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WIPP Fire Protection Program

Cognizant Department: Engineering

Approved by: Dave Freeman

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1.0 PURPOSE AND SCOPE

The WIPP Fire Protection Program identifies the various activities, regulations, and personnel responsibilities necessary for assuring fire safety and implementing the U.S. Department of Energy (DOE) Fire Protection Program at the Waste Isolation Pilot Plant (WIPP). WIPP facilities are designed with active and passive fire protection features. In order to meet the program goals and objectives, fire safety must be practiced by each employee and subcontractor during their daily work and be an integral part of all activities at WIPP.

The WIPP Fire Protection Program is administered primarily through the Washington TRU Solutions LLC (WTS) Engineering Department. Implementation of the WIPP Fire Protection Program requires the support of all WTS organizations.

Fire protection systems at WIPP shall fulfill the requirements of the best protected class of industrial risk (highly protected risk/improvement risk). The WIPP Fire Protection Program incorporates DOE Orders and Directives related to fire safety, unless explicit relief has been granted by the DOE Authority Having Jurisdiction (AHJ) for fire protection. For WIPP, the AHJ is the DOE Carlsbad Field Office (CBFO). National Fire Protection Association (NFPA) codes and standards, IBC, IFC and MSHA shall also be adopted and/or followed.

2.0 GENERAL

2.1 Responsibilities

2.1.1 Chief Nuclear Engineer

The Chief Nuclear Engineer has the responsibility to provide principal overview for the WIPP Fire Protection Program.

2.1.2 Industrial Safety and Hygiene Manager

The Industrial Safety and Hygiene (IS&H) manager is responsible for the following:

- Implementation of the WIPP Hot Work Program
- Providing staffing and resources to support the WIPP Fire Protection Program
- Hazardous Material Management Program

2.1.3 Fire Protection Engineer

Fire Protection Engineer (FPE) - The site subject matter expert (SME), who is a graduate of an accredited engineering curriculum and having completed not less than four years of engineering practice, three of which shall have been in responsible charge of diverse fire protection engineering work. If not such a graduate, a qualified engineer shall either demonstrate a knowledge of the principles of engineering and have completed not less than six years engineering practice, three of which shall have been in responsible charge of diverse fire protection engineering projects; be a registered

professional engineer in fire protection; or meet the requirements for a Grade 11 or higher FPE as defined by the Office of Personnel Management (reference DOE STD-1066-99).

Fire Protection Engineering is responsible for the following:

- Reviewing and revising the WIPP Fire Protection Program to ensure compliance with applicable DOE Orders, and Occupational Safety and Health Administration (OSHA) and other regulatory standards.
- Providing integration between the WIPP Documented Safety Analysis (DSA), the WIPP Fire Hazard Analysis (FHA), and the WIPP Fire Protection Program.
- Maintaining integration between the Hazardous Waste Facility Permit (HWFP) issued by the New Mexico Environment Department to WIPP, pursuant to the New Mexico Hazardous Waste Act, and the WIPP Fire Protection Program.
- Reviewing modifications to site equipment and/or facilities to ensure compliance with applicable fire protection codes and standards.
- Providing acceptance testing criteria for fire protection facilities and/or equipment.
- Providing oversight for fire protection equipment inspection, testing, and maintenance (IT&M) activities.
- Reviewing the frequency of fire protection equipment IT&M activities.
- Providing oversight of fire protection impairment program.
- Providing oversight of the Hot Work Permit Program.
- Providing oversight of the Combustible Loading Controls Program.
- Reviewing procedures that implement the WIPP Fire Protection Program

2.1.4 Line Management

Line management is responsible for supporting the WIPP Fire Protection Program through the implementation of procedures and policies.

2.1.5 Emergency Services

Emergency Services will perform its responsibilities under the security and emergency management section of the operations department. Emergency Services is responsible for the following:

- Supporting emergency response capability through implementation of the WIPP Emergency Management Program.
- Implementing IT&M procedures for fire protection/suppression equipment, systems, and vehicles.
- Supporting emergency planning and trained response personnel.
- Performing programmatic inspections.
- Performing combustible loading control inspections on the surface and in the underground.

3.0 PROGRAM ASSESSMENTS PERFORMED BY WTS

The following fire protection assessments and reports are performed to comply with DOE Orders and to provide information on the status of the WIPP Fire Protection Program.

A qualified FPE will perform an FHA for all significant WIPP structures, including new facilities that present unique or significant fire safety risks. The FHAs are performed using a graded approach to assure an appropriate level of analysis for the risk(s) involved.

The FHA results are incorporated into the facility design basis accident, and beyond design basis accident conditions of the DSA Accident Analysis. A review of the WIPP site FHA is also performed as part of the annual review of the DSA, or whenever changes to the facility impact the site FHA.

The frequency of assessments should be as follows:

- Annual Fire Hazard Assessments are performed in facilities valued in excess of $100 million, facilities considered to be high hazard or involved in vital programs, Hazard Category 1, 2, and 3 nuclear facilities, significant new facilities, and facilities that store or process significant quantities of hazardous materials in excess of the allowances described in NFPA 1, Uniform Fire Code.
- Remaining facilities should be assessed at least every three years or at frequencies determined by the AHJ. (Note: Low and ordinary hazard facility assessments in adjacent areas may be combined.)
- Comprehensive assessments of fire protection program elements by the DOE and by contractors should be made every three years. (These should be staggered in anticipation of contractor-initiated enhancements.)

3.1 Fire Hazard Analysis

Fire hazard analyses (FHAs) using a graded approach are conducted for Hazard Category 1, 2, and 3 nuclear facilities, significant new facilities, and facilities that represent unique fire safety risks. The FHAs must be performed under the direction of a qualified FPE; reviewed every three years; and revised when changes to the annual DSA updates impact the contents in the FHA, a modification to an associated facility or process adds a significant new fire safety risk, or the three-year review identifies the need for changes.

FHA conclusions are incorporated into the DSA and integrated into design basis accident and beyond design basis accident conditions.

The purpose of an FHA is to conduct a comprehensive, qualitative assessment of the risk from fire within individual fire areas in a DOE facility to ascertain whether the DOE fire safety objectives of DOE O 420.1B are met. This should include an assessment of the risk from fire and related hazards (wildland fire exposure, direct flame impingement, hot gases, smoke migration, fire-fighting water damage, etc.) in relation to existing or proposed fire safety features to ensure that the facility can be safely controlled and stabilized during and after a fire. In accordance with the "graded approach" concept, the level of detail necessary for an acceptable FHA is directly related to the complexity of the facility and the potential risk to the public and facility operators. The scope and content of an FHA should be limited to only those issues that are significant and relevant to the facility.

The FHA, including all assumptions, should be documented. When both an FHA and a DSA are developed for a facility, the developmental effort should be coordinated to the maximum extent possible to avoid duplication of effort.

The FPE is to conduct a comprehensive, qualitative assessment of the risk from fire within individual fire areas in a DOE facility to ascertain whether the DOE fire safety objectives of DOE O 420.1B are met. This should include an assessment of the risk from fire and related hazards (wildland fire exposure, direct flame impingement, hot gases, smoke migration, fire-fighting water damage, etc.) in relation to existing or proposed fire safety features to ensure that the facility can be safely controlled and stabilized during and after a fire. In accordance with the "graded approach" concept, the scope and content of an FHA should be limited to only those issues that are significant and relevant to the facility.

A preliminary FHA for significant planned facilities included should begin early in the design phase to ensure that an acceptable level of protection is being incorporated in the evolving design. This project or preliminary FHA should be updated whenever significant changes occur within an individual fire area and should form the basis for post-construction FHA. The analysis shall also support the conclusions of a preliminary DSA where required.

The FHA must be performed under the direction of a qualified FPE, who will also direct all of the technical aspects of an FHA's development.

The FHA should contain at minimum 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 and/or radiological incident due to a fire
- Natural hazards (earthquake, flood, wind, lightning, and wildland fire) impact on fire safety
- Damage potential: Include both the maximum possible fire loss (MPFL) as defined in DOE-STD-1066-99-Fire Protection Design Criteria and the DSA of the design basis fire scenario
- Fire protection features
- Protection of safety class systems
- Life safety considerations
- Emergency planning
- Fire Department/Brigade response
- Recovery potential
- Security and Safeguards considerations related to fire protection
- Exposure fire potential and the potential for fire spread between two fire areas
- Effect of significant fire safety deficiencies on fire risk
- Environmental impacts from a fire including suppression system run-off considerations

The FHA should evaluate the consequences of a single, worst-case automatic fire protection system malfunction.

The value of the MPFL, which is used in part to assess the need for fire protection systems, assumes that there is no automatic or manual fire suppression. This loss determination should include all direct and indirect costs associated with the fire and clean-up operations. In addition, there may be intangible costs such as mission interruption, erosion of public support, and local economic impact. All of these may need to be considered to ensure that appropriate levels of fire protection are included in a facility. Direct and indirect costs that should be included are:

- Replacement cost of building and building systems or contents within the fire area
- Replacement cost of contents
- Cost of lost time (considered mission interruption costs)
- Cost of environmental clean-up
- Exposure damage to other buildings, structures and property
- Costs for reestablishing operations (e.g., redesign approval and start-up)

If redundant automatic fire protection systems are provided in an area, only the system that causes the most vulnerable condition is assumed to fail. Properly constructed and maintained passive fire protection features are assumed to remain viable for their rated fire endurance period to the extent that they are properly constructed and maintained.

The FHA should focus on the individual fire areas that comprise the facility. When 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 FHA for nuclear facilities will inventory all safety class and safety significant systems within the fire area that are susceptible to fire damage. This includes those primary and supporting mechanical and electrical systems that must function effectively during and after a fire event to ensure safety.

All credible fire-related failure modes of safety systems should be considered including the loss of function of safety equipment when power cables to that equipment, potential for spurious signals that may cause the inadvertent operation of such equipment, and fire-induced electrical faults may trip upstream electrical disconnect devices in such a way as to render inoperable other safety systems. In addition, the effects of combustion products, manual fire-fighting efforts, and the activation of automatic fire suppression systems should be assessed.

Fire propagation and the potential for fire-induced radiological/hazardous material dispersal through the facility, and outside the facility should be considered.

Assumptions used in a fire model should be listed in the FHA, and the limiting conditions of operation or specific administrative controls established to assure that these assumptions produce reasonably conservative results compared to applicable codes and standards. Fire Models that are used in the development of an FHA, such as those developed by the National Institute of Standards and Technology, as applied by qualified FPEs.

Provide adequate documentation on actual fire testing or historical data on fire events both inside and outside the DOE Complex when such information is available for review. Alternately, an assumption can be made that all potentially vulnerable systems will be damaged within the fire area.

The quantity and associated hazards of flammable and combustible materials, including transient materials that are often found within the fire area should be factored into the analyses.

Where a facility is fully protected as required by directives and prescriptive codes and standards, combustibles can usually be characterized in general terms and limited through normal housekeeping programs. Averaging combustible loading as a means to characterize the fire severity is not considered an acceptable technique over localized combustible loading.

Descriptions of high-bay locations should consider the effects of smoke/hot gas stratification that may occur at some intermediate point below the roof or ceiling as well as the potential for delayed sprinkler response. Similarly, the effect of smoke movement through doors and dampers held open by fusible links should be addressed.

3.2 Fire Safety Assessments

The principal objective of a fire safety assessment is to identify deficiencies that would prevent the achievement of DOE's fire safety policy objectives.

Facility and programmatic assessments should be performed under the supervision of a qualified FPE as defined by the DOE. Personnel conducting such assessments should have an appropriate level of knowledge and experience in the application of fire safety codes and standards to diverse facilities.

Assessments should, as a minimum, encompass the following elements of the fire protection program. Assessments can be program related, facility related and combined assessments as illustrated below.

- Program Related (Performed by both the DOE and Contractors)
  - Comprehensiveness of the fire protection program.
  - Procedures for engineering design and review

  - Procedures for maintenance, testing, and inspection of installed fire protection systems and features
  - Fire protection engineering staff (number, qualifications, training)
  - Emergency Services organizations including the Baseline Needs Assessments
  - Management support
  - Exemptions and documented equivalencies or deviations

- Facility Related (Principally, but not Exclusively Contractor Self-Assessments and DOE Operational Readiness Reviews)
  - Fire protection of safety class and safety significant equipment
  - Life safety considerations
  - Fire protection of designated vital programs
  - Fire protection of high-value property
  - Fire suppression equipment
  - Water runoff
  - Facility evacuation plan and fire watch training
  - Fire apparatus accessibility
  - Completeness of fire hazards analyses
  - Fire barrier integrity
  - Completeness of MPFL determinations
  - Fire safety training
  - Potential for toxic, biological and /or radiological incident due to fire

- Combined Aspects (Program and Facility)
  - Conformance with applicable Orders, codes and standards
  - IT&M reports
  - Adequacy of facility assessment reports
  - Tests, inspections, procedures, and records for maintaining fire protection systems and features
  - Administrative controls
  - Temporary protection and compensatory measures

Assessment reports should include a description of what was accomplished during the effort (areas toured, documents reviewed, and people interviewed). It should feature a

"baseline" description of the facility, hazards and other occupancy considerations, and fire protection features. In addition, the report should document changes of significance that have occurred within the facility since the last assessment that affect fire safety, and it should list all noted deficiencies, along with a recommendation for remediation and interim compensatory measures, if necessary, pending resolution.

