TEMPORARY CHANGE REQUEST

TCR NO. *TCR-ESHD5008-Sect 5,Chapt 3,R3-002*

The Temporary Change Request (TCR) Form is to be used to process urgent or minor changes for PPPL Policies, Organization/Mission Statements and Procedures. The TCR should be used when changes are:
1) urgent, and can not wait the 2-4 week period for Department Head review/comment, or
2) minor, and do not warrant Department Head review.

Person Requesting Change: R. Jeanes

Department Name: ES&H and Infrastructure Support

Document Number: ESHD5008 Section 5, Chapter 3 **Revision No.:** 3

Document Title: ESHD5008 Section 5, Chapter 3 " Fire Protection Engineering "

Reason for change:

To allow alternate fire safety measures.

Change description: (Summarize and attach changed pages, with changes clearly indicated)

Replace TCR-ESHD5008-Sect 5, Chapt 3-R3-001 with TCR-ESHD5008-Sect 5, Chapt 3-R3-002.

The following sentence is added to Paragraph 3.13.
"Deviation from the Fire Protection Practices detailed below will require the written approval of the Fire Protection engineer and the applicable Department Head."

1. Does this TCR significantly alter the intent or scope of the document? **YES:**___ **NO:** X

2. Does this TCR significantly impact **ES&H**? **YES:**___ **NO:** X

If 1 or 2 is **YES**, Explain why the changes should not be routed for Department Head review:

_____

Jerry Levine **1/3/02**
Department/Division Head Approval (SRC Chairperson) **Date**

J.W. Anderson **1/3/02**
Head, ES&H and Infrastructure Support/designee **Date**

Release/Effective date of this TCR: **1/3/02**

Incorporate this TCR into next revision of this document? **Yes-** X **No-**____

3.1 FIRE PROTECTION CRITERIA and REQUIREMENTS

3.1.1 The following documents are the baseline criteria of the Fire Protection Program. The Program shall be administered to provide and maintain compliance with these requirements as a minimum. The fire protection related codes and standards in effect when facility design commences (code of record) shall remain in effect for the life of the facility.

3.1.2 When substantial upgrades or modifications are made, the current edition of the code shall apply to the upgrade or modification. Also, if there is a significant hazard that endangers building occupants, the public, or the environment, the facility shall be upgraded to the requirements of the current edition of the code or standard.

A. DOE Order 420.1, “Facility Safety”

B. DOE Order 440.1, “Worker Protection Management For Doe Federal And Contractor Employees”

C. DOE Order 470.1, “Safeguards and Security Program”

D. DOE Standard 1066, “Fire Protection Design Criteria”

E. DOE Standard 1088, “Fire Protection for Relocatable Structures”

F. National Fire Protection Association Codes and Standards

G. Title 29, Code of Federal Regulations 1910 and 1926

H. BOCA National Building Code

I. BOCA National Fire Prevention Code

J. State of New Jersey, Uniform Fire Code

K. PPPL Policies and Procedures

3.2 TECHNICAL LIBRARY

3.2.1 Items A, B, C, D, E, G, and K are available on the World Wide Web.

3.2.2 The Fire Protection Engineer shall maintain the other standards listed in paragraph 3.1 above plus other reference material, as necessary.

3.3 FIRE PROTECTION DESIGN REVIEW

3.3.1 Fire Protection review and approval by the M&O Fire Protection Engineer is required for the following:

A. Facility Additions

B. Facility Modifications such as relocating walls which could impact detection or suppression systems.

C. Facility Modifications which impact egress such as changes to doors, aisles or walls.

D. Changes of occupancy which could change the hazard classification of the area. For example, changing a room from office use to storage use.

E. Any change to a fire system.

3.4 DESIGN SPECIFICATIONS

3.4.1 All fire-protection designs shall use state-of-the-art equipment that has been tested by a nationally recognized testing laboratory for its intended use. All equipment components shall be compatible with existing equipment and installed as required by the applicable NFPA Codes and Standards.

3.4.2 New or modified fire system shall be tested to verify the systems perform as required. Test results shall be documented and any deficiencies shall be noted and corrected.

3.5 PROPERTY LOSS LIMITATION

3.5.1 DOE Criteria for limiting property loss are found in the Implementation Guide for use with DOE Orders 420.1 and 440.1, Fire Safety Program. Those criteria are summarized below:

A. Facilities having over 5,000 square feet and an MPFL of ≥ $1 Million are protected by automatic suppression.

B. Facilities having an MPFL > $50 Million are protected by redundant fire protection systems.

3.5.2 PPPL further limits property loss through a defense in depth fire protection program. The elements of this program are:

A. Fire Prevention.

B. Early Fire Detection systems in areas of high value or high programmatic importance.

C. Fire Suppression by automatic sprinkler systems throughout the Laboratory except for areas that have been specifically considered and exempted as being inappropriate for sprinkler protection.

D. Fire Suppression by other automatic systems, as appropriate.

E. Full Time Fire Department.

F. Rated Fire Barriers.

3.6 EQUIPMENT PROCUREMENT APPROVAL

3.6.1 All equipment procured for fire protection application shall be tested or approved for its intended use by a nationally recognized laboratory. The M&O FPE shall approve all purchase requisitions for fire protection equipment, except exact replacement items.

3.7 FIRE PROTECTION SYSTEMS TESTING/INSPECTION/MAINTENANCE

3.7.1 The fire protection systems shall be inspected/tested/maintained in accordance with the applicable NFPA Standards, ENG-026, and M&O Procedures

3.8 MAINTENANCE PRIORITY

3.8.1 The head of the M&O Division is responsible for assigning appropriate priority to the maintenance of fire systems.

3.8.2 The M&O Fire Protection Engineer is responsible to keep the M&O Division Head appraised of the status of fire systems and of any needs for priority maintenance.

3.9 through 3.12 Paragraphs Deleted

3.13 FIRE PREVENTION PRACTICES

Deviation from the Fire Protection Practices detailed below will require the written approval of the Fire Protection engineer and the applicable Department Head. TCR-ESHD5008-Sect 5,Chapt 3,R3-002

3.13.1 Fire Watch Requirements

A. Fire watches for welding, cutting, grinding, or open flame activity shall be performed per the "Cutting, Welding, and Open Flame Work" practice.

B. When automatic fire suppression or alarm systems are installed but are out of service, and the affected area is unattended, management shall ensure that a fire watch is initiated. The frequency of tours will depend on the value and programmatic importance of the area, the availability of additional automatic systems to provide detection or suppression and the probability of ignition. The frequency will be established by the Fire Protection Engineer in consultation with Site Protection. Typically, fire watch frequency will be:

a) Continuous for permitted open flame work per paragraph 3.13.3.

b) Continuous for very important areas with no automatic detection or suppression.

c) Continuous when an alarm or sprinkler system required for life safety is out of service for more than 4 hours and the building continues to be occupied.

d) Once every two hours for areas other than in a) above which have no automatic alarm capability.

C. The fire watch shall:

1. Understand the specific nature of the impairment and the area affected.

2. Be a roving watch and cover all areas affected by the impairment.

3. Understand the appropriate emergency actions such as: sounding an alarm, manually tripping suppression systems and using portable extinguishers, as appropriate.

