High-Level Waste Storage Tank Farms/242-A Evaporator Standards/Requirements Identification Document (S/RID), Vol. 5

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STANDARDS

REQUIREMENTS

IDENTIFICATION

DOCUMENT

FACILITY:

**HIGH LEVEL WASTE STORAGE
TANK FARMS/242-A
EVAPORATOR**

FUNCTIONAL AREA:

Fire Protection

Author: Bruce Miller

Reviewer: Stephen Thorne

REVISION 1

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STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

TABLE OF CONTENTS

2.0	FIRE PROTECTION	1
12.1	PROGRAM MANAGEMENT	4
12.1.1	Organization and Administration	4
12.1.1.1	Program Policy	4
12.1.1.2	Responsibilities	6
12.1.1.3	Organizational Interfaces	7
12.2	ADMINISTRATIVE PROGRAM FEATURES	7
12.2.1	Fire Prevention Procedures	8
12.2.2	Assessment Results Tracking Program	8
12.2.3	Interim Compensatory Measures	8
12.2.4	Operability Specifications	9
12.2.5	Emergency Planning	9
12.2.6	Training	9
12.2.7	Communications	9
12.3	FIRE ALARM AND DETECTION	9
12.3.1	Fire Alarm Systems	9
12.3.1.1	Fire Detection and Alarm Systems Design, Installation, Inspection, and Testing	10
12.3.1.2	Fire Alarm System Features	10
12.3.1.3	Compatibility of Alarm Systems	10
12.3.1.4	Underground Cables for Alarm Systems	11
12.3.2	Fire Detection Systems	11
12.3.2.1	Automatic Fire Detectors Design and Installation	11
12.4	FIRE PROTECTION SUPPRESSION SYSTEMS	11
12.4.1	Automatic Fire Suppression Provisions	12
12.4.1.1	Automatic Sprinkler Systems	14
12.4.1.2	Wet Pipe Systems	14
12.4.1.3	Dry Pipe Systems	14
12.4.1.4	Preaction	15
12.4.1.5	Deluge	15
12.4.1.6	Self-Restoring	15
12.4.1.7	Pressure-Relief Valves	15

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.4.1.8	Pressure-Reducing Valves	15
12.4.2	Special Fire Suppression Systems	16
12.4.2.1	Water Spray	16
12.4.2.2	Carbon Dioxide	16
12.4.2.3	Dry Chemical	17
12.4.2.4	Foam	17
12.4.2.5	Halon	17
12.4.3	Fire Extinguishers	17
12.4.4	Fire Hose and Standpipe	17
12.4.5	Control of Liquid Runoff	17
12.5	WATER SUPPLY AND DISTRIBUTION SYSTEMS	18
12.5.1	Water Supply Systems	18
12.5.1.1	Mains, Water Storage, Fire Pumps	19
12.5.1.2	Redundant Water Supply	19
12.5.2	Water Distribution System	20
12.5.2.1	Fire Hydrant Capacity	20
12.5.2.2	Fire Hydrant Spacing and Location	20
12.5.2.3	Air Release and Vacuum Valves	20
12.5.2.4	Distribution Systems Mains Depth	20
12.5.2.5	Dedicated Water Storage and Distribution Systems	20
12.5.2.6	Underground Fire Water System Design, Installation, Testing, and Operation	21
12.5.2.7	Water Distribution Loop Systems	21
12.5.2.8	Fire Mains	21
12.5.2.9	Sprinkler Supply Lead-Ins	21
12.5.2.10	Combined Fire and Domestic Process Water Systems	21
12.5.2.11	Sprinkler Risers	22
12.5.2.12	Outside Control Valves	22
12.5.2.13	Key Operated Buried Valves	22
12.5.2.14	Sprinkler Systems Lead-Ins and Fire Hydrants	22
12.5.2.15	Piping Protection Against Differential Settlements	22
12.6	PASSIVE FIRE PROTECTION	22
12.6.1	Fire Barriers	23
12.6.1.1	Fire Barrier Design Requirements	23
12.6.2	Fire Doors and Windows	23

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.6.3	Penetration Seals	24
12.6.3.1	Fire Barrier Penetrations	24
12.6.3.2	Fire Barrier Penetration by Raceways	24
12.7	FIRE, HAZMAT AND MEDICAL SUPPORT	24
12.7.1	Fire Department	24
12.7.1.1	Plans, Procedures, Devices, and Trained Personnel	25
12.7.1.2	Inspection, Testing and Records	25
12.7.2	Contingency Plan	25
12.7.2.1	Emergency Coordinators	25
12.7.2.2	Implementation of The Contingency Plan	26
12.7.2.3	Spill or Material Release	26
12.7.2.4	Response to Fire	28
12.7.2.5	Response to Transportation and/or Packaging Incidents	29
12.7.2.6	Prevention/Spread of Fires, Explosions, or Releases	31
12.8	FIRE HAZARD ANALYSIS	32
12.9	ASSESSMENT	32
12.9.1	Fire Protection Investigation and Reporting	32
12.9.1.1	Design Assessment	33
12.9.1.2	Inspection, Testing and Maintenance	34
12.9.2	Fire Protection Quality Assurance Program	35
12.9.2.1	Quality Assurance Program Objectives and Requirements	35
12.9.3	Control of Fire Protection Impairments	35
12.10	LIFE SAFETY	36
12.10.1	Facility Buildings	36
12.10.1.1	Exit and Emergency Lighting	36
12.10.1.2	Life Safety for Laboratories	36
12.10.1.3	Egress	36
12.10.1.4	Corridor Widths	36
12.10.1.5	Door Encroachment	37
12.10.1.6	Security Areas	37
12.10.1.7	Zoning for Automatic Control	37
12.10.1.8	Life Safety in Hazardous Areas	37

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.11	PROGRAM FEATURES	38
12.11.1	Improved Risk Level of Protection or Higher Standard of Protection	38
12.12	BUILDING DESIGN	39
12.12.1	Performance Objectives in the Design of DOE Facilities	40
12.12.2	Exterior Fire Protection Systems and Features	42
12.12.3	Fire Resistance for Materials and Construction	42
12.12.4	Building Design for Work Stations on Process Areas	42
12.12.5	Control of Combustibles	43
12.12.5.1	Interior Finish Materials	43
12.12.5.2	Interior Floor Coverings	43
12.12.5.3	Control of Combustible Materials by Building Design	43
12.12.5.4	Quantities of Stored Materials	44
12.12.5.5	Fire and Explosion Potential of the Materials	44
12.12.5.6	Storage and Use of Compressed Gases	44
12.12.6	Electrical Systems	44
12.12.6.1	Ignition Source by Electrical Equipment	44
12.12.6.2	Emergency Power and Emergency Lighting Circuits	44
12.12.6.3	Listing Requirements for Electrical Materials and Equipment	45
12.12.6.4	Conduits	45
12.12.6.5	Electrical Installations	45
12.12.6.6	Redundant Electric Circuits	46
12.12.6.7	Primary, Auxiliary, Emergency, and Standby Power Systems	46
12.12.7	Exhaust and Ventilation Systems	46
12.12.7.1	Ductwork and Air Ventilation Systems	46
12.12.7.2	Smoke Pressurization and Evacuation Systems	47
12.12.7.3	Confinement Systems Function During the DBF	47
12.12.7.4	Confinement Systems and Fire Protection	47
12.12.7.5	Design Features for Lower Flammability Limit	48
12.12.7.6	HEPA Filters	48
12.12.8	Lightning Protection	48
12.12.9	Seismic Requirements	49
12.12.10	Safety Class Equipment	49
12.13	DECOMMISSIONING PLANNING	49
12.14	CONSTRUCTION	50

NOTICE

The High-Level Waste Storage Tank Farms/242-A Evaporator Standards/Requirements Identification Document (S/RID) is contained in multiple binders. The content of the binders by functional area is as follows:

Volume 1	Revision
Management Systems	1
Configuration Management	1

Volume 2	
Quality Assurance	0
Training and Qualification	1
Emergency Planning and Preparedness	1
Construction	1

Volume 3	
Safeguards and Security	0
Engineering Design	1
Maintenance	0

Volume 4	
Radiation Protection	0
Operations	0

Volume 5	
Fire Protection	1
Packaging and Transportation	2

Volume 6	
Environmental Restoration and Waste Management	0
Research & Development & Experimental Activities	1
Nuclear Safety	0

Volume 7	
Occupational Safety and Health	0
Environmental Protection	1

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.0 FIRE PROTECTION

INTRODUCTION

The Fire Protection functional area for the High Level Waste Storage Tank Farms (Tank Farm) facilities and support structures is based on the application of relevant DOE orders, regulations, and industry codes and standards. The intent of this document is to address Defense Nuclear Facilities Safety Board Recommendations 90-2 and 91-1, which call for the strengthening of DOE facility activities through the identification and application of relevant standards that supplement and/or exceed requirements mandated by DOE Orders.

The fire protection program defined in this document may be divided into three areas: (1) organizational (Section 12.1); (2) administrative programmatic features (Section 12.2); and (3) technical features (Section 12.3-12.11.) The information presented in each sections is in the form of program elements and Orders, regulations, industry codes, and standards that serve as the attributes of a fire protection program for the Tank Farm facilities.

The reference documents and requirements included herein are those mandating the inclusion of an element or subelement as an essential component in the development of a comprehensive fire protection program in support of existing and future activities at the Tank Farm facilities. It is not the intent of this document to identify all requirements that have a potential relevancy or application. For example, included in this document are references to NFPA Codes and Standards. This document has not specifically identified the requirements contained in applicable NFPA codes and standards. However, compliance with the salient details contained in NFPA Codes and Standards relevant to activities is required to be demonstrated.

The requirements identified in this document are verbatim text from the referenced document. Due to the evolution cycle of documents, references identified in the requirements may not be to the latest revision. For example DOE Order 6430.1A references DOE Order 5480.7. The latest revision is 5480.7A. The user shall verify that the latest revision of each source document prior to implementation.

Source document 5480.7A is utilized extensively throughout this document. Within the requirements extracted, by verbatim text, referrals are made to various sections within 5480.7A. Therefore, it is important to remember that requirements are associated with a topical element as defined in the table of contents. S/RID requirements are identified by source document, part, section, or paragraph (e.g. DOE5480.7A Section 9.b.(15).

Upon completion this document will be utilized as the basis to evaluate compliance of the fire protection program being implemented for the Tank Farm facilities with the requirements of DOE orders and industry codes and standards.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

The interface with other functional areas is defined to ensure total integration and support of a fire protection program plan across disciplines relevant to the Tank Farm facilities over their design, construction, and operational life.

This document is not intended to replace the need for specific program manuals and/or documents related to fire protection activities, but is intended to serve as a baseline for assessing compliance of the existing fire protection program.

The implementation and administration of a fire protection program requires the identification of the interfaces with other functional areas. These interfaces are defined such that applicable requirements, to which the Tank Farm and its facilities has been designed, are identified and controlled in the appropriate functional area and are not repeated in any other functional area.

Specific interface boundaries between fire protection and other functional areas are defined as follows:

- **Configuration Management** - Maintains the documentation specifying and demonstrating the design baseline which is defined as the physical and functional configuration of the systems, structures and components associated with fire protection.
- **Engineering Design** - Provides the engineering design management and program elements incorporating the design features as well as the necessary support services (power, water, etc.) defined by the fire protection program.
- **Emergency Preparedness and Management** - Incorporates the pre-fire plans developed as part of the fire protection program. For events requiring fire related and HAZMAT services compliance.
- **Operational Readiness Reviews** - Provides a structured methodology for determining that a facility, project, process, or activity is ready for operation in a safe and controlled manner. This area addresses the readiness of the facility, hardware, personnel and procedures to determine criteria documents.
- **Environmental Protection** - Identifies and ensures compliance with the requirements contained in environmental laws and regulations addressing environmental protection from radioactivity, asbestos, and hazardous materials. For events requiring fire related and HAZMAT services response.
- **Maintenance** - Addresses the activities required to maintain the operability of fire protection equipment, ensuring that the equipment will be able to perform their required functions, as specified, when required.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

- **Management Systems** - Establishes organizational responsibilities and structure and the creation of appropriate implementing policies and procedures to develop and implement a fire protection program. Ensures adequate guidance and oversight for the implementation of these policies and procedures, and maintains a commitment of resources to perform the required functions. Elements included in this functional area are: issue management, document control and records management, occurrence reporting.
- **Nuclear Safety** - Provides design related inputs to the design process to ensure that safety considerations are addressed in the design process and implemented and maintained. Assures that the facility is designed in accordance with DOE requirements and selected industry codes, standards, and guidelines. Included in this area is the preparation of the Safety Analysis Reports (SARs), and technical safety evaluations that may be used as a source of information satisfying the need for or as input to the Fire Hazard Analysis.
- **Occupational Safety and Health** - Provides design related inputs to the design process to ensure that occupational health and safety considerations are addressed in the design process and are implemented and maintained. This functional area is responsible for the handling of events regarding HAZMAT and medical services unless associated with a fire.
- **Operations** - Provides input to the design process regarding operational requirements, preferences and capabilities. The fire protection program demonstrates the ability of operational personnel to perform their function for events requiring fire related services to respond.
- **Quality Assurance** - Provides oversight of the conduct of the fire protection program and its capability to perform its required function.
- **Radiological Protection** - Develops and implements procedures for the management and handling of radioactive materials by limiting access to development of the pre-fire plans to limit the radiological exposure of fire department personnel when mitigating a fire.
- **Safeguards and Security** - Identifies the activities associated with providing physical, personnel, material, communications, and information safeguards and security for the facility. With regards to events requiring fire related services to respond, this functional area ensures that contingencies have been developed and implemented so that a fire protection program may be implemented while not mitigating safeguards and security features of the facility.
- **Training and Qualification** - Fire Protection specifies the content to be contained in the training module and will provide a subject matter expert to conduct the training.
- **Environmental Restoration and Waste Management** - Identifies environmental protection activities and routine and non-routine effluent discharge requirements associated with the management and operation of radioactive and hazardous material facilities. This information impacts the development of a fire hazard analysis and pre-fire plans.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.1 PROGRAM MANAGEMENT

12.1.1 Organization and Administration

SITE REQUIREMENT SOURCE: DOE/EH0135 FP.1

"PERFORMANCE OBJECTIVE: Fire Protection organization and administration should ensure the effective implementation and control of fire Protection equipment and activities.

CRITERIA

1. The fire protection organizational structure is well defined and understood.
2. Resources are allocated and established to accomplish assigned tasks.
3. Responsibilities and authority of each management, supervisory, and professional position within the fire protection organization are well defined.
4. Personnel clearly understand their authority, responsibilities, accountabilities, and interfaces with support groups.
5. Policy is established for overall direction of the fire protection program.
6. Site/facility fire protection standards are established and incorporated in the plans and specifications for all new buildings and major modifications of existing buildings."

12.1.1.1 Program Policy

A program policy should be established that encompasses requirements from applicable portions of federal, state, and local codes and regulations, and recognized industry standards for fire protection, emergency medical response and hazardous material response.

Specific programmatic controls necessary for the implementation of this attribute include:

- Establish a written description of the Fire Protection Program defining key elements such as management commitment, organizational structure, identification of safety related systems, identification of potential fire situations and risks, control of fire protection activities, and the fire safety assurance program.
- Define objectives, goals and their means of implementation, for response to HAZMAT incidents and for emergency medical support.
- Establish the concept of defense in depth in fire protection areas important to safety.
- Establish the priorities for the saving of lives and protection of property in the event of fire.
- Define objectives, goals and their means of implementation , including procedures, equipment and personnel, for protection from fire of structures, systems and components important to safety for vital programs, employees and the public.
- Establish the existence of a fire department.
- Establish a consistent and auditable set of requirements, standards and responsibilities for conduct of the program.

SITE REQUIREMENT SOURCE: DOE5480.4 Attachment 3 2.c

"Reference ES&H Standards

The list of these reference ES&H standards and guidelines is as follows:

c. Fire Protection

- (1) "Handbook of Fire Protection" (NFPA)
- (2) "Loss of Prevention Data Sheets" (FM)

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

(3) RP-1, U.S. Department of Commerce, National Fire Prevention and Control Administration, 8-78, "Standard Practice for the Fire Protection of Essential Electronic Equipment Operations" (DOC)."

SITE REQUIREMENT SOURCE: DOE5480.7A Section 4

"The objectives of this Order are as follows:

- a. Minimize the potential for the occurrence of a fire.
- b. Ensure that fire does not cause an on-site or off-site release of radiological and other hazardous material that will threaten the public health and safety or the environment.
- c. Establish requirements that will provide an acceptable degree of life safety to DOE and contractor personnel and that there are no undue hazards to the public from fire and its effects in DOE facilities.
- d. Ensure that process control and safety systems are not damaged by fire or related perils.
- e. Ensure that vital DOE programs will not suffer unacceptable delays as a result of fire and its effects.
- f. Ensure that property damage from fire and related perils does not exceed an acceptable level."

SITE REQUIREMENT SOURCE: DOE5480.7A Section 5

"MANDATORY FIRE PROTECTION CRITERIA - Fire Protection criteria, delineated in the following codes, standards and other documents are the minimum requirements for the implementation of the DOE Fire Protection Program. These criteria are mandatory as a result of statutory requirements or DOE policy requirements. Where conflicts in the application of these codes and standards arise, the more restrictive requirements apply.

- a. Code of Federal Regulations (CFR) 29, Part 1910
- b. CFR 29, Part 1926
- c. National Fire Protection Association (NFPA) Codes and Standards
- d. DOE 5480.4, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION STANDARDS, of 5-15-84, which specifies requirements for the application of environmental protection, safety, and health standards.
- e. DOE 6430.1A, GENERAL DESIGN CRITERIA, of 4-6-89, which provides general design criteria for use in the acquisition of the Department's facilities.
- f. DOE/EP-0108, "Standard for Fire Protection of AEC Electronic Computer Data Processing Systems"
- g. DOE/EV-0043, 8-79, "Standard on Fire Protection for Portable Structures"
- h. Other DOE Orders and statutory requirements not listed above, that contain requirements of a more limited extent relating to the DOE Fire Protection Program.

NOTE:

APPLICATION OF CODES AND STANDARDS. The fire protection related codes and standards in effect when facility design commences (code of record) remain in effect for the life of the facility. When modifications of a substantial nature occur, as determined by the authority having jurisdiction (AHJ), the current edition of the code shall apply to the modification. EXCEPTION: If there is a significant hazard that endangers building occupants or the public, as determined by the AHJ, the facility shall be upgraded to the requirements of the current edition of the code of standard."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.a(1)

"Fire Protection Criteria. A documented "Fire Protection Program" which includes:

- (a) A statement of management commitment to achieve the above stated objectives.
- (b) A policy statement that implements this Order and other DOE fire protection related mandatory codes and standards.
- (c) Fire protection criteria that reflect site-specific aspects of the fire protection program, including: the organization and responsibilities of the fire protection staff, administrative aspects of the fire protection program, and requirements for physical fire protection features."

12.1.1.2

Responsibilities

FACILITY REQUIREMENT SOURCE: 29CFR1926 Part 150(a)(1)

"Occupational Health and Safety Standards for the Construction Industry - Fire Protection - General requirements. The employer shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction and demolition work, and he shall provide for the firefighting equipment as specified in this subpart. As fire hazards occur, there shall be no delay in providing the necessary equipment."

FACILITY REQUIREMENT SOURCE: 29CFR1926 Part 150(a)(2)

"Access to all available firefighting equipment shall be maintained at all times."

FACILITY REQUIREMENT SOURCE: 29CFR1926 Part 150(a)(3)

"All firefighting equipment, provided by the employer, shall be conspicuously located."

FACILITY REQUIREMENT SOURCE: 29CFR1926 Part 150(a)(4)

"All firefighting equipment shall be periodically inspected and maintained in operating condition. Defective equipment shall be immediately replaced."

FACILITY REQUIREMENT SOURCE: 29CFR1926 Part 150(a)(5)

"As warranted by the project, the employer shall provide a trained and equipped firefighting organization (Fire Brigade)) to assure adequate protection to life."

SITE REQUIREMENT SOURCE: DOE5480.7A Section 8.i

"As required by the PSO or the Heads of Field Organizations and directed by the Contracting Officer, contractors shall be required to:

- (1) Provide and maintain a level of fire protection to meet the objectives of paragraph 4, and the criteria of paragraph 9.
- (2) Provide and maintain a system to ensure that the requirements of the DOE fire protection program are documented and incorporated in the plans and specifications for all new facilities and for major modifications of existing facilities. This includes review and comment by a qualified fire protection engineer of plans, specifications

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

- and test procedures and results for fire protection features.
- (3) Assists DOE in coordinating fire safety assessments at those facilities included in the survey program, establish action plans for compliance with recommendations resulting from the assessments, and forward compliance plans, exemption requests, and other requested data to DOE field organizations.
 - (4) Establish and maintain a list of facilities for which the contractor has fire protection assessment responsibility.
 - (5) Conduct fire protection assessments of facilities according to the scope and frequency established by this Order.
 - (6) Provide fire protection technical assistance to DOE.
 - (7) Submit request for exemptions and fire safety equivalencies to the Head of the Field Organization for those facilities where compliance with specific program elements is not attainable and where an acceptable level of safety has been achieved.
 - (8) Maintain or have access to an adequate fire protection staff, including a qualified fire protection engineer(s). Continuing education and training should be provided to maintain and enhance the level of competency of the fire protection staff."

12.1.1.3

Organizational Interfaces

The external interfaces between organizations and the internal interfaces between organizational units should be documented and maintained current. The specific programmatic controls necessary for the implementation of this attribute include:

SITE REQUIREMENT SOURCE: DOE/EH0135 FP.3.1

"Facility operating procedures acknowledged the risk of fire. Appropriate provisions are in place to assure safe operation and shutdown, and that fire protection features are not compromised"

FACILITY REQUIREMENT SOURCE: DOE5480.19 Chapter I, Section A

"The organization and administration of operations should ensure that a high level of performance in DOE facility operations is achieved through effective implementation and control of operations activities. Operations activities should recognize that environment, safety, and productivity are compatible goals. DOE facility policies should describe the philosophy of standards of excellence under which the facility is operated and clear lines of responsibility for normal and emergency conditions are established. Effective implementation and control of operating activities are primarily achieved by establishing written standards in operations, periodically monitoring and assessing performance, and holding personnel accountable for their performance."

12.2

ADMINISTRATIVE PROGRAM FEATURES

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9(1)

"A DOE facility shall be characterized by a level of fire protection sufficient to fulfill the requirements for the best protected class of industrial risks (Highly Protected Risks/Improved Risks). This program is characterized by the inclusion of a continuing, sincere interest on the part of management and employees in minimizing losses from fire and related perils and the inclusion of preventive features necessary to ensure the satisfaction of objectives related to safety."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9(2)

"Based on the above paragraph the DOE Fire Protection Program shall meet or exceed the minimum requirements established by the National Fire Protection Association as directed by the PSO. Basic requirements shall include: a reliable water supply of acceptable capacity for fire suppression; noncombustible construction of an acceptable nature for the occupancy of the facility; automatic fire extinguishing systems; a fully staffed, trained, and equipped emergency response force; a means to summon the emergency response force in the event of a fire; and a means to notify and evacuate building occupants in the event of a fire. For areas subject to significant life safety risks, serious property damage, program interruption, or loss of safety class equipment as defined in the relevant facility SAR, additional protection measures may be necessary as determined by the AHJ."