DOE self-assessments and assessments of contractors are intended to confirm that comprehensive fire protection programs are in place sitewide. They should include a select review of facility and site fire protection features, fire safety policies and procedures, the qualifications of contractor fire safety professionals, the adequacy of self-assessments, fire hazards analyses, and program performance as detailed in this guidance and other DOE Orders/Manuals.

Additionally, it is expected that DOE assessments include the capabilities to respond in a timely and effective manner to site fire emergencies and related events. This assessment responsibility extends to contractors where there is no site fire department or brigade and where effective emergency response is predicated on other resources, such as occupant emergency organizations and off-site fire departments. In other words, the heads of field elements should determine the adequacy of the emergency response capability at all of the sites for which they have responsibility.

Examples of assessments are:

- Life safety
- Safety Class of Safety Significant programs
- IT&M reports
- Fire protection of high value property
- Fire suppression equipment
- Water runoff
- Pre-fire plans
- Fire apparatus accessibility
- Administrative controls
- Temporary protection and compensatory measures
- Completeness of fire hazards analysis per Implementation Guide for DOE Orders 420.1B, Facility Safety, and 440.1A, Worker Protection Management for DOE Federal and Contractor Employees
- Fire barrier integrity

- Fire loss potentials
- Fire suppression system tests and adequacy of water supplies
- Maintenance procedures for maintaining fire suppression systems

Status of findings from previous survey. Any findings that require corrective actions (including target completion dates) are entered into the Commitment Tracking System to chart progress on their closure.

3.3 Corrective Action Processes

It is expected that the corrective action process (WIPP Forms and nonconformance reports, as appropriate) will encompass all fire protection "findings" (i.e., issues requiring action, such as facility, program, and emergency response). When modifications that are necessary to correct significant fire safety deficiencies will be delayed beyond one week, it is expected that interim compensatory measures (such as Fire Watches) be adopted until the modifications are complete. Compensatory measures should be initiated without delay, commensurate with the finding and at the discretion of the AHJ.

Significant findings (life threatening or with a serious injury potential) from these assessments will be the basis, in part, for contractor entries into the Noncompliance Tracking System that is a component of the enforcement process required through Title 10 Code of Federal Regulations (CFR) Part 851, "Worker Safety and Health Program."

3.4 Fire Loss Reports and Investigations

Fire loss reports and investigations are performed in accordance with the requirements of DOE Order 231.1A, Environment, Safety, and Health Reporting, and WP 04-AD.01, Operations Event Critiques. Fire Protection Engineering investigates property damage, fire protection equipment and incidents involving fire safety issues.

3.5 WIPP Fire Protection Reviews

Fire Protection Engineering performs reviews to determine the WIPP Fire Protection Program implementation and to evaluate any impact(s) on fire safety, fire protection systems, life safety, and Technical Safety Requirements (TSRs). Each review is initiated, and any comments or concerns are resolved, in accordance with applicable WIPP procedures. The types of reviews performed include the following:

- Work orders that affect WIPP site fire protection equipment or components
- Purchase requisitions relevant to fire protection

- WIPP Documented Safety Analysis (DSA) and amendments, and WIPP HWFP for design and operational changes
- Subcontractor submittals such as Fire Hazard Analysis and fire protection/prevention plans
- Facility/systems design and modifications identified on Engineering Change Orders and Engineering Change Proposals
- Equipment specifications and acceptance testing
- Construction inspections

3.5.1 Facility/Systems Design Reviews

The design review process is performed for any construction and/or modification of WIPP facilities, temporary or permanent. The design review evaluates the work to be performed against the applicable Code of Record (COR).

WIPP fire protection systems are designed to be in compliance with a COR so that any unintentional operation, inactivation, or structural failure will not cause the loss of key safety functions.

3.5.2 Equipment Start-Up and Acceptance Testing

Facility equipment specifications affecting fire protection are reviewed by Fire Protection Engineering for fire protection adequacy. All WIPP construction/procurement packages involving fire protection facilities and equipment require acceptance testing. Fire Protection Engineering determines the acceptance testing requirements as part of the start-up and/or procurement process, and then witnesses and documents the acceptance testing as needed.

3.6 Fire Protection Exemptions and Equivalencies

When compliance with non-statutory code, standard, or DOE Order cannot be achieved, an exemption or equivalency request is submitted to the WIPP fire safety DOE AHJ.

4.0 EMERGENCY FIREFIGHTING CAPABILITIES AND PREFIRE PLANNING

Emergency services, emergency management with Fire Protection Engineering participation, develops and maintains emergency response plans and procedures that govern and facilitate all aspects of emergency response at WIPP. The Baseline Needs Assessment identifies the fire protection apparatus, facilities, equipment, personnel training, and off-site assistance necessary for maintaining a trained and equipped fire brigade for supporting emergency response. Fire Protection Engineering participates in integrating the WIPP Fire Protection Program requirements into the WIPP Site Emergency Plan.

Emergency services, emergency management with Fire Protection Engineering participation prepares and maintains the WIPP site prefire plans. The prefire plans are used to provide vital firefighting information to fire brigade responders. Prefire plans are reviewed and updated as necessary to accommodate any changes at the site. Copies of the prefire plans are maintained in the emergency response vehicles (to provide firefighting information to responders prior to their arrival at the fire alarm location), Building 452 (Safety Building), and the Emergency Operations Center.

Emergency response personnel receive training that is developed and presented in accordance with NFPA, OSHA, and Mine Safety and Health Administration emergency response training requirements.

5.0 INSPECTION, TESTING, AND MAINTENANCE PROGRAM

The WIPP fire protection systems IT&M program requires WTS organizations, with Fire Protection Engineering oversight, to perform IT&M of fire protection equipment and systems at regular intervals. The IT&M activities are accomplished in accordance with applicable NFPA standards and DOE directives and implementation guidance.

Technicians working on fire protection systems will be trained and qualified. The Cognizant Engineer (CE) and the FPE will review the training curricula. Two days of initial fire system specific training by a qualified trainer experienced and certified in fire alarm systems, and one day triennial refresher training is considered minimum. Factory training will be provided as needed. Technicians will be encouraged to pursue National Institute for Certification in Engineering Technologies (NICET), State Certification, or other professional certification.

5.1 Frequency of Inspections

The inspection frequency is in accordance with NFPA codes and standards as a minimum. Maintenance activities can be as a result of problems identified during inspections, testing, or other activities that impact fire protection equipment or systems. Acceptance testing is performed after completion of maintenance activities. Typical IT&M procedures and frequencies are listed in the attachments.

5.2 Record Keeping

All fire protection IT&M documentation is maintained as records. Emergency Services reviews these records for accuracy, completeness, and deficiencies. The FPE verifies accomplishment of fire protection program record keeping and may initiate corrective action(s) required to resolve any deficiencies identified during IT&M activities.

6.0 LIFE SAFETY AND FIRE PREVENTION PROGRAM

6.1 Exit and Evacuation Plans

Exit and evacuation plans for occupied WTS facilities are prepared, posted, and updated as needed. Employees receive training on the various types of alarm signals, evacuation plans, and assembly areas as part of General Employee Training. Drills are performed on a periodic basis to maintain awareness and preparedness.

6.2 Building Inspections

Fire Protection Engineering, Condition Assessment Survey/Capital Assessment Management Process Facility Planning group personnel, line management, landlords, and designated individuals perform periodic building inspections. These inspections are performed for the purpose of identifying and correcting potential fire hazards and/or conditions of noncompliance with safety codes and standards, the WIPP Fire Protection Program, and applicable policies and procedures.

6.3 Control of Combustibles

The control of combustible loading is an integral part of the Fire Safety Program. Combustible loading control is accomplished at WIPP through facility inspections, management control procedures, assessments (FHAs), and Fire Protection Engineering reviews. Periodic inspections are performed to include recognition of fire hazards such as combustible material buildup. Inspections are performed by Emergency Services, area landlords, Facility Planning, and IS&H. These inspections are performed for the purpose of identifying and correcting potential fire hazards and/or conditions of noncompliance with the WIPP Fire Protection Program, administrative controls in the Waste Handling Building (WHB), TSRs, limiting conditions for operations (LCOs) and surveillance requirements, and applicable policies and procedures.

Combustible loading controls are implemented in the WHB and underground per WIPP procedures. Daily inspections are performed by Operations personnel and documented on an inspection log sheet. The inspection and fire control measures are intended to limit the consequences of a fire. Management control procedures implement requirements in compliance with TSRs to establish combustible materials controls in the WHB and UNDERGROUND.

Management for each area shall ensure that the following are accomplished:

- Housekeeping inspections are performed to ensure that equipment and materials are maintained in an orderly arrangement at all times. Materials shall not be stored in aisles, corridors, stairways, or other paths of egress.

- Trash and vegetation in the PROPERTY PROTECTION AREA is controlled.

- At least 18 inches vertical clearance is maintained between the top of storage and sprinkler head deflectors.

- Combustible materials are limited to the quantity required for current needs and are separated from ignition sources.
- Workroom floors are maintained clean and dry to the extent practicable.
- Noncombustible or fire retardant materials are used whenever possible.
- Combustible waste is collected in metal containers and provided with lids. (Lids are not required for office waste cans.)
- Combustible waste does not accumulate inside or adjacent to buildings.
- Substitute less combustible materials when possible.
- The storage and use of combustible materials complies with TSRs.

6.3.1 Fuel Packages

Fuel packages are a continuous amount of combustible material which will burn until the fuel is consumed. Allowable fuel packages are 5 MW or less and fuel packages require a minimum of 10 feet of separation from other fuel packages, radiological material or container, and/or building equipment to prevent the spread of fire.

A fuel package with 5 MW of maximum energy release rate kept at a distance of 10 feet will have a heat flux of approximately 10 kW/m2. A heat flux of 10 kW/m2 is accepted as a critical heat flux that will not ignite exposed combustible material. Examples of 5MW fuel packages requiring NSTR-003-00 Combustible Fuel Package Separation Distances, are listed below.

5 MW Fuel Packages Requiring 10-Foot Separation

14	Empty stacked wooden pallets
5	Wood 4 ft by 4 ft by 7 ft wooden crates
4-⅛	Gallons of flammable/combustible liquids
1	Five-gallon container set of epoxy paint
2 cubic feet	Plastic material (non-fire retardant)
134 cubic feet	Of Trash bags
1	Pallet of HEPA filters 4 ft high

Staging or storing of fuel packages in excess of 5 MW require an evaluation and the approval of the FPE or covering the material with fire blankets to limit ignition and heat release rates. Fire blankets will be of minimum weight of 16 ounces and a minimum temperature rating of 1000°F, such as Tillman fire blanket #585 or Insuflex Pryoblanket™ (17 ounces). The fire blankets will be placed to cover each item, thus preventing ignition.

Combustible material may not be stored or staged within 10 feet of the north wall of the second floor of the WHB, WASTE, or any nuclear material

Each pallet of fiberboard or polyethylene slip sheets are 7.4 MW fuel packages and a separation distance of 15 feet is required from other combustibles or radiological material. No more than three pallets of slip sheets may be in the CH Bay. Pallets of slip sheets must not be stacked in the CH Bay.

6.4 Fire Barriers

Fire barriers provide for protection of property and life safety. (See Attachment 6 for a list of Fire Barriers and Doors.) Barriers such as walls, partitions, and floors may be designed and constructed to provide separation from a fire hazard. The effectiveness of a barrier is dependent upon its inherent fire resistance, the details of construction, and the penetrations, such as doors, windows, ducts, pipe chases, electrical raceways, and grills. Barriers are designed to provide an hourly rating of fire endurance that can range from one-half hour to four hours. All work, including repairs, modifications, or new construction that impact a fire barrier, shall be reviewed and approved by Fire Protection Engineering. Barriers will be constructed, maintained, and inspected per DOE Orders, NFPA codes and standards, and the applicable building code. The following requirements will ensure the integrity and continued operability of building fire barriers.

Management shall ensure that the following are accomplished.

- Fire barriers, credited or not by the DSA, will be maintained and alterations documented.
- Modifications or additions that affect new or existing fire barriers are reviewed and approved by Fire Protection Engineering.
- Fire barrier penetrations are provided with approved, through-penetration fire stops and/or are protected by approved operable fire door(s), fire damper(s), or fire window(s) having the appropriate fire-resistive rating.
- Drawings for each building provided with fire barriers are prepared to show the location of all fire barriers.
- Changes or modifications to installed fire barriers shall be controlled by administrative procedures.
- Fire doors are identified.
- Fire doors are not chocked or blocked open.