4. Have been instructed in the frequency of the fire watch tours.

5. Have received portable fire extinguisher training (including actual fire extinguishment).

6. Maintain a record of fire watch service completed.

3.13.2 Portable Space Heaters

A. Portable space heaters shall be used in a safe manner.

B. Management shall ensure that:

1. Electrical circuits are not overloaded by portable heaters.

2. Manufacturer's recommendations are observed for the following.

a) Adequate clearance to combustible furnishings, surfaces, or materials.

b) Adequate ventilation for fuel fired heaters to prevent products of combustion buildup and to maintain stable flame quality.

3. Heaters are Underwriters Laboratories (UL) listed or American Gas Association (AGA) certified.

4. Fuel for heaters is stored and handled in accordance with the requirements of 3.13.5, "Flammable and Combustible Liquids."

5. Fuel fired heaters are located outside and heat is ducted indoors, unless otherwise approved by the M&O FPE.

6. Indoor use of liquid petroleum gas fired heaters is temporary and only under the following conditions:

a) In buildings under construction or undergoing repairs or modifications.

b) As temporary heat in noncombustible industrial occupancies.

c) In other buildings for temporary emergency heating purposes as necessary to prevent damage to the building or contents, and a fire watch is provided.

7. Portable electric heaters are equipped with tip-over protection, which automatically shuts off the unit when the unit is tipped from its upright position.

3.13.3 Cutting, Welding, and Open Flame Work

A. Cutting and welding with electric arcs, oxygen-fuel gas flames and other forms of hot work such as open flames, grinding, or brazing activities shall be conducted in a safe manner.

B. This type of work shall comply with NFPA 51B, "Fire Prevention in Use of Cutting and Welding Processes," and the applicable Compressed Gas Association publications.

C. Management and craft supervisors shall ensure that:

1. Cutting and welding are done by authorized personnel in designated cutting and welding areas (shops), to the greatest extent practical.

2. Adequate ventilation is provided for all cutting and welding work.

3. Torches, regulators, pressure-reducing valves, and manifolds are Underwriters Laboratory listed or Factory Mutual approved.

4. Oxygen-fuel gas systems (e.g., oxygen/acetylene welders) are equipped with listed and/or approved backflow valves and pressure-relief devices.

5. Eye protection and protective clothing are worn by all cutters and welders, helpers, and fire watches, as appropriate. Workers adjacent to arc welding areas are protected from the rays by screens or shields. In the event that combustible clothing must be worn for radiation contamination control, continuous observation by a fire watch with suitable fire extinguishing equipment will be required.

6. When cutting and welding are done outside of designated areas, the following actions are performed.

   a) A Hot Flame Permit (issued and tracked by ESU) is completed for each shift.

   b) A continuous fire watch is maintained by instructed employees in accordance with 3.13.1.

   c) A member of supervision (i.e., craft supervisor) inspects the job site at least once before the start of each job and at least once every 24 hours until the completion of the job.

   d) A craft supervisor determines the best locations for the fire watch and verifies that automatic fire protection is in service, that precautions taken are adequate, and that information on the Permit is correct.

   e) Combustible materials, equipment, or building surfaces within 20 feet of the work or below the work must be either covered with fire-resistant welding blankets, moved, or wetted down. Openings in ducts, tanks, or other confined spaces within 20 feet of the work are also covered or plugged. Fire-resistant welding blankets are used for electric arc operations instead of wetting the work down.

7. Cutting or welding is prohibited in the following situations.

   a) In sprinklered areas while sprinkler protection is out-of-service.

   b) In explosive atmospheres of gases, vapors, or dusts or where explosive atmospheres could develop from residues or accumulations in confined spaces (see 8).

   c) On metal walls, ceilings, or roofs built of combustible sandwich-type panel construction or having combustible covering.

8. Confined spaces such as tanks are tested to ensure that the atmosphere is not in excess of 10% of the lower flammable limit prior to cutting or welding in or on the tank. Tests are repeated as conditions warrant, once each shift as a minimum. Mechanical ventilation is continuous when cutting or welding in or on a confined space.

9. When cutting or welding must be done on small tanks, piping, or containers that cannot be entered, they are cleaned, purged, and tested prior to starting the work. For work on combustible liquid or gas piping or tanks, intermittent testing is done during the work and a Job Safety Analysis is provided.

10. The long-term use of oxygen/acetylene welding carts should be done judiciously. If welding carts are not being used frequently (i.e., on the average of once per week), the oxygen and acetylene cylinders are to be removed from the cart and properly segregated and stored.

3.13.4 Maintenance for Ventilation, Exhaust & Blower Systems

A. Ventilation, exhaust & blower systems shall be maintained in a safe manner.

B. Ventilation, exhaust & blower systems consist of ventilation systems (including intake and exhaust openings, plenums, etc.) for change-rooms, exhaust and blower systems in laboratories, paint booths, metal and woodworking areas, and other similar areas where flammable/combustible vapors, residues, lint, and/or fibers may accumulate.

C. Management shall ensure that:

1. Compliance with the applicable sections of the following NFPA Standards is met:

a) NFPA 90A, "Installation of Air Conditioning and Ventilating Systems"

b) NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems"

c) NFPA 91, "Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying"

d) NFPA 96, "Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment"

NOTE: Ducts with known radiological contamination are excluded from this standard, except where the potential fire hazard is severe. Fire Protection requirements for HEPA filtration systems are provided in the "Fire Protection Criteria for Containment Ventilation Filter Plenum Systems" located in the DOE Fire Protection Resource Manual.

2. All building ventilation, exhaust, and blower systems where flammable/combustible vapors, residues, lint, and/or fibers accumulate are identified and documented.

3. All systems identified in item 2, are included in a minimum, annual preventive maintenance (PM) program. The frequency must be increased when conditions warrant.

4. The PM includes an inspection of all components of the systems and is documented for auditing purposes.

5. The PM includes but is not limited to cleaning grill plates, replacing filter media if design permits, and removing any buildup of foreign material from the duct interior if conditions warrant.

6. A list of all systems, identified in item 2, above, is forwarded to Fire Protection.

3.13.5 Flammable & Combustible Liquids

A. The use, storage, and handling of flammable/combustible liquids shall be accomplished in a safe manner.

B. Flammable/combustible liquids are classified as follows.

1. Flammable Liquid. A liquid having a flash point below 100°F (37.8°C) is known as Class I liquid.

Class I liquids are subdivided as follows.

a) Class IA liquids include those having flash points below 73°F (22.8°C) and having a boiling point below 100°F (37.8°C).

b) Class IB liquids include those having flash points below 73°F (22.8°C) and having a boiling point at or above 100°F (37.8°C).

c) Class IC liquids include those having flash points at or above 73°F (22.8°C) but below 100°F (37.8°C).

2. Combustible Liquid. A liquid having a flash point at or above 100°F (37.8°C).

Combustible liquids are subdivided as follows.

a) Class II liquids include those having flash points at or above 100°F (37.8°C) and below 140°F (60°C).

b) Class IIIA liquids include those having flash points at or above 140°F (60°C) and below 200°F (93°C).

c) Class IIIB liquids include those having flash points at or above 200°F (93°C).

