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DISCLAIMER

The analyses contained in this document were developed by Bechtel SAIC Company, LLC (BSC) and are intended solely for the use of BSC in its work for the Yucca Mountain Project

CONTENTS

FIGURES

Page

TABLES

Page

ACRONYMS

AF	Aging Facility
ADMF	Administration Facility (Area 620)
AOSF	Aging Overpack Staging Facility
AS	Administration Security Stations (Areas 65A and 65B)
BSC	Bechtel SAIC Company, LLC
CCCF	Central Control Center Facility
CFR	Code of Federal Regulations
CRS	Cask Receipt Security Station (Area 30B)
CS	Craft Shops (Area 71A)
CSS	Central Security Station (Area 30A)
CT	Cooling Tower
DBF	Design basis fire
DFS	Diesel Fuel Storage Area
DOE	U.S. Department of Energy
DPC	Dual Purpose Canister
EDG	Emergency Diesel Generator Facility
FHA	Fire hazard analysis
FRMF	Fire, Rescue and Medical Facility (Area 63A)
FRO	Fire/Rescue Organization
FS	Fueling Stations (Area 700)
FWF	Fire Water Facility(ies) (Areas 28A, 28B & 28E)
GROA	Geologic Repository Operations Area
HEMF	Heavy Equipment Maintenance Facility (Area 220)
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
ITS	Important to safety
ITWI	Important to Waste Isolation
LLWF	Low-Level Waste Facility (Area 160)
LSC	Life Safety Code (NFPA 101)
MPFL	Maximum possible fire loss
MTHM	Metric ton heavy metal
NFPA	National Fire Protection Association
NPS	North Perimeter Security Station
NRC	U.S. Nuclear Regulatory Commission

REMY	Rail Equipment and Maintenance Yard
SDGF	Standby Diesel Generator Facility (Area 26B)
SF	13.8 kV Switchgear Facility (Area 27B)
SSC	Structures, systems or components
TEV	Transport emplacement vehicle
TAD	Transportation Aging and Disposal canister
UF	Utilities Facility (Area 25A)
VM	Vehicle Maintenance and Motor Pool (Area 690)
WCS	Warehouse/Central Receiving (Area 68A)
WNNRF	Warehouse and Non-Nuclear Facility (Area 230)
YMP	Yucca Mountain Project

1. PURPOSE

This Fire Hazard Analysis (FHA) evaluates comprehensively and qualitatively the risk from fire within individual surface facilities at the Yucca Mountain Project (YMP) to ascertain whether the *Fire Protection Program* fire safety objectives are met (Reference 2.1.2, Section 4.2).

1.1 OBJECTIVE

The objective of this FHA is to assure the requirements established for the comprehensive fire and related hazards protection program for the YMP Project surface facilities are sufficient to minimize the potential for:

- The occurrence of a fire or related event;
- A fire that causes an unacceptable onsite or offsite release of hazardous or radioactive material that will threaten the health and safety of employees, the public, or the environment;
- Vital U.S. Department of Energy (DOE) programs suffering unacceptable interruptions as a result of fire and related hazards;
- Property losses from a fire and related events exceeding limits established by DOE; and
- Critical process controls and safety class systems [systems Important to Safety] being damaged as a result of fire and related events.

(Reference 2.2.1.21, Section 4.2(1))

The fire hazard analysis accomplishes the following objectives:

- Considers potential in-situ and transient fire hazards;
- Determines the consequences of fire in any location in the GROA surface facilities on the ability to minimize and control the release of radioactivity to the environment; and
- Specifies measures for fire prevention, fire detection, fire suppression, and fire containment for each fire area containing structures, systems and components (SSC) Important to Safety (ITS) in accordance with U.S. Nuclear Regulatory Commission (NRC) Guidelines and Regulations.

(Reference 2.2.1.23, Chapter C, Section 1.2)

This analysis will be revised as necessary to reflect plant design and operational changes.

1.2 SCOPE

This FHA is an overall assessment of the Geologic Repository Operations Area (GROA) surface facilities. The analysis is an assessment of the fire safety topics identified in Regulatory Guide 1.189, *Fire Protection for Operating Nuclear Power Plants* (Reference 2.2.1.23); DOE-STD-1066-99, *Fire Protection Design Criteria* (Reference 2.2.1.20); and DOE Order 420.1A, *Facility Safety* (Reference 2.2.1.21). In addition, the FHA provides the consequence evaluation of a single design-basis fire scenario for each surface facility, including the loss of fire suppression.

The FHA also identifies facility design features and fire hazard mitigating features for personnel safety and property protection that is commensurate with NRC and DOE criteria. This is accomplished by reviewing the facility preliminary layout drawings, the *Basis of Design for the TAD Canister-Based Repository Design Concept* (Reference 2.2.1.3) and the *Project Design Criteria Document* (Reference 2.2.1.4).

The FHA assures the current design is in accordance with the applicable codes, standards and project requirement documents. To support the license application, design requirements to mitigate fire hazards have been identified and are included in Section 7.

The FHA is also an assessment of the potential exposure hazards that may be presented by other facilities as they appear on the *Geologic Repository Operations Area North Portal Site Plan* (Reference 2.2.1.5).

The following GROA areas are addressed by facility-specific fire hazards analyses that are included in the site fire hazards analysis by reference:

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)
4. Central Control Center Facility (Area 240) (Reference 2.2.1.15)
5. Emergency Diesel Generator Facility (Area 26D) (Reference 2.2.1.16)
6. Initial Handling Facility (Area 51A) (Reference 2.2.1.14)

The Subsurface (Area 800) is beyond the scope of this analysis. A separate FHA will be prepared to address the subsurface.

1.3 LIMITATIONS

The level of design for the YMP site is preliminary. This analysis documents the best available information at the time of document preparation. During detailed design when additional design information is available, this FHA will be updated. Once operations begin, this FHA will be reviewed annually and updated as required based on any identified facility changes.

Where initial design information does not allow for a complete analysis, specific assumptions related to the design are documented in Section 3.

The identification of SSCs categorized as ITS is preliminary and is based on the Basis of Design for the *TAD Canister-Based Repository Design Concept* (Reference 2.2.1.3) or as determined by an on-going analysis by the Preclosure Safety Analysis organization.

Combustible material quantities for each facility are preliminary and are based on engineering judgment. Detailed design information such as cable routing and the specific types of cabling material will be developed in detail design. This information may change the amount of combustible material quantities within some fire areas. Detail design will allow for evaluation of cable routing and exposed cabling.

The results from this document are not to be used directly for procurement, fabrication, or construction.

2. REFERENCES

2.1 PROCEDURES/DIRECTIVES

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2.1.2 BSC 2006. *Fire Protection Program*. EM-DIR-02, Rev. 0. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20060227.0010.

2.1.3 Dyer, J.R. 2000. "Exploratory Studies Facilities (ESF) Fire Fighting Policy." Letter from J.R. Dyer (DOE/YMSCO) to G.E. Dials (CRWMS M&O), November 8, 2000, OPE: RBB-0104. ACC: MOL.20001204.0312 [DIRS 155248].

2.2 DESIGN INPUTS

This section identifies and documents technical product inputs and sources of input used in the development of this document.

2.2.1 Criteria

The fire protection design criteria supporting the preliminary and final design of the fire protection systems are based on information in the *Project Design Criteria Document* (Reference 2.2.1.4, Section 4.9.1).

2.2.1.1 BSC 2004. *Preliminary Hazards Analysis for License Application Study.* 000-30R-HPYK-00100-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20040610.0002.

2.2.1.2 BSC 2004. *Wildfire Exposure Calculation.* 000-00C-MGR0-00400-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20040211.0001.

2.2.1.3 BSC 2006. *Basis of Design for the TAD Canister-Based Repository Design Concept.* 000-3DR-MGR0-00300-000-000. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20061023.0002.

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2.2.1.9 BSC 2007. *Monitored Geologic Repository Fire Protection Wet Pipe Sprinkler System Piping and Instrument. Diagram.* 000-M60-FPS0-00101-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070326.0008.

2.2.1.10 BSC 2007. *Monitored Geologic Repository Fire Protection Double-Interlock Preaction Piping and Instrument. Diagram.* 000-M60-FPS0-00103-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070326.0010.

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2.2.1.14 BSC 2007. *Initial Handling Facility Fire Hazard Analysis.* 51A-M0A-FP00-00100-000-00B. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070724.0006.

2.2.1.15 BSC 2007. *Central Control Center Facility Fire Hazard Analysis.* 240-M0A-FP00-00100-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070612.0002

2.2.1.16 BSC 2007. *Emergency Diesel Generator Facility Fire Hazard Analysis.* 26D-M0A-FP00-00100-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20070329.0010.

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2.2.1.18 Chagnon, C.W. 2004. "Naval SNF Waste Package Temperatures During a Fire." Interoffice memorandum from C.W. Chagnon (BSC) to D.C. Richardson, March 22, 2004, 0322040858. ACC: MOL.20040414.0090 [DIRS 168469].

2.2.1.19 DOE (U. S. Department of Energy) G 440.1-5. 1995. *Implementation Guide for Use with DOE Orders 420.1 and 440.1 Fire Safety Program.* Washington, D.C.: U.S. Department of Energy. ACC: MOL.20050518.0094 [DIRS 144423].

2.2.1.20 DOE-STD-1066-99. 1999. *Fire Protection Design Criteria.* Washington, D.C.: U.S. Department of Energy. TIC: 249984 [DIRS 154954].

2.2.1.21 DOE O 420.1A. 2002. *Facility Safety.* Washington, D.C.: U.S. Department of Energy. ACC: MOL.20050411.0135 [DIRS 159450].

2.2.1.22 NFPA (National Fire Protection Association) 2003. *Fire Protection Handbook.* 19th Edition. Two volumes. Quincy, Massachusetts: National Fire Protection Association. TIC: 254223 [ISBN: 0-87765-474-3].

2.2.1.23 Regulatory Guide 1.189. 2001. *Fire Protection for Operating Nuclear Power Plants.* Washington, D.C.: U.S. Nuclear Regulatory Commission. ACC: MOL.20060105.0191 [DIRS 155040].

2.2.2 Codes and Standards

2.2.2.1 29 CFR 1910. 2006. Labor: Occupational Safety and Health Standards. Internet Accessible [DIRS 177507].

2.2.2.2 ANSI/IEEE Std 383-1974. 1982. *IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations.* New York, New York: Institute of Electrical and Electronics Engineers. TIC: 242995 [DIRS 160801].

2.2.2.3 IEEE Std 1202-2006. 2006. *IEEE Standard for Flame-Propagation Testing of Wire and Cable.* New York, New York: Institute of Electrical and Electronics Engineers. TIC: 258697 [ISBN: 0738150002].

2.2.2.4 ICC (International Code Council) 2003. *International Building Code 2000, with Errata to the 2000 International Building Code.* Falls Church, Virginia: International Code Council. TIC: 251054; 257198 [ISBN: 1-892395-25-8].

2.2.2.5 NFPA 10. 2006. *Standard for Portable Fire Extinguishers.* 2007 Edition. Quincy, Massachusetts: National Fire Protection Association. TIC: 258708 [DIRS 177964] [ISBN: 0-887765-646-0].

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2.2.2.8 NFPA 22. 2003. *Standard for Water Tanks for Private Fire Protection.* 2003 Edition. Quincy, Massachusetts: National Fire Protection Association. TIC: 254860 [DIRS 165075] [ISBN: 0-887765-647-9].

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2.2.2.19 NFPA 14. 2006. *Standard for the Installation of Standpipe and Hose Systems.* 2007 Edition. Quincy, Massachusetts: National Fire Protection Association. TIC: 258714 [DIRS 177969] [ISBN: 0-887765-647-9].

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2.2.2.22 NFPA 69. 2002. *Standard on Explosion Prevention Systems.* 2002 Edition. Quincy, Massachusetts: National Fire Protection Association. TIC: 253685 [DIRS 160953] [ISBN: 0-887765-649-5].

2.3 DESIGN CONSTRAINTS

No Design Constraints were identified in the development of this FHA.

2.4 DESIGN OUTPUTS

The conclusions of this analysis will be used as input for other calculations, analyses and drawings.

3. ASSUMPTIONS

3.1 ASSUMPTIONS REQUIRING VERIFICATION

The following assumptions require verification, and are therefore being tracked in the Calc Trac Database.

3.1.1 Fire-Fighting

Assumption: Fire protection systems provide for, and credit access to, a fully staffed completely equipped and adequately trained Fire/Rescue Organization (FRO) capable and committed to respond to fires and related emergencies onsite in a timely and effective manner.

Rationale: In order to provide defense-in-depth (See Section 4.3), manual firefighting capability will be required. A YMP full time Site FRO is anticipated to be established and fully functional prior to start of operations.

3.1.2 Non-Nuclear Hazards Analysis

Assumption: The non-nuclear external and internal hazards analyzed in this document are similar to those established for the previous design concepts, as documented in the current *Preliminary Hazards Analysis for License Application Study* (Reference 2.2.1.1). For this analysis, the non-nuclear facilities are assumed to be similar to the previously analyzed non-nuclear facilities.

Rationale: The analysis of non-nuclear hazards, for the TAD canister-based design, will be documented in a future revision to the *Preliminary Hazards Analysis for License Application Study*. Previous design iterations analyzed the external and internal hazards for facilities of similar functions to the current non-nuclear facilities. Therefore, it is reasonable to assume that these facilities and systems will identify the same hazards.

3.1.3 Heavy Load Transport Vehicles

Assumption: It is assumed that the site transporter/crawler, cask tractor and transfer trailer, which are utilized to transport waste packages between facilities are non-combustible vehicles powered by diesel fuel. These vehicles are assumed to contain 100 gallons of diesel fuel. These vehicles will utilize non-combustible hydraulic fluid.

It is further assumed that the transport emplacement vehicle and the drip shield emplacement equipment are electrically powered rail vehicles. These vehicles will be of non-combustible construction.

Rationale: This assumption is based on the best available information as of July 2007.

3.1.4 Locomotive Fuel Spills

Assumption An accident involving a diesel fuel powered locomotive is assumed to create a fuel spill of 100-gallons. The fuel is anticipated to spill, pool for a diameter of 30-feet, and then ignite.

Rationale Locomotive fuel tanks contain hundreds of gallons of fuel. In the event of an accident involving the locomotive fuel tank, it is reasonable to postulate that a portion of the tank's content will spill out of the tank onto the ground. The spill diameter of 30-feet is based on the liquid fuel spilling and spreading into a circular pattern on the ground. The Site FRO is likely to respond shortly after an accident scenario, provide diking of the fuel, and disperse a foam water blanket to suppress the combustible fuel vapors. The quantities of 100-gallons and 30-feet distance are used as bases for this analysis and may be increased/decreased in future analyses.

3.2 ASSUMPTIONS NOT REQUIRING VERIFICATION

3.2.1 Facility Design Basis Fire

Assumption: The design basis fire (DBF) within each facility/fire area assumes and evaluates the consequences of the worst-case fire that can be postulated for the hazards within a fire area. This includes both in-situ and transient combustibles. It also assumes a fire will occur while the installed automatic fire suppression systems malfunction and there is no manual response to suppress the fire. The fire is assumed to consume all available combustibles within the fire area. It is assumed that a fire may occur at any time but it is not postulated to occur simultaneously with another Category 1- or 2-design basis event (DBE).

Rationale: The DBF is postulated at the location within the fire area that produces the most severe fire. Worst-case fires are not postulated to be concurrent with non-fire-related failures, other plant accidents, or the most severe natural phenomena (Reference 2.2.1.23, Chapter C, Section 1.2).

3.2.2 Site Design Basis Fire

Assumption: The design basis fire for the site is assumed to be a wild land fire that may occur at any time.

Rationale: A wild land fire is expected to consume all of the combustible vegetation within the fire area and could potentially expose more than one surface facility; making a wild land fire the worst-case exterior fire.

3.2.3 High-Value Property

Assumption: High-Value property is individual pieces of equipment and/or systems with a value exceeding $1-million (Reference 2.2.1.20, Section 5.3.1).

Rationale: The assigned values do not require verification because they represent costs to establish a rough order-of-magnitude dollar estimate for property loss and only approximate values are required for this FHA. An order-of-magnitude change in these values will not impact the conclusions of this FHA.

3.2.4 Training

Assumption: Personnel trained in the use of portable fire extinguishers are assumed to voluntarily conduct firefighting efforts on fires in the incipient stage.

Rationale: BSC Training, in conjunction with Safety and Health, will develop a training course for incipient stage fire fighting. The training course will be available for all on-site personnel. This is current Office of Repository Development (ORD) policy (Reference 2.1.3).

3.2.5 Fossil-Fueled Vehicles

Assumption: It is assumed that fossil-fueled vehicles (buses, site owned maintenance/delivery vehicles, FRO response vehicles, security vehicles, etc) will be present on site. Whereas, private, employee-owned vehicles shall not be permitted within the GROA. It is further assumed that the maximum amount of fuel in these vehicles is 100 gallons.

Rationale: This assumption is based on standard practices at industrial facilities.

3.2.6 Low Level Waste Facility Occupancy Classifications

Assumption: It is assumed that the Low-Level Waste Facility (LLWF) is a Type II B non-combustible construction facility. It is further assumed that the Use and Occupancy Classification for the LLWF is Storage S-2.

Rationale: The LLWF does not handle high-level waste or spent nuclear fuel, however radioactive waste is handled inside the facility. No ITS or ITWI SSCs are present inside the facility. The *Project Design Criteria* Document (Reference 2.2.1.4, Table 4.2-4) lists the other non-ITS non-ITWI facilities as Type II B non-combustible construction. The one exception to this listing in the Central Control Center Facility, which is a Type I B non-combustible construction facility. Therefore, it is reasonable to conclude that the LLWF is a Type II B non-combustible construction.

The LLWF is utilized to store low-level waste. The method and types of storage within the facility have not yet been defined; but are assumed similar to the Warehouse/Central Receiving and the Warehouse and Non-Nuclear Receipt Facility, both of which are listed as Storage S-2 (Reference 2.2.1.4, Table 4.2-4).

3.2.7 Balance of Plant Facility Construction

Assumption: It is assumed that the non-nuclear (balance of plant) facilities are single story structures.

Rationale: This assumption is based on the current site design concept as it is more cost-effective to erect single-story structures. Furthermore, the area allocated to the site allows for the use of single story structures with their larger footprints.

