARD EVALUATION AND CONTROLS

### A. FACILITY CHARACTERISTICS

Railcars and tanker cars enter the facility on the west end through an outer rollup door and inner double doors. The car is positioned in the unloading room by alignment marks on the floor. A walkway platform is attached from the mezzanine level to the copula at the top of the car. This permits operator access to the copula and facilitates connection of the pumping and flushing jumper nozzles to the car.

The 204-AR unloading room is classified as a surface contamination area (SCA) and is a Radiological Buffer Area/Underground Radioactive Material Area (RBA/URMA). Specific controls for activities within the unloading room are specified in the *Tank Farm HASP*, this appendix, in the Radiation Work Procedures (RWP), and the ALARA (as low as reasonably achievable) Management Worksheets.

### B. SPECIFIC PHYSICAL, CHEMICAL, AND SAFETY HAZARDS

#### 1. Noise

No stationary high-noise sources are present in 204-AR. Hearing protection is only required if specified in work packages or permits to control intermittent noise sources from any equipment brought into the facility.

## 2. Chemicals

The following chemicals are used in 204-AR operations.

- Sodium nitrite ( $\text{NaNO}_2$ ) is added to the liquid waste to bring the waste from the tank cars up to double-shell tank corrosion specifications using an in-line mixer as the waste is pumped to the double-shell tanks.
- Sodium hydroxide ( $\text{NaOH}$ ), in addition to sodium nitrite, is added to the liquid waste to bring the waste from the tank cars up to double-shell tank corrosion specifications using an in-line mixer as the waste is pumped to the double-shell tanks.
- Orthophosphate ( $\text{Na}_2\text{HPO}_4$ ) is used at the 204-AR facility to calibrate pH probes. The compound is disposed of in the double-shell tanks.

Material safety data sheets (MSDS) are available in the facility.

Chemical use is limited and is discussed in the *Tank Farm HASP*, Section 2.0.

## 3. Confined Spaces

There are no confined spaces within 204-AR.

## 4. Asbestos

There are no asbestos materials present in 204-AR.

## C. TASK-BASED HAZARDS

Tasks common to all or many tank farms and related facilities and their associated hazard evaluations are listed in the *Tank Farm HASP*, Section 2.0. Hazards and controls for specific tasks can also be found in the work packages and work permits developed for the specific task as part of the work control process.

Tasks having additional task-based hazard controls specific to 204-AR include replacement of high-efficiency particulate air (HEPA) filters, changeout of seal loop fluid, and any other containment breach (e.g., opening of railcars). These tasks must

be conducted with Level C PPE (air respirators) to protect against the confirmed radiological hazard. This level of protection shall not be reduced for containment breaches on these tanks regardless of monitoring results.

- Fall protection is required when extending the walking platform from the mezzanine to the copula of the railcar.
- Closing of the inner doors with the railcar in place presents a hazard for personnel in the vicinity.

## **IV. SITE CONTROLS**

### **A. WORK ZONES**

Work zones and controlled areas for 204-AR are listed below:

#### **1. Perimeter Exclusion Zone**

There is no perimeter exclusion zone at 204-AR.

#### **2. Interior Exclusion Zones**

The unloading room and mezzanine has been established and serves as both a surface contamination area (SCA) and a controlled area for nonradiological hazards.

In addition to the SCA, any interior areas of radiological controls are posted onsite, with controls specified in RWPs.

#### **3. Contamination Reduction Zone/Contamination Reduction Corridor**

This zone consists of the SCA portion of the stairway from the clean laundry room down to the entrance to the unloading room. The decontamination line is through the SCA portion of the airlock outside the clean laundry room where workers doff PPE, scan for radiological contamination, and perform any necessary decontamination.

Currently at 204-AR, the only significant skin or clothing contamination potential is for radiological contamination; therefore, procedures are implemented and the contamination reduction corridor (CRC) and support areas are equipped and designed to address the radiological contamination hazards in accordance with the *Hanford Site Radiological Control Manual*.

#### **4. Support Zone**

The support zone consists of the portion of the clean laundry room outside the SCA and the area between the laundry room and control room. No controls other than normal Westinghouse Hanford Company Hanford Site and 200 East Area Tank Farm safety and health requirements are specified in the support zone.

### **B. ACCESS CONTROL**

Access to 204-AR is to occur only through the contamination reduction zone (CRZ)/CRC (east door of the facility and the control room) unless otherwise specified in an approved work package. Access through the north door is permitted for entry into the mechanical equipment room for chemical makeup activities. Authorization for entry/access must be obtained from the 200 East Area Tank Farm shift operations manager.

### **C. COMMUNICATIONS/BUDDY SYSTEM**

Unless shown on task-based permits or work packages, no specific communications or buddy system requirements have been identified for 204-AR beyond those specified in the *Tank Farm HASP*, Section 8.0.

## **V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

### **A. EXCLUSION ZONES**

Two levels of PPE are required in designated exclusion zones of 204-AR.

