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

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**Westinghouse
Hanford Company**

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Richland, Washington

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REQUIREMENTS

IDENTIFICATION

DOCUMENT

FACILITY:

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

FUNCTIONAL AREA:

Fire Protection

REVISION 0

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

TABLE OF CONTENTS

12.0	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	8
12.2.1	Fire Prevention Procedures	8
12.2.2	Assessment Results Tracking Program	8
12.2.3	Interim Compensatory Measures	9
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	9
12.3.1.2	Fire Alarm System Features	9
12.3.1.3	Compatibility of Alarm Systems	10
12.3.1.4	Fire Watch and Alarm Systems	10
12.3.1.5	Underground Cables for Alarm Systems	10
12.3.2	Fire Detection Systems	10
12.3.2.1	Automatic Fire Detectors Design and Installation	10
12.3.2.2	Emergency Electric Power for Fire Alarm Systems	10
12.4	FIRE PROTECTION SUPPRESSION SYSTEMS	10
12.4.1	Automatic Fire Suppression Provisions	11
12.4.1.1	Automatic Sprinkler Systems	13
12.4.1.2	Wet Pipe Systems	13
12.4.1.3	Dry Pipe Systems	13
12.4.1.4	Preaction	13
12.4.1.5	Deluge	13

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

	12.4.1.6	Self-Restoring	13
	12.4.1.7	Pressure-Relief Valves	13
	12.4.1.8	Pressure-Reducing Valves	13
12.4.2		Special Fire Suppression Systems	14
	12.4.2.1	Water Spray	14
	12.4.2.2	Carbon Dioxide	14
	12.4.2.3	Dry Chemical	14
	12.4.2.4	Foam	15
	12.4.2.5	Halon	15
12.4.3		Fire Extinguishers	15
12.4.4		Fire Hose and Standpipe	15
12.4.5		Control of Liquid Runoff	15
12.5		WATER SUPPLY AND DISTRIBUTION SYSTEMS	15
12.5.1		Water Supply Systems	15
	12.5.1.1	Mains, Water Storage, Fire Pumps	16
	12.5.1.2	Redundant Water Supply	16
	12.5.1.3	Supervision of Valves	17
12.5.2		Water Distribution System	17
	12.5.2.1	Fire Hydrant Capacity	17
	12.5.2.2	Fire Hydrant Spacing and Location	17
	12.5.2.3	Air Release and Vacuum Valves	17
	12.5.2.4	Distribution Systems Mains Depth	17
	12.5.2.5	Dedicated Water Storage and Distribution Systems	17
	12.5.2.6	Underground Fire Water System Design, Installation, Testing, and Operation	17
	12.5.2.7	Water Distribution Loop Systems	18
	12.5.2.8	Fire Mains	18
	12.5.2.9	Sprinkler Supply Lead-Ins	18
	12.5.2.10	Combined Fire and Domestic Process Water Systems	18
	12.5.2.11	Sprinkler Risers	18
	12.5.2.12	Outside Control Valves	19
	12.5.2.13	Key Operated Buried Valves	19
	12.5.2.14	Sprinkler Systems Lead-Ins and Fire Hydrants	19
	12.5.2.15	Piping Protection Against Differential Settlements	19
	12.5.2.16	Fire Hydrant Flow Testing and Marking	19
12.6		PASSIVE FIRE PROTECTION	19
12.6.1		Fire Barriers	19

REQUIREMENTS IDENTIFICATION DOCUMENT **HIGH LEVEL WASTE STORAGE TANK FARMS** **Fire Protection** **Revision 0**

12.6.1.1	Fire Barrier Design Requirements	20
12.6.1.2	Architectural and Special Design Requirements Fire Barriers . . .	20
12.6.1.3	Design Base Fire Analysis for Fire Barriers	20
12.6.1.4	Fire Barriers for Flammable and Combustible Liquids	20
12.6.1.5	Fire Barriers for Storage Areas	20
12.6.1.6	Combustible Loading and Fire Barriers	20
12.6.1.7	Fire Endurance Ratings	21
12.6.2	Fire Doors and Windows	21
12.6.3	Penetration Seals	21
12.6.3.1	Fire Barrier Penetrations	21
12.6.3.2	Fire Barrier Penetration by Raceways	21
12.7	FIRE, HAZMAT AND MEDICAL SUPPORT	21
12.7.1	Fire and HAZMAT Procedures	21
12.7.2	Pre-Fire Plans	21
12.7.3	Fire Department	22
12.7.3.1	Plans, Procedures, Devices, and Trained Personnel	22
12.7.3.2	Inspection, Testing, and Records	23
12.8	FIRE HAZARD ANALYSIS	23
12.9	ASSESSMENT	24
12.9.1	Fire Protection Investigation and Reporting	24
12.9.1.1	Design Assessment	24
12.9.1.2	Inspection, Testing, and Maintenance	24
12.9.2	Fire Protection Quality Assurance Program	24
12.9.2.1	Quality Assurance Program Objectives and Requirements	25
12.9.3	Control of Fire Protection Impairments	25
12.10	LIFE SAFETY	25
12.10.1	Facility Buildings	25
12.10.1.1	Exit and Emergency Lighting	26
12.10.1.2	Life Safety for Laboratories	26
12.10.1.3	Egress	26
12.10.1.4	Corridor Widths	26

REQUIREMENTS IDENTIFICATION DOCUMENT **HIGH LEVEL WASTE STORAGE TANK FARMS** **Fire Protection** **Revision 0**

12.10.1.5	Door Encroachment	26
12.10.1.6	Security Areas	27
12.10.1.7	Zoning for Automatic Control	27
12.10.1.8	Life Safety in Hazardous Areas	27
12.11	PROGRAM FEATURES	27
12.11.1	Maintenance of Improved Risk Level of Protection or Higher Standard of Protect	27
12.12	BUILDING DESIGN	29
12.12.1	Performance Objectives in the Design of DOE Facilities	30
12.12.2	Exterior Fire Protection Systems and Features	30
12.12.3	Fire Resistance for Materials and Construction	30
12.12.4	Building design for Work Stations on Process Areas	31
12.12.5	Control of Combustibles	31
12.12.5.1	Interior Finish Materials	31
12.12.5.2	Interior Floor Coverings	31
12.12.5.3	Control of Combustible Materials by Building Design	32
12.12.5.4	Quantities of Stored Materials	32
12.12.5.5	Fire and Explosion Potential of the Materials	32
12.12.5.6	Storage and Handling of Flammable and Combustible Liquids	32
12.12.5.7	Stationary Diesel Engines and Exhaust Systems	32
12.12.5.8	Storage and Use of Compressed Gases	32
12.12.5.9	Process Hazards Identification and Management Controls	33
12.12.5.10	Testing of Flame Spread of Construction Materials	33
12.12.5.11	Cutting and Welding Operations	33
12.12.6	Electrical Systems	33
12.12.6.1	Compliance Actions, Exemptions, and Investigation	33
12.12.6.2	Emergency Power and Emergency Lighting Circuits	33
12.12.6.3	Listing Requirements for Electrical Materials and Equipment	33
12.12.6.4	Conduits	34
12.12.6.5	Electrical Installations	34
12.12.6.6	Redundant Electric Circuits	34
12.12.6.7	Primary, Auxiliary, Emergency, and Standby Power Systems	34
12.12.7	Exhaust and Ventilation Systems	34
12.12.7.1	Ductwork and Air Ventilation Systems	34
12.12.7.2	Smoke Pressurization and Evacuation Systems	35
12.12.7.3	Ventillation Systems for Smoke Removal	35
12.12.7.4	Confinement Systems Function During the DBF	35
12.12.7.5	Confinement Systems and Fire Protection	35
12.12.7.6	Design Features for Lower Flammability Limit	35

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.12.7.7	HEPA Filters	35
12.12.8	Lightning Protection	36
12.12.9	Seismic Requirements	36
12.12.10	Safety Class Equipment	36

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.0 FIRE PROTECTION

INTRODUCTION

The Fire Protection functional area for the Hanford Site 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.

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.

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

- **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.
- **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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

- **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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

- 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)
- (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, is 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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

- 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."

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

"Fire protection programs shall incorporate the following elements to assure that the objectives of paragraph 4 are met:

(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: 29CFR1926F Part 1926.150(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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

hazards occur, there shall be no delay in providing the necessary equipment."

FACILITY REQUIREMENT SOURCE: 29CFR1926F Part 1926.150(a)(3)

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

FACILITY REQUIREMENT SOURCE: 29CFR1926F Part 1926.150(a)(4)

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

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 and test procedures and results for fire protection features.