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9(3)

"This level of protection also includes: administrative procedures encompassing controls for hazardous substances/processes; inspection, maintenance, and testing of fire protection features; and other programmatic fire safety and activities as defined below."

12.2.1

Fire Prevention Procedures

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.c.(1)

"Fire Prevention Procedures. Facilities shall have procedures governing the use and storage of combustible, flammable, radioactive and hazardous materials as to minimize the risk from fire. Such procedures shall also exist for activities, such as smoking limitations, isolation of hot work, and other fire prevention measures, which contribute to the decrease in fire risk."

12.2.2

Assessment Results Tracking Program

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.c.(2)

"Assessment Results Tracking Program. There shall be a program to identify, prioritized and monitor the status of fire protection related assessment findings/recommendations until resolution is achieved. Resolution could be achieved by either: plant modification, procedure change, fire safety equivalency, or exemption."

12.2.3

Interim Compensatory Measures

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.c.(3)

"Interim Compensatory Measures. When final resolution of a finding/recommendation will be significantly delayed because of funding, scheduling, or other considerations, appropriate interim compensatory measures (e.g., fire watches, fire patrols, enhanced hazards control procedures, temporary fire protection features) shall be implemented to minimize the fire risk."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.2.4 Operability Specifications

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.c.(4)

"Operability Specifications. Minimum requirements to establish "operability" shall be developed for fire protection features such as: fire doors, fire dampers, fire detection and suppression systems, fire protection water supplies, etc. Periodic tests, conducted to satisfy the applicable NFPA codes and standards or other DOE criteria shall confirm that these features are operable. If fire protection will be inoperable for a significant period of time, interim compensatory measures shall be implemented until operability is restored."

12.2.5 Emergency Planning

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.c.(5)

"Emergency Planning. Information from the fire protection program shall be incorporated in the Emergency Plan. The facility fire protection organization shall be involved in the development of the Emergency Plan and in all related training and drills."

12.2.6 Training

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.c.(6)

"Training. Training shall be provided for the individuals within the fire protection organization, the fire department/brigade, and any other person with responsibilities for fire safety. Training programs shall reflect the criteria contained in the mandatory codes and standards listed in paragraph 5 and shall reflect site-specific considerations."

12.2.7 Communications

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.c.(7)

"Communications. Emergency communications shall be outlined in the emergency plan. The communications capability among potential responders to an emergency shall be coordinated to avoid confusion and interference. This capability shall be tested on a frequency established by the authority having jurisdiction in accordance with DOE criteria."

12.3 FIRE ALARM AND DETECTION

Fire alarm, detection and prevention systems are essential elements of a fire protection system. The detection system detect fire in its early stages and provide warning, through the alarm system, so appropriate actions may be initiated.

12.3.1 Fire Alarm Systems

Signals from detection systems are fed to fire alarm panels which in turn are transmitted to local fire alarms and the Central Alarm Stations.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(11)

"Fire Alarm Systems - Where fire suppression or fire alarm systems are provided local alarms in the protected area and alarm transmission to an acceptable re-mote attended location shall be provided."

12.3.1.1

Fire Detection and Alarm Systems Design, Installation, Inspection, and Testing

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-8.1

AUTHOR'S NOTE: NFPA 72 combines NFPA 71, 72A, B, C, D, E, F, G, H and 74 into one document.

"Fire Detection and Alarm Systems - All fire detection and alarm devices shall have UL-listed components or be FM-approved. Devices and systems shall comply with NFPA 71, NFPA 72A, NFPA 72B, NFPA 72C, NFPA 72D, NFPA 72E, NFPA 72F, NFPA 72G, and NFPA 72H as applicable."

12.3.1.2

Fire Alarm System Features

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-8.2.1

"Fire alarm systems shall have the following basic features:

- Transmission of signals to the DOE facility fire department alarm center and other constantly attended locations in accordance with the appropriate NFPA Signaling Systems Standard.
- Local alarms for the building or zone in alarm.
- Trouble signals as required by the appropriate NFPA Signalling Systems Standard.
- Emergency battery backup for system operation.
- Electric supervision of all circuits as required by the appropriate NFPA standard.
- Supervisory devices for all critical functions (valve position switches, water level, temperature).
- Capability of annunciating at least three separate conditions: 1) a fire alarm, 2) a supervisory alarm, and 3) a trouble signal indicating a fault in either of the first two. Annunciation of each condition shall be separate and distinct from the other two."

12.3.1.3

Compatibility of Alarm Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-8.2.1[2]

"Fire alarm systems for new DOE buildings shall be compatible with those for the DOE complex where the new building is to be located."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.3.1.4

Underground Cables for Alarm Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1670-2

AUTHOR'S NOTE: NFPA 72 combines NFPA 71, 72A, B, C, D, E, F, G, H and 74 into one document.

"Fire alarm and supervisory systems shall comply with NFPA 71, NFPA 72A, NFPA 72B, NFPA 72C, NFPA 72D, NFPA 72E, NFPA 72F, NFPA 72G, NFPA 72H, NFPA 1221, and ANSI C2 as appropriate for the location. Outside cable plant for the alarm and supervisory systems shall comply with the standards for telephone cable plant. In the joint use of poles for electric power distribution and for supporting fire alarm and telephone cables, separate fire alarm cable shall be placed below the telephone cable.

Fire alarm cables installed in underground ducts shall be distinctively marked within manholes and handholes that are shared with other communication cables and shall be kept physical separated from all power conductors.

Exterior fire alarm pull boxes and emergency-reporting telephones shall be installed in weatherproof housings manufactured specifically for the mechanism."

12.3.2

Fire Detection Systems

Fire detectors sense a fire and transmit a signal to the fire alarm panel which activates local alarm(s) as well as a central alarm. The central station initiates firefighting action by the fire department personnel. Fire detection systems also activate suppression systems when automatic fire suppression is required and/or controls the fire barrier system components, such as fire dampers, provided for fire confinement.

12.3.2.1

Automatic Fire Detectors Design and Installation

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1660-99.0.2

"A protection system is a system that initiates corrective action, e.g., fire detection/Halon.

The protection system shall provide automatic initiation of protective actions that require rapid response and automatic control of interlocks that prevent unsafe operator action.

The protection system shall be designed to sense potentially hazardous conditions and to initiate actions to ensure that specific acceptable design limits are not exceeded as a result of anticipated operational occurrences."

12.4

FIRE PROTECTION SUPPRESSION SYSTEMS

The primary objective of the fire protection program is to minimize the probability and the consequences of fires. Automatic sprinkler systems play a major role in fire suppression, since they are the most effective means of controlling fires in buildings. Other types of suppression systems; (e.g. Dry chemical, foam, Halon, carbon dioxide) are utilized depending on the environment to be protected.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.4.1

Automatic Fire Suppression Provisions

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(3)

"Automatic Fire Protection - Complete automatic fire suppression systems designed in accordance with applicable NFPA standards shall be provided as follows:

- (a) In all new structures over 5000 square feet
- (b) In all structures having an MPFL in excess of \$1,000,000. Or where the maximum credible fire will result in the loss of use of a vital structures for a period longer than that specified as acceptable by the applicable PSO."

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(4)

"Redundant Fire Protection -

- (a) When the MPFL exceeds \$50 million, a redundant fire protection system is provided that, despite the failure of the primary fire protection system, will limit the loss to \$50 million.
- (b) When the MPFL exceeds \$150 million, a redundant fire protection system and a 3-hour fire barrier are required to limit the maximum possible fire loss to \$150 million."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1161.3

"Automatic fire suppression provisions shall comply with DOE 6430.1A, Section 1530-99, Special Features. When an automatic fire suppression system is mandatory and protection against loss from fire originating within the enclosure system is required, a highly reliable, fast-acting system shall be provided. Instead of such a system, an inert atmosphere can be used with in the enclosure, provided its reliability is commensurate with and approved fire suppression system (e.g. Dedicated gas supply, component quality and redundancy where appropriate). The oxygen concentration shall be less than the minimum concentration that would allow ignition or combustion of the enclosure contents. Where automatic systems are not required, fire detection shall be installed. Fire detection systems shall be integrated with any central alarm location and any associated automatic fire suppression systems."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0

"Special Facilities - Nonreactor Nuclear Facilities - An assessment shall be made early in the design or modification to determine the facility structures, systems, and components that shall be protected against the effects of a DBF and explosion. A fire protection engineer or person knowledgeable in applying the principles of fire protection shall develop the fire protection system. To maximize the protection against fire, the system shall contain an appropriate integration of fire prevention, detection, and suppression features."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[2]

"Fire protection systems shall not: (1) prevent a facility from achieving and maintaining a safe shutdown condition, (2) prevent the mitigation of DBA consequences, or (3) cause an inadvertent nuclear criticality."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[3]

"Total reliance shall not be placed on a single fire suppression system. Appropriate backup capability shall be provided."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[4]

"To ensure that redundant safety class components shall be capable of performing the necessary safety functions, the facility design shall provide appropriate separation against fire, explosion, and failure of fire suppression systems."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[5]

"Fire protection systems, or portions of them, that must function to control effects of a DBA event (as determined by safety analysis accident scenarios) shall be designed to be functional for all conditions included in the accident scenario. This shall include both the event initial cause and its consequences."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[6]

"Mechanical- and fluid-system portions of the fire protection system shall meet the appropriate NFPA requirements."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[7]

"The operation or failure of a fire protection system that interfaces with a safety class system, such as a safety class water system, shall not prevent the safety class system from completing its safety functions when required. Wherever practical, special facilities shall be designed and constructed using building components of fire-resistant and noncombustible material, particularly in locations vital to the functioning of confinement systems. To the extent practicable, combustible materials shall not be used in the construction of process system confinement barriers."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[8]

"Confinement systems, particularly the building structural shell and its associated ventilation system, shall be designed with the capability of retaining the confinement function during the DBF."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[9]

"When the use of water sprinkler coverage is precluded because of nuclear criticality or other hazards, nonaqueous extinguishing systems (i.e., inert gas, carbon dioxide, high-expansion foam, or halogenated organics) shall be used."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[10]

"Fire protection systems shall be designed so that the failure of any active component (equipment or control device) shall not disable the fire protection system. Fire protection systems and components shall have fail-safe features and audible and visual alarms for operability and trouble indications."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[16]

"Automatic water sprinkler coverage shall be provided throughout the facility except in areas where nuclear criticality or other hazards specifically preclude its use or where Halon systems are required to reduce equipment damage."

12.4.1.1

Automatic Sprinkler Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-3.1

"Water Flow and Pressure Requirements for Fire Protection - Total volume, pressure, and design flow rate of water necessary to provide fire protection for facilities shall be determined by the methods described in the following paragraphs. All sprinkler or other automatic fire suppression system components shall be UL- or FM-approved for the particular application chosen."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-3.2

"Occupancy Hazard Classification - NFPA 13 shall be used to determine the Occupancy Hazard Classification for any facility. Light hazard occupancy rules are prohibited."

12.4.1.2

Wet Pipe Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-4.2.1

"Wet Pipe - Sprinkler systems shall normally be wet pipe using pipe schedule sizes listed in NFPA 13 for ordinary installations. Hydraulic designs shall be considered for all systems. The system shall be hydraulically designed where residual pressure is marginal, water application rate is high, response time is critical, or special risks are involved."

12.4.1.3

Dry Pipe Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-4.2.2

"Dry Pipe - In unheated areas or other areas subject to freezing temperatures, dry pipe systems shall be provided. Because of the time delays associated with release of the air in the system, water demands for dry pipe systems shall be computed over areas 30 percent greater than for comparable wet pipe systems. Where the unheated area is small it may be cost effective to install an antifreeze system or small dry pipe system supplied from the wet pipe system in the main heated area."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.4.1.4

Preaction

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-4.2.3

"Preaction - A preaction system shall be used where it is particularly important to prevent the accidental discharge of water. Need for a preaction system shall be based on review by and recommendation of a professional fire protection engineer. The detection system chosen to activate the preaction valve shall have high reliability and a separate alarm/supervisory signal to indicate status. The detection system must be designed to be more sensitive than the closed sprinklers in the preaction system, but should not be so sensitive as to cause false alarms and unnecessary actuation of the preaction valve."

12.4.1.5

Deluge

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-4.2.4

"For extra hazard areas and specific hard-to-extinguish fuels such as explosives and pyrophoric metals, a deluge system with open sprinkler heads may be used to set down the entire protected area simultaneously. Deluge systems shall comply with NFPA 13. If quick response is required, deluge system piping may be primed with water. The nozzles must be provided with blow-off caps for water-filled deluge systems."

12.4.1.6

Self-Restoring

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-4.2.5

"Self-Restoring - Self-restoring sprinkler systems, such as the on-off multicycle system or systems using individual on-off sprinkler heads, shall be considered where the water from sprinklers will become contaminated by contact with room contents, where there is a concern for water damage, or where water supply or storage volume is marginal."

12.4.1.7

Pressure-Relief Valves

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1540-1.6.1(B)

"Wherever a pressure-reducing valve's failure may cause equipment damage or unsafe conditions, a pressure-relief valve shall be provided downstream of the reducing valve."

12.4.1.8

Pressure-Reducing Valves

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1540-1.6.1(A)

"Pressure-reducing valves shall be provided where service pressure at fixtures or devices exceeds the normal operating range recommended by the manufacture".

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.4.2

Special Fire Suppression Systems

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(13)

"Special Hazard Protection - Hazards unique to DOE and not addressed by mandatory codes and standards listed in Paragraph 5 shall be protected by isolation, segregation or use of special fire control systems (inert gas, explosion suppression, etc) as determined by the AHJ. In addition devices for limiting or controlling the effects of a fire (relief valves, filters, blast walls, emergency shutdown systems, scuppers, etc.) shall be provided."

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(14)

"Halon Usage - Future use of Halon will be governed under the conditions set forth in the DOE memorandum "Interim Position on the Installation of New Halon 1301 Fixed Fire Suppression Systems and Halon 1211 Portable Fire Extinguishers dated September 27, 1990, and superseding documents."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-5.1

"Special Protection Systems - Special protection systems may be used to extinguish or control fire in easily ignited, fast-burning substances such as flammable liquids, some gases, and chemicals. They shall also be used to protect ordinary combustibles in certain high-value occupancies especially susceptible to damage. Special protection systems supplement automatic sprinklers as described by NFPA and shall not be used to substitute for them except where water is not available for sprinkler protection. The added expense of the supplementary system shall be supported by documented justification."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-5.1[2]

"The selection of a particular special suppression system shall be based on:

- The effectiveness of that system or agent for the type of hazard
- The damage likely to be caused by the extinguishing agent, including cleanup and downtime."

12.4.2.1

Water Spray

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-5.2.1

"Water Spray - Installation of water spray systems shall comply with NFPA 15."

12.4.2.2

Carbon Dioxide

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-5.2.2

"Carbon Dioxide - Agent quantity requirements and installation procedures shall comply with NFPA 12."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.4.2.3

Dry Chemical

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-5.2.3

"Dry Chemical - Systems shall comply with NFPA 17."

12.4.2.4

Foam

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-5.2.4

"Foam - Foam systems shall comply with NFPA 11, NFPA 11A, NFPA 16, NFPA 16A, and NFPA 409."

12.4.2.5

Halon

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(14)

"Halon Usage - Future use of Halon will be governed under the conditions set forth in the DOE memorandum "Interim Position on the Installation of New Halon 1301 Fixed Fire Suppression Systems and Halon 1211 Portable Fire Extinguishers dated September 27, 1990, and superseding documents."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-5.2.5

"Halon - The installation of Halon 1301 systems and Halon 1211 systems shall comply with NFPA 12A and NFPA 12B, respectively."

12.4.3

Fire Extinguishers

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-7

"Portable Fire Extinguishers - Portable fire extinguisher shall comply with NFPA 10."

12.4.4

Fire Hose and Standpipe

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-6

"Standpipes and Hose Systems - Installation of standpipe systems shall comply with NFPA 14."

12.4.5

Control of Liquid Runoff

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(10)

"Liquid Run-off Control - Natural or artificial means of controlling liquid run offs from a maximum credible fire shall be provided so that contaminated or polluting liquids will not escape the site, including potentially contaminated water resulting from fire fighting operations. The amount of fire water that must be controlled and the design of the containment system shall be determined based on consultations with the cognizant DOE fire protection engineer."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1540-99.0.2(1)

"Collection systems shall be provided for water runoff, such as from firefighting activities, from areas within special facilities containing radioactive material. Nuclear criticality prevention (if necessary) confinement, sampling, volume determination, and retrievability of liquids and solids shall be provided for in the design of collection systems. The size of the collection system for firefighting water shall be based on the maximum amount of water that would be collected in fighting the DBF. The configuration of the system components shall be based on conservative assumptions as to the concentration of fissile or other materials capable of sustaining a chain reaction that might collect in the system. Recirculating systems shall also be considered when there is no possibility of contamination."

12.5 WATER SUPPLY AND DISTRIBUTION SYSTEMS

A reliable and adequate water supply and distribution system are essential elements for effective fire production. The following sub-elements constitute an effective water supply and distribution system.

12.5.1 Water Supply Systems

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(8)

"Fire Protection Water Supply - An automatic water supply for fire protection having a minimum two hours stored water capacity shall be maintained. Municipal supplies having the same capability are acceptable, Facilities having a MPFL in excess of \$50 million shall be provided with an additional, independent source of fire protection water.

A water supply dedicated for fire protection may be necessary as determined by the PSO. A dedicated system shall be able to meet hose stream and sprinkler system demands.

A combined fire and process/domestic system shall be able to deliver the fire demand plus the maximum daily domestic demand for the required duration."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-3.3.1

"Schedule-Designed Sprinkler System - For systems designed using pipe schedule methods, NFPA 13 shall be used for calculating water demand in the absence of specific requirements provided by the cognizant DOE fire protection authorities based on unusual occupancies or special hazards.

Precautions shall be taken to ensure that adequate residual pressure exists at full demand flow rate to fulfill the density and coverage requirements for schedule-designed systems. If water supply or pressure is marginal the pressure loss from the base of the riser to the most remote head should be calculated to confirm that the schedule designed-system will meet requirements, or the system shall be hydraulically designed."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-3.3.2

"Hydraulically Designed Sprinkler Systems - NFPA 13 shall be used to determine water supply requirements for hose streams (gpm) and duration (min). Density curves presented in NFPA 13 shall be used for calculating sprinkler demand for hydraulically designed systems. For

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

hazard classifications not covered in NFPA 13 and certain other special occupancies or hazards, design density and area of coverage shall be as specified by other more appropriate standards referenced in NFPA 13 or project-specific requirements as determined by the cognizant DOE fire protection engineer. For ordinary hazard occupancies and above, hose stream requirements shall be a minimum of 500 gpm regardless of the hose stream demands listed in the above references unless otherwise specified by the DOE project criteria. Determination of adequacy of water supply shall be made on the basis of actual flow test data gathered using the methods in NFPA 13, Appendix B."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-3.3.3

"Fire Hydrant Demand - Where reliance is placed on fire department response, either for protection of unsprinklered buildings or where the fire department will serve as redundant (backup) protection, as a general rule the water supply should be adequate to supply at least 0.03 gpm per cubic foot of fuel (building and contents) in the largest fire area (for high-BTU-content fuels, convert to equivalent ordinary BTU loads). This water supply should be available at 20 psig residual pressure at the hydrants."

FACILITY REQUIREMENT SOURCE: RLID5480.7 Section 8.9

"The Fire Protection Program must include a fire protection system winterization program to ensure that fire protection systems are protected against cold weather effects. The winterization program shall require that:

- a. Each operation or facility with fire protection systems is inspected annually, prior to the month of November, to ensure that freeze protection systems are provided where fire suppression systems, subject to damage by freezing, are located.
- b. As a minimum, fire protection system auxiliary drains, drip lines, fire pump test headers, and fire department connections are adequately drained to prevent fire system freeze up. The program shall also ensure that dry pipe system air pressures are normal, and air compressors and air maintenance devices for andy systems are operational.
- c. Heating systems utilizing fuel systems have an adequate supply of fuel and a strategy to replenish fuel supply during cold weather periods.
- d. Freeze protection systems are properly functioning throughout the freezing weather period."

12.5.1.1

Mains, Water Storage, Fire Pumps

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[3]

"Underground fire water mains or combined fire and domestic water mains, including valves, hydrants, and fittings, shall be installed, flushed, sterilized, and tested in accordance with NFPA 24 and Section 0260, Piped Utility Materials. Water storage tanks shall comply with NFPA 22. Fire pumps shall comply with NFPA 20. Water storage shall be sufficient to meet the density, pressure, and duration requirements of NFPA 13."

12.5.1.2

Redundant Water Supply

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[17]

"The water supply for the permanent fire protection installation shall have a minimum of two reliable, independent sources each with sufficient capacity (based on maximum demand) for

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

firefighting until other sources become available. Only one of these two sources shall be required to be DBE qualified."

12.5.2 Water Distribution System

12.5.2.1 Fire Hydrant Capacity

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0266-4(2)

"Domestic water distribution systems that also serve fire protection requirements shall be designed to satisfy fire flow requirements plus 50 percent of the average domestic requirements plus any industrial or process demands that cannot be reduced during a fire."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0266-4(3)

"Each fire hydrant within the distribution system must be capable of delivering 1000 gpm at a residual pressure of not less than 10 psi. Where domestic water distribution systems are to serve internal fire protection systems (i.e. Sprinklers or foamite systems), adequate residual pressures shall be maintained for proper operation of such fire protection systems."

12.5.2.2 Fire Hydrant Spacing and Location

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0266-4(9)

"Fire hydrants shall be installed at a maximum spacing of 400 feet. Fire Hydrants shall not be located more than 300 feet from the building to be protected. Each building shall be protected by a minimum of two hydrants."

12.5.2.3 Air Release and Vacuum Valves

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0266-4(10)

"Air release and vacuum valves shall be installed, as necessary at high points within the distribution system and long supply mains."

12.5.2.4 Distribution Systems Mains Depth

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0266-4(11)

"Distribution system mains shall have a minimum depth of cover of 2-1/2 feet, Additional cover shall be provided to prevent freezing in cold climates, at roadway crossings in high traffic areas, and at railroad crossings."

12.5.2.5 Dedicated Water Storage and Distribution Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9

"Water Storage and Distribution - Wherever practical, dedicated fire water storage and distribution systems shall be used. If a dedicated fire water supply system cannot be provided, the fire protection water supply shall assure availability regardless of simultaneous process and

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

domestic water usage."

12.5.2.6

Underground Fire Water System Design, Installation, Testing, and Operation

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(9)

"Underground Piping - Mains shall be sized for the largest fire flows anticipated but in no case shall be less than 8-inch diameter. Supply piping to individual fire sprinkler systems shall be at least as large as the fire sprinkler system riser."