- Level D PPE is required inside the unloading room. Required Level D PPE consists of anti-contamination (anti-C) protective clothing to include shoe covers, rubber overshoes, coveralls, and inner and outer gloves. Inner gloves and shoe covers must be taped to coveralls to seal

the seams. RWPs may specify additional Level D PPE requirements such as headcover, double coveralls, hard hat, or safety glasses.

- Level C PPE is required inside the unloading room when railcar containment is breached. Required Level C PPE consists of the same protective clothing/equipment as Level D described above plus headcover and air respiratory protection.

PPE for any interior areas controlled for radiological hazards will be identified on the RWPs.

## **B. CONTAMINATION REDUCTION ZONE**

Required Level D PPE consists only of general work clothes. Specific tasks, such as decontamination of equipment, may require additional Level D protective clothing such as that worn in the exclusion zone. If so, these requirements will be specified in the RWP or by the Site Safety and Health representative and/or Health Physics technician.

## **C. TASK-SPECIFIC HAZARDS**

For specific tasks, PPE requirements are to be listed in the *Tank Farm HASP*, Sections 2.0 and 4.0, and/or in work packages and work permits developed for the task.

## **VI. MONITORING REQUIREMENTS**

For entry into the CRZ/CRC, inside the facility, or into an SCA, external dosimetry is required as specified in the RWP.

There are four continuous air monitors for airborne radiological monitoring and two radiation monitors in the facility. A continuous air monitor provides facility stack ventilation effluent monitoring.

Any task-based monitoring requirements, in addition to those specified above, are identified in work packages and work permits by the Site Safety and Health representative or other designated TWRS IH&S representative for chemical and physical hazards, and by Health Physics for radiological hazards.

## VII. CONFINED SPACE ENTRY

There are no confined spaces in 204-AR.

## VIII. DECONTAMINATION PROCEDURES

Radiological contamination is the only significant decontamination issue at tank farms and related facilities at this time. See the *Tank Farm HASP*, Section 7.0, for information on decontamination procedures.

## IX. EMERGENCY RESPONSE

This section summarizes emergency information specific for the 204-AR facility. For additional information regarding emergency response issues, consult the *Tank Farm Facility Building Emergency Plan*, WHC-IP-0263-TF, Appendix D (Loll 1992), and the *Tank Farm HASP*, Section 9.0, which applies to all tank farms and associated facilities.

Operational emergencies could include industrial accidents and injuries, loss of utilities, fires, or other sudden threats. Because there is no backup generating facility, loss of utilities at 204-AR may result in loss of the operating capacity of the following equipment:

- All transfer pumps connected with the 204-AR pumping operation
- All control and instrument systems for the 244-AR building
- Instrument process air

An emergency generator activates with loss electrical feed and the following services are retained:

- Building lighting
- Building ventilation and exhaust
- Air sampling and stack monitor.

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## A. EVACUATION, ASSEMBLY, AND ACCOUNTABILITY

Situations requiring evacuation are described in the *Tank Farm HASP*, Section 9.0. Should evacuation of 204-AR be required, personnel should assemble either at the 200 East Area Tank Farm staging area on the south side of the parking lot below AW farm located at Canton Avenue, just south of 4th Street. The 200 East Area Tank Farm A farm complex staging areas are shown on Figure U-1.

## B. EMERGENCY EQUIPMENT AVAILABLE AT 204-AR

Figure U-1 shows the location of fire extinguishers, fire alarms, and eye-wash units at the facility. The 204-AR Fire Plan is posted on the wall of the control room.

The following equipment is available:

- Cardiopulmonary resuscitation (CPR) microshield (located on the wall near the main entrance of the control room)
- Panic button and fire alarm (located inside the east access door)
- Ladders (located in the unloading room, control room, and mechanical equipment room)
- Protective clothing (available in the clean laundry room)
- Radiological monitoring equipment (located in the clean laundry room).

## C. NOTIFICATIONS, CHAIN OF COMMAND, MEDICAL EMERGENCIES, PERSONNEL EXPOSURES, MEDICAL TREATMENT AND FIRST AID, ALARMS, AND VAPOR RELEASES

See the *Tank Farm HASP*, Section 9.0, for information on these and other emergency response issues.

Figure U-1. 242-AR Facility Site Plan.