3.2.8 Receipt Facility Fire Hazard Analysis

Assumption: It is assumed that a separate Fire Hazard Analysis will be generated for the Receipt Facility (Area 200).

Rationale: Separate Fire Hazard Analyses have been issued for the remaining ITS facilities and the Central Control Center Facility. A draft Fire Hazard Analyses for the Receipt Facility is currently in progress. It is reasonable to assume that the document will be issued.

4. METHODOLOGY

4.1 QUALITY ASSURANCE

This analysis was prepared in accordance with EG-PRO-3DP-G04B-00037, *Calculations and Analyses* (Reference 2.1.1). The Fire Protection SSCs discussed in this analysis are classified as Non-ITS per the *Basis of Design for the TAD Canister-Based Repository Design Concept* (Reference 2.2.1.3, Section 18.1.2). Therefore, the approved version of this analysis is classified as QA: N/A.

4.2 USE OF SOFTWARE

No software routines or models were developed or used in the preparation of this analysis. No calculations were performed in this analysis.

4.3 GENERAL

This analysis was prepared by qualified Fire Protection Engineers as directed by DOE O 420.1A, (Reference 2.2.1.21, Section 4.2.1), as defined in DOE Standard 1066-99 (Reference 2.2.1.20, Section 4), and Regulatory Guide 1.189 (Reference 2.2.1.23, Chapter C, Section 1.6).

The FHA begins with a review of the project documents (site and facility layout, design criteria, basis of design, etc.), regulatory requirements and industry codes/standards.

The FHA objectives are accomplished through the employment of a “defense-in-depth” approach to fire protection in order to achieve the required degree of personnel, facility, and environmental safety. Defense-in-depth means that fire safety is an integral part of all activities and that facilities are designed with both active and passive fire protection features such that reliance is not placed on only one means to ensure a acceptable level of fire safety (Reference 2.2.1.19, Section III, paragraph 2.0).

The FHA utilizes a deterministic approach in each fire area to identify potential fire hazards inherent in the design. The FHA identifies the fire protection features that mitigate these hazards. It assures the facility design and processes can be safely controlled or stabilized during

and after a fire event. The FHA seeks to demonstrate that, as the result of a fire, facilities and processes presenting a potential for radioactive or toxic chemical release are properly controlled and designed to allow for a "safe state" configuration.

The primary documents used in the identification and classification of the fire hazards include the following:

- Facility Architectural Drawings
- *Project Design Criteria Document* (Reference 2.2.1.4)
- *Basis of Design for the TAD Canister-Based Repository Design Concept* (Reference 2.2.1.3)

The consequences of an assumed single DBF event (Assumption 3.2.1) are determined, and then fire protection design features are identified to mitigate or control the event.

This FHA contains an assessment of the following fire safety issues:

- The NRC (U. S. Nuclear Regulatory Commission) fire protection requirements and guidance that apply
- Amounts, types, configurations, and locations of cable insulation and other combustible materials
- In-situ fire hazards
- Automatic fire detection and suppression capability
- Reliance, on and qualifications of, fire barriers
- Location and type of manual firefighting equipment and accessibility for manual fire fighting

(Reference 2.2.1.23, Chapter C, Section 1.2, pages 18 and 19)

This FHA also contains a conservative assessment of the following fire safety issues:

- Description of construction
- Description of critical process equipment
- Description of high-value property
- Description of fire hazards
- Description of operations
- Potential for a toxic, biological or radiation incident due to a fire
- Damage potential: Maximum Possible Fire Loss (MPFL)
- Protection of important to safety systems
- Life safety considerations
- Recovery potential
- Exposure fire potential and the potential for a fire spread between two fire areas.

(Reference 2.2.1.19, Section IV, Paragraph 4.5)

The fire safety items below are generic and apply to the fire areas described. They include the following:

- Natural hazards (Section 6.1.9)
- Emergency Planning (Section 6.1.7)
- Fire/Rescue Organization (FRO) response (Section 6.1.8)
- Security and safeguards considerations related to fire protection (Section 6.1.1.5)
- Effect of significant fire safety deficiencies (Section 6.1.13).

(Reference 2.2.1.19, Section IV, Paragraph 4.5)

4.4 FUNCTION AND ARRANGEMENT

4.4.1 General Operations Description

This FHA encompasses the GROA surface facilities and associated areas shown on the *Geologic Repository Operations Area North Portal Site Plan* (Reference 2.2.1.5) and delineated in Section 1.2. The GROA contains facilities that receive and handle spent nuclear fuel and high-level waste in preparation for underground emplacement within the GROA. This area also includes those facilities that support the receipt, handling and emplacement activities at the GROA.

The Aging Facility (AF), which is located to the north west of the GROA, as shown on the *Aging Facility General Arrangement Aging Pad Area Plan* (Reference 2.2.1.17), is also included in this analysis. Spent nuclear fuel will be stored at the Aging Facility until it is ready for emplacement.

4.4.2 General Construction Description

Table 1 identifies the GROA surface structures, their construction, use and occupancy classification as identified in the *Project Design Criteria Document* (Reference 2.2.1.4, Table 4.2-4) and their occupancy classification based on the *Life Safety Code* (LSC) (Reference 2.2.2.16).

Table 1 Use, Construction and Occupancy Classification

Area Code	Facility Description [1]	IBC Use Classification [2]	IBC Construction Classification [2]	LSC Occupancy Classification [4]
050	Wet Handling Facility	F 2	I B	Special Purpose Industrial
060	Canister Receipt and Closure Facility 1	F-2 and B	I B	Special Purpose Industrial
070	Canister Receipt and Closure Facility 2	F-2 and B	I B	Special Purpose Industrial
080	Canister Receipt and Closure Facility 3	F-2 and B	I B	Special Purpose Industrial
160	Low-Level Waste Facility	S-1 [3]	II B [3]	Special Purpose Industrial
200	Receipt Facility	F-2	I B	Special Purpose Industrial
220	Heavy Equipment Maintenance Facility	S-1 and B	II B	Special Purpose Industrial
230	Warehouse and Non-Nuclear Receipt Facility	S-2 and B	II B	Storage
240	Central Control Center Facility	B	I B	New Business
25A	Utilities Facility	F-2	II B	Special Purpose Industrial
26B	Standby Diesel Generator Facility	F2	II B	Special Purpose Industrial
26D	Emergency Diesel Generator Facility	F-2	II B	Special Purpose Industrial
27B	13.8 kV Switchgear Facility	F-2	II B	Special Purpose Industrial
28A	Fire Water Facility	F-2	II B	Special Purpose Industrial
28B	Fire Water Facility	F-2	II B	Special Purpose Industrial
28E	Fire Water Facility	F-2	II B	Special Purpose Industrial
30A	Central Security Station	B and U	II B	New Business
30B	Cask Receipt Security Station	B and U	II B	New Business
30C	North Perimeter Security Station	B	II B	New Business
51A	Initial Handling Facility	F-2	I B	Special Purpose Industrial
620	Administration Facility	A-2	II B	Mixed - New Business and Assembly
63A	Fire, Rescue and Medical Facility	B	II B	Mixed – New Business, New Dormitory and Storage
65A	Administration Security Station	B	II B	New Business
65B	Administration Security Station	B	II B	New Business
68A	Warehouse/Central Receiving	S-2	II B	Storage
690	Vehicle Maintenance and Motor Pool	S-1 and B	II B	Industrial
70B	Fueling Stations	M	II B	Industrial
71A	Craft Shops	S-1, S-2 and B	II B	Industrial

Source: 1) *Geologic Repository Operations Area North Portal Site Plan* (Reference 2.2.1.5)
2) *Project Design Criteria Document* (Reference 2.2.1.4, Table 4.2-4)
3) Assumption 3.2.6
4) Life Safety Code (Reference 2.2.2.16)

4.4.3 Fire Area Boundaries

A fire area is defined as that portion of a building or plant that is separated from other areas by fire barriers, including components of construction such as beams, joists, columns, penetration seals or closures, fire doors, and fire dampers. Fire barriers that define the boundaries of a fire area have a fire-resistance rating of 3-hours or more. (Reference 2.2.1.23, Chapter C, Section 4.1.2.1).

Most of the facilities addressed herein consist of a single fire area. As the details of these facilities mature, they may be subdivided into individual fire areas.

5. LIST OF ATTACHMENTS

Title	Number of Pages

None Used

6. BODY OF FIRE HAZARD ANALYSIS

6.1 GENERAL FEATURES

This FHA identifies the fire protection system design features necessary to minimize both the occurrence and the consequences of fire for the individual surface facilities within the GROA. The design features necessary to meet the design objectives are identified in the following sections.

6.1.1 Life Safety Considerations

6.1.1.1 General

Life safety provisions of the facility design are in accordance with NFPA 101, the *Life Safety Code* (LSC) (Reference 2.2.2.16) (Reference 2.2.1.4, Section 4.9.1.9.1). Compliance with the LSC satisfies the exit requirements of the *International Building Code* (IBC) (Reference 2.2.2.4) and the *Occupational Safety and Health Standard 29 CFR Part 1910* (Reference 2.2.2.1), (Reference 2.2.1.19, Section IV, paragraph 9.3). Life Safety provisions shall also comply with the provisions of 10 CFR Part 851.

Automatic smoke detectors are installed where required. In addition, manual pull stations are installed to allow personnel to activate the fire alarm system. Upon actuation of the fire alarm system, audible and visual indicating devices provide notification to personnel to evacuate the building. The fire alarm signal is transmitted to a facility fire alarm panel, located at the primary entryway to the facility (Reference 2.2.1.3, Section 18.2.2.2.1), and is then transmitted to the main fire alarm panel located in the Fire, Rescue and Medical Facility (Area 63A). Additional

signals are sent via the Digital Control Management Information System (DCMIS) to the continuously monitored fire alarm panel in the control room of the Central Control Center Facility (Area 240) and to the Secondary Alarm Station in the Cask Receipt Security Station (Area 30B) (Reference 2.2.1.6).

Interior finishes of the facilities consist of non-combustible and combustible materials. Exposed interior walls or ceilings (including ceilings formed by the underside of roofs) and any factory-installed facing materials have an Underwriters Laboratories (UL) listed/Factory Mutual (FM) approved surface flame spread rating of 25 or less, and a smoke development rating of 50 or less (Reference 2.2.1.4, Section 4.9.1.9.3).

6.1.1.2 Occupancy

The occupancy classification(s) of occupied facilities is defined in the LSC (Reference 2.2.2.16). Table 1 lists the occupancy classification(s) of each of the occupied surface facilities in the GROA. Facility specific information is provided in the detailed discussions provided herein for each individual surface facility.

6.1.1.3 Means of Egress Features

Emergency exits are available from all areas of the facilities within the LSC allowed maximum travel distance for the specific occupancy, with common path of travel not exceeding the allowed maximum for that occupancy per the LSC. Dead-end corridors meet the requirements for the specific occupancy. When more than one occupancy is cited, the more stringent occupancy requirements are used. (Reference 2.2.2.16, Section 7.6, and Table A.7.6)

The method of performing accountability of facility personnel will be determined during detail design.

6.1.1.4 Illumination and Marking of the Means of Egress

The illumination of means of egress is provided in accordance with the LSC (Reference 2.2.2.16, Section 7.8). Emergency lighting and marking of the means of egress is provided in accordance with the LSC (Reference 2.2.2.16, Section 7.10).

6.1.1.5 Security and Safeguard Considerations Related to Fire Protection

Security systems and hardware are provided to meet the requirements of the plant security plan. This includes access-controlled points of entry into the building, surveillance equipment, and alarms. Doors that serve as exits from security areas comply with the LSC and DOE security requirements. When security-related hardware is installed on a fire door, the installation is designed such that the fire rating of the door is not compromised. Security features associated with emergency exit doors do not impede emergency egress. (Reference 2.2.1.20, Section 10.5)

6.1.2 Fire Protection Features

This FHA is predicated on the assumption that a fire may occur in any one location at the site. Simultaneous fires in multiple areas are not anticipated. The nature of the postulated fire depends on the hazards present at any given time within the facility or fire area (Assumption 3.2.1). The following fire protection features are designed to ensure a fire is successfully

controlled or contained until such time as the FRO arrives to provide fire fighting efforts (Assumption 3.1.1).

6.1.2.1 Fire Water System

General

Fire water is distributed at the GROA by the Fire Water Subsystem as shown on Figure 1, and as detailed below. The Fire Water Subsystem is designed to provide the required quantity of water for the Fire Suppression Subsystem (automatic wet pipe and double-interlock sprinkler systems, deluge systems and hose stations) and fire hydrants.

Fire water is stored in dedicated storage tanks that are designed and installed in compliance with NFPA 22, *Standard for Water Tanks for Private Fire Protection* (Reference 2.2.2.8) (Reference 2.2.1.23, Section 3.2.1). Each fire water storage tank is capable of providing the largest required flow demand for the required duration (2 hours) (Reference 2.2.1.7, Section 4.3.5). Provisions shall be in place for refilling any one storage tank in eight continuous hours or less (Reference 2.2.1.23, Section 3.2.1.c).

Fire water is supplied to the fire water distribution mains via dedicated fire pumps. The fire pumps are designed and installed in compliance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection* (Reference 2.2.2.7). (Reference 2.2.1.23, Section 3.2.2)

The Fire Water Subsystem distribution mains are designed, installed, and tested in compliance with NFPA 24 *Standard for the Installation of Private Fire Service Mains and Their Appurtenances* (Reference 2.2.2.9) (Reference 2.2.1.23, Section 3.2.1). The fire water distribution mains are of a looped type grid that provides two-way water flow to any point in the system (Reference 2.2.1.20, Section 6.2.2).

Fire hydrants are installed, as required, to ensure adequate means of manual fire fighting coverage is provided. Sectional control valves are provided to limit the number of hydrants and individual suppression systems made inoperative during a single line break or impairment to a maximum of five (Reference 2.2.1.20, Section 6.2.2). Control and sectionalizing valves in the fire water supply system are electrically supervised, visually indicating type and shall transmit to the main fire alarm panel (Reference 2.2.1.23, Section 3.2.3) located within the Fire, Rescue and Medical Facility (FRMF) (Area 63A) (Reference 2.2.1.6).

The Fire Water Subsystem is subdivided into two separate loops. Each fire water supply loop is provided with dedicated pumps, storage tanks and piping.

Loop 1

Loop 1 provides fire water to the ITS structures and to those facilities providing direct support to the ITS structures (Figure 1). Loop 1 is supplied by Fire Water Facilities (FWF) 28A and 28E. Each Loop 1 FWF contains two 300,000-gallon fire water storage tanks, one electric motor driven fire pump, one diesel engine driven fire pump and one pressure maintenance (jockey) pump. Loop 1 is designed to meet the largest expected flow at the required pressure for a period of two hours. The flow rate is calculated as the largest suppression system demand, including an additional allowance for manual hose flow for that specific loop. Loop 1 is also sized to meet the largest fire hydrant demand for two hours. (Reference 2.2.1.7, Entire)

Loop 2

Loop 2 provides fire water to the facilities identified as the administration / balance of plant area (Figure 1). Loop 2 is supplied by FWF 28B which contains one 300,000-gallon fire water storage tank, and one diesel engine driven fire pump and one pressure maintenance (jockey) pump. Loop 2 is designed to meet the largest expected flow at the required pressure for a period of two hours. The flow rate is calculated as the largest suppression system demand, including an additional allowance for manual hose flow for that specific loop. Loop 2 is also sized to meet the largest fire hydrant demand for two hours. (Reference 2.2.1.7, Entire)

Loop 2 is provided with two locked closed cross-connection lines to Loop 1 to supply fire water to Loop 2 in the event that the fire pump in FWF 28B is out of service (Figure 1).

6.1.2.2 Fire Suppression System

Automatic Suppression

Automatic wet pipe sprinkler systems provide fire suppression capabilities for the facilities addressed in this analysis. The *Monitored Geologic Repository Fire Protection Wet Pipe Sprinkler System Piping & Instrument. Diagram* (Reference 2.2.1.9) shows a typical valve and piping arrangement for a wet pipe sprinkler system.

Double-interlock preaction sprinkler systems may be used to provide fire suppression in specific areas in those facilities where it is desired to preclude the inadvertent operation of an automatic sprinkler system where nuclear fuel is present. The facilities addressed in this FHA do not contain double-interlock preaction sprinkler systems. The *Monitored Geologic Repository Double-Interlock Preaction Piping System Piping & Instrument. Diagram* (Reference 2.2.1.10) shows a typical valve and piping arrangement for a double-interlock preaction pipe sprinkler system.

The automatic, wet pipe and double-interlock sprinkler system design requirements include the following:

- Automatic fire sprinkler systems are designed and installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems* (Reference 2.2.2.6) (Reference 2.2.1.23, Section 3.3.1.1).

- Automatic fire sprinkler systems are inspected, tested, and maintained in compliance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems* (Reference 2.2.2.10), (Reference 2.2.1.4, Section 4.9.17).

- Hydraulically designed fire sprinkler systems shall be designed for a supply pressure of 90-percent of the rated system pressure but not less than 10-psig below the supply curve (Reference 2.2.1.4, Section 4.9.1.13.4).

Fire sprinkler system piping is seismically restrained to prevent damage to equipment during or after a design basis event per NFPA 13 (Reference 2.2.2.6, Section 9.3) and DOE Standard 1066-99 (Reference 2.2.1.20, Section 7.3.2).

Manual Suppression

Manual fire suppression is conducted by a fully staffed, completely equipped and adequately trained FRO, capable and committed to respond to fires and related emergencies onsite in a timely and effective manner (Assumption 3.1.1). Personnel trained in the use of portable fire extinguishers are assumed to voluntarily conduct firefighting efforts on fires in the incipient stage (Assumption 3.2.4).

Class III standpipes are provided for manual fire suppression capability in the ITS surface facilities. Class III systems include both 1½ and 2½ inch connections. The 1½ shall be supplied with a hose and be considered useable for an incipient fire response. The 2½ will not be provided with a hose and will be there for the "trained fire-fighter" use. The Class III standpipes are designed and installed in accordance with NFPA 14 *Standard for the Installation of Standpipe and Hose Systems* (Reference 2.2.2.19). (Reference 2.2.1.23, Section 3.4.1).

Means for supporting manual fire suppression efforts in all surface facilities consists of portable multipurpose dry-chemical and clean-agent extinguishers. These extinguishers are selected, installed, inspected, tested, and maintained in accordance with NFPA 10, *Standard for Portable Fire Extinguishers* (Reference 2.2.2.5) (Reference 2.2.1.23, Chapter C, Section 3.4.4).

