

SALT WASTE PROCESSING FACILITY

FIRE PROTECTION PROGRAM PLAN

Contract No. DE-AC09-02SR22210

Function: Commissioning and Operations Requirements
Doc. No.: F-PP-J-00001
Revision: 4
Date: 09/17/2019

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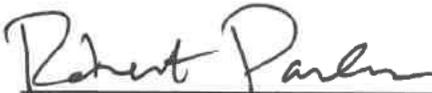
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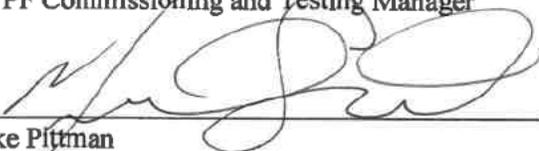
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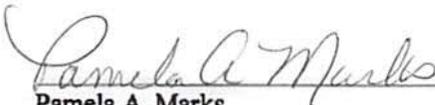
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SUMMARY OF CHANGES

Revision No.	Date	Description of Change
0	07/09/10	Initial Issuance.
1	05/22/15	Revise per DMR-3073. This is a complete rewrite. Revision bars will not be shown.
2	10/06/2016	Revise per DMR-3374. Update to include Testing and Commissioning activities.
3	2/26/2018	Revised per DMR-4070 to address changes associated with SWPF Condition Reports and align this plan with recent changes to the Fire Protection Project Procedures.
4	09/17/2019	Revised per DMR-4962 to incorporate CR items from assessments completed by DOE and Jensen-Hughes independent Fire Protection Company and to align the FP Engineering procedures. Complete Re-write, No Change bars Shown.

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Appendix A, Terms and Definitions

LIST OF ACRONYMS AND ABBREVIATIONS

°F	Degrees Fahrenheit
°C	Degrees Celsius
AEC	Area Emergency Coordinator
BNA	Baseline Needs Assessment
CR	Control Room
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
ERO	Emergency Response Organization
FHA	Fire Hazards Analysis
FPC	Fire Protection Coordinator
HEPA	High-Efficiency Particulate Air
HVAC	Heating, Ventilation, and Air Conditioning
ICD	Interface Control Document
kV	Kilovolt
PCAR	Programmatic Compliance Assessment Report
RLW	Radioactive Liquid Waste
NFPA	National Fire Protection Association
SRS	Savannah River Site
SRSFD	Savannah River Site Fire Department
SRSOC	Savannah River Site Operations Center
SWPF	Salt Waste Processing Facility
TSR	Technical Safety Requirement

1.0 INTRODUCTION

This Introduction will provide a brief summary of the Project site, Project facility, Project process, and the facility hazard category. These details will affect the nature and extent of the Fire Protection Program as such programs are most effective when tailored to the location, facilities, and operations in which they are carried out.

1.1 Site Description

The Salt Waste Processing Facility (SWPF) is located within the boundaries of Savannah River Site (SRS), which is approximately 310 square miles in size and is 22 miles south of Aiken, South Carolina. The SWPF plot is designated as J-Area per the SRS area naming convention and it has an area of approximately 11 acres. J-Area is adjacent to 200 S-Area, near the center of SRS. The shortest distance from the SWPF to the SRS boundary is approximately 7 miles to the north. SRS is owned by the U.S. Government for the research and development of nuclear materials for national defense and other missions. The U.S. Department of Energy (DOE) and its contractors are responsible for the operation of SRS. The electrical grid on SRS operates at 115 kilovolts (kV) and draws power from two transmission lines from the local public utility.

1.2 Facility Description

The SWPF main processing area is the Process Building (221-J), which has a reinforced concrete core of process cells that house equipment to treat radioactive liquid waste (RLW). The reinforced concrete core of the Process Building is surrounded by process support areas enclosed by steel framing, siding, and insulated roofing. The Facility has three floors, with the first floor containing the Process pumps and tanks, Control Room (CR), and support facilities. The second floor contains chemical separation equipment called contactors and intake and exhaust High-Efficiency Particulate Air (HEPA) filters. The third floor contains the Analytical Laboratory, Hot Cell, and Process Exhaust HEPA filters.

There are several ancillary facilities that support this operation. The primary ancillary facilities include, the Administration Building (704-J) and Next Generation Solvent (221-6J) which are east of the Process Building. The Compressor Building (221-4J) is west of the Process Building and the Warehouse (763-S) is one quarter mile north of the Process Building. There are various additional equipment pads around the Process Building which include chiller packages, transformers, and diesel generator. Across the roadway of the Process Building are a community of office trailers. In addition, there are Connex boxes (i.e., shipping containers) located throughout the SWPF Project area.

1.3 Process Description

Nuclear material production operations at the SRS resulted in the generation of RLW that is stored in Tank Farms nearby (i.e., F-Area and H-Area). Over 150 million gallons of RLW has been received into the underground waste storage tanks. The waste volume has been reduced using evaporators, resulting in the precipitation of salt solids.

Water will be added to dissolve the saltcake that has been segregated for vitrification. This waste stream is processed in SWPF and divided into two waste streams, one of high radiological activity

sent to the Defense Waste Processing Facility, and one with a low radiological activity sent to the Saltstone Facility in Z-Area. Based on the SWPF design throughput, and the volume of waste to process, the SWPF should be in operation for more than fifteen years.

1.4 Facility Hazard Category

The SWPF is a Hazard Category 2 Nuclear Facility, based on the criteria specified in DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*¹. The SWPF is not a Hazard Category 1 facility because the radioactive isotopic inventories are not sufficient to produce significant offsite consequences.

2.0 PURPOSE AND POLICY

The Purpose, Policy, and Management Support sections are provided here to explain the basis of the Program. The policy demonstrates management's interest in the SWPF Fire Protection Program and how it implements management expectations for facility operations.

2.1 Purpose

This Plan documents the elements, functions, and operations of the Fire Protection Program for the SWPF. The management and responsibilities of the various individuals in the Fire Protection Program will also be defined along with the organization and structure of the program. This Plan will demonstrate how the Fire Protection policy is implemented. This plan will also show how the SWPF Fire Protection Program (here in after referred to as the Fire Protection Program) addresses the Fire Protection related requirements of S-TSR-J-00001, *SWPF Technical Safety Requirements*².

The Plan is a high level document whose intent is to provide an overview of the Fire Protection Program. References to other documents, where further details on a topic can be obtained, are provided as necessary. Selected topics such as SRS Fire Department (SRSFD) may include more detail as there are no other SWPF documents that address this issue. This Plan is based on the requirements of DOE O 420.1B, *Facility Safety*³, and DOE O 420.1C, *Facility Safety*⁴, regarding the provision of a systematic and well defined Fire Protection Program that meets the DOE fire and life safety objectives.

2.2 Fire Protection Policy

Parsons, the SWPF Contractor, is committed to the prevention and mitigation of fire and fire-related losses, and providing personnel associated with the SWPF with a fire-safe working environment.

The SWPF Contractor will establish and maintain adequate Fire Protection at SWPF to ensure best protection in class (also known as Highly Protected Risk), and comply with applicable requirements including DOE O 420.1B³ and DOE O 420.1C, Chg.1⁴. The SWPF Contractor's implemented Fire Protection Program is designed to ensure a comprehensive Fire Protection that adequately supports emergency response for SWPF.

The goals of the Fire Protection Program are to minimize the effects and potential for the occurrence of a fire; establish requirements that will provide an acceptable degree of life safety to DOE and contract personnel; and minimize hazards to the public from fire and its effects in DOE facilities.

Fire Protection will be maintained sufficient to attain the following overarching objectives (as discussed further in this plan):

- Contain the fire to prevent on-site release of radiological and other hazardous material that may threaten the health and safety of the worker, public or the environment;
- Minimize damage to process control and safety systems from fire or related perils;
- Minimize the potential of unacceptable delays to DOE programs as a result of fire and its effects; and
- At a minimum keep property damage from fire and related perils from exceeding acceptable limits with the intention of having no injuries from the effects of a fire.

2.3 Management Support

SWPF Management is committed to the Fire Protection Program and the various implementing documents. This commitment includes providing funding to carry out the requirements of the program and management involvement in expediting the resolution of outstanding issues and deficiencies. The funding for the Fire Protection Program includes allocations for adequate staffing, facilities, resources and training. This funding is generally not a unique budget item but is built in to the budgets of the appropriate organizations.

This Plan affirms and implements the commitment of the SWPF Contractor Management to provide a comprehensive Fire Protection Program that adequately supports emergency response that meets the requirements of DOE O 420.1B³ and DOE O 420.1C Chg.1⁴, and other related DOE directives and applicable requirements.

3.0 PROGRAM SCOPE

The Program Scope is a reference to not just the activities that it performs, but also to the facilities, systems, and personnel that will be covered by the Program. This delineation of the Program boundaries clarifies the extent to which the requirements and responsibilities will be implemented.

3.1 Facilities

This Plan applies to facilities and property associated with the SWPF at SRS as identified in PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵. The facilities will include buildings, trailers, and temporary structures (e.g., containers, tent structure, canopies). Although this Plan applies to all facilities in general, there are certain elements of the Plan that apply to only specific facilities or areas as indicated in the above procedure. Examples of these facility specific elements include certain assessments, field inspections, and hazard controls. In addition, some facilities, such as vacant storage units (i.e., Connex boxes), may have requirements imposed on

them when they are used for Hot Work. Also, it should be understood that even outside areas and equipment may be subject to the requirements of the program.

3.2 Systems

This Plan applies to fire and life safety related equipment and systems that are under the control of the SWPF organizations. Production related equipment and materials that may pose fire hazards are also covered by this Plan in general as indicated in the implementing procedures. Equipment and systems that support the fire and life safety systems but are not under the control of SWPF are managed by cooperative agreements with other entities at SRS. These cooperative agreements include the provision of utilities and emergency response capabilities.

3.3 Personnel

The provisions of this plan apply to personnel associated with the SWPF project. Subcontractors working on site are also required to adhere to the portions of the Fire Protection Program that applies to their activity. This may necessitate the provision of instructions to the subcontractor on the appropriate process and procedures.

4.0 PROGRAM REQUIREMENTS

The requirements that govern the Fire Protection Program may be categorized into several groups which include applicable Federal Regulations, DOE Orders, National Fire Protection Association (NFPA) Codes and Standards, and selected Project Documents. Since the Project involves a lengthy list of applicable NFPA Codes and Standards, they are listed separately in PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵, Appendix A. The primary list of these governing documents with minor explanatory notes are provided below. At the end of the below list is a section on the flow-down documents that identify the means by which the various Project requirements are implemented.

4.1 Federal Regulations

The Federal Regulations that are most applicable to Fire Protection Program Plan are those associated with facilities handling nuclear materials as listed below:

- 10 CFR 830, *Nuclear Safety Management*⁶
- 10 CFR 851, *Worker Safety and Health Program*⁷

The Federal Regulations that are for general industry and therefore are applicable to the project as well and are as listed below:

- 29 CFR 1910, *Occupational Safety and Health Standards*, Subpart E and L⁸
 - 29 CFR 1926, *Safety and Health Regulations for Construction*, Subpart F⁹
-

4.2 Department of Energy Orders

The DOE Orders/Standards that are most applicable to Fire Protection Program Plan are those which make direct reference to Fire Protection Program and are listed below. The Design and Construction of SWPF were based on the applicable requirements in DOE O 420.1B, *Facility Safety*¹⁰. Plant Operations is currently using DOE O 420.1C Chg.1⁴, except for those items specifically omitted from the contract.

- DOE O 420.1B, *Facility Safety*¹⁰ (for design)
- DOE O 420.1C Chg.1 *Facility Safety*⁴ (for Operations)
- DOE-STD-1066-99, *Fire Protection Design Criteria*¹¹
- DOE O 151.1C, *Comprehensive Emergency Management System*¹²
- DOE O 450.2, *Integrated Safety Management*¹³
- DOE P 450.4A, *Integrated Safety Management System Policy*¹⁴

The DOE Orders/Standards that are of general application to functional areas of an operating facility are as listed below:

- DOE O 225.1B, *Accident Investigations*¹⁵
- DOE 414.1C, *Quality Assurance*¹⁶
- DOE O 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities*¹⁷
- DOE O 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*¹⁸
- DOE O 231.1B, Admin Chg. 1, *Environment, Safety and Health Reporting*¹⁹
- DOE-STD-1073-2003, *Configuration Management*²⁰
- DOE O 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*²¹
- DOE-STD-3006, *Planning and Conduct of Operational Readiness Reviews*²²

4.3 Federal Procurement

4.3.1 Prime Contract

The original contract for the SWPF Project dates back to 2002 and was designed to accommodate changes that the Department of Energy may desire during the development of the site and facility design phases. In addition there are often changes desired during the construction phase based on insights gained during the process. The primary contract title and number is listed below.

- DE-AC09-02SR22210, *Design, Construction, and Commissioning of a Salt Waste Processing Facility (SWPF)*, 9-17-02²³.
-

4.3.2 Contract Modifications

Numerous modifications have been made to the prime contract for various reasons and some of them have affected the Fire Protection Program. The most significant modifications that affected the Fire Protection Program and relevant correspondence on these items are provided below:

- Contract DE-AC09-02SR22210²³ Modification #139 dated 9-11-15
- 00-700-24032, *DOE Order 420.1B/C Chg. 1 Composite Requirements*, Attachment A: Composite Requirements²⁴
- 00-700-23378, *Response to OAM-15-006, Implement DOE O 420.1C*, Attachment A, Programmatic DOE O 420.1C Requirements to be Invoked in CLIN 0006 and CLIN 0007²⁵

Modification #139 to the primary Contract (DE-AC09-02SR22210²³) amended the original Contract to have the Fire Protection Program incorporate DOE O 420.1C Chg.1⁴, as described in the Correspondence Number 00-700-23378²⁵. Additional contract changes that significantly affect this Program Plan will be added to the above list.