(3) Assist 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:

REQUIREMENTS IDENTIFICATION DOCUMENT HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

Revision 0

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"

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

"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."

12.2.1

Fire Prevention Procedures

(Requirements for this subelement are provided by Section 12.2.)

12.2.2

Assessment Results Tracking Program

(Requirements for this subelement are provided by Section 12.2.)

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.2.3 **Interim Compensatory Measures**

(Requirements for this subelement are provided by Section 12.2.)

12.2.4 **Operability Specifications**

(Requirements for this subelement are provided by Section 12.2.)

12.2.5 **Emergency Planning**

(Requirements for this subelement are provided by Section 12.2.)

12.2.6 **Training**

(Requirements for this subelement are provided by Section 12.2.)

12.2.7 **Communications**

(Requirements for this subelement are provided by Section 12.2.)

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.

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

"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**

(Requirements for this subelement are provided by Subsection 12.3.1.1.)

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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."

12.3.1.4 Fire Watch and Alarm Systems

(Requirements for this subelement are provided by Subsection 12.3.1.1.)

12.3.1.5 Underground Cables for Alarm Systems

(Requirements for this subelement are provided by Subsection 12.3.1.1.)

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."

12.3.2.2 Emergency Electric Power for Fire Alarm Systems

(Requirements for this subelement are provided by Subsection 12.12.6.2.)

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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."

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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."

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[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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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

(Requirements for this subelement are provided by Section 12.4.1.)

12.4.1.3

Dry Pipe Systems

(Requirements for this subelement are provided by Section 12.4.1.)

12.4.1.4

Preaction

(Requirements for this subelement are provided by Section 12.4.1.)

12.4.1.5

Deluge

(Requirements for this subelement are provided by Section 12.4.1.)

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

(Requirements for this subelement are provided by Section 12.4.1.)

12.4.1.8

Pressure-Reducing Valves

(Requirements for this subelement are provided by Section 12.4.1.)

REQUIREMENTS IDENTIFICATION DOCUMENT HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

Revision 0

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 System 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 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

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.4.2.2

Carbon Dioxide

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.4.2.3

Dry Chemical

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.4.2.4

Foam

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.4.2.5

Halon

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.4.3

Fire Extinguishers

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.4.4

Fire Hose and Standpipe

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.4.5

Control of Liquid Runoff

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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 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."

12.5.1.1

Mains, Water Storage, Fire Pumps

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.5.1.3 Supervision of Valves

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

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

(Requirements for this subelement are provided by Section 12.4.1.)

12.5.2.4 Distribution Systems Mains Depth

(Requirements for this subelement are provided by Section 12.4.1.)

12.5.2.5 Dedicated Water Storage and Distribution Systems

(Requirements for this subelement are provided by Section 12.5.1.)

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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 valuing 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."

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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

(Requirements for this subelement are provided by Section 12.4.1.)

12.5.2.16

Fire Hydrant Flow Testing and Marking

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

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.

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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."

12.6.1.2

Architectural and Special Design Requirements Fire Barriers

(Requirements for this subelement are provided by Section 12.12.)

12.6.1.3

Design Base Fire Analysis for Fire Barriers

(Requirements for this subelement are provided by Section 12.12.3.)

12.6.1.4

Fire Barriers for Flammable and Combustible Liquids

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.6.1.5

Fire Barriers for Storage Areas

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.6.1.6

Combustible Loading and Fire Barriers

(Requirements for this subelement are provided by Section 12.12.4.)

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.6.1.7 **Fire Endurance Ratings**

Testing to determine fire endurance ratings of construction assemblies shall be in accordance with NFPA 251 Fire Test of Building Construction and Materials.

12.6.2 **Fire Doors and Windows**

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

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 and HAZMAT Procedures**

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.7.2 **Pre-Fire Plans**

Pre-fire plans should be developed for fire area presenting a hazard to equipment or public safety. Pre-HAZMAT plans are developed for appropriate areas of the facility. The plans

REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

Revision 0

define specific fire fighting and HAZMAT response strategies for these areas, including identifying hazards and special equipment.

SITE REQUIREMENT SOURCE: NFPA-801 Section 2-7

"A written fire emergency plan should be developed and should include the following:

- (a) Response to fire alarms and fire systems supervisory alarms.
- (b) Notification of personnel identified in the plan.
- (c) Evacuation of personnel not directly involved in fire fighting activities from the area.
- (d) Coordination with security forces, radiation protection personnel, or other designated personnel to admit public fire department and other emergency response agencies
- (e) Fire extinguishment activities, particularly those that are unique to the facility handling radioactive materials. (See Appendix B.)
- (f) Requirements for periodic drills and exercises to verify adequacy of the fire emergency plan. Practice sessions should be coordinated around previously developed valid emergency scenarios particular to the facility.
- (g) Fire prevention surveillance. (See NFPA 601, Standard for Guard Service in Fire Loss Prevention)"

12.7.3

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 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)."

12.7.3.1

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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."

12.7.3.2

Inspection, Testing, and Records

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

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: DOE5480.7A 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. A graded FHA 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 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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

- (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
- (k) Potential for a toxic, biological and/or radiation incident due to a fire
- (l) Emergency lighting
- (m) Security considerations related to fire protection
- (n) Natural hazards (earthquake, flood, wind) impact on fire safety
- (o) 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.

12.9.1.1

Design Assessment

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 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

REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

Revision 0

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

(Requirements for this subelement are provided by the Quality Assurance Functional Area.)

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."

SITE REQUIREMENT SOURCE: NFPA-801 Section 2-6

"A written procedure should be established to address impairments to fire protection systems and should include the following:

- (a) Identification and tracking of impaired equipment.
- (b) Identification of personnel to be notified.
- (c) Determination of needed fire protection and fire prevention measures."

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: DOE/EH0135 FP.2

"PERFORMANCE OBJECTIVE: All facilities onsite should provide adequate life safety provisions against the effects of fire.

CRITERIA

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

1. There is a program in place to ensure that facilities include NFPA 101, "Life Safety Code," requirements and conformance is verified by periodic field inspections.
2. Where strict code compliance is not feasible, as in some containment structures, alternative protection is provided in the form of personnel limitations, added control of combustibles, superior protection and/or construction, and strong management control (added inspection/maintenance, etc.).
3. Security considerations do not jeopardize life safety provisions."

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 an 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

(Requirements for this subelement are provided by Section 12.10.1.)

12.10.1.2 Life Safety for Laboratories

(Requirements for this subelement are provided by Section 12.10.1.)

12.10.1.3 Egress

Means of egress for both new and existing buildings shall comply with NFPA 101.

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

(Requirements for this subelement are provided by Section 12.10.1.)

12.10.1.5 Door Encroachment

(Requirements for this subelement are provided by Section 12.10.1.)

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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."

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

Maintenance of 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

REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Fire Protection

Revision 0

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."

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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:

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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.12.1

Performance Objectives in the Design of DOE Facilities

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."

12.12.2

Exterior Fire Protection Systems and Features

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.3

Fire Resistance for Materials and Construction

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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 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

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 NFPA 13; • 0.22 watts per square centimeter where there are sprinklers complying with NFPA 13"

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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:

- 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 Handling of Flammable and Combustible Liquids

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.5.7

Stationary Diesel Engines and Exhaust Systems

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.5.8

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

12.12.5.9 Process Hazards Identification and Management Controls

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.5.10 Testing of Flame Spread of Construction Materials

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.5.11 Cutting and Welding Operations

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.6 Electrical Systems

12.12.6.1 Compliance Actions, Exemptions, and Investigation

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.6.2 Emergency Power and Emergency Lighting Circuits

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

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"

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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.

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."

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 of fire to preclude release of radioactive, toxic, or other hazardous materials."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

FACILITY REQUIREMENT SOURCE: DOE6430.1A Section Z1550-2.5.6

"Ductwork shall also be designed to comply with NFPA 90A, including specification and installation of smoke and fire dampers at fire wall penetrations and smoke pressurization/containment dampers as 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."

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

Ventillation Systems for Smoke Removal

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.7.4

Confinement Systems Function During the DBF

(Requirements for this subelement are provided by Section 12.12.)

12.12.7.5

Confinement Systems and Fire Protection

(Requirements for this subelement are provided by Section 12.12.)

12.12.7.6

Design Features for Lower Flammability Limit

(Requirements for this subelement are provided by Section 12.12.)

12.12.7.7

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Fire Protection
Revision 0

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

(Requirements for this subelement are provided by Subsection 12.1.1.1.)

12.12.9

Seismic Requirements

(Requirements for this subelement are provided by Section 12.12.)

12.12.10

Safety Class Equipment

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."