C. Management shall ensure that:

1. The requirements of the following are met:

a) NFPA 30, "Flammable and Combustible Liquids Code,"

b) NFPA 45, "Fire Protection for Laboratories Using Chemicals,"

c) NFPA 395, "Storage of Flammable and Combustible Liquids on Farms and Isolated Sites."

d) Occupational Safety and Health Administration (OSHA), 29 CFR 1910.106, "Flammable and Combustible Liquids"

2. The following general requirements are met:

a) Whenever possible, an environmentally benign, non-flammable liquid is substituted for a flammable liquid.

b) Minimum quantities are in the workplace. No more than a weeks supply.

c) Users of flammable/combustible liquids are familiar with the hazard classification of the material they are using.

d) Proper ventilation is in place before using flammable liquids.

e) Sources of ignition (sparks, open flame, hot surfaces, etc.) have been eliminated. Since flammable liquid fumes are heavier than air, they may "travel" to ignition sources.

f) Combustible waste and residue is stored in a listed, closed, metal, waste container, and is disposed of daily into a satellite accumulation area.

g) Unneeded and waste flammable liquids are turned over to the Hazardous Waste Management Group for disposal.

h) Gasoline shall be stored in approved containers (less than two gallons) and in areas approved by the M&O FPE.

3. The following use/handling requirements are met:

   a) Containers, for the handling and use of flammable materials in the workplace, are limited to:

      i. End -use containers that are one gallon or smaller, and

      ii. Containers listed by Underwriters Laboratory, Factory Mutual, or another nationally recognized testing laboratory (See iv.*, for exception), and

      iii. Of the "plunger" type, or

      iv. Squeeze bottles* not exceeding one liter.

      * Squeeze bottles are not recommended for flammable liquids and shall only be used in those cases where the work cannot be accomplished using listed containers.

4. The following storage requirements are met:

   a) Not more than one liter of flammable/combustible liquid may be stored in a single fire zone outside of an approved flammable liquid storage cabinet, and

   b) Storage in flammable liquid storage cabinets is limited to not more than 120 gallons of Class I, II, and IIIA liquids. Of this total, not more than 60 gallons may be of Class I and II liquids, and

   c) When flammable liquid storage cabinets are used, not more than three cabinets may be stored in a single fire zone. In industrial facilities, additional cabinets (limited to a maximum group of three) may be stored in the same fire area, provided the groups of cabinets are separated by 100 feet, and

   d) When flammable liquid storage cabinets are used, the vent openings are sealed with properly fitted metal bungs; or when the cabinets are required to be vented, they must be vented to the outside, and

   e) When storage quantities exceed that permitted in ii, iii, or iv, the liquids are stored in rooms or facilities complying with NFPA 30, and OSHA, 29 CFR 1910.106, and

   f) All flammable/combustible liquids (except Class IIIB) in nuclear facilities shall be stored in approved flammable liquid storage cabinets or rooms/buildings complying with NFPA 30 and 29 CFR 1910.106 (This requirement does not apply to laboratories), and

   g) Class IA and IB liquids may be stored in glass containers of not more than 1 gallon, if required for liquid purity or to avoid excessive corrosion of metal containers, and

   h) The storage of liquids does not obstruct corridors, aisles, or exit doors, and liquids are not stored in exit enclosures (e.g., stairwells), and

   i) Outdoor storage requirements comply with NFPA 30 and 29 CFR 1910, and

   j) Inside storage rooms comply with NFPA 30 and 29 CFR 1910.106, and

k) Storage areas, for the purpose of dispensing shall be limited to C- and D- Sites, comply with 5, and be determined by the Waste Minimization Task Force. A Single individual will be assigned primary responsibility for each dispensing location.

5. The following dispensing requirements are met:

a) Dispensing shall be permitted in designated dispensing areas only; and

b) When dispensing from drums, the drums are equipped with Underwriters Laboratories, Inc.- (UL) listed or Factory Mutual- (FM) approved dispensing devices; and

c) When transferring liquids between conductive containers, the containers are bonded with a wire. The bonding wire or one of the containers must be grounded; and

d) When transferring Class I liquids in laboratories from containers of less than 5 gallon capacity, the transfer is made in one of the following manners:

i. With the use of a laboratory fume hood; or

ii. In an area provided with ventilation to prevent the accumulation of a flammable vapor/air mixture exceeding 25% of the lower flammable limit; or

e) When transferring Class I liquids in laboratories from containers of 5 gallon capacity or more, the transfer is made in one of the following manners:

i. From a separate area outside the building; or

ii. In a separate, inside storage room that complies with the requirements of NFPA 30 and 29 CFR 1910.106; and

f) In non-laboratory areas, mechanical ventilation is provided which meets the following criteria, when transferring Class I liquids;

i. The ventilation flow rate must be 1 $ft^3/min/ft^2$ of floor area but in no case less than 150 ft^3/min.

ii. The intake and exhaust points must be within 12 inches of the floor and positioned at opposite sides or ends of the room.

iii. A flow monitor or equivalent mechanism must be provided so an audible alarm will sound if the ventilation system fails.

3.13.6 Employee Training

A. Scope

1. Management shall ensure that:

a) All employees receive basic fire prevention training which includes the following items as a minimum:

i. Good housekeeping practices.

ii. Proper response/notification in the event of a fire.

iii. Instruction on the use of portable fire extinguishers.

iv. Recognition of potential fire hazards.

b) Employees who perform fire watches receive hands-on portable fire extinguisher training.

c) All training is documented for auditing purposes.

3.13.7 Control of Combustibles

A. Combustible materials shall be limited to quantities that are as low as practical.

B. Management shall ensure that:

1. The applicable sections of NFPA 1, "Fire Prevention Code" are met.

2. Housekeeping inspections are performed monthly in their facilities to ensure equipment and materials are maintained in an orderly arrangement at all times.

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

4. Combustible materials are limited to the quantity required for current needs, and are separated from ignition sources.

5. Workroom floors are maintained clean and dry to the extent practicable.

6. Noncombustible or fire retardant materials are used whenever possible.

7. Combustible waste is collected in metal containers and provided with lids. (Lids are not required for office waste cans.)

8. Combustible waste does not accumulate inside or adjacent to buildings.

9. In nuclear facilities, wood, plastic, and paper materials are strictly limited for uses that are essential to the operation of the facilities, and which do not have a noncombustible substitute.

10. Nuclear facilities shall develop and implement a combustible materials tracking program that includes review and approval for all changes in the combustible loading by a fire protection engineer.

3.13.8 Compressed Gas Cylinders

A. The storage, transportation, identification, and use of compressed gas cylinders shall be accomplished in a safe manner.