4.3.3 Partnering Agreement

In addition to the contract, a partnering agreement was made between the Department of Energy and the SWPF Contractor to further clarify the expectations and obligations of each party in the prime contract. This document was signed by the project management of the Department of Energy and the SWPF Contractor and it is referenced in V-PMP-J-00004, *SWPF Project Management Plan*²⁶.

4.4 Industry Codes and Standards

The industry codes and standards include the building codes of record as well as the applicable Codes and Standards of the NFPA. The NFPA Codes and Standards that apply to this project comprise a lengthy list of documents of which only a handful are actively in use for the present operations of the facility. This comprehensive list is provided in the Attachments of the PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵. In Section 6.2, additional information is also provided on the Codes of Record for the facility design and the primary Codes that will be applied to the operations of the facility.

4.5 Project Requirements

The Project Documents consist of the management, technical and operational documents that define the primary obligations and commitments of the project team. In addition, the primary hazard assessment documents and general operational documents that affect the requirements for the Fire Protection Program are also included. The documents for these three categories of requirements are provided below.

4.5.1 Management

The Project Management Documents describes the means and methods to be employed in the execution of the contract. It also covers all the major aspects of project management from the initiation to the completion is listed below.

- V-PMP-J-00004²⁶

4.5.2 Technical

The Nuclear Safety Base documents are prepared to identify significant risks to the facility and indicate the corresponding mitigative actions to reduce risk. The primary set of these safety basis documents are listed below.

- S-SAR-J-00002, *SWPF Documented Safety Analysis*²⁷
- S-TSR-J-00001, *SWPF Technical Safety Requirements*²

The Fire Hazards Analysis (FHA) documents are prepared to identify significant fire and life safety related risks to the facility and also indicate the corresponding mitigative actions to reduce risk. Where appropriate, the affected FHA documents will address the mitigative actions that the Safety Basis documents require of the Fire Protection Program. In addition, the Fire Protection Program will identify the specific implementation of these requirements.

- F-FHA-J-00001, *SWPF Project Fire Hazards Analysis*²⁸
- F-FHA-J-00002, *SWPF J-Area Warehouse Fire Hazards Analysis (Building 763-S)*²⁹

4.5.3 Operational

There are numerous operational documents for the facility. The primary operational documents that directly affect the Fire Protection Program through requirements relating to program system management, maintenance, and procedures. These primary operational documents are listed below.

- V-ESR-J-00025, *SWPF Project Interface Management Plan*³⁰
- P-ESR-J-00011, *SWPF Operations Requirements Document*³¹
- P-CMP-J-00001, *SWPF Conduct of Operations Manual*³²
- P-EIP-J-00001, *SWPF Integrated Safety Management System Description*³³

4.6 Requirements Flow Down

4.6.1 Requirements Identification

The SWPF method for flow-down of the requirements into the program is described in:

- S-RCP-J-00001, *SWPF Standards/Requirements Identification Document*³⁴
 - S-RCP-J-00002, *Standards/Requirements Identification Document Compliance Plan*³⁵
-

4.6.2 Requirements Compliance

The standard/requirements for the Fire Protection Program are detailed in the Programmatic Compliance Assessment Report (PCAR). These reports document the means of compliance with the Department of Energy primary requirements for the Fire Protection Program and are listed below:

- PCAR-FP-001, *DOE Order 420.1B Chapter II, Facility Safety- Fire*³⁶
- PCAR-FP-002, *DOE-STD-1088-95, Fire Protection for Relocatable Structures*³⁷
- PCAR-FP-003, *DOE O 420.1C, Chapter II, DOE O 420.1C Chg.1, Chapter II Fire Protection*³⁸

5.0 PROGRAM MANAGEMENT

The Fire Protection Program management is based on the Organizational Structure of the SWPF and the operational needs of the facility. This section describes the main elements of the SWPF organizational structure and specifically those elements that are responsible for the Program. The members of the Fire Protection Program staff are also described along with their responsibilities.

5.1 Organizational Structure

The SWPF has the five following organizations established to manage the Facility Operations:

- Engineering: Provides technical support for the design, maintenance, and operation of the facility, its equipment, and associated programs
- Plant Operations: Performs the production, work control, and maintenance activities which include Testing and Commissioning
- Program Development and Integration: Provides support services that include Environmental, Safety, and Health, Document Control, and procedure maintenance
- Business Operations: Performs Project Controls, Procurement, and Information Technology
- Quality Assurance: Oversees the quality controls on maintenance, equipment, and materials

A detailed description of the SWPF organizational structure is provided in V-IM-J-00001, *SWPF Organization, Roles, and Responsibilities Manual*³⁹.

5.2 Program Structure

The Fire Protection Program Plan is managed primarily by the following four departments that are in the Engineering and Plant Operations Organization:

5.2.1 Engineering

- Cognizant System Engineer: Provides the Fire Detection/Fire Suppression Cognizant System Engineer for the Fire Protection Program.
-

- Design Engineering: Provides Fire Protection Program Manager in addition to design and Engineering support to Fire Detection/Fire Suppression Cognizant System Engineer

5.2.2 Plant Operations

- Operations Integration: Provides the Fire Protection Lead and Fire Protection Coordinator(s) (FPCs) who support the operational needs and performs the program activities. Also provides the Chemical Coordinator for Management of chemical inventory.
- Maintenance: Provides the fire and life safety systems maintenance personnel and subcontractors, as necessary.

5.3 Program Staffing

The Fire Protection Program staff is not necessarily a single group of individuals in one department. Instead, it is the collection of individuals whose primary function is to carry out the duties of the Fire Protection Program. The members of the Program are provided by selected positions in the Management, Engineering, Plant Operations, Operations, and Maintenance organizations.

5.3.1 Core Staff

The Core Staff positions include the following:

- Fire Protection Program Manager
- Fire Protection Lead
- Fire Detection/Fire Suppression Cognizant System Engineer
- Fire Protection Engineer
- FPCs

The technical staff is the portion of the core staff that includes Fire Protection Lead, Fire Detection/Fire Suppression Cognizant System Engineer and the Fire Protection Engineer. These individuals oversee the technical aspects of the Fire Protection Program.

Additional information on the qualifications of the various positions related to the Fire Protection Program are detailed in PL-TR-1817, *SWPF Fire Protection Training Program Description*⁴⁰.

5.3.2 Support Staff

Support Staff positions of the Fire Protection Program are those support positions that are not full time responsibilities and may not be the primary duty of the individual. These positions may even be performed on a contract basis and therefore are inherently limited part of the program and include the following:

- Fire Suppression System Technician
 - Fire Alarm System Technician
 - Electrical Maintenance Technician
-

- Mechanical Maintenance Technician
- Fire Watch/Fire Patrol
- Plant Operator (fire extinguisher, exit signs)
- Chemical Coordinator

Additional information on the qualifications of the various positions related to the Fire Protection Program are detailed in PL-TR-1817, *SWPF Fire Protection Training Program Description*⁴⁰.

5.4 Program Responsibilities

This section provides an overview of the responsibilities of the organizations supporting the Fire Protection Program. Individuals performing the Fire Protection Program related tasks are assigned to different groups according to the organizational needs of SWPF. These responsibilities are the primary ones associated with the operation and maintenance of the Fire Protection Program. Therefore, the responsibilities of the support staff identified in Section 5.3.2 will be covered in PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵.

5.4.1 Director of Engineering

- Assigns Fire Protection Program Manager
- Approves primary engineering documents (e.g. F-FHA-J-00001²⁸, F-FHA-J-00002²⁹)
- Ensures SWPF has access to qualified, trained Fire Protection staff (including Fire Protection Engineers, and Fire Detection/Fire Suppression Cognizant System Engineers)
- Ensures that drawings, including those for fire and life safety systems, are controlled via the Engineering Program
- Owns PL-TR-1817, *SWPF Fire Protection Training Program Description*⁴⁰.

5.4.2 Plant Manager

- Has overall authority and responsibility for the safe operation and management of SWPF and implementing this Plan;
- Assigns Fire Protection Lead and FPCs.
- Determines whether fire hazards (e.g., system impairments, combustible loading) should impact facility operations
- Ensures SWPF has access to qualified, trained Fire Protection staff (including Fire Protection Lead and FPCs)

5.4.3 Fire Protection Program Manager

- This position is filled by the Engineering/Design Manager/Design Services.
 - Has overall authority and responsibility for the performance of this Fire Protection Program.
-

5.4.4 Maintenance Manager

- Ensures the Fire Protection Program requirements for testing and surveillance activities are performed
- Ensures SWPF has access to adequate qualified and trained Fire Protection maintenance staff

5.4.5 Operations Manager

- Provides operational support including coordination of CR activities and activities of other personnel to ensure effective fire prevention measures are in place
- Ensures that the Shift Operations Managers understand their responsibilities related to the Fire Protection Program and manage them appropriately

5.4.6 Shift Operations Manager

- Coordinates the day-to-day operations and surveillance inspection of SWPF facilities, including Fire Protection systems
- Oversees the Fire System Impairments that are present or initiated during their shift
- Oversees the Hot Work that is underway or initiated during their shift
- Initiates emergency response activities and acts as the Area Emergency Coordinator (AEC);

5.4.7 Cognizant System Engineer Lead

- Appoints and supervises the work assignments of the Fire Detection/Fire Suppression Cognizant System Engineer

5.4.8 Environmental, Safety, and Health Manager

- Serves as procedure owner for the Safety Procedure affecting Fire Protection
- Coordinates Industrial Hygiene involvement in Hot Work activities

5.4.9 Fire Protection Lead

- Ensures overall implementation of the Fire Protection Program
- Ensures the Technical Safety Requirements (TSRs) and Specific Administrative Controls are properly implemented
- Provides daily supervision to the FPCs
- Provides technical support related to the Fire Protection Program to Engineering and Plant Operations as necessary

5.4.10 Fire Detection/Fire Suppression Cognizant System Engineer

- Provides support to SWPF on issues related to Fire Protection systems. This support includes system reviews, procedure development, etc.;
-

- Reviews and approves design modifications related to the Fire Protection Program;
- Provides technical support, on issues related to fire and life safety, to Engineering and Plant Operations as necessary

5.4.11 Fire Protection Engineer

- Provides technical support on fire system design and modification
- Provides assistance in code interpretation and application

5.4.12 Fire Protection Coordinator

- Serves as a primary point-of-contact for facility Fire Protection matters;
- Supports hazard control programs per Section 7.3.
- Performs fire prevention and life safety field inspections per Section 7.4.

5.4.13 Fire Suppression System Technician

- Performs the inspection, testing, and maintenance of the water based suppression systems in accordance with an approved procedure.

5.4.14 Fire Alarm System Technician

- Performs the inspection, testing, and maintenance of the fire alarm system and equipment interfaces in accordance with an approved procedure.

5.4.15 Electrical Maintenance Technician

- Performs the inspection, testing, and maintenance of the emergency lights and the Public Address System in accordance with an approved procedure.

5.4.16 Mechanical Maintenance Technician

- Performs the inspection, testing, and maintenance of the fire barriers including opening protectives in accordance with an approved procedure.

5.4.17 Fire Watch/Fire Patrol

- Performs the Fire Watch and Fire Patrol duties in accordance with an approved procedure.

5.4.18 Plant Operator

- Performs the assigned inspection duties related to fire extinguisher and exit signs in accordance with an approved procedure.

5.4.19 Chemical Coordinator

- Monitors the chemical usage in the facility and oversees the limits established on chemicals by area and provides oversight of the Chemical Database.
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6.0 PROGRAM STANDARDS

The program standards cover the agreed upon design criteria including the codes of record, the applicable DOE Standard and the means to implement these standards. The operational standards to be used for the maintenance and performance evaluation of the program systems will be based on the latest editions of the applicable codes. This section also covers the systems and equipment standards that have been selected and established as the baseline of the facility protection systems.

6.1 Program Related Specifications

In general, the entire design criteria for the SWPF Project along with the most relevant specifications is provided in the following: These standards are followed for design modifications to existing systems as well as for maintenance, repair and related work on these systems. Deviation from this practice will be on a case by case basis and approved by the Fire Protection Lead.

- P-DB-J-00002, *SWPF Design Criteria Database*⁴¹
- Specification 07841, *Through-Penetration Firestop Systems*⁴²
- Specification 07842, *Fire Resistive Joint Systems*⁴³
- Specification 08110, *Standard Steel Doors and Frames*⁴⁴
- Specification 08331, *Overhead Coiling Doors*⁴⁵
- Specification 10520, *Fire Protection Specialties*⁴⁶
- Specification 15330, *Fire Protection Wet Pipe Sprinkler Systems*⁴⁷
- Specification 15331, *Fire Protection Interior Distribution System*⁴⁸
- Specification 15332, *Fire Protection Underground Water Supply System*⁴⁹
- Specification 15820, *Duct Accessories*⁵⁰
- Specification 16721, *Fire Alarm and Detection System*⁵¹

6.2 Codes of Record

For the purposes of this plan the following Codes/Standards of record will be utilized for facility hardware and physical plant features.

- NFPA 13, *Standard for the Installation of Sprinkler Systems*⁵², 2002 edition
 - NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*⁵³, 2003 edition
 - NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*⁵⁴, 2002 edition
 - NFPA 70, *National Electrical Code*⁵⁵, 2002 edition
 - NFPA 72, *National Fire Alarm and Signaling Code*⁵⁶, 2002 edition (design and installation)
 - NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*⁵⁷, 2003 edition
-

- *International Building Code*⁵⁸, 2003

6.3 Codes for Operations

The Codes/Standards listed below will be utilized for Inspection, Testing, and Maintenance of the Fire Protection systems, unless the Fire Detection/Fire Suppression Cognizant System Engineer determines it is a design related issue and will go by the Code of Record.

- NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*⁵⁹, 2017 edition
- NFPA 72, *National Fire Alarm and Signaling Code*⁶⁰, 2019 edition

6.4 Department of Energy

6.4.1 Facility Safety

The DOE O 420.1B³ and DOE O 420.1C Chg.1⁴, Fire Protection Attachment has DOE specific Design and Operations requirements that are not required in the NFPA Codes. These requirements include the intent to meet the insurance industry standard of Highly Protected Risk. This approach includes specific requirements based on the building hazard level, the importance of its mission and the value of the facility. These requirements are accounted for in design decisions as well as in decisions associated with hazard analysis and mitigation. There are other DOE orders listed in requirements for the program but their direct statements on fire protection design and systems are very limited. Since they have more to do with what should be in the program and how it should be performed, they were not included here. However, they are nonetheless accounted for in the design and operations of systems where appropriate.

6.4.2 Fire Protection Standard

This DOE Fire Protection Standard 1066 contains requirements that apply to system design. The facility design followed DOE-STD-1066-99, *Fire Protection Design Criteria*¹¹, as part of its code of record.

DOE-STD-1066-99, *Fire Protection Design Criteria*¹¹, will be followed for SWPF Facility construction and modifications. Among the prominent requirements of the standard is the use of non-combustible or fire resistive construction materials in the SWPF Process Building. In addition, ancillary structures provided to support maintenance and facility work activity (e.g., scaffolding, equipment enclosures, construction enclosures) will also be required to use the same type materials. Fire retardant materials listed by a Nationally Recognized Testing Laboratory testing may also be permitted with Fire Protection Program technical staff approval.

6.5 General References

The Department of Energy also recommends the use and consultation of various industry standards and advisory documents to assist in provide the most appropriate means in methods in resolving fire protection related issues and concerns. Codes/Standards listed below will be utilized for hazard analysis, equipment selection, risk mitigation, and general fire protection program issues as is appropriate.

- NFPA Guides and Handbooks and Recommended Practices
- FM Global Data Sheets and Approval Guide
- Product Directories of Underwriter's Laboratory
- Local and State Fire Protection Criteria, as applicable

6.6 System Standards

The System Standards refers to the standards that have been established for each fire and life safety system present in SWPF. These standards are detailed in the various system files that include system drawings, product data sheets, system calculations, acceptance test data, and operation and maintenance manuals. These documents are the baseline for repairs, changes or upgrades to these systems and are subject to review by the Fire Protection Program technical staff.

- Fire Suppression Systems
- Fire Alarm Systems
- Fire Extinguisher
- Standpipe Systems
- Construction

6.7 Authority Having Jurisdiction

The Authority Having Jurisdiction for the SWPF is the Head of the Savannah River Site Field Office of the Department of Energy. The Department of Energy-Savannah River Office of Safety and Quality Assurance, Fire Protection Program Manager handles the reviews, approvals, and dispositions of the following items:

- Code Conflicts
- Equivalency & Exemptions
- Listing Approvals
- De Minimis Issues

7.0 PROGRAM OPERATIONS

The Program operations is provided to describe the services and activities that the Fire Protection Program members engage in during normal operations. These services are broken down into basic categories of technical services, hazard control programs, and field inspections. In addition, issue management systems and the change management plan is included as they are their own processes but are an intrinsic part of the other operations.

7.1 General

The information provided in the topics in this section are general in nature and intended to only introduce these core elements of the Program as required by DOE O 420.1C Chg.1⁴. The purpose of the information in this section is to identify the various activities of the Fire Protection Program.

Some of these activities are covered by procedures as indicated next to the item and others are more general duties. The responsibilities of these general duties are dependent on the nature and complexity of the task or support request. These activities may be performed by Plant Operations or Engineering personnel of the Fire Protection Program depending on the complexity of the issue and the qualifications, knowledge, and skill level of the available personnel. Additional information is provided in PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵, and other specific procedures that may be identified in these sections.

7.2 Technical Services

The typical primary services are broken down into task subgroups according to the nature of the activity. These task support groups include primary services, administrative activities, and special activities. The primary services address the most prominent technical activities engaged in by the technical staff. The administrative services involve the management of technical issues and documents. The special activities involve items that are engaged in less frequent basis and address various topics in the program. These following is a detailed list of the services.

7.2.1 Primary Services

The first group of these support activities is in regard to fire and life safety systems design, review, and evaluation. These support activities include the following items:

- System Design and Modification (per applicable codes and standards and PP-EN-5001, *Design Control*⁶¹, PP-EN-5003, *Specifications*⁶¹, PP-EN-5004, *Calculations*⁶¹)
- Design Verification and Validation (per PP-EN-5005, *Intradiscipline Checking*⁶¹)
- Design Coordination Reviews (per PP-EN-5006, *Interdiscipline Review*⁶¹)

The second group of these support activities is in regard to the management of the configuration of the current facility equipment status is accurately tracked in the associated drawings and documents as well as in the master equipment list. These support activities include the following items:

- Fire System Impact Identification (per PP-EN-5012, *Design Change Notices*⁶¹, PP-EN-5034, *Field Change Notices (FCNs)*⁶¹, PP-EN-5046, *Temporary Modifications*⁶¹, PP-DC-3012, *Document/ Administrative Procedure Preparation and Review*⁶¹, and PP-EN-5036, *Fire Protection Impairment Control*⁶¹)
- Change Control (per PP-EN-5012⁶¹, PP-EN-5034⁶¹, PP-EN-5046⁶¹, PP-EN-5042, *Equipment Tracking Master Equipment List*⁶¹, and PP-EN-5039, *Plant Request for Information*⁶¹)
- Unreviewed Safety Question (per PP-EN-5507, *SWPF Unreviewed Safety Questions*⁶¹)

The third group of these support activities is in regard to the alignment of the hazards and risk analysis of the FHA with the Documented Safety Analysis (DSA) and the incorporation of TSRs of the DSA into the Fire Protection Program. Section 8.1 of this Plan provides additional information on this coordination effort. In general, these support activities include the following items:

- FHA Reviews and Updates (per PP-EN-5022, *Preparation of Fire Hazards Analysis*⁶¹)
- FHA and DSA Coordination (per PP-NS-5504, *Development and Control of Documented Safety Analysis and Technical Safety Requirements*⁶¹)
- TSRs Coordination with Fire Protection Program and Maintenance (per PP-NS-5504⁶¹)

The fourth group of these support activities involves the assessment of the fire and life safety systems as well as the Fire Protection Program itself. These support activities include the following items:

- System Health Evaluations (per PP-EN-5035, *System Health Reporting and Operability Assessments*⁶¹)
- Fire Protection Facility Assessments (per PP-EN-5049, *Facility Fire Protection Assessments*⁶¹)
- Fire Protection Program Self Assessments (per PP-EN-5050, *Fire Protection Program Self Assessments*⁶¹)
- Other Assessments (provide support to Internal and External Assessment Personnel)

The fifth group of these support activities involves identification, interpretation, and application of the specific program requirements or program standard that will inform the resolution of an issue. These support activities include the following items:

- Hazard and Risk Analysis
- Code Consulting Support
- Engineering Support Services
- Equivalency and Exemption Requests (per PP-EN-5048, *Evaluation and Resolution of Fire Protection Engineering Issues*⁶¹)

The sixth group of these support activities involves the documentation oversight of the records associated with fire and life safety systems maintenance, Facility Work Orders, and chemical inventory management. This activity also covers maintaining the status and accuracy of Fire Protection Program documents. These support activities include the following items:

- Fire System Maintenance Oversight
- Work Activity Oversight
- Chemical Management Oversight

The seventh group of these support activities involves the field oversight of facility work activity and maintenance along with acceptance of fire and life safety system modifications. These field support activities include the following items:

- Fire System Installation, Modification, and Upgrades
 - Fire System Verification and Acceptance Testing
 - Fire System Inspection, Testing, and Maintenance
-

- General Facility Work Activity Observation

The eighth group of these support activities involves utilization of the work order process to perform construction/modification activities and to correct outstanding issues, and deficiencies. This group includes facilitating the communications and prioritization efforts necessary to expedite facility and system repairs, maintenance or upgrades. These support activities include the following items:

- Procurement Support
- Work Order Generation Assistance
- Field Work Issue Resolution
- Verification of Work Performed

7.2.2 Administrative Services

The first group of Administrative Services involves the management of findings, deficiencies, and concerns that arise during the course of operations or during internal or external assessments. The systematic handling of these issues is described in Section 7.5 and these support activities include the following items:

- Evaluation of Issues Reported
- Prioritization and Tracking of Issues
- Resolution of Issues
- Development of Corrective Action Plans

The second group of Administrative Services involves maintenance of various Program related documents that require updates or corrections based on work experience, deficiencies identified or changes in conditions. This group does not include revisions of certain technical documents (e.g., FHA, calculations) that are modified based on engineering analysis and review. The documents covered in these support activities include the following items:

- Program Requirements and Standards (per PP-AS-1200, *S/RID Maintenance and Compliance*⁶¹)
- Program Plans, Procedures, and Control Documents (per PP-DC-3001, *Document Control*⁶¹)
- Program System Descriptions (per PP-EN-5017, *Development and Maintenance of System Descriptions*⁶¹)
- Program System, Standards and Drawings

The third group of Administrative Services involves management of changes at the SWPF that may affect the Fire Protection Program in some significant way. These changes may involve facility processes, equipment, or materials. There may also be changes in Fire Protection Program equipment, processes or procedures as well as organizational changes that may occur. In general, these changes are covered in Section 7.6 and include the following categories.

- Facility Changes
-

- Program Changes
- Organizational Changes

The fourth group of Administrative Services involves efforts related to continuous improvement of the program. This group encompasses a variety of input sources that include Employee Feedback, Assessment Findings, and DOE Complex Experience. Based on the evaluation of this input, the Fire Protection Program may be modified in various aspects including the following typical items:

- Hazard and Risk Analysis, Reduction, and Controls
- Engineering, Operational, and Maintenance Practices
- Equipment and Technology Advances
- Program Execution and Deliverables

7.2.3 Special Activities

Incident Investigation - Fire related incidents are investigated and documented per PP-CONOPS-07.4, *Investigations*⁶¹, and PP-AS-1208, *Cause Analysis*⁶¹. Fire related incidents and events are reported per the requirements noted in PP-CONOPS-07.2, *Occurrence Reporting*⁶¹. The Fire Protection Program will provide support of these incident investigations and the associated reporting of the events, as necessary. The reporting of significant incidents related to the Fire Protection Program are covered in PP-SH-4412, *Environmental, Safety, and Health Reporting*⁶¹.

Program Reports -The Fire Protection Program will make available reports on program metrics and quarterly and annual status of program issues, as necessary. The reporting practices on these matters are also covered in part in PP-SH-4412⁶¹.

7.3 Hazard Control Programs

The hazard control programs include regularly scheduled activities that are governed by the applicable procedures. These activities and the associated procedures are as follows:

- General Housekeeping (per PP-SH-4410, *Housekeeping and Sanitation*⁶¹)
 - Control of Combustibles (per PP-EN-5043, *Combustible Loading and Ignition Source Control*⁶¹)
 - Control of flammable/combustible liquids (per PP-EN-5038, *Flammable and Combustible Liquids and Gases*⁶¹)
 - Control of Compressed Gasses (per PP-SH-4463, *Portable Compressed Gas Systems*⁶¹)
 - Control of Ignition Sources (per PP-EN-5043⁶¹)
 - Control of Hot Work (per PP-SH-4416, *Control of Hot Work*⁶¹)
 - Control of Fire and Life Safety System Impairments (per PP-EN-5036, *Fire Protection Impairment Control*⁶¹)
-

In addition, fire watch is provided for hot work activities as necessary and a fire patrol is performed as a compensatory measure for impairments as is appropriate. These two duties are covered in accordance with PP-SH-4416⁶¹.

7.4 Field Inspections

The Fire Protection Program field inspections include the regularly scheduled walk downs that are governed by the applicable procedures. Life safety inspections are included in the performance of the combustible loading and ignition source control inspections. Fire prevention inspections are a general review that evaluates conditions inside and outside of buildings on a quarterly basis. The interior inspections include exits, rated barriers, active fire systems, fire extinguishers, flammable and combustible materials and ignition sources. The exterior inspections include Fire Department access, outside storage and exposure hazards. The plant operators support these field inspections by handling the regular review of fire extinguishers and exit signs and well as valve alignment verification after maintenance. These activities and the corresponding procedures are listed below:

- Life Safety Inspections (per PP-EN-5043, *Fire Protection Impairment Control*⁶¹)
- Fire Prevention Inspections (per PP-EN-5037, *Fire Prevention Inspections*⁶¹)
- Fire Extinguisher Inspections (per OPSINSP-SWPF-001, *SWPF J-Area Operations Inspection*)
- Emergency lights; per the associated Work Order
- Exit Sign Inspections (per OPSINSP-SWPF-001⁶¹)
- Fire barrier and opening protectives; per the associated Work Order
- Valve Alignment Verifications (per SOP-FSS-001, *Fire Suppression System*⁶¹)

7.5 Issues Management Systems

The reporting of issues at SWPF is paramount to safe operations and is handled according to the nature of the issue or concern. SWPF personnel have several means for submitting and tracking these items and they include:

- Service Requests (per PP-MN-8740, *Maintenance Work Control*⁶¹)
- Condition Reports (per PP-AS-1203, *Corrective Action Program*⁶¹)
- Consolidated Request for Information (per PP-EN-5039, *Plant Request for Information*⁶¹)
- Non-Conformance Reports (per PP-QA-4703, *Non-Conformance Items*⁶¹)
- Employee Concerns (per PP-TM-1408, *Employee Concerns Program*⁶¹)
- Employee Suggestions (per PP-TM-1411, *Employee Suggestions*⁶¹)
- Differing Professional Opinions (per PP-TM-1400, *Differing Professional Opinions*⁶¹)

The first step in addressing issues is to assess the condition to determine if there is a definite need to act on it. Once it is determined by management that an issue should be addressed, then the issue will be processed according the specific tracking system that it was entered. Management personnel will assist in assigning priorities to an issue. Once an issue has been resolved to the satisfaction of the responsible manager, documentation is submitted for the closure of the issue in

the system. The handling of findings and deficiencies by outside organizations (e.g., DOE, third party assessors) is typically addressed in the Condition Reporting System and regular follow-up is provided to that organization until closure of the matter. Additional information on this process is provided in PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵.