Fire hydrants are located in close proximity to the surface facilities so that a sufficient and effective hose stream can be provided for fighting fires from the exterior of the facility (Reference 2.2.1.4, Section 4.9.1.11.9), as shown in *Monitored Geologic Repository Site Fire Water Distribution Piping and Instrument Diagram* (Reference 2.2.1.8).

6.1.2.3 Fire Detection and Alarm Systems

The site fire detection and alarm system is shown on Figure 2.

Automatic Alarm and Detection Systems

Fire alarm and detection systems are provided throughout the GROA surface facilities and are designed, installed, located, inspected, tested, and maintained in accordance with NFPA 72, *National Fire Alarm Code* (Reference 2.2.2.13). The fire alarm systems in the GROA comply with the requirements of Class A systems as defined in NFPA 72 (Reference 2.2.2.13, Section 4.4.7) and Class I circuits as defined in NFPA 70 (Reference 2.2.2.12, Article 725.21), (Reference 2.2.1.4, Section 4.9.1.12.1).

Area smoke detectors are provided throughout the GROA surface facilities as prescribed by NFPA 72 (Reference 2.2.2.13, Section 5.5.2). These detectors are monitored by the facility fire alarm panel, which in turn actuates the audible and visual notification appliances in the affected facilities and signals the site fire alarm panel (Reference 2.2.1.11).

Audible and visual alarms are provided where required in each area of the facility to notify occupants of a potential fire condition (Reference 2.2.1.3, Section 18.2.2.2.1). Fire alarm circuits are supervised and report through the facility fire alarm panel (Reference 2.2.1.4, Section 4.9.1.12.1).

The actuation of the double-interlock fire sprinkler system requires the detection of a fire condition by a dedicated smoke detection system (Reference 2.2.1.10). These detectors are independent of the facility fire alarm and detection system and are designed, installed, located, inspected, tested and maintained in accordance with NFPA 72, *National Fire Alarm Code* (Reference 2.2.2.13).

Control and sectionalizing valves in the fire water supply system are electrically supervised, visually indicating type and shall transmit to the main fire alarm panel (Section 6.1.2.1)

The facility fire alarm panel is installed near the primary entrance (Reference 2.2.1.3, Section 18.2.2.2.1) to the facility. This panel monitors and supervises all fire detection, suppression, and alarm systems within the facility (Reference 2.2.1.4, Section 4.9.1.14.1). It also provides signals to interfacing systems, such as the ventilation systems, fire and smoke dampers, and fire door closure interlocks (Reference 2.2.1.4, Section 4.9.1.14.1). Signals from the facility fire alarm panel are sent to the main fire alarm panel (Reference 2.2.1.3, Section 18.1.1) in the Fire, Rescue and Medical Facility (Reference 2.2.1.6). Additional signals are sent to the continuously monitored fire alarm panel in the control room of the CCCF and to the Secondary Alarm System in the Cask Receipt Security Station (Area 30B). All fire alarm panels are UL-listed (Reference 2.2.1.4, Section 4.9.1.1.5) and are provided with 24-hr battery backup to the normal power supply (Reference 2.2.1.4, Section 4.9.1.12.1).

The facility fire alarm systems are shown in the *Monitored Geologic Repository Fire Alarm and Detection System Piping & Instrumentation Diagram* (Reference 2.2.1.11).

Manual Fire Alarm Systems

Manual fire alarm pull stations are provided throughout the GROA surface facilities, as prescribed by NFPA 72 (Reference 2.2.2.13, Section 5.13).

6.1.2.4 Fire Barriers and Protection of Penetrations

The GROA surface facilities are subdivided into separate fire areas (Section 4.4.3) for the purposes of limiting the spread of fire, protecting personnel, and limiting the consequential damage to the facility. Determination of fire area boundaries are based on consideration of the following:

- Types, quantities, density, and location of combustible materials
- Location and configuration of equipment
- Consequences of inoperable equipment
- Location of fire detection and suppression systems
- Personnel safety/exit requirements

(Reference 2.2.2.18, Sections 5.4 and A.5.4)

Fire area boundaries are typically provided to separate:

- Rooms with major concentrations of electrical equipment, from adjacent areas
- Computer and control room from adjacent areas
- Battery rooms from adjacent areas
- Office areas from adjacent areas

(Reference 2.2.2.18, Sections 5.4 and A.5.4)

Three-hour fire-rated barriers separate the individual fire areas in each facility from each other (Section 4.4.3). Fire barrier design and construction is in accordance with NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls* (Reference 2.2.2.17) (Reference 2.2.1.4, Section 4.9.1.16.2).

Fire-rated barriers prescribed for the separation of equipment from redundant trains or other parts of the GROA surface facilities are identified in each of the fire area discussions.

Where fire-rated assemblies are partially, or fully penetrated by pipes, ducts, conduits, raceways or other such penetrates, fire barrier penetration material is placed in and around the penetrations to maintain the fire-resistance rating of the assembly. All openings in fire barriers are protected consistent with the designated fire-resistance rating of the barrier (Reference 2.2.1.4, Section 4.9.1.16.7). Fire doors shall be rated commensurate with the fire barrier in which they are installed and shall comply with the requirements of NFPA 80, *Standard for Fire Doors and Other Opening Protectives* (Reference 2.2.2.14).

6.1.2.5 Exposure Fire Protection

With one exception, the GROA surface facilities are separated from other facilities by a minimum distance of approximately 100-ft (Reference 2.2.1.5). The exception is non-combustible Cooling Tower (Reference 2.2.1.4, 4.2.12.1.7), which is located approximately 50-feet to the south of the Utilities Facility. A minimum separation distance of 30-ft is required per the IBC (Reference 2.2.2.4, Table 602). Therefore, the separation distance between the GROA surface facilities adequately precludes a fire from propagating between facilities.

The GROA will have a fully staffed, completely equipped, and adequately trained FRO that will be capable and committed to respond to fires. The FRO will be capable of containing; controlling, and suppressing fires in a timely manner, thereby reducing the actual exposure fire threat potential (Assumption 3.1.1).

6.1.2.5.1 Wildfire

The *Wildfire Exposure Calculation* (Reference 2.2.1.2) evaluated the minimum separation distance that must exist between structures and combustible vegetation to prevent fire-induced damage due to wild land fire at the GROA. This calculation concluded that a fire exposure threat from wildfire is negligible if a 10-meter (33-ft) separation distance between combustible vegetation and the facility is maintained (Reference 2.2.1.2, Section 7). The GROA surface facilities are surrounded by maintained grounds and roadways for site vehicles, and are not within 10-meters (33-ft) of wildland vegetation (Reference 2.2.1.5.1). Therefore, The GROA surface facilities are not susceptible to exposure to a wild land fire.

6.1.2.5.2 Vehicles

Railroad Locomotives

Diesel fuel for the locomotives is stored on the underside of the locomotive. This fuel may leak due to rupture of the tank, and may be subjected to an ignition source, resulting in a 30-foot diameter diesel-fuel spill fire (Assumption 3.1.4). This scenario could present an exposure fire threat to those surface facilities located within 30 feet of railroad tracks.

Commercial locomotives, powered by diesel-driven engines, are used to deliver waste packages and materials to the non-ITS (Section 6.2.18.9) Cask Receipt Security Station (CRSS) (Area 30B) (Reference 2.2.1.5). The locomotive will enter the Rail Equipment and Maintenance Yard (REMY) outside the CRSS where it will then be turned around to allow it to push the rail cars up to the canopied inspection area of the CRSS. A site locomotive will then move the delivered rail cars to the Rail Car Staging Area (Area 33A). This operation will be performed one car at a time. At no time will either locomotive be allowed to enter the CRSS. Commercial locomotives may also collect empty rail cars at the CRSS. Upon completion of the custody transfer, the commercial locomotive will leave YMP. The locomotives are conservatively estimated to be closer than 30-feet from the security station itself. Therefore, the locomotive represents an exterior exposure fire threat to the facility. Refer to Section 6.2.18.7 for a discussion of the fire scenario associated with the railroad locomotives.

Railroad tracks are also routed directly to the following ITS facilities (Reference 2.2.1.5). Refer to the specific facility fire hazard analyses for a discussion of the exposure fire threat to the facility presented by the site railroad locomotives.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)
4. Initial Handling Facility (Area 51A) (Reference 2.2.1.14)

Railroad tracks are routed directly to the east sides of both the Heavy Equipment and Maintenance Facility (HEMF) (Area 220) and the Warehouse and Non-Nuclear Receipt Facility (WNNRF) (Area 230) (Reference 2.2.1.5). These two facilities are non-ITS (Sections 6.2.6.9 and 6.2.7.9 respectively). Locomotives will not be allowed to enter either of these facilities and are conservatively estimated to be no closer than 30-feet from the building entrance. Therefore, the 30-foot diameter locomotive fuel oil spill (Assumption 3.1.4) represents an exterior exposure fire threat to the east sides of these two facilities. Refer to Sections 6.2.6.7 and 6.2.7.7 respectively for a discussion of the effects of the fire scenarios associated with the railroad locomotives.

The remainder of the surface facilities are separated from railroad tracks by a minimum distance of approximately 100 feet (Reference 2.2.1.5). The locomotive fuel oil spill fire is a 30-foot diameter fire (Assumption 3.1.4). Therefore, for the purpose of this analysis, the locomotives present a fire threat to only to the CRSS, HEMF and the WNNRF. Refer to the fire hazard analyses in for these three facilities provided in Section 6.2 for a discussion of the affects of this fire scenario.

The Rail Car Staging Area (Area 33A) is used to store non-combustible rail cars without locomotives until their loads are required. The Rail Car Staging Area is located over 700 feet from the Initial Handling Facility (Area 51A) and over 500 feet from the Switchyard (Area 27) (Reference 2.2.1.5). Therefore, the Rail Car Staging Area does not represent an exposure fire threat to any site facility or structure.

Site Transporter/Crawler

The site transporter/crawler is a diesel-fuel powered, tracked vehicle used to transport waste packages between the Wet Handling Facility (Area 50), the Canister Receipt and Closure Facility 1 (Area 060), the Receipt Facility (Area 200) and the Aging Facility (AF) (Area 170).

Automatic fire suppression systems are provided on the site transporter/crawler. These systems will be defined during detail design.

Refer to the following fire hazard analyses for details regarding the site transporter/crawler with respect to those facilities.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)

Refer to Section 6.2.4.7 for a discussion of the postulated fire scenarios in the AF.

The site transporter/crawler will also enter the HEMF for periodic maintenance, testing and repair. This vehicle represents a direct fire threat to the HEMF. Refer to the fire hazard analyses for the HEMF provided in Section 6.2.6.7 for a discussion of the affects of this fire scenario.

Cask Handling Tractor and Cask Trailers

The Cask Handling Tractor is an electric powered vehicle with two Cask Trailers used to transport DPCs between the RF and Horizontal Aging Modules on the Aging Pads. Then once the DPC are adequately cooled, the Cask Handling Tractor and Cask Trailers retrieves the DPCs and transports them to the WHF for processing. The electrically powered Cask Handling Tractor and Cask Handling Trailers contain diesel systems and motors.

Refer to the following fire hazard analyses for details regarding the Cask Handling Tractor and Cask Trailers with respect to those facilities.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Receipt Facility (Area 200) (Assumption 3.2.8)

Refer to Section 6.2.4.7 for a discussion of the postulated fire scenarios in the AF.

Transport Emplacement Vehicle

The transport emplacement vehicle (TEV) is an electric powered vehicle used to transfer waste packages between the Initial Handling Facility (Area 51A), the Canister Receipt and Closure Facility 1 Area 060) and the subsurface (Area 800).

The waste packages (WP) aboard the TEV have been analyzed for an outer barrier peak temperature during a fire and found to be bounded by the 10 CFR 71 Regulatory fire exposure of 800^0C (1073^0K) for 30 minutes (Reference 2.2.2.20, Part 73(c)(4)). An Interoffice Memorandum (Reference 2.2.1.18) is used to bound the WP temperatures at 800^0C (1073^0K) for 30 minutes.

The TEV will also enter the HEMF for periodic maintenance, testing and repair. A fire involving the TEV could propagate to the HEMF. Refer to the fire hazard analyses for the HEMF provided in Section 6.2.6.7 for a discussion of the affects of this fire scenario.

Fossil-Fueled Vehicles

Fossil-fueled vehicles (trucks, buses, site owned maintenance/delivery vehicles, FRO response vehicles, security vehicles, etc) represent another transient exposure fire threat. These vehicles will be required to be provided with a portable fire extinguisher.

Commercial trucks will deliver and collect loaded trailers at the Cask Receipt Security Station (Area 30B). The truck will back up to the canopied trailer inspection area at the north side of the security station, but will no be allowed to enter the facility. The trailer will be transferred between the delivery truck and the transport truck. At the conclusion of the custody transfer, the commercial truck will depart the site.

Authorized personnel may operate government-furnished vehicles within close proximity to some of the surface facilities. These vehicles could contain up to 100-gallons of fuel (Assumption 3.2.5). The worst-case vehicle fire would occur during a delivery when the vehicle is parked adjacent to loading dock (Warehouses, Craft Shop, Low-Level Waste Facility, vehicle maintenance and fueling facilities, etc.) with an open doorway into the facility. Vehicle fires are also expected to be staged at, or "pass through" the AF, security facilities and the Fire, Rescue and Medical Facility. Therefore, vehicle fires are anticipated in these facilities.

Designated vehicle parking areas will be identified during detail. These parking areas will be separated from the facilities to limit the exposure fire threat posed by the vehicles.

In case of a vehicle fire in close proximity to a surface facility, the vehicle's operator will be able to use the vehicle's fire extinguisher in the incipient stage of the fire (Assumption 3.2.4) and to contact the FRO. The FRO will then respond in accordance with established procedures (Section 6.1.7). Refer to the fire hazard analyses for these individual facilities provided in Section 6 for a discussion of the affects of this fire scenario.

The Truck Staging Area (Area 33B) has the capability to store up to five government-furnished trucks with trailer waiting to deliver their loads. The Truck Staging Area is located over 700 feet from the Cask Receipt Security Station (Area 30B) and over 400 feet from the Switchyard (Area 27) (Reference 2.2.1.5). Therefore, the Truck Staging Area does not represent an exposure fire threat to any site facility or structure.

The fuel oil for the diesel engine driven fire pumps within the Fire Water Facilities will be delivered by trucks. Refer to the fire hazard analyses for these facilities provided in Section 6.2.15.7 for a discussion of the affects of this fire scenario.

6.1.2.5.3 Bulk Fuel Storage

Based on the best available information, the bulk fuel oil storage tank (Area 70A) is expected to contain approximately 100,000 gallons of Number 2 fuel oil. The design for this tank has not been finalized. However, it will be located in containment system in compliance with NFPA 30, *Flammable and Combustible Liquids Code* (Reference 2.2.2.11), which will preclude a fire from spreading beyond the containment system. The fuel oil tank and containment system are located a minimum of 100 feet from the non-combustible Cooling Tower (Area 25B) and the Utilities Facility (Area 25A) which are the nearest surface structures to the bulk fuel oil storage tank (Reference 2.2.1.5). Therefore, Area 70A does not represent an exposure fire threat to any other facility.

Should a fire occur, the FRO will respond in accordance with established procedures (Section 6.1.7). Fire hydrants shall be located such that an effective hose stream can be provided for fire fighting (Reference 2.2.1.5).

6.1.2.5.4 Transient Combustibles

Prior to operations, an active combustible control program shall be implemented to control the quantity and placement of combustibles at the GROA. This program is based on the findings of this FHA as well as the individual facilities.

Storage of liquid and gaseous combustibles shall comply with the applicable NFPA codes and standards. Consequently, the storage of these materials shall not adversely impact site operations. Refer to the specific FHA for a detailed description of the fire protection features provided for the ITS SC structures.

6.1.2.5.5 Construction Activities

Construction activities for future site facilities will be taking place concurrent with initial site operations. A discussion of the fire hazards associated with construction activities is beyond the scope of this analysis. An independent FHA will be developed for construction activities prior to their inception.

6.1.2.6 Fire Water Collection

Refer to the specific facility fire hazard analyses for a discussion of the collection of discharged fire water in the following surface nuclear facilities.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)
4. Initial Handling Facility (Area 51A) (Reference 2.2.1.14)

Discharged fire water in the LLWF (Area 160) shall be segregated from low level waste, collected, treated, and recycled for use within the surface facilities. Any contaminated material or liquid generated during treatment of the collected fire water shall be stabilized, solidified and managed as solid low level waste. (Reference 2.2.1.3, Section 30.2.2.6) This may change during detail design.

Discharged fire water in all non-nuclear facilities is classified as industrial waste water. Industrial wastewater is collected and shall be controlled such that the repository operates as a zero discharge process (Reference 2.2.1.4, Section 4.1.8.7).

Fire water is not provided in the subsurface.

6.1.3 Explosion Protection Features

Systems or processes that may evolve hydrogen or explosive gases are designed to prevent development of explosive mixtures by limiting the concentration of explosive gases and vapors within enclosures to less than 25% of the lower explosive limit (Reference 2.2.2.22, Section 6.3.1). Consequently, ventilation systems in battery rooms shall maintain hydrogen concentrations well below 1%. Loss of ventilation in the battery rooms is alarmed locally and in the control room (Reference 2.2.1.23, Chapter C, Section 6.1.7). Gel-cell batteries will be

specified for the battery rooms in order to preclude the production of hydrogen gas build-up due to battery charging.

The storage and use of explosives will conform to the applicable regulations, codes and standards.

During this stage of design development, there is insufficient information available to determine if other explosion hazards exist. A more detailed review of the specifics for explosion hazards will be performed during the detailed design phases of the project when all processes and materials have been finalized. At that time, if the need for additional explosion protection systems/criteria is identified, this section will be revised to incorporate the additional information and identify the required design features to mitigate the explosion hazard.

6.1.4 Ventilation and Smoke Control

During this stage of design development, there have been no smoke control design requirements relative to life-safety features identified for incorporation into the design of the GROA surface facilities.

6.1.5 Special Topics

6.1.5.1 Cable Trays

Electrical cabling specified for the project meets flame-testing requirements of ANSI/IEEE (Institute of Electrical and Electronic Engineers) Std 383, *IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations* (Reference 2.2.2.2), *or* IEEE Std 1202, *IEEE Standard for Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies* (Reference 2.2.2.3) (Reference 2.2.1.23, Chapter C, Section 4.1.3.1).

