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**Civilian Radioactive Waste Management System
Management & Operating Contractor**

Surface Fire Hazards Analysis Technical Report-Constructor Facilities

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October 2000

Prepared for:

U.S. Department of Energy
Yucca Mountain Site Characterization Office
P.O. Box 30307
North Las Vegas, Nevada 89036-0307

Prepared by:

TRW Environmental Safety Systems Inc.
1180 Town Center Drive
Las Vegas, Nevada 89144

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Prepared by:

R.E. Flye
Mechanical Engineer

10-23-00
Date

Checked by:

J.L. Kubicek
Fire Protection Engineer

10-24-00
Date

Approved by:

J.S. Leak
Test Facilities Design Section Supervisor

10-24-00
Date

L.R. Morrison
Test Facilities Design Section Manager

10/24/00
Date

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ACRONYMS AND ABBREVIATIONS

DAS	Data Acquisition System
DOE	U.S. Department of Energy
ES&H	Environmental Safety and Health
ESF	Exploratory Studies Facilities
ESFDR	Exploratory Studies Facilities Design Requirements
FHA	Fire Hazards Analysis
FOC	Field Operations Center
M&O	Management and Operating Contractor
NTS	Nevada Test Site
PVC	polyvinyl chloride
QC	quality control
RSN	Ratheon Services Nevada
SNL	Sandia National Laboratories
TBM	Tunnel Boring Machine
USGS	U.S. Geological Survey
YMP	Yucca Mountain Site Characterization Project

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1. PURPOSE

The purpose of this Fire Hazards Analysis Technical Report (hereinafter referred to as Technical Report) is to assess the risk from fire within individual fire areas to ascertain whether the U.S. Department of Energy (DOE) fire safety objectives are met. The objectives identified in DOE Order 420.1, Change 2, *Facility Safety*, Section 4.2, establish requirements for a comprehensive fire and related hazards protection program for facilities sufficient to minimize the potential for:

- The occurrence of a fire or related event
- A fire that causes an unacceptable on-site or off-site release of hazardous or radiological material that will threaten the health and safety of employees, the public, or the environment
- Vital DOE programs suffering unacceptable interruptions as a result of fire and related hazards
- Property losses from a fire and related events exceeding defined limits established by DOE
- Critical process controls and safety class systems being damaged as a result of a fire and related events.

2. SCOPE

The scope of this Technical Report is to review each of the individual fire areas that comprise the Exploratory Studies Facilities (ESF) Surface Facilities to verify compliance with DOE Order 420.1, Change 2. The definition of a fire area, per DOE G 440.1-5, *Implementation Guide for Use with DOE Orders 420.1 and 440.1 Fire Safety Program*, is stated as: "A fire area is defined as a location bounded by fire-rated construction, having a minimum fire resistance rating of 2 hours, with openings protected by equivalently-rated fire doors, dampers or penetration seals. The boundaries of exterior fire areas (yard areas) should be as determined by the Authority Having Jurisdiction or delegated authority. Where a facility is not subdivided by fire-rated construction, the fire area should be defined by the exterior walls and roof of the facility." The fire areas identified in this Technical Report are defined as the North Portal Pad, including the Heliport, the South Portal Pad, Exile Hill, and Booster Pump Station. This Technical Report is limited to the facilities and structures within each fire area listed in Tables 2-1 through 2-4.

Table 2-1. North Portal Pad Fire Area

Name	Building No.
Construction & Tunneling Services	307236
Craft Room	24-9917
Data Acquisition System (DAS)	A261873
Diesel Fueling Station (Trains)	A260710

Table 2-1. North Portal Pad Fire Area (Continued)

Name	Building No.
Diesel Fueling Station (Trucks)	-
Diesel Generator W/2 Tanks	A183815
Diesel Portable Air Compressor	A86078 #1
Diesel Portable Air Compressor	A86078 #2
Diesel Storage Tank	-
Diesel Storage Tank	-
Drilling Support	A502093
Duct Fabrication	A261290
Electrical Switchgear	A216873
Field Operations Center (FOC) at the North Portal Pad	-
Helicopter Pad	-
Issued for Construction Storage Yard	-
Microwave Unit-closed	-
Microwave Unit-open	-
Office	A535940
Office	A535939
Office	307240
Office (Construction)	7010
Office (Document Control)	7001
Office (DOE)	7011
Office (Electrical)	306489
Office (Environmental)	7003
Office (Environmental Safety and Health [ES&H])	7004
Office (Management and Operating Contractor [M&O] Complex)	7009
Office (Mechanical)	703366
Office (Mechanical)	-
Office (Mine Rescue)	7012
Office (Property/Management)	7007A
Office (Property/Training)	7006
Office (Quality Assurance)	7007
Office (Respirator Fit)	7005
Office (Ratheon Services Nevada [RSN] Field Office)	-
Office (Shipping/Receiving)	-
Office (Survey)	7002
Office (Teamsters-vacant)	7006A

Table 2-1. North Portal Pad Fire Area (Continued)

Name	Building No.
Office (Maintenance)	306487
Oil Storage Pad	-
Post Shot Field Office	900-0263
Quality Control (QC) Field Office	7008
Shop (Carpenter)	306654
Shop (Electrical)	535938
Shop (Electrical)	306485
Shop (Hose)	306483
Shop (Mechanical)	306486
Shop (Mechanical)	306466
Shop (Paint)	-
Shop (Pipe Fitters)	91654
Sandia National Laboratories (SNL)	-
SNL	-
SNL	PK-5
SNL-Operations Support	STA-Q
Spill Response Materials	A91212 is crossed out
Steam Cleaning Unit	307208
Storage (Acetylene Cylinders)	-
Storage (Alpine Parts)	307204
Storage (Argon Cylinders)	-
Storage (Blue Steel Barrels)	-
Storage (Boat Drill Parts)	262209
Storage (Bulk Oil)	306495
Storage (CO2/N2 Cylinders)	-
Storage (Electrical)	306485
Storage (Electrical)	306655
Storage (Electrical)	306656
Storage (Flammable Liquid Cabinets)	-
Storage (General)	A01153
Storage (General)	306482
Storage (General)	306484
Storage (General)	307207
Storage (General)	-
Storage (General)	-
Storage (General)	27716
Storage (General)	307210
Storage (General)	307211

Table 2-1. North Portal Pad Fire Area (Continued)

Name	Building No.
Storage (General)	-
Storage (Lubricant)	-
Storage (Mechanical)	306488
Storage (Mechanical)	307212
Storage (Oil Barrels)	-
Storage (Oil Filters)	-
Storage (Oxygen Cylinders)	-
Storage (Paint)	-
Storage (Pipe Fitters)	306657
Storage (Tunnel Boring Machine [TBM] Parts)	A262070
Storage (Tires)	705138
Storage (Ventilation Machine Fabricator Parts)	No. 3
Tool Crib	306490
Tool Crib	306491
Tool Crib	306492
Tool Crib	307205
Tool Crib	306493
Tool Crib	307201
Tool Crib	307202
Tool Crib	307203
Transformer	A01122
Transformer	XFMR-Sta. No. 2
Transformer	A01157
U.S. Geological Survey (USGS)-Sample Mgmt Field Ops	No. 3
USGS-Sample Mgmt Field Ops	No. 2
USGS-Tracer Gas Lab	-
Warehouse Tent No. 1	A01080
Warehouse Tent No. 2	A02104
Wiltel (PBX)	No. 6