7.6 Change Management

The management of change in the Fire Protection Program will be handled according to the nature of the change that the Program may experience. In addition, general changes in the facility and its Operations can necessitate the need to adjust the Program and its Operations accordingly. The changes in the facility may include:

- Process changes
- Equipment changes
- Material changes

The new conditions that result from the changes will be largely addressed in the Fire Hazards Analysis to confirm that they do not impact the hazards analysis or the conclusions in it. Significant impact that the facility changes cause in the FHA will be reviewed against the DSA to assure that these two documents are properly aligned.

The changes that the Fire Protection Program itself may be subject to include those pertaining to fire and life safety systems, Program activities, and Program documents which may include the following items:

- Equipment changes
- Process changes
- Procedure changes
- Organizational changes
- Personnel changes

Equipment change or replacement will be handled by the Configuration Management System, updating affected maintenance procedures and evaluating it against the FHA. The change of processes or procedures will be managed by updating the appropriate documentation to accurately describe the means and methods of performing or managing a task. The change in the structure of the Fire Protection Program organization will be handled by Senior Management review of the impact of the change. The outcome of this review will be used to determine the most appropriate means to ensure Program continuity. The change of personnel may be due to several reasons, but regardless of the reasons, the impact on workloads and schedule obligations will be reviewed with management to determine an appropriate path forward. In addition, training needs that will arise due to the change in equipment, process, procedure or personnel will be assessed by the Fire Protection Program Manager and the Training Manager. This team will determine what new training individuals may need to be fully competent to perform their responsibilities and how this training will be accomplished.

8.0 PROGRAM INTERFACES

The Fire Protection Program is required to integrate its services and requirements into aspects of facility operations, as is appropriate and necessary to ensure a comprehensive program. The core staff members of the Fire Protection Program are as indicated in Section 5.3.1 and they will engage other organizations as necessary for their individual responsibilities to integrate the Fire Protection Program requirements. The following groups are the primary organizational interfaces that the Fire Protection Program personnel engage in order to accomplish the integration. The point of contact for each organization for Fire Protection Program interface related issues is also provided. It is not necessarily the official contact for the organization. This person may also identify other individuals for specific details needed on any one issue.

8.1 Nuclear Safety

The Nuclear Safety organization prepares the DSA, which includes fire scenarios and related consequences that may affect nuclear safety. The SWPF Fire Protection Program is responsible for preparing the Fire Hazards Analysis (FHA), which also includes the significant fire scenarios of concern. In the preparation of the FHA, the Fire Protection Program personnel coordinate with the Nuclear Safety organization to ensure that their fire risk analyses are in agreement.

Technical Safety Requirements developed as part of the DSA identify the elements of the SWPF Fire Protection Program that are necessary to properly address the hazards identified in the DSA. These necessary elements are classified in the DSA as either Technical Safety Requirements or Specific Administrative controls in the DSA. The fire protection related elements are implemented by the SWPF Fire Protection Program through program standards, systems, processes, hazard controls, field inspections and related procedures. In addition, any significant changes in the fire protection systems configuration in the SWPF processing facilities or related fire protection program elements may require evaluation per PP-NS-5507, *SWPF Unreviewed Safety Questions*⁶¹.

The primary Fire Protection Program related requirements of the DSA are in section 5.8.2.6 of S-TSR-J-00001, *Technical Safety Requirements*². Sections 6.4, 7.3, 7.4, 9.0 and 11.2 of this Plan, address these primary TSR requirements. The primary document associated with this interface is identified in PL-NS-5500, *Safety Basis Implementation Plan*⁶². The point of contact for this organization is the Nuclear Safety Manager.

8.2 Engineering

SWPF Engineering has the role of ensuring fire and life safety design requirements are incorporated into facility modifications and for preparing specifications for outside organizations to meet the same requirements. Engineering also supports the Configuration Management needs of the Fire Protection Program. The primary document associated with Configuration Management is P-CDM-J-00001, *Configuration Management Plan*⁶³. The point of contact for this organization is the Director of Engineering.

8.3 Procurement

The Fire Protection Program provides support to Procurement for material (e.g., flammable and combustible liquids, spare parts) and vendor acquisitions (engineer and maintenance) support per

applicable procurement procedure. The primary document associated with the procurement of goods and services is PL-PR-6001, *Acquisition Process System Description*⁶⁴. The point of contact for this organization is the Procurement Lead.

8.4 Work Planning

The Fire Protection Program provides support to SWPF Work Planning through the provision of guidance on identifying work activities that may affect fire and life safety systems. In addition, work activities that may introduce significant fire or life safety hazards as also identified to ensure they are properly addressed in the work package. The primary document associated with Work Control is PL-MN-8709, *Work Control Program Plan*⁶⁵. The point of contact for this organization is the Work Control Manager.

8.5 Maintenance

SWPF Maintenance Organization is responsible for providing fire protection inspection, testing, and maintenance of fire systems (active and passive). Maintenance also performs work order based tasks that may affect fire and life safety systems and in these cases, Fire Protection Program personnel provides input on means and methods to minimize adverse impact on these systems. The primary document associated with maintenance performance, including fire systems, is PL-MN-8704, *Nuclear Maintenance Management Program Plan*⁶⁶. Maintenance also supports configuration management of fire systems by following PP-MN-8738, *Post Maintenance Testing*⁶¹. The point of contact for this organization is the Maintenance Manager.

8.6 Water Services

The Liquid Waste Contractor provides the fire water to SWPF via supply tanks and fire pumps in S-Area. They also interconnect with H-Area in the event Defense Waste Processing Facility has either a diminished supply or an unavailability of fire water. F-FHA-J-00001²⁸ provides detailed information on the water supply system serving J Area. V-ESR-J-00017, *SWPF Fire Protection Water System Interface Control Document (ICD-17)*⁶⁷, provides additional information on this service relationship. The point of contact for this organization is the Liquid Waste Contractor designee for Fire Water Services.

8.7 Plant Operations

SWPF Shift Operations Manager handles the fire and life safety issues that arise as part of production activities. These issues include hazard controls, inspections, and fire system monitoring per the procedures listed in Sections 7.3 and 7.4 of this plan. The Chemical Coordinator manages the chemical inventory at SWPF and follows PL-OP-8526, *SWPF Chemical Control Plan*⁶⁸. Fire Protection Program personnel provide technical and field support on these issues and on the annual plant assessment per PL-OP-8519, *SWPF Plant Operations Annual Assessment Plan*⁶⁹. Plant Operations personnel also support the fire system maintenance as indicated in PP-CONOPS-09.1, *Control of Equipment and System Status*⁶¹, and in SOP-FSS-001⁶¹. The point of contact for this organization is the Operations Manager.

8.8 Environmental, Safety and Health

The Fire Protection group and the Environmental, Safety, and Health group provide mutual technical support as necessary in regard to facility operations and worker safety. These support

activities involve various topics including hazardous materials, administrative controls and field inspections of the Fire Protection Program. There are several documents that provide detailed information on these safety and health related support activities. The documents associated with the management of hazardous materials includes PL-SH-4300, *SWPF Industrial Hygiene Program Plan*⁷⁰, PP-OP-8525, *Chemical Receipt and Inventory Control*⁶¹ and PL-SH-4309, *SWPF Hazardous Chemical Control Plan*⁷¹. PP-SH-4416⁶¹ is the primary procedure of this interface and it is owned by this group but is implemented by the Fire Protection Program personnel. PP-SH-4463⁶¹ is another prominent procedure in this interface. PP-SH-4404, *General Site Safety Requirements*⁶¹, and PP-SH-4420, *Walking and Working Surfaces*⁶¹, ensure a safe work environment and safe walking surfaces. The point of contact for this organization is the Environmental, Safety and Health Manager.

8.9 Training

The SWPF Training group provide General Employee Facility Training which includes fire safety and proper response to emergencies (e.g., warn others, notify CR). In addition, there are some specialty courses on Fire Protection activities (e.g., Fire Watch/Patrol, fire extinguisher use). The Fire Protection Program provides Subject Matter Expert support for the development and evaluation of these courses. PL-TR-1801, *SWPF Personnel Selection, Training, and Qualification Plan*⁷², is the primary document associated with the SWPF Training Program. The point of contact for this organization is the Training Manager.

8.10 Emergency Preparedness

Fire Protection will provide support to SWPF Emergency Preparedness Organization for general planning, scenario development and observation of drills, as requested. The primary document associated with this SWPF organization is PL-OP-8515, *SWPF Emergency Preparedness Implementation Plan*⁷³. The point of contact for this organization is the Emergency Preparedness Coordinator.

8.11 Savannah River Site Emergency Management

The primary document associated with the interface between SWPF and SRS Operations Center (SRSOC) and the SRSFD is V-ESR-J-00012, *SWPF Emergency Response Interface Control Document (ICD-12)*⁷⁴.

8.11.1 Savannah River Site Operations Center

SRS Emergency Operations, via the SRSOC provides a central alarm station and 911 Call Center for handling incoming emergency telephone calls, fire alarms, and the dispatching of personnel to the scene of an emergency. The point of contact for this organization is the Savannah River Site Fire Alarm System Manager.

8.11.2 Savannah River Site Fire Department

The Fire Protection Program personnel provide support to the SRSFD by assisting in preplan development, regular facility familiarization walkdowns, and Fire Water Underground pipe testing via flowing of the hydrants. The Fire Department may support the investigation of fire events depending on their severity and significance. The point of contact for this organization is the Savannah River Site Fire Department Chief.

8.11.3 United States Forest Service - Savannah River Site

The United States Forest Service - Savannah River Site does not provide direct services to the Fire Protection Program. Instead, it works in conjunction with the Savannah River Site Fire Department to handle wild land fire issues. The main interface with this organization is through communications on proscribed burns that are occurring on the Savannah River Site. Since there is no direct point of contact with this organization, communications with them would be handled via the Department of Energy Savannah River Site Fire Protection Engineer.

8.12 Department Of Energy Fire Protection

The Fire Protection Engineer for the DOE- Savannah River Field Office provides oversight of the Fire Protection Program. The oversight includes facility and program assessments along with providing Authority Having Jurisdiction approvals of resolutions of issues for non-code compliant conditions. The DOE has not delegated Authority Having Jurisdiction to the Fire Protection Program. The primary document associated with the interface between DOE and Fire Protection is V-ESR-J-00025, *SWPF Project Interface Management Plan*³⁰. The point of contact for this organization is the Department Of Energy Savannah River Site Fire Protection Engineer.

9.0 PROGRAM SYSTEMS

The information provided in the topics in this section are general in nature and intended to only introduce fire and life safety systems serving SWPF. Additional information is provided in F-SD-J-00001, *SWPF Fire Detection/Protection System Description*⁷⁵. In the DSA Report, it was determined that there are not fire or life safety systems that would be designated as Safety Class or Safety Significant systems.

9.1 System Description

The following is a brief description of the primary Fire Protection Program systems. These systems include those that are directly controlled by the SWPF and those that are managed by the Savannah River Site water utilities groups. Likewise, the Fire Alarm System utilizes a central monitoring station on the Savannah River Site which is referred to as the Operations Center. These services involve corporative effort between the management and operating contractors that are also providing contracted services for the Department of Energy.

9.1.1 System Ownership

The fire and life safety systems in all SWPF facilities are considered to be owned by the Plant Manager. This individual will ensure that any significant issues which occur with these systems are addressed by the proper management personnel and with due regard for life safety as well as property protection.

9.1.2 Fire Water Supply

The SWPF fire water mains are fed from the Defense Waste Processing Facility water distribution network system. This network is supplied by a water storage tank in the S-Area and has a backup supply from H-Area tanks. The Defense Waste Processing Facility underground main has two

active connections to J-Area. These connections provide a water supply to the east and west side of the Process Building. The J-Area mains form a loop around the process facilities and the Administration Building. The cooperative agreement for this water service is detailed in V-ESR-J-00017, *SWPF Fire Protection Water System Interface Control Document (ICD-17)*⁶⁷.

9.1.3 Suppression Systems

The SWPF Process Building is provided with 28 automatic sprinkler systems for occupiable areas. Selected non-combustible enclosed spaces such as the Process Cells, certain Heating, Ventilation and Air Conditioning (HVAC) plenums, and pipe chases are not provided with sprinkler protection. Automatic sprinklers are provided in enclosures, such as glove boxes, fume hoods, and the hot cell. There are a total of 19 wet sprinkler systems in 221-J along with the following systems:

- Six deluge systems: (highly radioactive labyrinths and Contactor Room below the grating)
- Two pre-action systems (Main Electrical Room and CR/Uninterruptible Power Supply room)
- One dry system (Cold Chemicals Area Loading Dock)

There are four additional wet sprinkler systems in the following buildings:

- 704-J (Administration Building)
- 763-S (Warehouse)
- 221-4J (Compressor Building)
- 221-6J (Next Generation Solvent)

Five manually controlled open head sprinkler systems are provided for the final exhaust HEPA filters larger than 16 square feet in surface area on the first and second floor.

