

U.S. Department of Energy
Washington, D.C.

ORDER

DOE 5480.7A

2-17-93

SUBJECT: FIRE PROTECTION

1. PURPOSE. To establish requirements for a comprehensive fire protection and related perils protection program sufficient to attain Department of Energy (DOE) objectives.

2. CANCELLATION. DOE 5480.7, FIRE PROTECTION, of 11-16-87.

3. SCOPE.

a. Provisions:

The provisions of this Order apply to all Departmental Elements. It specifically applies to personnel and property at all DOE-owned or -leased structures. This Order has primacy over all other DOE Orders with respect to matters concerning fire protection.

The Naval Nuclear Propulsion Program, as stipulated below, is exempt from the provisions of this Order.

DOE facilities, projects and programs that are licensed by the Nuclear Regulatory Commission (NRC) or an NRC Agreement State shall use the requirements specified by the NRC or NRC Agreement State in lieu of this Order where requirements overlap NRC or NRC Agreement State regulations.

b. Application to Contracts:

The provisions of this Order are to be applied to covered contractors and they will apply to the extent implemented under a contract or other agreement. A covered contractor (including Management and Operating contracts) is a seller of supplies or services performing on-site at a DOE-owned or -leased facility and awarded a procurement contract or a subcontract. The term "procurement contract" does not include small purchases.

4. OBJECTIVES. The objectives of this Order are as follows:

a. Minimize the potential for the occurrence of a fire.

b. Ensure that fire does not cause an on-site or off-site release of radiological and other hazardous material that will threaten the public health and safety or the environment.

DISTRIBUTION:

All Departmental Elements

INITIATED BY:

Assistant Secretary for
Environment, Safety and Health

- c. Establish requirements that will provide an acceptable degree of life safety to DOE and contractor personnel and that there are no undue hazards to the public from fire and its effects in DOE facilities.
 - d. Ensure that process control and safety systems are not damaged by fire or related perils.
 - e. Ensure that vital DOE programs will not suffer unacceptable delays as a result of fire and its effects.
 - f. Ensure that property damage from fire and related perils does not exceed an acceptable level.
5. **MANDATORY FIRE PROTECTION CRITERIA.** Fire protection criteria, delineated in the following codes, standards and other documents are the minimum requirements for the implementation of the DOE Fire Protection Program. These criteria are mandatory as a result of statutory requirements or DOE policy requirements. Where conflicts in the application of these codes and standards arise, the more restrictive requirements apply.
- a. Code of Federal Regulations (**CFR**) 29, Part 1910
 - b. **CFR** 29, Part 1926
 - c. National Fire Protection Association (**NFPA**) Codes and Standards
 - d. DOE 5480.4, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION STANDARDS, of 5-15-84, which specifies requirements for the application of environmental protection, safety, and health standards.
 - e. DOE **6430.1A**, GENERAL DESIGN CRITERIA, of 4-6-89, which provides general design criteria for use in the acquisition of the Department's facilities.
 - f. **DOE/EP-0108**, "Standard for Fire Protection of AEC Electronic Computer Data Processing Systems".
 - g. **DOE/EV-0043**, 8-79, "Standard on Fire Protection for Portable Structures".
 - h. Other DOE Orders and statutory requirements, not listed above, that contain requirements of a more limited extent relating to the DOE Fire Protection Program.

NOTE:

APPLICATION OF CODES AND STANDARDS. The fire protection related codes and standards in effect when facility design commences (code of record) remain in effect for **the** life of the facility. When modifications of a substantial nature occur, as determined by the authority having jurisdiction (**AHJ**), the current edition of the code shall apply to the modification. EXCEPTION: If there is a significant hazard that endangers building occupants or the public, as determined by the AHJ, the facility shall be upgraded to the requirements of the current edition of the code or standard.