Table 2-2. South Portal Pad Fire Area

Name	Building Number
Personal Protective Equipment Storage	A01469
480V Switchgear	A02154
Diesel Generator	306466
Oxygen/Acetylene Cylinder Storage	-
Hazardous Waste Pickup	-

Table 2-3. Exile Hill Fire Area

Name	Building Number
Chlorination Unit	765014
Non-Potable Water Tank (200,000 gal)	-
Potable Water Tank (50,000 gal)	-

Table 2-4. Booster Pump Station Fire Area

Name	Building Number
Booster Pump	-
Water Tank	WT-7008-1
Water Tank	WT-7008-2

This Technical Report does not include the Change House (Building 5008) or the Electrical Switchgear Building (Building 5010), both located at the North Portal Pad. Separate Fire Hazards Analysis (FHA) documents, *North Portal - Fire Hazards Analysis - Change House Building #5008* (Ruonavaara 1993) and *North Portal Fire Hazards Analysis - Switchgear Building No. 5010 - ESF Surface Design Package 1A* (Kubicek 1995), were prepared and issued for these facilities. The *Subsurface Fire Hazards Technical Report* (Logan 1999) discusses the fire hazards for the subsurface facilities and are not included in this Technical Report.

3. QUALITY ASSURANCE

This Technical Report was prepared in accordance with AP-3.11Q, *Technical Reports*, and the associated AP-2.13Q, *Technical Product Development Planning*.

Results of the *Complete Accurate Technical Baseline* (CRWMS M&O 1999a) has determined that the preparation of this Technical Report is not subject to the requirements of the *Quality Assurance Requirements and Description* (DOE 2000). No quality assurance controls are applicable to the items or activities addressed in this design analysis. (QA: N/A)

The items addressed in this Technical Report are temporary and are, therefore, not classified in accordance with QAP-2-3, *Classification of Permanent Items*.

4. COMPUTER SOFTWARE AND MODEL USAGE

This Technical Report uses off-the-shelf, commercial software in its preparation. No software routines or models are used.

5. INPUTS

Inputs for this Technical Report are listed in Section 9. The architect/engineer performed walk-downs on January 24 and April 25, 2000, to verify the as-installed systems and structures.

5.1 PARAMETERS

Not used.

5.2 CRITERIA

The *Safety and Health Plan* (YMP 1998a) and the *Management and Operating Contractor Safety and Health Plan* (CRWMS M&O 1999b) refer to DOE Order 420.1, Change 2, to establish safety requirements related to fire protection mitigation.

The following fire protection design requirements are applicable to the ESF Surface Facilities.

5.2.1 Environment

Surface Facilities and equipment shall be designed to operate under the environmental conditions listed in the *Exploratory Studies Facility Design Requirements* (ESFDR) (YMP 1997). These requirements are described in Sections 3.2.1.2.1.1.A, Fungus, Bacteria, and Algae; 3.2.1.2.1.1.B, Earthquake; 3.2.1.2.1.1.C, High Winds; 3.2.1.2.1.1.D, Grounding; 3.2.1.2.1.1.E, Precipitation; 3.2.1.2.1.1.F, Temperature; 3.2.1.2.1.1.G, Snow; 3.2.1.2.1.1.H, Humidity; 3.2.1.2.1.1.I, Flood; and 3.2.1.2.1.1.J, Sand and Dust. These requirements were implemented during the design, installation, and testing of the Surface Facilities fire protection systems.

5.2.2 Compliance

The ESFDR (YMP 1997) states that the fire protection requirements shall be designed in compliance with DOE Order 5480.7A, *Fire Protection*. This Order has been replaced by DOE Order 420.1, Change 2. The requirements of DOE Order 420.1, Change 2, were implemented during the design, installation, and testing of the Surface Facilities fire protection systems.

5.2.3 Fire Protection

Surface Facilities fire protection shall be provided as specified by Sections 3.4.2.1.1.B, Vehicle Access; 3.4.2.1.2.B, Surface Facilities Fire Protection Systems; 3.4.2.5.1, Shop Building Requirements; 3.4.2.5.1.A, Flammable Materials Storage; 3.4.5.1.1.B.1, Surface Utilities; 3.4.5.3.1.J, Water Supply, Storage, and Distribution; 3.4.5.2.1.N, Switching and Protective Devices; 3.4.5.2.1.P, Surge Protection and Grounding; 3.5.7.1.C, Booster Pump Station; 3.5.9.1.C, Tank Size; and 3.5.9.1.D, Tank Volume of the ESFDR (YMP 1997). These requirements were implemented during the design, installation, and testing of the Surface Facilities fire protection features and systems.

5.2.4 Alarm Systems

To alert on-site and fire fighting personnel of possible dangerous environmental and safety situations, the ESFDR (YMP 1997) describes the system requirements. These requirements are described in Sections 3.4.5.5.1.F, Communications with Underground; 3.4.5.5.1.I, Public Address System; 3.4.5.5.1.L, Communication With NTS Fire Response and Nye County; 3.5.7.1.B, Pump Rate; 3.5.7.1.C, Pump Demand; and 3.6.2.1.C, Facility Monitoring & Control System of the ESFDR (YMP 1997), requiring that alarm and communication systems be

provided. These requirements were implemented during the design, installation, and testing of the Surface Facilities fire protection systems.

5.3 CODES AND STANDARDS

This section lists the codes and standards used in the development of this Technical Report.

5.3.1 Code of Federal Regulations

- a) 29 CFR 1910 Subpart L, Labor: Occupational Safety and Health - Fire Protection
- b) 29 CFR 1910.38 Subpart E, Labor: Occupational Safety and Health Standards - Means of Egress
- c) 29 CFR 1926, Labor: Safety and Health Regulations Construction

5.3.2 U. S. Department of Energy Orders

- a) DOE Order 420.1, Change 2, *Facility Safety*
- b) DOE G 440.1-5, *Implementation Guide for Use with DOE Orders 420.1 and 440.1 Fire Safety Program*
- c) DOE Order 5480.7A, *Fire Protection*

5.3.3 National Fire Protection Association

- a) National Fire Protection Association (NFPA) 1, Fire Prevention Code
- b) NFPA 10, Standard for Portable Fire Extinguishers
- c) NFPA 13, Standard for the Installation of Sprinkler Systems
- d) NFPA 22, Standard for Water Tanks for Private Fire Protection
- e) NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- f) NFPA 72, National Fire Alarm Code
- g) NFPA 101, Life Safety Code

6. ASSUMPTIONS

6.1 WATER

It is assumed there is an adequate water supply from the non-potable storage tank on Exile Hill to meet the demand of the sprinkler systems and fire hydrants installed at the North Portal Pad.

This assumption is based on the fact that the automatic controls for the Raw Water System were not installed. The Non-Potable Water System storage tanks, the distribution piping system supplying the sprinkler systems and fire hydrants, and the sprinkler systems were designed, installed, and tested per the baseline engineering document and with NFPA 13, 22, and 24, respectively.

Operations and Maintenance testing and inspection records of the sprinkler systems, fire hydrants, and fire extinguishers are available in the project records.

6.2 HIGH VALUE PROPERTY

For the purposes of this Technical Report, high value property is defined as property that has a replacement cost in excess of \$1,000,000. This definition is consistent with high value property in DOE Order 420.1, Change 2.