12.5.2.7

Water Distribution Loop Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[4]

"Whenever feasible, all water distribution systems shall be of the looped grid type providing two-way flow with sectional valving arranged to provide alternate water flow paths to any point in the system."

12.5.2.8

Fire Mains

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[5]

"Fire mains (except those supplying a single hydrant or extensions of existing smaller mains) shall be at least 8 inches. Mains shall be sized to supply the largest fire demand plus the largest domestic and process demand with consideration for residual sprinkler system pressure requirements."

12.5.2.9

Sprinkler Supply Lead-Ins

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[6]

"Sprinkler supply lead-ins should be at least 6 inches, except lead-ins of 4 inches may be used for very small sprinkler systems when substantiated by hydraulic calculations. In no case shall the lead-in be smaller than the sprinkler riser."

12.5.2.10

Combined Fire and Domestic Process Water Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[7]

"Where combined fire and domestic-process water systems are used, the supplies to each building shall be arranged and valved so that the domestic and process systems can be shut down without shutting off the fire system supply."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1540-1.1(2)

"Domestic water shall be supplied by a separate service line and not be a combined fire protection and potable water service or a combined process water and potable water system within the building."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.5.2.11

Sprinkler Risers

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[8]

"Sprinkler risers should be located at an exterior wall. Sprinkler supply lead-ins should run under buildings the minimum distance possible. Where a riser must be located in a potentially contaminated area, consideration should be given to locating the riser exterior to the building in a heated enclosure."

12.5.2.12

Outside Control Valves

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[9]

"Outside control valves that can be locked open shall be provided on each supply lead-in, located if possible a minimum distance of 40 feet from the building. PIVs should be used where possible. If site conditions preclude the use of PIVs, such as where they would be subject to mechanical damage and cannot be properly guarded, OS&Y valves in pits may be used."

12.5.2.13

Key Operated Buried Valves

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[10]

"Key-operated buried valves shall not be used for sprinkler control valves. In no case shall there be more than one valve controlling a sprinkler supply lead-in."

12.5.2.14

Sprinkler Systems Lead-Ins and Fire Hydrants

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-9[11]

"All lead-ins shall be connected with the sprinkler system at the base of the riser. Alarm valves shall be located as close as practical to the building entry point. Hydrants shall be provided so that hose lays from hydrants to all exterior portions of a protected building are no more than 300 feet. Hydrants shall not be closer to buildings than 50 feet."

12.5.2.15

Piping Protection Against Differential Settlements

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1540-1.3.1

"Where domestic or fire water service lines enter buildings, suitable flexibility shall be provided to protect against differential settlement or seismic activity in accordance either the NSPC or NFPA 13, respectively."

12.6

PASSIVE FIRE PROTECTION

The concept of passive fire protection is to confine the fire in the originating "enclosure" by providing fire resisting construction such as fire rated wall, ceiling, floor, doors, penetrations, etc., and provide sufficient separation from combustible materials or buildings to prevent the spreading of fire from one area to another.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.6.1

Fire Barriers

The objective of passive fire protection is to confine the fire in an area or compartment formed with rated fire barriers. The construction and installation of fire barriers are based on configurations that have been tested by recognized testing laboratories. Penetrations through fire barriers shall be designed, tested and installed to satisfy the fire rating of the barrier, thereby maintaining the configuration of the structure or compartment.

12.6.1.1

Fire Barrier Design Requirements

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(4)

"Redundant Fire Protection -

- (a) When the MPFL exceeds \$50 million, a redundant fire protection system is provided that, despite the failure of the primary fire protection system, will limit the loss to \$50 million.
- (b) When the MPFL exceeds \$150 million, a redundant fire protection system and a 3-hour fire barrier are required to limit the maximum possible fire loss to \$150 million."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.3

"Fire Resistance Ratings - All facilities shall be divided into areas in which the total potential fire loss to each area and its equipment does not exceed \$75 million as described in DOE Order 5480.7. These areas shall be separated by fire walls and barriers with not less than 4-hour fire-resistance ratings. Where exceptions are necessary for reasons of operations and equipment, exemption procedures shall comply with DOE Order 5480.7."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[19]

"Where fire barriers are penetrated by the confinement system's ventilation ducting, fire dampers shall be appropriately used to maintain the barrier integrity. However, the closure of such dampers shall not compromise the functions of the confinement system where the loss of confinement might pose a greater threat than the spread of fire. In such cases, alternative fire protection means (e.g., duct wrapping) shall be used as a substitute for fire barrier closure. In no case shall a sprinkler system (including safety class sprinklers) be considered a fire barrier substitute."

12.6.2

Fire Doors and Windows

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0800-1.2

"Doors - Fire Protection - Fire doors, frames, and hardware shall be either tested and listed by UL or similar nationally accredited testing laboratories or approved by FM or similar national insurance organizations. Fire doors, frames, and hardware shall be installed with label attached in accordance with NFPA 80."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0800-2.2

"Windows - Fire Protection - Where required by code, fire windows, frames, and hardware shall be either tested and listed by UL or similar nationally recognized testing laboratories or approved by FM or similar national insurance organizations. Such fire windows, frames, and hardware shall be installed with label attached in accordance with NFPA 80."

12.6.3

Penetration Seals

Penetration seal assemblies, materials, installation etc., shall be compatible with the fire rating of the barrier. The configuration of the installed assembly shall conform to the tested configuration used in qualifying the assembly.

12.6.3.1

Fire Barrier Penetrations

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0727, General

"Firestopping shall comply with NFPA 101, Chapter 6.

Firestopping materials and assemblies shall be tested for their fire resistance and listed by UL or similar nationally accredited testing laboratories, or shall be listed for their fire resistance as approved by FM or similar national insurance organizations. Unrated and unapproved assemblies shall be tested and approved before being considered for use in a DOE facility.

Where fire-rated assemblies (walls, floors-ceilings, roof-ceilings) are either partially or fully penetrated by pipes, ducts, conduits or other such building elements, firestopping material shall be placed in and around the penetrations to maintain the fire resistance rating of the assembly."

12.6.3.2

Fire Barrier Penetration by Raceways

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1605-2.1.1

"Raceways that penetrate fire-assemblies shall be noncombustible. The complete installation shall be suitably sealed to maintain the established fire ratings as defined in UL Building Material Directory and UL 1479. Raceways shall be 1/2 inch minimum in diameter. Raceways embedded in concrete or masonry shall be 3/4 inch minimum and shall be adequate in number and capacity for the initial and projected facility requirements."

12.7

FIRE, HAZMAT AND MEDICAL SUPPORT

12.7.1

Fire Department

The Fire Department is an active element of the fire protection program. Its preparedness to react effectively in the event of a fire is essential to protect life, prevent, contain and extinguish fires, and to reduce property damage.

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(7)

"Fire Department - A fully staffed, trained, and equipped fire department brigade shall service all DOE facilities, except as determined by the PSO. (Refer to the fire protection positions on

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

minimal staffing levels in the DOE Fire Protection Resource Manual.) DOE or Contractor-operated organizations with the responsibility for providing fire protection for DOE property may enter into mutual aid agreements with other fire departments in accordance with Public Law 46 (Title 42 USC Section 1856)."

12.7.1.1

Plans, Procedures, Devices, and Trained Personnel

SITE REQUIREMENT SOURCE: DOE/EH0135 FP.6

- "1. There is a corrective action plan to achieve compliance with NFPA Standard 1500.
2. There is a training program for certifying Fire Department personnel to NFPA and/or State requirements. There is a documented program for verifying the proficiency of Fire Department Personnel. Training records are maintained.
3. There are pre-fire plans which reflect the current conditions at the site and facilities. The fire department/fire brigade are drilled in their use.
4. There is a documented program established which requires Fire Department fire fighters and officers to tour each facility on the site a minimum of once each quarter.
5. Mutual-aid agreements are in place with nearby agencies or there is a documented procedure in place for the call-back of off-duty fire suppression personnel.
6. The Fire Emergency Response Team (Fire Brigade or Fire Department) conducts periodic drills in response to simulated fires in actual facilities to assure familiarity with facilities and adequacy of emergency response and pre-fire plans. Drills are appropriately critiqued and the results are documented."

12.7.1.2

Inspection, Testing and Records

Inspection, Testing and Records for the facility shall be in accordance with the applicable NFPA Code or standards. See also subsection 12.9.1.2 Inspection, Testing and Maintenance for additional information.

12.7.2

Contingency Plan

12.7.2.1

Emergency Coordinators

FACILITY REQUIREMENT SOURCE: DOE-RL-91-28 Appendix 7A, Section 3

"The overall responsibility for implementation of this Plan lies with the building emergency director (BED) or their designated alternates. The BED has the responsibilities of the Emergency Coordinator as discussed in WAC 173-303-360 and is also the Event Commander. A list of all BEDs and alternates is maintained at various locations throughout the Hanford Facility, and these individuals can be reached 24 hours a 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 Hanford Fire Department personnel who are authorized to act for the BED when the BED is absent. 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 (or an Emergency Coordinator) usually is obtained through the DOE-RL single point-of-contact by dialing telephone number 811 or 373-3800 or 375-2400. The single point-of-contact has been designated as the contact point to mobilize a response to any Hanford Facility emergency. The single point-of-contact is available at all times and has the responsibility to initiate notifications to the BED or alternate to begin responses to

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

emergencies, as well as to dispatch emergency responders (Hanford Fire Department, Hanford Patrol, or ambulance services). All emergency notifications to the BED, building managers, etc., can be made directly from the affected TSD unit or through the single point-of-contact. The unit-specific DOE-RL technical contact responds to regulatory agency inquiries regarding this Plan. The unit-specific DOE-RL technical contact is accessed by contacting 373-3800 or 375-2400."

12.7.2.2

Implementation of The Contingency Plan

FACILITY REQUIREMENT SOURCE: DOE-RL-91-28 Appendix 7A, Section 4

"This Plan describes parallel decision flow paths for evaluating and classifying an incident. The U.S. Department of Energy (DOE) Orders and WAC 173-303-360 require incident classification. The definition of emergencies according to DOE Orders differs from the definition contained in WAC 173-303. Because of this, a dual incident classification decision path is necessary to meet both DOE Orders and WAC 173-303 requirements. Incident classification according to DOE Orders is described in this Plan for completeness only. The DOE Orders will not be used to evaluate whether an incident requires implementation of a contingency plan.

Implementation of a contingency plan will occur when a BED has determined that a release, a fire, or an explosion has occurred at the Hanford Facility that could threaten human health and the environment. A release is defined in WAC 173-303-040 within the definition of "discharge". An incident requiring evacuation of personnel or the summoning of emergency response units will not necessarily indicate that a contingency plan has been or will be implemented.

Any incident that poses a potential threat to human health and the environment discovered by TSD unit personnel requires immediate notification of the BED and the single point-of-contact, who then notifies the Hanford Fire Department. Personnel may respond, in accordance with the procedures described in TSD unit-specific contingency plans, before the arrival of the BED, as long as such response is within their level of training. The Hanford Fire Department is contacted through the single point-of-contact on all incidents involving dangerous materials or mixed waste."

12.7.2.3

Spill or Material Release

FACILITY REQUIREMENT SOURCE: DOE-RL-91-28 Appendix 7A, Section 5.3

"(Signal: None) The following actions are taken in the event of a major release.

5.3.1 Discoverer

The discoverer performs the following:

1. If within the TSD unit, notifies personnel (including BED) of discovery of spill or release by sounding the appropriate alarm, using the public address system, etc.
2. Initiates notifications to the Hanford Fire Department (and BED if necessary) by contacting the single point-of-contact and provides all known information, in accordance with Section 5.1.
3. Takes action to contain and/or to stop the spill if all of the following are true:
 - Identity of the substance(s) involved is known
 - Appropriate protective equipment and control/cleanup supplies are readily available
 - Action(s) can be performed safely without assistance, or assistance is readily available from other trained TSD unit personnel.

If any of the above conditions are not met, or there is any doubt, the discoverer evacuates the area and remains outside, upwind of the TSD unit, pending the arrival of the BED. The

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

discoverer remains available for consultation with the BED, Hanford Fire Department, or other emergency response personnel.

5.3.2 Single Point-of-Contact

The single point-of-contact performs the following:

1. Notifies the Hanford Fire Department and relays information received from the event scene
2. Initiates notification to the BED if the BED is not at the TSD unit
3. Remains available to support further notification and response activities if needed.

5.3.3 Building Emergency Director

The BED performs or arranges for the following:

1. Proceeds directly to the TSD unit to coordinate further activity and to establish a command post at a safe location
2. Obtains all available information pertaining to the incident and determines if the incident requires implementation of the contingency plan
3. Determines need for assistance from agencies listed in Section 8.0 and arranges for their mobilization and response through the single point-of-contact
4. Initiates the appropriate alarm if building or area evacuation is necessary
5. Arranges for care of any injured persons
6. Requests activation of the affected area ECC via the single point-of-contact if a threat to surrounding buildings or structures exists
7. Provides for event notification in accordance with Section 5.1
8. Maintains access control at the incident site by keeping unauthorized personnel and vehicles away from the area. Security personnel can be used to assist in site control if control of the boundary is difficult (e.g., repeated incursions). In determining controlled access areas, considers environmental factors such as wind velocity and direction
9. Arranges for proper remediation of the incident after evaluation
10. Remains available for fire, patrol, and other authorities on the scene and provides all required information
11. Enlists the assistance of alternate BED(s) if around-the-clock work is anticipated
12. Refers media inquiries to the Media Relations/Communications offices of the contractors or the DOE-RL
13. Ensures the use of proper protective equipment, remedial techniques (including ignition source control for flammable spills), and decontamination procedures by all involved personnel if remediation is performed by TSD unit personnel. Areas of expertise are available in determining necessary equipment or procedures
14. Remains at the scene to oversee activities and to provide information if remediation is performed by the Hanford Fire Department Hazardous Materials Response Team or other response teams
15. Ensures proper containerization, packaging, and labeling of recovered spill materials and overpacked containers
16. Ensures decontamination (or restocking) and restoration of emergency equipment used in the spill remediation before resuming TSD unit operations
17. Provides required reports after the incident in accordance with Section 9.0.

5.3.4 Hanford Fire Department Response to Major or Unknown Spills

The Hanford Fire Department response to unknown spills is as follows.

1. Initial Hanford Fire Department response includes one engine company, one hazardous materials unit, one ambulance unit, and one battalion commander.
2. The Hanford Fire Department, as the Hazardous Materials Incident Command Agency, establishes command and control of the situation. The first arriving unit assumes incident command and determines location of the command post, and evacuates personnel from a red zone consisting of a minimum of 100 feet (30.5 meters) in all directions. The red zone could be adjusted as deemed necessary by the hazardous materials team leader.
3. The Incident Commander evacuates all personnel within the red zone area.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

4. The hazardous materials team leader establishes a yellow zone and decontamination corridor.
5. The hazardous materials team leader assigns fully trained and qualified team members specific tasks, i.e.,
Team Safety Officer Decontamination Team Leader
Entry Team Resource Leader
Backup Team Science Leader
6. The hazardous materials team safety leader controls and directs the medical evaluations for personnel working in the red and the yellow zones.
7. Team members performing entry, back up, and decontamination, suit up in level "A" protection.
8. The entry team members make entry to obtain samples of unknown hazardous material, and observe for other pertinent information.
9. Entry team collects sample and exits area going through decontamination by decontamination team.
10. The hazardous materials sample is analyzed on scene by hazardous materials team personnel using available testing equipment. This testing is to determine hazard group classification, i.e., poison, acid, flammable, oxidizer, etc.
11. Once the hazard classification has been identified, the hazardous materials entry team makes re-entry to stabilize and control hazardous materials to the point that the emergency no longer exists.
12. The entry team exits the area going through decontamination by the decontamination team.
13. The spill site is turned over to cleanup personnel for cleanup and disposal.
14. The hazardous materials response command is dissolved; all units return to stations.
15. A critique of the hazardous materials incident is held with team members as soon as possible after Hanford Fire Department units have returned to their stations."

12.7.2.4

Response to Fire

FACILITY REQUIREMENT SOURCE: DOE-RL-91-28 Appendix 7A, Section 5.4

"(Signal: Gong) In the event of a fire, the discoverer activates a fire alarm and calls the single point-of-contact. Automatic initiation of a fire alarm (through the smoke detectors and sprinkler systems) also is possible. The TSD unit personnel are trained in the use of portable fire extinguishers for incipient fires. Personnel use their best judgment whether to fight a fire or to evacuate. Under no circumstances do personnel remain to fight a fire if unusual hazards exist.

The following actions are taken in the event of a fire or explosion.

1. On actuation of the fire alarm, personnel shut down equipment, secure waste, and lock up classified documents (or carry the documents with them), ONLY if time permits. The alarm automatically signals the Hanford Fire Department and the Hanford Patrol Operations Center.
2. Personnel leave the area/building by the nearest safe exit and proceed to the designated staging area for accounting.
3. The single point-of-contact is notified immediately, who in turn initiates notifications to the BED (or alternate) if necessary.
4. The BED proceeds directly to the scene (if not already there).
5. The BED obtains all necessary information pertaining to the incident.
6. Depending on the severity of the event, the BED (or lead TSD unit manager) contacts the ONC and requests additional notifications to offsite agencies (e.g., Ecology, local counties, and DOE-Headquarters), informing them as to the extent of the emergency (including estimates of dangerous waste or mixed waste quantities released to the environment) and any actions

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

necessary to protect nearby buildings and/or structures.

7. Depending on the severity, the BED requests activation of the affected area ECC to establish organizations to provide assistance from the DOE-RL, other Hanford Facility contractors, and outside agencies.

8. The Hanford Patrol establishes roadblocks within the area to route traffic away from the emergency scene.

9. Hanford Fire Department medical personnel remove injured personnel to a safe location, apply first aid, and prepare the injured for transport to medical aid stations or to local hospitals in accordance with established memoranda of understanding (MOUs) (copies of the MOUs are maintained by the Hanford Fire Department). Medical personnel are on standby at the fire stations 24 hours a day.

10. Hanford Fire Department firefighters extinguish the fire.

11. All emergency equipment is cleaned and fit for its intended use following completion of cleanup procedures."

12.7.2.5

Response to Transportation and/or Packaging Incidents

FACILITY REQUIREMENT SOURCE: DOE-RL-91-28 Appendix 7A, Section 5.7

"This section describes the actions taken in the event of an unplanned sudden or nonsudden release of dangerous waste or dangerous waste constituents to air, soil, surface water, or groundwater during onsite transportation activities, or at locations not covered by a unit-specific contingency plan. This includes spills or releases as a result of transportation activities, movement of materials, packaging, and storage of hazardous materials. The following actions are performed by those individuals responding to a hazardous materials transportation incident at the Hanford Facility.

5.7.1 Initial Responder Actions

The initial responder or discoverer of a hazardous materials spill or release resulting from onsite transportation activities initiates the following response actions, if the actions can be performed without jeopardizing personnel safety, as appropriate:

- Determines the nature of incident
 - Personnel injuries
 - Hazardous material spill with fire
 - Hazardous material spill without fire.
- Assists injured personnel
- Initiates notifications to the single point-of-contact by any means available (telephone, radio, passing motorist, etc.) to request assistance from the Hanford Fire Department (Emergency Coordinator for these type of events), Hanford Patrol, and medical personnel
- Remains in a safe location and attempts to isolate the area to prevent inadvertent personnel access.

5.7.2 Event Commander--Outside Treatment, Storage, and/or Disposal Units

If the emergency event is located within the responsibility of a BED, the BED will establish event command.

The Hanford Fire Department will establish and maintain incident command on arrival at the emergency event. The Incident Commander will perform or coordinate the event command actions for locations not controlled by a BED.

The Event Commander ensures that the cause of the incident and its possible effects are investigated and evaluated as soon as possible. The Event Commander, with input from the Incident Commander, assesses possible hazards to human health and the environment (considering direct, indirect, immediate, and long-term effects) that might result from the release, fire, or explosion and takes the following actions as appropriate:

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

- Isolate event from employees:
 - Cordon off access
 - Place apparatus to block roadways
 - Use Hanford Patrol roadblocks
 - Use TSD unit/vehicle public address systems
 - Sound appropriate alarms.
 - Determine type of hazardous materials involved:
 - Occupancy/location
 - Container shapes
 - Markings and colors
 - Placards and labels
 - Shipping papers
 - Consult reference materials [(U.S. Department of Transportation, National Institute of Occupational Safety and Health Pocket Guide to Chemical Hazards (NIOSH 1993))]
 - Unit managers/employees.
 - Notify the appropriate manager of the incident and ensure that the incident is reported properly in accordance with Section 9.0 of this Plan
 - If the TSD unit stops operations in response to a fire, an explosion, or a release, the BED will monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate
 - Coordinate with emergency response organizations to establish a command post, upwind and uphill of the incident:
 - Ensure command post is located so as to minimize the need for relocation
 - Direct incoming response vehicles to a safe staging area
 - Coordinate tasks with other responders
 - Activate required emergency centers
 - Dispatch radiological and nonradiological field teams to help define and locate the plume.
 - Ensure that all personnel who enter the area are equipped with proper protective clothing and respiratory protection
 - Rescue should only be attempted when the risks have been evaluated and are considered acceptable
 - If the risks are unknown, or considered unacceptable, wait for the Hazardous Materials Response Team.
- Rescue/evacuation can be performed by trained personnel, other than the Hanford Fire Department, if the victim's location could present an immediate life-threatening situation or further injuries to the victim.
- Complete other actions necessary to effect control of the scene, including but not limited to the following:

NOTE: The following steps normally are conducted and/or directed by a Hanford Fire Department Hazardous Materials Response Team leader:

 - Secure the scene
 - Use absorbents
 - Use covering (blankets, polyethylene, etc.)
 - Overpack
 - Plug/patch
 - Transfer to new container
 - Venting/vapor suppression.
 - Initiate other measures as needed, including but not limited to, the following:
 - Place hose streams and unmanned monitors
 - Establish confinement dikes to prevent run-off
 - Perform first aid.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

- Obtain additional information:
 - Who is operating the equipment
 - What and how much hazardous material is involved
 - Manufacturer, shipper, receiver
 - Weather conditions.
- Set up resource areas:
 - Command post location
 - Logistics area
 - Triage area
 - Decontamination area (personnel and equipment)
 - Staging area
 - Planning.
- Reevaluate evacuation boundaries and identify containment zones to adequately protect responding personnel
- Take any additional actions to mitigate the incident, possibly including the following:
 - Cool tanks involved in a fire or exposed to heat to reduce the potential for explosion
 - Remove all available ignition sources
 - Divert liquid and run-off water to prevent contamination spread
 - Dike and retain liquids from a leak or spill
 - Limit property damage as much as possible
 - Provide on-scene emergency medical services.
- Document the response to the incident and provide a report to appropriate management
- Conduct a critique, including cause(s), impact(s), and lesson(s) learned from an incident, following the emergency incident and on completion of the emergency response to that incident. The Emergency Coordinator and/or BED ensures that all appropriate parties are aware of, and participate in, decisions on the best course(s) of action to take to prevent or minimize the possibility of future occurrences. Steps are listed in Section 5.9."