6.1.5.2 Compensatory Measures for Impairments to Fire Protection Systems

When fire protection systems are inoperable, interim temporary compensatory measures, such as fire watches and impairment monitoring precautions, are implemented. These temporary compensatory measures are in accordance with approved procedures. Procedures for return-to-service of impaired equipment as well as the tracking and trending of impairments are identified as a part of the *Fire Protection Program* (Reference 2.1.2, Section 4.13.1 and 4.14 (2)).

6.1.6 Combustible Materials

Detailed design will allow for a complete and through assessment of combustible loading. Where identified, the combustibles are categorized using the following terms to describe the relative quantities of combustible materials in a given fire area. These terms are based on definitions of fire load from the NFPA *Fire Protection Handbook* (Reference 2.2.1.22, Section 12, Chapter 5) and are discussed in Table 2.

For purposes of estimating the types of combustible materials in a given fire area, electrical cable contained within an enclosed raceway or cabinet, such as conduit or enclosed metal cable tray, is excluded.

Table 2. Combustible Material Quantities

Quantity	Average Combustible Load (CL) [a] (Btu/sq. ft.)	Equivalent Fire Severity [b] (hrs)	Isolated Concentrations (Btu/sq. ft.)
Low	< 100,000	1.25	CL < 200,000
Moderate	100,000 < CL < 200,000	1.25 < 2.50	CL < 400,000
High	200,000 < CL < 400,000	2.50 < 7.50	CL < 800,000

Source: NFPA 2003 (Reference 2.2.1.22, Table 12.5.1)

NOTES: [a] Based on the definitions of fire load from the *NFPA Fire Protection Handbook* (Reference 2.2.1.22, Table 12.5.1). British fire loading studies were used as the model of combustible loading (Reference 2.2.1.22, Section 12, Chapter 5, pages 12-96 & 12-97).

[b] The weight per square foot of ordinary combustibles (wood, paper, and similar materials with a heat of combustion of 8,000 Btu per pound) is related to hourly fire severity (Reference 2.2.1.22, Section 12, Chapter 5, Table 12.5.1).

6.1.6.1 Control of Transient Combustible Materials

Transient combustible materials are those combustible materials that are not permanently installed in a given fire area. Transient combustible materials primarily include waste materials generated from plant operations and combustibles introduced during maintenance activities. The control of transient combustible materials is an essential element of the defense-in-depth approach to fire protection. As part of the fire protection procedures and practices, prior to operations, an active administrative control program will be implemented to control the quantities of combustibles allowed in a given fire area (Reference 2.1.2, Section 7.2).

6.1.7 Emergency Planning

Prior to operations, pre-fire plans will be prepared for use by the FRO. The pre-fire plans will provide pertinent information about each surface facility and each fire area within the building (Reference 2.1.2, Section 7.2.6). The baseline needs assessment, as required per DOE Order 420.1A (Reference 2.2.1.21, Section 4.2.1(7)), establishes the minimum required capabilities of the site fire fighting force.

The Central Control Center Facility (Area 240) functions as the site technical support center for conducting emergency management activities (Reference 2.2.1.3, Section 9.1.1.1). This center has redundant emergency communications, a GROA-wide alarm notification system and an electronic system to provide accountability (Reference 2.2.1.3, Section 9.1.2.1.3). The Administration Facility (Area 620) contains a dedicated Emergency Operations Center that is fully capable of functioning as an alternate technical support center (Reference 2.2.1.3, Section 9.5.2.1.4). An off-site Emergency Operations Facility is available outside of 10 miles from the technical support center (Reference 2.2.1.2, Section 9.5.2.1.4).

6.1.8 Fire/Rescue Organization Response

Upon actuation of the fire alarm system, either automatically or manually, the site FRO will be notified and will respond in accordance with pre-established emergency procedures (Assumption 3.1.1).

The plant communications systems is utilized to summon the FRO in those areas where fire alarm systems are not provided.

6.1.9 Impact of Hazards on Fire Safety

The *Preliminary Hazards Analysis for License Application Study* (Reference 2.2.1.1) identifies external hazards and internal hazards in the preclosure safety analysis that are applicable to the site (Assumption 3.1.2). The analysis identifies the required mitigation/control features, the defense-in-depth mitigation/control features, along with the mitigated hazard classification, required of individual systems necessary to minimize the effects of the particular hazards.

Refer to the specific facility fire hazard analyses for a discussion of the external hazards and internal hazards in the preclosure safety analysis that are applicable to the following facilities.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)
4. Central Control Center Facility (Area 240) (Reference 2.2.1.15)
5. Emergency Diesel Generator Facility (Area 26D) (Reference 2.2.1.16)
6. Initial Handling Facility (Area 51A) (Reference 2.2.1.14)

A list of the external and internal hazards applicable to the fire protection SSCs for the remaining site facilities is given in Table 3 and Table 4 respectively.

Table 3. External Hazards

External Hazard	Source[1]	Risk Significance Rating
Aircraft Crash	(Scenario Number SE577, page III-581)	Very Low or No Risk
Drift Degradation	(Scenario Number UE578, page III-582)	Very Low or No Risk
Extreme Wind	(Scenario Number SE579, page III-583)	Very Low or No Risk
Range Fire	(Scenario Number SE580, page III-584)	Very Low or No Risk
Flooding	(Scenario Number SE581, page III-585)	Very Low or No Risk
Industrial-Activity-Induced Accident	(Scenario Number SE582, page III-586)	Very Low or No Risk
Lightning	(Scenario Number SE583, page III-587)	Very Low or No Risk
Loss of Offsite/Onsite Power	(Scenario Number SE584, page III-588)	Very Low or No Risk
Military-Activity-Induced Accident	(Scenario Number SE585, page III-589)	Very Low or No Risk
Rainstorm	(Scenario Number SE586, page III-590)	Very Low or No Risk
Seismic Activity, Earthquake	(Scenario Number SE587, page III-591)	Very Low or No Risk
Seismic Activity, Surface Fault Displacement	(Scenario Number SE588, page III-592)	Very Low or No Risk
Seismic Activity, Subsurface Fault Displacement	(Scenario Number SE589, page III-593)	Very Low or No Risk
Fracturing	(Scenario Number SE590, page III-594)	Very Low or No Risk
Tornado	(Scenario Number SE591, page III-595)	Very Low or No Risk
Volcanism – Ash Fall	(Scenario Number SE592, page III-596)	Very Low or No Risk
Extreme Temperature	(Scenario Number SE593, page III-597)	Low Risk
Sandstorm	(Scenario Number SE1363, page III-614)	Low Risk

Note 1: The source for these external hazards is Reference 2.2.1.1.

The external hazards identified in Table 3 have a potential to impact the fire protection design features identified in this FHA. For facilities required to survive specific external hazards, the external walls mitigate these hazards, except the seismic activities. The fire suppression systems installed within this building are designed to comply with the seismic requirements of NFPA 13 (Reference 2.2.2.6, Section 9.3), and DOE Standard 1066-99 (Reference 2.2.1.20, Section 7.3.2).

The internal hazards identified in Table 4 have a potential to impact the fire protection design features identified in this FHA. The mitigation of these hazards include:

- **Chemical Contamination /Flooding /Radiation/Thermal/Magnetic /Electrical /Silica Dust /High Energy/Fissile/Criticality/Radon** - The mitigation of these internal hazards are discussed in each Scenario Analysis Summary of the *Preliminary Hazards Analysis for License Application Study* (Reference 2.2.1.1). Specific negative impact on the fire protection systems produced by these hazards has not been identified.
- **Explosion/Implosion** - No explosion or implosion hazards to the fire protection systems have been identified inside the GROA surface facilities.

- **Collision/Crushing -** No collision or crushing hazards to the fire protection systems have been identified inside the GROA surface facilities.

Table 4. Internal Hazards

Internal Hazard	Source[1]	Risk Significance Rating
Collision/Crushing	(Scenario Number SI594, page III-598)	Low Risk
Chemical Contamination	(Scenario Number SI595, page III-599)	Low Risk
Flooding	(Scenario Number SI596, page III-600)	Low Risk
Explosion/Implosion	(Scenario Number SI597, page III-601)	Low Risk
Fire	(Scenario Number SI598, page III-602)	Low Risk
Radiation	(Scenario Number SI599, page III-603)	Low Risk
Thermal	(Scenario Number SI600, page III-604)	Low Risk
Magnetic	(Scenario Number SI601, page III-605)	Low Risk
Electrical	(Scenario Number SI602, page III-606)	Low Risk
Fissile	(Scenario Number SI603, page III-608)	Low Risk
ALARA	(Scenario Number SI604, page III-609)	Low Risk
Criticality	(Scenario Number SI605, page III-610)	Low Risk
High Energy	(Scenario Number SI606, page III-611)	Low Risk
Radon	(Scenario Number SI607, page III-612)	Low Risk
Silica Dust	(Scenario Number SI608, page III-613)	Low Risk

Note 1: The source for these internal hazards is Reference 2.2.1.1.

6.1.10 Protection of SSCs Important to Safety

The following facilities contain SSCs that are ITS. Refer to the specific facility fire hazard analyses for a discussion of the protection of SSCs that are ITS.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)
4. Emergency Diesel Generator Facility (Area 26D) (Reference 2.2.1.16)
5. Initial Handling Facility (Area 51A) (Reference 2.2.1.14)

The Aging Facility (Area 170) contains SSCs that are ITS and Safety Category (Reference 2.2.1.3, Section 10.1.2).

The remaining GROA surface facilities are classified as non-ITS, and do not include SSCs ITS or natural and engineered barriers Important to Waste Isolation. These facilities are non-safety category facilities. (Reference 2.2.1.3, Section 9)

6.1.11 Spurious Actuation of Equipment

Fire damage may result in circuit faults such as hot shorts, open circuits, and shorts to ground. Spurious actuation of components caused by these circuit faults will be evaluated during detail

design to assure safety and the functions of the SSCs located within any fire area of a given facility.

6.1.12 Ventilation System Penetration Assemblies

Ventilation fire dampers are installed in ducts penetrating fire-rated barriers in accordance with the requirements of NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems* (Reference 2.2.2.15) (Reference 2.2.1.4, Section 4.9.1.16.9). Fire dampers used for the protection of openings in walls with fire resistance ratings of 3 hours or more shall have a 3-hour fire protection rating, all others shall have a fire protection rating commensurate with the fire barrier in which the damper is installed (Reference 2.2.2.15, Section 5.4.1.1 and 5.4.2).

6.1.13 Effect of Significant Fire Safety Deficiencies

The design of the GROA surface facilities includes fire protection systems, components, and life safety design features necessary to assure that no fire safety deficiencies exist. The reliability, availability and preferred failure modes of the fire protection components installed in the GROA surface facilities are provided through the use of components that are tested and/or listed by nationally recognized testing laboratories for their intended purpose, and installed in accordance with nationally recognized codes and standards (Reference 2.2.1.4, Sections 4.9.1.1.2 and 4.9.1.1.5). The fire protection systems and components are designed, installed, and maintained in accordance with the appropriate industry codes and standards.

6.1.14 Potential for Toxic, Biological or Radioactive Incident Due to a Fire

Whereas all fires emit products that are considered toxic, sources of toxic material that may affect the efforts of the FRO response or negatively impact the immediate environment are the plastics associated with the electrical cabling and components required to support the function of each facility. Small quantities of unspecified toxic materials to support maintenance and testing operations may be introduced as transients into the GROA surface facilities.

FRO response plans provide direction for response to fire involving toxic material (Assumption 3.1.1).

There are no biological agents, present in the GROA surface facilities.

Radioactive materials are present in the following facilities. Refer to the specific facility fire hazard analyses for a discussion of the impact of fires on those materials.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility 1 (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)
4. Initial Handling Facility (Area 51A) (Reference 2.2.1.14)

Radioactive materials are present in the LLWF (Area 160). These materials will be required to be physically contained within sealed non-combustible containers (vented drums, barrels, boxes) and will not become airborne in a fire. Trace amounts of surface contamination may be present on these containers.

DPC carcasses will be stored in the LLWF. Plastic bags of low-level waste containing significant amounts of contamination may also be present for short term operations (1-2 shifts) which could potentially become airborne during a fire. Should these become airborne during a fire they will be captured by the LLWF exhaust filter system.

6.1.15 Critical Process Equipment

For the purposes of this analysis, critical process equipment is defined as those components critical to the mission of the YMP. Critical process equipment is present in the following facilities. Refer to the specific facility fire hazard analyses for a discussion of the impact of fires on that equipment.

1. Wet Handling Facility (Area 050) (Reference 2.2.1.12)
2. Canister Receipt and Closure Facility (Area 060) (Reference 2.2.1.13)
3. Receipt Facility (Area 200) (Assumption 3.2.8)
4. Emergency Diesel Generator Facility (Area 26D) (reference 2.2.1.16)
5. Initial Handling Facility (Area 51A) (Reference 2.2.1.14)

The AF (Area 170) contains SSCs that are ITS and Safety Category (Reference 2.2.1.3, Section 10.1.2). The AF is an open area (reference 2.2.1.17) for the storage of up to 21,000 MTHM of DPCs and TADs with high thermal power, which require additional time to cool until they can be placed in the subsurface (Reference 2.2.1.3, Section 10.1.1). The AF is utilize for storage and does not contain any permanently installed critical process equipment.

The remaining GROA surface structures are classified as non-ITS, and do not include SSCs ITS or natural and engineered barriers Important to Waste Isolation. These GROA surface structures are non-safety category facilities (Reference 2.2.1.3) and therefore do not contain any critical process equipment.

6.1.16 Recovery Potential

Physical damage to the facility and its contents due to fire is limited to the general location of the fire's origin. The use of fire-resistant or non-combustible materials for construction, strict control of combustible materials, and the provisions of fire-rated barriers and fire protection systems for both automatic and manual actuation ensure the confinement of fire. These features combine to form a defense-in-depth which minimizes the recovery time due to the effects of a DBF in a given fire area.

6.1.17 Consequences of an Automatic Fire Suppression System Failure

Assuming the failure of the automatic fire suppression systems, the exposed in-situ and transient combustibles would be consumed in the event of fire. The presence of in-situ and transient combustibles are minimized by design and controlled by operational procedures, thus minimizing the potential for a fire to spread beyond its area of origin. Equipment located in the fire area may also be damaged by smoke and hot gases.

In the event that the automatic fire suppression system fails to operate, the fire detection and fire alarm systems will remain capable of identifying fire signatures, alerting personnel, and transmitting signals, as described in Section 6.1.2.3. Manual fire alarm pull stations are also

available for personnel intimate with the fire condition to initiate the fire alarm system. The site FRO will respond to the fire event (Assumption 3.1.1).

6.2 FIRE HAZARDS ANALYSES

6.2.1 Wet Handling Facility (Area 050)

Refer to the *Wet Handling Facility Fire Hazard Analysis* (Reference 2.2.1.12) for a discussion of the fire hazards associated with the Wet Handling Facility and the fire protection features provided to minimize/mitigate those hazards.

6.2.2 Canister Receipt and Closure Facility 1 (Area 060)

Refer to the *Canister Receipt and Closure Facility 1 Fire Hazard Analysis* (Reference 2.2.1.13) for a discussion of the fire hazards associated with the Canister Receipt and Closure Facility 1 and the fire protection features provided to minimize/mitigate those hazards.

For the purpose of this analysis, the *Canister Receipt and Closure Facility 1 Fire Hazard Analysis* also bounds the Canister Receipt and Closure Facility 2 (Area 070) and the Canister Receipt and Closure Facility 3 (Area 080).

6.2.3 Low Level Waste Facility (Area 160)

6.2.3.1 Construction/Operations

The Low-Level Waste Facility (LLWF) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 300 feet x 150 feet. The closest surface facility to the LLWF is the Emergency Diesel Generator Facility (Area 26D) which is located approximately 500 feet to the east of the LLWF. (Reference 2.2.1.5, G-6) The layout and design of the LLWF will be developed during detail design.

The LLWF is utilized for the collection, processing and disposal of the low level waste streams generated during handling of high level waste and spent nuclear fuel at the repository (Reference 2.2.1.3, Section 30.1.1). This waste is to be stored in the LLWF until it can be shipped to another site for disposal.

6.2.3.2 High-Value Property

Information quantifying the value of equipment within the LLWF is not currently available. As the design for the LLWF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.3.3 Description of Fire Hazards

In addition to transients that may be introduced into the LLWF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the LLWF.

The site transporter/crawler will deliver DPC Carcasses to the LLWF. The method of exporting these canisters has not yet been identified. Additionally, fossil-fueled vehicles will be utilized to deliver waste to the facility.

The LLWF is expected to contain large amounts of stored radioactive/contaminated combustible materials (protective clothing, decontamination supplies, trash, HEPA filters, etc.). This material is stored, after processing, in non-combustible containers (vented drums, barrels, boxes, etc.).

Hot work (welding, flame/plasma cutting) may take place within the facility.

The LLWF contains the low-level waste handling mechanical handling and packaging systems and equipment with the required supporting electrical systems and equipment. The LLWF also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.3.4 Life Safety Considerations

The LLWF is classified as an IBC S-1 Storage Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.3.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The LLWF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the LLWF precludes the propagation of wildfire to the LLWF (Section 6.1.2.5.1).

The LLWF is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the LLWF. Government-furnished vehicles represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the LLWF is considered a single fire area.

6.2.3.6 Fire Protection Features

The LLWF requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the LLWF, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the LLWF, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the LLWF consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the LLWF, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the LLWF, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.3.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the LLWF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the LLWF;

Scenario 3. A fire caused by hot work (welding, flame/plasma cutting);

Scenario 4. A fire starting on the site transporter/crawler;

Scenario 5. A fire from overheated mechanical or electrical equipment associated with the low level waste handling system; and

Scenario 6. A fire starting in a parked delivery vehicle adjacent to the facility.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The LLWF is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the LLWF.

6.2.3.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the LLWF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.3.9 Protection of Important to Safety Systems, Structures and Components

The LLWF does not contain any SSCs ITS (Reference 2.2.1.3, Section 30.1.2).

6.2.3.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological materials in the LLWF. Radioactive hazards in the LLWF consists of stored radioactive/contaminated materials in non-combustible containers (Section 6.2.3.3). These containers will preclude the fire-related release of radioactive material into the environment.