6. DOE REFERENCED CRITERIA. The following references contain additional criteria and guidelines pertaining to the DOE Fire Protection Program:
 - a. DOE Fire Protection Resource Manual.
 - b. "General Fire Fighting Guidance for Nuclear Weapons," (this document is Confidential Restricted Data) (**TP20-11**) (DOE).
 - c. DOE **5482.1B**, ENVIRONMENT, SAFETY, AND HEALTH APPRAISAL PROGRAM, of 9-23-86, which establishes the environmental protection, safety, and health protection appraisal program.
 - d. DOE 5484.1, ENVIRONMENTAL PROTECTION, SAFETY, AND HEALTH PROTECTION INFORMATION REPORTING REQUIREMENTS, of 2-24-81, which establishes procedures for the reporting of information having environmental protection, safety, or health protection significance.
 - e. DOE **5500.1B**, EMERGENCY MANAGEMENT SYSTEM, of 4-30-91, which establishes procedures for planning for emergencies involving DOE or requiring DOE assistance.
 - f. National Fire Protection **Association** Handbooks.
 - g. Factory Mutual Loss Prevention Data Sheets.
 - h. Society of Fire Protection **Engineers (SFPE)** Handbook.
 - i. DOE Explosives Safety Manual, **DOE/EV/06194**.
 - j. Local and State fire protection criteria.
 - k. American Petroleum Institute Guidelines.
 - l. NFPA guides, manuals and recommended practices.
 - m. "Product Directories of Underwriters Laboratories," **together** with the periodic supplements (**UL**).
 - n. "Factory **Mutual** Research Corporation Approval¹ Guide" (FM).

7. **DEFINITIONS.**

- a. **Acceptable.** When applied to fire safety, "acceptable" is a level of protection which the Authority Having Jurisdiction, after consultation with the cognizant DOE fire protection engineer(s), considers sufficient to achieve the objectives defined above. 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.
- b. **Authority Having Jurisdiction (AHJ).** The decision making authority in matters concerning fire protection. Except as directed by the Program Secretarial Officers, the Heads of Field Organizations or designee is the AHJ. Decisions impacting fire safety shall be made by the AHJ only after consultation with the cognizant DOE fire protection engineer(s). Where an Area Office or Site Office exists within the DOE organization, a formal, clearly defined delegation of fire protection responsibility shall be established regarding the AHJ.
- c. **DOE Fire Protection Program.** Those fire protection requirements, hardware, administrative controls, procedures, guidelines, plans, personnel, analyses, and technical criteria that comprehensively ensure that DOE objectives relating to fire safety are achieved.
- d. **Equivalency.** The approved alternate means of satisfying the technical provisions of a fire protection code or standard. (Deviations from specific requirements of occupational safety and health standards, as delineated in the Code of Federal Regulations, are treated as variances as defined in the Department's Occupational Safety and Health Program).
- e. **Exemption.** The approved deviation from a non-statutory code, standard or DOE Order. (Deviations from specific requirements of occupational safety and health standards, as delineated in the Code of Federal Regulations, are treated as variances as defined in the Department's Occupational Safety and Health Program).
- f. **Fire Area.** A location bounded by construction having a minimum fire resistance rating of 2 hours with openings protected by appropriately fire-rated doors, dampers, or penetration seals. The boundaries of exterior fire areas (yard areas) shall be as determined by the authority having jurisdiction.
- g. **Fire Loss.** The dollar cost of restoring damaged property to its pre-fire condition (refer to DOE 5484.1). In determining loss, the estimated damage to the facility and contents shall include replacement cost, less salvage value. Losses will exclude costs of restoration of:
- (1) Property that is scheduled for demolition.
 - (2) Property:
 - (a) decommissioned and not carried on books as a value, or

(b) where there is no loss potential.

Include the cost of decontamination and cleanup, the loss of production or program continuity, the indirect costs of fire extinguishment (**such as** damaged fire department equipment), and consequent effects on related areas, in all property loss amounts.

- h. Fire Protection. A **broad** term which encompasses all aspects of fire safety, including: building construction and fixed building fire features, fire suppression and detection systems, fire water systems, emergency process safety control systems, emergency fire fighting organizations (fire departments, fire brigades, etc.), fire protection engineering, and fire prevention. Fire protection is concerned with preventing **or** minimizing the direct and indirect consequences of fire. It also includes aspects of the following perils as they relate to fire protection: explosion, natural phenomenon, smoke and water damage from fire.
- i. Fire Protection System. Any system designed to detect, extinguish, and limit the extent **of** fire damage or enhance life safety. Where redundant fire protection systems are required, any two of the following will satisfy that requirement. These include:
- (1) Automatic suppression systems, such as fire sprinklers, foam, gaseous, explosion suppression, or other specialized extinguishing systems plus appropriate alarms. An adequate supply, storage and distribution system is an essential element.
 - (2) Automatic fire detection, occupant warning, manual fire alarm, and fire alarm reporting systems combined with properly equipped and adequately trained fire departments or brigades.
 - (3) Fire barrier systems or combinations of physical separation and barriers for outdoor locations.
 - (4) Other systems, **such as alternate** process control systems, as approved by the AHJ.
- j. Maximum Credible Fire Loss (MCFL). The property damage that would be expected from a fire, assuming that:
- (1) All installed fire protection systems function as designed.
 - (2) The effect of emergency response is omitted except for post-fire actions **as** salvage work, shutting down water systems, and restoring operation.
- k. Maximum Possible Fire Loss (MPFL). The value of property, excluding land, within a fire area, unless a fire hazards analysis demonstrates a lesser (or greater) loss potential. This assumes the failure of both automatic fire suppression systems and manual fire fighting efforts.