12.7.2.6

Prevention/Spread of Fires, Explosions, or Releases

FACILITY REQUIREMENT SOURCE: DOE-RL-91-28 Appendix 7A, Section 5.9

"The BED, in coordination with emergency response organizations, takes the steps necessary to ensure that a secondary release, fire, or explosion does not occur. The following actions are taken:

- Isolate the area of the initial incident by shutting off power, closing off ventilation systems, etc., to minimize the spread of a release and/or the potential for a fire or explosion
- Inspect containment for leaks, cracks, or other damage
- Inspect for toxic vapor generation
- Remove released material and waste remaining inside of containment structures as soon as possible
- Contain and isolate residual waste material using dikes and adsorbents
- Cover or otherwise stabilize areas where residual released materials remain to prevent migration or spread from wind or precipitation run-off
- Install new structures, systems, or equipment to enable better management of hazardous materials or dangerous waste
- Reactivate adjacent operations in affected areas only after cleanup of residual waste materials is achieved."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.8

FIRE HAZARD ANALYSIS

A fire hazard analysis should be performed by qualified fire protection and system engineers to (1) consider potential in situ and transient fire hazards; (2) determine the consequences of fire in any location in the plant on the ability to safely shut down or on the ability to minimize and control the release of radioactivity to the environment; (3) specify measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability as required for each fire area containing structures, systems, and components important to safety. The fire hazard analysis provides a comprehensive analysis of fire protection and life safety features, by fire area, building etc. To assess the compliance with codes, standards and directives (DOE Orders).

SITE REQUIREMENT SOURCE: DOE 5480.7A Section 9.a(3)

"Fire Hazards Analyses. The purpose of a fire hazards analysis (FHA) is to comprehensively assess the risk from fire within individual fire areas in a DOE facility in relation to existing or proposed fire protection so as to ascertain whether the objectives of paragraph 4, are met. A graded FHA, that reflects the risks from fire in a facility, shall be performed for new facilities as directed by DOE 6430.1A, for nuclear facilities where safety analyses are required by DOE 5480.23, and as directed by the PSO. A Safety Analysis Report (SAR) that addresses the following elements will satisfy the requirements for an FHA. A graded FHA shall contain, but not be limited to, the following elements:

- (a) Description of construction
- (b) Protection of essential safety class equipment
- (c) Fire protection features
- (d) Description of fire hazards
- (e) Life safety considerations
- (f) Critical process equipment
- (g) High value property
- (h) Damage potential: Maximum Credible Fire Loss (MCFL) and Maximum Possible Fire Loss (MPFL)
- (i) Fire Department/Brigade response
- (j) Recovery potential
- (l) Potential for a toxic, biological and/or radiation incident due to a fire
- (m) Emergency planning
- (n) Security considerations related to fire protection
- (o) Natural hazards (earthquake, flood, wind) impact on fire safety
- (p) Exposure fire potential, including the potential for fire spread between fire areas.

An FHA shall be performed under the direction of a qualified fire protection engineer."

12.9

ASSESSMENT

12.9.1

Fire Protection Investigation and Reporting

A process should be developed and implemented to notify site management and DOE regarding fires and fire protection related equipment failures and occurrences. Included in this process would be requirements as to when and how investigations are to be performed, root causes determinations, trending etc.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

FACILITY REQUIREMENT SOURCE: RLID5480.7 Section 8.8

"Fire investigations and reports shall be performed and prepared, in accordance with DOE 5000.3B and DOE 5485.1."

12.9.1.1

Design Assessment

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.a(2)

"Assessments. Documented evaluations of the fire protection program, including field walkdowns of facilities, shall be performed as follows:

- (a) Facilities/contractors shall be assessed to establish that they conform with DOE fire protection criteria.

- (b) Minimum Frequency

Headquarters:

- PSO assessment of field offices 3 years
- EH assessment of program offices 3 years

Field Office:

- Field office assessment of the fire protection program of each contractor 2 years

Contractors/Facility Managers:

- Annual fire protection assessments shall be made of facilities valued in excess of \$50 million; where considered to be a moderate (Category 2 Hazard) or high hazard (Category 1 Hazard) as defined in DOE 5481.1B, SAFETY ANALYSIS AND REVIEW SYSTEM, for nonnuclear facilities and in DOE 5480.23, NUCLEAR SAFETY ANALYSIS REPORTS, for nuclear facilities; or in which vital programs are involved.

- Fire protection assessments shall be made at least every two years of facilities plus equipment valued at \$10 million to \$50 million.

- Remaining facilities shall be assessed at least every three years or at frequencies determined by the AHJ.

- Comprehensive assessments of fire protection program elements shall be made every two years.

- Copies of the two most recent assessment reports shall be kept on file.

- (c) Nature and Scope - Assessments shall include an evaluation of the following elements of the fire protection program:

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

Program-Related:

- Comprehensiveness of the fire protection program.
- Procedures for engineering design and review.
- Procedures for maintenance, testing and inspection.
- Fire protection engineering staff (number, qualifications, training).
- Fire suppression organization (personnel and training).
- Fire suppression mutual aid agreements.
- Management support.
- Exemptions and documented equivalencies.

Facility- Related:

- Fire protection of safety class equipment.
- Life safety considerations.
- Fire protection of vital programs.
- Fire protection of high value property.
- Fire suppression equipment.
- Water runoff.
- Pre-fire plans.
- Fire apparatus accessibility.
- Completeness of fire hazards analyses.
- Fire barrier integrity.
- Completeness of fire loss potential (MPFL/MCFL) determinations.
- Fire safety training.

Combined Aspects (Program & Facility):

- Inspection, testing, and maintenance reports.
- Adequacy of facility appraisal reports.
- Tests of fire suppression systems, water supplies, and procedures for maintaining these in working order.
- Administrative controls.
- Temporary protection and compensatory measures.
- Status of findings from previous assessments.
- Conformance with applicable Orders, codes and standards."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0

"Special Facilities - Nonreactor Nuclear Facilities - An assessment shall be made early in the design or modification to determine the facility structures, systems, and components that shall be protected against the effects of a DBF and explosion. A fire protection engineer or person knowledgeable in applying the principles of fire protection shall develop the fire protection system. To maximize the protection against fire, the system shall contain an appropriate integration of fire prevention, detection, and suppression features."

12.9.1.2

Inspection, Testing and Maintenance

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(5)

"Testing and Maintenance - Fire protection systems shall be tested and maintained in accordance with the applicable NFPA standards and as supplemented by criteria in the DOE

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

Fire Protection Resource Manual. "

12.9.2

Fire Protection Quality Assurance Program

With respect to a fire protection program, a Fire Protection Quality Assurance Program should include the design and documents, material procurement, equipment, installation, non-conformance reports, procedures, etc., to assure the integrity of the program. Additional "Quality Assurance" requirements are identified in the RID for Quality Assurance to aid as guidance in developing a Fire Protection Quality Assurance Program.

Independent of the conventional "Quality Assurance" audits periodic reviews and continuous surveillance are performed to provide adequate assurance of compliance to the commitments in the fire protection program and safe operation of the facility.

12.9.2.1

Quality Assurance Program Objectives and Requirements

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0140

"Quality Assurance. Facility design shall be conducted under QA requirements to ensure that the established program and project quality objectives are satisfied. A QA program shall be developed and implemented in compliance with DOE 5700.6B and using the elements of DOE 4700.1 and ANS ANSI/ASME NQA-1."

12.9.3

Control of Fire Protection Impairments

Guidelines should be developed to support the implementation of compensatory measures as required to mitigate the consequences of impairments to the fire protection system and features. Controls should be established to control the disarming of fire detection and suppressions and the establishing fire watches as compensatory measures while the system are disarmed.

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(16)

"Impairment Control - A fire protection system impairment program shall be provided for control of operation and tracking of impairments during periods when fire protection systems are out of service."

FACILITY REQUIREMENT SOURCE: RLID5480.7 Section 8.6

"The Fire Protection Program must include a fire protection system impairment strategy to minimize the duration and impact of fire protection system impairments. Elements of the fire protection impairment strategy must provide that:

- a. Fire protection system impairments are identified, assigned priority, and promptly corrected in a reasonable amount of time.
- b. A documented impairment program is administrated by trained personnel.
- c. Fire protection staff and fire department personnel are advised and updated on impairments.
- d. A policy is established for immediate and expedient repair of impairments.
- e. Compensatory measures are implemented until the impaired system is restored."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.10

LIFE SAFETY

Life Safety Code establishes minimum requirements that will provide a reasonable degree of safety from fire in buildings and structures.

12.10.1

Facility Buildings

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(2)

"Life Safety - Life safety provisions shall be provided for all facilities in accordance with the Life Safety Code (LSC), NFPA Standard 101. The methods outlined in NFPA 101M may be used to obtain an equivalent level of life safety where strict compliance is not possible. Exit requirements for toxic and explosive environments shall be as determined by the AHJ. In addition, for explosive environments, exits shall reflect the criteria contained in the DOE Explosives Safety Manual, (DOE/EV 06194). Where noncompliance with some Life Safety Code provisions may be required for public safety, as in some containment structures, additional protective systems and personnel limits should be maintained. Compliance with the Life Safety Code shall be considered to satisfy the exit requirements of the applicable building code and OSHA 29 CFR 1910."

12.10.1.1

Exit and Emergency Lighting

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1655-1

"Exit and emergency lighting systems shall comply with NFPA 101 and NFPA 110."

12.10.1.2

Life Safety for Laboratories

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-99.0.4(2)

"A minimum number of entrances shall be provided for security areas. However, exits shall comply with NFPA 101. Some exits shall be provided for emergency use only, and equipped with alarm devices and seals. At least two exits shall be provided in rooms where hazardous materials are handled."

12.10.1.3

Egress

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0110-99.0.4(3)

"In those areas where an accidental breach of a primary confinement system could expose personnel to radioactive material, a distance of 75 feet as measured by the method in the NFPA 101 shall be the maximum travel distance to ensure that personnel can exit through the next confinement.etc."

12.10.1.4

Corridor Widths

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-99.0.4(12)

"Corridor width(s) can be a controlling factor in the overall building size, and corridors shall be no wider than required for facility functions. All Corridors and door openings, shall meet

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

NFPA 101 or more stringent requirements based on the hazards of materials to be handled or operations to be performed, as established by the cognizant DOE health and safety authority. The size and arrangement of interior corridors shall accommodate the following.

- Personnel traffic flow patterns
- Safety of building occupants
- Movement of equipment (including initial equipment installations, facility operations and future replacement or removal)
- Ultimate decontamination and decommissioning of the facility including equipment required during decontamination."

12.10.1.5

Door Encroachment

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-99.04(13)

"Where room doors open into corridors, frames shall be recessed to prevent the open doors from encroaching on clear corridor spaces."

12.10.1.6

Security Areas

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0800-1.3(4)

"Doors that serve as exits from security areas shall comply with NFPA 101, Chapter 5, and with DOE security requirements, except the use of panic hardware on doors from security area shall be limited to assembly, educational, and hazardous occupancy classifications of UBC as determined by the cognizant DOE authority."

12.10.1.7

Zoning for Automatic Control

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1595-2

"Zoning for automatic control of space temperatures, static pressures, humidities, ventilation, smoke and fire detection, security and lighting shall satisfy health and safety requirements as indicated in DOE project criteria, NFPA 101, space operational and occupancy requirements, and zoning exposure with relation to building size, orientation and configuration, etc."

12.10.1.8

Life Safety in Hazardous Areas

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.4

"Hazardous Areas - When exemptions are granted to specific DOE fire protection standards for reasons unique to DOE facilities, as in the case of some containment structures, fire protection shall be provided so as to assure the life safety of facility occupants as required by the cognizant DOE fire protection authority."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.4[2]

"Hazardous areas, such as radioactive spaces with inert atmospheres, shall have sufficient alarms and interlocks to assure that access by emergency personnel will not endanger such personnel or result in a public hazard."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.4[3]

"The design of hazardous areas shall facilitate access by emergency personnel from the exterior and, at the same time, shall maintain any required confinement or containment using air locks or other features."

12.11

PROGRAM FEATURES

12.11.1

Improved Risk Level of Protection or Higher Standard of Protection

SITE REQUIREMENT SOURCE: DOE/EH0135 FP.7

"PERFORMANCE OBJECTIVE: A fire protection engineering program should be in place to effectively provide and maintain an "improved risk" level of fire protection. CRITERIA

1. Fire protection engineering review and approval is required in the planning and design of all new projects, building modifications, and renovations, including the acceptance of fire protection systems.
2. Fire protection systems and equipment, e.g., suppression systems, detection systems, fire pumps, portable extinguishers, etc., are inspected, tested, and maintained in accordance with the National Fire Protection Association Codes and Standards.
3. Fire Protection Engineering Surveys are conducted as defined in DOE 5480.7
4. Fire loss records are maintained, analyzed, and reported in accordance with DOE 5484.1.
5. Exemptions to basic objectives are documented in DOE-HQ granted exemptions or are to be corrected by approved corrective action plans.
6. Water supplies and the water supply system, e.g. Source, storage facilities, pumps, underground piping, isolation valves, etc., are reliable and sufficient for the maximum credible fire.
7. Fire hydrants and fire department connections are accessible, protected, and appropriately located.
8. Surveys, audits and appraisals are performed to assure proper implementation of fire protection standards.
9. Documented programs are in place for the control of welding/cutting operations, use of flammable materials, and hazardous materials.
10. A documented fire barrier maintenance program is in place.
11. A formal system has been established to track and document completion of fire protection findings, recommendations, and other items that result from Fire Protection Engineering Surveys, fire protection system inspections and other audits and appraisals.
12. An annual documented review is made of the fire protection program
13. Safety Analysis Report, Fire Hazard Analyses, Fire Risk Analyses, or other similar documents are prepared to assess the potential impact of credible fires. The fire safety review program provides for appropriate updating of analyses."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1530-2.1

"Improved Risk Concept for Fire Protection Systems - Fire protection design shall incorporate an "improved risk" level of fire protection as directed in DOE Order 5480.7 as well as Section 0110-5, Health and Safety."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-2.2

"Vital Programs - Fire protection systems for vital programs shall incorporate a "higher standard of protection" than the "improved risk" level as directed by DOE Order 5480.7."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-2.3.1

"Maximum Possible Fire Loss - The "improved risk" level of protection requires that the "maximum possible fire loss" shall be the basis for determining the need to provide automatic fire suppression systems and for additional fire protection systems and features. "Maximum possible fire loss" is defined in DOE Order 5480.7, Criteria I through V as discussed in DOE Order 5480.7 correspond with Section 1530.2.3.2, Criterion I, through Section 1530.2.3.6, Criterion V. The application of these criteria shall be considered by an experienced fire protection engineer."

12.12

BUILDING DESIGN

This element when worked with Section 12.10 Life Safety identify the requirements for building design, materials, furnishings etc.

SITE REQUIREMENT SOURCE: DOE/EV-0043 101

"This standard applies to all portable or relocatable structures including trailers, (hereafter referred to as portable structure) in a single fire area where any one of the following conditions exists:

- o Creates a life hazard.
- o Endangers the public or environment.
- o Replacement value exceeds \$250,000. (Structure and Contents)
- o Is vital to a DOE program."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.1

"Fire Protection - General - Facilities shall comply with the following:

- DOE Order 5480.4 Attachment 2, Section 2.c
- DOE Order 5480.7
- Section 1530, Fire Protection

Facilities shall also comply with 29 CFR 1926 and 29 CFR 1910. Except as requires by other sections of these criteria, NFPA 101 shall apply where 29 CFR 1926 and 29 CFR 1910 does not apply or where NFPA 101 exceeds the requirements of 29 CFR 1926 and 29 CFR 1910."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.1[2]

"Definitions, fire resistance ratings, and types of construction shall be as contained in the UBC. Any materials with unusual fire characteristics, such as urethane foams, and any materials that develop significant quantities of toxic or harmful products of combustion, shall not be used as interior finishes or other interior applications without the approval of the cognizant DOE fire protection authority. The use of foam plastics in construction shall be prohibited unless it fully complies with FM 1-57."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.12.1

Performance Objectives in the Design of DOE Facilities

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.2[2]

"As part of determining the "improved risk" level, the analysis shall address those conditions in a facility where:

- Large or unusual fire potential exists.
- There are special life-safety hazards.
- Toxic chemicals or biological agents exist.
- The consequences of a fire include radioactive contamination of the facility, the site, or the public environment.
- National security is adversely affected by fire."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.2[3]

"Special precautions for preventing the spread of fires, such as multiple fire suppression systems, rapid detection of incipient fires, confining fires, increased fire ratings of construction materials, and rapid-response fire departments shall be provided."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.2[4]

"A general fire-protection design analysis shall be made of each facility to ascertain and limit the cost of future damage repair and replacement of facilities and their contents from fire. The analysis shall be made using those parameters established in DOE Order 5480.7. The analysis shall determine the special fire prevention and protection features and controls deemed by the cognizant DOE fire protection authority to achieve a level of improved risk fire protection that limits damage to an acceptable level. The analysis shall be documented in report form in the facility project files and referenced by the SAR."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.2[5]

"Fire protection design analysis shall be done as soon as possible and included as a portion of the Title I Design Summary document required by DOE 4700.1."

FACILITY REQUIREMENT SOURCE: WAC-173-303 Section 395(1)

"395 (1) Precautions for ignitable, reactive, or incompatible wastes.

395 (1) (a) The owner or operator must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including, but not limited to, open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the owner or operator must confine smoking and open flame to specially designated locations. "No smoking" signs must be conspicuously placed wherever there is a hazard from ignitable or reactive waste.

395 (1) (b) Where specifically required by other sections of this chapter 173-303 WAC, the treatment, storage, or disposal of ignitable or reactive waste, and the mixture or commingling of incompatible wastes, or incompatible wastes and materials, must be conducted so that it does not:

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

395 (1) (i) Generate extreme heat or pressure, fire or explosion, or violent reaction;

395 (1) (ii) Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment;

395 (1) (iii) Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;

395 (1) (iv) Damage the structural integrity of the facility or device containing the waste; or

395 (1) (v) Through other like means, threaten human health or the environment.

395 (1) (c) When required to comply with (a) and (b) of this subsection, the owner or operator must document that compliance in the operating record required under WAC 173-303-380(l). This documentation may be based on references to published scientific or engineering literature, data from trial tests, waste analyses, or the results of the treatment of similar wastes by similar treatment processes and under similar operating conditions.

395 (1) (d) At least yearly, the owner or operator shall inspect those areas of his facility where ignitable or reactive wastes are stored. This inspection shall be performed in the presence of a professional person who is familiar with the Uniform Fire Code, or in the presence of the local, state, or federal fire marshal. The owner or operator shall enter the following information in his inspection log or operating record as a result of this inspection:

395 (1) (i) The date and time of the inspection;

395 (1) (ii) The name of the professional inspector or fire marshal;

395 (1) (iii) A notation of the observations made; and

395 (1) (iv) Any remedial actions which were taken as a result of the inspection."

FACILITY REQUIREMENT SOURCE: WAC-173-303 Section 630(8)

"Special requirements for ignitable or reactive waste.

(a) Containers holding reactive waste exhibiting a characteristic specified in WAC 173-303-090 (7)(a)(vi), (vii) or (viii) must be stored in a manner equivalent to the Uniform Fire Code's "American Table of Distances for Storage of Explosives," Table 77-201, 1979 edition.

(b) The owner or operator shall design, operate, and maintain ignitable waste and reactive waste (other than a reactive waste which must meet (a) of this subsection) container storage in a manner equivalent with the Uniform Fire Code. Where no specific standard or requirements are specified in the Uniform Fire Code, or in existing state or local fire codes, applicable sections of the NFPA Pamphlet # 30, "Flammable and Combustible Liquids Code," shall be used. The owner/operator shall also comply with the requirements of WAC 173-303-395 (1)(d)."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.12.2

Exterior Fire Protection Systems and Features

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.4[4]

"The design of the exteriors of facilities shall follow the recommendations of NFPA 80A. Facilities that are not separated as recommended by NFPA 80A shall have fire protection systems such as exterior sprinklers or barrier walls."

12.12.3

Fire Resistance for Materials and Construction

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(6)

"Quality Construction - New Permanent structures in excess of 5000 square feet of area shall be of noncombustible or fire resistive construction."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.3[2]

"Adjacent occupancies of noncompatible groups shall be separated by 2-hour, or better, fire-rated walls, floors, and ceilings as required by NFPA codes."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-6.3[3]

"Wall, floor and ceiling, and roof and ceiling assemblies shall be tested and rated for their fire resistance by UL or similar nationally accredited testing laboratories, or shall be listed for their fire resistance as approved by FM or similar national insurance organizations. Untested, unrated or unapproved assemblies shall be approved by the cognizant DOE fire protection authority before being considered for use in a facility."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0110-99.0.6

"Fire Resistance - Development of the DBF shall include consideration of conditions that may exist during normal operations and special situations (e.g., during periods of decontamination, renovation, modification, repair, and maintenance). The structural shell surrounding critical areas and their supporting members shall remain standing and continue to act as a confinement structure during the DBF under conditions of failure of any fire suppression system not designed as a safety class item. Fire resistance of this shell shall be attained by an integral part of the structure (concrete slabs, walls, beams, and columns) and not by composite assembly (membrane fireproofing). In no event shall the fire resistance rating be less than two hours under conditions of failure of any fire suppression system not designed as a safety class item. Penetrations in this shell shall incorporate, as a minimum, protection against DBF exposures unless greater protection is required by other sections of these criteria."

12.12.4

Building Design for Work Stations on Process Areas

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1161-2

"Non-combustible or fire resistant and corrosion-resistant materials shall be used for enclosures and, to the maximum extent practicable, for any required radiation shielding. In no case shall the total combustible loading located in a fire area exceed the fire resistance rating of the structural envelope (see DOE 6430.1A, Section 0110-99.0.6, Fire Resistance). This shall be documented in a fire risk analysis performed according to a methodology approved by the

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

DOE Fire Protection Authority. This analysis should include estimated fire area combustible loadings, ventilation parameters, room dimensions, maximum average gas temperature, fire duration, maximum average heat flux, and the calculational method used. Enclosures (except open-face hoods) shall be designed with the objectives of being leak-tight. In conjunction with their ventilation systems all enclosures shall be capable of maintaining confinement (i.e. Negative pressure with respect to the surrounding operating area). Without their associated ventilation systems enclosures shall be designed with appropriate physical features to provide an essentially leak-tight confinement (except open-face hoods, which shall provide filtered confinement) for the contaminants they handle. Enclosures specifications should include the following standardized features, where applicable:

Windows and mountings
Fire barriers and filter installation."

12.12.5

Control of Combustibles

12.12.5.1

Interior Finish Materials

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 0995

"Wall Coverings shall conform to NFPA 101."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1260-3

"Furniture systems shall comply with NFPA 101, Chapter 31 (sections concerning furnishings, decorations, and treated finishes), and UBC Chapter 17 for folding, portable, and movable partitions."