DPC carcasses will be stored in the LLWF. Plastic bags of low-level waste containing significant amounts of contamination may also be present for short term operations (1-2 shifts) which could potentially become airborne during a fire. Should these become airborne during a fire they will be captured by the LLWF exhaust filter system.

6.2.3.11 Critical Process Equipment

There are no critical process equipment in the LLWF, as defined in Section 6.1.15.

6.2.3.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.3.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the LLWF are discussed in Section 6.1.17.

6.2.3.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.4 Aging Facility (Area 170)

6.2.4.1 Construction/Operations

The Aging Facility (AF) is an open area to the northwest of the North Portal (Reference 2.2.1.17) for the storage of up to 21,000 MTHM of Transportation Aging and Disposal Canisters (TAD) and DPCs with high thermal power, which require additional time to cool until they can be placed in the subsurface (Reference 2.2.1.3, Section 10.1.1). The TADs and DPCs are delivered to, and removed from, the AF by the diesel fuel-powered site transporter/crawler and the electric powered cask handling tractor and its cask handling trailers.

The AF is subdivided into two individual aging pads (Areas 17P and 17R) (Reference 2.2.1.17). Non-combustible pre-engineered Electric Utility Buildings are provided to monitor the stored TADs and DPCs on the aging pads.

Personnel will not normally occupy the AF.

6.2.4.2 High-Value Property

Information quantifying the value of equipment within the AF is not currently available. As the design for the AF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.4.3 Description of Fire Hazards

In addition to transients that may be introduced into the AF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the AF.

The AF is an open area, which does not contain combustible materials or flammable liquids.

The Electric Utility Buildings will contain electrical systems and equipment for monitoring the stored TADs and DPCs.

Fossil-fueled vehicles and the diesel fuel-powered site transporter/crawler and diesel fueled vehicles are expected to be present at the AF. The fossil-fueled vehicles are not expected to enter the aging pad areas.

6.2.4.4 Life Safety Considerations

The AF is an open area. Plant personnel will not normally occupy the AF.

6.2.4.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The AF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the AF precludes the propagation of wildfire to the AF (Section 6.1.2.5.1).

The AF is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the AF. Government-furnished vehicles represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

6.2.4.6 Fire Protection Features

Automatic fire detection and alarm systems are installed in the Electric Utility Buildings, as described in Section 6.1.2.3.

Manual fire suppression capability is provided by the FRO (Assumption 3.1.1).

Automatic fire suppression systems are provided on the site transporter/crawler. These systems will be defined during detail design.

6.2.4.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the AF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire starting because of overheated equipment in one of the Electric Utility Buildings;

Scenario 3. A fire starting in a diesel system on either the Cask Handling Tractor and/or a Cask Handling Trailer on an aging pad;

Scenario 4. A fire starting in the site transporter/crawler on an aging pad; and

Scenario 5. A fire starting in a fossil-fueled vehicle parked adjacent to one of Electric Utility Buildings.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

6.2.4.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the AF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.4.9 Protection of Important to Safety Systems, Structures and Components

The AF. contains SSCs ITS (Reference 2.2.1.3, Section 10.1.2).

6.2.4.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or exposed radioactive materials in the AF. Radioactive hazards in the AF consist of stored radioactive materials in the form of stored TADs and DPCs.

6.2.4.11 Critical Process Equipment

The Site Transporter/Crawler is considered as critical process equipment; however, it is in the AF for short periods of time.

There are no other critical process equipment in the AF, as defined in Section 6.1.15.

6.2.4.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.4.13 Consequence of an Automatic Fire Suppression System Failure

No automatic fire suppression is provided for the AF.

6.2.4.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.5 Receipt Facility (Area 200)

Refer to the *Receipt Facility Fire Hazard Analysis* (Assumption 3.2.8) for a discussion of the fire hazards associated with the Receipt Facility and the fire protection features provided to mitigate/eliminate those hazards.

6.2.6 Heavy Equipment Maintenance Facility (Area 220)

6.2.6.1 Construction/Operations

The Heavy Equipment Maintenance Facility (HEMF) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 300 feet x 150 feet. The closest surface facility to the HEMF is the Initial Handling Facility (Area 51A), which is located approximately 200 feet to the southeast of the HEMF. (Reference 2.2.1.5, E-6) The layout and design of the facility will be developed during detail design.

The HEMF provides functional space and equipment for the maintenance and repair of the fleet of transport equipment used within the GROA along with office space and personnel areas for the maintenance and repair function (Reference 2.2.1.3, Section 9.4.2.2.1).

6.2.6.2 High-Value Property

Information quantifying the value of equipment within the HEMF is not currently available. As the design for the HEMF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.6.3 Description of Fire Hazards

In addition to transients that may be introduced into the HEMF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the HEMF.

The HEMF is expected to contain large amounts of stored combustible materials associated with the testing, repair and maintenance of heavy transport equipment (fuels, lubricants, hydraulic fluids solvents, cleaning supplies, trash, etc.). Flammable and combustible liquids are stored, dispensed and utilized within the HEMF in accordance with NFPA 30 (Reference 2.2.2.11). Solid combustible materials (filters, gaskets, belts, etc.) are stored in non-combustible containers.

The HEMF contains the mechanical handling mechanical systems and equipment required to support the testing, repair and maintenance of heavy transport equipment, along with the required supporting electrical and mechanical systems and equipment. The HEMF also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.6.4 Life Safety Considerations

The HEMF is classified as a combined IBC S-1 Storage and B Business Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.6.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The HEMF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the HEMF precludes the propagation of wildfire to the HEMF (Section 6.1.2.5.1).

Railroad locomotives approach, but do not enter the facility. Consequently, a fire in a locomotive could propagate to the HEMF. Government-furnished vehicles also represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the HEMF is considered a single fire area.

6.2.6.6 Fire Protection Features

The HEMF requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the HEMF, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the HEMF, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the HEMF consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the HEMF, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the HEMF, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.6.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the HEMF.

Scenario 1. A fire starting as a result of repair and maintenance activities associated with the HEMF;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the mechanical equipment handling systems;

Scenario 3. A fire from overheated mechanical or electrical equipment associated with the operation of the HEMF;

Scenario 4. A fire starting in an adjacent railroad locomotive; and

Scenario 5. A fire starting on one of the heavy vehicles being repaired/maintained; and

Scenario 6. A fire starting in a parked fossil-fueled vehicle adjacent to the facility.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The HEMF is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the HEMF.

6.2.6.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the HEMF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.6.9 Protection of Important to Safety Systems, Structures and Components

The HEMF does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.4.1.2).

6.2.6.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the HEMF.

6.2.6.11 Critical Process Equipment

There are no critical process equipment in the HEMF, as defined in Section 6.1.15.

6.2.6.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.6.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the HEMF are discussed in Section 6.1.17.

6.2.6.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.7 Warehouse and Non-Nuclear Receipt Facility (Area 230)

6.2.7.1 Construction/Operations

The Warehouse and Non-Nuclear Receipt Facility (WNNRF) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 300 feet x 150 feet. The closest surface facility to the WNNRF is the Central Control Center Facility (Area 240) which is located approximately 150 feet to the west of the WNNRF. (Reference 2.2.1.5, E-5) The layout and design of the facility will be developed during detail design.

The WNNRF provides functional space and equipment to receive, inspect and stage clean empty waste packages and their associated components. The waste packages are placed on site transport vehicles for use in the nuclear facilities when required (Reference 2.2.1.3, Section 9.3.2.1.1). The WNNRF also provides storage space for equipment required during infrequent operations within the nuclear facilities.

6.2.7.2 High-Value Property

Information quantifying the value of equipment within the WNNRF is not currently available. As the design for the WNNRF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.7.3 Description of Fire Hazards

In addition to transients that may be introduced into the WNNRF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the WNNRF.

The WNNRF is not expected to contain large amounts of stored combustible materials or flammable liquids.

The WNNRF contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.7.4 Life Safety Considerations

The WNNRF is classified as a combined IBC S-2 Storage and B Business Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.7.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The WNNRF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the WNNRF precludes the propagation of wildfire to the WNNRF (Section 6.1.2.5.1).

Railroad locomotives approach, but do not enter the facility. Consequently, a fire in a locomotive could propagate to the WNNRF. Government-furnished vehicles also represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the WNNRF is considered a single fire area.

6.2.7.6 Fire Protection Features

The WNNRF requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the WNNRF, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the WNNRF, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the WNNRF consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the WNNRF, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the WNNRF, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.7.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the WNNRF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the mechanical equipment handling systems;

Scenario 3. A fire from overheated mechanical or electrical equipment associated with the operation of the WNNRF;

Scenario 4. A fire starting in an adjacent railroad locomotive; and

Scenario 5. A fire starting in a parked fossil-fueled vehicle adjacent to the facility.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The WNNRF is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the WNNRF.

6.2.7.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the WNNRF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.7.9 Protection of Important to Safety Systems, Structures and Components

The WNNRF does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.3.1.2).

6.2.7.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the WNNRF.

6.2.7.11 Critical Process Equipment

There are no critical process equipment in the WNNRF, as defined in Section 6.1.15.

6.2.7.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.7.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the WNNRF are discussed in Section 6.1.17.

6.2.7.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.8 Central Control Center Facility (Area 240)

Refer to the *Central Control Center Facility Fire Hazard Analysis* (Reference 2.2.1.15) for a discussion of the fire hazards associated with the Central Control Center Facility and the fire protection features provided to minimize/mitigate those hazards.

6.2.9 Utilities Facility (Area 25A)

6.2.9.1 Construction/Operations

The Utilities Facility (UF) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 100 feet x 180 feet. The closest surface facility to the UF is the non-combustible Cooling Tower (Area 25B) which is located approximately 50 feet to the west of the UF. (Reference 2.2.1.5, E-5) The layout and design of the facility will be developed during detail design.

The UF provides functional space and equipment for the compressed air, deionizing water, chilled water, hot water, plant heating boiler and cooling systems.

6.2.9.2 High-Value Property

Information quantifying the value of equipment within the UF is not currently available. As the design for the UF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.9.3 Description of Fire Hazards

In addition to transients that may be introduced into the UF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the UF.

The UF is not expected to contain large amounts of stored combustible materials or flammable liquids. The fuel for the plant boiler is supplied via piping from the diesel fueling storage area (Area 70A).

The UF contains the plant heating systems oil-fired boiler. The UF also contains the mechanical systems and equipment (pumps, compressors, etc.) required for the compressed air, deionizing water, chilled water, hot water, plant heating boiler and cooling systems. The UF also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.9.4 Life Safety Considerations

The UF is classified as an IBC F-2 Factory Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.9.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The UF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the UF precludes the propagation of wildfire to the UF (Section 6.1.2.5.1).

Government-furnished vehicles represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the UF is considered a single fire area.

6.2.9.6 Fire Protection Features

The UF requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the UF, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the UF, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the UF consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the UF, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the UF, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.9.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the UF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the UF;

Scenario 3. A fire starting in a fossil-fueled vehicle parked adjacent to the UF;

Scenario 4. A fire starting in the plant heating system/components; and

Scenario 5. A fire starting due to a fuel oil leak at or near the boiler or a fuel system pump.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The UF is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the UF.

6.2.9.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the UF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.9.9 Protection of Important to Safety Systems, Structures and Components

The UF does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.9.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the UF.

6.2.9.11 Critical Process Equipment

There are no critical process equipment in the UF, as defined in Section 6.1.15. The UF contains the plant heating and cooling systems and equipment. Should a fire in the UF damage these systems, temporary heating and/or cooling could be established for the ITS facilities. Thus this loss will not preclude the operations in the affected facilities.

6.2.9.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems

for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.9.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the UF are discussed in Section 6.1.17.

6.2.9.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.10 Cooling Tower (Area 25B)

6.2.10.1 Construction/Operations

The Cooling Tower (CT) is a unoccupied non-combustible structure (Reference 2.2.1.4, Section 4.2.12.1.7). The footprint of the facility is approximately 75 feet x 150 feet. The closest surface facility to the non-combustible Cooling Tower (Area 25A) is the UF which is located approximately 50 feet to the east of the CT. (Reference 2.2.1.5, E-5) The layout and design of the facility will be developed during detail design.

The CT rejects heat from the plant cooling water system and provides cooling water to the plant chillers.

6.2.10.2 High-Value Property

Information quantifying the value of equipment within the CT is not currently available. As the design for the CT progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.10.3 Description of Fire Hazards

In addition to transients that may be introduced into the CT during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the CT.

The CT is not expected to contain stored combustible materials or flammable liquids.

The CT contains the mechanical systems and equipment (pumps, fans, etc.) required to move water through the tower.

6.2.10.4 Life Safety Considerations

The CT is not normally occupied. Hence, no life safety provisions are required.

6.2.10.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The CT is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the CT precludes the propagation of wildfire to the CT (Section 6.1.2.5.1).

The CT is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the CT. Government-furnished vehicles do not represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the CT is considered a single fire area.

6.2.10.6 Fire Protection Features

The CT is not normally occupied and is of non-combustible construction. Therefore, no fire protection features are provided for the CT.

6.2.10.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the CT.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame; and

Scenario 2. A fire from overheated mechanical or electrical equipment (fans ,motors, etc,) associated with the CT systems.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The CT is considered as a single fire area. Therefore, either of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the CT.

6.2.10.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the CT is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.10.9 Protection of Important to Safety Systems, Structures and Components

The CT does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.10.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the CT. Water treatment chemicals may be stored in close proximity to the CT during operations. These will be identified during detail design and the appropriate safety precautions will be implemented.

6.2.10.11 Critical Process Equipment

There are no critical process equipment in the CT, as defined in Section 6.1.15.

6.2.10.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.10.13 Consequence of an Automatic Fire Suppression System Failure

No automatic fire suppression is provided for the CT.

6.2.10.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.11 Evaporation Pond (Area 25C)

The evaporation pond is used to collect water from the cooling tower. The evaporation pond does not contain any SSCs and is not normally occupied. Furthermore, no combustible materials or flammable liquids are used or stored in this area. The evaporation pond does not contain any ignition sources. Thus, a fire is not postulated for the evaporation pond.

6.2.12 Standby Diesel Generator Facility (Area 26B)

6.2.12.1 Construction/Operations

The Standby Diesel Generator Facility (SDGF) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 50 feet x 150 feet. The closest surface facility to the SDGF is the 13.8 kV Switchgear Facility (Area 27B) which is located approximately 200 feet to the west of the SDGF. (Reference 2.2.1.5, C-6) The Switchyard contains transformers, which are anticipated to be located more than 100 feet from the SDGF. The layout and design of the facility will be developed during detail design.

The SDGF contains four standby diesel generators and the associated support systems and equipment to provide a backup source of power to pre-selected non ITS loads in the event of a offsite power interruption (Reference 2.2.1.3, Section 9.2.1.1).

This facility is not normally occupied.

6.2.12.2 High-Value Property

Information quantifying the value of equipment within the SDGF is not currently available. As the design for the SDGF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.12.3 Description of Fire Hazards

In addition to transients that may be introduced into the SDGF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the SDGF.

The SDGF is not expected to contain large amounts of stored combustible materials or flammable liquids. The fuel supply for the diesel generators is located outside the facility in tanks, which are designed and installed in accordance with NFPA 30 *Flammable and Combustible Liquids Code* (Reference 2.2.2.11).

The SDGF contains the standby diesel generators, along with the required supporting electrical and mechanical systems and equipment. The SDGF also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.12.4 Life Safety Considerations

The SDGF is classified as an IBC F-2 Factory Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.12.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The SDGF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the SDGF precludes the propagation of wildfire to the SDGF (Section 6.1.2.5.1).

The SDGF is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the SDGF. Government-furnished vehicles do not represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the SDGF is considered a single fire area.

6.2.12.6 Fire Protection Features

The SDGF requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the SDGF, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the SDGF, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the SDGF consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the SDGF, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the SDGF, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.12.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the SDGF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the SDGF;

Scenario 3. A fire from overheated mechanical or electrical systems and equipment associated with the diesel generators; and

Scenario 4. A fire starting in, or near a diesel generator due to a fuel oil leak.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The SDGF is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the SDGF.

6.2.12.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the SDGF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.12.9 Protection of Important to Safety Systems, Structures and Components

The SDGF does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.2.1.2).

6.2.12.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the SDGF.

6.2.12.11 Critical Process Equipment

There are no critical process equipment in the SDGF, as defined in Section 6.1.15.

6.2.12.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.12.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the SDGF are discussed in Section 6.1.17.

6.2.12.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.13 Emergency Diesel Generator Facility (Area 26D)

Refer to the *Emergency Diesel Generator Fire Hazard Analysis* (Reference 2.2.1.16) for a discussion of the fire hazards associated with the Emergency Diesel Generator Facility and the fire protection features provided to minimize/mitigate those hazards.

6.2.14 138 kV Switchyard and Switchyard Facility (Areas 27A and 27B)

6.2.14.1 Construction/Operations

The closest surface facility to the SF is the SDGF (Area 26B), which is located approximately 200 feet to the west of the SF. (Reference 2.2.1.5, C-6) The Switchyard contains transformers, which are anticipated to be located more than 100 feet from the SDGF. The Switchyard including the Switchyard Facility (SF) is an open area to the south of the North Portal (Reference 2.2.1.5, C-6). This area contains the requisite transformers and switchgear to bring in offsite power and step it down to the level required by the plant systems. A non-combustible pre-engineered switchgear facility is provided to monitor the incoming power. The layout and design of the facility will be developed during detail design.

Personnel will not normally occupy the SF.

6.2.14.2 High-Value Property

Information quantifying the value of equipment within the SF is not currently available. As the design for the SF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.14.3 Description of Fire Hazards

In addition to transients that may be introduced into the SF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the SF.

The SF is not expected to contain stored combustible materials or flammable liquids. The SF contains transformers and switchgear.

The SF will contain transmission towers and outdoor power transformers along with the required supporting electrical systems and equipment. These transformers will be specified with an approved “less flammable” dielectric insulating fluid with a flash point of 340^0 C (644^0 F). The

Switchyard area contains a small non-combustible pre-fabricated switchgear structure, which will be separated from the transformers by a minimum of 5 feet. (Reference 2.2.1.7, Section 4.3.3.1).

6.2.14.4 Life Safety Considerations

The SF is not normally occupied therefore, no life safety features are provided for the SF.