- Security systems do not interfere with, or affect, the operation or integrity of fire doors (e.g., latch mechanisms), fire dampers, fire windows, or other fire protection system components.

- Fire or smoke dampers are identified and numbered.

- Fire or smoke dampers are not blocked open as determined by a visual inspection or functional test as required by the applicable code of record.

- Inspection records of fire barrier penetration devices (fire doors and fire or smoke dampers) are maintained.

7.0 FIRE EXTINGUISHERS

7.1 Fire Response

Employees receive training on the various types of fires and their sources, fire extinguishers and fire prevention as part of General Employee Training. Employees are not required to fight a fire. The site has trained response teams to deal with fire emergencies.

If a fire is discovered:

- Sound the fire alarm
- Notify the CMR immediately (8111)
- Warn co-workers to leave the area

If the fire occurs in a town facility, call 9-911, then notify the CMR at 8111. Always make the call from a safe area. Never go back into the burning or smoke-filled building for personal items, or to use the phone.

Employees are not obligated or expected to fight a fire. After the employee has made the notification, they should fight the fire only if they believe they can fight the fire safely and are comfortable using a fire extinguisher.

Do NOT turn back to the fire. Maintain a path of escape from the fire at all times.

When using a fire extinguisher, remember the PASS system.

Pull the pin
Aim at the base of the fire
Squeeze the handle
Sweep from side to side

7.2 Acceptable Extinguishers

Portable fire extinguishers at WIPP SHALL be limited to the following types:

- Pressurized water-type, including Aqueous Film-Forming Foam (AFFF)
- Stored pressure type dry chemical
- Cartridge operated dry chemical or dry powder
- Non-rechargeable dry chemical, limited to vehicle use only
- Stored pressure, low-pressure gaseous agents (other than Halon)
- Self-expelling, high-pressure gaseous agent (carbon dioxide)
- Type K in kitchens that have griddles and deep fat fryers.

The following types of portable fire extinguishers are prohibited for use on-site:

- Carbon tetrachloride or Halon extinguishing agents
- Soldered or riveted shell self-generating soda acid or self-generating foam
- Gas cartridge water type extinguishers which are operated by inverting
- Portable fire extinguishers that contain Halon or any Halon alternative gas

7.3 Extinguisher Distribution

Portable fire extinguishers are distributed throughout site facilities based on the types of hazards expected within the area, and spacing requirements defined by OSHA, 29 CFR Parts 1910 and 1926, and NFPA 10, Standard on Portable Fire Extinguishers.

All self-propelled, diesel-powered underground equipment shall be equipped with at least one portable, multipurpose (ABC) dry chemical extinguisher having a nominal capacity of 10 pounds of extinguishing agent and a minimum rating of 4-A:10-B:C.

FSM shall be notified of any portable fire extinguisher addition, removal, or relocation to ensure proper tracking.

Portable fire extinguishers shall not be removed from the assigned location for any purpose other than fire extinguishment.

7.4 Extinguisher Installation

Indoor portable fire extinguishers shall be installed in accordance with the following:

- Secured to a stationary vertical surface using the hanger assembly supplied with the extinguisher or placed in non-locking cabinets or wall recesses designed to house portable fire extinguishers.

- Conspicuously located where they are readily accessible and immediately available in the event of a fire, preferably along normal paths of travel such as exits.

- Mounted such that operating instructions appear on the front or outward side of the extinguisher.

- Installed such that the bottom of the extinguisher is greater than 4 inches above the floor.

- Installed such that the top of the extinguisher is less than 5 feet above the floor for extinguishers with a gross weight of less than 40 pounds, or less than 3-1/2 feet above the floor for extinguishers with a gross weight greater than 40 pounds.

- If water-type extinguisher, protected from temperatures < 40°F and >120°F.

Outdoor extinguishers shall be installed in vented enclosures to protect the extinguisher from exposure, and shall be easily identifiable.

Vehicle extinguishers shall be securely mounted in a harness bracket to prevent dislodgment from any direction.

8.0 FLAMMABLE AND COMBUSTIBLE LIQUIDS

Classification of flammable and combustible materials shall be determined using NFPA 30, Flammable and Combustible Liquids Code, and the Material Safety Data Sheet (MSDS) for the product.

IS&H provides written approval for the procurement and use of flammable liquids (liquids with a flash point of 100ºF or less). This is per WP 12-IH.02-4, WIPP Industrial Hygiene Program – Hazard Communication and Hazardous Materials Management Plan.

Maintenance workers may use containers of flammable or combustible contents up to 20 ounces for use as lubricants or fuel for soldering and brazing. The number of containers will be reduced to the minimum quantity needed to accomplish the task. Hot work permits will be required for soldering and brazing.

TSR does not permit propane in the WHB or UNDERGROUND except for a hand-held propane cylinder ≤ 15 ounces used for maintenance activities in the SHAFT ACCESS AREA when no WASTE is present.

Areas where flammable liquids are transferred from one tank or container to another will be separated from other operations by distance, or by fire-resistant construction. Spill control and adequate ventilation shall be provided. The adequacy of fire protection shall be determined by the FPE in accordance with NFPA 30 Code.

The Central Monitoring Room (CMR) is notified when a spill occurs. Spill control, cleanup, and material disposal shall be provided wherever flammable or combustible liquids are used or handled.

Flammable liquids shall be kept in approved safety containers or flammable liquids storage cabinets when not actually in use. Class I flammable liquids may be used only in areas where no open flames or sources of ignition are present or in the possible path of vapor travel.

Employees responsible for storage and handling flammable or combustible liquids shall ensure that fire extinguishers in the storage and handling area are accessible. Combustible waste material and residues in an operating area shall be kept to a minimum and stored in covered metal receptacles. Adequate aisles shall be maintained for unobstructed movement of fire protection personnel and equipment. The ground area around buildings and operating areas shall be kept free of weeds, trash, and other unnecessary combustible materials.

8.1 Flammable and Combustible Liquids Quantity Limits

All flammable and combustible liquids will be stored in tanks, closed containers, or other suitable containers. Quantities of flammable and combustible liquids located outside an approved storage area or in any one fire area of a building shall not exceed the greater of the following:

- A supply for one shift
- 25 gallons of Class IA liquids in approved containers
- 120 gallons of Class IB, IC, II, or III liquids in approved containers
- One portable tank not exceeding 660 gallons of Class IB, IC, II, or III liquids

MAXIMUM ALLOWABLE SIZE OF CONTAINERS & PORTABLE TANKS (NFPA 30)					
Container Type	Flammable Liquids			Combustible Liquids	
	Class IA	Class IB	Class IC	Class II	Class III
Metal (other than DOE drums) or approved plastic	1 gal	5 gal	5 gal	5 gal	5 gal
Safety Cans	2 gal	5 gal	5 gal	5 gal	5 gal
Metal Drums (Department of Transportation spec.)	60 gal	60 gal	60 gal	60 gal	60 gal
Approved Portable Tanks	660 gal	660 gal	660 gal	660 gal	660 gal

Compressed liquefied flammable gasses, such as LNG or propane, shall be restricted at the WIPP site. Transport and use of compressed liquefied flammable gasses shall not be in proximity of other combustible hazards to prevent the possibility of a BLEVE.

Special operations may be exempted to these requirements by separate analysis and requirements. TSRs restrict propane in the WHB and UNDERGROUND.

8.2 Flammable and Combustible Liquid Transfers

Flammable and combustible liquids shall be drawn from or transferred into vessels, containers, or portable tanks within a building only from (1) original shipping containers with a capacity of 5 gallons (18.92 liters) or less; (2) from safety cans; (3) through a closed piping system; (4) from a portable tank or container by means of a device that draws through an opening in the top of the tank or container; or (5) by gravity through a Nationally Recognized Testing Laboratory listed self-closing valve or faucet.

Using pressurized air to transfer flammable/combustible liquids from one container to another is prohibited. Transferring flammable/combustible liquids by using a pressurized inert gas is permitted only if controls, such as pressure relief devices, are provided to limit the pressure so it cannot exceed the design pressure of the container.

Flammable liquids shall not be dispensed into metal containers unless the nozzle or fill pipe is in electrical contact (bonded) with the container. Bonding can be accomplished by either connecting a bond wire between the two containers or by ensuring other conductive paths. Questions regarding bonding should be directed to Fire Protection Engineering or Electrical Engineering.

Refueling operations are required to have a fire extinguisher rated at 4A:30B:C accessible within 25 feet when refueling.

8.3 Flammable Liquids Storage Cabinets

Cabinets designed for safe storage of flammable liquids are effective only if used and maintained properly. The following are requirements for the use of flammable liquids storage cabinets.

Storage cabinets shall be marked in lettering that is at least 2 inches high as follows: WARNING: FLAMMABLE — KEEP FIRE AWAY.

- The volume of Class I, Class II, and Class IIIA liquids stored in an individual storage cabinet shall not exceed 120 gallons.
- Only liquids or materials compatible with each other shall be stored inside the same flammable liquids storage cabinet.
- Paper and cardboard should not be stored inside flammable liquids storage cabinets, unless essential to packaging or individual MSDS.
- The amount of liquids or materials stored in a flammable liquids storage cabinet shall not exceed the cabinet's design specifications.
- Any flammable liquids storage cabinet located inside a building must have its vents sealed with metal bungs.

- Flammable liquids storage cabinets that are required to be vented must be vented to the outside.

- Holes will not be drilled in listed flammable storage cabinets for mounting any item.

Placement of flammable storage cabinets shall be subject to requirements of WP 12-IH.02-4.

9.0 COMPRESSED GAS CYLINDERS

Classification of compressed gases and cryogenic fluids shall be determined by NFPA 55 and the MSDS for the product.

The high pressures in compressed gas cylinders contain considerable energy per unit of volume as well as the hazards of the gas when it escapes from the container. Proper use and storage of compressed gas cylinders at WIPP include:

- Compressed gas containers, cylinders, and tanks in use or in storage shall be secured to prevent them from falling or being knocked over by corralling them and securing them to a cart, framework, or fixed object by use of a restraint.

- Compressed gas container valves shall be protected from physical damage by means of protective caps, guards, collars, or similar devices.

- Where compressed gas containers, cylinders, and tanks are designed to accept valve protective caps, the user shall keep such caps on the compressed gas containers, cylinders, and tanks at all times, except when being processed, or connected for use.

- No container or cylinder containing highly toxic (a Health hazard of 4), pyrophoric, or unstable reactive gases is permitted without written authorization of the FPE and IS&H.

- Compressed gas containers in storage or use shall be separated from materials and conditions that present exposure hazards to or from each other, and will not be stored with flammable or combustible liquids

- Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 meters) or by a noncombustible barrier at least 5 feet (1.5 meters) high having a fire-resistance rating of at least one-half hour.

- Compressed gas containers, cylinders, and tanks, whether full or partially full, shall not be exposed to temperatures exceeding 125°F.

- Where containers, cylinders, or tanks are moved by hand cart, hand truck, or other mobile device, such carts, trucks, or devices shall be designed for the secure movement of containers, cylinders, or tanks.

- TSR controls for the use of flammable and nonflammable compressed gas cylinders in the UNDERGROUND and WHB shall be implemented.

Also see WP 12-IH.02-12, WIPP Industrial Hygiene Program - Cryogenics, Refrigerants, and Process Gasses, and WP 12-IS.01-2, Industrial Safety Program - Lockout/Tagout and Nonelectrical Energy Hazards, regarding additional requirements.

10.0 HOT WORK POLICY

10.1 Hot Work Policy

Work activities covered by the Hot Work Policy include, but are not limited to, any activity involving open flames or sparks, including riveting, welding, burning, powder-actuated tools, brazing, cutting, grinding, soldering, torch-applied roofing, or similar spark-producing operations capable of initiating fires or explosions, or is an ignition hazard based on review.

10.2 Designated Hot Work Areas

Designated Hot Work Areas are equipped and/or designed for conducting hot work, for example, the welding shop contains spark shields or curtains, fire suppression equipment, and other equipment for reducing the fire risk. Designated Hot Work Areas require annual approval by Fire Protection Engineering. Designated Hot Work Areas are posted with signs indicating the area is approved for hot work.

No employee shall be assigned, or allowed, or be required to perform work alone in any area where hazardous conditions exist that would endanger his safety unless his cries for help can be heard or he can be seen (30 CFR §57.18020).

10.3 Hot Work Permits

Hot work performed outside designated Hot Work Areas requires a temporary hot work permit for authorization. Temporary hot work permits may be approved for up to five consecutive working days, and extended at the discretion of IS&H or the FPE. The manager or person in charge of the hot work activity is responsible for initiating a hot work permit. The person in charge must verify that the following conditions exist prior to starting the hot work activities:

Before a hot work permit is issued, the following conditions shall be verified

- The operator and nearby personnel shall be suitably protected against dangers such as heat, sparks, and slag by wearing personal protective equipment or having barriers in place.