12.12.5.2

Interior Floor Coverings

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1260-4

"Rugs and Mats shall comply as furnishings with NFPA 101, Chapter 31 (sections concerning furnishings, decorations and treated finishes), in all occupancy classifications except those of storage and industrial.

Rugs and mats used in storage or industrial occupancies shall have a critical radiant flux not less than the following:

- * 0.45 watts per square centimeter where there are no sprinklers complying with NFPA13;
- * 0.22 watts per square centimeter where there are sprinklers complying with NFPA 13"

12.12.5.3

Control of Combustible Materials by Building Design

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0110-99.0.4(4)

"The facility design shall provide space to accommodate all planned activities, operations, and maintenances (e.g., processing, research and development, scrap and waste handling, sample analysis, shipping and receiving and material staging required for equipment installation and modifications). The design shall minimize the hazard of handling flammable and other hazardous materials. In addition to the usual industrial safety features required in a nuclear facility, the design shall also include the following safety features as appropriate:

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

- Layout of the facility shall provide specific control and isolation, if possible, of quantities of flammable, toxic and explosive gases, chemicals, and other hazardous materials admitted to the facility."

12.12.5.4 Quantities of Stored Materials

SITE REQUIREMENT SOURCE: DOE6430.1A Section 0110-99.0.4(8)

"Suitable physical compartmentalization shall be provided, as determined from the safety analysis, to limit the quantities of stored materials in each compartment to safety levels; ensure the necessary access features and controls; and satisfy the loss limitation criteria in Section 0110-99.0.7, Loss Limitations."

12.12.5.5 Fire and Explosion Potential of the Materials

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[12]

"The designers of the fire protection system shall consider the fire and explosion potential of the materials being processed and the solvents used during processing. In addition, the design shall include facility-specific fire protection systems to mitigate the damage from pyrophoric and other materials that are fire hazards, (e.g., magnesium, ion exchange resins, nitrate solvent and nitrate reduction reactions, and zirconium fuel element cladding hulls)."

12.12.5.6 Storage and Use of Compressed Gases

Fire protection requirements for the storage and use of compressed gases, acetylene, hydrogen, flammable and combustible liquids, and LPG shall be in accordance with 29 CFR 1910 Subpart H, Hazardous Materials.

12.12.6 Electrical Systems

12.12.6.1 Ignition Source by Electrical Equipment

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[21]

"Because of flammable or potentially flammable atmospheres, electrical installations in hazardous process locations shall be designed to preclude the introduction of any ignition source by the electrical equipment."

12.12.6.2 Emergency Power and Emergency Lighting Circuits

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[11]

"An emergency source of electric power shall be provided to operate fire protection systems. Fire protection systems shall be capable of operating during a normal power outage. The emergency power sources and the electrical distribution circuits shall have independence and testability to ensure performance of their safety functions assuming any single failure."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection.

WHC-EP-0750

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1660-1(4)

"Emergency power shall be provided for protective alarm and communications systems as dictated by the system requirements. Switchover to emergency power shall be automatic on failure of the primary power source and shall be indicated on an annunciator panel. The annunciator shall be located in an occupied area and shall indicate any problems with the emergency system. Definition of "emergency systems", "legally required standby systems", and "operational standby systems" shall be in accordance with NFPA 70."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1660-2

"Emergency power systems shall be capable of maintaining full operation of emergency loads for the full time period specified by the cognizant DOE authority (nominally, a minimum of 24 hours). Such power sources shall have the necessary built-in features to facilitate operation testing on a periodic basis to verify their readiness.

Emergency power systems shall comply with NFPA 37, NFPA 70, NFPA 101, NFPA110, and IEEE 446."

12.12.6.3

Listing Requirements for Electrical Materials and Equipment

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1605-1(2)

"Electrical materials and equipment shall be UL or FM tested, with label attached, for the purpose intended, whenever such products are available. Where there are no UL or FM listed products of the type, testing and certification by another nationally recognized testing agency may be acceptable. Installation methods shall be in accordance with the manufacturer's instructions, with NFPA 70, and with other applicable requirements."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1640-2.3

"Interior service transformer installations shall comply with NFPA 70. The minimum number of transformers necessary to satisfy initial and projected facility loads and operational continuity, safety, and security requirements shall be used. Transformer protection and appurtenances shall comply with IEEE CC37.91. Transformer installation shall comply with FM 5-4/14-8"

12.12.6.4

Conduits

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1605-2.1.4

"Rigid steel conduit shall be used in locations classified as hazardous by NFPA 70."

12.12.6.5

Electrical Installations

Electrical installations shall comply with the National Electrical Code, NFPA 70.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.12.6.6

Redundant Electric Circuits

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1630-1.3

"Facilities designated by the cognizant DOE authority as critical shall be served by dedicated, redundant electric circuits. The two services shall be separated by a 4-hour fire-rated barrier and shall be served from separate sources. In lieu of providing two separate services, a single service supplied from a loop-type transmission or distribution system having sectionalizing features may be provided when the reliability of the single service proves adequate when considered in conformance with IEEE 399 and IEEE 493."

12.12.6.7

Primary, Auxiliary, Emergency, and Standby Power Systems

SITE REQUIREMENT SOURCE: DOE6430.1A Section 110-99.8.1

"A primary and auxiliary power source shall be provided for protective alarm systems. See DOE 6430.1A Division 16, Electrical, for power supply criteria"

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1640-3.2

"Normal primary power for protective alarm and communications systems shall come directly from the on-site power distribution system or, in the case of isolated facilities, shall come directly from the public utility. Where several primary power sources are available, the most reliable source shall be used."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1640-3.3

"Standby or emergency power supplies for security, communications, and alarm systems shall be provided in accordance with DOE 6430.1A Section 1660, Special Systems."

12.12.7

Exhaust and Ventilation Systems

Building ventilation systems, exhaust and supply, may potentially perform multiple functions with respect to fire protection. This would include confinement, pressurization, smoke removal, controlling smoke, etc.

12.12.7.1

Ductwork and Air Ventilation Systems

SITE REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(12)

"Containment Systems for Ventilation - Facilities which require ventilation containment systems shall be protected from the effects from fire to preclude release of radioactive, toxic, or other hazardous materials."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1550-2.5.6

"Ductwork, accessories, and support systems shall be designed to comply with the following: NFPA 45

Ductwork shall also be designed to comply with NFPA 90A including specification and

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

installation of smoke and fire dampers at fire wall penetrations and smoke pressurization/containment dampers s required for smoke pressurization/evacuation systems. Fire dampers shall not be used on exhaust system ducting if it is required to maintain confinement of hazardous materials during and after a fire event.

Exhaust ductwork shall comply with NFPA 91. Ductwork for kitchen exhaust shall comply with NFPA 96."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1595-6.5[2]

"All air handling systems shall be provided with the smoke and fire protection controls require by NFPA 101."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1595-6.5[3]

"All supply, return, relief, and exhaust air ventilation systems shall have interlock controls that interface with fire and smoke detection system controls and either turn off or selectively operate fans and dampers to prevent the spread of smoke and fire throughout the building. These controls shall comply with NFPA 90A."

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1595-6.5[4]

"Special exhaust systems shall be designed to include fire and smoke safety controls as required by NFPA 91. Kitchen exhaust ductwork systems shall be designed to include all fire and smoke safety controls as required by NFPA 91."

12.12.7.2

Smoke Pressurization and Evacuation Systems

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1595-6.5

"Control of Air Handling Systems - Fire and Smoke Detection and Protection Controls - Engineered smoke pressurization and evacuation systems shall comply with the following:

- NFPA 90A
- NFPA 72E
- ASHRAE Manual, Design of Smoke Control Systems for Buildings
- ASHRAE Systems Handbook"

12.12.7.3

Confinement Systems Function During the DBF

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[8]

"Confinement systems, particularly the building structural shell and its associated ventilation system, shall be designed with the capability of retaining the confinement function during the DBF."

12.12.7.4

Confinement Systems and Fire Protection

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[18]

"To protect the integrity of process confinement systems, fire protection systems shall include the following features:

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

- Automatic and redundant fire detection devices.
- A fire-extinguishing system to rapidly remove heat produced by fire to prevent or minimize the Pressurization of a process confinement and to rapidly extinguish a fire to minimize the loading of ventilation system filters with combustion products.
- The introduction of the extinguishing agent in a way that does not result in over-pressurization of the confinement barriers."

12.12.7.5

Design Features for Lower Flammability Limit

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1530-99.0[13]

"When the process uses or produces combustible gases or vapors, the design shall include features such as inert gas purging, premixing hydrogen to a nonflammable percent with inert gas, and increasing the air flow within process confinement barriers to provide the dilution required to maintain the concentration of gases or vapors below the lower limit for flammability."

12.12.7.6

HEPA Filters

Air filter units shall meet the requirements of UL 586 "High Efficiency Particulate Air Filter Units" and UL 900 "Test Performance for Air Filter Units".

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1161-4(2)

"...The design of the enclosure ventilation flow pattern shall minimize the spread of fire, and fire screens shall be provided where applicable."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1550-2.5.5(9)

"Heating, Ventilating and Air-Conditioning Systems - Air Cleansing Devices - Fire Protection of HEPA Filter Assemblies - In providing fire protection for the HEPA filters, the design shall separate prefilters or fire screens equipped with water spray sufficiently from the EPA filters to restrict impingement of moisture on the HEPA filters. Under conditions of limited separation, moisture eliminators or other means of reducing entrained moisture shall be provided. Moisture eliminators may be omitted where system design provided sufficient filter redundancy to ensure continued effluent filtration in the event of fire within any portion of the system. The HEPA filter fire protection system shall be activated in a manner consistent with the fire protection system in the room or building in which the filters are located and as directed by the cognizant DOE fire protection authority."

12.12.8

Lightning Protection

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section 1630-5

"Lighting protection systems shall comply with NFPA 78. Lightning protection systems shall be considered for buildings containing facilities for the use, processing, and storage of radioactive, explosive and similarly hazardous materials; for buildings over 50 feet in height; and for buildings containing valuable equipment. A risk assessment using the guide in Appendix I of NFPA 78 shall be made of these buildings to determine the risk of loss due to lightning."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

12.12.9

Seismic Requirements

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(15)

"Seismic Criteria - The design of fire protection systems to withstand seismic events shall be in accordance with the criteria developed by the National Fire Protection Association, except as required by other DOE criteria."

12.12.10

Safety Class Equipment

FACILITY REQUIREMENT SOURCE: DOE5480.7A Section 9.b.(1)

"Safety Class Equipment - In areas where a fire could cause damage to safety class equipment and where no redundant safety capability exists, a redundant fire protection system shall be provided for the safety class equipment. For new facilities, redundant Safety Class equipment shall be located in separate fire areas. Fire suppression systems shall be designed such that their actuation will not damage safety class equipment or cause a criticality incident."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1660-99.0.1(4)

"Redundant safety class electric systems shall be physically protected or separated to prevent a common external event from causing a failure of the redundant systems. IEEE 379 and IEEE 384 shall be used as redundancy and separation criteria."

SITE REQUIREMENT SOURCE: DOE6430.1A Section 1660-99.0.5

"The design of protection systems and safety class instrumentation and control systems shall provide for the periodic in-place testing and calibration of instrument channels and interlocks. The design shall allow periodic testing of protective functions to determine whether failure or loss of redundancy may have occurred."

12.13

DECOMMISSIONING PLANNING

FACILITY REQUIREMENT SOURCE: RLID5480.7 Section 8.3

"Required fire protection features (includes fire department emergency response capabilities) shall be maintained throughout the life of a facility or operation. When a facility is no longer required for a DOE mission and is scheduled for shutdown, decommissioning, and demolition, all of the following must be completed before any fire protection feature is deactivated, no longer maintained, and/or removed from service:

- a. Property book value of the facility or operations (includes building and building contents) must be devaluated below levels, which would require certain fire protection features. Even if property has no inherent value but property is shown to have record value, fire protection must be maintained until recorded value is lowered below protection requirements.
- b. An analysis must be performed to demonstrate that a radiological or hazardous material release, beyond DOE guidelines, is not possible. The analysis must be performed or reviewed by a qualified Fire Protection Engineer. If fire protection feature(s) are determined necessary to prevent a radiological or hazardous release, then fire protection feature(s) must remain in place until radiological or hazardous materials are removed.
- c. For life safety purposes, fire protection features may only be deactivated after personnel are no longer occupying the facility. For purpose of this section, a facility is considered to be

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

WHC-EP-0750

occupied, as defined by NFPA 101, Life Safety Code.

d. Decommission and demolition activities must be coordinated with the Hanford Fire Department for fire and emergency medical response services."

12.14

CONSTRUCTION

FACILITY REQUIREMENT SOURCE: RLID5480.7 Section 8.4.a

"Fire protection must be provided on all construction sites, as required by applicable sections of NFPA 241, Safeguarding Construction, Alteration, And Demolition Operations, and NFPA 1141, Fire Protection In Planned Building Groups."

FACILITY REQUIREMENT SOURCE: RLID5480.7 Section 8.4.b

"Where underground water mains and hydrants are to be provided, they shall be installed, completed, and in service, prior to accumulation of combustible materials on the project site, and prior to the completion of any project structure."

FACILITY REQUIREMENT SOURCE: RLID5480.7 Section 8.4.c

"Construction sites shall provide and maintain fire department vehicle access. The access roads shall have an unobstructed driving surface width of at least 20 feet during all weather conditions, and be able to withstand the live loads of fire department apparatus."

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REQUIREMENTS

IDENTIFICATION

DOCUMENT

FACILITY:

**HIGH LEVEL WASTE STORAGE
TANK FARMS/242-A
EVAPORATOR**

FUNCTIONAL AREA:

Packaging & Transportation

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REVISION 2

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

TABLE OF CONTENTS

3.0	PACKAGING AND TRANSPORTATION	1
13.1	PROGRAM MANAGEMENT	4
13.1.1	Central Control of Packaging and Transportation Activities	4
13.1.2	Staffing	4
13.1.3	Onsite Material Tracking	4
13.2	PACKAGING AND TRANSPORTATION OPERATIONS	4
13.2.1	Packaging Operations	4
13.2.1.1	Low Specific Activity Packaging	8
13.2.1.2	Limited Quantity Packaging	9
13.2.1.3	Packaging Limitations	10
	13.2.1.3.1 Radiation Levels	10
	13.2.1.3.2 Contamination Levels	11
13.2.2	Loading Operations	12
13.2.3	Transportation Operations	13
	13.2.3.1 QA/QC	15
13.2.4	Marking, Labeling and Placarding	16
	13.2.4.1 Marking Requirements	16
	13.2.4.2 Labeling Requirements	17
	13.2.4.3 Placarding Requirements	18
13.2.5	Shipping Papers, Bills of Lading and Manifests	20
13.2.6	Notification of State Authorities of Shipments of High-Hazard Materials	23
13.2.7	Emergency Response Information	23
13.2.8	Receipt Inspection	25
13.2.9	Coordination and Planning of Base Technology	25
13.2.10	Vehicle and Equipment Control and Maintenance	25
13.2.11	Offsite Transportation Management	25
13.2.12	Identification, Establishment and Implementation of Security Controls	26
13.2.13	Shipment Plans	26
13.2.14	Reporting	26
13.3.1	Package Standards and Certifications	29
13.3.2	Safety Analysis	29
13.3.3	Design, Fabrication, Assembly and Testing QA for OffSite Shipping Containers	29
13.3.4	Physical Protection for Security	30

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation

WHC-EP-0750

13.3.5	Nuclear Explosives, Components, and Assemblies	30
13.4	ONSITE SAFETY	30
13.4.1	Coordination of Material Transfers	30
13.4.2	Safety Analysis	31
13.4.3	Requirements for Potentially Explosive and Hazardous Materials	31
13.4.4	Personnel Protection During Movement of Hazardous Materials	31
13.5	KEY INTERFACES	32
13.5.1	Training and Qualification	32
13.5.2	Safeguards and Security	34
13.5.3	Nuclear Safety	34
13.5.4	Emergency Preparedness	34
13.5.5	Radiation Protection	35
13.5.6	Safety & Health	35
13.5.7	Quality Assurance	35
13.5.8	Waste Management	36
13.5.9	Reporting	36

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

13.0 PACKAGING AND TRANSPORTATION

INTRODUCTION

BACKGROUND

This Standards Requirements Identification Document (S/RID) describes a Packaging and Transportation (P&T) program as defined through the relevant DOE Orders, regulations, industry codes/standards, industry guidance documents and, as appropriate, good industry practice. The definition of a P&T program as specified by this document is intended to address Defense Nuclear Facilities Safety Board Recommendations 90-2 and 91-1, which call for the strengthening of DOE weapons complex activities through the identification and application of relevant regulations and standards that supplement or exceed requirements mandated by DOE Orders.

The P&T program defined in this document is presented in the form of program elements and sub-elements. The descriptive text specifies the programmatic controls necessary for implementation of each element and sub-element. The specific DOE Orders, regulations, industry codes/standards, guidance documents and good industry practices that serve as the basis for each element/sub-element are identified and aligned with each sub-element.

It is intended that this document be used as a baseline from which to compare the existing P&T program at the tank farms for determination of the level of program definition and maturity including the existence of an overall site infrastructure and clearly defined interfaces with other relevant functional areas. Additionally, this S/RID may be used as the basis against which future program definition and improvement efforts, including procedures development and/or revisions, can be compared to ensure consistency, completeness, and proper integration with other functional programs.

SCOPE

This S/RID applies to all of the packaging and transportation activities associated with the Tank Farm Facilities and Operations at the Hanford Site. The terms "onsite" and "offsite" will be used to describe shipments throughout this document. Onsite refers to any shipment made within the security boundaries of the Hanford site. Offsite refers to shipments made over public roads and highways. It is WHC policy that all shipments of hazardous and/or radioactive materials are to be performed in accordance with all federal and state regulations and that DOT regulations will be applied to all onsite and offsite shipments.

The onsite shipment activities include the shipment of hazardous waste, radioactive materials/waste and mixed waste. The radioactive materials/waste is shipped as either limited quantity or low specific activity (LSA). The mixed waste may be shipped as limited quantity, LSA, Type A, or Type B. Tank Farms prepares and ships these wastes according to all applicable DOT regulations to the appropriate Solid Waste Disposal Facility within the 200 Area of the Hanford Site.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

The offsite shipment activities include the shipment of radioactive materials (samples and contaminated equipment) to offsite laboratories and/or decontamination facilities. Offsite shipments are either LSA or limited quantity, and are coordinated with the WHC sitewide packaging and transportation organization.

This Tank Farm P&T S/RID is based upon the WHC sitewide P&T S/RID, and outlines those areas of P&T that are Tank Farm specific. All general P&T requirements are outlined in the WHC sitewide P&T S/RID.

The waste storage tanks provide for storage of high-level radioactive waste containing hazardous constituents. These tanks continue to receive waste periodically from various onsite generators through piping and transfer truck. Although the wastes contain transuranic materials, they are not of a sufficient concentration to be classified as transuranic per DOE 5820.2A; therefore, technical requirements for TRU waste are not applicable. Tank Farms also generates low-level radioactive waste and low-level waste is packaged and transported to Hanford disposal facilities. Mixed low-level radioactive wastes are packaged and transported to Hanford storage facilities. All shipments of this waste are onsite only; no offsite waste shipments are made. (Page 2, Item 2 identifies off-site shipments.)

The P&T functional are includes program elements that are necessary to assure that operations at DOE facilities are conducted safely, effectively, and in accordance with specified DOE requirements and selected industry codes, standards, and guidelines.

The scope of the P&T functional area encompasses the programmatic controls for activities associated with onsite and offsite packaging and transportation of hazardous and radioactive materials and wastes. The basis for selecting the requirements applicable to the Tank Farms is described in the following key points:

1. Site P&T personnel are responsible for the following:
 - Program management
 - Carrier selection
 - Safety analysis
 - Package standards and certification
 - Design, fabrication, assembly, and testing for offsite shipping containers
 - Training program content
 - Emergency planning and notification
2. The Tank Farms Offsite shipments consist of "Limited Quantity" or "Low Specific Activity" materials to the 300 area. LSA shipments are exclusive use in strong, tight packages.

The DOE requirements that govern P&T activities are primarily contained in a series of DOE Orders and in Department of Transportation (DOT), EPA, and NRC regulations. The DOE Orders are currently being expanded to provide a more complete definition of requirements, and are being restructured to improve their use. The Functional Area elements are discussed in Sections 13.1 through 13.4. Key Program Interfaces with other functional areas are discussed in Section 13.5.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

- 13.1 Program Management
- 13.2 Packaging and Transportation Operations
- 13.3 Offsite Safety
- 13.4 Onsite Safety
- 13.5 Key Program Interfaces

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

13.1 PROGRAM MANAGEMENT

This element addresses the unique aspects of program management that are an essential part of an effective Packaging and Transportation Program. The general aspects of management, policy, staffing, and training are covered in the Management Systems Functional Area. Management of transportation includes administrative aspects of on and offsite the movement of hazardous and radioactive materials and wastes.

13.1.1 Central Control of Packaging and Transportation Activities

The P&T Program should establish a single mechanism for site-wide control of shipment and receipt of hazardous and radioactive materials.

- P&T operations at the Tank Farms are centrally controlled by the WHC Site Transportation and Packaging Organization.

13.1.2 Staffing

The P&T program should ensure that appropriate staffing is provided for transportation activities. The logistics of offsite shipping is fairly complex, particularly documentation requirements. Any facility which frequently ships materials should have personnel fully dedicated to this aspect of P&T management.

Appropriate staffing is provided within the Tank Farms Facility to support packaging and transportation activities.

13.1.3 Onsite Material Tracking

The P&T Program should ensure that an onsite materials tracking system is established with defined responsibilities and interfaces. Tracking of special nuclear materials for accountability generally lies within the purview of Safeguards and Security Functional Area. However, management and control of hazardous materials and their onsite movements should be tracked within the P&T Program.

Tank Farms follows standard WHC requirements as provided for in the WHC Site P&T S/RID.

13.2 PACKAGING AND TRANSPORTATION OPERATIONS

Programmatic controls and procedures should be established for P&T operations to comply with federal regulations unless waivers or statutory exemptions are granted. P&T operations should include:

13.2.1 Packaging Operations

Appropriate packaging as dictated by governing regulations should be used for hazardous and radioactive materials and wastes. When packaging is not dictated by regulations, consideration should be given to the integrity of the package, reaction of packaging materials with the intended contents, anticipated duration of use, mobility and storage and/or transportation conditions. Packaging also includes identification of appropriate transport vehicles and modes of travel as well as details of securing individual packages within vehicles.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation

WHC-EP-0750

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 22(a)(1) thru (2)

"Shipper's responsibility.