WESTINGHOUSE HANFORD COMPANY

REQUIREMENTS

IDENTIFICATION

DOCUMENT

FACILITY:

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

FUNCTIONAL AREA:

Packaging and Transportation

REVISION 0

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

TABLE OF CONTENTS

13.0	PACKAGING AND TRANSPORTATION	1
13.1	PROGRAM MANAGEMENT	3
13.1.1	Central Control of Packaging and Transportation Activities	3
13.1.2	Staffing	3
13.1.3	Onsite Material Tracking	3
13.2	PACKAGING AND TRANSPORTATION OPERATIONS	3
13.2.1	Packaging Operations	3
13.2.1.1	Type A Packaging	5
13.2.1.2	Type B Packaging	5
13.2.1.3	Low Specific Activity Packaging	5
13.2.1.4	Limited Quantity Packaging	8
13.2.1.5	Fissile Packaging	9
13.2.1.6	Empty Packaging	9
13.2.1.7	Instruments and Articles Packaging	9
13.2.1.8	Hazardous Materials	9
13.2.1.8.1	Pyrophoric Packaging	9
13.2.1.8.2	Oxidizer Packaging	9
13.2.1.8.3	Multiple Hazard Classification	9
13.2.1.9	NRC Certified Packaging	11
13.2.1.10	Import/Export Packaging	11
13.2.1.11	Alternatives to DOE 5480.3 Requirements	11
13.2.1.12	Packaging Limitations	11
13.2.1.12.1	Radiation Levels	11
13.2.1.12.2	Thermal Levels	13
13.2.1.12.3	Contamination Levels	13
13.2.1.12.4	Special Form vs. Normal Form Materials	14
13.2.1.12.5	Package Problems (Leaks, Overpacks, Markings, Labels, Loose Lids, etc.)	14
13.2.2	Storage Of Packaged Materials Prior to Shipment	14
13.2.3	Loading Operations	14

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.2.4	Transportation Operations	15
13.2.4.1	Public Highway	15
	13.2.4.1.1 Private Vehicle	15
	13.2.4.1.2 Public Conveyance	15
13.2.4.2	Rail	15
13.2.4.3	Air	15
13.2.4.4	Vessel	16
13.2.4.5	Foreign Shipments (Import/Export)	16
13.2.4.6	Miscellaneous Requirements	16
	13.2.4.6.1 Bracing	18
	13.2.4.6.2 QA/QC	18
	13.2.4.6.3 Scheduling of Shipment with Consignee	19
	13.2.4.6.4 Lifting and Tie Downs	19
	13.2.4.6.5 Equipment Inspection	19
	13.2.4.6.6 Weight Limitations	19
13.2.5	Marking, Labeling and Placarding	19
13.2.5.1	Marking Requirements	19
13.2.5.2	Labeling Requirements	22
13.2.5.3	Placarding Requirements	28
13.2.6	Shipping Papers, Bills of Lading and Manifests	28
13.2.6.1	Manifest	37
13.2.6.2	Emergency Notifications	37
13.2.6.3	Paperwork Storage Location While in Transit	37
13.2.7	Notification of State Authorities of Shipments of High-Hazard Materials	37
	13.2.7.1 State Routing Requirements/Notifications	38
	13.2.7.2 Consignee Notifications	38
13.2.8	Emergency Response Information	38
13.2.9	Receipt Inspection	38
	13.2.9.1 Radiation/Contamination Surveys	38
	13.2.9.2 Shipment Inspection (Bracing/General Condition of Shipment)	38
	13.2.9.3 Notification of Acceptance/Refusal of Shipment	39
	13.2.9.4 Opening of Containers, as appropriate	39

REQUIREMENTS IDENTIFICATION DOCUMENT **HIGH LEVEL WASTE STORAGE TANK FARMS** **Packaging and Transportation** Revision 0

13.2.11	Coordination and Planning of Base Technology	39
13.2.12	Vehicle and Equipment Control and Maintenance	39
13.2.13	Offsite Transportation Management	39
13.2.14	Identification, Establishment and Implementation of Security Controls . . .	40
	13.2.14.1 General	40
	13.2.14.2 Internal Transfers	40
	13.2.14.3 External Transfers	40
13.2.15	Shipment Plans	40
13.3	OFFSITE SAFETY	41
13.3.1	Package Standards and Certifications	41
13.3.2	Safety Analysis	41
13.3.3	Design, Fabrication, Assembly, and Testing QA for Off-Site Shipping Containers	41
	13.3.3.1 Type A Package Tests	41
	13.3.3.2 Type B Package Tests	41
	13.3.3.3 Fissile Package Tests	42
	13.3.3.4 NRC Certified Packaging Tests	42
	13.3.3.5 Foreign Manufactured Packages Tests	42
	13.3.3.6 Package Recertification	42
	13.3.3.7 QA/QC Requirements	42
	13.3.3.8 Certification Application	42
13.3.4	Tests for Special Form Material	42
13.3.5	Physical Protection for Security	42
	13.3.5.1 Exclusive Use Shipment	43
	13.3.5.2 Sealing of Shipment	43
13.3.6	Nuclear Explosives, Components, and Assemblies	43
13.4	ONSITE SAFETY	43
13.4.1	Coordination of Material Transfers	43
13.4.2	Safety Analysis	43
13.4.3	Requirements for Potentially Explosive and Hazardous Materials	44
13.4.4	Personnel Protection During Movement of Hazardous Materials	44
13.5	KEY PROGRAM INTERFACES	44
13.5.1	Training and Qualification	44
13.5.2	Safeguards and Security	47
13.5.3	Nuclear Safety	47
13.5.4	Emergency Planning and Preparedness	47

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.5.5 Radiation Protection	47
13.5.6 Safety & Health	47
13.5.7 QA	47
13.5.8 Waste Management	48
13.5.9 Reporting	48

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.0 PACKAGING AND TRANSPORTATION

INTRODUCTION

BACKGROUND

This Requirements Identification Document (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 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 RID applies to all of the onsite and offsite packaging and transportation activities associated with the Tank Farms Facilities and Operations at the Hanford Site.

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 radioactive mixed waste resulting from operations and maintenance activities. Low-level radioactive waste is packaged and transported to Hanford disposal facilities. Mixed low-level radioactive wastes are packaged and transported to Hanford storage facilities. All shipments are onsite only; no offsite shipments are made.

The P&T functional area 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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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.
3. The Tank Farms Onsite shipments may encompass other shipping classifications, but are not directly regulated by federal or state agencies. Westinghouse Hanford Company has adopted federal and state requirements where appropriate.

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.

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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

SITE REQUIREMENT SOURCE: 49CFR173 Section 22

***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.

(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

(ii) With respect to cargo tanks provided by a carrier, the manufacturer's identification plate or a written certification of specification or exemption provided by the carrier.

(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)"

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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."

FACILITY REQUIREMENT SOURCE: DOE5480.3 Section 10.d

"Routine Determinations. Prior to each use of a package for shipment of radioactive or fissile materials, the shipper shall ascertain that the package with its contents satisfies the applicable requirements of paragraph 8, including determination that:

- (1) The packaging has not been significantly damaged.
- (2) Any moderators and nonfissile neutron absorbers, if required, are as authorized.
- (3) The closure of the package and any sealing gaskets present are free from defects.
- (4) Any valve through which primary coolant can flow is protected against tampering.
- (5) The internal gauge pressure of the package will not exceed, during the anticipated period of transport, the maximum normal operating pressure.
- (6) Contamination of the primary coolant will not exceed, during the anticipated period of transport, the limits as prescribed in paragraph 8.e.(1)(d)."

13.2.1.1

Type A Packaging

The specific requirements for utilizing Type A Packaging are delineated in the following requirements:

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.2

Type B Packaging

The specific requirements for utilizing Type B Packaging are delineated in the following requirements:

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.3

Low Specific Activity Packaging

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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

following requirements:

SITE REQUIREMENT SOURCE: 49CFR173 Section 425

"Transport requirements for low specific activity (LSA) radioactive materials.

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.

(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.

(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.

(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.

(10) Transportation by aircraft is prohibited.