6.3 OCCUPATIONAL SAFETY AND HEALTH

Due to the temporary nature of the Surface Facilities and periodic construction activities that occur, it is assumed that 29 CFR 1926 is the appropriate code for occupational safety and health for Constructor Facilities. Operating Facilities of a long term nature such as the Change House (5008) and Electrical Switchgear (5010) Buildings are not in this report, and 29 CFR 1910 is the assumed appropriate code.

7. ANALYSIS

7.1 INTRODUCTION

The Surface Facilities include the systems, structures, and components that support ESF construction and operation activities. Surface Facilities are located at the North and South Portal Pads, Exile Hill, and Booster Pump Station.

The approach taken to complete this Technical Report involved site walk-downs of Surface Facilities located in each fire area. A description of each building and structure and their construction, a description of the installed fire protection features, and the identification of fire hazards that may involve these facilities is included in this Technical Report. After the data was collected, an analysis was performed to determine if the fire safety objectives identified in Section 1 have been satisfied.

7.2 CONSTRUCTION

This section identifies each building and structure and their construction for each fire area. Figures 1, 2, and 3 illustrate the constructor facilities on the North Portal Pad, Helicopter Pad, and South Portal Pad.

7.2.1 North Portal Pad

The North Portal Pad is the major activity center to support testing and operations within the tunnel. Temporary trailers housing administrative offices for engineering, construction, and

support staff are located on the north side of the pad. Craft shops and storage facilities for construction activities and equipment repair are housed in transportainers, conexes, and other temporary structures. Table 7.2.1-1 describes the construction features of those facilities located at the North Portal Pad. See Figure 1 for facility locations.

Table 7.2.1-1. Construction Description of the Facilities Located at the North Portal Pad

Name	Number	Trailer	Transp.	Other	Comments
Construction & Tunneling Services	307236		✓		
Craft Room	24-9917		✓		
DAS	A261873	✓			North of the portable air compressors
Diesel Fueling Station (Trains)	A260710			Skid	Convault, double walled with leak detection
Diesel Fueling Station (Trucks)	-			Concrete pads	Truck pad with concrete basins
Diesel Generator W/2 tanks	A183815			Mobile	Plastic lined concrete collection basin
Diesel Portable Air Compressor	A86078 #1			Mobile	Plastic lined earth berm
Diesel Portable Air Compressor	A86078 #2			Mobile	Plastic lined earth berm
Diesel Storage Tank (Trucks)	-			Elevated	Plastic lined earth berm
Diesel Storage Tank (Air Compressors)	-			Convault	Plastic lined earth berm
Drilling Support	A502093		✓		Magnesium construction
Duct Fabrication	A261290		✓		
Electrical Switchgear	A216873			Concrete pad	
FOC	-	✓			Triple-wide
Heliport	-			Concrete slab	

Table 7.2.1-1. Construction Description of the Facilities Located at the North Portal Pad (Continued)

Name	Number	Trailer	Transp.	Other	Comments
Issued for Construction Storage Yard	-			Open yard	
Microwave Unit-closed	-	✓			Elevated on wood beams
Microwave Unit-open	-	✓			Elevated on wood beams
Office	A535940		✓		
Office	A535939		✓		
Office	307240		✓		
Office (Construction)	7010	✓			Triple-wide
Office (Document Control)	7001	✓			
Office (DOE)	7011	✓			Double-wide
Office (Electrical)	306489		✓		
Office (Environmental)	7003	✓			
Office (ES&H)	7004	✓			
Office (M&O Complex)	7009	✓			Multiple trailer complex
Office (Maintenance)	306487		✓		
Office (Mechanical)	703366		✓		
Office (Mechanical)	-		✓		
Office (Mine Rescue)	7012	✓			To be relocated
Office (Property/Management)	7007A	✓			
Office (Property/Training)	7006	✓			
Office (QC Field Office)	7008	✓			Double-wide
Office (Quality Assurance)	7007	✓			
Office (Industrial Hygiene)	7005	✓			
Office (RSN Field Office)	-			Skid	8' x 10'
Office (Shipping/Receiving)	-	✓			
Office (Survey)	7002	✓			
Office (Teamsters-vacant)	7006A	✓			
Oil Storage Pad	-			Concrete basin	
Post Shot Field Office	900-0263			✓	
Shop (Carpenter)	306654		✓		
Shop (Electrical)	535938		✓		
Shop (Mechanical)	306486		✓		
Shop (Paint)	-		✓		
Shop (Pipe Fitters)	91654	✓			Magnesium construction

Table 7.2.1-1. Construction Description of the Facilities Located at the North Portal Pad (Continued)

Name	Number	Trailer	Transp.	Other	Comments
SNL	-		✓		Blue, 8' x 18'
SNL	-		✓		White, 8' x 8'
SNL	PK-5			Skid	
SNL-Operations Support	STA-Q	✓			
Spill Response Materials	A91212			Skid	Supported by wood beams on grade
Steam Cleaning Unit	307208		✓		
Storage (Acetylene Cylinders)	-			Steel shed	
Storage (Alpine Parts)	307204		✓		
Storage (Argon Cylinders)	-			Steel shed	
Storage (Blue Steel Barrels)	-			Open racks	Concrete basin
Storage (Boart Drill Parts)	262209		✓		
Storage (Bulk Oil)	306495		✓		
Storage (CO2/N2 Cylinders)	-			Steel shed	In non-conforming item yard
Storage (Electrical)	306485		✓		
Storage (Electrical)	306655		✓		
Storage (Electrical)	306656		✓		
Storage (Flammable Liquid Storage Cabinets)	-			Open area	Tool Crib area
Storage (General)	-	✓			Magnesium construction
Storage (General)	-		✓		White, adjacent to horizontal water tanks
Storage (General)	A01153		✓		
Storage (General)	306482		✓		
Storage (General)	306484		✓		
Storage (General)	307207		✓		
Storage (General)	-			Steel shed	3 in the non-conforming item yard
Storage (General)	27716			Rail car	
Storage (General)	307210		✓		
Storage (General)	307211		✓		
Storage (General)	-		✓		
Storage (Lubricants)	-			Open area	
Storage (Mechanical)	306488		✓		
Storage (Mechanical)	307212		✓		
Storage (Oil Barrels)	-			Open area	Concrete collection basin

Table 7.2.1-1. Construction Description of the Facilities Located at the North Portal Pad (Continued)

Name	Number	Trailer	Transp.	Other	Comments
Storage (Oil Filters)	-		✓		
Storage (Oxygen Cylinders)	-			Steel shed	
Storage (Paint)	-			Open area	
Storage (Pipe Fitters)	306657		✓		
Storage (QC)	-			Open yard	
Storage (TBM Parts)	A262070		✓		
Storage (Tires)	705138		✓		
Storage (Ventilation Machine Fabrication Parts)	No. 3		✓		8' x 10'
Tool Crib	306490		✓		
Tool Crib	306491		✓		
Tool Crib	306492		✓		
Tool Crib	306493		✓		
Tool Crib	307201		✓		
Tool Crib	307202		✓		
Tool Crib	307203		✓		
Transformer	A01122			Concrete basin	Basin needs repair
Transformer	XFMR- Sta. No. 2			Concrete pad	
Transformer	A01157			Concrete basin	
USGS-Sample Mgmt Field Ops	No. 3	✓			
USGS-Sample Mgmt Field Ops	No. 2	✓			
USGS-Tracer Gas Lab	-	✓			
Warehouse Tent No. 1	A01080			Polyvinyl chloride (PVC) polyester coated scrim over steel structure	A separate FHA will be provided
Warehouse Tent No. 2	A02104			PVC polyester coated scrim over steel structure	A separate FHA will be provided
Witel (PBX)	No. 6			Skid

cod file: p:\esf_s\firepro\dgn\sfp0001.fig

FIGURE 1.DOC.TPM.DOCUMENTS.M&O.DOCUMENTS.5705-00016/10-23-00

The office trailers, housing a majority of site personnel, are commercially available, and are constructed of a steel frame with exterior sheet metal siding and wood paneling or gypsum wallboard on the interior. A majority of the trailers are located on the northern half of the North Portal Pad. There are no office trailers located in the other fire areas.