(a) Except as otherwise provided in this part, a person may offer a hazardous material for transportation in a packaging or container required by this part only in accordance with the following:

(1) The person shall class and describe the hazardous material in accordance with parts 172 and 173 of this subchapter, and

(2) The person shall determine that the packaging or container is an authorized packaging, including part 173 requirements, and that it has been manufactured, assembled, and marked in accordance with:

(i) Section 173.7(a) and parts 173, 178, or 179 of this subchapter;

(ii) A specification of the Department in effect at the date of manufacture of the packaging or container;

(iii) An approval issued under this subchapter; or

(iv) An exemption issued under subchapter B of this chapter.

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 22(a)(3)(i)

(3) In making the determination under paragraph (a)(2) of this section, the person may accept:

(i) The manufacturer's certification, specification, approval, or exemption marking (see 178.0 2 and 179.1 of this subchapter); or

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 22(a)(4)

(4) For a DOT specification or UN Standard packaging, a person shall perform all functions necessary to bring that package into compliance with part 178 of this subchapter, as identified by the packaging manufacturer or subsequent distributor, in accordance with 178.2(c) of this subchapter.

(b) [Reserved]

(c) Prior to each shipment of fissile radioactive materials, and Type B or highway route controlled quantity packages of radioactive materials (see 173.403), the shipper shall notify the consignee of the dates of shipment and expected arrival. The shipper shall also notify each consignee of any special loading/unloading instructions prior to his first shipment. For any shipment of irradiated reactor fuel, the shipper shall provide physical protection in compliance with a plan established under:

(1) Requirements prescribed by the U.S. Nuclear Regulatory Commission, or

(2) Equivalent requirements approved by the Associate Administrator for Hazardous Materials Safety, RSPA.

(49 U.S.C. 1803, 1804, 1808, and 1809; 49 CFR 1.53, app. A to part 1)"

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 24(a) thru (f)

"General requirements for packagings and packages.

(a) Applicability. Except as otherwise provided in this subchapter, the provisions of this section apply to-

(1) Bulk and non-bulk packagings;

(2) New packagings and packagings which are reused; and

(3) Specification and non-specification packagings.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

(b) Each package used for the shipment of hazardous materials under this subchapter shall be designed, constructed, maintained, filled, its contents so limited, and closed, so that under conditions normally incident to transportation-

(1) Except as otherwise provided in this subchapter, there will be no identifiable (without the use of instruments) release of hazardous materials to the environment;

(2) The effectiveness of the package will not be substantially reduced; for example, impact resistance, strength, packaging compatibility, etc. must be maintained for the minimum and maximum temperatures encountered during transportation;

(3) There will be no mixture of gases or vapors in the package which could, through any credible spontaneous increase of heat or pressure, significantly reduce the effectiveness of the packaging.

(c) Authorized packagings. A packaging is authorized for a hazardous material only if-

(1) The packaging is prescribed or permitted for the hazardous material in a packaging section specified for that material in Column 8 of the 172.101 Table and conforms to applicable requirements in the special provisions of Column 7 of the 172.101 Table and, for specification packagings (including U.N. standard packagings), the specification requirements in parts 178 and 179 of this subchapter; or

(2) The packaging is permitted under, and conforms to, provisions contained in 171.11, 171.12, 171.12a, 173.3, 173.4, 173.5, 173.7, 173.27, or 176.11 of this subchapter.

(d) DOT specification and U.N. standard packagings. For DOT specification packagings (including U.N. standard packagings), conformance to the applicable specifications in parts 178 and 179 of this subchapter is required in all details. For performance-oriented packagings covered by subpart L of part 178 of this subchapter, each packaging must be capable of meeting the performance test requirements specified in subpart M of part 178 of this subchapter for the applicable packing group shown in Column 5 of the 172.101 Table.

(e) Compatibility. (1) Even though certain packagings are specified in this part, it is, nevertheless, the responsibility of the person offering a hazardous material for transportation to ensure that such packagings are compatible with their lading. This particularly applies to corrosivity, permeability, softening, premature aging and embrittlement.

(2) Packaging materials and contents must be such that there will be no significant chemical or galvanic reaction between the materials and contents of the package.

(3) Plastic packagings and receptacles. (i) Plastic used in packagings and receptacles must be of a type compatible with the lading and may not be permeable to an extent that a hazardous condition is likely to occur during transportation, handling or refilling.

(ii) Each plastic packaging or receptacle which is used for liquid hazardous materials must be capable of withstanding without failure the procedure specified in appendix B of this part ("Procedure for Testing Chemical Compatibility and Rate of Permeation in Plastic Packagings and Receptacles"). The procedure specified in appendix B of this part must be performed on each plastic packaging or receptacle used for Packing Group I materials. The maximum rate of permeation of hazardous lading through or into the plastic packaging or receptacles may not exceed 0.5 percent for materials meeting the definition of a Division 6.1 material according to 173.132 and 2.0 percent for other hazardous materials, when subjected to a temperature no lower than-

(A) 18 C (64 F) for 180 days in accordance with Test Method 1 in appendix B of this part;

(B) 50 C (122 F) for 28 days in accordance with Test Method 2 in appendix B of this part; or

(C) 60 C (140 F) for 14 days in accordance with Test Method 3 in appendix B of this part.

(iii) Alternative procedures or rates of permeation are permitted if they yield a level of safety equivalent to or greater than that provided by paragraph (e)(3)(ii) of this section and are specifically approved by the Associate Administrator for Hazardous Materials Safety.

(4) Mixed contents. Hazardous materials may not be packed or mixed together in the same outer packaging with other hazardous or nonhazardous materials if such materials are capable of reacting dangerously with each other and causing-

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

- (i) Combustion or dangerous evolution of heat;
- (ii) Evolution of flammable or poisonous gases; or
- (iii) Formation of unstable or corrosive materials.

(5) Packagings used for solids, which may become liquid at temperatures likely to be encountered during transportation, must be capable of containing the hazardous material in the liquid state.

(f) Closures. (1) Closures on packagings shall be so designed and closed that under conditions (including the effects of temperature and vibration) normally incident to transportation-

- (i) Except as provided in paragraph (g) of this section, there is no identifiable release of hazardous materials to the environment from the opening to which the closure is applied; and
- (ii) The closure is secure and leakproof.

(2) Except as otherwise provided in this subchapter, a closure (including gaskets or other closure components, if any) used on a specification packaging must conform to all applicable requirements of the specification.

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 24(g)(1) thru (4)

(g) Venting. Venting of packagings, to reduce internal pressure which may develop by the evolution of gas from the contents, is permitted only when-

- (1) Transportation by aircraft is not involved;
- (2) Except as otherwise provided in this subchapter, the evolved gases are not poisonous, likely to create a flammable mixture with air or be an asphyxiant under normal conditions of transportation;
- (3) The packaging is designed so as to preclude an unintentional release of hazardous materials from the receptacle; and
- (4) For shipments in bulk packagings, venting is authorized for the specific hazardous material by a special provision in the 172.101 Table or by the applicable bulk packaging specification in part 178 of this subchapter.

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 24(h)(1)

(h) Outage and filling limits-(1) General. When filling packagings and receptacles for liquids, sufficient ullage (outage) must be left to ensure that neither leakage nor permanent distortion of the packaging or receptacle will occur as a result of an expansion of the liquid caused by temperatures likely to be encountered during transportation. Requirements for outage and filling limits for non-bulk and bulk packagings are specified in 173.24a(d) and 173.24b(a), respectively.

FACILITY REQUIREMENT SOURCE: DOE1540.1 Chapter II, Section 2.a

"Properly preparing materials for transportation is the responsibility of the shipper. Proper preparation enables the materials to reach destination in good order. Except for those goods which can be shipped in bulk or loose, goods should be packaged in material of sufficiently substantial construction to withstand the ordinary hazards of transportation. Both packaged and loose materials must be marked to assure prompt, safe, and correct delivery. Minimum packaging and marking requirements for materials in transportation are contained in the "Freight Classifications" of the various modes of transportation. Noncompliance can result in

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EP-0750

penalty rate assessments, denial of claims or both when materials are damaged in transit. More detailed guidance regarding packaging and marking of specific items may be developed locally as necessary."

FACILITY REQUIREMENT SOURCE: DOE1540.2 Chapter X, Section 2.b

"Requirements

Users shall ensure that packaging constructed in accordance with the DOT specifications meet the current requirements.

(1) Packaging procured from commercial sources must be certified by the manufacturer that the packaging meets all applicable specifications.

(2) It is the responsibility of the user to ensure that adequate documentation is developed and maintained for new specification packaging constructed for their use. All documentation should be available for audit."

13.2.1.1

Low Specific Activity Packaging

The specific requirements for packaging to be utilized on a LSA shipment are delineated in the following requirements:

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 425(Intro)

In addition to other applicable requirements specified in this subchapter, low specific activity (LSA) materials shall be transported in accordance with paragraph (a) of this section, or if transported as exclusive-use may be transported in accordance with paragraph (b) or (c) of this section.

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 425(a)

(a) DOT Specification 7A (178.350 of this subchapter) Type A package. The requirements of 173.412 (a), (b), (d), and (n) do not apply.

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 425(b)(1) thru (9)

(b) Packaged shipments of LSA material consigned as exclusive use shall either be in accordance with paragraph (a) of this section or shall comply with the following in which case they are excepted from specification packaging, marking and labeling:

(1) Materials must be packaged in strong, tight packages so that there will be no leakage of radioactive material under conditions normally incident to transportation.

(2) Packages must not have any significant removable surface contamination (see 173.443).

(3) External radiation levels must comply with 173.441.

(4) Shipments must be loaded by consignor and unloaded by consignee from the conveyance or freight contained in which originally loaded.

(5) There must be no loose radioactive material in the conveyance.

(6) Shipment must be braced so as to prevent shifting of lading under conditions normally incident to transportation.

(7) Except for shipments of unconcentrated uranium or thorium ores, the transport vehicle must be placarded with the placards prescribed in accordance with subpart F of part 172 of this subchapter, as appropriate.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

(8) The exterior of each package must be stenciled or otherwise marked "Radioactive LSA". Packages, with a capacity of 110 gallons or less, that contain a hazardous substance, must be stenciled or otherwise marked with the letters "RQ" in association with the above description.

(9) Specific instructions for maintenance of exclusive use shipment controls must be provided by the shipper to the carrier. Such instructions must be included with the shipping paper information.

SITE REQUIREMENT SOURCE: 49CFR173 Part 425(d)

(d) Except for transportation by aircraft, low specific activity material that conforms with the provisions specified in 10 CFR 20.306 is excepted from all requirements of this subchapter pertaining to radioactive materials when offered for transportation for disposal or recovery. A material which meets the definition of another hazard class is subject to the provisions of this subchapter relating to that hazard class."

13.2.1.2

Limited Quantity Packaging

The specific requirements for packaging to be utilized on a limited quantity shipment are delineated in the following requirements:

SITE REQUIREMENT SOURCE: 49CFR173 Part 421

"Limited quantities of radioactive materials.

Radioactive materials whose activity per package does not exceed the limits specified in 173.423 are excepted from the specification packaging, shipping paper and certification, marking, and labeling requirements of this subchapter and requirements of this subpart if:

- (a) The materials are packaged in strong, tight packages that will not leak any of the radioactive materials during conditions normally incident to transportation;
- (b) The radiation level at any point on the external surface of the package does not exceed 0.5 millirem per hour;
- (c) The nonfixed (removable) radioactive surface contamination on the external surface of the package does not exceed the limits specified in 173.443(a);
- (d) The outside of the inner packaging or if there is no inner packaging, the outside of the packaging itself bears the marking "Radioactive";
- (e) Except as provided in 173.424, the package does not contain more than 15 grams of uranium-235; and
- (f) The material is otherwise prepared for shipment as specified in 173.421 1."

SITE REQUIREMENT SOURCE: 49CFR173 Part 421-1

"Additional requirements for excepted packages containing Class 7 (radioactive) materials.

- (a) Excepted packages prepared for shipment under the provisions of §§ 173.421, 173.422, 173.424, or 173.427 of this subpart must be certified as being acceptable for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. This notice must include the name of the consignor or consignee and the statement "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910;

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

49 CFR 173.422 for radioactive material, excepted package—articles manufactured from natural or depleted uranium or natural thorium, UN2910; or 49 CFR 173.427 for radioactive material, excepted package—empty packages, UN2908", as appropriate.

(b) An excepted radioactive material classed radioactive material and prepared for shipment under the provisions of §173.421, §173.422, §173.424, §173.427 or §173.421-2 is not subject to the requirements of this subchapter, except for:

(1) Sections 171.15, 171.16, 174.750, 176.710 and 177.861 of this subchapter pertaining to the reporting of incidents and decontamination when transported by a mode other than air; or

(2) Sections 171.15, 171.16, 175.45, and 175.700(b) of this subchapter pertaining to the reporting of incidents and decontamination if transported by aircraft."

13.2.1.3

Packaging Limitations

The limitations associated with different types of packaging are discussed within this section.

13.2.1.3.1

Radiation Levels

The packaging limitations associated with the radiation levels of the various packages are discussed within this section.

SITE REQUIREMENT SOURCE: 49CFR173 Part 441(a) thru (c)

"Radiation level limitations.

(a) Except as provided in paragraph (b) of this section, each package of radioactive materials offered for transportation shall be designed and prepared for shipment so that under conditions normally incident to transportation the radiation level does not exceed 200 millirem per hour at any point on the external surface of the package, and the transport index does not exceed 10.

(b) A package which exceeds the radiation level limits specified in paragraph (a) of this section shall be transported by exclusive use shipment only and the radiation levels for such shipment must not exceed the following during transportation:

(1) 200 millirem per hour (2 millisievert per hour) on the external surface of the package unless the following conditions are met, in which case the limit is 1000 millirem per hour (10 millisievert per hour).

(i) The shipment is made in a closed transport vehicle;

(ii) The package is secured within the vehicle so that its position remains fixed during transportation; and

(iii) There are no loading or unloading operations between the beginning and end of the transportation;

(2) 200 millirem per hour (2 millisievert per hour) at any point on the outer surfaces of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load (or enclosure is used), and on the lower external surface of the vehicle;

(3) 10 millirem per hour (0.1 millisievert per hour) at any point 2 meters (6.6 feet) from the outer lateral surfaces of the vehicle (excluding the top and underside of the vehicle); or in the case of a flat-bed style vehicle, at any point 2 meters (6.6 feet) from the vertical planes

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

projected by the outer edges of the vehicle (excluding the top and underside of the vehicle);
and

(4) 2 millirem per hour (0.02 millisievert per hour) in any normally occupied space, except that this provision does not apply to private carriers if exposed personnel under their control wear radiation dosimetry devices and operate under provisions of a State or Federally regulated radiation protection program.

(c) For shipments made under the provisions of paragraph (b) of this section, the shipper shall provide specific written instructions for maintenance of the exclusive use shipment controls to the carrier. The instructions shall be included with the shipping paper information.

SITE REQUIREMENT SOURCE: 49CFR173 Part 441(e)

(e) The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions which will unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures.

13.2.1.3.2

Contamination Levels

The packaging limitations associated with the contamination levels of the various packages are discussed within this section.

SITE REQUIREMENT SOURCE: 49CFR173 Part 443

"Contamination control.

(a) The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for shipment shall be kept as low as practicable. The level of non-fixed radioactive contamination may be determined by wiping an area of 300 square centimeters of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements shall be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. Except as provided in paragraph (b) of this section, the amount of radioactivity measured on any single wiping material when averaged over the surface wiped shall not exceed the limits given in Table 10 at any time during transport. Other methods of assessment of equal or greater efficiency may be used. When other methods are used the detection efficiency of the method used shall be taken into account and in no case shall the non-fixed contamination on the external surfaces of the package exceed ten times the limits listed in Table 10. HAZDOCS-2 Table No. 90

(b) Except as provided in paragraph (d) of this section, in the case of packages transported as exclusive use shipments by rail or public highway only, the removable (non-fixed) radioactive contamination on any package at any time during transport shall not exceed ten times the levels prescribed in paragraph (a) of this section. The levels at the beginning of transport shall not exceed the levels prescribed in paragraph (a) of this section.

(c) Except as provided in paragraph (d) of this section, each transport vehicle used for transporting radioactive materials as an exclusive use shipment which utilizes the provisions of paragraph (b) of this section shall be surveyed with appropriate radiation detection instruments after each use. A vehicle shall not be returned to service until the radiation dose rate at each accessible surface is 0.5 millirem per hour or less, and there is no significant removable (non-fixed) radioactive surface contamination as specified in paragraph (a) of this section.

(d) Paragraph (b) and (c) of this section do not apply to any closed transport vehicle used solely for the transportation by public highway of radioactive material packages with

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EP-0750

contamination levels that do not exceed 10 times the levels prescribed in paragraph (a) of this section if:

- (1) A survey of the interior surfaces of the empty vehicle shows that the radiation dose rate at any point does not exceed 10 millirem per hour at the surface or 2 millirem per hour at 1 meter (3.3. feet) from the surface;
- (2) Each vehicle is stenciled with the words "For Radioactive Materials Use Only" in letters at least 76 millimeters (3 inches) high in a conspicuous place on both sides of the exterior of the vehicle; and
- (3) Each vehicle is kept closed except for loading or unloading."

FACILITY REQUIREMENT SOURCE: 49CFR177 Part 843

(a) Each motor vehicle used for transporting Class 7 (radioactive) materials under exclusive use conditions in accordance with 173.425(c) or 173.443(c) shall be surveyed with radiation detection instruments after each use. A vehicle may not be returned to service until the radiation dose rate at each accessible surface is 0.5 millirem per hour or less and the removable (non-fixed) radioactive surface contamination is not greater than the level prescribed in 173.443(a).

(b) This section does not apply to any vehicle used solely for transporting Class 7 (radioactive) material if a survey of the interior surface shows that the radiation dose rate does not exceed 10 millirem per hour at the interior surface or 2 millirem per hour at 1 m (3 feet) from any interior surface. These vehicles must be stenciled with the words "For Class 7 (radioactive) Materials Only: in lettering at least 7.5 cm (3 inches) high in a conspicuous place, on both sides of the exterior of the vehicle. These vehicles must be kept closed at all times other than loading and unloading.

(c) In case of fire, accident, breakage, or unusual delay involving shipments of Class 7 (radioactive) material, see 177.861.

13.2.2

Loading Operations

The requirements and precautions necessary to safely load a shipment are discussed within this section.

FACILITY REQUIREMENT SOURCE: 49CFR173 Part 425(b)(4) thru (6)

- (4) Shipments must be loaded by consignor and unloaded by consignee from the conveyance or freight contained in which originally loaded.
- (5) There must be no loose radioactive material in conveyance.
- (6) Shipment must be braced so as to prevent shifting of lading under conditions normally incident to transportation.

SITE REQUIREMENT SOURCE: 49CFR173 Part 30

"Loading and unloading of transport vehicles.

A person who loads or unloads hazardous materials into or from a transport vehicle or vessel shall comply with the applicable loading and unloading requirements of parts 174, 175, 176, and 177 of this subchapter."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

FACILITY REQUIREMENT SOURCE: 49CFR177 Part 842(c)

(c) Shipments of low specific activity materials, as defined in 173.403 of this subchapter, must be loaded so as to avoid spillage and scattering of loose materials. Loading restrictions are set forth in 173.425 of this subchapter.

FACILITY REQUIREMENT SOURCE: 49CFR177 Part 848(a)(1)

"Segregation of hazardous materials

(a) This section applies to materials which meet one or more of the hazard classes defined in this subchapter and are:

(1) In packages which require labels in accordance with part 172 of this subchapter;

FACILITY REQUIREMENT SOURCE: 49CFR177 Part 848(d)

(d) Hazardous materials may not be loaded, transported, or stored together, except as provided in this section, and in accordance with the following table:"

SITE REQUIREMENT SOURCE: DOE1540.1 Chapter II, Section 4.b(1)(c)

"Acceptable Practices. The following represents a composite of acceptable practices which should be applied to assure a successful program.

Loading.

(c) Reasonable precautions such as wheel chocking shall be taken to prevent motion of the conveyance during the loading or unloading process."

SITE REQUIREMENT SOURCE: DOE1540.1 Chapter II, Section 4.b(e)

(e) The loading device used to load or unload a shipment shall be appropriate for the dimensions and weight of the package. Loading devices which may possibly damage any packages of a shipment shall not be used."

13.2.3

Transportation Operations

The requirements and precautions necessary to successfully run a packaging and transportation operation are discussed within this section.

SITE REQUIREMENT SOURCE: 49CFR171 Part 2

"(a) No person may offer or accept a hazardous material for transportation in commerce unless that material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by this subchapter (including 171.11, 171.12, and 176.11).

(b) No person may transport a hazardous material in commerce unless that material is handled and transported in accordance with this subchapter, or an exemption issued under subchapter B of this chapter.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation

WHC-EP-0750

(c) No person may represent, mark, certify, sell, or offer a packaging or container as meeting the requirements of this subchapter or an exemption issued under subchapter B of this chapter, governing its use in the transportation in commerce of a hazardous material, whether or not it is used or intended to be used for the transportation of a hazardous material, unless the packaging or container is manufactured, fabricated, marked, maintained, reconditioned, repaired, or retested, as appropriate, in accordance with this subchapter, an approval issued thereunder, or an exemption issued under subchapter B of this chapter.

(d) The representations, markings, and certifications subject to the prohibitions of paragraph (c) of this section include:

(1) Specification identifications that include the letters "DOT" or "UN";

(2) Exemption, approval, and registration numbers that include the letters "DOT;" and

(3) Test dates displayed in association with specification, registration, approval, or exemption markings indicating compliance with a test or retest requirement of this subchapter, an approval issued thereunder, or an exemption issued under subchapter B of this chapter.

(e) When a person performs a function covered by or having an effect on a specification prescribed in part 178, 179 or 180 of this subchapter, an approval issued under this subchapter, or an exemption issued under subpart B of this chapter, that person must perform the function in accordance with that specification, approval, or exemption, as appropriate.

(f) No person shall, by marking or otherwise, represent that-

(1) A container or package for the transportation of hazardous materials is safe, certified, or in compliance with the requirements of this title unless it meets the requirements of all applicable regulations issued under the Act; or

(2) A hazardous material is present in a package, container, motor vehicle, rail freight car, aircraft, or vessel, if the hazardous material is not present.

(g) No person shall unlawfully alter, remove, deface, destroy, or otherwise tamper with-

(1) Any marking label, placard, or description on a document required by the Act, or a regulation issued under the Act; or

(2) Any package, container, motor vehicle, rail freight car, aircraft, or vessel used for the transportation of hazardous materials.

(49 U.S.C. 1803, 1804, 1808, and 1809; 49 CFR 1.53, app. A to part 1)"

SITE REQUIREMENT SOURCE: 49CFR173 Part 448(a)

"General transportation requirements.

(a) Each shipment of radioactive materials shall be secured in order to prevent shifting during normal transportation conditions.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

13.2.3.1

QA/QC

The additional quality assurance/quality control (QA/QC) requirements associated with a shipment of radioactive material are delineated within the following section.

- The P&T program at the Tank Farms is subject to the standard WHC QA requirements as provided for in the WHC Site S/RID. See also subelements 13.3.3 and 13.5.7 of this S/RID.