(c) Unpackaged (bulk) shipments of LSA materials shall be transported only in exclusive use closed transport vehicles and shall comply with the following:

(1) Authorized materials are limited to the following:

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

- (i) Uranium or thorium ores and physical or chemical concentrates of those ores.
 - (ii) Uranium metal or natural thorium metal, or alloys of these materials.
 - (iii) Materials of low radioactive concentration, if the average estimated radioactivity concentration does not exceed 0.001 millicurie per gram and the contribution from materials with an A2 value (see 173.435) of less than 0.05 curie does not exceed one percent of the total radioactivity.
 - (iv) Objects of nonradioactive material externally contaminated with radioactive material, if the radioactive material is not readily dispersible and the surface contamination, when averaged over one square meter, does not exceed 0.0001 millicurie per square centimeter of radionuclides for which the A2 value is less than 0.05 or 0.001 millicurie per square centimeter of other radionuclides. Such objects must be suitably wrapped or enclosed.
- (2) Bulk liquids must be transported in the following:
- (i) Specification 103CW, 111A60W7 (179.200, 179.201, 179.202 of this subchapter) tank cars. Bottom openings in tanks prohibited.
 - (ii) Specification MC 310, MC 311, MC 312, or MC 331 (178.343 or 178.337 of this subchapter) cargo tanks. Authorized only where the radioactivity concentration does not exceed 10 percent of the specified low specific activity levels (see 173.403(n)). The requirements of 173.412(n) do not apply to these cargo tanks. Bottom fittings and valves are not authorized. Trailer-on-flat-car service is not authorized.
- (3) External radiation levels must comply with 173.441(b).
- (4) Shipments must be loaded by the consignor, and unloaded by the consignee from the conveyance or freight container in which originally loaded.
- (5) Except for shipments of unconcentrated uranium or thorium ores, the transport vehicle must be placarded with the placards prescribed in subpart F of part 172 of this subchapter, as appropriate.
- (6) There must be no leakage of radioactive materials from the vehicle.
- (7) 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.
- (8) Transportation by aircraft is prohibited.
- (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 radio-active 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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.2.1.4

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 Section 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 Section 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; 49 CFR 173.422 for radioactive for radioactive material, excepted package--articles manufactured from natural or depleted uranium or natural thorium, UN2910; or 49 CFR 173.427for 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:
 - (b)(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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(b)(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."

13.2.1.5 **Fissile Packaging**

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

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.6 **Empty Packaging**

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

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.7 **Instruments and Articles Packaging**

The specific requirements for packaging to be utilized to ship instruments and articles are delineated in the following requirements:

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.8 **Hazardous Materials**

The shipment of hazardous materials and multiple hazard classification are discussed within this section.

13.2.1.8.1 **Pyrophoric Packaging**

The shipment of pyrophoric radioactive materials are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.8.2 **Oxidizer Packaging**

The shipment of oxidizing radioactive materials are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.8.3 **Multiple Hazard Classification**

Multiple hazard classifications are discussed within this section.

SITE REQUIREMENT SOURCE: 49CFR173 Section 2

"Hazardous materials classes and index to hazard class definitions.

The hazard class of a hazardous material is indicated either by its class (or division) number,

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

its class name, or by the letters "ORM D". The following table lists class numbers, division numbers, class or division names and those sections of this subchapter which contain definitions for classifying hazardous materials, including forbidden materials. HAZDOCS-2 Table No. 24"

SITE REQUIREMENT SOURCE: 49CFR173 Section 2(a)

"Classification of a material having more than one hazard.

(a) Classification of a material having more than one hazard. Except as provided in paragraph (c) of this section, a material not specifically listed in the 172.101 Table that meets the definition of more than one hazard class or division as defined in this part, shall be classed according to the following hazard classes, which are listed in descending order of hazard:

- (1) Class 7 (radioactive materials, other than limited quantities).
- (2) Division 2.3 (poisonous gases).
- (3) Division 2.1 (flammable gases).
- (4) Division 2.2 (nonflammable gases).
- (5) Division 6.1 (poisonous liquids), Packing Group I, poisonous-by-inhalation only.
- (6) A material that meets the definition of a pyrophoric material in 173.124(b)(1) of this subchapter (Division 4.2).
- (7) A material that meets the definition of a self-reactive material in 173.124(a)(2) of this subchapter (Division 4.1).
- (8) Class 3 (flammable liquids), Class 8 (corrosive materials), Division 4.1 (flammable solids), Division 4.2 (spontaneously combustible materials), Division 4.3 (dangerous when wet materials), Division 5.1 (oxidizers) or Division 6.1 (poisonous liquids or solids other than Packing Group I, poisonous-by-inhalation). The hazard class and packing group for a material meeting more than one of these hazards shall be determined using the precedence table in paragraph
(b) of this section.
- (9) Combustible liquids.
- (10) Class 9 (miscellaneous hazardous materials).
- (b) Precedence of hazard table for Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1 and 6.1. The following table ranks those materials that meet the definition of Classes 3 and 8 and Divisions 4.1, 4.2, 4.3, 5.1 and 6.1: HAZDOCS-2 Table No. 25
- (c) The following materials are not subject to the provisions of paragraph (a) of this section because of their unique properties:
 - (1) A Class 1 (explosive) material that meets any other hazard class or division as defined in

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

this part shall be assigned a division in Class 1. Class 1 materials shall be classed and approved in accordance with 173.56 of this part;

(2) A Division 5.2 (organic peroxide) material that meets the definition of any other hazard class or division as defined in this part, shall be classed as Division 5.2;

(3) A Division 6.2 (infectious substance) material that meets the definition of any other hazard class or division as defined in this part shall be classed as Division 6.2;

(4) A material that meets the definition of a wetted explosive in 173.124(a)(1) of this subchapter (Division 4.1). Wetted explosives are either specifically listed in the 172.101 Table or are approved by the Associate Administrator for Hazardous Materials Safety (see 173.124(a)(1) of this subchapter); and

(5) A limited quantity of a Class 7 (radioactive) material that meets the definition for more than one hazard class or division shall be classed in accordance with 173.421 2."

13.2.1.9

NRC Certified Packaging

NRC Certified Packagings and the requirements thereto are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.10

Import/Export Packaging

Additional requirements associated with import/export shipments are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.11

Alternatives to DOE 5480.3 Requirements

Alternatives to the requirements set forth in DOE 5480.3 are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.12

Packaging Limitations

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

13.2.1.12.1

Radiation Levels

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

SITE REQUIREMENT SOURCE: 49CFR173 Section 441

*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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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 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.

(d) Packages exceeding the radiation level or transport index prescribed in paragraph (a) of this section shall not be transported by aircraft.

(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.

(The information collection requirements contained in paragraph (c) were approved by the Office of Management and Budget under control number 2137 0536)"

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.2.1.12.2

Thermal Levels

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

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.12.3

Contamination Levels

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

SITE REQUIREMENT SOURCE: 49CFR173 Section 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 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;

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(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."

13.2.1.12.4

Special Form vs. Normal Form Materials

The packaging limitations associated with special form vs. normal form materials are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.1.12.5

Package Problems (Leaks, Overpacks, Markings, Labels, Loose Lids, etc.)

The correct procedures to follow for package problems are delineated in the following section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.2

Storage Of Packaged Materials Prior to Shipment

The requirements associated with the storage of materials prior to their shipment are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.3

Loading Operations

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

SITE REQUIREMENT SOURCE: 49CFR173 Section 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."

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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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

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

Loading.

(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."

13.2.4

Transportation Operations

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

13.2.4.1

Public Highway

The specific requirements associated with the transportation of radioactive materials on the public highway are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.1.1

Private Vehicle

The specific requirements associated with the transportation of radioactive materials on the public highway in a private vehicle are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.1.2

Public Conveyance

The specific requirements associated with the transportation of radioactive materials on the public highway in a public conveyance are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.2

Rail

The specific requirements associated with the transportation of radioactive materials on via the public rail system are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.3

Air

The specific requirements associated with the transportation of radioactive materials on via air are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.2.4.4

Vessel

The specific requirements associated with the transportation of radioactive materials on water are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.5

Foreign Shipments (Import/Export)

The requirements for either importing or exporting a shipment of radioactive material are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.6

Miscellaneous Requirements

Additional transportation requirements are delineated within this section.

SITE REQUIREMENT SOURCE: 49CFR171 Section 2

*General requirements.

(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.

(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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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 Section 448

"General transportation requirements.

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

(b) Except as may be specifically required by the competent authority in the applicable certificate, a package of radioactive materials may be carried among packaged general cargo without special stowage provisions, if:

(1) The heat output in watts does not exceed 0.1 times the minimum package dimension in centimeters; or

(2) The average surface heat flux of the package does not exceed 15 watts per square meter and the immediately surrounding cargo is not in sacks or bags or otherwise in a form that would seriously impede air circulation for heat removal.

(c) Packages bearing labels prescribed in 172.403 of this subchapter may not be carried in compartments occupied by passengers, except in those compartments exclusively reserved for couriers accompanying those packages.

(d) Mixing of different kinds of packages, including Fissile Class I packages with Fissile Class II packages, is authorized in accordance with 173.459.