- The hot work equipment to be used shall be in satisfactory operating condition and in good repair.

- Personnel performing the work are aware of the hazards that exist or could develop.

- At least one trained Fire Watch is stationed in the area, knows the areas/locations to be watched and inspected, and will remain for at least 30 minutes after work is complete. Provisions for fire watch relief will be included.

- Fire Watches shall be familiar with alarm location and procedures for sounding an alarm in the event of a fire.

- Fully charged and operable multipurpose dry chemical portable extinguisher having a minimum nominal capacity of 20 pounds shall be available at the work site before the hot work begins and shall be available immediately at the work area (25 feet).

- Materials such as flammable liquids, oily rags, paper, wood, debris, brush/dead plants, and other combustible materials are removed from a radius of 35-ft from the hot work , or If relocation is impractical, combustibles shall be protected by a listed or approved welding curtain, welding blanket, welding pad, or equivalent.

- Combustible floors shall be kept wet, covered with damp sand, or protected by a listed or approved welding blanket, welding pad, or equivalent.

- Where floors have been wet down, personnel operating arc welding equipment or cutting equipment shall be protected from possible shock.

- All combustibles shall be relocated at least 35 feet in all directions from the work site, and the following criteria also shall be met:

- To prevent the entrance of sparks, the edges of covers at the floor shall be tight, including at the point at which several covers overlap where a large pile is being protected.

- Openings or cracks in walls, floors, or ducts within 35 feet of the hot work activity shall be covered or sealed with listed or approved fire-rated or noncombustible material to prevent the passage of sparks to adjacent areas.

- Ducts and conveyor systems that might carry sparks to distant combustibles shall be shielded, shut down, or both.

- If hot work is done near walls, partitions, ceilings, or roofs of combustible construction, they shall be protected by a listed or approved welding curtain, welding blanket, welding pad, or equivalent.

- If hot work is done on one side of a wall, partition, ceiling, or roof, one of the following criteria shall be met:

  - Precautions shall be taken to prevent ignition of combustibles on the other side by relocating the combustibles.

  - If it is impractical to relocate combustibles, a fire watch shall be provided on the side opposite from where the work is being performed.

  - Hot work shall not be attempted on a partition, wall, ceiling, or roof that has a combustible covering or insulation, or on walls or partitions of combustible sandwich type panel construction.

  - Hot work that is performed on pipes or other metal that is in contact with combustible walls, partitions, ceilings, roofs, or other combustibles shall not be undertaken if the work is close enough to cause ignition by conduction.

Special precautions shall be taken to avoid accidental operation of automatic fire detection or suppression systems (e.g., special extinguishing systems or sprinklers).

In instances where the scope of work and the tools used to conduct hot work result in possible travel of slag, sparks, spatter or similar mobile sources of ignition farther than or less than 35 feet, the permit shall be permitted to extend the distances and areas addressed in the permit

The area shall be inspected at least once per day while the hot work permit is in effect to ensure that it is a fire-safe area. Conditions and requirements specified on the hot work permit have been met.

10.4 Fire Watch

A trained Fire Watch shall be present during all hot work permit activities outside designated areas and when required by a TSR. A person must complete a training course that addresses the Fire Watch's function and responsibilities prior to being designated as a trained Fire Watch. Subcontractors must provide a Fire Watch for any work subject to a hot work permit. The subcontractor's Fire Watch must be trained to WTS requirements. A WIPP employee who has been trained as a Fire Watch may be the Fire Watch for a subcontractor. A Fire Watch has the following responsibilities:

- The Fire Watch shall detect the presence of heat, smoke or flame then provide immediate notification to any affected workers and to emergency personnel.

- Remain at the job site throughout the entire hot work operation and for at least 30 minutes following work completion, or as directed by the hot work permit.
- Monitor the area where the hot work is performed to a distance of at least 35 feet in all directions (see Figures 1 and 2).
- Take immediate steps to extinguish sparks, burning, smoldering materials or insipient fires detected during the watch.
- Perform no duties or activities that will interfere with constant monitoring of the job site during the watch.
- Include provisions for fire watch relief with a worker that is also qualified as a fire watch.
- Limiting the amount of combustible fuel in the area.

A Fire Watch shall also be posted for non-hot work activities when required by an impairment or a TSR requirement.

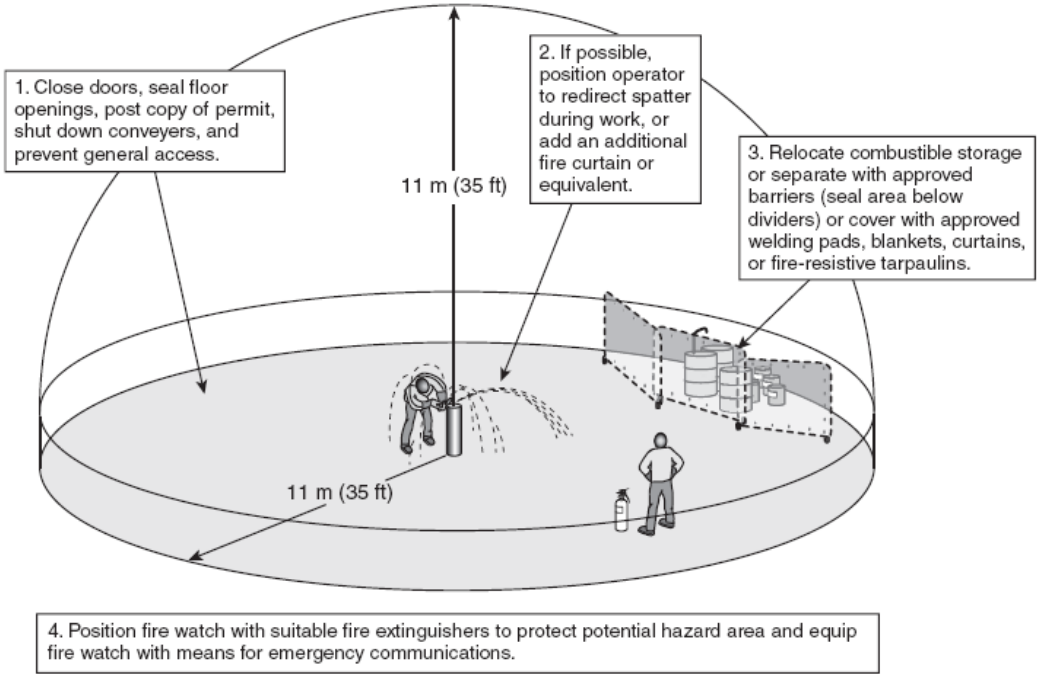

Figure 1 – NFPA 51B, 35-Foot Illustrated

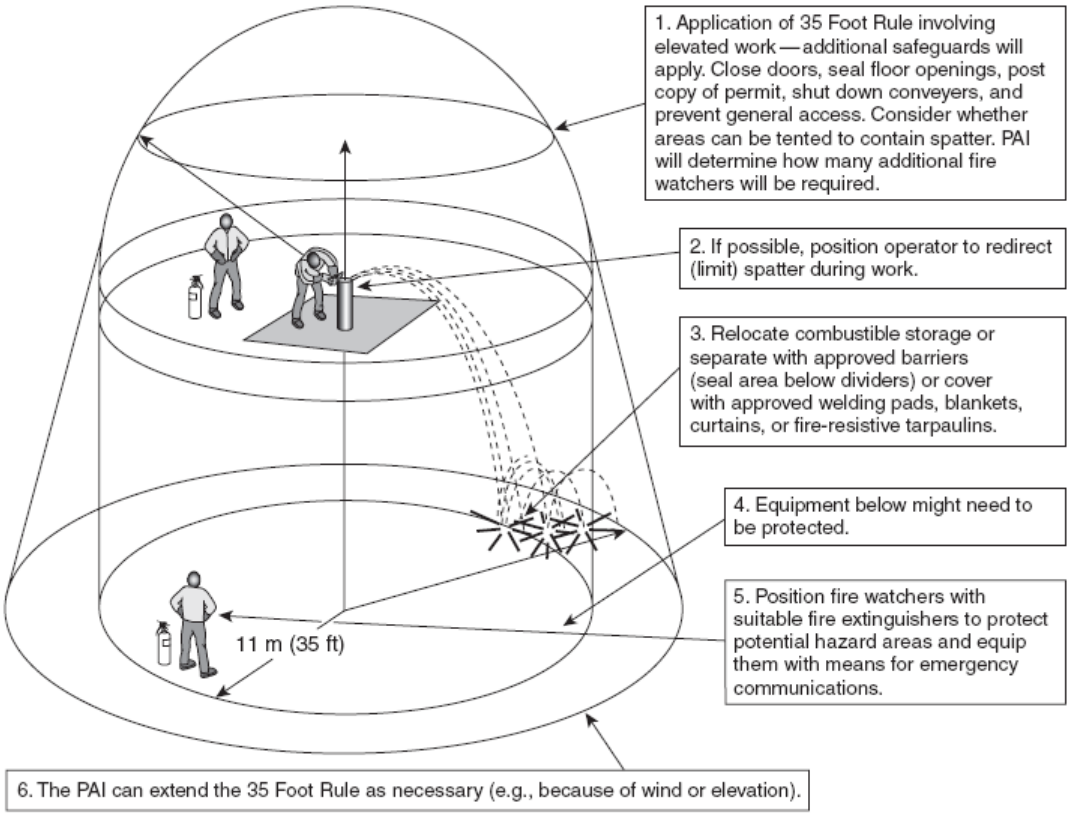

Figure 2 – NFPA 51B, Example of Where Multiple Fire Watches Are Needed

10.5 Types of Fire Watches

- Continuously Monitoring Fire Watch: A placement of personnel to monitor a single affected area continuously. This is a more stringent requirement than a Roving Fire Watch and is used for situations such as hot work or abnormal events.

- Roving Fire Watch: A walk-through by personnel to monitor an affected area. The interval for a Roving Fire Watch is to be determined by the conditions and risk of the current situation. The frequency can be from continuous to once each shift.

When the fire suppression system for a WIPP structure is inoperable a fire watch shall be established.

11.0 IMPAIRMENTS

An impairment is a condition that affects or can affect the operability of a fire protection system. This can be a temporary or a potential disablement of fire protection equipment/systems, such as fire detection and alarm equipment, automatic sprinkler systems, fire water valves, and related loss-control systems.

Normal plant configuration is all fire water supply and control valves open and all fire alarm systems operable. An impairment is issued when a system or a part of a system is not in service.

The impaired equipment shall include, but shall not be limited to, the following:

- Sprinkler systems
- Standpipe systems
- Firehose systems
- Underground fire service mains
- Fire pumps
- Water storage tanks
- Fire service control valves
- Alarm initiating devices such as pull stations
- Alarm notification devices such as strobes and horns
- Fire panels

11.1 Impairment approval and Control

The FPE and the Facility Shift Manager (FSM) are responsible for the approval of fire protection impairments on the surface at WIPP. The FPE and the Underground Facility Engineer (UFE) are responsible for fire protection impairments in the underground. The CMR and FSM will be informed of all impairments. The FSM directs the posting of impairments on the surface. The UFE directs the posting of impairments in the underground.

Work activities of less than one hour duration, such as planned IT&M activities, do not require an impairment.

Impairments (planned or unplanned) at the WIPP site are performed in accordance with WP12-FP3001, Fire Protection Impairments. The procedure is used to ensure that:

- The CE and the FPE should be notified if a fire protection system is out of service for more than 4 hours.
- Compensatory measures are established as required, and reviewed by the CE and the FPE
- Impairments are restored as quickly as possible.
- The potential risk of fire loss is given adequate consideration.
- Adequate actions are taken to restore or correct the condition.

Facility Operations prioritizes corrective actions for impairments appropriate to the risk. The FPE may be required to identify associated risks and determine potential alternatives to repair or acceptable compensatory measures.

11.2 Returning Impaired Equipment/System to Service

When a system that was impaired is returned to service, a verification of correct alignment and/or a functional test is conducted to verify that the system will operate as designed.

11.3 Compensatory Measures

Compensatory measures for a fire protection issue will be determined by the FPE, then reviewed by the Chief Nuclear Engineer and Operations and implemented and logged by FSM.

LCOs may predetermine required compensatory measures for some conditions.

Compensatory measures can be:

- Evacuating the facility.
- Shutting down building operations during the impairment.
- Providing temporary connections from fire hydrants to sprinkler systems.
- A fire watch may be posted for all impairments required by an LCO.

- A fire watch may be posted for impairments of fire suppression systems.
- Life safety impairments can require a buddy system, personal lighting, radio communication, log in/out sheets.