B. The design, use, and storage of compressed gas cylinders and systems shall comply with the following standards as applicable:

1. NFPA 50, "Bulk Oxygen Systems at Consumer Sites"

2. NFPA 50A, "Gaseous Hydrogen Systems at Consumer Sites"

3. NFPA 50B, "Liquefied Hydrogen Systems at Consumer Sites"

4. NFPA 51, "Design and Installation of Oxygen-Fuel Gas Systems for Welding Cutting and Allied Processes"

5. NFPA 51B, "Cutting and Welding Processes"

6. NFPA 52, "Compressed Natural Gas Vehicular Fuel Systems"

7. NFPA 54, "National Fuel Gas Code"

8. NFPA 55, "Storage, Use and Handling of Compressed and Liquified Gases in Portable Cylinders"

9. NFPA 58, "Liquefied Petroleum Gas Code"

10. NFPA 59, "Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants"

11. NFPA 59A, "Production, Storage and Handling of Liquefied Natural Gas"

12. Occupational Safety and Health Administration (OSHA), 29 CFR 1910.166 to 1910.169, "Compressed Gas and Compressed Air Equipment"

13. Occupational Safety and Health Administration (OSHA), 29 CFR 1910.101, "Compressed gases (general requirements)"

14. Occupational Safety and Health Administration (OSHA), 29 CFR 1910.102, "Acetylene"

15. Occupational Safety and Health Administration (OSHA), 29 CFR 1910.103, "Hydrogen"

16. Occupational Safety and Health Administration (OSHA), 29 CFR 1910.104, "Oxygen"

17. Compressed Gas Association Publications

C. Management shall ensure that:

1. Cylinders in transit or storage are provided with protective valve caps and secured in the upright position.

2. All storage areas are clearly identified.

3. The storage of compressed gas cylinders within buildings shall be limited to the quantity required for daily operations unless additional quantities are permitted by the applicable NFPA Standard.

4. Containers when stored inside shall not be located near exits, stairways, or in areas normally used or intended for the safe exit of people.

5. The storage of compressed gas cylinders outside of buildings shall be in accordance with the applicable NFPA Standard.

6. Flammable and oxidizing compressed gas cylinders are separated by 20 feet or with a minimum five foot high, 30 minute fire-rated wall.

7. Empty and full gas cylinders are segregated, and empty cylinders are tagged "empty."

8. Compressed gas cylinders are not exposed to temperatures above 125°F and are protected from direct sun and weather elements.

9. Compressed gas cylinders are identified regarding their contents; they are free of defects and are within their hydrostatic test date.

10. Gases are not mixed or transferred from one compressed gas cylinder to another and are refilled only by trained personnel.

11. Cylinders are not lifted by magnetic devices or by their protective caps. They must be secured to a cradle or platform and never dragged, dropped, or struck.

12. Compressed gas cylinders do not come in contact with electrical circuits, open flames, or arcs.

13. Compressed gas cylinders are not used for any purpose other than compressed gas containment.

14. Gas is not used from compressed gas cylinders without approved pressure reducing regulators.

15. Connecting devices are free of oil, grease, and dirt and have threads corresponding to the cylinder valve.

16. Valves must be closed when cylinders are transported, moved at sites, and when connecting for use.

17. All devices used on compressed gas cylinders comply with the American National Standards Institute and Compressed Gas Association Standards C-4 and V-1.

18. All compressed gas manifolds are designed in accordance with the applicable NFPA Standard.

19. Personnel who use compressed gas cylinders are trained in accordance with the Office of Training and Certification requirements.

3.13.9 Smoking Policy

A. Smoking is not allowed inside Laboratory facilities.

B. Management shall ensure that smoking is prohibited in the following areas:

1. All government vehicles.

2. Near hazardous or toxic materials.

C. Areas where smoking is permitted shall be designated.

3.13.10 Construction Sites

For special fire protection requirements for construction sites, see Section 1.

3.14 FIRE PROTECTION PRACTICES

3.14.1 Portable Fire Extinguishers

A. To provide for incipient stage fire fighting, PPPL facilities shall be provided with portable fire extinguishers installed, tested, and maintained in accordance with NFPA 10, “Portable Fire Extinguishers.”

1. Extinguishers installed in facilities are for emergency use in the area where installed and shall not be removed except for use on actual fires. Extinguishers for Hot Flame Permits shall be provided by the group requesting the Hot Flame Permit.

2. Wheeled Fire extinguishers are for use by the ESU or those individuals that have received appropriate training.

B. Management shall ensure that:

1. The location and type of portable fire extinguisher are in accordance with the requirements of NFPA 10. The relocation or installation of any portable fire extinguisher must be approved by M&O FPE.

2. New portable fire extinguishers are approved by the M&O FPE prior to purchase.

3. Portable fire extinguishers are inspected, maintained and tested in accordance with M&O Maintenance Procedures.

   a) The inspection, testing, and maintenance of the fire extinguishers discussed in 3.14.1, A shall be the responsibility of the ESU.

   b) The inspection, maintenance, testing of fire extinguishers on lift trucks, welding carts and others not covered in a) above shall be the responsibility of the actual owners/users.

   c) All fire extinguishers shall be on the M&O PM program.

4. Portable fire extinguishers are conspicuously marked and identified.

   a) The markings shall include “Picture-Grams” as found in Appendix F of NFPA 10.

5. Portable fire extinguishers are safely secured by one of the following methods:

   a) On hangers or in cabinets

   b) They are of the wheeled type

   c) Extinguishers associated with Hot Flame Permits may be set on the floor.

   d) Portable fire extinguishers that are provided for vehicles are mounted or secured to prevent physical damage to the portable fire extinguisher and injury to passengers.

7. Portable fire extinguishers are not obstructed or obscured from view, with clear access to the portable fire extinguisher maintained.

8. Immediate corrective action is taken for portable fire extinguishers identified as having a deficiency (e.g., empty, not mounted or missing, broken seal, etc.).

9. New employees will receive fire extinguisher training upon initial employment through the General Employee Training Program provided by the Office of Certification and Training. This training shall permit them to recognize, identify and use a fire extinguisher. Thereafter, employees will be given a documented refresher every two years.

10. Employees who are expected to use a fire extinguisher, such as those who will act as a fire watch for Hot Flame Permits, will receive additional training which includes live-fire extinguishment. This training shall be renewed annually.

3.14.2 Non Emergency Use of Fire Hydrants

A. To provide assurances that the water supply and fire hydrants are available in an emergency, management shall ensure the following:

1. Prior permission is obtained from the ESU, the ER/WM Environmental Compliance Manager and the M&O FPE prior to non-emergency use of fire hydrants.

2. The hydrant user installs one valve on each of the ports on the fire hydrant being used. The steamer port is reserved for use by the ESU.

3. The user provides and uses only approved fire hydrant wrenches when opening or closing a fire hydrant (i.e., no pipe wrenches are to be used).

4. The user keeps the fire hydrant in a fully opened or fully closed configuration.

5. An approved portable backflow device or air gap is used to protect the potable water system from potential backflow conditions, where water for purposes such as flushing drains, filling tankers, etc., is drawn from a fire hydrant that is connected to a potable water system.

6. Special precautions are taken during freezing weather conditions to prevent fire hydrant damage. The fire hydrant and any attached hoses are not left pressurized in a non-flowing condition for an extended length of time.

3.14.3 Maintenance of "Means of Egress"

A. Means of egress shall be maintained in accordance with NFPA 101, "Safety to Life from Fire in Buildings and Structures." Compliance with OSHA 1910, Subpart E, "Means of Egress," is considered satisfied when the requirements of NFPA 101 are met.