(e) No person shall offer for transportation aboard a passenger-carrying aircraft any single package with a transport index greater than 3.0 or an overpack with a transport index greater than 3.0.

(f) No person shall offer for transportation aboard a passenger-carrying aircraft any radioactive

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

material unless that material is intended for use in, or incident to, research, medical diagnosis or treatment.

(g) If an overpack is used to consolidate individual packages of radioactive materials, the packages shall comply with the packaging, marking, and labeling requirements of this subchapter, and the following:

(1) The overpack shall be labeled as prescribed in 172.403 of this subchapter except as follows:

(i) The "contents" entry on the label may state "mixed" unless each inside package contains the same radionuclide(s).

(ii) The "activity" entry on the label must be determined by adding together the number of curies of the radioactive materials packages contained therein.

(iii) For a non-rigid overpack, the required label together with required package markings shall be affixed to the overpack by means of a securely attached, durable tag. The transport index shall be determined by adding together the transport indexes of the radioactive materials packages contained therein.

(iv) For a rigid overpack, the transport index shall be determined by:

(A) Adding together the transport indexes of the radioactive materials packages contained in the overpack; or

(B) Except for fissile radioactive materials, direct measurements as prescribed in 173.403(bb) which have been taken by the person initially offering the packages contained within the overpack for shipment.

(2) The overpack shall be marked as prescribed in subpart D of part 172 of this subchapter and 173.25(a).

(3) The transport index of the overpack shall not exceed 3.0 for passenger-carrying aircraft shipments, or 10.0 for cargo-aircraft only shipments."

13.2.4.6.1

Bracing

The bracing requirements for shipments of radioactive material are delineated within the following section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.6.2

QA/QC

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

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.2.4.6.3

Scheduling of Shipment with Consignee

The additional requirements associated with the scheduling of shipments with the consignee are delineated within the following section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.6.4

Lifting and Tie Downs

The additional requirements associated with the lifting and tie downs are delineated within the following section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.6.5

Equipment Inspection

The additional requirements associated with the equipment inspections are delineated within the following section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.4.6.6

Weight Limitations

Weight restrictions and limitations of offsite are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.5

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.

13.2.5.1

Marking Requirements

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

SITE REQUIREMENT SOURCE: 49CFR172 Section 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."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

SITE REQUIREMENT SOURCE: 49CFR172 Section 301

"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:

(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.)

(f) Marking exceptions.

(1) Identification numbers are not required on packages which contain only limited quantities, as defined in 171.8 of this subchapter, or ORM D materials.

(2) The marking of technical names on non-bulk packagings filled for shipment prior to December 31, 1990 is not required until December 31, 1991."

SITE REQUIREMENT SOURCE: 49CFR172 Section 303

"Prohibited marking.

(a) No person may offer for transportation or transport a package which is marked with the

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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 Section 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."

SITE REQUIREMENT SOURCE: 49CFR172 Section 310

"Radioactive materials.

(a) In addition to any other markings required by this subpart, each package containing radioactive materials must be marked as follows:

(1) Each package of radioactive materials in excess of 110 pounds (50 kilograms) must have its gross weight plainly and durably marked on the outside of the package.

(2) Each package of radioactive materials which conforms to the requirements for Type A or Type B packaging (173.403 of this subchapter) must be plainly and durably marked on the outside of the package in letters at least -inch (13 mm.) high, with the words "TYPE A" or "TYPE B" as appropriate. A packaging which is not in compliance with these requirements may not be so marked.

(3) Each package of radioactive material destined for export shipment must also be marked "USA" in conjunction with the specification marking, or other package certificate identification. (See 173.471 173.472, and 173.473 of this subchapter.) (49 U.S.C. 1803, 1804, 1808, 49 CFR 1.53, app. A to part 1)"

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.2.5.2

Labeling Requirements

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

SITE REQUIREMENT SOURCE: 49CFR172 Section 400

"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:

(1) A non-bulk package;

(2) A bulk packaging, other than a cargo tank, portable tank, or tank car, with a volumetric capacity of less than 18m³ (640 cubic feet), unless placarded in accordance with subpart F of this part;

(3) A portable tank of less than 3785 L (1000 gallons) capacity, unless placarded in accordance with subpart F of this part;

(4) A DOT Specification 106 or 110 multi-unit tank car tank, unless placarded in accordance with subpart F of this part; and

(5) An overpack, freight container or unit load device, of less than 18 m³ (640 cubic feet), which contains a package for which labels are required, unless placarded or marked in accordance with 172.512 of this part.

(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 Section 401

"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.

(c) The restrictions in paragraphs (a) and (b) of this section, do not apply to packages labeled

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

in conformance with:

- (1) Any United Nations recommendation, including the class number (see 172.407), in the document entitled "Transport of Dangerous Goods.";
- (2) The International Maritime Organization (IMO) requirements, including the class number (see 172.407), in the document entitled "International Maritime Dangerous Goods Code";
- (3) The ICAO Technical Instructions; or
- (4) The TDG Regulations. (49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, app. A to part 1)"

SITE REQUIREMENT SOURCE: 49CFR172 Section 402

"Additional labeling requirements.

(a) Subsidiary hazard labels. Each package containing a hazardous material:

(1) Shall be labeled with primary and subsidiary hazard labels as specified in Column 6 of the 172.101 Table; and

(2) For other than Class 2 or Class 1 materials (for subsidiary labeling requirements for Class 1 materials see paragraph (e) of this section), if not already labeled under paragraph (a)(1) of this section, shall be labeled with subsidiary hazard labels in accordance with the following table: HAZDOCS-2 Table No. 17

(b) Display of hazard class on labels. The appropriate hazard class or, for Division 5.1 or 5.2 the division number, shall be displayed in the lower corner of a primary hazard label and may not be displayed on a subsidiary label.

(c) Cargo Aircraft Only label. Each person who offers for transportation or transports by aircraft a package containing a hazardous material which is authorized on cargo aircraft only shall label the package with a CARGO AIRCRAFT ONLY label specified in 172.448 of this subpart.

(d) Radioactive Materials. Each package containing a radioactive material that also meets the definition of one or more additional hazards, except Class 9, shall be labeled as a radioactive material as required by 172.403 of this subpart and for each additional hazard.

(e) Class 1 (explosive) Materials. In addition to the label specified in Column 6 of the 172.101 Table, each package of Class 1 material that also meets the definition for:

(1) Division 6.1, Packing Groups I or II, shall be labeled POISON; or

(2) Class 7, shall be labeled in accordance with 172.403 of this subpart."

SITE REQUIREMENT SOURCE: 49CFR172 Section 403

"Radioactive material.

(a) Unless excepted from labeling by 173.421 through 173.425 of this subchapter, each

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

package of radioactive material must be labeled as provided in this section.

(b) The proper label to affix to a package of radioactive material is based on the radiation level at the surface of the package, the transport index (173.403 of this subchapter) and, if appropriate, the fissile characteristics of the package. The proper category of label shall be determined in accordance with paragraph (c) of this section. The label to be applied shall be the highest category required for any of the three determining conditions for the package. Radioactive White-I is the lowest category and Radioactive Yellow-III is the highest. For example: a package with a transport index of 0.8 and a maximum surface radiation level of 60 millirem per hour which contains no fissile material must bear a Radioactive Yellow-III label.

(c) Category of Label to be Applied to Radioactive Materials Packages: HAZDOCS-2 Table No. 18,

(d) EMPTY label. See 173.427(d) of this subchapter for EMPTY labeling requirements.

(e) [Reserved]

(f) Each package required by this section to be labeled with a RADIOACTIVE label must have two of these labels, affixed to opposite sides of the package. (See 172.406(e)(3) for freight container label requirements).

(g) The following applicable items of information must be entered in the blank spaces on the RADIOACTIVE label by legible printing (manual or mechanical), using a durable weather resistant means of marking:

(1) Contents. The name of the radionuclides as taken from the listing of radionuclides in 173.435, of this subchapter (symbols which conform to established radiation protection terminology are authorized, i.e., 99Mo, 60Co, etc.). For mixtures of radionuclides, the most restrictive radionuclides on the basis of radiotoxicity must be listed as space on the label allows.

(2) Activity. Units shall be expressed in appropriate curie units, i.e., curies (Ci), millicuries (mCi) or microcuries (uCi) (abbreviations are authorized). For a fissile material, the weight in grams or kilograms of the fissile radioisotope also may be inserted.

(3) Transport index. (See 173.403 of this subchapter.) (49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, app. A to part 1)"

SITE REQUIREMENT SOURCE: 49CFR172 Section 404

"Labels for mixed and consolidated packaging.