Transportainers (abbreviated 'Transp.' on the various tables in this report) are constructed of heavy gage steel with double doors at one end and, in specific cases, a personnel door installed on one side. Transportainers are temporary structures designed to be moved by trucks from location to location. In a few cases, some transportainers have had windows installed to convert them into temporary offices. Transportainers, most of which are used for storage, are located throughout the North Portal Pad. There is one transportainer located at the South Portal Pad. Neither Exile Hill nor the Booster Pump Station has transportainers located there.

The first Diesel Fueling Station is located south of the DOE Office Trailer (7011). This station is used to fill vehicles at the station and to refill a tank truck that services vehicles at remote locations. The elevated fuel tank has the capacity to contain 5,000 gallons of No. 2 diesel fuel. The fueling station has a berm with a plastic covered spill collection basin under the storage tank designed to contain the contents of the tank. The concrete refueling pad, where the tank truck is filled, is bermed to collect spills that may occur during filling operations.

Warehouse Tent No.1 (A01080) and Warehouse Tent No. 2 (A02104) are constructed of a PVC coated polyester scrim supported by metal frames. The scrim is fire retardant. There are several personnel doors accessing the Warehouses with large vehicle access openings at each end. These structures are located near the center of the North Portal Pad. They house supplies, parts, and materials required for construction and operations. In addition, one half of Warehouse Tent No. 2 is used as a metal fabrication shop. Both tents are temporary structures and separate FHAs will be performed.

Personnel at the repair, machine, and welding shop complex perform repairs on vehicles and equipment as required. Numerous transportainers are used for both storage and office space. Flammable liquids are used here and are stored in flammable liquid storage cabinets located outdoors adjacent to the work areas.

A second Diesel Fueling Station (A260710), for fueling the diesel-powered trains, is located just north of the repair shop complex. The storage tank is a skid mounted convault tank containing 2,000 gallons of No. 2 diesel fuel. The tank is constructed of double walls with leak detection in the annular space. There is no collection berm installed for this tank. In addition, it was noted during the site walk-down that the tank is not protected by guard posts.

The area east of the train tracks and south of Warehouse Tent No. 2 (A02104) is used as a miscellaneous storage and maintenance area. Numerous transportainers are located here. A Steam Cleaning Unit (307208), housed in a transportainer, is also located here.

The Paint Shop, along with 13 flammable liquid storage cabinets utilized for paint and solvent storage, is located east of Warehouse Tent No. 2 (A02104). All flammable liquid storage cabinets are stored outdoors.

The Diesel Portable Air Compressors (A86078#1 and #2) are located at the south end of the North Portal Pad, west of the Electrical Switchgear Building (5010). These redundant air compressors are mounted on a trailer and are supplied fuel from a 650-gallon storage tank. The compressors and the storage tank are located within a plastic lined spill containment berm.

An electrical substation and transformer (A01122) are located in the area east of the Electrical Switchgear Building (5010). The concrete collection basin for Transformer A01122 has been severely damaged to the point where it can no longer contain a spill.

A helicopter pad is located east of the North Portal Access Road. It consists of a concrete pad with all vegetation surrounding the pad being removed. Adjacent to the pad is a windsock and a wheeled fire extinguisher. See Figure 2 for its location.

7.2.2 Exile Hill

A non-potable water tank (200,000 gallons), a potable-water tank (50,000 gallons), and a Chlorination Unit (765014) are located on Exile Hill. The 200,000-gallon tank is part of the Surface Non-Potable Water System and supplies water to the fire hydrants and sprinkler systems located at the North Portal Pad. The 50,000-gallon tank and chlorinating unit are part of the Surface Potable Water System. Both water storage tanks are constructed of steel, while the Chlorination unit is housed inside a rigid fiberglass enclosure.

7.2.3 Booster Pump Station

The Booster Pump Station is located near the junction of North Portal Access Road and H-Road. The Booster Pump Station was not installed per the baseline design. The pump foundations, portions of the underground piping, and two storage tanks (WT-7008-1 and -2) were installed. The permanent pumps were not installed. A skid mounted, temporary pump is located east of the Booster Pump Station foundation. It pumps water to the non-potable water storage tank on Exile Hill. The pump and its associated piping are wrapped with heat trace tape to prevent the water from freezing.

7.2.4 South Portal Pad

The South Portal Pad is located approximately two miles south of the North Portal Pad. Currently, the 25-foot diameter Tunnel Boring Machine (TBM) is stored here. This area is unoccupied. Personnel and vehicle access is restricted. A Diesel Generator (306466) and its associated Electrical Switchgear (A02154), an oxygen and acetylene cylinder storage steel rack, and a hazardous waste pickup skid (with a spill control pallet) are the only equipment at this location. The diesel generator is skid mounted with an integral 1,700-gallon diesel fuel storage tank. The tank is constructed of double walls with leak detection in the annular space. The Electrical Switchgear sits in a concrete collection basin. A Steel Transportainer (A01469) is located adjacent to the diesel generator to store personal protective equipment for individuals entering the tunnel. See Figure 3 for equipment locations.

The TBM is stored on the south side of the pad. It has been inactive for several years and is currently for sale. All electrical devices have been de-activated and all hydraulic fluids have been removed or are contained within the machinery itself. It is constructed predominantly of

FIGURE 2.DOC.TPM.DOCUMENTS.M&O.DOCUMENTS.5705-00016/10-18-090

FIGURE 3.DOC.TPM.DOCUMENTS.M&O.DOCUMENTS.5705-00016/10-23-00

steel and has a number of exposed electrical cables. Several hundred feet separate the TBM from sources of ignition and other facilities located at the South Portal Pad.

7.3 OPERATIONS

The purpose of the Surface Facilities is to support the ESF testing and operation activities. The majority of the testing and operation work is performed underground in the tunnel. The site is manned on a four day work week, ten hour shift basis by all assigned personnel. During off hours, and Friday through Sunday, the site is secured with no unauthorized access allowed.

The North Portal Pad is where virtually all activity takes place. Personnel enter and exit the tunnel through this site. Construction, administrative, and scientific offices are located here. All craft shops and repair facilities are also located here.

Activities conducted at the South Portal Pad, Exile Hill, and Booster Pump Station are on an as needed basis for maintenance of equipment. There are no routine operations performed at any of these locations.

The fire protection equipment is inspected and tested as scheduled maintenance activities for the ESF. Fire extinguishers are visually inspected on a monthly basis by M&O Safety and Health, and tested and maintained on an annual basis in accordance with NFPA 10 by the Nevada Test Site (NTS) Support Contractor. The automatic smoke detection and fire alarm systems are inspected and tested in accordance with NFPA 72 on an annual basis by the NTS Support Contractor. The fire hydrants and automatic sprinkler system are inspected and tested in accordance with NFPA 13, 22, and 24 on an annual basis by the NTS Fire Department. Inspection and testing records are filed by the inspection/testing organization.