1. **Property.** All government-owned or leased structures and contents for which the Department has responsibility, including:
 - (1) All DOE land, structures, and contents.
 - (2) All leased locations.
 - (3) All other Government property on DOE land or in DOE structures.
 - (4) Other property that occupy DOE land or are in DOE structures.
- m. **Qualified Fire Protection Engineer.** 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 Fire Protection Engineer as defined by the Office of Personnel Management.
- n. **Related Perils.** Aspects of the following as they relate to fire protection: explosion, natural phenomenon, **smoke, and water damage.**
- o. **Risk.** A term used to describe the overall potential for loss (refer to DOE 5481.1B) .
- p. **Safety Class Equipment.** Systems, structures, or components including primary environmental monitors and portions of process systems, whose failure could adversely affect the environment, or the safety and health of the public.

For nuclear reactors and non-reactor nuclear facilities, Class A Equipment includes those systems, structures, or components with the following characteristics:

- o Those whose failure would produce exposure consequences that would exceed DOE established guidelines at the site boundary or nearest point of uncontrolled public access.
- o Those required to maintain operating parameters within the safety limits specified in Technical Safety Requirements (Technical Specification or Operational Safety Requirements) during normal operations and anticipated operational occurrences.
- o Those required for nuclear criticality safety.

- o Those required to monitor the release of radioactive materials to the environment during and after a design basis accident.
 - o Those required to monitor and maintain the facility in a safe shutdown condition.
 - o Those that control the safety class items described above.
- q. Vital Program. A DOE program so defined by the Program Secretarial Officers.

8. RESPONSIBILITIES AND AUTHORITIES.

a. Program Secretarial Officers.

For matters affecting facilities under their programmatic responsibility, PSOS shall:

- (1) Direct DOE fire protection programs for personnel and property under their responsibility.
- (2) Evaluate and assess in accordance with this Order, the adequacy of contractor fire protection programs so as to assure that the criteria in paragraph 8h are met and the elements delineated in paragraph 9 are incorporated.
- (3) Review and define each vital program and provide current information to the head of the field organization describing the maximum acceptable impact on the program if a property within the field organization is lost due to a fire. This shall include the maximum acceptable down time if less than 6 months and fire loss if less than **\$150M**.
- (4) Establish and maintain a system to assure that the DOE fire protection program is documented and incorporated in the plans and specifications for all new facilities and for major modifications of existing facilities. This includes oversight by a qualified **fire** protection engineer of plans, specifications, and testing of fire protection features.
- (5) Review field organization requests for exemptions. Obtain **EH-1** approval for proposed actions on exemption requests. (Coordinates with **NS-1** when nuclear fire safety issues are involved.)
- (6) Maintain or has access to an adequate fire protection staff, including one or more qualified fire protection engineers, to accomplish the above responsibilities. Continuing education and training **should** be provided to maintain and enhance the level of competency **of** the fire protection staff.

b. Assistant Secretary for Environment, Safety and Health (EH-1).