(a) Mixed packaging. When hazardous materials having different hazard classes are packed within the same packaging, or within the same outside container or overpack as described in 173.25 and authorized by 173.21 of this subchapter, the packaging, outside container or overpack must be labeled as required for each class of hazardous material contained therein.

(b) Consolidated packaging. When two or more packages containing compatible hazardous material (see 173.21 of this subchapter) are placed within the same outside container or overpack, the outside container or overpack must be labeled as required for each class of

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

hazardous material contained therein."

SITE REQUIREMENT SOURCE: 49CFR172 Section 405

"Authorized label modifications.

(a) For Classes 1, 2, 3, 4, 5, 6, and 8, text indicating a hazard (for example FLAMMABLE LIQUID) is not required on a primary or subsidiary label when:

(1) The label otherwise conforms to the provisions of this subpart, and

(2) The hazard class or, for Division 5.1 or 5.2 the division number, is displayed in the lower corner of the label, if the label corresponds to the primary hazard class of the hazardous material.

(b) For a package containing Oxygen, compressed, or Oxygen, refrigerated liquid, the OXIDIZER label specified in 172.426 of this subpart, modified to display the word "OXYGEN" instead of "OXIDIZER", and the class number "2" instead of "5.1", may be used in place of the NON-FLAMMABLE GAS and OXIDIZER labels. Notwithstanding the provisions of paragraph (a) of this section, the word "OXYGEN" must appear on the label."

SITE REQUIREMENT SOURCE: 49CFR172 Section 406

"Placement of labels.

(a) General.

(1) Except as provided in paragraphs (b) and (e) of this section, each label required by this subpart must:

(i) Be printed on or affixed to a surface (other than the bottom) of the package or containment device containing the hazardous material; and

(ii) Be located on the same surface of the package and near the proper shipping name marking, if the package dimensions are adequate.

(2) Except as provided in paragraph (e) of this section, duplicate labeling not required on a package or containment device (such as to satisfy redundant labeling requirements).

(b) Exceptions. A label may be printed on or placed on a securely affixed tag, or may be affixed by other suitable means to:

(1) A package that contains no radioactive material and which has dimensions less than those of the required label;

(2) A cylinder; and

(3) A package which has such an irregular surface that a label cannot be satisfactorily affixed.

(c) Placement of multiple labels. When primary and subsidiary hazard labels are required, they must be displayed next to each other. Placement conforms to this requirement if labels are

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

within 150 mm (6 inches) of one another.

(d) Contrast with background. Each label must be printed on or affixed to a background of contrasting color, or must have a dotted or solid line outer border.

(e) Duplicate labeling. Generally, only one of each different required label must be displayed on a package. However, duplicate labels must be displayed on at least two sides or two ends (other than the bottom) of:

(1) Each non-bulk package or overpack having a volume of 1.8 m³ (64 cubic feet) or more;

(2) Each non-bulk package containing a radioactive material;

(3) Each DOT 106 or 110 multi-unit tank car tank. Labels must be displayed on each end;

(4) Each portable tank of less than 3,785 L (1000 gallons) capacity; and

(5) Each freight container or aircraft unit load device having a volume of 1.8 m³ (64 cubic feet) or more, but less than 18 m³ (640 cubic feet). One of each required label must be displayed on or near the closure.

(f) Visibility. A label must be clearly visible and may not be obscured by markings or attachments."

SITE REQUIREMENT SOURCE: 49CFR172 Section 407

"Label specifications.

(a) Durability Each label, whether printed on or affixed to a package, must be durable and weather resistant. A label on a package must be able to withstand, without deterioration or a substantial change in color, a 30-day exposure to conditions incident to transportation that reasonably could be expected to be encountered by the labeled package.

(b) Design.

(1) Except for size and color, the printing, inner border, and symbol on each label must be as shown in 172.411 through 172.448 of this subpart, as appropriate.

(2) The dotted line border shown on each label is not part of the label specification, except when used as an alternative for the solid line outer border to meet the requirements of 172.406(d) of this subpart.

(c) Size.

(1) Each diamond (square-on-point) label prescribed in this subpart must be at least 100 mm (3.9 inches) on each side with each side having a solid line inner border 5.0 to 6.3 mm (0.2 to 0.25 inches) from the edge.

(2) The CARGO AIRCRAFT ONLY label must be a rectangle measuring at least 110 mm (4.3 inches) in height by 120 mm (4.7 inches) in width. The word "DANGER" must be shown in letters measuring at least 12.7 mm (0.5 inches) in height.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(3) Except as otherwise provided in this subpart, the hazard class number, or division number, as appropriate, must be at least 6.3 mm (0.25 inches) and not greater than 12.7 mm (0.5 inches).

(4) When text indicating a hazard is displayed on a label, the label name must be shown in letters measuring at least 7.6 mm (0.3 inches) in height except that:

(i) For a SPONTANEOUSLY COMBUSTIBLE or DANGEROUS WHEN WET label, respectively, the words "Spontaneously" and "When Wet" must be shown in letters measuring at least 5.1 mm (0.2 inches) in height.

(ii) For a KEEP AWAY FROM FOOD label, the word "HARMFUL" must be shown in letters measuring at least 7.6 mm (0.3 inches) in height.

(5) The symbol on each label must be proportionate in size to that shown in the appropriate section of this subpart.

(d) Color.

(1) The background color on each label must be as prescribed in 172.411 through 172.448 of this subpart, as appropriate.

(2) The symbol, text, numbers, and border must be shown in black on a label except that:

(i) White may be used on a label with a one color background of green, red or blue; and

(ii) White must be used for the text and class number for the CORROSIVE label.

(3) Black and any color on a label must be able to withstand, without substantial change, a 72-hour fadeometer test (for a description of equipment designed for this purpose, see ASTM G 23 69 (1975) or ASTM G 26 70).

(4) (i) A color on a label, upon visual examination, must fall within the color tolerances:

(A) Displayed on color charts conforming to the technical specifications for charts set forth in Table 1 or 2 in appendix A to this part; or

(B) For labels printed on packaging surfaces, specified in Table 3 in appendix A to this part.

(ii) Color charts conforming to appendix A to this part are on display in Room 8421, Nassif Building, 400 Seventh Street, SW., Washington DC 20590 0001.

(5) The specified label color must extend to the edge of the label in the area designated on each label except the CORROSIVE, RADIOACTIVE YELLOW II AND RADIOACTIVE YELLOW III labels on which the color must extend only to the inner border.

(e) Form identification. A label may contain form identification information, including the name of its maker, provided that information is printed outside the solid line inner border in no larger than 10-point type.

(f) Exceptions. A label conforming to specifications in the UN Recommendations may be used in place of a corresponding label which conforms to the requirements of this subpart."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

SITE REQUIREMENT SOURCE: 49CFR172 Section 436

"RADIOACTIVE WHITE-I label.

(a) Except for size and color, the RADIOACTIVE WHITE-I label must be as follows:

(b) In addition to complying with 172.407, the background on the RADIOACTIVE WHITE-I label must be white. The printing and symbol must be black, except for the "I" which must be red."

SITE REQUIREMENT SOURCE: 49CFR173 Section 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."

13.2.5.3

Placarding Requirements

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

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.6

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 Section 200

"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.

(b) This subpart does not apply to any material, other than a hazardous waste or a hazardous substance, that is:

(1) Identified by the letter "A" in Column 1 of the 172.101 Table, except when the material is offered or intended for transportation by air; or

(2) Identified by the letter "W" in Column 1 of the 172.101 Table, except when the material is offered or intended for transportation by water; or

(3) An ORM D, except when the material is offered or intended for transportation by air."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

SITE REQUIREMENT SOURCE: 49CFR172 Section 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 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 Section 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;

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

- (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)"

SITE REQUIREMENT SOURCE: 49CFR172 Section 203

"Additional description requirements.

- (a) Exemptions. Each shipping paper issued in connection with a shipment made under an exemption must bear the notation "DOT E" followed by the exemption number assigned and so located that the notation is clearly associated with the description to which the exemption applies.
- (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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

"Ltd Qty" following the basic description.

(c) Hazardous substances.

(1) Except for radioactive materials described in accordance with paragraph (d) of this section, if the proper shipping name for a material that is a hazardous substance does not identify the hazardous substance by name, one of the following descriptions shall be entered, in parentheses, in association with the basic description:

(i) The name of the hazardous substance as shown in the appendix to 172.101; or

(ii) For waste streams, the waste stream number; or

(iii) For wastes which exhibit an EPA characteristic of ignitability, corrosivity, reactivity, or Toxicity, the letters "EPA" followed by the word "ignitability", or "corrosivity", or "reactivity", or "Toxicity", as appropriate or the corresponding "D" number, as appropriate.