7.4 HIGH VALUE PROPERTY

No high value property has been identified at the North Portal Pad, Exile Hill, or Booster Pump Station. The TBM, located at the South Portal Pad, had a purchase price of approximately \$13,500,000. Its current estimated value is approximately \$750,000.

7.5 FIRE HAZARDS

“Any situation, process, material, or condition that, on basis of applicable data, may cause a fire or explosion or provide a ready fuel supply to augment the spread or intensity of the fire or explosion and that poses a threat to life or property.” This is the definition of a fire hazard as described in NFPA 1, Fire Prevention Code.

Fuel sources at each site could include, but not be limited to, combustible and flammable liquids, wiring insulation, rubber tires, tubing, paper, and wood. Combustible liquids include diesel fuel, hydraulic fluid, compressor oil, grease, and lubricating oil. Ignition sources may include faulty electrical equipment, welding and cutting operations, engine heat, and friction.

Typically, all materials used by craft personnel are stored properly in containers, cabinets, or areas.

7.5.1 North Portal Pad Fire Hazards

The potential fire hazards are those typical of field support facilities of this type. The office trailers such as the M&O Trailer Complex and DOE Office contains office furniture, personal computers, printers, copying machines, small electric appliances, battery and two-way radio charging stations, paper products, microwave ovens, and storage for supplies.

The shop complex includes areas for a carpenter's shop, pipe fitter's shop, mechanical shop, paint shop, and an electrician's shop. Local to each shop are transportainers used to store tools, cutting and welding equipment, wiring and cables, oil filter storage, air compressors, hydraulic fluids, compressor oil, and miscellaneous supplies. Typically, transportainers used for storage are not provided with power or heat.

There are two diesel-fueling stations on the North Portal Pad. One station has an elevated 5,000-gallon storage tank that provides diesel fuel for the construction vehicles used on the site. It is located in a plastic lined earth berm. Adjacent to this tank is a tank truck-fueling pad. This pad is designed to park a tank truck on it while being filled. The pad is also designed to contain any spills that may occur during the filling process. The other fueling station provides diesel fuel for the trains that transport personnel and equipment in and out of the tunnel. This storage tank contains 2,000 gallons of diesel fuel.

Diesel powered construction equipment is used extensively on the surface. The construction vehicles have rubber tires, large diesel fuel tanks, lead-acid batteries, lubricating oil, hydraulic fluids, and bearing grease.

The warehouse tents contain materials and equipment to support construction, operations, and testing. Items are stored in their shipping containers on racks. These containers consist of plastics, wooden crates and pallets, and cardboard boxes.

Compressed gas bottles (oxygen, acetylene, carbon dioxide, and nitrogen cylinders) are located in steel racks along the fence of the Storage Yard. These racks are separated from other facilities and equipment.

Two diesel powered air compressors mounted on a trailer are used on the North Portal Pad to augment and backup the two electrically driven air compressors. These units have rubber tires, a diesel fuel tank (650 gallons), lead-acid batteries, lubricating oil, hydraulic fluids, and bearing grease. The trailer and storage tank are located within a plastic lined earth berm.

The fire hazards at the Heliport, located at the North Portal Pad, are limited to the fuel within a helicopter and the helicopter itself. At all other times the area is unoccupied.

7.5.2 South Portal Pad Fire Hazards

The fire hazards identified at the South Portal Pad are limited to the skid mounted diesel generator with its integral diesel storage tank, electrical switchgear, and transportainer.

The TBM has numerous exposed electrical cables. These cables are not connected to an electrical source. All hydraulic fluids within the TBM have been removed or are contained within the machine itself.

A cylinder storage rack and a hazardous waste pickup location are separated from adjoining facilities and have no sources of ignition.

7.5.3 Exile Hill Fire Hazards

The fire hazards located on Exile Hill are limited to the fiberglass enclosure housing the chlorination unit. All other items located in the immediate area are of non-combustible materials.

7.5.4 Booster Pump Station Fire Hazards

The fire hazards identified at the Booster Pump Station are limited to the electrical wiring to the pump motor and electrical heat tracing of the piping. All other items located in the immediate area are of non-combustible materials.

7.6 ANALYSIS OF POTENTIAL FIRE SCENARIOS

Based on the fire hazards listed in Subsection 7.5, several potential fire scenarios can be postulated. In all scenarios, with exception of the M&O Office Complex (7009), the projected fire loss is less than \$1,000,000. An automatic, wet pipe sprinkler system is provided in the M&O Office Complex (7009). In addition, the M&O Office Complex (7009) has a smoke detection system installed that sounds local alarms and sends a signal the NTS fire department. No other facility evaluated for this Technical Report is provided with an automatic fire suppression or detection system, or fire alarms. A summary of the cost of the main structures on the North and South Portal pads is shown in Appendix A.

7.6.1 Surface Trailers

Most of the trailers on the North Portal Pad have similar construction and contain paper products. However, these trailers do not have sprinkler system protection. A small electric appliance left on during a period of non-occupancy could start a fire that could quickly spread throughout the trailer. The Morrison-Knudsen Construction Office Trailer Complex (7010) replacement cost is approximately \$267,900. The replacement costs for each of the other trailers, including their contents, is less than \$70,000.

The M&O Office Complex (7009) consists of numerous trailers assembled to make one large office complex. It has the largest fuel loading capability at the North Portal Pad, consisting predominantly of paper and paper products. A small electric appliance left on during a period of non-occupancy could start a fire that could spread throughout the trailer. The automatic, wet pipe sprinkler system would limit fire damage to approximately \$75,000.

7.6.1.1 Magnesium Construction - Surface Trailers

Three trailers are constructed with magnesium siding. These are labeled “No Welding, Keep Open Flames Away.” These trailers are highly flammable and should be replaced with all steel transportainers.

7.6.2 Shop Complex

The shop complex consists of office trailers, transportainers, mechanical and electrical repair shops, and storage. Flammable liquids are stored utilizing flammable liquid storage cabinets. A diesel fueling station for the tunnel trains is located 50 feet north of the complex. The replacement cost for the Shop Complex is approximately \$365,000.

The replacement cost of each transportainer is approximately \$2,500.

7.6.3 Warehouse Tents

Warehouse Tent No. 1 (A01080) and Warehouse Tent No. 2 (A02104) are located on the North Portal Pad. Automatic fire suppression systems are not installed in these two structures, but fire extinguishers are installed throughout each warehouse. The replacement cost for both tents and equipment/materials inside is less than \$1,000,000 for each tent.

7.6.4 Diesel Powered Equipment

Diesel powered vehicles and air compressors are operated during normal work shifts. The diesel generator at the South Portal Pad is a standby diesel generator. This equipment may operate during periods of non-occupancy. A fire could be caused due to a fuel leak and an electrical system failure. The fire would be localized due to the containment design, which keeps leaking fuel from migrating. The replacement cost is less than \$100,000.

7.7 LIFE SAFETY CONSIDERATIONS

This section evaluates the life safety considerations, as described in NFPA 101, for personnel who occupy the facilities on the North Portal Pad. Occupied trailers have emergency lighting installed to allow personnel to exit during a power outage.

The M&O Office Complex (7009) has emergency lighting, an automatic wet pipe sprinkler system, and smoke detectors. In addition, in the event of a fire, local fire alarms will sound throughout the complex and a signal is sent to the NTS fire department. Portable fire extinguishers are installed throughout the M&O Office Complex (7009) and throughout the North and South Portal Pads.