- (1) Develops fire protection requirements and guidelines for programs and facilities. Coordinates the development of fire protection criteria with the Office of Organization, Resources and Facilities Management (AD-10), the Director of Nuclear Safety Policy and Standards (NE-70), PSOs, and other appropriate Headquarters organizations to assure the consistency of such criteria with the requirements of applicable fire protection codes and, DOE 5480.4, and this Order.
- (2) Evaluates and assesses, in accordance with this Order and DOE 5482.1B, the adequacy of DOE fire protection programs.
- (3) Disseminates fire protection related technical information through the Annual Summary of DOE Fire Protection Programs and updates of the Fire Protection Resource Manual.
- (4) Issues guidance and interpretations of the DOE fire protection program in coordination with NE-70.
- (5) Approves fire protection exemption requests. Action on exemption requests shall be completed within 60 days of receipt of the request. Approval of the Office of the Secretary (S-1) shall be solicited for any generic fire protection exemption request that has DOE-wide nuclear safety implications.
- (6) Coordinates activities of the DOE Fire Safety Committee
- (7) Maintains or has access to an adequate fire protection staff to accomplish the above responsibilities, including one or more qualified fire protection engineers. Continuing education and training should be provided to maintain and enhance the level of competency of the fire protection staff.

c. The Director of Nuclear Safety (NS-1).

- (1) Evaluates and assesses, in accordance with this Order the adequacy of DOE Fire Protection Programs relative to nuclear safety.
- (2) Concurs with fire protection exemptions that relate to nuclear fire safety. Action on exemption requests shall be completed within 60 days of receipt of the request.
- (3) Maintains or has access to an adequate fire protection staff, including a qualified fire protection engineer, to accomplish the above responsibilities. Continuing education and training should be provided to maintain and enhance the level of competency of the fire protection staff.

d. The Assistant Secretary for Nuclear Energy (NE-1).

- (1) Reviews and concurs with fire protection policy and guidance developed by EH-1 that relate to nuclear safety. Provides interpretation and guidance concerning the fire protection criteria for nuclear facilities.
- (2) Maintains or **has** access to an adequate fire protection staff, including a qualified fire protection engineer, to accomplish the above **responsibilities**. Continuing education and training should be provided to maintain and enhance the level of competency of the fire protection **staff**.

e. The Director of the Naval Nuclear Propulsion Program (NE-60).

Presidential Executive Order 12344, statutorily prescribed by Public Law 98-525, 42 U.S.C. S7158 note (1984), establishes the responsibilities and authorities of the Director, Naval Nuclear Propulsion Program (who is also the Deputy Assistant Secretary for Naval Reactors within the Department) over all facilities and activities which comprise the program, a joint Navy-DOE organization. These executive and legislative actions establish that the Director is responsible for all matters pertaining to naval nuclear propulsion for all program facilities and activities. Accordingly, the Provisions of this Order do not apply to the Naval Nuclear **Propulsion** Program.

f. The Director of Administration and Management (AD-1).

- (1) Ensures that the requirements of this Order are **inc**uded within DOE **6430.1A**, GENERAL DESIGN CRITERIA.
- (2) Evaluates and **assesses** the adequacy of fire protection for DOE Records Management Programs.

g. Heads of Field Organizations.

As directed **by** the PSO, the Heads of Field Organizations shall:

- (1) Ensure a level of fire protection adequate to meet the objectives of this Order for personnel and property within their responsibility. Where an area office exists within the organization, a clear, formal delegation of **fire** protection responsibilities shall be established.
- (2) Establish and maintain a system to assure that the DOE fire protection program is documented and incorporated in the plans and specifications for all new facilities and for major modifications of existing facilities. This includes oversight by a qualified fire protection engineer of plans, specifications, and **testing** of fire protection features.

- (3) Review implementation plans for compliance with recommendations resulting from fire protection assessments. Forwards a copy of compliance plans, exemption requests, equivalency determinations, compliance schedule approvals, and other requested data to the **PSO**.
- (4) Approve contractor requests for fire safety equivalences.
- (5) Maintain a list of facilities/contractors for which they have fire protection appraisal responsibility in accordance with this Order, indicating the assessment frequency for each.
- (6) Conduct fire protection assessments of facilities and/or contractors , according to the frequency and scope established by this Order to assure that:
 - (a) The program described in paragraph 9 is being implemented.
 - (b) Effective action is being taken to correct deficiencies identified from previous appraisals, including prioritization, tracking, and implementation of interim compensatory measures.
 - (c) Losses, impairments, and unusual fire-related incidents have been investigated and analyzed to identify causes, corrective action(s), and preventive methods.
- (7) Submit an annual summary to Office of Safety and Quality Assurance **(EH-30)** through the **PSO** covering the fire protection program and loss experience of the previous year, as required by **DOE 5484.1**.
- (8) Forward requests for fire protection exemptions prepared by the contractor to the **PSO**. Submit a recommendation for approval for these conditions to the **PSO** for those issues where, in the judgment of the Head of the Field Organization, compliance with specific program elements is not attainable and where an acceptable level of safety has been provided. The cognizant Headquarters fire protection engineer should be consulted on these issues as appropriate.
- (9) Maintain or have access to an adequate fire protection staff, including one or more qualified fire protection engineers, to accomplish the above objectives. Continuing education and training should be provided to maintain and enhance the level of competency of the fire protection staff.
- (10) Establish and maintain a method to disseminate fire protection information from Headquarters to the contractors and vice versa.