B. Management shall ensure that:

1. Every means of egress to an exit is kept clear and unobstructed.

2. Exit doors are not locked against egress and do not require more than one action to open.

3. Exit doors are maintained in good operating condition.

4. Material is not stored in exit stairwells or exit passageways.

5. Emergency lights, exit signs, and other exit marking systems are maintained in good operating condition.

6. Fire doors are not blocked open.

7. Exit discharges including exterior building stairs are kept clean and unobstructed.

8. Radiation barriers (e.g. roped areas, etc.) do not affect egress routes.

9. Security features are in compliance with NFPA 101.

3.14.4 Emergency Lights

A. To provide assurances that battery-operated and emergency generator-operated, emergency-lighting systems will function, management shall ensure:

1. Emergency light systems are installed, maintained, inspected, and tested in accordance with:

a) NFPA 101, “Safety to Life from Fire in Buildings and Structures”

b) NFPA 70, “National Electrical Code”

c) NFPA 110, “Emergency and Standby Power Systems.”

2. All emergency light tests are documented and written records maintained.

3. Emergency lights which are found deficient are repaired within 24 hours, or portable emergency lights are provided at the affected area(s) until the permanent lights are restored to service.

4. Emergency lights are inspected during emergency light tests to verify:

a) Electrical cords are not damaged or frayed

b) Lamps are not cracked or damaged

c) Units are securely mounted

d) Lamps illuminate within 10 seconds of switching to the backup power supply.

e) Battery powered lights operate for at least 90 minutes.

3.14.5 Fire Protection System Impairment

A. To ensure that facilities are operated within their design parameters and to minimize the duration and impact of modifications or unplanned impairments to fire protection systems, management shall ensure that:

1. Fire protection system modifications are reviewed and approved by the M&O FPE.

2. Fire protection system operation is not hindered by storage practices, temporary construction activities, or enclosures.

3. Corrective actions are implemented for all fire protection system impairments.

4. The craft personnel, the ESU, and the necessary engineering support are coordinated to properly and expeditiously restore the fire protection system to service.

5. The ESU and M&O are immediately notified of all fire protection system impairments.

6. Compensatory measures are implemented as required by the M&O FPE until the system is restored.

7. When a fire protection system impairment is identified, the M&O Division, Maintenance Engineering Branch shall initiate corrective actions as soon as possible. Compensatory actions may include, as appropriate, but are not be limited to, the following.

a) Notify the occupants of the building affected by the impairment.

b) Determine when any unsatisfactory housekeeping, storage, or special hazardous conditions need to be corrected.

c) Terminate hazardous operation or maintenance operations and impose "no smoking" regulations until appropriate protection/detection is restored. Cutting, welding, or other "hot work" shall be prohibited until adequate protection is assured.

d) With M&O FPE consultation, determine when the ESU should be present at the facility and/or provide alternate water supplies to the impaired system.

e) As much of the fire protection system shall be maintained in an operable status as possible.

f) Establish a fire watch throughout the area that is affected by the impairment of the fire protection system as required by the M&O FPE.

3.14.6 Fire Protection System Winterization

A. To minimize the impact of cold-weather conditions on fire protection systems/components (sprinkler, deluge, foam systems, smoke detectors, standpipes, etc.) management shall ensure that:

1. A written winterization program is in place for each facility. The program shall require that each facility be inspected annually during the month of October to ensure all areas are adequately winterized. The inspection shall include the following items as a minimum:

a) Condition/operation and adequacy of heating systems, e.g. forced air, radiant heaters, portable heaters, etc.

b) Condition/operation of thermostats and filters.

c) Condition/operation/installation of heat tape systems.

d) Draining of sprinkler system drip lines and fire pump hose headers.

2. Inspection results shall be maintained for two years in a form that is capable of being audited.

3. All areas where fire protection systems are present are provided with sufficient heat and/or noncombustible insulation to prevent freezing and/or equipment damage.

4. Heat tape and portable heaters are used only when no other preventive measures are immediately available. If used, these items must be listed or approved for their intended use.

5. Heat tape and portable heaters are not used as a permanent means of preventing system freezes, and an engineered solution is provided for deficient areas, e.g. forced hot air, fixed radiant heaters, insulation, etc.

3.15 SPECIAL HAZARDS PROTECTION

3.15.1 Temporary Enclosures

A. Temporary enclosures shall be installed and maintained in compliance with NFPA 241, "Safeguarding Construction, Alterations, and Demolition Operations," and

B. Management shall ensure that:

1. Temporary enclosures erected within a facility are not structurally supported by piping for automatic sprinkler systems or other M&O FPE equipment.

2. The enclosure supporting structures are constructed of noncombustible or fire-retardant material which is approved by M&O FPE.

3. The coverings for enclosure walls, ceilings, and floors are of noncombustible or approved fire-retardant materials. Where plastic films are used, only plastic films approved by M&O FPE are used.

4. Deleted.

5. Combustible materials are not stored within the enclosure.

6. Flammable and/or combustible liquids are kept to an absolute minimum and are stored in and dispensed from Underwriters Laboratories (UL) or Factory Mutual (FM) approved safety cans. Flammable or combustible liquid-soaked clothes, rags, or waste are stored in UL or FM approved safety containers.

7. Combustible materials which are used in the enclosure operations (e.g., rags, paper products, etc.) are removed from the enclosure immediately after use or transported and stored in approved metal containers with lids. All combustible waste is removed from the enclosure after each work shift.

8. Exits are kept unobstructed at all times.

9. Cutting, welding, open flame, or grinding are not performed in enclosures without an approved Permit.

10. Portable fire extinguishers are provided and positioned for visibility and easy access.

3.15.2 Computer/Data Acquisition Facilities

A. Computer/data shall comply with the following codes and standards as applicable:

1. NFPA 75, “Standard for the Protection of Electronic Computer/Data Processing Equipment,”

B. Deleted.

C. Management shall ensure that:

1. Deleted.

2. Furniture in computer areas is metal and limited to what is required for efficient operations.

3. Waste containers are noncombustible and listed.

4. Waste containers are emptied daily.

5. Office or computer supplies, forms, stationary, and other combustible supplies are not stored in the computer area.

6. Maintenance operations are not performed in the computer area, except for those repairs made directly to equipment which is impractical to remove from the area.

7. Records and tapes are not stored in the computer area, except those required for daily operations.

8. Records and tapes required for daily operations are stored in closed metal cabinets.

9. Computer areas have an equipment salvage plan in place for the reconditioning of equipment which is exposed to smoke and water.

10. Fire protection features are provided in accordance with NFPA 75.

11. Employees who normally work in computer facilities are familiar with the fire protection systems in their work area.

12. Computer facilities with raised floors are provided with floor lifters which are mounted near the room exit door.

3.15.3 Oxidizing Materials

A. The storage, use, and handling of liquid and solid oxidizing materials (as defined by NFPA 49) shall comply with:

1. NFPA 430, “Storage of Liquid and Solid Oxidizers”

2. NFPA 55, “Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders.”

3. NFPA 49, “Hazardous Chemical Data,” and

B. Management shall ensure that:

1. An emergency plan is in place for facilities storing oxidizing materials.

2. Storage facilities are labeled with the “Class” of oxidizer they contain (reference NFPA 430, “Storage of Liquid and Solid Oxidizers”).