12.0 WILDLAND FIRE

The WIPP Fire Protection Program includes response to wildland fires in a timely and effective manner. The Emergency Response Team (ERT) will respond to fires on the WIPP Land Withdrawal Area (WLWA) as described in the WIPP Land Management Plan. The ERT may respond to wildland fires outside the WLWA boundary in accordance with existing Mutual Aid Agreements. Local fire-fighting organizations may also assist with fires on the WLWA when requested. All wildland fire response will be at the direction of the Facility Shift Manager in accordance with the WIPP Surface Fire Response procedure. A Wildland Fire Management Plan is in place that is consistent with the Federal Wildland Fire Management Policy and any DOE requirements.

13.0 FUEL CONFINEMENT PROGRAM

The Fuel Confinement Program shall ensure the placement of a spill barrier device or dike in a manner that prevents fuel spills from exposing waste containers to direct fire impingement.

Attended liquid-fueled vehicles used to transport materials and supplies do not require placement of absorbent material while in use.

The Fuel Confinement Program shall require the placement of a spill barrier or dike at the base of a STATIC WASTE FACE in a DISPOSAL ROOM.

The Fuel Confinement Program shall ensure fuel will not migrate from the RH BAY to the CH BAY and create a condition for a pool fire to expose wasted containers to direct fire impingement.

The Fuel Confinement Program shall require the placement of a spill barrier device or dike at the base of a STATIC WASTE FACE when a bulkhead or chain link/brattice is not installed preventing a pool fire exposing waste containers to direct fire impingement.

14.0 TECHNICAL SAFETY REQUIREMENTS

TSRs affecting some WIPP fire protection systems are identified in DOE/WIPP-07-3373, Waste Isolation Pilot Plant Technical Safety Requirements.

TSRs are limits, controls, and related actions that establish the specific parameters and requisite actions for the safe operation of WIPP. Specific systems required to be operable include the fire suppression systems in the WHB, Support Building, and site fire water supply. All operability requirements apply only to the WASTE HANDLING and

WASTE STORAGE modes. Verification of Operability is accomplished through surveillance requirements. LCOs with required actions are identified in DOE/WIPP-07-3373.

15.0 RADIOLOGICAL AREAS

15.1 Combustible Materials in Radiological Posted Areas

Combustible materials in radiological areas shall be minimized by housekeeping and limiting the introduction of such materials.

- Partitions, furniture, bookcases, and shelves shall be limited to what is required for operations.
- Wooden scaffolding used within radiological areas shall be treated and maintained so as to be flame-retardant in accordance with nationally recognized standards such as NFPA 703. Factory treated fire retardant scaffold material is normally tinted blue.
- Each pallet of slip sheets are rated at 7.4 MW and 15 feet of clear area is required between the slip sheet pallets and other combustibles and radiological material or containers.
- Pallets of slip sheets will not be stacked.
- Only three slip sheet pallets are allowed in the CH Bay.

15.2 Combustible Materials in Posted Radiological Contaminated Areas

Combustible materials in radiological contaminated areas shall be minimized to control contamination and the generation of contaminated material.

- Partitions, furniture, bookcases, and shelves shall be constructed of noncombustible materials.
- Storage of combustible materials, not required for operations, shall be prohibited. Combustible material not required for operations will be removed.
- Wooden pallets shall not be stored inside areas posted for radiological control.

15.3 Plastic Containment Enclosures

Plastic containment enclosure supporting structures shall be constructed of noncombustible or fire-retardant material in accordance with NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, or NFPA 705 Recommended Practice for a Field Flame Test for Textiles and Films, or California Public Safety Law, Section 1237.

Tape used within the structure and used to assemble or repair the structure shall be noncombustible or of fire-retardant material in accordance with NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films, or NFPA 705 Recommended Practice for a Field Flame Test for Textiles and Films or Federal Aviation Regulation (FAR) 25.853.

Plastic containment enclosures erected within a facility shall not be structurally supported by piping arrangements designed for automatic sprinkler systems and other fire protection equipment (metal scaffolding frame can provide an effective exoskeleton).

Wire or metal supporting systems shall be installed so that they not come in contact with any electrically charged systems, for example, conduits, power panels, transformers, or switchgear.

The coverings for plastic containment enclosure walls, ceiling, and floor shall be of noncombustible or approved fire-retardant materials.

Where plastic films are utilized, only plastic films which have been approved by Fire Protection Engineering shall be used. Clear windows will be provided and a material not meeting NFPA 701 or 705, such as PVC, will be limited to 4 square feet per wall or 50 square feet of wall area, unless approved by FPE for operations or safety requirements.

Flammable and/or combustible liquids shall be minimized, stored in and dispensed from listed/approved safety cans.

Flammable or combustible liquid-soaked clothes, rags, or waste shall be stored listed/approved safety containers.

Combustible materials which are used in plastic containment enclosure operations (for example, rags and paper products) shall be removed from the plastic containment enclosure immediately after use, or shall be transported and stored in approved metal containers with lids.

All combustible waste shall be removed from the plastic containment enclosure after each work shift.

Exits shall remain unobstructed at all times.

Hot work shall not be performed in plastic containment enclosures, located in radiological areas, without an approved radiological work permit in accordance with the site radiological control manual.

- Hot work permit shall be obtained when performing cutting, welding, grinding, or open-flame operations within a plastic containment enclosure, or the area shall be designated as a Permissible Welding Area by the FPE.

- Portable fire extinguishers shall be provided and positioned for easy visibility and access, as determined by Fire Protection Engineering.

- Proper placement of fire blankets over combustible materials, when used, shall be verified daily.

Portable ventilation units using HEPA filters to provide negative air pressure for contamination control will be electrically safe.

Plastic containment enclosure construction and materials shall be inspected weekly to verify that the fire retardant properties of the materials are maintained, including fire blankets, if used.

The plastic containment enclosure configuration shall be inspected monthly to ensure that any modifications or repairs performed are consistent with the requirements of this section.

16.0 REFERENCES

- 10 CFR Part 851, "Worker Safety and Health Program"

- 29 CFR Part 1910, "Occupational Safety and Health Standards"

- 29 CFR Part 1926, "Safety and Health Regulations for Construction"

- 30 CFR Part 57, Subpart C, "Fire Prevention and Control"

- DOE Order 231.1A, *Environment, Safety, and Health Reporting*

- DOE Order 420.1B, *Facility Safety*

- DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*

- DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection Standards*

- DOE-STD-1066-99, *Fire Protection Design Criteria*

- DOE-STD-1088-95, *Fire Protection for Relocatable Structures*

- Permit No. 4890139088-TSDF Hazardous Waste Facility Permit, Waste Isolation Pilot Plant, NM, issued by the New Mexico Environment Department

- National Fire Protection Association (NFPA) Codes and Standards

- NSTR-003-00, *Combustible Fuel Package Separation Distances*

- DOE/WIPP-93-004, Waste Isolation Pilot Plant Land Management Plan
- DOE/WIPP-07-3372, Waste Isolation Pilot Plant Documented Safety Analysis
- DOE/WIPP-07-3373, Waste Isolation Pilot Plant Technical Safety Requirements
- SDD FP00, Fire Protection System (FP00) System Design Description (SDD)
- WSMS - WIPP-023, Fire hazard Analysis for the Waste Isolation Pilot Plant, Carlsbad, NM
- WP 04-AD.01, Operations Event Critiques
- WP 12-IH.02-4, WIPP Industrial Hygiene Program – Hazard Communication and Hazardous Materials Management Plan
- WP 12-IH.02-12, WIPP Industrial Hygiene Program – Cryogenics, Refrigerants, and Process Gasses
- WP 12-IS.01-2, Industrial Safety Program – Lockout/Tagout and Nonelectrical Energy Hazards

Attachment 1 – Definitions and Acronyms

Definitions and Acronyms

Acceptable	When applied to fire safety, "acceptable" is a level of protection which the Authority Having Jurisdiction, after consultation with the cognizant DOE FPE(s), considers sufficient to achieve the fire and life safety objectives defined in DOE Orders. In some instances, it is a level of protection necessary to meet a code or standard. In other instances, it is a level of protection that deviates (plus or minus) from a code or standard as necessary and yet adequately protects against the inherent fire hazards.
Affected Area	A physical enclosure, space, or piece of equipment that requires protection by an operable fire detection or suppression system, or requires protection by an operable fire detection or suppression system for a remote enclosure, space, or piece of equipment to continue operations.
Approved	Acceptable to the manager of Fire Protection Program, or designee
Auto-ignition	Initiation of combustion by heat but without a spark or flame.
Authority Having Jurisdiction	The organization, office, or individual responsible for approving equipment, an installation, or a procedure.
Bar Code Database	A specialized tracking system used by Fire Systems Services to track the portable fire extinguisher inventory, location, maintenance, and inspection history.
BLEVE	Boiling liquid expanding vapor explosion. Can be flammable or non flammable The hazard is restricted to containers of liquefied gases. Fire exposure is the major cause of such BLEVEs. LNG and LP-Gas containers are susceptible to BLEVEs and vapor cloud explosions.
Boiling Point	The temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure.
Carbon Dioxide	A colorless, odorless, electrically nonconductive inert gas that is suitable medium for extinguishing Class B and Class C fires. (NFPA 10)
Cartridge/Cylinder-Operated Fire Extinguishers	A fire extinguisher in which the expellant gas is in a separate container from the agent storage container.
Class A Fires	Fires in ordinary combustible materials where an ash remains, such as wood, cloth, paper, rubber, some plastics, and carpets.
Class B Fires	Fires in flammable or combustible liquids such as oils, greases, tars, oil base paints, lacquers, and flammable gasses.
Class C Fires	Fires that involve energized electrical equipment.

Attachment 1 – Definitions and Acronyms

Class D Fires	Fires in combustible metals, such as uranium, plutonium, magnesium, titanium, zirconium, sodium, lithium, and potassium.
Class K Fires	Fires in or on cooking appliances using combustible cooking media (vegetable or animal oils and fats).
Classification of Portable Fire Extinguishers	Portable fire extinguishers are classified according to the four types of fires (Class A, B, C, and D) they are effective in extinguishing.
Combustible Liquid	A combustible liquid is a liquid having a flash point at or above 100°F (37.9°C). Refer to Table 1, Flash and Boiling Points for Flammable and Combustible Liquids. Combustible liquids **SHALL** be subdivided as follows:
Class II Combustible Liquids	Have flash points at or above 100°F (37.8°C) and below 140°F (60°C). Examples: Fuel oil numbers 1, 2, 3, 4, and 5; mineral spirits, kerosene, turpentine, JP-6 fuel, enamels, glacial acetic acid, and formaldehyde. A hazard rating of 2.
Class IIIA Combustible Liquids	Have flash points at or above 140°F (60°C) and below 200°F (93.4°C). Example: fuel oil No. 6. A hazard rating of 2.
Class IIIB Combustible Liquids	Have flash points at or above 200°F (93.4°C). Examples: Mineral oil, Motor oils, polyurethane glue, propylene glycol, and glycerin. Hazard rating of 1.
Combustible Material	Any material, solid, liquid, or gas that can oxidize rapidly, producing heat, and often light. This includes materials such as tissues, paper, rags, wood, oils, and flammable liquids.
Common Path of Travel	That portion of the initial exit access travel for which a building occupant can travel. The path of travel ends where the occupant reaches a point at which a choice of independent paths to remote exits becomes available.
Compensatory Measures	A measure instituted to compensate for the lack of fire protection during an Impairment. These measures do not replace the impaired fire protection system but are designed to reduce the risk or effect of fire during the Impairment. All Compensatory Measures must receive concurrence from the FPE.
Container	A vessel less than or equal to 60 gallons approved by NFPA 30, Flammable and Combustible Liquids Code, and the Uniform Fire Code. (See Table 2.)
Continuity of Combustibles	The distribution or arrangement of fixed or transient combustible items, whose proximity is sufficiently close, one to another that the ignition of one item can be expected to cause the spread of the fire to other items within the compartment or area.