(11) Where there is no **PSO**, the Head of the Field Organization shall assume the responsibilities as delineated in paragraph **8a**. Where there is no contractor, the Head of the Field Organization shall assume the responsibilities as delineated in paragraph **8h**.

h. Heads of Headquarters Elements and Heads of Field Organizations.

The senior ranking DOE official at a DOE office location shall include the following in a procurement request package for each procurement requiring the application of this directive: (1) identification of the Directive, (2) identification of the specific requirements with which a contractor or other **awardee** is to comply, or, if this is not practicable, identification of the specific paragraphs or other portions of this Directive with which a contractor or other **awardee** is to comply, and (3) requirements for the flowdown of provisions of this directive to any subcontract or subaward. For application to awarded management and operating contracts, Heads of Headquarters Elements and heads of field organizations may set forth this information in a written communication to the contracting officer rather than in a procurement request package.

i. Contractor Organizations.

As required by the **PSO** or the Heads of Field Organizations and directed by the Contracting Officer, contractors shall be required to:

- (1) Provide and maintain a level of fire protection to meet the objectives of paragraph 4, and the criteria of paragraph 9.
- (2) Provide and maintain a system to ensure that the requirements of the DOE fire protection program are documented and incorporated in the plans and specifications for all new facilities and for major modifications of existing facilities. This includes review and comment by a qualified fire protection engineer of plans, specifications and test procedures and results for fire protection features.
- (3) Assist DOE in coordinating fire safety assessments at those facilities included in the survey program, establish action plans for compliance with recommendations resulting from the assessments, and forward compliance plans, exemption requests, and other requested data to DOE field organizations.
- (4) Establish and maintain a list of facilities for which the contractor has fire protection assessment responsibility.
- (5) Conduct fire protection assessments of facilities according to the scope and frequency established by this Order.
- (6) Provide fire protection technical assistance to DOE.

- (7) Submit requests for exemptions and fire safety equivalences to the Head of the Field Organization for those facilities where compliance with specific program elements is not attainable and where an acceptable level of safety has been achieved.
- (8) Maintain or have access to an adequate fire protection staff, including a qualified fire protection engineer(s). Continuing education and training should be provided to maintain and enhance the level of competency of the fire protection staff.

9. DOE FIRE PROTECTION PROGRAM REQUIREMENTS.

A DOE facility shall be characterized by a level of fire protection sufficient to fulfill the requirements for the best protected class of industrial risks (Highly Protected **Risk/Improved Risk**). This program is characterized by the inclusion of a continuing, sincere interest on the part of management and employees in minimizing losses from fire and related perils and the inclusion of preventive features necessary to ensure the satisfaction of objectives related to safety.

Based upon the above paragraph, the DOE Fire Protection Program shall meet or exceed the minimum requirements established by the National Fire Protection Association as directed by the PSO. Basic requirements shall include: a reliable water supply of acceptable capacity for fire suppression; noncombustible construction of an acceptable nature for the occupancy of the facility; automatic fire extinguishing systems; a fully staffed, trained, and equipped emergency response force; a means to summon the emergency response force in the event of a fire; and a means to notify and evacuate building occupants in the event of a fire. For areas subject to significant life safety risks, serious property damage, program interruption, or loss of safety class equipment as defined in the relevant facility SAR, additional protection measures may be deemed necessary as determined by the AHJ.

This level of protection also includes: administrative procedures encompassing controls for hazardous substances/processes; inspection, maintenance, and testing of fire protection features; and other programmatic fire safety activities as defined below.

a. Programmatic Elements.