6.2.14.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The SF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the SF precludes the propagation of wildfire to the SF (Section 6.1.2.5.1).

The SF is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the SF. Government-furnished vehicles represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the SF is considered a single fire area.

6.2.14.6 Fire Protection Features

Automatic fire suppression (deluge) systems are not required for outdoor transformers when they are more than 5 feet from non-combustible plant structures and the dielectric insulating fluid is an approved "less flammable" fluid. Consequently, the transformers in the Switchyard do not require automatic fire suppression system. However, fire hydrants shall be provided for manual fire suppression capability in the Switchyard. (Reference 2.2.1.7, Section 4.3.3.1)

6.2.14.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the SF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire starting in a fossil-fueled vehicle parked in the SF;

Scenario 3. A fire from overheated electrical systems and equipment in the Switchgear Facility; and

Scenario 4. A fire starting in, or near a transformer.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The SF is a large open fire area. Therefore, any of the scenarios listed above would only result in the loss of function for the affected systems and/or equipment in the SF. This loss of system/ equipment function constitutes the DBF for the SF.

6.2.14.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the SF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.14.9 Protection of Important to Safety Systems, Structures and Components

The SF does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.14.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the SF.

6.2.14.11 Critical Process Equipment

There are no critical process equipment in the SF, as defined in Section 6.1.15.

6.2.14.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.14.13 Consequence of an Automatic Fire Suppression System Failure

Automatic fire suppression system is not provided for the SF.

6.2.14.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.15 Fire Water Facilities (Areas 28A, 28B and 28E)

6.2.15.1 Construction/Operations

The Fire Water Facilities (FWFs) are single story (Assumption 3.2.7), IBC Type II B non-combustible structures (Table 1). The footprint of these facilities is approximately 75 feet x 25 feet. The closest surface facility to any one of the FWFs is the Vehicle Maintenance and Motor Pool (Area 690) which is located approximately 150 feet to the east of 28B. (Reference 2.2.1.5) The layout and design of these facilities will be developed during detail design.

The FWFs contain fire pumps and the associated controllers, drivers, support systems and equipment to provide fire water to the site. The FWFs each contain a diesel engine-driven fire pump with a dedicated diesel fuel oil day tank and controllers. FWFs 28A and 28E also contain an electric motor-driven fire pump with controllers.

The fire water storage tanks are considered to be a part of the FWF.

6.2.15.2 High-Value Property

Information quantifying the value of equipment within the FWFs is not currently available. As the design for the FWFs progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.15.3 Description of Fire Hazards

In addition to transients that may be introduced into the FWFs during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the FWFs.

The FWFs are not expected to contain large amounts of stored combustible materials or flammable liquids. The fuel supply for the diesel fire pump are located inside the facility in diked day tanks which are designed and installed in accordance with NFPA 30 *Flammable and Combustible Liquids Code* (Reference 2.2.2.11).

The FWFs contain the YMP fire pumps, along with the required supporting water supplies and mechanical and electrical systems and equipment. The FWFs also contain the electrical and mechanical systems and equipment required to support the operation of the facility themselves.

6.2.15.4 Life Safety Considerations

The FWFs are classified as IBC F-2 Factory Use Occupancies (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.15.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The FWFs are separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the FWFs precludes the propagation of wildfire to the FWFs (Section 6.1.2.5.1).

The FWFS are separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the FWFs. Government-furnished vehicles delivering fuel oil to the day tanks represent an exposure fire threat to the exterior to these facilities. (Section 6.1.2.5)

FWF 28A and 28E are provided with a 3-hour fire barrier to separate the diesel engine-driven and the electric motor-driven fire pumps.

6.2.15.6 Fire Protection Features

The FWFs require the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the FWFs, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the FWFs, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the FWFs consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the FWFs, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the FWFs, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.15.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the FWFs.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the FWF;

Scenario 3. A fire from overheated mechanical or electrical systems and equipment associated with the fire pumps and/or controllers;

Scenario 4. A fire starting in, or near the electric motor-driven fire pump (Areas 28A and 28E only);

Scenario 5. A fire starting at a delivery truck during replenishment of the diesel generator-driven fire pump day tank due to a fuel oil leak and

Scenario 6. A fire starting in, or near the diesel generator-driven fire pump or its associated day tank due to a fuel oil leak.

A fire is not expected to occur at a fire water storage tank.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

FWF 28B contains a single fire pump and is a single fire area. Whereas FWFs 28A and 28E are separated into 2 fire areas to preclude a fire from impacting both fire pumps within either of those facilities. Therefore, any of the scenarios listed above could result in the complete loss of function of one fire pump. This loss of a fire pump constitutes the DBF for the FWFs.

6.2.15.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the FWFs is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.15.9 Protection of Important to Safety Systems, Structures and Components

The FWFs do not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.15.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the FWFs.

6.2.15.11 Critical Process Equipment

There are no critical process equipment in the FWFs, as defined in Section 6.1.15.

6.2.15.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.15.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the FWFs are discussed in Section 6.1.17.

6.2.15.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for these facilities ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.16 Aging Overpack Staging Facility (Area 290)

The Aging Overpack Staging Facility (AOSF) is an open concrete pad adjacent to the Canister Receipt and Closure Facility 1. Refer to the *Canister Receipt and Closure Facility 1 Fire Hazard Analysis* (Reference 2.2.1.13) for further details regarding the exposure fire threat from the AOSF to the CRCF.

The AOSF contains empty Aging Overpacks. The Site Transporter/Crawler may also be present. No other SSCs are anticipated in the AOSF

The Site Transporter/Crawler is equipped with onboard automatic fire suppression systems. These systems will be identified during detail design.

The AOSF is not normally occupied. Furthermore, no combustible materials or flammable liquids are anticipated to be used or stored, in this area.

6.2.17 Central Security Station (Area 30A)

6.2.17.1 Construction/Operations

The Central Security Station (CSS) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 175 feet x 125 feet, including the canopied vehicle inspection area. The closest surface facility to the CSS is the Vehicle Maintenance and Motor Pool (Area 690) which is located approximately 300 feet to the east of the CSS. (Reference 2.2.1.5, F-4) The layout and design of the facility will be developed during detail design.

The CSS contains the necessary systems and equipment to control vehicle and personnel access to the nuclear facilities. The CSS contains the equipment for an armed response to a security incident at any site facility.

6.2.17.2 High-Value Property

Information quantifying the value of equipment within the CSS is not currently available. As the design for the CSS progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.17.3 Description of Fire Hazards

In addition to transients that may be introduced into the CSS during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the CSS.

The CSS is not expected to contain large amounts of stored combustible materials or flammable liquids. The combustible loading in the CSS consists of Class A combustibles in metal cabinets (File cabinets, desks, etc.). Weapons are stored in a fire-rated vault.

The CSS contains the mechanical and electrical systems and equipment required to control access to the nuclear facilities. The CSS also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.17.4 Life Safety Considerations

The CSS is classified as an IBC B Business Use Occupancy; the canopied vehicle inspection area is an unclassified (U) Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.17.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The CSS separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the CSS precludes the propagation of wildfire to the CSS (Section 6.1.2.5.1).

The CSS is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the CSS. Government-furnished vehicles represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

6.2.17.6 Fire Protection Features

The CSS requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the CSS, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the CSS, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the CSS consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the CSS, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the CSS, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.17.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the CSS.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire starting in office area or conference room;

Scenario 3. A fire from overheated mechanical or electrical equipment associated with the operation of the CSS;

Scenario 4. A fire starting in, or near a vehicle in the canopied inspection area or parked adjacent to the CSS; and

Scenario 5. A fire starting in the armory.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The CSS is considered as a single fire area. The armory is separated from the balance of the CSS by fire-rated barriers. Therefore, any of the scenarios listed above could result in the complete loss of function of the CSS or its armory. The loss of the function of the CSS constitutes the DBF for the CSS.

6.2.17.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the CSS is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.17.9 Protection of Important to Safety Systems, Structures and Components

The CSS does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.17.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the CSS.

6.2.17.11 Critical Process Equipment

There are no critical process equipment in the CSS, as defined in Section 6.1.15.

6.2.17.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.17.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the CSS is discussed in Section 6.1.17.

6.2.17.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.18 Cask Receipt Security Station (Area 30B)

6.2.18.1 Construction/Operations

The Cask Receipt Security Station (CRS) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 175 feet x 100 feet, including the canopied inspection areas. The closest surface facility to the CRS is the 13.8 kV Switchgear Facility (Area 27B) which is located approximately 1,800 feet to the west of the CRS. (Reference 2.2.1.5, F-4) The layout and design of the facility will be developed during detail design.

The CRS contains the necessary systems and equipment to inspect incoming waste and materials being delivered to the site on truck trailers and rail cars. Commercial vehicles will deliver their loads adjacent to the CRS for inspection and subsequent transfer to government-furnished vehicles. At no time will vehicles be allowed directly enter the CRS itself. However, they will be parked under the canopied area for short periods of time while they are being cleared for passage into the GROA.

The CRS also contains the secondary alarm station as a backup to the primary alarm station in the CCCF (Area 240).

6.2.18.2 High-Value Property

Information quantifying the value of equipment within the CRS is not currently available. As the design for the CRS progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.18.3 Description of Fire Hazards

In addition to transients that may be introduced into the CRS during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the CRS.

The CRS is not expected to contain large amounts of stored combustible materials or flammable liquids. The combustible loading in the CRS consists of Class A combustibles in metal cabinets (File cabinets, desks, etc.).

The CRS contains the mechanical and electrical systems and equipment required to control vehicle access to the nuclear facilities. The CRS also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.18.4 Life Safety Considerations

The CRS is classified as a combined IBC B Business Use Occupancy for the structure; with the canopied vehicle inspection area being an unclassified (U) Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.18.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The CRS separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the CRS precludes the propagation of wildfire to the CRS (Section 6.1.2.5.1).

Railroad tracks are routed through the CRS. Thus a fire in a locomotive represents an direct exposure fire threat to the CRS. Commercial and government-furnished vehicles also represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

6.2.18.6 Fire Protection Features

The CRS requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the CRS, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the CRS, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the CRS consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the CRS, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the CRS, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.18.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the CRS.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the CRS;

Scenario 3. A fire starting in office area or conference room; and

Scenario 4. A fire starting in, or near a vehicle (locomotive or truck) under the canopied inspection area or parked adjacent to the facility.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The CRS is considered as a single fire area. The armory is separated from the balance of the CRS by fire-rated barriers. Therefore, any of the scenarios listed above could result in the complete loss of function of the CRS or its armory.

6.2.18.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the CRS is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.18.9 Protection of Important to Safety Systems, Structures and Components

The CRS does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.18.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the CRS.

6.2.18.11 Critical Process Equipment

There are no critical process equipment in the CRS, as defined in Section 6.1.15.

6.2.18.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.18.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the CRS is discussed in Section 6.1.17.

6.2.18.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.19 North Perimeter Security Station (Area 30C)

6.2.19.1 Construction/Operations

The North Perimeter Security Station (NPS) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 25 feet x 25 feet. The closest surface facility to the NPS is the Canister Receipt and Closure Facility 3 (Area 080), which is located approximately 450 feet to the southwest of the NPS. (Reference 2.2.1.5, G-4) The layout and design of the facility will be developed during detail design.

The NPS is not normally occupied.

6.2.19.2 High-Value Property

Information quantifying the value of equipment within the NPS is not currently available. As the design for the NPS progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.19.3 Description of Fire Hazards

The NPS is not expected to contain stored combustible materials or flammable liquids.

6.2.19.4 Life Safety Considerations

The NPS is not normally occupied. Hence, no life safety provisions are required.

6.2.19.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The NPS is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the NPS precludes the propagation of wildfire to the NPS (Section 6.1.2.5.1).

The NPS is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the NPS. Government-furnished vehicles represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the NPS is considered a single fire area.

6.2.19.6 Fire Protection Features

The NPS is not normally occupied and is of non-combustible construction.

Automatic

An automatic fire detection and alarm system is installed in the NPS, as described in Section 6.1.2.3.

Manual

Manual fire suppression for the NPS consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the NPS, as described in Section 6.1.2.2.

A manual fire alarm pull station is provided within the NPS, as described in Section 6.1.2.3.

Passive

None

6.2.19.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the NPS.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame; and

Scenario 2. A fire starting in a nearby vehicle and propagating to the NPS.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The NPS is considered as a single fire area. Therefore, either of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the NPS.

6.2.19.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the NPS is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.19.9 Protection of Important to Safety Systems, Structures and Components

The NPS does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.19.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the NPS.

6.2.19.11 Critical Process Equipment

There are no critical process equipment in the NPS, as defined in Section 6.1.15.

6.2.19.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.19.13 Consequence of an Automatic Fire Suppression System Failure

No automatic fire suppression is provided for the NPS.

6.2.19.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.20 Rail Car Staging Area (Area 33A)

The Rail Car Staging Area is used to stage non-combustible rail cars until they can be moved into the GROA. The Rail Car Staging Area does not contain any SSCs and is not normally occupied. Furthermore, no combustible materials or flammable liquids are used or stored in this area. No ignition sources are located in the Rail Car Staging Area. Fire hydrants are located in close proximity to the Rail Car Staging Area, as described in Section 6.1.2.2.

The only fire scenario in the Rail Car Staging Area is a transient combustible which exposes a rail car. The worst-case fire would result in the complete loss of the rail car(s) involved. Fire hydrants are located in close proximity to the staging area, as described in Section 6.1.2.2.

The Rail Car Staging Area is separated from all other surface structure by a minimum of 600 feet (Reference 2.2.1.5, C-5).

Therefore, a fire in the Rail Car Staging Area will not preclude the safe operation of any plant SSCs.

6.2.21 Truck Staging Area (Area 33B)

The Truck Staging Area is used to stage truck trailers and up to five truck(s) until they can be moved into the GROA. The Truck Staging Area does not contain any SSCs and is not normally occupied. No combustible materials or flammable liquids are used or stored in this area.

The only fire scenario in the Truck Staging Area is a vehicle fire. The worst-case fire would result in the complete loss of the vehicle(s) involved. Fire hydrants are located in close proximity to the staging area, as described in Section 6.1.2.2.

The Truck Staging Area is separated from all other surface structure by a minimum of 600 feet (Reference 2.2.1.5, C-5).

Therefore, a fire in the Truck Staging Area will not preclude the safe operation of any plant SSCs.

6.2.22 Initial Handling Facility (Area 51A)

Refer to the *Initial Handling Facility Fire Hazard Analysis* (Reference 2.2.1.14) for a discussion of the fire hazards associated with the Initial Handling Facility and the fire protection features provided to minimize/mitigate those hazards.

6.2.23 Administration Facility (Area 620)

6.2.23.1 Construction/Operations

The Administration Facility (ADMF) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 225 feet x 150 feet. The closest surface facility to the ADMF is the Fire, Rescue and Medical Facility (Area 63A) which is located approximately 150 feet to the east of the ADMF. (Reference 2.2.1.5, F-4) The layout and design of the facility will be developed during detail design.

The ADMF provides functional space and equipment for the management and administration of the GROA. The ADMF will also provide food service, training, computer support and the Emergency Operations Center.

6.2.23.2 High-Value Property

Information quantifying the value of equipment within the ADMF is not currently available. As the design for the ADMF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.23.3 Description of Fire Hazards

In addition to transients that may be introduced into the ADMF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the ADMF.

The ADMF will be provided with offices, conference rooms and records retention centers. The combustible loading in these areas is expected to be low.

The ADMF is also expected to contain a food preparation area with a commercial grade kitchen area. The potential exists for a fire in the food preparation area due to the presence of open flames, grease and other combustible materials. Ignition sources in the facility include faults in rotating machinery, electrical equipment failures, hot cooking surfaces, and maintenance activities.

The ADMF also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.23.4 Life Safety Considerations

The ADMF is classified as an IBC A-2 Assembly Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.23.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The ADMF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the ADMF precludes the propagation of wildfire to the ADMF (Section 6.1.2.5.1).

The ADMF is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the ADMF. Government-furnished vehicles do not represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the ADMF is considered a single fire area.

6.2.23.6 Fire Protection Features

The ADMF requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the ADMF, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the ADMF, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the ADMF consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the ADMF, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the ADMF, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.23.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the ADMF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the ADMF;

Scenario 3. A fire starting in a office or records area; and

Scenario 4. A fire starting in the kitchen/food service area

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The ADMF is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function of the facility. This total loss of facility function constitutes the DBF for the ADMF.

6.2.23.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the ADMF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.23.9 Protection of Important to Safety Systems, Structures and Components

The ADMF does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.5.1.2).

6.2.23.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the ADMF.

6.2.23.11 Critical Process Equipment

There are no critical process equipment in the ADMF, as defined in Section 6.1.15.

6.2.23.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.23.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the ADMF are discussed in Section 6.1.17.

6.2.23.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.24 Fire, Rescue and Medical Facility (Area 63A)

6.2.24.1 Construction/Operations

The Fire, Rescue and Medical Facility (FRMF) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 125 feet x 150 feet. The closest surface facility to the FRMF is the ADMF (Area 620), which is located approximately 150 feet to the west of the FRMF. (Reference 2.2.1.5, F-4) The layout and design of the facility will be developed during detail design.

The FRMF provides operational facilities for emergency service personnel and equipment that is responsible for responding to emergencies at the GROA. The facility will house the site medical facilities and personnel. The facility will also serve as the headquarters and sleeping quarters for the FRO.

6.2.24.2 High-Value Property

Information quantifying the value of equipment within the FRMF is not currently available. As the design for the FRMF progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.24.3 Description of Fire Hazards

In addition to transients that may be introduced into the FRMF during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the FRMF.

The FRMF is provided with offices, sleeping quarters, medical facilities, and equipment storage. The combustible loading in these areas is expected to be low. Site emergency vehicles will be located within a climate controlled indoor staging area attached to the facility. These vehicles may pose a significant exposure fire threat to the Fire, Rescue and Medical Facility.

The FRMF will also store, and maintain fire protection and fire fighting equipment. The combustible loading during these storage and maintenance activities.

The FRMF also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

6.2.24.4 Life Safety Considerations

The FRMF is classified as an IBC B Business Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.24.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The FRMF is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the FRMF precludes the propagation of wildfire to the FRMF (Section 6.1.2.5.1).

The FRMF is separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the FRMF. Government-furnished vehicles represent an exposure fire threat to the exterior to the facility. (Section 6.1.2.5)

For the purpose of this analysis, the FRMF is considered a single fire area.