3. Oxidizing material is not stored with noncompatible materials such as ordinary combustibles, flammable/combustible liquids, greases, etc. (This does not apply to approved packaging material.)

4. The total amount of oxidizing material for each “Class” does not exceed two tons in nonsprinklered buildings or four tons in sprinklered buildings.

5. Employees involved in the storage operation receive instruction on handling the material in a safe manner.

6. “No Smoking” signs are posted at the entrance and within the storage building.

7. Any wood construction in storage buildings that may come in contact with oxidizers is protected with a compatible material to prevent the wood from impregnation by the oxidizers.

8. Combustible waste and used or empty containers are not stored with the oxidizing material.

3.15.4 Gloveboxes

A. Gloveboxes and their use shall comply with the Glovebox Fire Protection Criteria located in the DOE Fire Protection Resource Manual, and DOE-STD-1066-97, "Fire Protection Design Criteria"

B. Management shall ensure that:

1. All new gloveboxes and windows are constructed of noncombustible or fire retardant materials.

2. Glovebox gloves are of hypalon or neoprene material.

3. Window size is held to a minimum consistent with good operator vision and maintenance needs.

4. Gloveboxes are equipped with fire protection (reference DOE-STD-1066-97).

5. Only combustibles required for daily operations are permitted in a glovebox.

6. Transient combustibles in gloveboxes are kept in closed metal containers.

7. Combustible waste is removed from gloveboxes daily or placed in closed metal containers.

8. Flammable and combustible liquids used in gloveboxes are stored and dispensed from approved safety cans.

9. Glovebox exhaust filter openings are equipped with fire screens.

10. Heat-producing equipment in gloveboxes (e.g., calciners, hot plates) are equipped with high temperature automatic shut-off devices, safety shut-off valves, or safety tip-over switches.

3.15.5 Explosives

A. Any material classified as an explosive by Title 18, USC, Chapter 40 and the Hazardous Material Regulations of the U.S. Department of Transportation shall be stored, and handled in compliance with the following codes and standards as applicable:

1. NFPA 495, “Explosive Material Code”

2. NFPA 498, “Safe Havens and Interchange Lots for Vehicles Transporting Explosives”

3. 27 CFR, Parts 55 & 181, “Explosive Materials Regulations

4. 49 CFR, Parts 100-199, “Transportation”

5. ATF 5400.7, “Alcohol, Tobacco, and Firearms: Explosives Laws and Regulations”

6. 18 USC 40, “Importation, Manufacture, Distribution, and Storage of Explosive Materials”

NOTE: Charges for Powder Actuated Fastening Devices (Hilti, etc.) are considered as small arms ammunition. As such, handling and use is governed by NFPA 495.

B. Management shall ensure that:

1. The manufacture, storage, and use of explosive materials is prohibited unless it can be done in a safe manner.

2. The safety of the explosive workers, the general public, and the environment in the vicinity of the explosive materials are the primary importance of the operations.

3. Smoking and flame-producing equipment are not permitted in the vicinity where explosive materials are produced, handled, stored, or used.

4. All explosive materials which are not in the process of manufacture, being transported, or in use are kept in a storage magazine.

5. Storage magazines are of the proper construction and are properly located for the type and amount of explosive being stored.

6. The area around storage magazines is kept clear of brush, dry grass, leaves, or similar combustibles for a minimum distance of 25 feet.

7. Combustible materials are not stored within 50 feet of explosive magazines.

8. All electrical equipment utilized near explosive material complies with NFPA 70, "National Electric Code" for "Classified Hazardous Areas."

9. Precautions are taken to prevent accidental detonation of explosives from currents induced by radar and radio transmitters, lightning, adjacent power lines, dust and snow storms, or other sources of extraneous electricity. These precautions shall include:

   a) The posting of signs warning against the use of mobile radio transmitters on all roads within 350 feet of explosive operations, as required.

   b) Tools used in the handling of explosives shall be constructed of non-sparking materials.

   c) All handling of explosive materials shall be discontinued during the approach and progress of an electrical storm. All personnel shall move to a safe location.

   d) Bonding and grounding straps shall be provided for all equipment where explosive materials are processed and handled.

   e) Floorings shall be of non-sparking material.

3.15.6 Transportation of Hazardous Materials

A. The transportation of hazardous materials shall be in compliance with the following codes and regulations as applicable:

1. NFPA 30, "Flammable and Combustible Liquids Code"

2. NFPA 58, "Liquefied Petroleum Gas Code"

3. NFPA 59, "Liquefied Petroleum Gases at Utility Plants"

4. NFPA 59A, "Production, Storage and Handling of Liquefied Natural Gas"

5. NFPA 77, "Static Electricity"

6. NFPA 327, "Cleaning or Safeguarding Small Tanks and Containers Without Entry"

7. NFPA 385, "Tank Vehicles for Flammable and Combustible Liquids"

8. NFPA 386, “Portable Shipping Tanks for Flammable and Combustible Liquids”

9. NFPA 495, “Explosive Materials Code”

10. 10 USC 40, “Importation, Manufacture, Distribution, and Storage of Explosive Materials”

11. 46 CFR, Parts 1-199, “Shipping”

12. 49 CFR, Parts 100-199, “Transportation”

13. 49 CFR, Parts 393, 396, 397, “Transportation”

B. Management shall ensure that:

1. Hazardous materials are transported in compliance with the U.S. Department of Transportation Hazardous Material Regulations. All vehicles and containers used for transportation of hazardous materials are provided with the proper valves, piping, hoses, connectors, pumps, meters, dispensers, regulators, strainers, and emergency venting.

2. Hazardous Materials are not be stored in a vehicle that is not in compliance with the U.S. Department of Transportation Hazardous Material Regulations.

3. During transportation, all:

a) Vehicles and containers used for transportation of any material covered by this Section (regardless of quantity being transported, or whether loaded or empty) are conspicuously and legibly marked in accordance with the requirements of the U.S. Department of Transportation Hazardous Material Regulations.

b) Vehicle drivers are thoroughly trained and licensed in the proper method of operating, loading, and unloading the vehicle.

c) Vehicles are operated only when they are in proper repair, devoid of accumulation of grease, oil, and free of leaks.

d) Material containers used in transportation are chemically compatible with the material being transported.

e) Vehicles, except in an emergency situation, are not parked and left unattended adjacent to any building, street, highway, avenue, or alley, that is not connected with the normal duties of the vehicle.

f) Vehicles used for transporting explosive materials are not exposed to spark producing surfaces on the inside of the transporting body.

g) Explosive materials are not transported through any prohibited vehicular bridge, roadway, or elevated highway.

4. Vehicle Repairs are:

a) Not made unless the repairs can be made without hazard.

b) Not performed in a closed building or with the vehicle loaded or unpurged.

5. During the Loading/unloading process:

   a) Material is not removed from a vehicle unless the parking brake is securely set, wheels blocked as required, and all other reasonable precautions have been taken to prevent motion of the vehicle.

   b) Vehicles are bonded and grounded as required.

6. Vehicles used for transportation of materials covered by this Section are designated as "No Smoking" areas.

7. Vehicles are provided with at least one 20-B:C rated fire extinguisher, or two 10-B:C rated fire extinguishers.

   a) Extinguishers are maintained in good operating condition (see 3.14.1, "Portable Fire Extinguishers") and are located on the vehicle in an accessible location.