SITE REQUIREMENT SOURCE: 49CFR173 Part 474

"Quality control for construction of packaging.

(a) Prior to the first use of any packaging for the shipment of radioactive material, the shipper shall determine, that:

- (1) The packaging meets the quality of design and construction requirements as specified in this subchapter; and
 - (2) The effectiveness of the shielding, containment, and, when required, the heat transfer characteristics of the package, are within the limits specified for the package design.
- (b) [Reserved]"

SITE REQUIREMENT SOURCE: 49CFR173 Part 475(Intro)

"Quality control requirements prior to each shipment of radioactive materials.

Before each shipment of any radioactive materials package, the shipper shall ensure by examination or appropriate tests, that:

SITE REQUIREMENT SOURCE: 49CFR173 Part 475(a) thru (c)

- (a) The packaging is proper for the contents to be shipped;
- (b) The packaging is in unimpaired physical condition, except for superficial marks;
- (c) Each closure device of the packaging, including any required gasket, is properly installed, secured, and free of defects;

SITE REQUIREMENT SOURCE: 49CFR173 Part 475(e) and (f)

- (e) Each special instruction for filling, closing, and preparation of the packaging for shipment has been followed;
- (f) Each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed;

SITE REQUIREMENT SOURCE: 49CFR173 Part 475(h) and (i)

- (h) The internal pressure of the containment system will not exceed the design pressure during transportation; and
- (i) External radiation and contamination levels are within the allowable limits specified in this subchapter."

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

13.2.4

Marking, Labeling and Placarding

Packaging, marking, labeling and placarding of materials for transportation should comply with DOT hazardous materials regulations, EPA, NRC and/or Federal Motor Carrier Safety Regulations. Onsite marking and labeling should also comply with these standards to avoid the use of two different systems and the potential to mislabel offsite shipments.

13.2.4.1

Marking Requirements

The marking requirements associated with a shipment of radioactive materials are delineated in the following section.

SITE REQUIREMENT SOURCE: 49CFR172 Part 300

"Applicability.

(a) Each person who offers a hazardous material for transportation shall mark each package, freight container, and transport vehicle containing the hazardous material in the manner required by this subpart.

(b) When assigned the function by this subpart, each carrier that transports a hazardous material shall mark each package, freight container, and transport vehicle containing the hazardous material in the manner required by this subpart."

SITE REQUIREMENT SOURCE: 49CFR172 Part 301(a) thru (e)

"General marking requirements for non-bulk packagings.

(a) Proper shipping name and identification number.

(1) Except as otherwise provided by this subchapter, each person who offers for transportation a hazardous material in a non-bulk packaging shall mark the package with the proper shipping name and identification number (preceded by "UN" or "NA", as appropriate) for the material as shown in the 172.101 table.

(2) The proper shipping name for a hazardous waste (as defined in 171.8 of this subchapter) is not required to include the word "waste" if the package bears the EPA marking prescribed by 40 CFR 262.32.

(b) Technical names. In addition to the marking required by paragraph (a) of this section, each non-bulk packaging containing hazardous materials subject to the provisions of §172.203(k) of this part shall be marked with the technical name in parentheses in association with the proper shipping name in accordance with the requirements and exceptions specified for display of technical descriptions on shipping papers in §172.203(k) of this part.

(c) Exemption packagings. The outside of each package authorized by an exemption shall be plainly and durably marked "DOT E" followed by the exemption number assigned.

(d) Consignee's or consignor's name and address. Each person who offers for transportation a hazardous material in a non-bulk package shall mark that package with the name and address of the consignor or consignee except when the package is--

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

- (1) Transported by highway only and will not be transferred from one motor carrier to another; or
- (2) Part of a carload lot, truckload lot or freight container load, and the entire contents of the rail car, truck or freight container are shipped from one consignor to one consignee.
- (e) Previously marked packagings. A package which has been previously marked as required for the material it contains and on which the marking remains legible, need not be remarked. (For empty packagings, see §173.29 of this subchapter.)

SITE REQUIREMENT SOURCE: 49CFR172 Part 303

"Prohibited marking.

- (a) No person may offer for transportation or transport a package which is marked with the proper shipping name or identification number of a hazardous material unless the package contains the identified hazardous material or its residue.
- (b) This section does not apply to-
 - (1) Transportation of a package in a transport vehicle or freight container if the package is not visible during transportation and is loaded by the shipper and unloaded by the shipper or consignee.
 - (2) Markings on a package which are securely covered in transportation.
 - (3) The marking of a shipping name on a package when the name describes a material not regulated under this subchapter."

SITE REQUIREMENT SOURCE: 49CFR172 Part 304

"Marking requirements.

- (a) The marking required in this subpart-(1) Must be durable, in English and printed on or affixed to the surface of a package or on a label, tag, or sign.
- (2) Must be displayed on a background of sharply contrasting color;
- (3) Must be unobscured by labels or attachments; and
- (4) Must be located away from any other marking (such as advertising) that could substantially reduce its effectiveness."

13.2.4.2

Labeling Requirements

The labeling requirements associated with a shipment of radioactive materials are delineated in the following section.

SITE REQUIREMENT SOURCE: 49CFR172 Part 400(a)(1)

"General labeling requirements.

- (a) Except as specified in 172.400a, each person who offers for transportation or transports a hazardous material in any of the following packages or containment devices, shall label the package or containment device with labels specified for the material in the 172.101 Table and in this subpart:

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

(1) A non-bulk package;

SITE REQUIREMENT SOURCE: 49CFR172 Part 400(b)

(b) Labeling is required for a hazardous material which meets one or more hazard class definitions, in accordance with Column 6 of the 172.101 Table and the following table: HAZDOCS-2 Table No. 16"

SITE REQUIREMENT SOURCE: 49CFR172 Part 401(a) and (b)

"Prohibited labeling.

(a) Except as provided in paragraph (c) of this section, no person may offer for transportation and no carrier may transport any package bearing a label specified in this subpart unless:

- (1) The package contains a material that is a hazardous material, and
- (2) The label represents a hazard of the hazardous material in the package.

(b) No person may offer for transportation and no carrier may transport a package bearing any marking or label which by its color, design, or shape could be confused with or conflict with a label prescribed by this part.

SITE REQUIREMENT SOURCE: 49CFR173 Part 444

"Labeling requirements.

Each package of radioactive materials, unless excepted by 173.421, 173.422, 173.424, 173.425(b), or 173.427 shall be labeled as provided in subpart E of part 172 of this subchapter."

13.2.4.3

Placarding Requirements

The placarding requirements associated with a shipment of radioactive materials are delineated in the following section.

SITE REQUIREMENT SOURCE: 49CFR172 Part 504(a) thru (e)

"General placarding requirements.

(a) General. Except as otherwise provided in this subchapter, each bulk packaging, freight container, unit load device, transport vehicle or rail car containing any quantity of a hazardous material must be placarded on each side and each end with the type of placards specified in Tables 1 and 2 of this section and in accordance with other placarding requirements of this subpart, including the specifications for the placards named in the tables and described in detail in 172.519 through 172.560.

(b) DANGEROUS placard. A freight container, unit load device, transport vehicle or rail car which contains non-bulk packagings with two or more categories of hazardous materials that require different placards specified in Table 2 may be placarded with DANGEROUS placards instead of the separate placarding specified for each of the materials in Table 2. However, when 2,268 kg (5,000 pounds) or more of one category of material is loaded therein at one loading facility, the placard specified in Table 2 of paragraph (e) of this section for that category must be applied.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

(c) Exception for less than 454 kg (1,001 pounds). Except for bulk packagings and hazardous materials subject to 172.505, when hazardous materials covered by Table 2 of this section are transported by highway or rail, placards are not required on-

(1) A transport vehicle or freight container which contains less than 454 kg (1001 pounds) aggregate gross weight of hazardous materials covered by Table 2 of paragraph (e) of this section; or

(2) A rail car loaded with transport vehicles or freight containers, none of which is required to be placarded. The exceptions provided in paragraph (c) of this section do not prohibit the display of placards in the manner prescribed in this subpart, if not otherwise prohibited (see 172.502), on transport vehicles or freight containers which are not required to be placarded.

(d) Exception for empty non-bulk packages. A non-bulk packaging that contains only the residue of a hazardous material covered by Table 2 of paragraph (e) of this section need not be included in determining placarding requirements.

(e) Placarding tables. Placards are specified for hazardous materials in accordance with the following tables: HAZDOCS-2 Table No. 19

HAZDOCS-2 Table No. 20

SITE REQUIREMENT SOURCE: 49CFR172 Part 506

"Providing and affixing placards:
Highway.

(a) Each person offering a motor carrier a hazardous material for transportation by highway shall provide to the motor carrier the required placards for the material being offered prior to or at the same time the material is offered for transportation, unless the carrier's motor vehicle is already placarded for the material as required by this subpart.

(1) No motor carrier may transport a hazardous material in a motor vehicle, unless the placards required for the hazardous material are affixed thereto as required by this subpart.

(2) [Reserved]

(b) [Reserved]"

SITE REQUIREMENT SOURCE: 49CFR172 Part 516

"Visibility and display of placards.

(a) Each placard on a motor vehicle and each placard on a rail car must be readily visible from the direction it faces except from the direction of another motor vehicle or rail car to which the motor vehicle or rail car is coupled. This requirement may be met by the placards displayed on the freight containers or portable tanks loaded on a motor vehicle or rail car.

(b) The required placarding of the front of a motor vehicle may be on the front of a truck-tractor instead of or in addition to the placarding on the front of the cargo body to which a truck-tractor is attached.

(c) Each placard on a transport vehicle, bulk packaging, freight container or aircraft unit load device must-

(1) Be securely attached or affixed thereto or placed in a holder thereon. (See appendix C to this part.);

(2) Be located clear of appurtenances and devices such as ladders, pipes, doors, and tarpaulins;

(3) So far as practicable, be located so that dirt or water is not directed to it from the wheels of the transport vehicle;

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

- (4) Be located away from any marking (such as advertising) that could substantially reduce its effectiveness, and in any case at least 3 inches (76.0 mm.) away from such marking;
- (5) Have the words or identification number (when authorized) printed on it displayed horizontally, reading from left to right.
- (6) Be maintained by the carrier in a condition so that the format, legibility, color, and visibility of the placard will not be substantially reduced due to damage, deterioration, or obscurement by dirt or other matter.
- (7) Be affixed to a background of contrasting color, or must have a dotted or solid line outer border which contrasts with the background color.
- (d) Recommended specifications for a placard holder are set forth in appendix C of this part. Except for a placard holder similar to that contained in appendix C to this part, the means used to attach a placard may not obscure any part of its surface other than the borders.
- (e) A placard or placard holder may be hinged provided the required format, color, and legibility of the placard are maintained."

13.2.5

Shipping Papers, Bills of Lading and Manifests

Shipping papers, bills of lading and manifests for hazardous or radioactive materials are governed by DOE, DOT, NRC and/or EPA.

SITE REQUIREMENT SOURCE: 49CFR172 Part 200(a)

"Applicability.

(a) Description of hazardous materials required. Except as otherwise provided in this subpart, each person who offers a hazardous material for transportation shall describe the hazardous material on the shipping paper in the manner required by this subpart.

SITE REQUIREMENT SOURCE: 49CFR172 Part 201

"General entries.

(a) Contents. When a description of hazardous material is required to be included on a shipping paper, that description must conform to the following requirements:

(1) When a hazardous material and a material not subject to the requirements of this subchapter are described on the same shipping paper, the hazardous material description entries required by 172.202 and those additional entries that may be required by 172.203:

- (i) Must be entered first, or
- (ii) Must be entered in a color that clearly contrasts with any description on the shipping paper of a material not subject to the requirements of this subchapter, except that a description on a reproduction of a shipping paper may be highlighted, rather than printed, in a contrasting color (the provisions of this paragraph apply only to the basic description required by 172.202(a) (1) and (2), and (3)), or

(iii) Must be identified by the entry of an "X" placed before the proper shipping name in a column captioned "HM." (The "X" may be replaced by "RQ," if appropriate.)

(2) The required shipping description on a shipping paper and all copies thereof used for transportation purposes, must be legible and printed (manually or mechanically) in English.

(3) Unless it is specifically authorized or required in this subchapter, the required shipping description may not contain any code or abbreviation.

(4) A shipping paper may contain additional information concerning the material provided the information is not inconsistent with the required description. Unless otherwise permitted or

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

required by this subpart, additional information must be placed after the basic description required by 172.202(a).

(b) Name of shipper. A shipping paper for a shipment by water must contain the name of the shipper.

(c) Continuation page. A shipping paper may consist of more than one page, if each page is consecutively numbered and the first page bears a notation specifying the total number of pages included in the shipping paper. For example, "Page 1 of 4 pages."

(d) Emergency response telephone number. A shipping paper must contain an emergency response telephone number, as prescribed in subpart G of part 172 of this subchapter. (49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, app. A to part 1)"

SITE REQUIREMENT SOURCE: 49CFR172 Part 202

"Description of hazardous material on shipping papers.

(a) The shipping description of a hazardous material on the shipping paper must include:
(1) The proper shipping name prescribed for the material in Column 2 of the 172.101 Table;
(2) The hazard class or division prescribed for the material as shown in Column 3 of the 172.101 Table (class names or subsidiary hazard class number may be entered following the numerical hazard class, or following the basic description). The hazard class need not be included for the entry "Combustible liquid, n.o.s.";

(3) The identification number prescribed for the material as shown in Column 4 of the 172.101 Table;

(4) The packing group, in Roman numerals, prescribed for the material in Column 5 of the 172.101 Table, if any. The packing group may be preceded by the letters "PG" (e.g., "PG II"); and

(5) Except for empty packagings (see 173.29 of this subchapter), cylinders for Class 2 (compressed gases) materials, and bulk packagings, the total quantity (by net or gross mass, capacity, or as otherwise appropriate), including the unit of measurement, of the hazardous material covered by the description (e.g., "800 lbs", "55 gal.", "3629 kg", or "208 L"). For cylinders for Class 2 (compressed gases) materials and bulk packagings, some indication of total quantity must be shown (e.g., "10 cylinders" or "1 cargo tank").

(b) Except as provided in this subpart, the basic description specified in paragraphs (a) (1), (2), (3) and (4) of this section must be shown in sequence with no additional information interspersed. For example: "Gasoline, 3, UN 1203, PG II".

(c) The total quantity of the material covered by one description must appear before or after, or both before and after, the description required and authorized by this subpart. The type of packaging and destination marks may be entered in any appropriate manner before or after the basic description. Abbreviations may be used to express units of measurement and types of packagings.

(d) Technical and chemical group names may be entered in parentheses between the proper shipping name and hazard class or following the basic description. An appropriate modifier, such as "contains" or "containing," may be used. For example: "Flammable liquids, n.o.s. (contains Xylene and Benzene), 3, UN 1993, II".

(e) Except for those materials in the UN Recommendations, the ICAO Technical Instructions, or the IMDG Code, a material that is not a hazardous material according to this subchapter may not be offered for transportation or transported when its description on a shipping paper includes a hazard class or an identification number specified in 172.101.

(49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, app. A to part 1)"

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

FACILITY REQUIREMENT SOURCE: 49CFR172 Part 203(b)

"Limited quantities. The description for a material offered for transportation as "limited quantity," as authorized by this subchapter, must include the words "Limited Quantity" or "Ltd Qty" following the basic description."

FACILITY REQUIREMENT SOURCE: 49CFR172 Part 203(d)(1) thru (6)

"Radioactive material. The description for a shipment of a Class 7 (radioactive) material must include the following additional entries as appropriate:

- (1) The words "RADIOACTIVE MATERIAL" unless these words are contained in the proper shipping name.
- (2) The name of each radionuclide in the radioactive material that is listed in 173.435 of this subchapter. Abbreviations, e.g., "99Mo" are authorized.
- (3) A description of the physical and chemical form of the material, if the material is not in special form (generic chemical description is acceptable for chemical form).
- (4) The activity contained in each package of the shipment in terms of curies, millicuries, or microcuries. Abbreviations are authorized. For the shipment of a package containing a highway route controlled quantity of radioactive materials (see 173.403(1) of this subchapter), the words "Highway route controlled quantity" must be entered in association with the basic description.
- (5) The category of label applied to each package in the shipment. For example: "RADIOACTIVE WHITE I."
- (6) The transport index assigned to each package in the shipment bearing RADIOACTIVE YELLOW II or RADIOACTIVE YELLOW III labels.

SITE REQUIREMENT SOURCE: 49CFR172 Part 203(d)(8)

(8) For a package approved by the U.S. Department of Energy (DOE) or U.S. Nuclear Regulatory Commission (USNRC), a notation of the package identification marking as prescribed in the applicable DOE or USNRC approval. (See 173.471 of the subchapter.)

FACILITY REQUIREMENT SOURCE: 49CFR172 Part 203(k) Paragraph 1

"Technical names for "n.o.s." and other generic descriptions. Unless otherwise excepted, if a material is described on a shipping paper by one of the proper shipping names listed in paragraph (k)(3) of this section the technical name of the hazardous material must be entered in parentheses, in association with the basic description. For example, "Corrosive liquid, n.o.s., (Caprylyl chloride), 8, UN 1760, II", or (contains caprylyl chloride)". The word "contains" may be used in association with the technical name, if appropriate. For organic peroxides which may qualify for more than one generic listing depending on concentration, the technical name must include the actual concentration being shipped or the concentration range for the appropriate generic listing. For example, "Organic peroxide type B, solid, 5.2, UN 3102 (dibenzoyl peroxide, 52-100%)" or "Organic peroxide type E, solid, 5.2, UN 3108 (dibenzoyl peroxide, paste, less than 52%)."

FACILITY REQUIREMENT SOURCE: 49CFR172 Part 203(k)(1)

"In addition to the n.o.s. descriptions herein, the requirements of this section apply to all shipping descriptions for poisonous materials which are subject to the requirements of paragraph (m) of this section, and for which the proper shipping name does not specifically

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EP-0750

identify the poisonous constituent by technical name. For example, "Motor fuel antiknock mixtures (Tetraethyl lead), 6.1, UN 1649, I", or "Motor fuel antiknock mixtures, 6.1, UN 1649, I (Tetraethyl lead)."

FACILITY REQUIREMENT SOURCE: 49CFR172 Part 203(k)(2)

"If a hazardous material is a mixture or solution of two or more hazardous materials, the technical names of at least two components most predominately contributing to the hazards of the mixture or solution must be entered on the shipping paper as required by paragraph (k) of this section. For example, "Flammable liquid, corrosive, n.o.s., 3, UN 2924, II (contains Methanol, Potassium hydroxide)".

13.2.6

Notification of State Authorities of Shipments of High-Hazard Materials

Shipments of high-hazard materials, high-level radioactive waste and spent nuclear fuel should include advance written notification to the states through which any such shipments will pass. For security reasons, notification should not indicate the exact route and time of such shipments.

- The Tank Farms does not ship any of these materials.

13.2.7

Emergency Response Information

Shipments of hazardous materials should comply with DOT requirements for Emergency Response Information in case of release of materials. Emergency Response Information should include names and means of contacting emergency response personnel in the various jurisdictions to be traversed.

SITE REQUIREMENT SOURCE: 49CFR172 Part 602

"Emergency response information.

(a) Information required. For purposes of this subpart, the term "emergency response information" means information that can be used in the mitigation of an incident involving hazardous materials and, as a minimum, must contain the following information:

(1) The basic description and technical name of the hazardous material as required by 172.202 and 172.203(k), the ICAO Technical Instructions, the IMDG Code, or the TDG Regulations, as appropriate;

(2) Immediate hazards to health;

(3) Risks of fire or explosion;

(4) Immediate precautions to be taken in the event of an accident or incident;

(5) Immediate methods for handling fires;

(6) Initial methods for handling spills or leaks in the absence of fire; and

(7) Preliminary first aid measures.

(b) Form of information. The information required for a hazardous material by paragraph (a) of this section must be:

(1) Printed legibly in English;

(2) Available for use away from the package containing the hazardous material; and

(3) Presented-

(i) On a shipping paper;

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

(ii) In a document, other than a shipping paper, that includes both the basic description and technical name of the hazardous material as required by 172.202 and 172.203(k), the ICAO Technical Instructions, the IMDG Code, or the TDG Regulations, as appropriate, and the emergency response information required by this subpart (e.g., a material safety data sheet); or

(iii) Related to the information on a shipping paper, a written notification to pilot-in-command, or a dangerous cargo manifest, in a separate document (e.g., an emergency response guidance document), in a manner that cross-references the description of the hazardous material on the shipping paper with the emergency response information contained in the document. Aboard aircraft, the ICAO "Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods" and, aboard vessels, the IMO "Emergency Procedures for Ships Carrying Dangerous Goods", or equivalent documents, may be used to satisfy the requirements of this section for a separate document.

(c) Maintenance of information. Emergency response information shall be maintained as follows:

(1) Carriers. Each carrier who transports a hazardous material shall maintain the information specified in paragraph (a) of this section in the same manner as prescribed for shipping papers, except that the information must be maintained in the same manner aboard aircraft as the notification to pilot-in-command, and aboard vessels in the same manner as the dangerous cargo manifest. This information must be immediately accessible to train crew personnel, drivers of motor vehicles, flight crew members, and bridge personnel on vessels for use in the event of incidents involving hazardous materials.

(2) Facility operators. Each operator of a facility where a hazardous material is received, stored or handled during transportation, shall maintain the information required by paragraph (a) of this section whenever the hazardous material is present. This information must be in a location that is immediately accessible to facility personnel in the event of an incident involving the hazardous material."

SITE REQUIREMENT SOURCE: 49CFR172 Part 604

"Emergency response telephone number.

(a) A person who offers a hazardous material for transportation must provide a 24-hour emergency response telephone number (including the area code or international access code) for use in the event of an emergency involving the hazardous material. The telephone number must be-

(1) Monitored at all times the hazardous material is in transportation, including storage incidental to transportation;

(2) The number of a person who is either knowledgeable of the hazardous material being shipped and has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information; and

(3) Entered on a shipping paper, as follows:

(i) Immediately following the description of the hazardous material required by subpart C of this part 172; or

(ii) Entered once on the shipping paper in a clearly visible location. This provision may be used only if the telephone number applies to each hazardous material entered on the shipping paper, and if it is indicated that the telephone number is for emergency response information (for example: "EMERGENCY CONTACT: ***).

(b) The telephone number required by paragraph (a) of this section must be the number of the person offering the hazardous material for transportation or the number of an agency or organization capable of, and accepting responsibility for, providing the detailed information concerning the hazardous material. A person offering a hazardous material for transportation

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

who lists the telephone number of an agency or organization shall ensure that agency or organization has received current information on the material, as required by paragraph (a)(2) of this section before it is offered for transportation."

SITE REQUIREMENT SOURCE: DOE1540.1 Chapter II, Section 7.c(3)

"Emergency Response.

All DOE-owned shipments of radioactive and other hazardous materials, substances, and wastes will comply with the DOT requirements for Emergency Response Information cited in 49 CFR, Subpart G, Sections 172.600-172.604."