6.2.24.6 Fire Protection Features

The FRMF requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the FRMF, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the FRMF, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the FRMF consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the FRMF, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the FRMF, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.24.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the FRMF.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the FRMF;

Scenario 3. A fire starting in a medical laboratory;

Scenario 4. A fire starting in a sleeping area;

Scenario 5. A fire starting in an office or conference room; and

Scenario 6. A fire involving a staged emergency vehicle and then spreading to the facility

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The FRMF is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function of the facility. This total loss of facility function constitutes the DBF for the FRMF.

6.2.24.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the FRMF is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.24.9 Protection of Important to Safety Systems, Structures and Components

The FRMF does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.6.1.2).

6.2.24.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the FRMF.

6.2.24.11 Critical Process Equipment

There are no critical process equipment in the FRMF, as defined in Section 6.1.15.

6.2.24.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.24.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the FRMF are discussed in Section 6.1.17.

6.2.24.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.25 Administration Security Stations (Areas 65A and 65B)

6.2.25.1 Construction/Operations

The Administration Security Stations (AS) are single story (Assumption 3.2.7), IBC Type II B non-combustible structures (Table 1). The footprint of these facilities is approximately 25 feet x 25 feet. The closest surface facility to either Security Station is the Warehouse (Area 68A), which is located approximately 200 feet to the west of Area 65A. (Reference 2.2.1.5, F-4) The layout and design of the facility will be developed during detail design.

The AS are not normally occupied.

6.2.25.2 High-Value Property

Information quantifying the value of equipment within the AS is not currently available. As the design for the AS progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.25.3 Description of Fire Hazards

The AS are not expected to contain stored combustible materials or flammable liquids.

6.2.25.4 Life Safety Considerations

The AS are not normally occupied. Hence, no life safety provisions are required.

6.2.25.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The AS are separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the AS precludes the propagation of wildfire to the AS (Section 6.1.2.5.1).

The AS are separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the AS. Government-furnished vehicles represent an exposure fire threat to the exterior to the facilities. (Section 6.1.2.5)

For the purpose of this analysis, the AS are considered as single fire areas.

6.2.25.6 Fire Protection Features

The AS are not normally occupied and is of non-combustible construction.

Automatic

None

Manual

Manual fire suppression for the AS consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the AS, as described in Section 6.1.2.2.

A manual fire alarm pull station is provided within the AS, as described in Section 6.1.2.3.

Passive

None

6.2.25.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the AS.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame; and

Scenario 2. A fire starting in a nearby vehicle and propagating to the AS

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The AS are considered as a single fire area. Therefore, either of the scenarios listed above could result in the complete loss of function for the systems and/or equipment in the facility. This total loss of facility function constitutes the DBF for the AS.

6.2.25.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the AS are not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.25.9 Protection of Important to Safety Systems, Structures and Components

The AS does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.25.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the AS.

6.2.25.11 Critical Process Equipment

There are no critical process equipment in the AS, as defined in Section 6.1.15.

6.2.25.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.25.13 Consequence of an Automatic Fire Suppression System Failure

No automatic fire suppression is provided for the AS.

6.2.25.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for these facilities ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.26 Warehouse/Central Receiving (Area 68A) and Materials Yard/Storage (Area 68B)

6.2.26.1 Construction/Operations

The Warehouse/Central Receiving (WCS) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 200 feet x 100 feet. The closest surface facility to the WCS is the AS (Area 65A) which is located approximately 150 feet to the east of the WCS. (Reference 2.2.1.5, F-4)

An open Materials/Yard Storage Area (Area 68B) is provided adjacent to the WCS. Because there is no physical separation or fire rated barriers separating the Warehouse/Central Receiving facility (Area 68A), and the Material/Yard Storage (Area 68B), they are being treated here as a single fire area hereafter referred to as the WCS.

The layout and design of the facility will be developed during detail design.

The WCS is used to receive, store, and issue consumable materials and spare parts required to support the day-to-day maintenance and operation of the GROA.

6.2.26.2 High-Value Property

Information quantifying the value of equipment within the WCS is not currently available. As the design for the WCS progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.26.3 Description of Fire Hazards

In addition to transients that may be introduced into the WCS during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the WCS.

The Warehouse is expected to have large amounts of combustible materials arranged in racked and palletized storage. Large quantities of combustible and flammable liquids may also be stored in the Warehouse. Lift and transport vehicles are expected to be present in the Warehouse. Ignition sources in the Warehouse will also include faults in rotating machinery, electrical equipment failures, and maintenance activities.

The WCS also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

The Storage Area is expected to contain combustible materials arranged in open storage. Lift and transport vehicles are expected to be present in the Storage Area. No ignition sources are postulated in the Storage Area.

6.2.26.4 Life Safety Considerations

The WCS is classified as an IBC S-2 Storage Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.26.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The WCS is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the WCS precludes the propagation of wildfire to the WCS (Section 6.1.2.5.1).

The WCS separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the WCS. Government-furnished vehicles represent an exposure fire threat to the exterior to the WCS. (Section 6.1.2.5)

For the purpose of this analysis, the WCS is considered a single fire area.

6.2.26.6 Fire Protection Features

The WCS requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the WCS, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the WCS, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the WCS consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the WCS, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the WCS, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.26.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the WCS.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the WCS;

Scenario 3. A fire starting in an area where large amounts of flammable and combustible liquids are stored;

Scenario 4. A fire starting in a delivery vehicle and spreading to where large amounts of combustibles are stored; and

Scenario 5. A fire starting in an area where large amounts of combustibles are stored; and

Scenario 6. A fire starting in an office area.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The WCS is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function of the facility. This total loss of facility function constitutes the DBF for the WCS.

6.2.26.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the WCS is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.26.9 Protection of Important to Safety Systems, Structures and Components

The WCS does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.26.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the WCS.

6.2.26.11 Critical Process Equipment

There are no critical process equipment in the WCS, as defined in Section 6.1.15.

6.2.26.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.26.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the WCS are discussed in Section 6.1.17.

6.2.26.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.27 Vehicle Maintenance and Motor Pool (Area 690)

6.2.27.1 Construction/Operations

The Vehicle Maintenance and Motor Pool (VM) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 75 feet x 150 feet. The closest surface facility to the VM is the UF (Area 25A), which is located approximately 125 feet to the south of the VM. (Reference 2.2.1.5, E-4) The layout and design of the facility will be developed during detail design.

The VM is utilized to service and maintain site vehicle powered by fossil fuels.

6.2.27.2 High-Value Property

Information quantifying the value of equipment within the VM is not currently available. As the design for the VM progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.27.3 Description of Fire Hazards

In addition to transients that may be introduced into the VM during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the VM.

The Vehicle Maintenance and Motor Pool (Area 690) will be utilized to repair and service/maintain the fossil-fueled site vehicles. Hot work such as cutting, grinding and welding is expected take place during the vehicle service activities. Quantities of Class A combustibles as well as both flammable and combustible liquids are expected in this area to support the service and maintenance of the site vehicles. The area will also contain small office areas. The combustible loading in these rooms is expected to be low.

Additional ignition sources in the facility include faults in rotating machinery, electrical equipment failures, and maintenance activities. Other combustibles may include transient combustibles introduced into the facility during routine maintenance activities.

6.2.27.4 Life Safety Considerations

The VM is classified as a combined IBC S-1 Storage and B Business Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.27.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The VM is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the VM precludes the propagation of wildfire to the VM (Section 6.1.2.5.1).

The VM separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the VM. Government-furnished vehicles represent an exposure fire threat to the exterior to the VM. (Section 6.1.2.5)

For the purpose of this analysis, the VM is considered a single fire area.

6.2.27.6 Fire Protection Features

The VM requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the VM, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the VM, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the VM consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the VM, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the VM, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.27.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the VM.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire starting in a fuel dispensing area as the result of a spill/leak and spreading to the repair shop;

Scenario 3. A fire from overheated mechanical or electrical equipment associated with the operation of the VM;

Scenario 4. A fire involving a delivery vehicle and then spreading to the facility and

Scenario 5. A fire involving a vehicle being repaired and then spreading to the facility

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The VM is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function of the facility. This total loss of facility function constitutes the DBF for the VM.

6.2.27.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the VM is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.27.9 Protection of Important to Safety Systems, Structures and Components

The VM does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.27.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the VM.

6.2.27.11 Critical Process Equipment

There are no critical process equipment in the VM, as defined in Section 6.1.15.

6.2.27.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems

for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.27.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the VM are discussed in Section 6.1.17.

6.2.27.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.28 Diesel Fuel Oil Storage (Area 70A)

Based on the best available information, the Diesel Fuel Oil Storage Area (DFS) is expected to contain approximately 100,000 gallons of Number 2 fuel oil in a diked storage tank for the GROA. The design for this tank has not been finalized. The DFS is not normally occupied.

A fuel pump transfer shelter is located adjacent to the fuel oil storage tank inside the diked area. The pumps inside the shelter represent an ignition source only during fuel oil transfer operations. No other SSCs or ignition sources are located in the DFS.

A fire is not postulated concurrent with a catastrophic failure of the tank. Routine maintenance and/or repair activities are not expected to produce sufficient thermal energy to ignite the contents of a large fuel oil spill and/or the contents of the tank.

The DFS is enclosed by a dike. The diked area will preclude the spread of fire beyond the dike and is separated from all surface structures by a minimum of 150 feet (Reference 2.2.1.5, E-4) and is designed in accordance with NFPA 30 *Flammable and Combustible Liquids Code* (Reference 2.2.2.11).

Fire hydrants are located in close proximity to the DFS, as described in Section 6.1.2.2.

Therefore, a fire in the DFS will not preclude the safe operation of any plant SSCs.

6.2.29 Fueling Stations (Area 70B)

6.2.29.1 Construction/Operations

The Fueling Stations (FS) is an open fueling area under a canopy. This area contains diesel fuel oil and gasoline tanks. The footprint of the facility is approximately 25 feet x 125 feet. The closest surface facility to the FS is the UF (Area 25A), which is located approximately 200 feet to the west of the FS. (Reference 2.2.1.5, E-4) The layout and design of the facility will be developed during detail design. This design will conform to the *Flammable and Combustible Liquids Code* (Reference 2.2.2.11).

The FS is utilized to provide fuel (diesel and gasoline) to site vehicle powered by fossil fuels. Whereas, vehicle maintenance activities are performed in the VM (Area 690).

Alternate fuels may be identified during detail design. These will included in future revisions of the FHA as required.

6.2.29.2 High-Value Property

Information quantifying the value of equipment within the FS is not currently available. As the design for the FS progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.29.3 Description of Fire Hazards

The FS will be utilized to provide the fossil-fueled site vehicles. The fuel (diesel fuel and gasoline) is stored in underground tanks.

Hot work such as cutting, grinding and welding is not expected take place during the vehicle service activities. Combustible materials and flammable liquids, other than those being dispensed at this facility, are not expected in this area.

The only ignition sources anticipated for the FS are the vehicles being fueled.

6.2.29.4 Life Safety Considerations

The FS is an open area, which is not normally occupied. Hence, no life safety provisions are required.

6.2.29.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The FS is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the FS precludes the propagation of wildfire to the FS (Section 6.1.2.5.1).

The FS separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the FS. Government-furnished vehicles represent an exposure fire threat to the exterior to the FS. (Section 6.1.2.5)

For the purpose of this analysis, the FS is considered a single fire area.

6.2.29.6 Fire Protection Features

The FS requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic fire detection and alarm system is installed for the FS, as described in Section 6.1.2.3.

Manual

A dry chemical fire suppression system is provided for the fueling station.

Manual fire suppression within the FS consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the FS, as described in Section 6.1.2.2.

A manual fire alarm pull station is provided for the FS as described in Section 6.1.2.3.

Passive

None

6.2.29.7 Design Basis Fire Scenario

The following scenario was considered as design basis fire scenarios for the FS.

Scenario 1. A fire involving a vehicle and then spreading to the facility

The design basis for this fire area would result in the complete combustion of the vehicle and other combustible materials in the area of origin. No credit is taken for fire suppression activities.

The FS is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function of the facility. This total loss of facility function constitutes the DBF for the FS.

6.2.29.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the FS is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.29.9 Protection of Important to Safety Systems, Structures and Components

The FS does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.29.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the FS.

6.2.29.11 Critical Process Equipment

There are no critical process equipment in the FS, as defined in Section 6.1.15.

6.2.29.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.29.13 Consequence of an Automatic Fire Suppression System Failure

Automatic fire suppression systems are not provided.

6.2.29.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or

hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.30 Craft Shops (Area 71A) and Equipment Yard/Storage (Area 71B)

6.2.30.1 Construction/Operations

The Craft Shop (CS) is a single story (Assumption 3.2.7), IBC Type II B non-combustible structure (Table 1). The footprint of the facility is approximately 225 feet x 75 feet. The closest surface facility to the CS is the WCS (Area 68A) which is located approximately 200 feet to the east of the CS. (Reference 2.2.1.5, F-4)

An open Equipment/Yard Storage Area (Area 71B) is provided adjacent to the WCS. Because there is no physical separation or fire rated barriers separating the Craft Shop (Area 71A), and the Equipment/Yard Storage (Area 71B), they are being treated here as a single fire area hereafter referred to as the CS.

The layout and design of the facility will be developed during detail design.

The CS is used to repair and maintain systems and equipment as required to support the day-to-day maintenance and operation of the GROA. The Equipment/Yard Storage Area is utilized to store materials and equipment to support the activities in the Craft Shop. The CS is expected to have office and support areas for personnel assigned to work in the facility.

6.2.30.2 High-Value Property

Information quantifying the value of equipment within the CS is not currently available. As the design for the CS progresses, protection of high-value property (Assumption 3.2.3) will be evaluated and included into this analysis, as appropriate.

6.2.30.3 Description of Fire Hazards

In addition to transients that may be introduced into the CS during normal operations, and maintenance and testing of facility equipment, the following are the predominant fire hazards and ignition sources of the CS.

The Craft Shops are expected to have facilities for painting and for hot work (cutting, grinding, and welding). The area is also expected to contain flammable and combustible liquids, compressed welding gasses and Class A combustible materials. The area is also expected to contain solid combustibles such as wood, wood dust and plastics. Ignition sources in the Craft Shops will also include faults in rotating machinery, electrical equipment failures, and maintenance activities. Other combustibles may include transient combustibles introduced into the facility during routine maintenance activities.

The CS also contains the electrical and mechanical systems and equipment required to support the operation of the facility itself.

The Storage Area is expected to contain combustible materials arranged in open storage. Lift and transport vehicles are expected to be present in the Storage Area. No ignition sources are postulated in the Storage Area.

6.2.30.4 Life Safety Considerations

The CS is classified as a combined IBC S-1 and S-2 Storage Use Occupancy, and a B Business Use Occupancy (Table 1). The means of egress from the facility are designed to meet the requirements of the LSC (Section 6.1.1). Fire barriers are used to limit the spread of fire (Section 6.1.2.4).

6.2.30.5 Exposure Fire Potential/Potential for Fire Spread Between Fire Areas

The CS is separated from all other structures to preclude a fire propagating to, or from adjacent structures (Section 6.1.2.5). A 33-foot minimum horizontal distance between combustible vegetation and the CS precludes the propagation of wildfire to the CS (Section 6.1.2.5.1).

The CS separated from the railroad tracks by a minimum distance of 300 feet. This precludes a fire in a locomotive from propagating to the CS. Government-furnished vehicles represent an exposure fire threat to the exterior to the CS. (Section 6.1.2.5)

For the purpose of this analysis, the CS is considered a single fire area.

6.2.30.6 Fire Protection Features

The CS requires the following fire protection features to provide a defense in depth approach to the fire protection of the facility. This defense results a fire being quickly detected and suppressed, thus limiting fire-induced damage.

Automatic

An automatic wet-pipe sprinkler system is designed and installed for the CS, as described in Section 6.1.2.2.

An automatic fire detection and alarm system is installed throughout the CS, as described in Section 6.1.2.3.

Manual

Manual fire suppression within the CS consists of portable fire extinguishers, as described in Section 6.1.2.2.

Fire hydrants are located in close proximity to the CS, as described in Section 6.1.2.2.

Manual fire alarm pull stations are provided within the CS, as described in Section 6.1.2.3.

Passive

Passive fire protection is provided in the form of fire-rated construction to protect means of egress from the facility and separation between fire areas, as described in Sections 6.1.2.4.

6.2.30.7 Design Basis Fire Scenario

The following scenarios were considered as design basis fire scenarios for the CS.

Scenario 1. A fire starting because of maintenance activities, ignited from a spark or open flame;

Scenario 2. A fire from overheated mechanical or electrical equipment associated with the operation of the CS;

Scenario 3. A fire starting in an area where large amounts of flammable and combustible liquids are stored;

Scenario 4. A fire starting in delivery vehicle and then spreading to an area where large amounts of flammable and combustible liquids are stored;

Scenario 5. A fire starting in an area where large amounts of combustibles are stored; and

Scenario 6. A fire starting in an office area.

The design basis for this fire area would result in the complete combustion of the combustible materials in the area of origin. No credit is taken for fire suppression activities.

The CS is considered as a single fire area. Therefore, any of the scenarios listed above could result in the complete loss of function of the facility. This total loss of facility function constitutes the DBF for the CS.

6.2.30.8 Damage Potential: Maximum Possible Fire Loss (MPFL)

The MPFL for fires in the CS is not expected to exceed $150-million. Therefore, additional fire-rated barriers are not required to limit loss potential, as identified in Section 5.1.2 of DOE-STD-1066-99 (Reference 2.2.1.20).

6.2.30.9 Protection of Important to Safety Systems, Structures and Components

The CS does not contain any SSCs ITS (Reference 2.2.1.3, Section 9.10.1.2).

6.2.30.10 Potential for Toxic or Radioactive Incident Due to a Fire

There are no toxic, or biological or radioactive materials in the CS.

6.2.30.11 Critical Process Equipment

There are no critical process equipment in the CS, as defined in Section 6.1.15.

6.2.30.12 Recovery Potential

Physical damage to the facility and its contents will be limited to the general location of the fire's origin. This will be assured by the use of fire resistant or non-combustible materials for the construction, strict control of combustible materials, and the provisions of fire protection systems for both automatic and manual actuation. Therefore, the facility will most likely be able to readily recover from a design basis fire in this fire area.