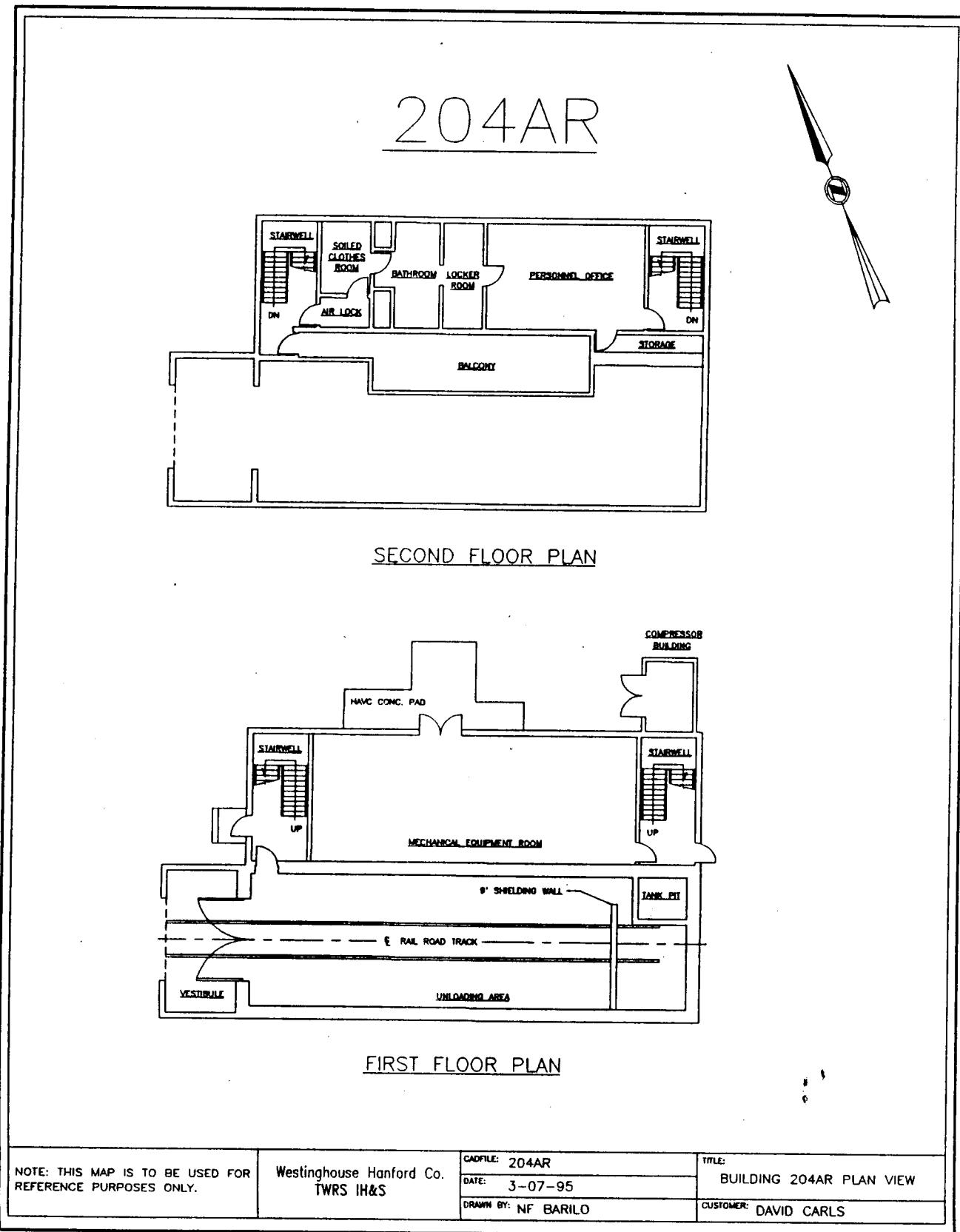


Table U-1. East Tank Farm Confined Spaces.

Location	ID No.	Active/ Inactive	Space contents	Description of CS	Description of personnel entrance	Access	Type of access	Permit/Not permitted	Comments
204-AR		Active		Diesel tank pit	Metal cover/ 2 ft dia. open x 3 ft deep	Y		P F. Zak	Located N of 204-AR emergency generator diesel tank (back of bldg).
204-Ar		Active	Regulator	Regulator Mit	Metal cover/ 5 ft dia. open x 4 ft deep	Y		NP F. Zak	Located in back of 204-AR bldg NW end.

## U-2. COMPREHENSIVE BASELINE HAZARD ASSESSMENT

DATE OF ASSESSMENT: 1/23/95

1 PAGE

DATE OF REPORT: 3/13/95 IS AND IH REPRESENTATIVES: ED PONN/ROGER MITCHELL/P. ZAK

ASSESSMENT NUMBER:

AREA: 200E

FACILITY: 204-AR

OTHER EMPLOYEES: DEL SPAULDING

U-13

LOCATION ROOM/AREA	DESCRIPTION OF TASK/HAZARD	HAZARD CONTROLS OR RECOMMENDED ABATEMENT	ABATEMENT REQUIRED	RELEVANT STANDARD	KEYWORD	RAC
	1x3 foot hole on north side of building.	Fill hole.	Y	.22	BIIk	4B
	Wooden pallet in path of egress from west door of facility.	Housekeeping.	Y	.141	BIIz	B2
	Storage shed on est side of building not labeled. Contains new rad signs ready for posting. Bags of unidentified material, possibly chemicals being stored also.	Housekeeping.	Y	.141	BIIz	B2
	No written Hazcom program, chemical inventory, or control of chemicals in flammable cabinet.	Develop/implement Hazcom program.	Y	.1200	AIIb	2B
	Potential noise hazard near CAMs.	Noise test.	Y	.95	AIII	2B
Unloading Room	Raw water lines ID#s 30 and 32 have temporary tags dated 9/16/93.	Remove/update tags.	Y	.145	BIIr	3B
Unloading Room	conduit for DP readings has cap missing at elbow exposing wires.	Repair.	Y	.303	BIIq	2B

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