Attachment 1 – Definitions and Acronyms

Defense-In-Depth	Typically associated with facilities that can be classified as a highly protected risk or an improved risk. This means that reliance is not placed on any single fire protection feature to ensure an acceptable level of fire safety.
Deficiency	Condition(s) that fail(s) to meet a requirement that may or may not result in an impairment.
Department of Transportation	The U.S. Department of Transportation, which has jurisdiction over all cylinders and cartridges containing 40 psi or more internal pressure. (NFPA 10)
Designated Users	Employees who are expected to use portable fire extinguishers as part of a job assignment. Designated Users are generally hot work Fire Watches and firefighters.
Dry Chemical	Various mixtures of finely divided solid particles additionally supplemented with special treatments to provide resistance to packing and moisture absorption (caking) and to promote proper flow characteristics. These agents are designed for Class A and Class B fires. They are nonconductors and are approved for use on energized Class C fires. (NFPA 10)
Dry Powder	Solid materials in powder or granular form designed to extinguish Class D combustible metal fires by crusting, smothering, or heat-transferring means. (NFPA 10)
Duration	The length of time the requester expects the Impairment to prevail. This information will be determined when the requester discusses the Impairment with Fire Protection Engineering.
Exemption	The approved deviation from a DOE Order, non-statutory code or standard.
Equivalency	A determination by the DOE AHJ that a code or standard has been met by alternate means.
Exit Access	Includes all portions of a building through which an individual has to travel to reach an exit from any occupied spot in the building.
Exit Discharge	That portion of a means of egress between the termination of an exit and a public way.
Exit	That portion of a means of egress that is separated from all other spaces of the building by construction or equipment as required to provide a protected way of travel to the exit discharge.
Extension Cord	An assembly of a flexible cord of any length with one male connector on one end, one or more female connectors on the other end and no built-in over-current protection.
Extinguisher Users	Extinguisher Users are classified as General Users or as Designated Users as described in 29 CFR §1910.157(g):

Attachment 1 – Definitions and Acronyms

Fire Area	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. 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.
Fire Assembly	The assembly of a fire door or fire window.
Fire Barrier	A wall, ceiling, roof, or floor, including opening and penetration protection elements, which has a structural resistance to fire as prescribed by a recognized testing laboratory.
Fire Damper	A device installed in air distribution ducts, or in air transfer grilles, designed to close automatically upon the detection of fire, to interrupt migratory airflow, and to restrict the passage of flame.
Fire Extinguisher	A device containing an extinguishing agent that can be expelled under pressure for the purpose of suppressing or extinguishing fire.
Fire Hazard	Any thing or act which increases or may cause an increase of the hazard or menace of fire to a greater degree than that which is recognized as normal by persons regularly engaged in preventing and extinguishing fires, or which may obstruct, delay, hinder or interfere with the operations of the fire department or the egress of occupants in the event of fire.
Fire Protection Engineer	The FPE is the site SME, and shall be a graduate of an accredited engineering curriculum and having completed not less than four years of engineering practice, three of which shall have been in responsible charge of diverse fire protection engineering work. If not such a graduate, a qualified engineer shall either: demonstrate a knowledge of the principles of engineering and have completed not less than six years engineering practice, three of which shall have been in responsible charge of diverse fire protection engineering projects; be a registered professional engineer in fire protection; or meet the requirements for a Grade 11 or higher FPE as defined by the Office of Personnel Management SME subject matter expert.
Fire Protection System	Any fire safety system that detects, extinguishes, or limits the extent of fire damage or enhances fire life safety.
Fire Screen	An item of equipment installed ahead of all HEPA filter banks intended to reduce flame propagation and glowing/burning ember products from reaching final high efficiency particulate air (HEPA) filters.
Fire Watch	The process of observing field conditions that are indicators of incipient stage fire development and initiating specified actions to mitigate the situation. Also, an individual assigned the Fire Watch duties, who is knowledgeable of the requirements.

Attachment 1 – Definitions and Acronyms

Flame Spread Rating Flame spread rating is a numerical classification determined by the test method in ASTM E-84, which indexes the relative burning behavior of a material by quantifying the spread of flame of a test specimen. The surface burning characteristic of a material is not a measure of resistance to fire exposure.

Flammable Liquid A flammable liquid is a liquid having a flash point below 100°F (37.8°C) and having a vapor pressure not exceeding 40 pounds per square inch (psi) absolute at 100°F (37.8°C); known as a Class I Liquid. Refer to Table 1. Class I Liquids **SHALL** be subdivided as follows:

Class IA Flammable Liquids Have flash points below 73°F (22.8°C) and having a boiling point below 100°F (37.8°C). Examples: Benzol, ether, aerosol paints, JP-4 fuel, and naphtha. Hazard rating of 4.

Class IB Flammable Liquids Have flash points below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C). Examples: Acetone, ethyl alcohol, methyl ethyl ketone, isopropyl alcohol, toluene, lacquers, carbon disulfide. Hazard rating of 3.

Class IC Flammable Liquids Have flash points at or above 73°F (22.8°C) and below 100°F (37.8°C). Examples: n-Propyl alcohol, dibutyl ether, and xylene. Hazard rating of 3.

Table 1 - Flash and Boiling Points for Flammable and Combustible Liquids

Liquid	Class	Hazard	Flash Point (°F)	Boiling Point (°F)
Flammable	IA	4	Below 73	Below 100
	IB	3	Below 73	100 or Higher
	IC	3	73 to 100	
Combustible	II	2	100 to 140	100 or Higher
	IIIA	2	140 to 200	
	IIIB	1	Above 200	

Flammable Liquids Storage Cabinet A storage cabinet which is listed by Underwriters Laboratories (UL) or approved by FM, or other equivalent organization per Fire Protection Engineering, for the storage of flammable and combustible liquids having a 15-minute fire rating.

Flash Point The minimum temperature of a liquid at which sufficient vapor is given off to form an ignitable mixture with air, near the surface of the liquid.

Floor Coating An applied liquid to a floor. Solid covings such as tile, carpeting, wood, and others are considered floor finishes and are covered in Chapter 5 of this manual.

Attachment 1 – Definitions and Acronyms

Fuel Package	A grouping of one or more items whose proximity is sufficiently close that the ignition of one item can be expected to spread the fire to the remaining items.
General Users	All site employees and subcontractors.
Hazard Categories	The consequences of unmitigated releases of radioactive and/or hazardous material are evaluated as required by DOE Order 5480.23, *Nuclear Safety Analysis Reports*, and classified by the following hazard categories:
Hazard Category 1	The hazard analysis shows the potential for significant off-site consequences.
Hazard Category 2	The hazard analysis shows the potential for significant on-site consequences.
Hazard Category 3	The hazard analysis shows the potential for only significant localized consequences.
Hazardous Materials	Any solid, liquid, or gaseous material that is toxic, explosive, flammable, corrosive, or otherwise physically or biologically threatening to health.
Heat Resistant	A material having the quality or capability of withstanding heat for a specified period at a maximum given temperature without decomposing or losing its integrity.
High Efficiency Metal Fiber Filter	A reusable metal filter composed of fine sintered stainless steel fibers together with a stainless steel wire and metal support housing and pleated to enhance strength, surface area, and particle holding capacity.
High Efficiency Particulate Air (HEPA) Filter	Throwaway extended pleated medium dry-type filter with (1) a rigid casing enclosing the full depth of the pleats, (2) a minimum particle removal efficiency of 99.97% for thermally generated monodisperse smoke particles with a diameter of 0.3 micrometer, and (3) a maximum pressure drop of 1.0 inches w.g. when clean and operated at its rated airflow capacity.
High-Pressure Cylinder	For the purposes of this technical position, high-pressure cylinders (and cartridges) are those containing nitrogen, compressed air, carbon dioxide, or other gases at a pressure higher than 500 psi at 70°F. (NFPA 10)
Hot Work Permit	A daily or weekly authorization document provided by the fire department for performing hot work outside of an established Permissible Welding Area.
Hot Work	Any activity involving open flames, sparks including riveting, welding, burning, powder-actuated tools, brazing, cutting, grinding, soldering, torch- applied roofing or similar spark-producing operations capable of ignition, initiating fires or explosions.

Attachment 1 – Definitions and Acronyms

Hydrophoric Materials	Materials that react violently with water or water vapor (such as lithium and lithium hydride).
Hydrostatic Testing	Pressure testing of a system or an object to verify its strength against unwanted rupture.
Immediate	Action initiated as soon as possible (not to exceed 5 minutes).
Impairment	A fire protection system condition that challenges the overall intended function of a system. An Impairment Tag provides key information on the Impairment or Deficiency which allow emergency response personnel to utilize fire protection systems that may otherwise be unavailable
Impairment Priority Level 1 (High)	Poses imminent danger to personnel, or a violation of requirements that poses substantial risk to personnel, property, or the environment, and would be detrimental to the site mission if left uncorrected. A condition that affects a fire protection system that is designated Safety Significant. Compensatory measures may be required to reduce risk pending completion of work Corrective actions **SHALL** receive high priority
Impairment Priority Level 2 (Medium)	A condition that poses a risk to personnel, property, or the environment. A code violation of a Safety Significant System, or a high value building safety system. A condition that can affect the operation of a fire protection system in Balance of Plant. Compensatory actions may be required pending work under Work Control.
Impairment Priority Level 3 (Low)	A violation of regulatory requirements or deviations from normal configuration that have a low or moderate risk to personnel, property, or the environment. Fire Protection Engineering may be required to identify associated risks and determine potential alternatives to repair or acceptable compensatory measures.
Incipient Stage Fire	Defined as the start of a fire during which time there is no active flaming. The fire may be smoldering for several hours.
Industrial Materials	Chemicals or substances which are physical hazards or health hazards as defined and classified in the Uniform Fire Code.
Inspection	A check of a fire protection system that is intended to give reasonable assurance that the system is operable. This is done by verifying that it is in its designated place, that it has not been actuated or tampered with, and that there is no obvious or physical damage or condition to prevent its operation.
Interior Finish	Interior wall, floor and ceiling finish means the exposed interior surfaces of buildings including, but not limited to, fixed or movable walls and partitions, columns, and ceilings.

Attachment 1 – Definitions and Acronyms

Life Safety	The prevention or reduction in probability, to a reasonable degree, of injury and loss of life from the effects of fire and other similar emergencies. The level of life safety is defined by the: Combination of physical facilities Type of activities undertaken. Provisions for the capabilities and needs of employees and other occupants. Prevention programs Built-in protection. Egress and other safety features and systems
Limited Supply Suppression System	A system installed in accordance with the applicable NFPA Standards and having a limited quantity of suppression agent. These systems typically include carbon dioxide, dry chemical, other gaseous agents, or water.
Listed/Approved Equipment or Materials	Have been tested, passed, and are included in a current list published by a nationally recognized testing laboratory which is concerned with product evaluation and is acceptable to the AHJ. The laboratory maintains periodic inspection of production of listed equipment or materials. Such lists state either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner. This definition applies to products which are UL listed or FM approved.
Low-Pressure Cylinder	For the purposes of this technical position, low-pressure cylinders are those containing fire extinguishing agent (medium), nitrogen, compressed air, or other compressed gases at a service pressure of 500 psi or lower at 70°F. (NFPA 10)
Maintenance	A thorough examination of a fire protection system that is intended to give maximum assurance that the system will operate effectively and safely
Maximum Possible Fire Loss (MPFL)	The estimate of the fire loss within a fire area, unless a FHA demonstrates a lesser (or greater) loss potential, assuming the failure of both automatic fire suppression systems and manual fire fighting efforts. Fire loss shall include the cost of replacing the damaged facility and components, recovery costs and time, clean-up costs, etc., fire suppression systems and manual fire fighting efforts.
Means of Egress	A continuous and unobstructed way of travel from any point in a building or structure to a public way consisting of three separate and distinct parts: (1) the exit access, (2) the exit, and (3) the exit discharge.
Noncombustible	A material that in the form in which it is used and under the conditions anticipated will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.
Occupancy	The purpose for which a building, or portion thereof, is used or intended to be used.
Occupancy Restriction Order (ORO)	A documented order initiated by the Fire Protection organization to restrict or limit the specific occupancy of a building or area which has been determined to be a life safety hazard.

Attachment 1 – Definitions and Acronyms

Off-Site	Any area beyond access-controlled Department of Energy (DOE) property to which the public has free and unlimited access.
Opening	Openings include doors, windows and ventilation openings (ducts).
Out of Commission	Out of Commission, for the purpose of this procedure, is defined as a fire protection system, subsystem, or component that is no longer required for fire protection and is no longer credited in an Authorization Basis document, and has been physically segregated from other active system components and site support systems. Segregation includes isolation from site electrical, alarm, and water systems. Systems placed in an Out of Commission status require prior written approval from the FPE and are tracked and monitored in the Impairment Database as Status Code Level OOC until physically removed from the facility.
Out of Service	Out of Service is defined as a fire protection system, subsystem, or components that is no longer required for fire protection and no longer credited in an Authorization Basis document, but are still physically connected to site support systems. These systems or components are generally scheduled for removal through the site or facility decontamination and decommissioning schedule. Out of Service systems or components are excluded from fire protection system inspection, testing, and maintenance requirements, however, a site response is required for alarms received from this system, and failure of a component within this Out of Service equipment that affects other active or credited systems will impose required repairs. Systems placed in an Out of Service status require prior written approval from the FPE.
Penetration	An opening created in a membrane or assembly to accommodate penetrating items for electrical, mechanical, plumbing, environmental, and communication systems.
Permissible Welding Areas	A specific area approved by Fire Protection Engineering for long-term or permanent welding, cutting, and burning, such as a maintenance shop or a detached outside location that is: Constructed with non-combustible or fire-resistive material. Essentially free of combustible and flammable content. Suitably segregated from adjacent areas. Equipped with a suitable exhaust system capable of removing the fumes and spent gases associated with hot work.
Planned Impairment	An Impairment that would result during the implementation of an approved work package that has been placed on the appropriate Plan of the Day schedule(s) for fire systems and individual buildings.
Plastic Containment Enclosure	A containment structure utilized for the control of radiological hazards and asbestos abatement activities.
Power Strip	An assembly of receptacles, on-off switch and over-current protection on one end of a flexible cord of any length with one male connector on the other end.