6.2.30.13 Consequence of an Automatic Fire Suppression System Failure

The consequences of an automatic fire suppression system failure in the CS are discussed in Section 6.1.17.

6.2.30.14 Conclusion

The installations and provisions identified for fire protection and life safety systems for this facility ensure that a credible fire does not result in an onsite or offsite release of a radioactive or hazardous material, and all design requirements and FHA objectives identified in Section 1.1 are met.

6.2.31 Subsurface (Area 800)

The Subsurface is beyond the scope of this analysis (Section 1.2).

6.2.32 Storm Water Retention Pond (Area 90A)

The storm water retention pond is used to collect water storm water runoff. The storm water retention pond does not contain any SSCs and is not normally occupied. Furthermore, no combustible materials or flammable liquids are used or stored in this area. The storm water retention pond does not contain any ignition sources. Thus, a fire is not postulated for the storm water retention pond.

7. REQUIRED DESIGN FEATURES

The assessment of this FHA is that implementation of the identified hazard mitigations and life safety provisions will provide an acceptable level of fire protection that meets applicable NRC regulations and DOE fire protection orders. Failure to provide the required mitigation features designed, installed, tested and maintained, as prescribed in applicable consensus codes and standards, will invalidate the conclusions of this analysis.

7.1 DESIGN FEATURE REQUIREMENTS

7.1.1 Automatic Suppression and Fire Alarm and Detection

- Automatic fire suppression and fire alarm and detection systems are required throughout the facilities addressed in this analysis as required in Section 6.2.
- Fire suppression systems are designed, fabricated, installed, and tested in accordance with the requirements identified in Section 6.1.2.2.
- Automatic fire alarm and detection systems are designed, fabricated, installed and tested in accordance with the requirements identified in Section 6.1.2.3. .

7.1.2 Manual Fire Suppression and Detection

- Portable fire extinguishers are provided and selected, installed, inspected, tested and maintained in accordance with the requirements identified in Section 6.1.2.2.
- Manual pull stations are designed, fabricated, installed and tested in accordance with the requirements identified in Section 6.1.2.3.

7.1.3 Passive Fire Protection

Fire barriers defining the boundaries of fire areas are required to have fire-resistance ratings as discussed in Section 6.1.2.4. Additional barriers necessary to separate individual fire zones within the fire areas are identified in the individual fire area discussions.

- Where fire-rated assemblies (walls, floor ceilings, roof ceilings) are either partially or fully penetrated by pipes, ducts, conduits, raceways or other such building elements, fire barrier penetration material is required around the penetrations to maintain the fire-resistance rating of the assembly. Assemblies are designed, fabricated, installed and tested in accordance with the requirements listed in Section 6.1.2.4.

- All openings in fire barriers are protected consistent with the designated fire-resistance rating of the barrier as required by the IBC and the LSC as identified in Section 6.1.2.4.

- Ventilation fire dampers installed in ducts penetrating fire-rated barriers are installed and fire-rated as identified in Section 6.1.12.

- Electrical cabling is designed, fabricated, installed and tested in accordance with the requirements listed in Section 6.1.5.1.

- Fire rated plenum electrical cable shall be used to limit the potential for fire under the raised floors. This cable shall be used in lieu of providing a dedicated gaseous fire suppression system for these areas.

7.1.4 Explosion Protection

Explosion protection is incorporated into the design of each facility, as described in Section 6.1.3.

7.1.5 Life Safety

Life safety features employed in the design of each facility are designed in accordance with the requirements listed in Section 6.1.1.

The life safety design features include provisions for means of egress. This includes fire-rated barriers, exit doors, emergency lighting, illuminated exits signs, and both automatic and manually actuated fire alarm systems with audible and visual indicating devices for all fire areas.

7.1.6 Fire Protection Procedural Requirements

The following procedures and controls are required as a part of the *Fire Protection Program* (Reference 2.1.2) for the GROA:

- A combustible control program will be implemented to limit the amount of combustibles that are brought into, used or stored in the GROA. Quantities of transient combustibles and flammable liquids will be controlled, tracked and then removed from the GROA when they are no longer required.

- Compensatory measures shall be implemented for impairments to fire protection systems and equipment. These measures ensure that fire protection systems and equipment that are impaired or out of service are tracked and returned to service in an expeditious manner. These measures include actions to be taken to provide additional measures to be taken during the time a system/component is out of service (e.g., provision of additional lengths of fire hose and/or fire watch (stationary or roving)).

- Fire/rescue organization (FRO) operational procedures, including pre-fire plans will be established for the prompt suppression of fires in the GROA. This organization will be fully staffed and trained in fire suppression (Assumption 3.1.1).

- Controlled surveillance procedures for both the active and passive fire protection systems and components installed in the GROA. These procedures will provide for the inspection, testing, and maintenance required by the applicable NFPA codes and standards to maximize the potential that the fire protection systems and components will fulfill their intended design function.

- Administrative and operational procedures (e.g., vegetation removal for a 33-foot perimeter around the GROA facilities). These procedures will ensure that the CCCF is not exposed to fire hazards from external sources.

8. RESULTS AND CONCLUSIONS

8.1 RESULTS

The results of this FHA requires the installation of the identified design features and life safety provisions discussed within this analysis. This provides an acceptable level of fire protection that meets applicable NRC regulations and DOE fire protection criteria. Failure to provide the required mitigation features designed, installed, tested and maintained, as prescribed in applicable consensus codes and standards may lead to an unsafe condition.

8.2 CONCLUSIONS

As stated in Section 1.1, the objective of this FHA is to minimize the potential for:

- The occurrence of a fire or related event;
- A fire that causes an unacceptable onsite or offsite release of hazardous or Radioactive material that will threaten the health and safety of employees, the public, or the environment;
- Vital U.S. Department of Energy (DOE) programs suffering unacceptable interruptions as a result of fire and related hazards;
- Property losses from a fire and related events exceeding limits established by DOE; and
- Critical process controls and safety class systems being damaged as a result of fire and related events.

Based on the defense-in-depth approach to fire protection employed for the protection of the GROA surface facilities the following conclusions have been reached.

- The requirements established for the comprehensive fire and related hazards protection program for the GROA Site are sufficient to minimize the potential for fire and related events.
- The GROA surface facilities will maintain the ability to monitor the entire repository and control select systems.
- An acceptable level of fire and life safety is provided in the GROA surface facilities to minimize the occurrence of a fire or related event.
- Fire rated construction separating the GROA surface facilities systems and equipment provides sufficient separation to preclude a fire from compromising the ability of the GROA surface facilities to perform their intended design functions.
- The design and operation of the fire protection features minimizes the potential for a fire to pose a threat for an onsite or offsite release of hazardous material.
- Fire protection design features minimize the potential for a fire involving the GROA surface facilities to produce unacceptable interruptions to the DOE programs at the YMP.
- Design features protecting process controls minimize the potential for their damage due to a fire or related event.
- Separation of the building into multiple fire areas and fire zones confines a fire to a limited area and reduces overall property damage. Therefore, it is concluded that property damage from a fire event is not likely to exceed DOE property loss criteria.

As design progresses more detailed information will become available relevant to equipment costs. In the event the MPFL rises above the acceptable limits set by DOE, engineering controls such as fire barrier separation and redundant fire suppression capabilities will be employed to limit losses and conform to DOE property loss criteria. Limiting in situ combustible material quantities and enforcing administrative limitations on transient combustible material in each fire area lowers the risk of damaging the structure, and minimizes the risk of critical process controls and safety class systems from being damaged as a result of fire or related events.

Mitigation of hazards is provided by incorporating the design features identified in Section 7. Implementation of the hazard mitigations provide a satisfactory level of fire protection that meets applicable NRC regulations and DOE fire protection orders.

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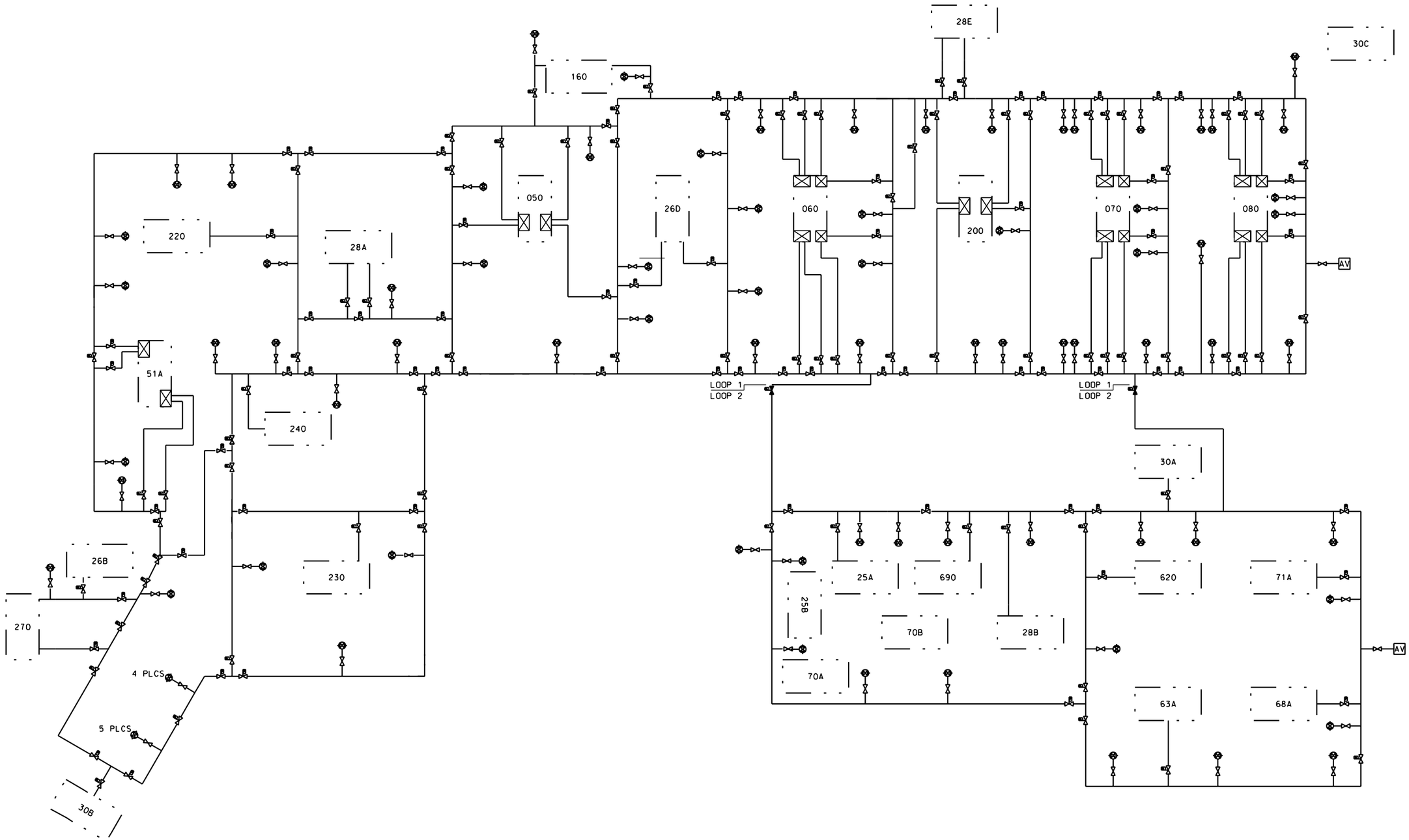
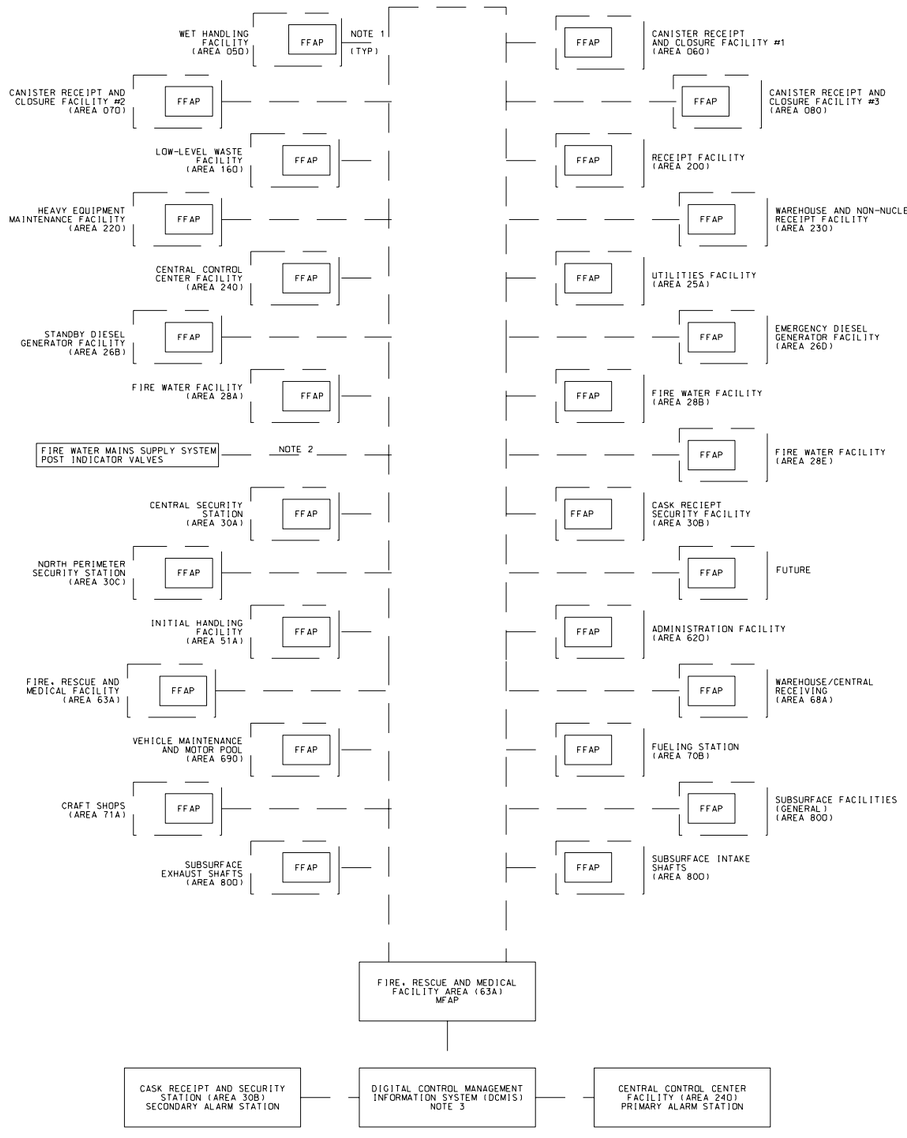
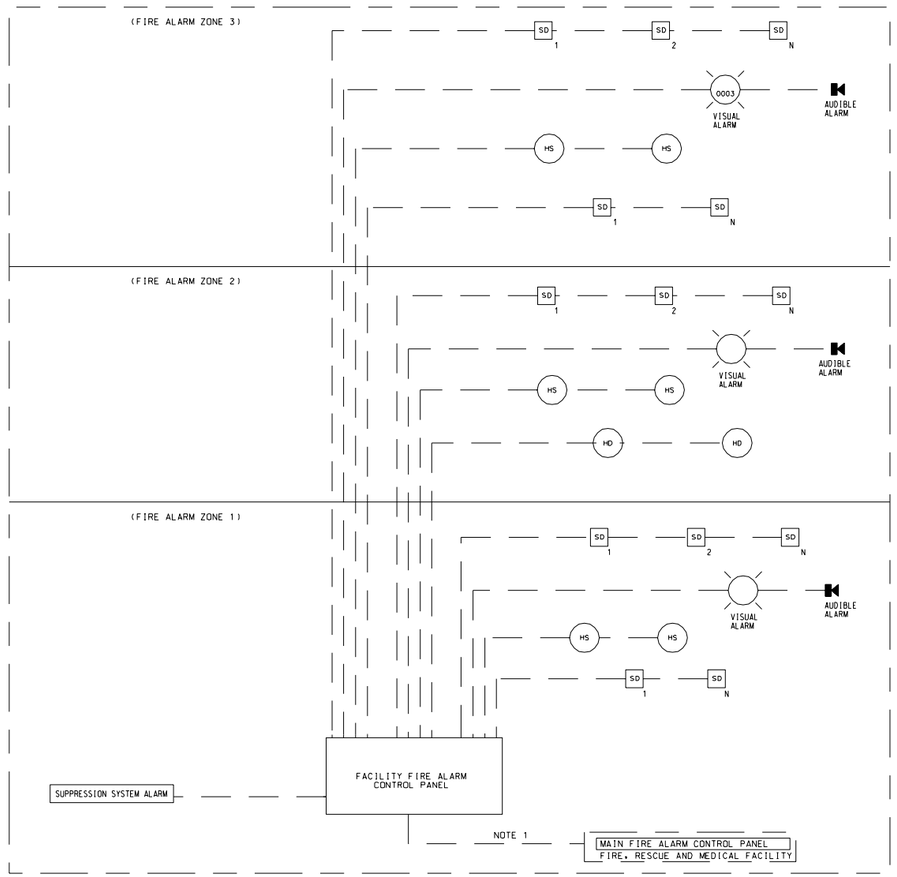


Figure 1. Fire Water Subsystem



SITE FIRE ALARM AND DETECTION SYSTEM SCHEMATIC DRAWING



TYPICAL FACILITY FIRE DETECTION AND ALARM SYSTEM

LEGEND

SD	SMOKE DETECTOR
HD	HEAT DETECTOR
	STROBE LIGHT
	HORN
HS	MANUAL PULL STATION
MFAP	MAIN FIRE ALARM PANEL
FFAP	FACILITY FIRE ALARM CONTROL PANEL

NOTES

1. THIS SINGLE LINE REPRESENTS THE INDIVIDUAL CIRCUITS BETWEEN THE FACILITY FIRE ALARM CONTROL PANEL AND THE MAIN FIRE ALARM CONTROL PANEL.
2. THIS SINGLE LINE REPRESENTS THE INDIVIDUAL CIRCUITS BETWEEN THE ELECTRICALLY SUPERVISED POSITION INDICATOR VALVES IN THE FIRE MAINS SUPPLY PIPING AND THE MAIN FIRE ALARM CONTROL PANEL.
3. THE DCMIS SYSTEM INTERFACES WITH THE MFAP FOR MONITORING PURPOSE.

Figure 2. Site Fire Detection and Alarm System