13.2.8

Receipt Inspection

The different aspects of receipt inspections are discussed within these sections.

- These activities are performed by another WHC Site organization as provided for in the WHC Site P&T S/RID.

13.2.9

Coordination and Planning of Base Technology

With the change in mission and scope of DOE facilities to reflect emphasis on environmental remediation, a need for base technology for the transfer of hazardous materials, particularly radioactive materials, has emerged. Policies and procedures should be developed to coordinate and plan base technology for packaging and transportation of radioactive materials.

- These activities are performed by another WHC Site organization as provided for in the WHC Site P&T S/RID.

13.2.10

Vehicle and Equipment Control and Maintenance

The P&T Program should ensure that appropriate vehicles and equipment for staging and/or storing materials are available. The Program should also specify responsibilities and authorities for control of this equipment and should arrange for their routine maintenance and repair. Vehicles used for onsite transportation of hazardous materials may require special physical features such as cushioning devices for movement of potentially explosive materials or tiedowns or other configuration controls for fissionable materials. Any specially equipped vehicles, as well as those used for routine movements of materials, should be controlled and maintained to ensure availability and operability when required. The Program should ensure the control and maintenance of equipment such as tanks for bulk storage of materials, staging platforms, forklifts, etc.

- These activities are performed by another WHC Site organization as provided for in the WHC Site P&T S/RID.

13.2.11

Offsite Transportation Management

Tracking of materials for offsite transportation should include a formal system of shipping papers, manifests, markings, labeling and placarding with regulated requirements for the content, format, and standardized nomenclature for material types.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EP-0750

Additionally, management of offsite transportation should consider compliance with laws and regulations; consignment of shipments; demurrage and detention; description of property for shipment; consolidation of shipments; quantity, size and weight limitations; carrier selection; vehicle inspections; security measures; receipt inspections and requirements for maintaining transportation data.

Offsite transportation management should also take into account the mode of transportation need for American or foreign flag carriers, classification of transport vehicles and aircraft, military air transportation, and insurance requirements.

SITE REQUIREMENT SOURCE: DOE1540.1 Chapter I, Section 7.c

"Shippers who offer radioactive materials, other hazardous materials, or hazardous wastes subject to Department of Transportation or Environmental Protection Agency regulations shall describe and classify these articles on manifests and other shipping papers as prescribed in the applicable regulations. Persons who knowingly deliver any hazardous material under a false or deceptive description, marking, or other declaration are subject to criminal penalties under the Hazardous Materials Transportation Act, Public Law 93-633."

13.2.12

Identification, Establishment and Implementation of Security Controls

Security controls should be identified and established primarily for classified materials and high-value unclassified materials. A graded approach to security should be applied for transportation of unclassified materials and materials of lesser monetary value.

- The Tank Farms does not ship or receive any of these materials.

13.2.13

Shipment Plans

Shipment plans should be prepared for shipments of highway route-controlled quantities of radioactive materials. Shipment plans should include identification of preferred travel routes, safety features and precautions and emergency response procedures.

- The Tank Farms does not ship or receive any of these materials.

13.2.14

Reporting

All occurrences involving transportation and packaging operations are reported, reviewed, and conducted according to the requirements of DOE 5000.3A. In summary, this order establishes the requirement to review and evaluate occurrences associated with DOE facilities and operations.

FACILITY REQUIREMENT SOURCE: DOES000.3B Group 6

"Shippers are responsible for occurrences involving their shipments. DOE organizations receiving hazardous materials, which are not in compliance with appropriate requirements, from a DOE shipper must report the discrepancies to the DOE shipper who will prepare Notification and Occurrences Reports in accordance with this Order and implement suitable corrective actions. If an out-of-compliance shipment is received from a non-DOE shipper, the DOE-recipient shall notify the non-DOE shipper of the discrepancy and shall prepare

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

Notification and Occurrence Reports in accordance with this Order. These reports must contain a statement that the non-DOE shipper has been notified and identify any corrective actions taken or planned to eliminate the occurrence from being repeated.

The term "limited quantity" as used in this Group is defined 49 CFR 171.8.

A. Offsite Transportation (DOT jurisdiction) Occurrences.

Emergency

An offsite transportation event involving the release of a reportable quantity of a hazardous substance (per 49 CFR 171.8) which is transported in support of Departmental operations.

Unusual Occurrence

(a) An offsite transportation event involving the release of hazardous material (per 49 CFR 171.8), other than radioactive material, in an amount greater than a limited quantity (per 49 CFR 171.8) transported in support of Departmental operations.

(b) An offsite transportation event involving the release of radioactive material transported in support of departmental operations.

(c) Any radioactive material shipment transported offsite that arrives at its destination with radiation or contamination levels in excess of DOT allowable limits.

(d) Any shipment of radioactive material or hazardous waste that arrives at its destination with a nonreconcilable shipping paper discrepancy or unaccounted for package (e.g., actual number of packages inconsistent with number indicated on shipping papers) related to material quantity.

(e) Any violation of Department of Transportation (DOT) Federal Motor Carrier Safety Regulations or Federal Aviation Agency (FAA) Regulations contributing to a transportation event involving a release of hazardous material.

Off-Normal

(a) An offsite transportation event involving a release of hazardous material (per 49 CFR 171.8) other than radioactive material, not exceeding a limited quantity (per 49 CFR 171.8) transported in support of Departmental operations.

(b) Any other violation of regulatory requirements involving improper material descriptions, marking, labeling, placarding, routing, or separation/segregation of hazardous materials that could or does result in:

- (1) improper handling/storage;
- (2) personnel exposures higher than permitted; or
- (3) emergency response actions inconsistent with the actual hazard.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

- (c) Any violation of DOT Federal Motor Carrier Safety Regulations or FAA Regulations.
- (d) Evidence of improper classification of hazardous materials transported offsite.
- (e) Evidence of improper selection or assembly of a hazardous material package transported offsite.
- (f) Evidence that cargo has shifted during transport offsite.
- (g) Transportation activities that are performed by unqualified personnel.
- (h) Any transportation event involving Departmental property resulting in vehicular/aircraft damage of more than \$5000 or, for insurance purposes, considered a total loss.

B. Onsite Transportation (DOE jurisdiction) Occurrences.

Unusual Occurrence

- (a) An onsite transportation event involving the release of a reportable quantity of a hazardous substance (per 49 CFR 171.8) which is transported in support of Departmental operations.
- (b) An offsite transportation event involving the release of radioactive material greater than an excepted quantity [per 49 CFR 173.421-l(a)] transported in support of Departmental operations.
- (c) An onsite transportation event involving the release of hazardous material (per 49 CFR 171.8) transported in support of Departmental operations.

Off Normal

- (a) An onsite transportation event involving a release of hazardous material (per 49 CFR 171.8), other than radioactive material, not exceeding a limited quantity (per 49 CFR 171.8) transported in support of Departmental operations.
- (b) An onsite transportation event involving the release of radioactive material not exceeding an excepted quantity [per 49 CFR 173.421-l(a)] transported in support of Departmental operations.
- (c) Any other violation of DOE requirements involving improper material descriptions, marking, labeling, placarding, routing, or separation/segregation of hazardous materials that could result in:
 - (1) improper handling/storage;
 - (2) personnel exposures higher than permitted; or,
 - (3) emergency response actions inconsistent with the actual hazard.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

(d) Any transportation event involving Departmental property resulting in vehicular/aircraft damage of more than \$5000 or, for insurance purposes, considered a total loss.

13.3 OFFSITE SAFETY

Controls should be established for the safe packaging and transportation of hazardous materials to ensure that there is no undue risk to the health and safety public. Compliance with established controls on manifests, records, and labels should ensure complete and effective tracking of all transported hazardous materials. This element is comprised of the following sub-elements:

13.3.1 Package Standards and Certifications

Packages for transportation of special nuclear materials may require certification by DOT, DOE or NRC dependent on the type of material, quantity and form.

- The Tank Farms does not ship or receive any of these materials.

13.3.2 Safety Analysis

A Safety Assessment/Analysis should be performed for the transportation of some high-hazard materials should including packaging (SARP) and overall transfer operations. The development of a SARP is dependent on the type and quantity of material being moved. The safety aspects of the transfer operations should be included in the Shipment Plan which is also material dependent on the type and quantity. A graded approach to safety documentation for transportation should be developed, including identification of the level of hazards that would trigger documentation requirements.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3 Design, Fabrication, Assembly and Testing QA for OffSite Shipping Containers

QA controls should be applied to the development of new shipping containers. These controls should ensure that the design and safety bases of the container are documented, reviewed and approved at the appropriate authority level.

(See also subelements 13.2.3.1 and 13.5.7 of this S/RID.)

SITE REQUIREMENT SOURCE: 49CFR173 Part 411

"General design requirements.

Except for a package that contains a limited quantity or excepted instrument or article under 173.421 through 173.424, each package used for shipment of radioactive materials shall be designed so that:

- (a) The package can be easily handled and properly secured in or on a conveyance during transport;
- (b) A package with a gross weight exceeding 10 kilograms (22 pounds) and up to 50 kilograms (110 pounds) has a means for manual handling;

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EP-0750

(c) A package with a gross weight of 50 kilograms (110 pounds) or more can be safely handled by mechanical means;

(d) Each lifting attachment on the package, when used in the intended manner, with a minimum safety factor of three, does not impose an unsafe stress on the structure of the package. In addition, the lifting attachment shall be so designed that failure under excessive load would not impair the ability of the package to meet all other requirements of this subpart. Each attachment or other feature on the outer surface of the packaging that could be used to lift the package must be removable or otherwise capable of being made inoperable for transport, or shall be designed with strength equivalent to that required for lifting attachments;

(e) The external surface, as far as practicable, may be easily decontaminated;

(f) The outer layer of packaging will avoid, as far as practicable, pockets or crevices where water might collect; and

(g) Each feature that is added to the package at the time of transport, and that is not a part of the package, will not reduce the safety of the package."

13.3.4

Physical Protection for Security

When shipping nuclear materials, special nuclear materials or irradiated reactor fuel, physical protection measures should be established to facilitate early detection and assessment of unauthorized access attempts, to assure notification of such attempts, and to identify and report attempts to interdict or sabotage shipping vehicles.

- The Tank Farms does not ship or receive any of these materials.

13.3.5

Nuclear Explosives, Components, and Assemblies

Transportation of nuclear explosives, components, and assemblies should include analysis of shielding and criticality, structural and stress analysis of package and vehicle designs and development of a DOE approved Safety Analysis Report for Packaging (SARP).

- The Tank Farms does not ship or receive any of these materials.

13.4

ONSITE SAFETY

Onsite transportation safety should ensure that movement of hazardous materials comply with DOT regulations if economically and technically feasible. Where compliance with DOT regulations is not feasible, compensatory administrative and technical controls should be used to ensure equivalent safety to workers, the public, and the environment.

FACILITY REQUIREMENT SOURCE: RLID 5480.3 Section 7.b

Onsite Shipments. Packages used exclusively for onsite shipments need not have a Certificate of Compliance. However an equivalent degree of safety must be established by use of alternative engineering methods or administrative measures, which are approved by RL.

13.4.1

Coordination of Material Transfers

The controls associated with the transfer of hazardous materials should ensure that personnel exposure to the hazardous materials will be minimized. Coordination through the Transportation Management Program should ensure that the shipper will have materials properly packaged or ready to package, that the transfer will be accomplished at the specified

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

time in an orderly manner and that the receiver will be prepared to accept the materials. The routes to be used for transfer of hazardous materials or wastes should be planned and, to varying degrees dependent on the hazards involved, access to those routes controlled during transfer.

- Reference subelement 13.4 and the associated requirement. The OSH 1910 regulations are delineated in the Occupational Health & Safety S/RID.

13.4.2

Safety Analysis

Onsite transportation of some high-hazards materials may require that a safety basis be developed including analysis of the packaging (SARP) and/or of the operations involved in the total transfer. Standards should be developed for the level of hazard that triggers such a requirement and interfaces developed with the Nuclear Safety Program. One element of the safety basis for onsite movement of hazardous materials, including potentially explosive materials, should be a limiting condition of operation. That is, all non-essential workers and the public should be excluded from those areas involved in the transfer, including the receiving point, the designated travel routes and the destination point.

- Reference sub-element 13.4 and the associated requirement.
- For onsite transport of Type B quantities of radioactive materials in packages which do not fully comply with the Type B packaging requirements, specific alternative requirements are prescribed in the SARP for that package.

13.4.3

Requirements for Potentially Explosive and Hazardous Materials

Methods for handling potentially explosive and hazardous materials onsite, may vary from specific DOT requirements where compliance with these may be impracticable on a cost or time basis. Administrative controls and technology should ensure that these alternate methods meet the intent of DOT regulations, i.e., protection of the worker, the public and the environment.

- Reference sub-element 13.4 and the associated requirement.

13.4.4

Personnel Protection During Movement of Hazardous Materials

The program should ensure protection of workers during movement of hazardous materials. Procedures and personnel protection devices should be developed for onsite handling of potentially explosive and other hazardous materials. This is especially significant where more restrictive regulations governing movement of these materials are replaced by less rigorous or cost restrictive site procedures.

FACILITY REQUIREMENT SOURCE: 49CFR177 Part 842(e)

(e) Persons should not remain unnecessarily in a vehicle containing Class 7 (radioactive) materials.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

13.5 KEY INTERFACES

The key program interfaces for the Packaging and Transportation department are delineated within this section of the S/RID.

13.5.1 Training and Qualification

Personnel involved in the P&T of hazardous materials should be knowledgeable of all applicable Federal, state and local regulations as well as DOE Orders. Training specific to P&T may include, as appropriate for specific job descriptions, but should not be limited to:

- a. Regulations pertinent to specific waste types and quantities, e.g., those governing plutonium or plutonium bearing wastes in greater than A2 quantities;
 - b. Regulations governing various forms of transportation, i.e., railway, highway, air or ocean vessels;
 - c. Requirements for the design, construction, testing, analysis and documentation of shipping containers; and/or
 - d. Requirements for preparing, tracking, receiving and maintaining shipping documentation.
- Training is provided by the WHC site Transportation & Packaging Organization; according to the requirements in the WHC Site P&T S/RID. Tank Farms employees who require training are identified by the Tank Farms Staff.

SITE REQUIREMENT SOURCE: 49CFR172 Part 702

"Applicability and responsibility for training and testing.

(a) A hazmat employer shall ensure that each of its hazmat employees is trained in accordance with the requirements prescribed in this subpart.

(b) A hazmat employee who performs any function subject to the requirements of this subchapter may not perform that function unless trained in accordance with the requirements prescribed in this subpart. It is the duty of each hazmat employer to comply with the applicable requirements of this subchapter and to thoroughly instruct each hazmat employee in relation thereto.

(c) Training may be provided by the hazmat employer or other public or private sources.

(d) A hazmat employer shall ensure that each of its hazmat employees is tested by appropriate means on the training subjects covered in 172.704."

SITE REQUIREMENT SOURCE: 49CFR172 Part 704

"Training requirements.

(a) Hazmat employee training shall include the following:

(1) General awareness/familiarization training. Each hazmat employee shall receive general awareness/familiarization training designed to provide familiarity with the requirements of this

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EF-0750

subchapter and to enable the employee to recognize and identify hazardous materials consistent with the hazard communication standards of this subchapter.

(2) Function-specific training. (i) Each hazmat employee shall receive function-specific training concerning requirements of this subchapter which are specifically applicable to the functions the employee performs.

(ii) Training conducted by hazmat employers, as necessary, to comply with, and when subject to, the requirements of the ICAO Technical Instructions or the IMDG Code, as authorized in 171.11 and 171.12 of this subchapter, respectively, may be used, when appropriate, to the extent they serve as a substitute for the requirements of this section.

(3) Safety training. Each hazmat employee shall receive safety training concerning-

(i) Emergency response information required by subpart G of Part 172;

(ii) Measures to protect the employee from the hazards associated with hazardous materials to which they may be exposed in the work place, including specific measures the hazmat employer has implemented to protect employees from exposure; and

(iii) Methods and procedures for avoiding accidents, such as the proper procedures for handling packages containing hazardous materials.

(b) OSHA or EPA Training. Training conducted by employers to comply with the hazard communication programs required by the Occupational Safety and Health Administration (OSHA) of the Department of Labor (29 CFR 1910.120) or the Environmental Protection Agency (EPA) (40 CFR 311.1), to the extent that training addresses the training specified in paragraph (a) of this section, may be used to satisfy the training requirements in paragraph (a) of this section, in order to avoid unnecessary duplication of training.

(c) Initial and recurrent training.-(1) Initial training. Each hazmat employer shall train each hazmat employee as follows:

(i) Training for a hazmat employee employed on or before November 15, 1992, shall be completed prior to April 1, 1993.

(ii) Training for a hazmat employee employed after November 15, 1992, shall be completed within 90 days after employment.

(iii) A hazmat employee who changes hazardous materials job functions shall complete training in the new job function(s) within 90 days after the change.

(iv) A hazmat employee described in paragraph (c)(1) (ii) or (iii) of this section, may perform new hazardous materials job functions prior to the completion of training provided the employee performs those functions under the supervision of a properly trained and knowledgeable hazmat employee.

(2) Recurrent Training. A hazmat employee shall receive the training required by this subpart at least once every two years.

(3) Relevant Training. Relevant training received from a previous employer or other source may be used to satisfy the requirements of this subpart provided a current record of training is obtained from hazmat employees' previous employer.

(4) Compliance. Each hazmat employer is responsible for compliance with the requirements of this subchapter regardless of whether the training required by this subpart has been completed.

(d) Recordkeeping. A record of current training, inclusive of the preceding two years, in accordance with this subpart shall be created and retained by each hazmat employer for each hazmat employee for as long as that employee is employed by that employer as a hazmat employee and for 90 days thereafter. The record shall include:

(1) The hazmat employee's name;

(2) The most recent training completion date of the hazmat employee's training;

(3) A description, copy, or the location of the training materials used to meet the requirements in paragraph (a) of this section;

(4) The name and address of the person providing the training; and

(5) Certification that the hazmat employee has been trained and tested, as required by this subpart.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EP-0750

(e) Limitation. A hazmat employee who repairs, modifies, reconditions, or tests packagings as qualified for use in the transportation of hazardous materials, and who does not perform any other function subject to the requirements of this subchapter, is not subject to the safety training requirement of paragraph (a)(3) of this section.

Pt. 172, App. A"

13.5.2

Safeguards and Security

Shipment of nuclear and special nuclear materials involves considerable interaction with safeguards and security. This interface is particularly prominent in the consideration of transportation of classified materials and precious metals. Transportation of these materials should take into account security aspects, such as provisions for tampering prevention, detection and notification.

- The Tank Farms does not ship or receive any of these materials.

13.5.3

Nuclear Safety

Although nuclear safety is an area of significant interface with P&T, this should be an inherent interface in that nuclear safety is a prominent factor in the regulations governing P&T of nuclear materials. However, consideration should be given to onsite P&T operations to ensure that the interaction with the nuclear safety program is carried through where administrative and technical controls are relied upon to satisfy the intent of DOT regulations in lieu of adhering to exact, sometimes unfeasible, requirements.

- The Tank Farms does not ship or receive any of these materials.

13.5.4

Emergency Preparedness

The interface between Emergency Preparedness and P&T primarily involves the element of emergency response. Shipment of hazardous and/or nuclear materials should include emergency response information and carrier instructions including organizations and authorities to be notified in the event of release of materials.

- Coordination between the Transportation Program and the Emergency Planning and Preparedness Functional Area should be developed to ensure that commonly handled hazardous materials are known and included in emergency plans for the site and that special equipment or vehicles for transportation are known and available for emergency situations.
- The WHC Site Emergency Preparedness Organization provides contractor emergency response to transportation accidents involving DOE-owned hazardous material shipments both on and off the WHC Site. Additionally, this organization develops and maintains implementing procedures for contractor response to transportation accidents involving DOE-owned hazardous material shipments both on and off the WHC Site and provides support to DOE-Headquarters on emergency preparedness matters related to transportation.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging & Transportation

WHC-EP-0750

13.5.5

Radiation Protection

- Physical management of radioactive material requires an interface to the Radiation Protection Functional Area to ensure proper labeling, packaging and transportation of those material. In addition, the Radiation Protection personnel provide the surveys of the materials to be transferred offsite as well as radiation protection and ALARA criteria and the dosimetry program for those individuals that are exposed to ionizing radiation.

13.5.6

Safety & Health

- The P&T personnel interface with the Safety and Health organization on a daily basis. The use of forklift, cranes, chemicals, etc. require the use of the site/plant industrial safety and industrial hygiene programs. A safety professional assigned to the Packaging and Transportation organization provides independent oversight of all P&T operations.
- The Environmental, Safety, and Health organization provides health physics support for all WHC hazardous material P&T activities, ensuring that ALARA practices are utilized in the packaging and shipment of radioactive materials. This organization also provides radiological and criticality analysis when required for the preparation of safety analysis documentation; reviews and approves nuclear criticality specifications and applicable WHC documents relating to the packaging and shipping of hazardous materials and occupational safety items or hazards.
- Additionally, this organization maintains surveillance of P&T operations to ensure adherence to the technical and safety aspects of the program and provide verification, where applicable, and performs an annual appraisal of WHC hazardous materials P&T operations.

13.5.7

Quality Assurance

- The Quality Assurance (QA)/Quality Control (QC) departments interface with the Packaging and Transportation personnel in regards to both the shipment of radioactive materials and the manufacture and use of different packages.
- This group assists in the development, implementation, and maintenance of a QA program for the packaging and transporting of hazardous material that addresses the fabrication, testing, assembly, maintenance, repair, and use (including reuse) of approved packagings.
- QA Department personnel review and approve WHC shipping package procurement documentation to ensure compliance with applicable WHC policies and procedures, DOT regulations, and DOE Orders. They also review and approve WHC plans, facility procedures, safety analysis documentation, drawings, and specifications related to hazardous material P&T.
- Additionally, the QA Department personnel inspect shipping packages procured from outside sources and those fabricated onsite, including the verification of package qualification tests; inspect reusable packages for integrity verification, as required by safety analysis documentation; and conduct periodic audits and surveillances to assess program compliance with applicable codes, standards, and requirements.

STANDARDS REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging & Transportation
WHC-EP-0750

- See also subelements 13.3.3 and 13.2.3.1 of this S/RID.

13.5.8

Waste Management

- Tank Farms personnel are responsible for assuring that the materials to be shipped are packaged correctly, and assure that any disposal criteria are met by the packages and their contents. The Packaging and Transportation personnel are responsible for verifying that the transportation and shipping requirements for radioactive materials to be shipped have been met.

13.5.9

Reporting

- WHC Site staff makes occurrence reports required by 49 CFR 171.15 and 171.16. Tank Farms P&T staff makes occurrence reports required by DOE 5000.3B-6.
- Occurrences are reported to Operations shift managers who make an initial categorization and notify the Tank Farm Occurrence Reporting Group of the details. This group reports the applicable notification reports working with the shift manager, and ensures that information associated with occurrence reports are communicated to the line organizations via established "lessons learned" procedures.