(2) The letters "RQ" shall be entered on the shipping paper either before or after, the basic description required by 172.202 for each hazardous substance (see definition in 171.8 of this subchapter). For example: "RQ, Allyl alcohol, 6.1, UN 1098, I"; or "Environmentally hazardous substance, solid, n.o.s., 9, UN 3077, III, RQ (Adipic acid)".

(d) 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(l) 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.

(7) For a shipment of fissile radioactive materials:

(i) The words "Fissile Exempt," if the package is exempt pursuant to 173.453 of this subchapter, or

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(ii) If not exempt, the fissile class of each package in the shipment, pursuant to 173.455 of this subchapter; and

(iii) For a Fissile Class III shipment, the additional notation: "Warning_Fissile Class III Shipment. Do not Load More Than * * * Packages per Vehicle." (Asterisks to be replaced by appropriate number.) "In loading and Storage Areas, Keep at Least 20 Feet (6 Meters) from Other Packages Bearing Radioactive Labels."

(iv) If a Fissile Class III shipment is to be transported by water, the supplementary notation must also include the following statement: "For shipment by water, only one Fissile Class III shipment is permitted in each hold."

(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.)

(9) For an export shipment or a shipment in a foreign made package, a notation of the package identification marking as prescribed in the applicable International Atomic Energy Agency (IAEA) Certificate of Competent Authority which has been issued for the package. (See 173.473 of the subchapter.)

(e) Empty packagings.

(1) The description on the shipping paper for a packaging containing the residue of a hazardous material may include the words "RESIDUE: Last Contained * * *" in association with the basic description of the hazardous material last contained in the packaging.

(2) For a tank car containing the residue (as defined in 171.8) of a hazardous material, the requirements of 174.25(c) and paragraph (e)(3) of this section apply.

(3) If a packaging, including a tank car, contains a residue that is a hazardous substance, the description on the shipping papers must be prefaced with the phrase "RESIDUE: Last Contained * * *" and the letters "RQ" must be entered on the shipping paper either before or after the basic description.

(f) Transportation by air. When a package containing a hazardous material is offered for transportation by air and this subchapter prohibits its transportation aboard passenger-carrying aircraft, the words "Cargo aircraft only" must be entered after the basic description.

(g) Transportation by rail.

(1) The shipping paper for a rail car containing a hazardous material must contain the notation "Placarded" followed by the name of the placard required for the rail car.

(2) The shipping paper for each Class DOT 113 tank car containing a flammable gas must contain an appropriate notation, such as "DOT 113A," and the statement "Do Not Hump or Cut Off Car While in Motion."

(3) When shipments of elevated temperature materials are transported under the exception permitted in 173.247(d) of this subchapter, the shipping paper must contain an appropriate notation, such as "Maximum Operating Speed 15 mph."

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(h) Transportation by highway. Following the basic description for a hazardous material in a Specification MC 330 or MC 331 cargo tank, there must be entered for:

(1) Anhydrous ammonia.

(i) The words "0.2 PERCENT WATER" to indicate the suitability for shipping anhydrous ammonia in a cargo tank made of quenched and tempered steel as authorized by 173.315(a), Note 14 of this subchapter, or

(ii) The words "NOT FOR Q and T TANKS" when the anhydrous ammonia does not contain 0.2 percent or more water by weight.

(2) Liquefied petroleum gas.

(i) The word "NONCORROSIVE" or "NONCOR" to indicate the suitability for shipping "Noncorrosive" liquefied petroleum gas in a cargo tank made of quenched and tempered steel as authorized by 173.315(a), Note 15 to this subchapter, or

(ii) The words "NOT FOR Q and T TANKS" for grades of liquefied petroleum gas other than "Noncorrosive".

(i) Transportation by water. Each shipment by water must have the following additional shipping paper entries:

(1) Identification of the type of packagings such as barrels, drums, cylinders, and boxes.

(2) The number of each type of package including those in a freight container or on a pallet.

(3) The gross mass of each type of package or the individual gross mass of each package.

(j) Dangerous when wet material. The words "Dangerous when wet" shall be entered on the shipping paper in association with the basic description for a material which meets the definition of a dangerous when wet material in 173.124(c) of this subchapter.

(k) 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 "Corrosive liquid, n.o.s., 8, UN 1760, II (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, <52%)"

(1) In addition to the n.o.s. descriptions listed 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 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)".

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(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)".

(3) Proper shipping names for which the provisions of this paragraph apply are as follows:

Alcohols, toxic, n.o.s.
Articles, explosive, n.o.s.
Caustic alkali liquids, n.o.s.
Combustible liquid, n.o.s.
Compounds, cleaning liquid, corrosive
Compounds, cleaning liquid, flammable
Compounds, tree or weed killing, liquid, corrosive
Compounds, tree or weed killing, liquid, flammable
Compounds, tree or weed killing, liquid, poisonous
Components, explosive train, n.o.s.
Compressed or Liquefied gases, n.o.s.
Compressed or Liquefied gases, flammable, n.o.s.
Compressed or Liquefied gases, flammable, toxic, n.o.s.
Compressed or Liquefied gases, toxic, n.o.s.
Contrivances, water-activated
Corrosive liquids, flammable, n.o.s.
Corrosive liquids, n.o.s.
Corrosive liquids, oxidizing, n.o.s.
Corrosive liquids, poisonous, n.o.s.
Corrosive liquids, which in contact with water emit flammable gases, n.o.s.
Corrosive solids, flammable, n.o.s.
Corrosive solids, n.o.s.
Corrosive solids, oxidizing, n.o.s.
Corrosive solids, poisonous, n.o.s.
Corrosive solids, self heating, n.o.s.
Corrosive solids, which in contact with water emit flammable gases, n.o.s.
Disinfectants, corrosive, liquid, n.o.s.
Disinfectants, liquid, n.o.s.
Disinfectants, solids, n.o.s.
Dispersant gas, n.o.s.
Dyes, liquid, n.o.s. or Dye intermediates, liquid, n.o.s.
Dyes, solid, n.o.s. or Dye intermediates, solid, n.o.s.
Environmentally hazardous substances, liquid, n.o.s.
Environmentally hazardous substances, solid, n.o.s.
Flammable liquids, corrosive, n.o.s.
Flammable liquids, n.o.s.
Flammable liquids, poisonous, n.o.s.
Flammable solids, corrosive, n.o.s.
Flammable solids, n.o.s.
Flammable solids, poisonous, n.o.s.
Halogenated irritating liquids, n.o.s.
Hazardous waste, liquid, n.o.s.
Hazardous waste, solid, n.o.s.
Infectious substances, affecting animals

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

Infectious substances, affecting humans
Insecticide gases, flammable, n.o.s.
Insecticide gases, n.o.s.
Insecticide gases, toxic, n.o.s.
Medicines, n.o.s.
Metal powders, flammable, n.o.s.
Organic peroxide type B, liquid
Organic peroxide type B, liquid, temperature controlled
Organic peroxide type B, solid
Organic peroxide type B, solid, temperature controlled
Organic peroxide type C, liquid
Organic peroxide type C, liquid, temperature controlled
Organic peroxide type C, solid
Organic peroxide type C, solid, temperature controlled
Organic peroxide type D, liquid
Organic peroxide type D, liquid, temperature controlled
Organic peroxide type D, solid
Organic peroxide type D, solid, temperature controlled
Organic peroxide type E, liquid
Organic peroxide type E, liquid, temperature controlled
Organic peroxide type E, solid
Organic peroxide type E, solid, temperature controlled
Organic peroxide type F, liquid
Organic peroxide type F, liquid, temperature controlled
Organic peroxide type F, solid
Organic peroxide type F, solid, temperature controlled
Other regulated substances, liquid, n.o.s.
Other regulated substances, solid, n.o.s.
Oxidizing substances, liquid, corrosive, n.o.s.
Oxidizing substances, liquid, n.o.s.
Oxidizing substances, liquid, poisonous, n.o.s.
Oxidizing substances, solid, corrosive, n.o.s.
Oxidizing substances, solid, n.o.s.
Oxidizing substances, solid, poisonous, n.o.s.
Pesticides, liquid, flammable, toxic, n.o.s.
Pesticides, liquid, toxic, flammable, n.o.s.
Pesticides, liquid, toxic, n.o.s.
Pesticides, solid, toxic, n.o.s.
Poisonous liquids, corrosive, n.o.s.
Poisonous liquids, flammable, n.o.s.
Poisonous liquids, n.o.s.
Poisonous liquids, oxidizing, n.o.s.
Poisonous liquids, which in contact with water emit flammable gases, n.o.s.
Poisonous solids, corrosive, n.o.s.
Poisonous solids, flammable, n.o.s.
Poisonous solids, n.o.s.
Poisonous solids, oxidizing, n.o.s.
Poisonous solids, self-heating, n.o.s.
Poisonous solids, which in contact with water emit flammable gases, n.o.s.
Pyrophoric liquids, n.o.s.
Pyrophoric solids, n.o.s.
Pyrophoric metals, n.o.s. or Pyrophoric alloys, n.o.s.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