There are also Class 1 standpipe systems (i.e., 2 ½” connections) in the stairwells of 221-J and hose stations at appropriate locations in the building along with fire extinguishers per code.

9.1.4 Fire Alarm Systems

The following SWPF Buildings have a Fire Alarm System and their own Fire Alarm Control Panels:

- 221-J (Process Building)
- 221-4J (Compressor Building)
- 221-6J (Next Generation Solvent)
- 704-J (Administration Building)
- 763-S (Warehouse Building)

1. Control Panels

The 221-J Fire Alarm System has a network of Fire Alarm Control Panels in 221-J, 221-4J, and 221-6J that are in full communication with one another. The 704-J and 763-S Fire Alarm panels are independent and do not communicate with the 221-J Fire Alarm System. The 221-J Fire Alarm panel is connected to a computer work station that provides graphical interface for representing actual location of the initiating device. This workstation will provide this information in one of the three building on the Fire Alarm network. A remote annunciator panel is provided in the 221-J, a Back-up CR, R181.

2. Detection

Smoke detection is provided for the SWPF Process Building Electrical Rooms, CR area, and at other select locations including the recirculating Air Handling Unit supply ductwork.

Some Labyrinths utilize a heat sensitive wire as a means to thermally detect a fire. Exhaust HEPA Filters are provided with thermal detectors on the intake and discharge of the filters. Thermal detection is also provided in buildings 221-4J and 221-6J above the Fire Alarm Control Panel.

3. Notification

The Fire Alarm Systems provide Horn/Strobes devices are provided throughout the following building:

- 221-J (Process Building) excluding the Process Cells and HVAC/pipe chases
- 221-4J (Compressor Building)
- 221-6J (Next Generation Solvent)
- 704-J (Administration Building)
- 763-S (Warehouse)

Signals (Alarm, Trouble, and Supervisory) originating from the Fire Alarm Systems network are annunciated in the 221-J CR, and transmitted to the SRSOC. The Fire Alarms in 704-J and 763-S transmit to the SRSOC and have no annunciation in the 221-J CR.

9.1.5 Life Safety Systems

Emergency lighting and Exit signage are provided throughout:

- 221-J (Process Building) excluding the Process Cells and HVAC/pipe chases
 - 221-4J (Compressor Building)
 - 221-6J (Next Generation Solvent)
 - 704-J (Administration Building)
 - 763-S (Warehouse)
-

9.1.6 Fire Barrier Systems

The construction of 221-J includes numerous robust masonry walls to contain radiation and to provide structural stability. This design has created many fire barriers that have been used to establish fire areas in the FHA. These fire barriers are identified in the FHA and may serve as life safety features. There is also other fire rated construction in the facility that performs a life safety function and there is structural steel fire proofing in selected locations. These fire barriers include opening protection (e.g., fire doors, fire windows, fire dampers, penetration seals) as necessary.

9.1.7 Special Systems

A special process system that supports the Fire Protection Program objectives is the HVAC Process Exhaust System. There are multiple fire related event scenarios that the HVAC System is designed to address via temperature sensors, dampers, and interlocks. These controls provide a primary means of fire suppression or extinguishment by oxygen (i.e., air) reduction at the affected location via air supply diversion. In addition, there would be dilution of the hot air by its combination with the other exhaust air streams. The sprinklers, noted above, which protect the HEPA exhaust filters are the secondary means of fire suppression or extinguishment.

There are two other locations where sprinkler protection is provided that creates an unusual situation. In these locations the presence of the sprinklers and the consequences of the discharge offers a potential problem in and of themselves. The first location is the gloveboxes where there is a radiological atmosphere. The work performed in these spaces is via individuals utilizing built in gloves to protect them while they handle the hazardous materials. There is a potential for fire in these specialized enclosures as well as potential for an accidental discharge from mechanical injury to the sprinkler head. The presence of ordinary combustible materials and flammable liquids in the gloveboxes warrant special consideration. Another hazard is with the sprinkler runoff as it may contain radiological materials and spread inside the enclosure before it is fully drained. These hazards need to be managed with care to reduce the likelihood of a fire occurring and to ensure that the potential collateral damage is minimized.

The second special location of sprinklers is in the Laboratory fume hoods. This equipment is also a work space and is subject to similar risks to those of gloveboxes. The difference being is that there is no barrier between the worker and the work space. Therefore, the worker movement is less restricted and may potentially have greater opportunity to accidentally cause a fire based on the handling of the chemicals and heat sources in the fume hood. There is also a need to manage the run off potential in the fume hood despite the presence of a drain as the sprinkler water may escape the confines of the fume hood. These work spaces will likewise need managed with care to ensure a significant fire event does not occur.

9.1.8 Public Address System

The J-Area Public Address System is a dedicated land line based announcement system that is audibly throughout J-Area, including outside areas and the 763-S. There are two locations where a Public Address System announcement can be initiated: the CR and the Safe Shutdown Panel Room. The Public Address System will also provide a Safety Alarm Signal for J Area personnel

protective actions and emergency declarations. This system is used to make general announcements, in addition to emergency notifications. The SRSOC cannot directly make an announcement over this system, however the SWPF CR has a Selective Signaling Terminal telephone that is connected to the SRSOC and can be monitored by SRS site areas in when emergency declarations are made.

9.2 System Maintenance

9.2.1 Maintenance Management

The maintenance management of the fire and life safety systems involves more than ordinary maintenance schedules. There are several oversight issues that influence the scope and nature of the maintenance program. These issues include preventative maintenance, corrective maintenance, and predictive maintenance. In addition, assembling a maintenance history of systems and associated costs along with component failure rates may be useful in improving the efficiency of the maintenance program. It may also be used to improve the planning of spare parts inventory. In general, these options and strategies are at the discretion of the Maintenance Manager who will determine how these concepts may be implemented. In regard to maintenance activities, the issue of addressing deficiencies and potential system impairments is covered in PL-MN-8704, *Nuclear Maintenance Management Program Plan*.

9.2.2 Fire Water Supply

The inspection, testing and maintenance of the following systems is performed by the SRS Site Utilities Division.

1. H-Area Water Storage
2. H-Area Fire Pumps
3. H-Area Underground Mains

The inspection, testing and maintenance of the following systems is managed by the SRS Liquid Waste Contractor.

1. S-Area Water Storage
2. S-Area Fire Pumps
3. S-Area Underground Mains

The inspection, testing and maintenance of the following systems is managed by the SWPF Contractor.

1. J-Area Underground Mains

The regularly scheduled Code required inspection, testing and maintenance for the fire water supply systems in H-, S-, and J-Area includes activities performed on a weekly, monthly, quarterly, semi-annual, annual and five year basis.

9.2.3 Suppression Systems

The inspection, testing and maintenance of the following suppression systems is managed by the SWPF Contractor and is performed by a state licensed subcontractor.

1. Wet Pipe Systems
2. Dry Pipe Systems
3. Pre-action Systems
4. Deluge Systems
5. Standpipe Systems
6. Manual Deluge Systems (HEPA)

The regularly scheduled Code required inspection, testing and maintenance includes activities performed on a monthly, quarterly, semi-annual, annual and five year basis. Minor corrective maintenance on items that will not impact system performance (e.g. rerouting drain lines, replacing air compressors) and will not generate a fire signal may be performed by SWPF mechanical maintenance personnel.

9.2.4 Fire Alarm Systems

The inspection, testing and maintenance of the following systems and the associated initiation, control and notification devices is managed by The SWPF Contractor and performed by a state licensed subcontractor.

1. Notifier NFS2-640
2. Notifier NFS-320

The regularly scheduled Code required inspection, testing and maintenance includes activities performed on a monthly, quarterly, semi-annual and annual basis. Minor corrective maintenance on some self-monitoring items (e.g. replacing smoke detectors, fuses, batteries, horn/strobes, low air pressure switch) may be performed by SWPF electrical maintenance personnel.

9.2.5 Life Safety Systems

The inspection, testing and maintenance of the Emergency lighting and Exit signage is performed by the SWPF Contractor. The regularly scheduled Code required inspection, testing and maintenance includes activities performed on a monthly and annual basis. Corrective maintenance on these items are performed by SWPF Electrical maintenance personnel.

9.2.6 Fire Barrier Systems

The inspection, testing and maintenance of the fire barriers are performed the SWPF Contractor's Maintenance personnel to ensure their integrity is not compromised. The regularly scheduled Code required inspection, testing and maintenance includes activities performed on an annual and four year basis. Corrective maintenance on these items are performed by SWPF maintenance personnel.

9.2.7 Special Systems

The inspection, testing and maintenance of the sprinklers for these systems is the same as that for the other fire suppression systems. The remaining elements of the special systems are maintained by the SWPF Contractor's Electrical and Mechanical maintenance personnel.

9.2.8 Public Address System

The inspection, testing and maintenance of the Public Address System is performed by the SWPF Contractor's Electrical Maintenance personnel. The telephone system maintenance is performed by a telecommunications subcontractor.

10.0 PROGRAM DOCUMENTS

The Fire Protection Program documents are those created by the Fire Protection Program to maintain a record of the pertinent activities of the program. Records are managed in accordance with PP-DC-3002, *Records Management*⁶¹.

10.1 Governing Documents

The governing documents covered in the section are those that include documents that either directly or indirectly define the boundaries of the program requirements.

10.1.1 Project Governance

The Project Governance documents include those that address the general management, technical and operational boundaries of the requirements of the program.

1. Management

The Project Management Plan provides the high level summary of the SWPF project execution.

- V-PMP-J-00004, *SWPF Project Management Plan*²⁶.

2. Technical

The technical governing documents cover the Nuclear Safety Basis for operating the facility in accordance with the Department of Energy standards to properly address the associated risks.

- S-SAR-J-00002, *SWPF Documented Safety Analysis*²⁷
- S-TSR-J-00001, *SWPF Technical Safety Requirements*²
- F-FHA-J-00001, *SWPF Project Fire Hazards Analysis*²⁸
- F-FHA-J-00002, *SWPF J-Area Warehouse Fire Hazards Analysis (Building 763-S)*²⁹

3. Operational

These operational governing documents cover the interfaces, operations and safety aspects of the facility and especially during hot operations.

- V-ESR-J-00025, *SWPF Project Interface Management Plan*³⁰
- P-ESR-J-00011, *SWPF Operations Requirements Document*³¹
- P-CMP-J-00001, *SWPF Conduct of Operations Manual*³²
- P-EIP-J-00001, *SWPF Integrated Safety Management System Description*³³

10.1.2 Program Governance

The governing documents covered in the section are those that include the flow down documents which indicate how the Program requirements are implemented in the Fire Protection Program.

1. Requirements Identification

The SWPF method for identification of the program requirements is described in:

- S-RCP-J-00001, *SWPF Standards/Requirements Identification Document*³⁴
- S-RCP-J-00002, *Standards/Requirements Identification Document Compliance Plan*³⁵

2. Program Compliance

The documents that demonstrate the Fire Protection Program's compliance with the requirements are listed here:

- PCAR-FP-001, *DOE Order 420.1B Chapter II, Facility Safety- Fire*³⁶
- PCAR-FP-002, *DOE-STD-1088-95, Fire Protection for Relocatable Structures*³⁷
- PCAR-FP-003, *DOE O 420.1C, Chapter II, DOE O 420.1C Chg.1, Chapter II Fire Protection*³⁸

10.2 Program Plans

10.2.1 Primary Plans

The plans covered in the section are those that are essential to the Fire Protection Program and are directly controlled by the Fire Protection Program personnel.

- F-PP-J-00001, *Fire Protection Program Plan*
- PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵
- PL-TR-1817, *SWPF Fire Protection Training Program Description*⁴⁰

10.2.2 Interface Plans

The plans covered in the section are those of the organizations at SWPF that are mutually cooperative with the Fire Protection Program. See Section 8.0 for the organizations that own these documents.

- PL-NS-5500, *Safety Basis Implementation Plan*⁶²
- P-CDM-J-00001, *Configuration Management Plan*⁶³
- S-CIP-J-00003, *10 CFR 851 Worker Safety And Health Program*⁷⁶
- PL-PR-6001, *Acquisition Process System Description*⁶⁴
- PL-MN-8709, *Work Control Program Plan*⁶⁵
- PL-MN-8704, *Nuclear Maintenance Management Program Plan*⁶⁶
- PL-OP-8519, *SWPF Plant Operations Annual Assessment Plan*⁶⁹
- PL-OP-8526, *Chemical Control Plan*⁶⁸
- PL-SH-4300, *SWPF Industrial Hygiene Plan*⁷⁰
- PL-SH-4306, *ESH Internal Assessment Plan*⁷³
- PL-SH-4309, *SWPF Hazardous Chemical Control Plan*⁷¹
- PL-TR-1801, *SWPF Personnel Selection, Training, and Qualification Plan*⁷²
- PL-OP-8515, *SWPF Emergency Preparedness Implementation Plan*⁷³
- PL-QA-4702, *SWPF Annual Assessment Plan for Quality Assurance*⁷³

10.3 Program Procedures

10.3.1 Primary Procedures

The following procedures are identified as primary, due to their ownership by the Engineering Program and being under the direct control of the Fire Protection Program.