7.8 FIRE PROTECTION FEATURES

7.8.1 North Portal Pad

This section describes the fire protection features (i.e., detection and suppression systems, and alarms) installed at the North and South Portal Pads, Exile Hill, and Booster Pump Station.

Table 7.8.1-1 identifies the fire protection features located at the North Portal Pad. The North Portal Pad has an underground firewater piping distribution system supplying water to fire hydrants and the sprinkler systems installed there.

Table 7.8.1-1. Fire Protection Features for Facilities Located at the North Portal Pad

Name	Number	Detection	Suppression	Alarms	Comments
Construction & Tunneling Services	307236	None	None	None	
Craft Room	24-9917	None	Extinguishers	None	
DAS	A261873	None	None	None	
Diesel Fueling Station (Trains)	A260710	None	Extinguishers	None	Convault, double wall with leak detection
Diesel Fueling Station (Trucks)	-	None	Extinguishers	None	Concrete collection basin
Diesel Generator W/2 tanks	A183815	None	Extinguishers	None	Concrete collection basin, plastic lined
Diesel Portable Air Compressor	A86078 #1	None	Extinguishers	None	Earth berm, plastic lined
Diesel Portable Air Compressor	A86078 #2	None	Extinguishers	None	Earth berm, plastic lined
Diesel Storage Tank (Trucks)	-	None	None	None	Earth berm, plastic lined
Diesel Storage Tank (Air Compressors)	-	None	None	None	Convault, double wall with leak detection, plastic lined earth berm
Drilling Support	A502093	None	None	None	
Duct Fabrication	A261290	None	Extinguishers	None	
Electrical Switchgear	A216873	None	Extinguishers	None	
FOC	-	None	Extinguishers	None	
Heliport	-	None	Extinguisher	None	150-lb wheeled unit
Issued for Construction Storage Yard	-	None	None	None	
Microwave Unit – closed	-	None	None	None	
Microwave Unit – open	-	None	None	None	
Office	A535940	None	Extinguishers	None	
Office	A535939	None	Extinguishers	None	
Office	307240	None	Extinguishers	None	Exit signs, emergency lights
Office (Construction)	7010	None	Extinguishers	None	Exit signs, no emergency lights
Office (Document Control)	7001	None	Extinguishers	None	Exit signs, emergency lights
Office (DOE)	7011	None	Extinguishers	None	
Office (Electrical)	306489		Extinguishers		

Table 7.8.1-1. Fire Protection Features for Facilities Located at the North Portal Pad (Continued)

Name	Number	Detection	Suppression	Alarms	Comments
Office (Environmental)	7003	None	Extinguishers	None	Exit signs, emergency lights, flammable storage cabinets
Office (ES&H)	7004	None	Extinguishers	None	Exit signs, emergency lights
Office (M&O Complex)	7009	Smoke detectors, manual pull stations	Automatic wet pipe sprinkler system	Local & remote	Remote signal sent to the NTS Fire Department Exit signs, emergency lights
Office (Maintenance)	306487	None	None	None	
Office (Mechanical)	703366	None	Extinguishers	None	
Office (Mechanical)	-	None	Extinguishers	None	
Office (Mine Rescue)	7012	None	Extinguishers	None	
Office (Property/Management)	7007A	None	Extinguishers	None	Exit signs, emergency lights
Office (Property/Training)	7006	None	Extinguishers	None	Exit signs, emergency lights
Office (QC Field Office)	7008	None	Extinguishers	None	
Office (Quality Assurance)	7007	None	Extinguishers	None	Exit signs, emergency lights
Office (Industrial Hygiene)	7005	None	Extinguishers	None	Exit signs, emergency lights
Office (RSN Field Office)	-	None	None	None	
Office (Shipping/Receiving)	-	None	Extinguishers	None	Exit signs, emergency lights
Office (Survey)	7002	None	Extinguishers	None	Exit signs, emergency lights
Office (Teamsters-vacant)	7006A	None	Extinguishers	None	Exit signs, emergency lights
Oil Storage Pad	-	None	None	None	
Post Shot Field Office	900-0263	None	Extinguishers	None	
Shop (Carpenter)	306654	None	Extinguishers	None	
Shop (Electrical)	535938	None	Extinguishers	None	
Shop (Electrical)	306485	None	None	None	
Shop (Hose)	306483	None	None	None	
Shop (Mechanical)	306486	None	None	None	
Shop (Mechanical)	306466	None	None	None	
Shop (Paint)	-	None	Extinguishers	None	13 flammable storage cabinets
Shop (Pipe Fitters)	91654	None	Extinguishers	None	
SNL	-	None	None	None	

Table 7.8.1-1. Fire Protection Features for Facilities Located at the North Portal Pad (Continued)

Name	Number	Detection	Suppression	Alarms	Comments
SNL	-	None	None	None	
SNL	PK-5	None	Extinguishers	None	
SNL – Operations Support	STA-Q	None	None	None	
Spill Response Materials	A91212	None	None	None	
Steam Cleaning Unit	307208	None	None	None	
Storage (Acetylene Cylinders)	-	None	Extinguishers	None	150-lb wheeled unit
Storage (Alpine Parts)	307204	None	Extinguishers	None	
Storage (Argon Cylinders)	-	None	None	None	
Storage (Blue Steel Barrels)	-	None	Extinguishers	None	Concrete collection basin
Storage (Boart Drill Parts)	262209	None	Extinguishers	None	
Storage (Bulk Oil)	306495	None	None	None	Plastic lined earth berm
Storage (CO2/N2 Cylinders)	-	None	None	None	
Storage (Electrical)	306485	None	Extinguishers	None	
Storage (Electrical)	306655	None	Extinguishers	None	
Storage (Electrical)	306656	None	Extinguishers	None	Flammable storage cabinets
Storage (Flammable Liquid Storage Cabinets)	-	None	None	None	12 cabinets in the Tool Crib area
Storage (General)	-	None	None	None	
Storage (General)	A01153	None	None	None	
Storage (General)	306482	None	None	None	
Storage (General)	306484	None	None	None	
Storage (General)	307207	None	None	None	
Storage (General)	-	None	Extinguishers	None	Non-combustible storage
Storage (General)	27716	None	None	None	
Storage (General)	307210	None	Extinguishers	None	
Storage (General)	307211	None	Extinguishers	None	
Storage (General)	-	None	None	None	
Storage (Lubricants)	-	None	None	None	Concrete collection basin
Storage (Mechanical)	306488	None	Extinguishers	None	
Storage (Mechanical)	307212	None	None	None	
Storage (Oil Barrels)	-	None	Extinguishers	None	Concrete collection basin
Storage (Oil Filters)	-	None	None	None	
Storage (Oxygen Cylinders)	-	None	None	None	
Storage (Paint)	-	None	Extinguishers	None	13 flammable storage cabinets
Storage (Pipe Fitters)	306657	None	Extinguishers	None	
Storage (TBM Parts)	A262070	None	None	None	

Table 7.8.1-1. Fire Protection Features for Facilities Located at the North Portal Pad (Continued)

Name	Number	Detection	Suppression	Alarms	Comments
Storage (Tires)	705138	None	None	None	
Storage (Ventilation Machine Fabricator Parts)	No. 3	None	None	None	
Tool Crib	306490	None	None	None	
Tool Crib	306491	None	None	None	
Tool Crib	306492	None	None	None	
Tool Crib	307205	None	None	None	
Tool Crib	306493	None	None	None	
Tool Crib	307201	None	None	None	
Tool Crib	307202	None	None	None	
Tool Crib	307203	None	None	None	
Transformer	A01122	None	Extinguishers	None	Concrete collection basin (damaged)
Transformer	XFMR-Sta. No. 2	None	None	None	Concrete pad
Transformer	A01157	None	None	None	Concrete collection basin
USGS Sample Mgmt Field Ops	No. 3	None	None	None	
USGS Sample Mgmt Field Ops	No. 2	None	None	None	
USGS Tracer Gas Lab	-	None	None	None	
Warehouse Tent No. 1	A01080	None	None	None	
Warehouse Tent No. 2	A02104	None	None	None	
Wiltel (PBX)	No. 6	None	None	None	

7.8.2 South Portal Pad

The fire protection features of the South Portal Pad are limited to portable fire extinguishers and facility separation. Table 7.8.2-1 identifies the fire protection features of the South Portal Pad.