Refrigerant gas, n.o.s.
Refrigerant gases, n.o.s.
Rodenticides, n.o.s.
Samples, explosive (other than initiating explosives)
Self-heating substances, solid, corrosive, n.o.s.
Self-heating substances, solid, n.o.s.
Self-heating substances, solid, poisonous, n.o.s.
Self-reactive substances, Sample, n.o.s.
Self-reactive substances, Trial quantities, n.o.s.
Substances, explosive, n.o.s.
Substances, explosive, very insensitive (substances, EVI) n.o.s.
Substances, which in contact with water emit flammable gases, liquid, corrosive, n.o.s.
Substances, which in contact with water emit flammable gases, liquid, n.o.s.
Substances, which in contact with water emit flammable gases, liquid, poisonous, n.o.s.
Substances, which in contact with water emit flammable gases, solid, corrosive, n.o.s.
Substances, which in contact with water emit flammable gases, solid, n.o.s.
Substances, which in contact with water emit flammable gases, solid, oxidizing, n.o.s.
Substances, which in contact with water emit flammable gases, solid, poisonous, n.o.s.
Substances, which in contact with water emit flammable gases, solid, self-heating, n.o.s.
Substances, which in contact with water emit flammable gases, solid, flammable n.o.s.
Tear gas substances, n.o.s. liquid or solid

(4) The provisions of this paragraph do not apply:

- (i) To a material that is a hazardous waste and described using the proper shipping name "Hazardous waste, liquid or solid, n.o.s.", classed as a miscellaneous Class 9, provided the EPA hazardous waste number is included on the shipping paper in association with the basic description, or provided the material is described in accordance with the provisions of 172.203(c) of this part.
- (ii) To a material for which the hazard class is to be determined by testing under the criteria in 172.101(c)(11).
- (iii) If the n.o.s. description for the material (other than a mixture of hazardous materials of different classes meeting the definitions of more than one hazard class) contains the name of the chemical element or group which is primarily responsible for the material being included in the hazard class indicated. For example "Mercury compounds, solid, n.o.s., 6.1, UN 2025, II".
- (iv) If the n.o.s. description for the material (which is a mixture of hazardous materials of different classes meeting the definition of more than one hazard class) contains the name of the chemical element or group responsible for the material meeting the definition of one of these classes. In such cases, only the technical name of the component that is not appropriately identified in the n.o.s. description shall be entered in parentheses. For example: "Carbamate pesticides, liquid, flammable, toxic, n.o.s., flash point less than 23C (contains Xylene) 3, 6.1, UN 2758, II".

(l) [Reserved]

(m) Poisonous materials. Notwithstanding the hazard class to which a material is assigned:

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(1) If a liquid or solid material in a package meets the definition of a Division 6.1, Packing Group I or II, according to this subchapter, and the fact that it is a poison is not disclosed in the shipping name or class entry, the word "Poison" shall be entered on the shipping paper in association with the shipping description.

(2) If the technical name of the compound or principal constituent that causes a material to meet the definition of Division 6.1, Packing Group I or II (as defined in 173.132(a) of this subchapter), or Division 2.3 (as defined in 173.115(c) of this subchapter), is not included in the proper shipping name for the material, the technical name shall be entered on the shipping paper in the manner prescribed in paragraph (k) of this section.

(3) For materials which are poisonous by inhalation (see 171.8 of this subchapter), the words "Poison-Inhalation Hazard" and the words "Zone A", "Zone B", "Zone C", or "Zone D", for gases or "Zone A" or "Zone B" for liquids, as appropriate, shall be entered on the shipping paper immediately following the shipping description. The word "Poison" need not be repeated if it otherwise appears in the shipping description.

(n) Elevated temperature materials. Except for molten sulfur or molten aluminum, if a liquid material in a package meets the definition of an elevated temperature material in 171.8 of this subchapter, and the fact that it is an elevated temperature material is not disclosed in the shipping name, the word "HOT" must immediately precede the proper shipping name of the material on the shipping paper. (49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53; app. A to part 1)"

13.2.6.1

Manifest

The information required on the shipment manifest are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.6.2

Emergency Notifications

The emergency notification information required for a shipment of radioactive material are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.6.3

Paperwork Storage Location While in Transit

The locations that radioactive shipment paperwork is to reside in while in transit are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.7

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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.7.1

State Routing Requirements/Notifications

The state routing/notifications that are required for a shipment of a radioactive material are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.7.2

Consignee Notifications

The consignee notifications that are required for a shipment of a radioactive material are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.8

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: 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."

13.2.9

Receipt Inspection

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

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.9.1

Radiation/Contamination Surveys

The necessary receipt radiation/contamination surveys are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.9.2

Shipment Inspection (Bracing/General Condition of Shipment)

The overall inspection of the condition of the load and the load bracing associated with the receipt of a shipment of radioactive material is discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.2.9.3

Notification of Acceptance/Refusal of Shipment

The notification of the acceptance or refusal of a shipment of radioactive material is discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.9.4

Opening of Containers, as appropriate

The procedures for the opening of containers, as appropriate, are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.11

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.12

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.13

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.

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,

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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."

13.2.14

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.14.1

General

General requirements associated with the identification, establishment and implementation of security controls are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.14.2

Internal Transfers

Internal transfers as they relate to the identification, establishment and implementation of security controls are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.14.3

External Transfers

External transfers as they relate to the identification, establishment and implementation of security controls are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.2.15

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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:

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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 Off-Site 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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3.1

Type A Package Tests

The requirements associated with the tests for Type A packages are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3.2

Type B Package Tests

The requirements associated with the tests for Type B packages are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.3.3.3

Fissile Package Tests

The requirements associated with the tests for fissile packages are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3.4

NRC Certified Packaging Tests

The requirements associated with the tests for NRC Certified Packaging are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3.5

Foreign Manufactured Packages Tests

The requirements associated with the tests for foreign manufactured packages are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3.6

Package Recertification

Package recertifications are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3.7

QA/QC Requirements

The Quality Assurance (QA)/Quality Control (QC) requirements associated with the design, fabrication, assembly of offsite shipping containers are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.3.8

Certification Application

The application for package certification is discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.4

Tests for Special Form Material

Tests for special form material are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.5

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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

attempts to interdict or sabotage shipping vehicles.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.5.1

Exclusive Use Shipment

The physical security aspects associated with an exclusive use shipment are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.5.2

Sealing of Shipment

The physical security aspects associated with the sealing of a load are discussed within this section.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.3.6

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).

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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 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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.4.2

Safety Analysis

Onsite transportation of some high-hazards materials may require that a safety basis be

REQUIREMENTS IDENTIFICATION DOCUMENT

HIGH LEVEL WASTE STORAGE TANK FARMS

Packaging and Transportation

Revision 0

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

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.

- No requirements in this sub-element have been identified as applicable to the Tank Farms.

13.5

KEY PROGRAM INTERFACES

The key program interfaces for the Packaging and Transportation department are delineated within this section of the 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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

SITE REQUIREMENT SOURCE: 49CFR172 Section 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 Section 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 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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

(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.

(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

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REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

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.

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.

13.5.4

Emergency Planning and 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.

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 Packaging and Transportation personnel interface with the Safety and Health organization on a daily basis. The use of forklift, cranes, chemicals, etc. require the use the site/plant industrial safety and industrial hygiene programs.

13.5.7

QA

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 in the manufacture and use of different packages.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

13.5.8

Waste Management

Waste Management personnel are responsible for assuring that the materials to be shipped are packaged correctly. In addition, Waste Management personnel assure that any disposal criteria are met by the packages and their contents. The Packaging and Transportation personnel are responsible for verifying the transportation shipping requirements of radioactive materials that are shipped.

13.5.9

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: DOE5000.3B 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 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.

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

- (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.
 - (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

REQUIREMENTS IDENTIFICATION DOCUMENT
HIGH LEVEL WASTE STORAGE TANK FARMS
Packaging and Transportation
Revision 0

- (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.
- (d) Any transportation event involving Departmental property resulting in vehicular/aircraft damage of more than \$5000 or, for insurance purposes, considered a total loss.

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