- PP-EN-5022, *Preparation of an FHA*⁶¹
- PP-EN-5036, *Fire Protection Impairment Control*⁶¹
- PP-EN-5037, *Fire Prevention Inspections*⁶¹
- PP-EN-5038, *Flammable and Combustible Liquids and Gases*⁶¹
- PP-EN-5043, *Combustible Loading and Ignition Source Control*⁶¹
- PP-EN-5048, *Evaluation and Resolution of Fire Protection Engineering Issues*⁶¹
- PP-EN-5049, *Facility Fire Protection Assessments*⁶¹
- PP-EN-5050, *Fire Protection Program Assessments*⁶¹

10.3.2 Secondary Procedures

The following procedures are identified as secondary, due to their ownership by groups other than the Engineering Program and are not controlled by the Fire Protection Program.

- PP-SH-4404, *General Site Safety Requirements*⁶¹
- PP-SH-4407, *Job Hazards Analysis*⁶¹
- PP-SH-4410, *House Keeping and Sanitation*⁶¹
- PP-SH-4412, *Environmental, Safety, and Health Reporting*⁶¹
- PP-SH-4416, *Control of Hot Work*⁶¹
- PP-SH-4420, *Walking and Working Surfaces*⁶¹
- PP-SH-4463, *Portable Compressed Gas Systems*⁶¹
- SOP-FSS-001, *Fire System Component Alignment*⁶¹
- OPSINSP-SWPF-001, *SWPF J-Area Operations Inspection*⁶¹
- PP-CONOPS-09.1, *Control of Equipment and System Status*⁶¹

10.3.3 Engineering Procedures

The following procedures are identified as ancillary, due to their ownership by the Engineering Program and apply to Engineering as well as to Fire Protection systems.

- PP-EN-5001, *Design Control*⁶¹
- PP-EN-5003, *Specifications*⁶¹
- PP-EN-5004, *Calculations*⁶¹
- PP-EN-5005, *Intradiscipline Checking*⁶¹
- PP-EN-5006, *Interdiscipline Review*⁶¹
- PP-EN-5012, *Design Change Notices*⁶¹
- PP-EN-5017, *Development and Maintenance of System Descriptions*⁶¹
- PP-EN-5034, *Field Change Notices (FCNs)*⁶¹
- PP-EN-5035, *System Health Reporting and Operability Assessments*⁶¹
- PP-EN-5039, *Plant Request for Information*⁶¹
- PP-EN-5042, *Master Equipment List*⁶¹
- PP-EN-5046, *Temporary Modifications*⁶¹

10.3.4 Issues Management

The following procedures are identified as Issues Management as they are utilized by the Fire Protection Program but are owned by various groups depending on their topic.

- PP-AS-1203, *Corrective Action Program*⁶¹
 - PP-EN-5039, *Plant Request for Information*⁶¹
-

- PP-QA-4703, *Nonconforming Items*⁶¹
- PP-TM-1400, *Differing Professional Opinions*⁶¹
- PP-TM-1408, *Employee Concerns Program*⁶¹

10.3.5 Maintenance Procedures

The following procedures are identified as maintenance, due to their involving the inspections, maintenance and testing of fire systems. The Conduct of Operations procedure that affects the maintenance of the fire systems is therefore also included.

- PP-MN-8740, *Maintenance Work Control*⁶¹
- PP-MN-8741, *Preventive Maintenance*⁶¹
- PP-MN-8727, *Maintenance Work Scheduling*⁶¹
- PP-CONOPS-09.1, *Control of Equipment and System Status*⁶¹

10.4 Interface Documents

These Interface Control Documents (ICDs) are used to ensure that both parties understand their responsibilities in regard to utilities and emergency response.

- V-ESR-J-00012, *SWPF Emergency Response Interface Control Document (ICD-12)*⁷⁴
- V-ESR-J-00013, *SWPF Telecommunications and Controls Datalink System Interface Control Document (ICD-13)*⁷⁷
- V-ESR-J-00017, *SWPF Fire Protection Water System Interface Control Document (ICD-17)*⁶⁷

10.5 Technical Reports

These reports include the Engineering analysis of hazards and risks in the facility associated with the DSA and the Fire Protection Program.

10.5.1 Fire Hazards Analysis

- F-FHA-J-00001, *SWPF Project Fire Hazards Analysis*²⁸
- F-FHA-J-00002, *SWPF J-Area Warehouse Fire Hazards Analysis (Building 763-S)*²⁹

10.5.2 Engineering Study Reports

The Engineering Study Reports include Equivalency Requests and Engineering Evaluations which are essentially position papers on a given topic.

- F-ESR-J-00001, *SWPF Fire Protection Engineering Equivalency Request Process Building Contactor Operating Deck Common Path of Travel*⁷⁸
-

- F-ESR-J-00002, *SWPF Fire Protection Engineering Equivalency Request Process Building Omission of Sprinklers in Process Vessel Cell Area*⁷⁹
- F-ESR-J-00003, *Salt Waste Processing Facility (SWPF) Project DOE Standard 1066 Equivalency Approval*⁸⁰
- F-ESR-J-00005, *Omission of Sprinklers in Waste Transfer Enclosure; West Utility Chase; HVAC Shielding Chase; South Utility Chase and Contactor Support Floor Chase; and East CSSX Tank Cell*⁸¹
- F-ESR-J-00007, *Analysis of Fire Alarm Horns in High Noise Areas*⁸²
- F-ESR-J-00008, *Maximum Allowed Quantities of Hazardous Materials by Area*⁸³

10.5.3 Engineering Calculations

The following Engineer Calculations are provided as they affected the Hazard Assessment in the FHA.

- F-CLC-J-00011, *Air Temperature Change at HEPA Filters Resulting from Fire in a Process Cell*⁸⁴
- S-CLC-J-00041, *SWPF Fire Radiological Consequence Analysis*⁸⁵
- S-CLC-J-00054, *Accident Analysis of Explosion Events*⁸⁶

10.5.4 System Descriptions

The Fire Detection/Protection System Description document provides descriptions of the fire and life safety systems that serve the SWPF project, either in the main process building or in an ancillary facility.

- F-SD-J-00001, *SWPF Fire Detection/Protection System Description*⁷⁵

The following System Descriptions provide descriptions of related mechanical, electrical, and plumbing systems that interface with fire and life safety systems that serve the SWPF, either in the main process building or in an ancillary facility.

- E-SD-J-00002, *SWPF Electrical System Description*⁸⁷
- M-SD-J-00004, *SWPF Heating, Ventilating and Air Conditioning System Description*⁸⁸
- M-SD-J-00005, *SWPF Utilities System Description*⁸⁹
- X-SD-J-00005, *SWPF Drains System Description*⁹⁰

10.6 Design Documents

The drawings, calculations, and the vendor data for the fire and life safety systems are maintained on the SWPF Project Collaboration Portal. The drawings for section 10.6.3, 10.6.6, 10.6.9, 10.6.10, 10.6.11, 10.6.12, and 10.6.13 are identified in F-SD-J-00001, *SWPF Fire Detection/Protection System Description*⁷⁵.

10.6.1 Drawing Index Plans

The Drawing Index Plans are prepared for each discipline in the project and will assist in identifying supplemental drawings relate to the fire and life safety drawings. Some disciplines are further broken down into sub-categories and each of them may have their own drawing index.

10.6.2 Site Plans

The Site Plans cover only the J-Area and interfaces with the S-Area drawings. These plans include the buildings, permanent structures, and trailers. The non-permanent structures are not identified on these drawings. The roadways, the fire lane marking, access boundaries for the emergency response activities are also provided.

10.6.3 Underground Fire Mains Plans

The Underground Fire Mains Plans cover only the J-Area and extend to the interconnection with the S-Area Fire Water Mains. These plans include the mains, the valves, fire hydrants, post indication valves and facility tie-in point(s). These plans are referred to as the Fire Protection Piping Plans.

10.6.4 Floor Plans

The Architectural Floor Plans show the building layout without the associated equipment or furnishings. These plans assist in the identification of significant adjacencies and fire growth pathways.

10.6.5 Life Safety Plans

The Life Safety Plans are the enhanced floor plans that show the egress routes and associated travel distances. The International Business Code Occupancy Classification is also provided on these plans. Life Safety Plans were only prepared for the 221-J Process Facility.

10.6.6 Emergency Lights and Exit Signs Plans

The Emergency Lights and Exit Signs Plans are enhanced reflected ceiling plans that are primarily lighting plans. The lights that serve as emergency lights have individual battery packs on each light fixture. These emergency lights are given a distinct symbol on the lighting plan to identify them. These drawings are used to assist in the Life Safety Analysis.

10.6.7 Flammable Liquid Cabinet Plans

The Flammable Liquid Cabinet Plans are the enhanced Architectural equipment plans that show Flammable Liquid Cabinet locations. The Flammable Liquid Cabinet Plans were only prepared for the 221-J Process Facility.

10.6.8 Fire Extinguisher Plans

The Fire Extinguisher Plans are the enhanced Architectural equipment plans that show Fire Extinguisher locations. The Fire Extinguisher Plans were only prepared for the 221-J Process Facility.

10.6.9 Fire Suppression Systems Plans

The Fire Suppression System Plans include water based suppression in the affected facilities. These facilities with these systems are identified in Section 9.1.3. The Suppression Systems include wet pipe, dry pipe, pre-action, deluge and standpipe/hose stations.

10.6.10 Fire Alarm and Detection System Plans

The Fire Alarm and Detection System Plans include the detections, control and notification systems in the affected facilities. These facilities with these systems are identified in Section 9.1.4.

10.6.11 Fire Barriers Plans

The Fire Barriers Plans are enhanced equipment plans that show the locations of the fire rated construction walls and floors in the 221-J facility. The Fire Barriers Plans were only prepared for the 221-J Process Facility since the other facilities do not contain fire barriers.

10.6.12 Fire Doors/Windows Plans

The Fire Doors/Windows Plans are enhanced floor plans that show the locations of the fire rated doors and windows in the 221-J facility. The Fire Doors/Windows Plans were only prepared for the 221-J Process Facility since the other facilities do not contain fire barriers.

10.6.13 Fire Dampers Plans

The Fire Dampers Plans are provided on the HVAC Plans that show the ductwork and associated locations of the fire dampers in the 221-J facility. The Fire Dampers Plans were only prepared for the 221-J Process Facility since the other facilities do not contain fire barriers.

10.6.14 Barrier Penetration Plans

The Barrier Penetration Plans consist of a combination of the Architectural and Structural Plans that show the penetrations locations in walls and floors in the 221-J facility. In addition, a Penetration Seal Schedule provides correlation between the wall/floor rating, the penetration, the item passing through the barrier and the fire stop material installed. The Barrier Penetration Plans were only prepared for the 221-J Process Facility since the other facilities do not contain fire barriers.

10.6.15 HEPA Filter Plans

These Plans are the Mechanical/HVAC Plans that show the primary process exhaust filters which have been provided with manual sprinkler suppression. The drawings include the sprinkler piping and sprinklers provided and the overall operation of the ductwork system.

10.6.16 Confinement and Pressurization Plan

The Confinement and Pressurization Plan are enhanced Plant Design floor plans that indicate pressure in the various areas of the 221-J facility. The Confinement and Pressurization Plan were only prepared for the 221-J Process Facility since the other facilities do not have radiological hazards where directional ventilation flow is vital. These plans assist in the identification of significant adjacencies and fire growth pathways.

10.6.17 Drainage Plans

The Drainage Plans, of interest, include the Floor Plans which show the drain and trench locations and the Mechanical Plans which show the piping runs to the point of termination. The Plans of interest are primarily those that are intended for controlling suppression system run-off in 221-J Process Facility. The other facilities do not have radiological hazards where suppression system run-off is controlled. These plans assist in the evaluation of the impact of suppression system run-off on fire event scenarios.

10.7 Fire Protection Staffing Documents

The Fire Protection Staffing Documents refers to those documents that address the training and qualification requirements for staffing positions in the Fire Protection Program. These documents are placed into three categories that include position description, training requirements and qualification summaries which are detailed in the following sections.

10.7.1 Position Descriptions

For each Core and Support Staff position (listed in Section 5.3) in the Fire Protection Program, a position description document is prepared. This document details the education, skills set and practical factors (e.g. experience) requirements for each position. These items form the basis for management's determination of the suitability of individuals to qualify for these positions. There may also be a candidate interview process by the hiring manager to assess the competence of the individual who is being considered for the position.

10.7.2 Training Requirements

The training requirements for a staff position will vary with each position and the individual's experience and knowledge. In general, the training will consist of selected course work, required reading and on the job training as is appropriate for the individual. These training elements must be successfully completed to the satisfaction of the trainers and the hiring manager before the individual is considered to be fully qualified for the position.

10.7.3 Qualification Summary

A summary of the position qualification and training requirements is prepared for each position and is referred to as a Qualification Card. This card will not only list requirements but also the specific course title and number. This document is also prepared for each individual in the Fire Protection Program staff. It serves not only as a guide for requirements, but also becomes a record of each individual's successful completion of those requirements and is retained by the Training Department accordingly. Additional information is provided on these topics in PL-TR-1817, *SWPF Fire Protection Training Program Description*⁴⁰.

10.8 Assessment Documents

These assessment documents will include those performed by the Fire Protection Program personnel and by DOE and independent third parties. Third party assessments are performed at the discretion of DOE or the SWPF Contractor to assist them in meeting the assessment requirements of the DOE Orders.