Table 7.8.2-1. Fire Protection Features for Facilities Located at the South Portal Pad

Name	Number	Detection	Suppression	Alarms	Comments
Portal Controller's Shack	A01469	None	Extinguishers	None	
480V Switchgear	A02154	None	None	None	Collection basin
Diesel Generator	306466	None	Extinguishers	None	Double wall tank with leak detection
Oxygen/Acetylene Cylinder Storage	-	None	None	None	Separated from ignition sources and other combustibles
TBM	-	None	Extinguishers	None	The TBM is physically separated from other facilities by a minimum of 100 feet
Hazardous Waste Pickup	-	None	None	None	Separated from ignition sources and other combustibles

7.8.3 Exile Hill

The fire protection features of Exile Hill are limited to facility separation and non-combustible construction. Table 7.8.3-1 identifies the fire protection features of Exile Hill.

Table 7.8.3-1. Fire Protection Features for Facilities Located at Exile Hill

Name	Number	Detection	Suppression	Alarms	Comments
Non-Potable Water Tank	-	None	None	None	Non-combustible construction
Potable Water Tank	-	None	None	None	Non-combustible construction
Chlorination Unit	765014	None	None	None	Separated from ignition sources and other combustibles

7.8.4 Booster Pump Station

The fire protection features of the Booster Pump Station are limited to facility separation and non-combustible construction. Table 7.8.4-1 identifies the fire protection features of the South Portal Pad.

Table 7.8.4-1. Fire Protection Features for Facilities Located at the Booster Pump Station

Name	Number	Detection	Suppression	Alarms	Comments
Water Tank	WT-7008-1	None	None	None	Non-combustible construction
Water Tank	WT-7008-2	None	None	None	Non-combustible construction
Water Pump	-	None	None	None	Separated from ignition sources and other combustibles

7.9 POTENTIAL FOR A TOXIC, BIOLOGICAL, AND/OR RADIATION INCIDENT DUE TO A FIRE

The potential for a toxic, biological, and/or radiation incident due to a fire is not considered significant because:

- Most materials selected for construction are essentially inert.
- Burning electrical cables can emit potentially toxic gases as products of combustion. The risk of combustion occurring is low due to the expected use of fire resistant cables.
- Biological and radioactive materials are not present.

7.10 NATURAL HAZARDS

The impact on fire safety from natural hazards, such as earthquakes, floods, wind, dusty environment, and expected temperature and humidity, is limited and was considered during the design phase of the systems.

The automatic, wet pipe sprinkler system installed in the M&O Office Complex (7009) was designed and installed in compliance to NFPA 13 and the 1997 *Uniform Building Code* (ICBO 1997) for areas subject to earthquakes.

Due to occasional dust storms, the smoke detectors installed in the M&O Office Complex (7009) can experience false alarms.

7.11 DAMAGE POTENTIAL

The response time of the NTS fire response unit (CRWMS M&O 1999b) during off working hours is such that the structures and equipment involved would be a total loss prior to the unit reaching the North Portal Pad. It is anticipated that a fire burning unchecked could cause damage in excess of \$1,000,000.

7.12 SAFETY CLASS EQUIPMENT

No safety class systems or equipment have been identified as important to radiological safety or waste isolation at the North Portal Pad, South Portal Pad, Exile Hill, or Booster Pump Station.

7.13 CRITICAL PROCESS EQUIPMENT

No process equipment has been identified as being critical at the North Portal Pad, South Portal Pad, Exile Hill, or Booster Pump Station.

7.14 EMERGENCY PLANNING

The operating contractor has the responsibility for developing and maintaining the emergency action plan in accordance with 29 CFR 1910.38 Subpart E, Labor: Occupational Safety and Health Standards - Means of Egress. The *Emergency Management Plan* (YMP 1998b) and LP-ESH-010-M&O, *Emergency Management*, comply with this requirement.

7.15 FIRE DEPARTMENT/BRIGADE

The response time of the NTS fire response unit during off working hours is such that the structures and equipment involved would be a total loss prior to the unit reaching the North Portal Pad. The project does not have a trained fire brigade made up of site personnel. Site personnel have received cursory training on the use of fire extinguishers, but have not been trained as a fire brigade.

7.16 RECOVERY POTENTIAL

The ability to recover from a credible fire is considered reasonably acceptable. The installed fire protection systems and facility separations will limit physical damage to the facility and its contents.

Unacceptable levels of environmental damage, caused by a credible fire, are postulated only if the fire protection systems fail to perform as designed and fire spreads to the local vegetation.

7.17 SECURITY AND SAFEGUARDS

There are no security requirements or concerns related to fire protection. Since all the facilities located at the Yucca Mountain Site Characterization Project (YMP) site are located within the same security area, no security violations have been identified.

7.18 EXPOSURE FIRE POTENTIAL AND THE POTENTIAL FOR FIRE SPREAD BETWEEN TWO FIRE AREAS

An exposure fire potential and the potential for fire spread between two fire areas is not a factor at the North Portal Pad, South Portal Pad, Exile Hill or Booster Pump Station. Each of the areas is considered separate fire areas. Several thousand feet separate the areas from one another.

Within the North Portal Pad, trailers are separated by 15 feet, while some of the transportainers are butted up against each other. The potential does exist for fire to spread from transportainer to transportainer if their doors are open and no one can attack the fire in its incipient stage.

7.19 EFFECTS OF SIGNIFICANT FIRE SAFETY DEFICIENCIES ON FIRE RISK

Due to the remote location of the YMP from the NTS fire response unit, the response time is insufficient to minimize the loss from fire. If a fire occurs during the off working hours, those structures and equipment involved would be a total loss prior to the response unit reaching any of the sites.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

This Technical Report identifies fire hazards and fire protection features that mitigate the damage that could occur as a result of a fire. It confirms that the objectives identified in Section 1 have been met for each fire area.

8.1.1 Fire Occurrence

To minimize the occurrence of a fire or related event, ignition sources are minimized and combustibles are either contained within transportainers or separated from each other. Flammable liquids are stored within flammable liquid storage cabinets when not in use.

8.1.2 Radioactive and Hazardous Materials

The Surface Facilities currently have no significant radioactive materials on site. Small amounts of radiological sources are used in radiographic instruments and tools in the alcoves for testing. This radiological equipment is sealed and will be briefly transported on the surface for use and storage in the tunnel. In addition, hazardous materials are controlled and properly stored to minimize the threat to the health and safety of the employees, public, or environment.