3.15.7 Clean Rooms

A. Clean rooms shall be operated and maintained in accordance with:

1. NFPA 318, "Standard for the Protection of Clean Rooms"

2. Factory Mutual Data Sheet, FM 1-56, "Clean Rooms"

3. Factory Mutual Data Sheet, FM 7-7, "Semiconductor Fabrication Facilities."

B. Management shall ensure that:

1. The interior finish of clean rooms has a flame-spread rating of 25 or less and a smoke development of 50 or less in accordance with ASTM E-84.

2. Carpet and flooring used in clean rooms has a minimum, average, critical-radiant flux of 0.25 watts per square centimeter when tested in accordance with ASTM E-648.

3. Clean rooms are constructed of fire-resistive or noncombustible construction and are separated from other occupancies by minimum one hour fire-rated construction.

4. All piping, ductwork, cables, etc., passing through fire-rated construction are fire stopped or wrapped with the appropriate materials for the penetration rating. Fire dampers shall not be installed in exhaust ventilation systems.

5. Clean rooms are subdivided by one hour fire rated partitions into the smallest areas possible to limit damage in the event of fire. Individual clean room areas should not exceed 10,000 square feet.

6. Clean rooms have an engineered smoke-control systems, designed to exhaust 100% air in the fire area and simultaneously provided areas adjacent to the fire area with 100% supply so that at least 0.20 inch water-gauge higher pressure is provided in the adjacent areas.

7. Bench stations handling flammable, combustible, or corrosive materials are provided with ventilation-hood systems.

8. Bench stations and hoods are made of noncombustible materials.

9. Ducting in ventilation systems are made of noncombustible materials or of materials that have a flame spread of 25 or less and smoke development of 50 or less when tested in accordance with UL 181.

10. All electrical equipment and wiring complies with NFPA 70, "National Electrical Code."

11. Sprinkler protection is provided throughout the clean rooms, including under workbenches and under exhaust hood systems.

12. Automatic smoke detection and alarm system are provided throughout clean rooms.

13. Smoke detection is provided on a 200 square foot maximum spacing, due to high airflows associated with clean rooms.

14. Smoke detection sounds internal evacuation alarms, actuates the smoke-control systems, and signals the ESU.

15. Carbon dioxide or sprinkler systems are provided for underfloor spaces over 5,000 cubic feet where the space contains power, communication, or data cables that are not located in approved conduit or metallic tubing.

16. HEPA filters used in clean rooms are UL listed per UL 900.

17. HEPA filters and ducts are inspected frequently, and filters are cleaned or replaced on a regular schedule.

18. HEPA filters are not patched or plugged to improve their efficiency as this action adversely affects their fire resistance.

19. Exiting from clean rooms comply with NFPA 101, "Safety to Life from Fire in Buildings and Structures."

20. Combustible and/or flammable liquids and corrosive liquids are limited to one day supply in a clean room and are stored in approved safety containers. A maximum of a 10 day supply of combustible and/or flammable liquids and corrosive liquids may be located in a clean room provided they are stored in an approved, noncombustible storage cabinet or locker. All other combustible and/or flammable or corrosive liquids shall be separated from the clean room by one-hour, fire-rated construction.

21. Flammable gases used within clean rooms have the supply cylinder or bulk tanks located outside the clean room, separated by one-hour, fire rated construction.

22. All process and production areas are kept clean and free of all combustible materials such as cartons, papers, and packaging materials.

23. Portable fire extinguishers are provided per NFPA 10, "Portable Fire Extinguishers."

24. Detailed emergency procedures are posted in the clean room. Procedures should included instructions for shutting off all hazardous gases, maintaining fume exhaust systems, and sounding an evacuation alarm. Personnel should be trained in the emergency procedures.

3.15.8 Laboratories

A. Laboratories, as defined by NFPA 45, shall be operated and maintained per NFPA 45, "Fire Protection for Laboratories Using Chemicals." and per Section 8, Chapter 3 of this HSD, "Chemicals in Laboratories".

3.15.9 Pyrophoric Materials

A. Processes and facilities where pyrophoric materials and combustible metals are stored, processed, or handled shall be in compliance with the following standards, as applicable:

1. NFPA 68, "Guide for Venting of Deflagrations"
2. NFPA 69, "Explosion Prevention Systems"
3. NFPA 325, "Fire Hazard Properties of Flammable liquids, Gases, and Volatile Solids"
4. NFPA 480, "Storage, Handling and Processing of Magnesium Solids and Powders"
5. NFPA 481, "Production, Processing, Handling and Storage of Titanium"
6. NFPA 482, "Production, Processing, Handling, and Storage of Zirconium"
7. NFPA 651, "Manufacture of Aluminum Powder"

B. Management shall ensure that:

1. The appropriate extinguishing agents are utilized where pyrophoric materials and combustible metals are processed, stored, or handled. Most pyrophoric materials react violently with water, foam agents, halogenated agents, and carbon dioxide gas. Some combustible metals cannot be extinguished with water and require special extinguishing powders (for Class D fires) or special inerting gases.
2. Processes involving pyrophoric materials are performed in an enclosed, oxygen-free, oxygen-deficient, or inerting atmosphere that is moisture controlled (dry).
3. Whenever inert gas systems are used, a reserve supply of gas is available for emergency use.
4. Ordinary combustible materials, such as paper, wood, cartons, packing material, etc., are not stored or allowed to accumulate near processes where pyrophoric materials and combustible metals are handled.
5. Smoking and uncontrolled use of open flames are prohibited where materials are processed, stored, or handled. Areas shall be clearly posted with "No Smoking" signs.
6. Non-sparking tools are used when handling combustible metal powders.

3.15.10 Portable Structures

A. Portable structures shall be installed and maintained in compliance with DOE-STD-1088-95, "Fire Protection for Relocatable Structures"

B. Management shall ensure that:

1. The placement and use of all portable structures are reviewed by the M&O FPE.

3.15.11 Hazardous Material Storage

A. The storage of hazardous materials shall be in compliance with the following standards as applicable:

1. NFPA 30, “Flammable and Combustible Liquids Code”
2. NFPA 430, “Storage of Liquid and Solid Oxidizers”
3. NFPA 43B, “Storage of Organic Peroxide Formulations”
4. NFPA 55, “Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders”
5. NFPA 58, “Liquefied Petroleum Gas Code”
6. NFPA 59A, “Production, Storage and Handling of Liquefied Natural Gas”
7. NFPA 231, “General Storage”
8. NFPA 231C, “Rack Storage of Materials”
9. NFPA 491, “Hazardous Chemical Reactions”
10. NFPA 704, “Standard System for the Identification of the Hazards of Materials for Emergency Response”

B. Management shall ensure that:

1. Hazardous-material storage is separated by minimum distances from other facilities and from personnel areas.
2. Incompatible hazardous-materials in the same building are separated by suitable fire rated construction. A material that is incompatible with another is a material that can cause hazardous reactions or can promote or initiate combustion with the material. Examples of materials that require separation between each other are flammable and/or combustible liquids, corrosive materials, oxidizers, and water reactives.
3. Incompatible-hazardous materials stored outside of buildings are separated from one another by minimum distances.
4. Hazardous-materials are stored in the appropriate containers.
5. Hazardous-material storage areas and buildings are provided with containment for liquid run-off control.
6. Hazardous-material storage buildings and aboveground tanks are provided with fire protection.
7. Hazardous-materials that may cause environmental damage in the event of fire are located in separate hazardous-material containment buildings or tanks.
8. Separate hazardous-material containment buildings are provided with sprinkler protection or other approved fire-protection control and extinguishing systems.