10.8.1 Operational Readiness Review Assessments

The Operational Readiness Review Assessments will be performed by the SWPF Contractor and a DOE selected team of assessors. These assessments are intended to determine if the SWPF is ready to enter into full operation mode. The Contractor Operational Readiness Review will be performed in accordance with PL-OP-8525, *Contractor Operational Readiness Review Plan of Action*⁹¹. The DOE Operational Readiness Review will be performed in accordance with DOE O 425.1D, *Verification of Readiness to Start Up or Restart Nuclear Facilities*²¹, and DOE Standard 3006, *Planning and Conduct of Operational Readiness Reviews*²². These Operational Readiness Review assessment will be listed in the attachments of PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵ upon completion.

10.8.2 Fire Protection Program Assessments

This section covers the two types of assessments in the Fire Protection Program. The first is the Fire Protection Facility assessment that mainly evaluates physical systems. This assessment is required to be performed on either an annual or three year basis, depending on the value of the facility per DOE O 420.1C Chg.1, *Facility Safety*⁴. The following is a list of the three buildings required to have Facility Fire Protection Assessments.

- 221-J and associated buildings
- 704-J Administration Building
- 763-S Warehouse

The second type is the Fire Protection Program Self Assessments which evaluates the program plans, processes and procedures and their effectiveness. Although this assessment is referred to as a self-assessment, it may be performed by a subcontractor, if necessary. This assessment is

required to be performed on a three year basis. The list of both types of these assessment reports is provided in PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵.

10.8.3 Department Of Energy-Savannah River Assessments

There have been numerous DOE Assessments performed during the life of the project. Many of the DOE Assessments were performed during the construction phase of the project and are not applicable, as construction is complete. The DOE Assessments that are more recent (2016 to date) and, for the most part, performed during late construction through the operations phase are listed in the Attachments of PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵.

10.8.4 Third Party Assessments

These Third Party Assessments can be from a variety of internal and external organizations, (e.g., independent contractors, DOE Enterprise Assessment Group). The assessments from this group are infrequent and may be initiated by the DOE-Savannah River Field Office or DOE Headquarters. The list of the current assessment reports are provided in the Attachments of PL-EN-5024, *SWPF Fire Protection Management and Administration*⁵.

10.9 Fire Protection Program Records

Fire Protection Program records refer to documents that are generally records of activities performed and are not intended to be updated. However selected documents such as Qualifications and Training Records may be updated with additional information due to the nature. This updating is in distinction from that for the technical documents such as the FHA which may undergo a revision. Examples are provided below:

- Staffing and Qualifications
- Training-Fire Protection Program Staff and General Employee
- Technical-Engineering
- Non-Compliances
- Hazard Controls Program
- Field Inspections (Monitoring)
- System Maintenance
- Occurrences/Incidents/Exposures/Injuries
- SWPF Project Collaboration Portal and CAD files

10.10 Emergency Response Documents

The following emergency response documents cover the primary SWPF emergency procedures and the SRSFD resource management and general response documents

10.10.1 Salt Waste Processing Facility

The following is a list of the primary Emergency Response procedures for SWPF.

- AOP-SWPF-013, *Fire/Explosion In J Area (Excluding 221-J And 221-3J)*⁶¹
- AOP-SWPF-014, *Response To Spills/Releases*⁶¹
- AOP-SWPF-021, *Wildland Fires*⁶¹
- AOP-SWPF-023, *Activation of Sprinkler System*⁶¹
- PP-EV-4008, *Hazardous Materials Spill Control*⁶¹
- EOP-SWPF-001, *Fire/Explosion in 221-J and 221-3J*⁶¹

10.10.2 Savannah River Site Fire

The SRSFD has facility specific preplans for Emergency Response activities in the SRS J-Area and Warehouse. These documents are developed based on facility walkdowns, review of facility documentation and interviews with SWPF Personnel. The preplans are revised on a regular basis and are reviewed by the Technical Staff of the Fire Protection Program for accuracy and conformance to Code requirements.

- 221-000J, *Preplan for SWPF*⁹²
- 221-005J, *Preplan for Temporary Tank Farm*⁹³
- 704-000J, *Preplan for Administration Building*⁹⁴
- 763-000S, *Preplan for Warehouse*⁹⁵

The primary SRSFD Emergency Response standards and general response procedures are provided below. The Baseline Needs Assessment evaluates the adequacy of SRSFD to address emergency response needs of SRS including J-Area.

- 2Q2-4, *Fire Control Pre-Plan Development*⁹⁶
 - 2Q2, *Fire Department Operating Standards*⁹⁷
 - 2Q2-1.1, *General Fire Department Procedures*⁹⁸
 - 2Q2-1.3, *Dispatching Activities*⁹⁹
 - 2Q2-1.5, *Fire Equipment and Apparatus Procedures*¹⁰⁰
 - 2Q2-1.7, *Hazmat Response Procedures*¹⁰¹
 - 2Q2-1.10, *Emergency Medical Service Procedures*¹⁰²
 - 2Q2-1.13, *Rescue Response Procedures*¹⁰³
 - F-TRT-G00010, *Fire Department Emergency Response Baseline Needs Assessment*¹⁰⁴
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11.0 EMERGENCY RESPONSE

The emergency response section provides an overview of the response activities of the SWPF facility personnel and the corresponding activities of the Savannah River Site Fire Department and when appropriate, the United States Forest Service for wildland fires. Additional details are provided on each of these organizations regarding their organizational structure, qualifications and capabilities.

11.1 J-Area Emergency Response Organization

The main guidelines for Emergency Response at SWPF are covered in the EOPs and AOPs. The primary coordinator during an emergency event, is the AEC. This position, is located in the CR, is in command and control of the facility and responsible for assessing the severity of the facility event. This individual remains in charge of the event until the SRS Emergency Operations Center is activated if it is other than a fire related event. This position is filled by the Shift Operations Manager. If the Shift Operations Manager is unable to perform the duties of AEC, the Shift Technical Engineer may fill this role.

The Lead CR Operator will provide support to the AEC. A pre-assigned person assumes the role of Incident Scene Coordinator and meets the Incident Scene Commander (e.g., SRSFD Officer) for information turnover and support. This position is responsible for meeting and interfacing with the site emergency response personnel Incident Commander (fire, medical, or security) to provide information and maintain communications with the AEC. This position is filled by designated Operations Department personnel. For fire related events, the SRSFD will take charge of event until the situation is resolved.

The SWPF Emergency Response Organization includes a pre-assigned group of individuals that provide technical support during an incident to the AEC. This group is referred to as the SWPF Operations Support Center. This group generally consists of a Radiation Protection Coordinator, Operations Specialist, and Engineering Advisor. Emergency preparedness is developed, scheduled, conducted, and critiqued. The frequency of drills will be in accordance with PP-CONOPS-03.2, *Conduct of Drills*⁶¹. Further details are provided in PL-OP-8515, *SWPF Emergency Preparedness Implementation Plan*⁷³.

For events of high severity, the SRSOC will become directly involved in managing an incident. In this case, the SWPF Emergency Response Organization (ERO) will include the facility response personnel as well as the staffing of the Technical Support Room of the SRSOC. The Technical Support Room is staffed with affected facility/area personnel with the expertise to interpret and provide technical information to the Site ERO in the Emergency Operations Center after the declaration of an Alert or Site Area Emergency as they exist for SWPF. Additional personnel may be requested to respond to the Technical Support Room as needed. Personnel assigned to the Technical Support Room will be provided notification devices that will be activated when an emergency has been declared at SWPF. There will be a rotating schedule for these individuals to be “on-call” to respond to the Technical Support Room.

The primary SWPF Emergency Response procedures related to the Fire Protection Program are those associated with hazardous materials, fires and explosions, and sprinkler system activation.

The hazardous material procedure addresses both large and small spills as detailed in PP-EV-4008⁶¹. In the event of a fire or explosion, EOP-SWPF-001⁶¹ provides the information for the appropriate response steps. This procedure includes guidance on handling the manual activation of the Process Exhaust HEPA filter sprinklers.

11.2 Savannah River Site Fire Department

11.2.1 General

The firefighting response, as well as emergency medical and rescue, is provided to SWPF by a site dedicated SRSFD. An agreement for services is provided in V-ESR-J-00012, *SWPF Emergency Response Interface Control Document (ICD-12)*⁷⁴. The DSA acknowledges the need for emergency response in Section 11.4.4. DOE O 420.1C Chg.1⁴, Attachment II, Fire Protection Section 2(d)(1)(e) recognizes emergency response, including the Baseline Needs Assessment (BNA) and Pre-fire plans as an important element of a Fire Protection Program.

The SRSFD exists as part of the annual budget of the Safeguards, Security, and Emergency Services Department, under a contract with the DOE for the purpose of providing protection for life, property, and the environment. The SRSFD provides the following four emergency response services:

- emergency medical services at the Advanced Life Support level including mass casualties, active shooter and natural disasters,
- structural fire suppression, investigation and wildland firefighting support,
- hazardous material response [including weapons of mass destruction or terrorism],
- technical rescue (including High/Low Angle Rescue, Vehicle Extrication, Confined Space, Structural Collapse, Trench, Tower and Surface Water Rescue).

In addition, the SRSFD provides collateral functions such as emergency preplanning, fire safety education, alcohol testing, tree removal from roadways, and the inspection, maintenance and testing of some fire protection components. The SRSFD also participates in mutual aid agreements with the local communities.

11.2.2 Emergency Response

SWPF does not have a fire brigade, and relies on the SRSFD for emergency services. S-SAR-J-00002²⁷ discusses fire suppression and response by the SRSFD, but does not rely on emergency response to maintain the safety envelope. Safety is maintained in a design basis fire with robust construction and fire and life safety system. The SRSFD provided Emergency response services to the entire SRS site, including J-Area, on a 24 hour 365 day per year basis. The ability of the SRSFD to properly respond to emergencies at SRS including J-Area is evaluated in F-TRT-G00010¹⁰⁴, also referred to as the BNA. In the BNA, the Emergency Response of the SRSFD to the J-Area is indicated to be, on average, approximately five to seven minutes. The BNA states there is an existing response capability of 21 personnel and additional two personnel Monday through Thursday (0700-1900).

The SRSFD has standards and procedures to cover Emergency Response activities. These standards and procedures are in the SRSFD Manual referred to as 2Q2⁹⁷. This manual covers many different aspects of the SRSFD operations and the primary procedures that relate to Emergency Response included here. These procedures relate to dispatching personnel, vehicle and equipment use, proper handling of hazardous materials, providing medical services and performing rescue activities. The Fire Protection Program Personnel are not involved with the development or review of these documents.

- 2Q2-1.1, *General Fire Department Procedures*⁹⁸
- 2Q2-1.3, *Dispatching Activities*⁹⁹
- 2Q2-1.5, *Fire Equipment and Apparatus Procedures*¹⁰⁰
- 2Q2-1.7, *Hazmat Response Procedures*¹⁰¹
- 2Q2-1.10, *Emergency Medical Service Procedures*¹⁰²
- 2Q2-1.13, *Rescue Response Procedures*¹⁰³
- F-TRT-G00010, *Fire Department Emergency Response Baseline Needs Assessment*¹⁰⁴

11.2.3 Training

The SRSFD provides training to the operating shifts during scheduled training hours in the four-shift rotation. Training topics are developed and delivered by a qualified training staff in each of the service areas provided by the SRSFD. Topics meeting applicable NFPA requirements for fire fighter, driver-operator, fire officer, and fire instructor are presented using the Department of Defense Fire Fighter Certification Program, which is certified by the International Fire Service Accreditation Congress as the primary source of training materials.

Emergency Medical Service training is based on South Carolina Department of Health and Environmental Control requirements for In-Service Certification. The SRSFD is also an external provider for the U.S. Environmental Protection Agency Course “Emergency Response to Hazardous Materials Incidents” technician course. In general, the minimum training for Firefighters includes: a) Firefighter II, b) Emergency Medical Service Advanced Life Support, c) HazMat Technician Level, and d) Rad Worker II.

In addition to formal training the SRSFD performs facility walkdowns to familiarize the emergency responders with the facility hazards and facility configuration, as well as to help facility managers identify conditions that prevent the responders for effective fire or Emergency Medical Service operations. SWPF works with the SRSFD to review fire ground tactics and approach to optimize their emergency response.

The SRSFD training includes familiarization with their response apparatus including: a) five Engines, b) one Aerial 35’, c) one Heavy Rescue, d) one Light Rescue, e) one HazMat Response Truck, f) one Wildland Truck, g) four Ambulances, h) one Boat, and i) Rescue supply trailer, mass casualty trailer, air trailer.

11.2.4 Fire Pre-Plans

The SRSFD develops Fire Control Preplans for each major facility using a standard template and procedure 2Q2-4, *Fire Control Pre-Plan Development*⁹⁶. The plans for SWPF facilities including the Process Facility (221-J), the Temporary Tank Farm (221-5J), the Administration Building (704-J) and the Warehouse (763-S). The information contained in the pre-plans is a combination of data gathered by the SRSFD during facility walkdowns, and information provided to them from the SWPF Fire Protection, Emergency Management, and Radiological Experts within facility operations. These pre-plans are listed in section 10.10.2 and are owned by the SRSFD. The SRSFD performs periodic walkdowns of the SWPF facilities to verify the pre-plan accuracy. Periodic updates of the pre-plans are made on a maximum of a three year schedule.

11.3 Wildland Fire Management

The SRS is surrounded by woodland areas and are managed by the U.S. Forest Service to prevent the threat of wildland fire. In addition, the U.S. Forest Service cleared the land of trees around the SWPF facilities to create a large buffer between the woodlands and the structures. The United States Forest Service-Savannah River has the role of providing a Wildland Fire Management Program for the site through an inter-agency agreement (DE-EM-0003622, *Interagency Agreement*¹⁰⁵) with DOE-Savannah River. The SRSFD acts in a supporting role only. The overall SRS Wildland Fire Management Program also includes the area surrounding SWPF.