8.1.3 Vital DOE Programs

The facilities identified in this Technical Report are of a temporary nature and their loss would not interrupt vital DOE programs.

8.1.4 Property Loss

Property losses from a fire and related events do not exceed defined limits established by DOE.

8.1.5 Critical Process Controls and Safety Class Systems

No critical process controls or safety class systems have been identified.

8.2 RECOMMENDATIONS

8.2.1 Diesel Fueling Station

It is recommended that vehicle guard posts be installed around the Diesel Fueling Station (Trains) A260710.

8.2.2 Transformer Basin

The concrete collection basin for Transformer A01122 has been damaged to where it can no longer contain a spill of transformer oil. The basin should be repaired to its original condition.

8.2.3 Fire Fighting Capabilities

The current project policy is that no M&O employee will suppress a fire beyond the incipient stage. The response time from the fire station in Mercury is approximately 45 minutes. The number of structures on the North Portal Pad has greatly increased over the past two years, plus additional functions are performed on the North Portal Pad. In the event that a major fire occurs, the non-sprinkler trailers could be lost during occupied and non-occupied work shifts.

It is time to re-evaluate the feasibility of on-site fire fighting to reduce fire risk and an interruption of operations due to fire.

9. INPUTS AND REFERENCES

9.1 REFERENCED DOCUMENTS

The information contained in this Technical Report is based on the information obtained during the two site walkdowns on January 24 and April 25, 2000. The documents referenced are listed in Subsections 9.1.1 and 9.1.2.

9.1.1 Documents Cited

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Ruonavaara, N.M. 1993. *North Portal - Fire Hazards Analysis - Change House Building #5008*. BABBAF000-01717-0200-00101 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19940712.0095.

YMP (Yucca Mountain Site Characterization Project) 1998a. *Safety and Health Plan*. YMP/90-37, Rev. 3, ICN 1. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.19980710.0367; MOL.19970401.0232.

YMP 1998b. *Emergency Management Plan*. YMP/92-38, Rev. 3. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.19980921.0373.

YMP 1997. *Exploratory Studies Facility Design Requirements*. YMP/CM-0019, Rev. 2, ICN 1. Las Vegas, Nevada: Yucca Mountain Site Characterization Office. ACC: MOL.19980107.0544; MOL.19960926.0065.

9.1.2 Codes, Standards, Regulations, and Procedures

29 CFR (Code of Federal Regulations) 1910 Subpart L. 1988. Labor: Occupational Safety and Health Standards - Fire Protection. Readily available.

29 CFR 1910.38 Subpart E. 1997. Labor: Occupational Safety and Health Standards - Means of Egress. Washington, D.C.: U.S. Department of Labor. TIC: N/A.

29 CFR 1926. 1998. Labor: Safety and Health Regulations for Construction. Readily available.

DOE (U.S. Department of Energy) Order 420.1, Change 2. 1996. *Facility Safety*. Washington, DC: U.S. Department of Energy. Readily available.

DOE 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. Readily available.

DOE Order 5480.7A. 1993. *Fire Protection*. Washington, D.C.: U.S. Department of Energy. ACC: N/A. TIC: N/A. (This Order is superseded by DOE Order 420.1.)

DOE 2000. *Quality Assurance Requirements and Description*. DOE/RW-0333P, Rev. 9. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19991028.0012.

AP-3.11Q, *Technical Reports*.

AP-2.13Q, *Technical Product Development Planning*.

QAP-2-3, *Classification of Permanent Items*.

LP-ESH-010-M&O, *Emergency Management*.

ICBO (International Conference of Building Officials) 1997. *1997 Uniform Building Code*. Three volumes. Whittier, California: International Conference of Building Officials. TIC: 233816; 233817; 233818.

NFPA (National Fire Protection Association) 1. 1997. *Fire Prevention Code*. Quincy, Massachusetts: National Fire Protection Association. TIC: 238744.

NFPA 10. 1998. *Standard for Portable Fire Extinguishers*. Quincy, Massachusetts: National Fire Protection Association. TIC: 241333.

NFPA 13. 1994. *Standard for the Installation of Sprinkler Systems*. Quincy, Massachusetts: National Fire Protection Association. TIC: 103082.

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NFPA 72. 1999. *National Fire Alarm Code*. Quincy, Massachusetts: National Fire Protection Association. TIC: 247112.

NFPA 101. 1997. *Life Safety Code*. (with Tentative Interim Amendment). Quincy, Massachusetts: National Fire Protection Association. TIC: 248386.

APPENDIX A

SURFACE FIRE HAZARDS ANALYSIS TECHNICAL REPORT

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SURFACE FIRE HAZARDS ANALYSIS TECHNICAL REPORT

SURFACE FIRE HAZARDS ANALYSIS TECHNICAL REPORT BAB000000-01717-5705-00016 REV 00

ESF PROPERTY COST LISTING

#	STRUCTURE	BUILDING NUMBER	COST	LOCATION
1	Trailers (1)	Bldg. No. 7001 - 7007A (11 Trailers @ \$32,000 ea.)	\$ 352,000.00	No. Portal Pad
2	M&O Trailer (1)	Bldg. No. 7009	\$ 1,051,540.00	No. Portal Pad
3	MK Trailer (1)	Bldg. No. 7010	\$ 267,900.00	No. Portal Pad
4	DOE Trailer (1)	Bldg. No. 7011	\$ 65,700.00	No. Portal Pad
5	Warehouse Tent #1 (1)	Bldg. No. A01080 (Structure: \$226,300/Inventory: \$100,00)	\$ 326,300.00	No. Portal Pad
6	Warehouse Tent #2 (1)	Bldg. No. A02104 (Structure: \$160,700/Inventory: \$50,000)	\$ 210,700.00	No. Portal Pad
7	Craft Transportainers (1)	Bldg. No. 306654 - 306657, 7012, 91654, & 535938 (7 Trans @ \$2,500 ea.)	\$ 17,500.00	No. Portal Pad
8	Offices (1)	Bldg. No. 535939 & 535940 (2 Trans @ \$2,500 ea.)	\$ 5,000.00	No. Portal Pad
9	FOC Trailer (1)	Bldg. No. -	\$ 80,000.00	No. Portal Pad
10	Office Trailer (1)	Bldg. No. 7008	\$ 32,000.00	No. Portal pad
11	Ship/Receiving Trailer (3)	Bldg. No. 7014	\$ 16,000.00	No. Portal pad
12	Lab/USGS Trailers (3)	Bldg. No. Various (8 Small Trailers @ \$2,500 ea.)	\$ 20,000.00	No. Portal pad
13	Office Trailer (1)	Bldg. No. R-3877	\$ 32,000.00	No. Portal pad
14	Conex Complex (3)	Bldg. No. Various (26 Transportainers + 2 Conexes)	\$ 365,000.00	No. Portal Pad
15	Transportainer (1)	Bldg. No. A01469	\$ 2,500.00	So. Portal Pad
16	Transformer (2)	Equip. No. -	\$ 13,500.00	So. Portal Pad
17	Standby Generator (2)	Equip. No. 306466	\$ 76,000.00	So. Portal Pad
TOTAL			\$ 2,933,640.00	

NOTES:

- (1) Cost for this item was obtained from the M&O Property Management Team.
- (2) Cost for this item is ROM estimates obtained from the 1999 Means Electrical Manual.
- (3) Cost for this item is ROM estimates based on the prorated square footing value provided by the M&O Property Management Team for similar trailers.

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