Attachment 1 – Definitions and Acronyms

Pre-filter A filter that is located upstream from another filter. Pre-filters, or roughing filters, remove and/or reduce the percentage of large particles that would reduce the life of the next-in-line or final filters.

Process Area An area or facility used for the processing or storing radiological materials.

Public Way Parcels of land essentially open to outside air, having a clear width and height of not less than 10 feet.

Pyrophoric Material A material with an auto-ignition temperature in air at or below 130°F (54.4°C) and 50% relative humidity.

Reasonable Time A length of time determined after careful, candid, and impartial evaluation by persons regularly engaged in and knowledgeable about protecting life and property from the effects of fire. The evaluation considers risk, the probability that a hazard will cause harm, and the consequences of that event. After determining risk, the evaluation considers the magnitude of expenditure and the disruption of service.

Redundant Fire Protection System A fire protection system that is designed and installed to function in the event of the failure of a primary fire protection system.

- Automatic suppression systems, or other specialized extinguishing systems plus appropriate alarms.
- Automatic fire detection, occupant warning, manual fire alarm, and fire alarm reporting systems (considered together) combined with a sufficiently-staffed, properly-equipped and adequately trained fire brigade that is able and committed to respond in a timely and effective manner.
- Fire barrier systems or combinations of physical separation and barriers for outdoor locations.
- Redundant fire protection systems may include dual water supplies to sprinkler systems, dual piping risers, or valving systems such that adequate redundancy in water supply to the sprinklers

Portable fire extinguishers < 60-pounds, interior fire hose systems, or interior fire detection and alarm systems do not meet the definition of a redundant fire protection system.

Sealed Container A container that is closed by an engineered tight seal such as an elastomer O-ring, a crimp seal, or a metal to metal seal. Taping does not constitute a seal. The innermost packaging component of a hazardous material packaging.

Attachment 1 – Definitions and Acronyms

SHALL, Should, and May Statements	The word **SHALL** identify those mandatory requirements or actions, unless prior written justification and approval of an alternate approach is obtained from the Fire Protection Program Manager. The word **Should** indicates a recommendation that is based on standards and good safety and business practices. The word **May** indicates when permission is granted, but the action is neither a recommendation nor a requirement. **May** statements often provide a suggested or possible course of action when a consistent methodology is not required.
Smoke Barrier	A smoke barrier is a continuous membrane, either vertical or horizontal, such as a wall, floor, or ceiling assembly, which is designed and constructed to restrict the movement of smoke. A smoke barrier may or may not have a fire resistance rating. Such barriers may have protected openings.
Smoke Developed Rating	Smoke developed rating is a numerical classification determined by ASTM E-84, which indexes the smoke generation rate of a given material to those of two standard materials (inorganic reinforced cement board and select grade red oak). Material used for interior finish will be 25 or less (Class A) unless approved.
Spray Area	Any area in which dangerous quantities of flammable or combustible vapors, mists, residues, dusts, or deposits are present due to the operation of spray processes. The spray area includes (1) the interior of any spray booth or spray room, (2) the interior of any exhaust plenum and any exhaust duct leading from the spray process, and (3) any area in the direct path of a spray application process.
Spray Booth	A power-ventilated structure that encloses a spray application operation or process, confines and limits the escape of the material being sprayed (including vapors, mists, dusts, and residues that are produced by the spraying operation), and conducts or directs these materials to an exhaust system. A spray booth is not a spray room.
Stored-Pressure Fire Extinguisher	A fire extinguisher in which both the extinguisher material and expellant gas are kept in a single container, and that includes a pressure indicator or gauge.
Technician	An individual qualified and authorized to provide IT&M to a fire protection system.
Tight-Fitting Lid	A lid that, when placed on the container, a remains securely in place as the container is handled during normal operations.
Time Requirement	There is no specific time requirement for corrective action. Corrective action due dates **SHALL** be determined by the Chief Nuclear Engineer, with concurrence from the Facility Manager, based on the risks identified for individual violations.

Attachment 1 – Definitions and Acronyms

Transfer	Any on-site transport of materials. Movement within buildings is considered movement, not transfer.
Unplanned Impairment	An Impairment that would result from system breakdowns or component failures.
Vehicle Owners	For the purpose of this procedure, personnel assigned responsibility for, or custodians of, United States Government-owned fleet or special purpose vehicles at the site.
Vapor Cloud Explosion (VCE)	A vapor cloud explosion is a combustion explosion that follows the release of a large quantity of flammable gas or vapor in an outdoor area with conditions that promote rapid flame speeds and associated pressure increases. Associated with BLEVEs.
Water-Type Fire Extinguisher	A water-type fire extinguisher contains water-based agents, such as water, aqueous film-forming foam, FFFP, antifreeze, and loaded stream. (NFPA 10)
Welding Blanket	A heat-resistant material designed to be placed in the vicinity of a hot work operation. Intended for use in horizontal applications with light to moderate exposures such as that resulting from chipping, grinding, heat treating, sand blasting, and light horizontal welding. Designed to protect machinery and prevent ignition of combustibles such as wood that are located adjacent to the underside of the blanket.
Welding Curtain	A heat-resistant material designed to be placed in the vicinity of a hot work operation. Intended for use in vertical applications with light to moderate exposures such as that resulting from chipping, grinding, heat treating, sand blasting, and light horizontal welding. Designed to prevent sparks from escaping a confined area.
Welding Pad	A heat-resistant material designed to be placed directly under a hot work operation such as welding or cutting. Intended for use in horizontal applications with severe exposures such as that resulting from molten substances or heavy horizontal welding. Designed to prevent the ignition of combustibles that are located adjacent to the underside of the pad. Can be multiple layers of welding blanket.

Attachment 1 – Definitions and Acronyms

AHJ	Authority Having Jurisdiction
CBFO	Carlsbad Field Office
CFR	*Code of Federal Regulations*
COR	Code of Record
DOE	U.S. Department of Energy
DSA	Documented Safety Analysis
FAR	Federal Aviation Regulation
FHA	Fire Hazard Analysis
FM	Factory Mutual
FPE	Fire Protection Engineer
HEPA	High-Efficiency Particulate Air
IS&H	Industrial Safety and Hygiene
IT&M	Inspection, Testing, and Maintenance
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SME	Subject Matter Expert
TSR	Technical Safety Requirement
U/G	Underground
UL	Underwriters Laboratory
WIPP	Waste Isolation Pilot Plant
WLWA	WIPP Land Withdrawal Area
WTS	Washington TRU Solutions LLC

Attachment 2 – Typical Fire Protection IT&M Procedures

Typical Fire Protection IT&M Procedures

PM Number	Title
DC000038	Calibration of Facility Pressure Gauges
DC025018	Limiting Conditions for Operations (LCO) Calibration of Mercoid Switches
IC041095	45-G-602 Temperature and Oil Pressure Gauge Calibration
IC456003	Calibration of Water Storage Tanks 25-D-001A/B Level Indication
IC456006	Calibration of 456-PT-008-001
IC456007	Calibration of Compound Gauges
PM00008	Roll-up Door Equipped Bulkhead Inspection U/G
PM000012	Cleaning, Inspection, and Testing of Fire Alarm Panels
PM000013	Cleaning, Inspection, and Testing of Fire Alarm Panels
PM000014	Cleaning, Inspection, and Testing of Fire Alarm Panels
PM000016	Cleaning, Inspection, and Testing of Fire Alarm Panels.
PM000020	Cleaning, Inspection, and Testing of Fire Alarm Transmitters (FTR)
PM000023	Testing of Electrical Heat Trace for Freeze Protection
PM000027	U/G Fuel Station Dry Chemical Fire Suppression System
PM000028	Fire/Safety Inspection and Testing
PM000029	Self-Contained Breathing Apparatus Inspections
PM000030	Ambulance & Surface Rescue Truck Inspection
PM000031	Fire Hose and Nozzle Inspection and Testing
PM000033	Emergency Response Equipment Inspection
PM000034	Fire Hydrant, PIV, and Isolation Valve Inspection
PM000035	U/G Miners First Aid Station Inspection
PM000036	Fire Extinguishers and Extinguishing Systems Monthly Inspection
PM000039	Emergency Services Ground Ladder Inspection
PM000048	WIPP Main Water Supply Line Vendor Cathodic Protection Survey Equipment No. 23-X-075
PM000051	Emergency Lighting System
PM000054	Annual Surveillance for Fire Suppression System (Main Drain)
PM025064	Inspection of Water Storage Tanks 25-D-001 A & B
PM025066	Site Grounding and Lightning Protection
PM041108	Inspection and Maintenance of Shield Doors and Tornado Door 41-N-014, 1-N-015, 41-N-016, & 41-N-109 semi-annual (Semi-annual)
PM041139	Inspection and Maintenance of Overhead Doors 41-N-005, 131, 133, and 135 (Semi-annual)
PM041150	Inspection and Maintenance of Overhead Doors 41-N-100, 102, and 103 (Semi-annual)
PM045008	Diesel Driven Firewater Pump 45-G-602 (A)

Attachment 2 – Typical Fire Protection IT&M Procedures

Typical Fire Protection IT&M Procedures

PM Number	Title
PM045009	Diesel Driven Fire Pump 45-G-602 (Q)
PM045010	Diesel Fire Pump Batteries
PM045011	Electric Fire Pump 45-G-601 (A)
PM045075	Rescue & Safety Purified Air Compressor
PM074084	Underground Rescue Vehicle 74-Q-014
PM074117	Annual Maintenance and Inspection of U/G Ambulance
PM075068	Surface Fire Truck 75-Q-003
PM075013	Quarterly Inspection and Maintenance of Ambulance 75-Q-010
PM075033	Rescue Truck 75-Q-004 (M)
PM075034	Rescue Truck 75-Q-004 (A)
PM075036	Rescue Truck 75-Q-004 (Q)
PM075037	Seagraves Fire Truck (M)
PM075038	Seagrave Fire Truck 75-Q-007 (Q)
PM075039	Seagrave Fire Truck 75-Q-007 (A)
PM451001	Fire Damper Inspection
PM451002	Fire Damper Inspection
PM486001	Engineering Building Fire Damper Inspection
PM486002	Internal Mechanical Inspections at Sprinkler System Risers Limited Conditions for Operations (LCO) (5-Yr)
PM534001	Cleaning, Inspection and Testing of Fire Alarm Panel 534-FP-00601
PM534002	Cleaning, Inspection and Testing of Fire Alarm Panel 534-FP-0320
PM534004	Cleaning, Inspection and Testing of Fire Panel 534-FP-14002
PM534008	Cleaning, Inspection and Testing of Fire Alarm Panel 534-FP-0315
WP 04-FP1201	Site Fire Water Supply System Operations
WP 12-FP0025	Sprinkler System Inspection and Testing
WP 12-FP0026	Weekly Surveillance for Fire Water Supply and Distribution System
WP 12-FP0055	Monthly Surveillance for Fire Suppression System
WP 12-FP0056	Quarterly Surveillance of Fire Suppression System
WP 12-FP0060	Semi Annual Surveillance of Automatic Fire Suppression for Diesel Powered Waste Handling Equipment
WP 12-FP5113	Limiting Conditions for Operation (LCO) Electric Fire Pump Test 45-G-601 LCO
WP 12-FP5114	Limiting Conditions for Operations (LCO) Requirements 45-G-602, Diesel Fire Pump Flow Test

Attachment 3 – Typical Fire Service IT&M

Typical Fire Service IT&M

Equipment to be Inspected	Inspection Frequency	Responsible Organization
Underground (U/G) Fuel Station # 2 dry chemical system/Cafeteria	Monthly/Semiannual	Emergency Services
Self-Contained Breathing Apparatus (SCBA)	Weekly/Monthly	Emergency Services
Compressed breathing air quality	Quarterly	Industrial Safety & Hygiene
Ambulance and surface rescue truck	Weekly	Emergency Services
Services Fire hoses	Annual	Emergency Services
Fire trucks	Weekly/Annual	Emergency Services
Miners first aid stations	Quarterly	Emergency Services
Chemical Extinguishing Systems	Semiannually Annually	Maintenance
Fire extinguishers	Monthly/Annual	Emergency Services