Appendix A, Terms and Definitions

1. **Assessment:** A formal and documented evaluation of a topic of interest (e.g., program, document, facility) that is intended to determine its conformance to requirements.
 2. **Combustible Liquid:** A liquid having a closed cup flash point at or above 100 degrees Fahrenheit (°F) (37.8 degrees Celsius [°C]). Combustible liquids are subdivided as Class II and Class III liquids.
 - Class II liquids shall include those having a flash point at or above 100°F (37.8°C) and below 140°F (60°C).
 - Class IIIA liquids shall include those having a flash point at or above 140°F (60°C) and below 200°F (93°C).
 - Class IIIB liquids shall include those having a flash point at or above 200°F (93°C).
 3. **Combustible Loading:** A general reference to the presence, quantity and hazard level of combustibles in a facility.
 4. **Documented Safety Analysis:** A hazard and risk analysis of a facility that handles nuclear materials. The purpose of the analysis is to identify the operating conditions, safe boundaries, and hazard controls necessary for ensuring safety to workers, the public, and the environment.
 5. **Equivalency (Report):** A technical report prepared to demonstrate that an apparent non-compliant condition meets the intent and objectives of a requirement.
 6. **Exemption (Report):** A technical report prepared to demonstrate that a non-compliant condition due to its unique aspects should be relieved of the need to meet a specific requirement.
 7. **Fire Detection_Fire Suppression Cognizant System Engineer:** The engineer who serves as the technical authority of the fire systems and the associated documents.
 8. **Fire Hazards Analysis:** A comprehensive assessment of the risks from fire within individual fire areas in a building or structure in relation to Fire Protection systems and programs. The analysis is developed to ascertain whether applicable DOE Fire Protection criteria are met. An FHA is used as a management tool to identify the fire risks present in an area, building, or structure; identify Fire Protection systems; and to document if the Fire Protection provided is adequate to control the risks.
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Appendix A, Terms and Definitions (cont)

9. **Fire Patrol:** A trained person assigned to tour a designated zone or affected area to ensure conditions (acceptable housekeeping, new work activities, change in operating conditions, new ignition sources, etc.) are maintained such that a fire watch is not required.
 10. **Fire Protection Coordinator:** Individual who is the primary point of contact for coordination of fire protection-related activities and carries out various fire prevention programs.
 11. **Fire Protection Engineer:** A person meeting the qualifications for a Fire Protection Engineer as defined in DOE-STD-1066-99, *Fire Protection Design Criteria*¹¹, and serves as a Subject Matter Expert.
 12. **Fire Protection Lead:** The Fire Protection Engineer who is responsible for overseeing the daily operations of the Fire Protection Program.
 13. **Fire Protection Program Manager:** This position handles the general management issues of the Fire Protection Program and is responsible for its implementation.
 14. **Fire Watch:** A person trained in the use of Fire Protection equipment and continuously posted in the area during hot work and for the specified time after the hot work is completed to maintain safe working conditions, fight incipient fires, and protect the hot work operator.
 15. **Flammable Liquids:** Any liquid that has a closed cup flash point below 100°F (37.8°C) and a Reid vapor pressure not exceeding 40 pounds per square inch absolute (2068.6 Millimeters of mercury) at 100°F (37.8°C), as determined by American Society for Testing and Materials D 323, *Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method)*¹⁰⁶. Flammable liquids shall be further classified as follows:
 - Class IA liquids shall include those having a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C).
 - Class IB liquids shall include those having a flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C).
 - Class IC liquids shall include those having a flash point at or above 73°F (22.8°C) and a boiling point below 100°F (37.8°C).
 16. **Hot Work:** An activity involving significant ignition sources (e.g., welding, torch cutting, burning, grinding) that are capable of initiating fires or explosions.
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Appendix A, Terms and Definitions (cont)

17. **Ignition sources:** An item or substance capable of an energy release sufficient to ignite a combustible material (e.g., hot surfaces, sparks, flames).
 18. **Impairment:** A condition where a Fire Protection or life safety system, component, function of portion, thereof, is out of service, or does not meet its design criteria.
 19. **Inspection:** A documented evaluation of equipment or conditions that are intended to ensure the safety and integrity of the items under review.
 20. **Ordinary Combustible:** A commonly used combustible material in solid form (e.g., paper, wood, rubber, plastics).
 21. **Life Safety:** Conditions that affect the safe egress from a facility during an emergency.
 22. **Qualifications:** The general reference to the suitability of an individual for a specific position which considers their education, experience, training (coursework and required reading) as well as any relevant certifications or other evidences of competency (e.g. practical factors).
 23. **Technical Safety Requirement:** A specific mean or method (e.g., safety limits, operating limits, surveillances, administrative controls) of operations established to support the required operating conditions, safe boundaries, and hazard controls identified in the DSA.
 24. **TSR Document:** The document that summarizes all the TSRs for a facility handling nuclear materials.
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12.0 REFERENCES

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- ¹ DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*. U.S. Department of Energy, Washington, D.C.
 - ² S-TSR-J-00001, *SWPF Technical Safety Requirements*. Parsons, Aiken, South Carolina.
 - ³ DOE O 420.1B, *Facility Safety*. U.S. Department of Energy, Washington, D.C.
 - ⁴ DOE O 420.1C, *Facility Safety*. Chg. 1. U.S. Department of Energy, Washington, D.C.
 - ⁵ PL-EN-5024, *SWPF Fire Protection Management and Administration*. Parsons, Aiken, South Carolina.
 - ⁶ 10 CFR 830, *Nuclear Safety Management*.
 - ⁷ 10 CFR 851, *Worker Safety and Health Program*.
 - ⁸ 29 CFR 1910, *Occupational Safety and Health Standards*.
 - ⁹ 29 CFR 1926, *Safety and Health Regulations for Construction*.
 - ¹⁰ DOE Order 420.1B, *Facility Safety*. U.S. Department of Energy, Washington, D.C.
 - ¹¹ DOE-STD-1066-99, *Fire Protection Design Criteria*. U.S. Department of Energy, Washington, D.C.
 - ¹² DOE O 151.1C, *Comprehensive Emergency Management System* U.S. Department of Energy, Washington, D.C.
 - ¹³ DOE O 450.2, *Integrated Safety Management* U.S. Department of Energy, Washington, D.C.
 - ¹⁴ DOE P 450.4A, *Integrated Safety Management System Policy* U.S. Department of Energy, Washington, D.C.
 - ¹⁵ DOE O 225.1B, *Accident Investigations* U.S. Department of Energy, Washington, D.C.
 - ¹⁶ DOE 414.1C, *Quality Assurance* U.S. Department of Energy, Washington, D.C.
 - ¹⁷ DOE O 426.2, *Personnel Selection, Training, Qualification, and Certification Requirements for DOE Nuclear Facilities* U.S. Department of Energy, Washington, D.C.
 - ¹⁸ DOE O 433.1B, *Maintenance Management Program for DOE Nuclear Facilities* U.S. Department of Energy, Washington, D.C.
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- ¹⁹ DOE O 231.1B, Admin Chg. 1, *Environment, Safety and Health Reporting* U.S. Department of Energy, Washington, D.C.
- ²⁰ DOE-STD-1073-2003, *Configuration Management*. U.S. Department of Energy, Washington, D.C.
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- ²² DOE-STD-3006, *Planning and Conduct of Operational Readiness Reviews*. U.S. Department of Energy, Washington, D.C.
- ²³ DE-AC09-02SR22210, *Design, Construction, and Commissioning of a Salt Waste Processing Facility (SWPF)*
- ²⁴ 00-700-24032, *DOE Order 420.1B/C Chg. 1 Composite Requirements*. Interoffice Correspondence from Bill Brasel to Brad Kerr. Parsons, Aiken, South Carolina. February 20th, 2018.
- ²⁵ 00-700-23378, *Response to OAM-15-006, Implement DOE O 420.1C*. Letter from Louis M. Jackson to Samuel A. Stewart. January 16th, 2015.
- ²⁶ V-PMP-J-00004, *SWPF Project Management Plan*. Parsons, Aiken, South Carolina.
- ²⁷ S-SAR-J-00002, *SWPF Documented Safety Analysis*. Parsons, Aiken, South Carolina.
- ²⁸ F-FHA-J-00001, *SWPF Project Fire Hazards Analysis*. Parsons, Aiken, South Carolina.
- ²⁹ F-FHA-J-00002, *SWPF J-Area Warehouse Fire Hazards Analysis (Building 763-S)*. Parsons, Aiken South Carolina.
- ³⁰ V-ESR-J-00025, *SWPF Project Interface Management Plan*. Parsons, Aiken, South Carolina.
- ³¹ P-ESR-J-00011, *SWPF Operations Requirements Document*. Parsons, Aiken, South Carolina.
- ³² P-CMP-J-00001, *SWPF Conduct of Operations Manual*. Parsons, Aiken, South Carolina.
- ³³ P-EIP-J-00001, *SWPF Integrated Safety Management System Description*. Parsons, Aiken, South Carolina.
- ³⁴ S-RCP-J-00001, *SWPF Standards/Requirements Identification Document*. Parsons, Aiken, South Carolina.
- ³⁵ S-RCP-J-00002, *Standards/Requirements Identification Document Compliance Plan*. Parsons, Aiken, South Carolina.
- ³⁶ PCAR-FP-001, *DOE Order 420.1B Chapter II, Facility Safety- Fire*. Parsons, Aiken, South Carolina.
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- ³⁷ PCAR-FP-002, *DOE-STD-1088-95, Fire Protection for Relocatable Structures*. Parsons, Aiken, South Carolina.
- ³⁸ PCAR-FP-003, *DOE O 420.1C, Chapter II, DOE O 420.1C Chg.1, Chapter II Fire Protection*. Parsons, Aiken, South Carolina.
- ³⁹ V-IM-J-00001, *SWPF Organization, Roles, and Responsibilities Manual*. Parsons, Aiken, South Carolina.
- ⁴⁰ PL-TR-1817, *SWPF Fire Protection Training Program Description*. Parsons, Aiken, South Carolina.
- ⁴¹ P-DB-J-00002, *SWPF Design Criteria Database*. Parsons, Aiken, South Carolina.
- ⁴² Specification 07841, *Through-Penetration Firestop Systems*. Parsons, Aiken, South Carolina.
- ⁴³ Specification 07842, *Fire Resistive Joint Systems*. Parsons, Aiken, South Carolina.
- ⁴⁴ Specification 08110, *Standard Steel Doors and Frames*. Parsons, Aiken, South Carolina.
- ⁴⁵ Specification 08331, *Overhead Coiling Doors*. Parsons, Aiken, South Carolina.
- ⁴⁶ Specification 10520, *Fire Protection Specialties*. Parsons, Aiken, South Carolina.
- ⁴⁷ Specification 15330, *Fire Protection Wet Pipe Sprinkler Systems*. Parsons, Aiken, South Carolina.
- ⁴⁸ Specification 15331, *Fire Protection Interior Distribution System*. Parsons, Aiken, South Carolina.
- ⁴⁹ Specification 15332, *Fire Protection Underground Water Supply System*. Parsons, Aiken, South Carolina.
- ⁵⁰ Specification 15820, *Duct Accessories*. Parsons, Aiken, South Carolina.
- ⁵¹ Specification 16721, *Fire Alarm and Detection System*. Parsons, Aiken, South Carolina.
- ⁵² NFPA 13, *Standard for the Installation of Sprinkler Systems*. 2002 edition. National Fire Protection Association. 2002.
- ⁵³ NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*. 2003 Edition. National Fire Protection Association. 2003.
- ⁵⁴ NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*. 2002 Edition. National Fire Protection Association. 2002.
- ⁵⁵ NFPA 70, *National Electrical Code*. 2002 Edition. National Fire Protection Association. 2002.
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- ⁵⁷ NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*. 2003 Edition. National Fire Protection Association. 2003.
- ⁵⁸ IBC-2003, *International Building Code*. International Code Council Falls Church, Virginia.
- ⁵⁹ NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems* 2017 Edition. National Fire Protection Association. 2017
- ⁶⁰ NFPA 72, *National Fire Alarm and Signaling Code*. 2019 Edition. National Fire Protection Association. 2019.
- ⁶¹ *Salt Waste Processing Facility Project Procedures Manual*. Parsons, Aiken, South Carolina.
- ⁶² PL-NS-5500, *Safety Basis Implementation Plan*. Parsons, Aiken, South Carolina.
- ⁶³ P-CDM-J-00001, *Configuration Management Plan*. Parsons, Aiken, South Carolina.
- ⁶⁴ PL-PR-6001, *Acquisition Process System Description*. Parsons, Aiken, South Carolina.
- ⁶⁵ PL-MN-8709, *Work Control Program Plan*. Parsons, Aiken, South Carolina.
- ⁶⁶ PL-MN-8704, *Nuclear Maintenance Management Program Plan*. Parsons, Aiken, South Carolina.
- ⁶⁷ V-ESR-J-00017, *SWPF Fire Protection Water System Interface Control Document (ICD-17)*. Parsons, Aiken, South Carolina.
- ⁶⁸ PL-OP-8526, *SWPF Chemical Control Plan*. Parsons, Aiken, South Carolina.
- ⁶⁹ PL-OP-8519, *SWPF Plant Operations Annual Assessment Plan*. Parsons, Aiken, South Carolina.
- ⁷⁰ PL-SH-4300, *SWPF Industrial Hygiene Program Plan*. Parsons, Aiken, South Carolina.
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- ⁷⁴ V-ESR-J-00012, *SWPF Emergency Response Interface Control Document (ICD-12)*. Parsons, Aiken, South Carolina.
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