9. Accumulation of combustible materials such as cartons, papers, and packaging materials is prohibited in and around hazardous-material storage.

10. Weeds or similar combustibles are not permitted within 15 feet of hazardous-material storage areas.

11. Portable fire extinguishers in hazardous storage buildings are provided for the appropriate hazard per NFPA 10, "Portable Fire Extinguishers."

12. Personnel involved in hazardous material-operations receive instructions in handling the materials in a safe manner.

13. Smoking is not permitted in or near hazardous storage areas.

14. Storage facilities are not used as dispensing facilities.

3.15.12 Hydrogen Systems

A. Hydrogen systems shall be installed and maintained in compliance with the following standards as applicable:

1. NFPA 50A, "Gaseous Hydrogen Systems at Consumer Sites"

2. NFPA 50B, "Liquefied Hydrogen Systems at Consumer Sites"

3. NFPA 77, "Static Electricity"

4. 49 CFR, Parts 100-199, "Transportation"

5. Compressed Gas Association Publications.

B. Management shall ensure that:

1. Gas or liquid hydrogen is stored in approved containers equipped with pressure relief-devices.

2. Piping, tubing, fittings, valves, gages, and regulators in hydrogen systems are suitable for hydrogen service.

3. Hydrogen storage is not permitted inside buildings other than in separate, specially designed buildings or rooms or in conjunction with systems having a total inventory (including storage) of less than 400 cubic feet.

4. Storage containers, piping, valves, regulating equipment, and other accessories are readily accessible to authorized personnel, the ESU apparatus, and are protected against physical damage.

5. Hydrogen systems are electrically bonded or grounded before discharging hydrogen.

6. Legible instructions are maintained at locations that require operation of hydrogen equipment by the user.

7. A qualified person is in attendance at all times when mobile hydrogen-supply equipment is unloading hydrogen.

8. Each hydrogen system installed is inspected annually and maintained by qualified personnel.

9. Weeds or similar combustibles are not permitted within 15 feet of gaseous hydrogen-system equipment or within 25 feet of liquefied hydrogen system equipment.

10. Personnel using hydrogen and hydrogen equipment are provided documented training on the fire hazards associated with hydrogen, e.g. the flames are practically invisible.

3.15.13 Records Storage

A. Records storage shall be in compliance with the following standards as applicable:

1. NFPA 232, "Protection of Records"

2. NFPA 232M, "Fire Protection for Archives and Record Centers"

3. NFPA 910, "Protection of Libraries and Library Collection"

4. 36 CFR, Chapter XII, "Records Management"

5. NFPA 75, "Standard for the Protection of Electronic Computer/Data Processing Equipment,"

B. Management shall ensure that:

1. Vital and important records (as defined by NFPA 232) are protected against fire.

2. Records that can be reproduced are duplicated and stored away from the originals so they will not be subject to the same fire incident.

3. Vital and important records are located and stored in noncombustible buildings protected with automatic sprinklers.

4. Areas that provide storage of vital and important records are provided with smoke detection systems.

5. Appropriate fire extinguishers are provided for record storage vaults, file rooms, and record storage areas.

6. Good housekeeping, orderliness, and maintenance of equipment are provided for record storage-areas.

7. Record storage areas are posted as "No Smoking" areas.

8. File rooms and storage vaults are not used as working spaces.

9. Persons other than those authorized to handle records are not permitted in file rooms and record vaults.

3.15.14 Lightning Protection

A. The installation and maintenance of lightning protection shall be in compliance with the following standards as applicable:

1. NFPA 70, "National Electric Code"

2. NFPA 780, "Standard for the Installation of Lightning Protection Systems"

3. Factory Mutual Data Sheet, FM 5-11 “Lightning And Surge Protection For Electrical Systems”

B. Management shall ensure that:

1. Lightning protection systems are provided for facilities that handle, process, or store radioactive materials, explosives, or similarly hazardous materials; buildings containing high value equipment; and structures having a severe lightning risk value per NFPA 780, Appendix H.

2. Electric power and communication services to all facilities and underground power cables, where connected by overhead power distribution lines, have lightning and surge protection.

3. All lightning protection systems are maintained.

4. All lightning protection systems are visually inspected per NFPA 780, Appendix B, annually.

5. Complete in-depth testing and inspections per NFPA 780, Appendix B, are performed every three years on critical systems providing lightning protection for facilities involving radioactive or explosive materials.

6. Inspection and maintenance procedures are in place for personnel performing lightning protection system maintenance and inspections.

7. Inspection and maintenance records of the lightning protection systems are documented and maintained for auditing purposes.

3.15.15 Electrical System Components In Division 1 & Division 2 Hazardous Areas

A. Electrical system components in Division 1 and Division 2 hazardous areas shall be installed and maintained in compliance with the following standards as applicable:

1. NFPA 70, “National Electrical Code”

2. NFPA 495, “Explosive Material Code”

3. NFPA 496, “Purged and Pressurized Enclosures for Electrical Equipment”

4. NFPA 497, “Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas”

5. NFPA 499, “Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas”

B. Management shall ensure that:

1. Electrical equipment of the proper classification is provided in locations where flammable vapors, liquids, gases, or combustible dusts or fibers may be present in concentrations sufficient to produce explosive or ignitable mixtures.

2. All electrical equipment used in hazardous areas is Underwriters Laboratory Listed or Factory Mutual Approved for use in the appropriate hazardous atmosphere.

3. No alterations or modifications are made to Listed or Approved equipment for hazardous locations. If modifications are made, the equipment shall be void for use in a classified hazardous location.

3.15.16 Lasers

A. The installation, maintenance, and use of laser systems shall be in compliance with the following standards as applicable:

1. NFPA 70, “National Electrical Code”

2. American National Standards Institute, ANSI/Z136.1 “Safe Use of Lasers”

B. Management shall ensure that:

1. All class lasers and laser systems have protective housings, interlocks, circuit breakers, insulation, switching devices, and the appropriate affixed warning labels.

2. When a high valued laser system is located in a building, the building is protected by automatic fire detection and fire suppression systems.

3. All electrical equipment is installed in accordance with NFPA 70.

4. All laser system frames, enclosures, and other accessible, non-current-carrying metallic parts are grounded.

5. Lasers and laser systems are operated and maintained by authorized employees only.

6. Employees involved with lasers and laser systems are properly trained.

7. Procedures are developed for the proper installation and use of all laser systems.

8. Beam target areas of Class IV lasers (per ANSI Z136.1) are free of combustible and flammable materials.

9. Lasers using flammable liquids are provided with effective means of controlling liquid fires.

10. Experimental lasers that are not listed or approved for use in classified hazardous locations and have unique electrical components are provided with the necessary precautions to control all fire hazards.