Attachment 4 – Water-Based Fire Protection System IT&M Requirements

Water-Based Fire Protection System IT&M Requirements			
Component	**Action**	**NFPA 25 Requirement**	**NFPA 25 2008 Ref.**
Inspection			
Alarm Valves	Inspection	Monthly	13.4.1.1
Sprinklers	Inspection	Annually	5.2.1
Alarm Valves	Inspection	5 years	13.4.1.2
Alarms - Sprinklers	Inspection	Quarterly	5.2.6
Check Valves (Internal)	Inspection	5 years	13.4.2.1
Control Valves	Inspection	Monthly	Table 13.1
Fire Department Connection	Inspection	Quarterly	13.7.1
Fire Pump	Inspection	Weekly	8.2.2
Fire Pump House	Inspection	Weekly	8.2.2(1)
Gauges	Inspection	Monthly	5.2.4.1
Hangers- Pipe	Inspection	Annually	5.2.3
Hydrants	Inspection	Annually	7.2.2.4
Hydraulic Nameplate	Inspection	Quarterly	5.2.7
Pipe and Fittings	Inspection	Annually	7.2.2.1
Relief Valve - Fire Pump	Inspection	Weekly	8.2.2(2)
Storage Tank - Condition/Exposures	Inspection	Monthly	9.2.1
Storage Tank - Interior	Inspection	3 years	9.2.6
Storage Tank - Level	Inspection	Monthly	9.2.1
Maintenance			
Alarm Valves	Maintenance	Per Mfg's Instructions	13.4.1.3.2
Control Valves	Maintenance	Annually	13.3.4
Fire Pump	Maintenance	Per Mfg's Instructions	8.5.1
Hose/Hydrant Houses	Maintenance	Annually	7.2.2.7
Hydrants	Maintenance	Annually	7.4.2
Sprinkler Piping - Obstruction Investigation	Maintenance	5 years	14.2
Storage Tank - Flush Sediment	Maintenance	Semiannually	9.4.5
Testing			
Alarms - Waterflow	Test	Quarterly/Semiannually	13.2.6
Control Valves	Test	Annually	13.3.3.1
Dry Pipe Valve Trip	Test	Annually	13.4.4.2.2
Fire Pump - Operation	Test	Weekly	8.3.1
Fire Pump - Performance	Test	Annually	8.3.3.1
Hose connections Flow Test -	Test	5 years	6.3.1
Gauges	Test	5 years	5.3.2
Hydrants	Test	Annually	7.3.2

Attachment 4 – Water-Based Fire Protection System IT&M Requirements

Water-Based Fire Protection System IT&M Requirements			
Storage Tank - Low Water Temperature Alarms	Test	Quarterly	9.2.4.2, 9.2.4.3
Flow Test - Distribution System	Test	5 years	7.3.1
Main Drains	Test	Annually	Table 13.1
Sprinklers	Test	50 years then	5.3.1.1.1
Storage Tank - Level Indicators	Test	5 years	9.3.1
Storage Tank - Water Level Alarms	Test	Semiannually	9.3.5

Attachment 5 – Fire Alarms IT&M

Fire Alarms IT&M

NFPA 72 2007 Table 10.3.1 Visual Inspection Frequencies						
	Component	Testing Frequencies				
		Initial/ Reacceptance	Monthly	Quarterly	Semiannually	Annually
1.	**Control Equipment: Fire Alarm Systems Monitored for Alarm, Supervisory, and Trouble Signals**					
(a)	Fuses	X	—	—	—	X
(b)	Interfaced equipment	X	—	—	—	X
(c)	Lamps and LEDs	X	—	—	—	X
(d)	Primary (main) power supply	X	—	—	—	X
5.	**Fire Alarm Control Unit Trouble Signals**	X (weekly)	—	—	X	—
9.	**Initiating Devices**					
(b)	Duct detectors	X	—	—	X	—
(c)	Electromechanical releasing devices	X	—	—	X	—
(d)	Fire extinguishing system(s) or suppression system(s) switches	X	—	—	X	—
(e)	Fire alarm boxes	X	—	—	X	—
(f)	Heat detectors	X	—	—	X	—
(h)	Smoke detectors (excluding one- and two-family dwellings)	X	—	—	X	—
(i)	Supervisory signal devices	X	—	X	—	—
(j)	Waterflow devices	X	—	X	—	—
13.	**Alarm Notification Appliances — Supervised**	X	—	—	X	—
15.	**Supervising Station Fire Alarm Systems — Transmitters**					
(d)	RAT	X	—	—	X	—
17.	**Supervising Station Fire Alarm Systems — Receivers**					

Attachment 5 – Fire Alarms IT&M

Fire Alarms Inspection, Testing, and Maintenance

NFPA 72 2007 Table 10.4.4 Testing Frequencies							
	Component	**Testing Frequencies**					
		Initial/ Reacceptance	**Monthly**	**Quarterly**	**Semiannually**	**Annually**	**Table 10.4.2.2 Reference**
1.	**Control Equipment — Building Systems Connected to Supervising Station**						
(a)	Functions	X	—	—	—	X —	
(b)	Fuses	X	—	—	—	X	—
(c)	Interfaced equipment	X	—	—	—	X	—
(d)	Lamps and LEDs	X	—	—	—	X	—
(e)	Primary (main) power supply	X	—	—	—	X	—
(f)	Transponders	X	—	—	—	X	—
5.	**Batteries — Central Station Facilities**	Central UPS					
(c)	Sealed lead-acid type	X	X	—	—	—	6d
(1)	Charger test (Replace battery within 5 years after manufacture or more frequently as needed.)	—	X	X	—	—	—
(2)	Discharge test (30 minutes)	X	X	—	—	—	—
(3)	Load voltage test	X	X	—	—	—	—
6.	**Batteries — Fire Alarm Systems**						
(a)	Lead-acid type	—	—	—	—	—	6b
(1)	Charger test (Replace battery as needed.)	X	—	—	—	X	—
(2)	Discharge test (30 minutes)	X	—	—	X	—	—
(3)	Load voltage test	X	—	—	X	—	—
(4)	Specific gravity	X	—	—	X	—	—
(d)	Sealed lead-acid type	—	—	—	—	—	6d
(1)	Charger test (Replace battery within 5 years after manufacture or more frequently as needed.)	X	—	—	—	X	—
(2)	Discharge test (30 minutes)	X	—	—	—	X	—
(3)	Load voltage test	X	—	—	X	—	—

Attachment 5 – Fire Alarms IT&M

Fire Alarms Inspection, Testing, and Maintenance							
NFPA 72 2007 Table 10.4.4 Testing Frequencies							
	Component	**Testing Frequencies**					
		Initial/ Reacceptance	**Monthly**	**Quarterly**	**Semiannually**	**Annually**	**Table 10.4.2.2 Reference**
9.	**Control Unit Trouble Signals**	X	—	—	—	X	10
15.	**Initiating Devices**	—	—	—	—	—	14
(a)	Duct detectors	X	—	—	—	X	—
(b)	Electromechanical releasing device	X	—	—	—	X	—
(c)	Fire extinguishing system(s) or suppression system(s) switches	X	—	—	—	X	—
(d)	Fire–gas and other detectors	X	—	—	—	X	—
(e)	Heat detectors (The requirements of 10.4.4.4 shall apply.)	X	—	—	—	X	—
(f)	Fire alarm boxes	X	—	—	—	X	—
(g)	Radiant energy fire detectors	X	—	—	X	—	—
(h)	System smoke detectors — functional test	X	—	—	—	X	—
(i)	Smoke detectors — sensitivity testing in other than one- and two-family dwellings (The requirements of 10.4.4.2 shall apply.)	—	—	—	—	—	—
(m)	Waterflow devices	X	—	—	X	—	—
(n)	Valve supervisory switches	X	—	—	X	—	—
20.	**Alarm Notification Appliances —**	—	—	—	—	15	
(a)	Audible devices	X	—	—	—	X	—
(b)	Audible textual notification appliances	X	—	—	—	X	—
(c)	Visible devices	X	—	—	—	X	—
23.	**Supervising Station Fire Alarm Systems — Transmitters**	—	—	—	—	—	18
(d)	RAT	X	—	—	—	X	—
25.	**Supervising Station Fire Alarm Systems — Receivers**	—	—	—	—	—	19
(f)	RARSR	X	X	—	—	—	—

Attachment 6 – Fire Barriers and Doors

Fire Barriers and Doors						
LOCATION			FIRE RATING	Dwg. #	Associated Fire Door #	FIRE RATING
BLDG. NO.	RM. NO.	Title				
411	113	Air lock perimeter	2 hr.	41-E-003-014 Rev. 4	136, 137	1 1/2 hr.
411	105	Stair No. 1 enclosure	1 hr.	41-E-003-014 Rev. 4	121	3/4 hr.
411	106	Air lock perimeter	2 hr.	41-E-003-014 Rev. 4	123	1 1/2 hr.
411	107	S. & E. walls of air lock	2 hr.	41-E-003-014 Rev. 4	124	1 1/2 hr.
411	103	N. wall of CH area	2 hr.	41-E-003-014 Rev. 4	n/a	n/a
411	114	W. wall of Corridor	2 hr.	41-E-003-014 Rev. 4	n/a	n/a
411	n/a	Elevator shaft enclosure	1 hr.	41-E-003-014 Rev. 4	n/a	n/a
411	119	Stair No. 2 enclosure	1 hr.	41-E-018-014 Rev. 4	214	3/4 hr.
411	119	Stair No. 2 enclosure	1 hr.	41-E-005-014 Rev. 4	143	1 1/2 hr.
411	204	N. & W. walls of room	1 hr.	41-E-006-014 Rev. 4	207	3/4 hr.
411	105	Stair No. 1 enclosure	1 hr.	41-E-006-014 Rev. 4	201	3/4 hr.
412	102	N. wall Maintenance Stations	2 hr.	41-E-600-021 Rev. K	n/a	n/a
413	105	N, E, & W. walls of filter chamber	1 hr.	41-E-008-019 Rev. 3	6, 7, 8	3/4 hr.
451	160	N. wall of corridor	1 hr.	45-E-201-014 Rev. 4	11, 12, 13	3/4 hr.
451	103	Stair No. 1 enclosure	1 hr.	45-E-205-014 Rev. 3	29	1 hr.
451	116	N. & W. walls of room	1 hr.	45-E-205-014 Rev. 3	44	1 hr.
451	n/a	Elevator shaft enclosure	1 hr.	45-E-205-014 Rev. 3	n/a	n/a
451	115	Stair No. 2 enclosure	1 hr.	45-E-205-014 Rev. 3	n/a	n/a
451	103	Stair No. 1 enclosure	1 hr.	45-E-205-014 Rev. 3	101	3/4 hr.

Attachment 6 – Fire Barriers and Doors

Fire Barriers and Doors						
LOCATION			FIRE RATING	Dwg. #	Associated Fire Door #	FIRE RATING
BLDG. NO.	RM. NO.	Title				
451	n/a	Elevator shaft enclosure	1 hr.	45-E-206-014 Rev. 3	n/a	n/a
451	240	S. & W. walls of room	2 hr.	45-E-206-014 Rev. 3	161	3/4 hr.
451	231	Perimeter of room	2 hr.	45-E-206-014 Rev. 3	n/a	n/a
451	230	W. wall of room	2 hr.	45-E-206-014 Rev. 3	135	1 1/2 hr.
451	229	S. & W. wall of room	2 hr.	45-E-206-014 Rev. 3	127	1 1/2 hr.
451	234	Perimeter of room	2 hr.	45-E-206-014 Rev. 3	133, 159	1 1/2 hr.
451	115	Stair No. 2 enclosure	1 hr.	45-E-206-014 Rev. 3	126	3/4 hr.
451	226	N. & W. walls of room	1 hr.	45-E-206-014 Rev. 3	125, 160	3/4 hr, 1 1/2 hr.
452	115	Stair No. 2 enclosure	1 hr.	CMA A-1	3, 31, 32	1 1/2 hr, 1 1/2 hr, 3/4 hr.
452	202	Perimeter of room	1 hr.	CMA A-1	36	1 1/2 hr.
459		Center Dividing Wall	2 hr.	45-D-010-W		2 hr.
486	116	Perimeter of room	2 hr.	A-1	24	1 1/2 hr.
486	124	Perimeter of room	2 hr.	A-1	30	1 1/2 hr.
486	125	Perimeter of room	2 hr.	A-1	29, 40	1 1/2 hr, 3/4 hr.
486	135	Support beams	1 hr.	A-1	n/a	n/a
489	102	S. wall of room	1 hr.	ACA 9492-A-1	7, 8, 9	20 min.
489	108	Perimeter of corridor	1 hr.	ACA 9492-A-1	10, 11, 12, 13, 14, 15, 17, 18	20 min.
489	120	Perimeter of corridor	1 hr.	ACA 9492-A-2	24, 25	20 min.
489	121	Perimeter of corridor	1 hr.	ACA 9492-A-3	26, 27, 28, 29, 30	20 min.