Fire protection programs shall incorporate the following elements to assure that the objectives of paragraph 4 are met:

- (1) Fire Protection Criteria. A documented "Fire Protection Program" which includes:
 - (a) A statement of management commitment to achieve the above stated objectives.
 - (b) A policy statement that implements this Order and other DOE fire protection related mandatory codes and standards.

(c) Fire protection criteria that reflect site-specific aspects of the fire protection program, including: the organization and responsibilities of the fire protection staff, administrative aspects of the fire protection program, and requirements for physical fire protection features.

(2) Assessments. Documented evaluations of the fire protection program, including field **walkdowns** of facilities, shall be performed as follows:

(a) **Facilities/contractors** shall be assessed to establish that they conform with DOE fire protection criteria.

(b) Minimum Frequency

Headquarters:

- o PSO assessment of field offices 3 years
- o EH assessment of program offices 3 years

Field Office:

- o Field office assessment of the fire protection program of each contractor 2 years

Contractors/Facility Managers:

- o Annual fire protection assessments shall be made of **facilities** valued in excess of \$50 million; where considered to be a moderate (Category **2 Hazard**) or-high hazard (Category **1 Hazard**) as defined in DOE **5481.1B**, SAFETY ANALYSIS AND REVIEW SYSTEM, for nonnuclear facilities **and in** DOE 5480.23, NUCLEAR SAFETY ANALYSIS REPORTS, for nuclear facilities; or in which vital programs are involved.
- o Fire protection assessments shall be made at least every two years of facilities plus equipment valued at \$10 million to \$50 million.
- o Remaining facilities shall be assessed at least every three years or at frequencies determined by the **AHJ**.
- o Comprehensive assessments of fire protection program elements shall be made every two years.
- o Copies of the two most recent assessment reports shall be kept on file.

- (c) Nature and Scope. Assessments shall include an evaluation of the following elements of the fire protection program:

Program-related:

- o Comprehensiveness of the fire protection program.
- o Procedures for engineering design and review.
- o Procedures for maintenance, testing, and inspection.
- o Fire protection engineering staff (number, qualifications, training).
- o Fire suppression organization (personnel and training).
- o Fire suppression mutual aid agreements.
- o Management support.
- o Exemptions and documented equivalences.

Facility-related:

- o Fire protection of safety class equipment.
- o Life safety considerations.
- o Fire protection of vital programs.
- o Fire protection of high value property.
- o Fire suppression equipment.
- o Water runoff.
- o **Pre-fire** plans.
- o Fire apparatus accessibility.
- o Completeness of fire hazards analyses.
- o Fire barrier integrity.
- o Completeness of fire loss potential (MPFL/MCFL) determinations.
- o Fire safety training.

Combined Aspects (Program & Facility):

- o Inspection, testing, and maintenance reports.
- o Adequacy of facility appraisal reports.
- o Tests of fire suppression systems, water supplies, and procedures for maintaining these in working order.
- o Administrative controls.
- o Temporary protection and compensatory measures.
- o Status of findings from previous assessments.
- o Conformance with applicable Orders, codes and standards.

- (3) **Fire Hazards Analyses.** The purpose of a fire hazards analysis (FHA) is to comprehensively assess the risk from fire within individual fire areas in a DOE facility in relation to existing or proposed fire protection so as to ascertain whether the objectives of paragraph 4, are met. A graded FHA, that reflects the risks from fire in a facility, shall be performed for new facilities as directed by DOE 6430.1A, for nuclear facilities where safety analyses are required by DOE 5480.23, and as directed by the PSO. A Safety Analysis Report (SAR) that addresses the following elements will satisfy the requirement for an FHA. A graded FHA shall contain, but not be limited to, the following elements:

- (a) Description of construction.
- (b) Protection of essential safety class equipment.
- (c) Fire protection features.
- (d) Description of fire hazards.
- (e) Life safety considerations.
- (f) Critical process equipment.
- (g) High value property.
- (h) Damage potential: Maximum Credible Fire Loss (MCFL) and Maximum Possible Fire Loss (MPFL).
- (i) Fire Department/Brigade response.
- (j) Recovery potential.
 - (1) Potential for a toxic, biological and/or radiation incident due to a fire.
- (m) Emergency planning.
- (n) Security considerations related to fire protection.
- (o) Natural hazards (earthquake, flood, wind) impact on fire safety.
- (p) Exposure fire potential, including the potential for fire spread between fire areas.

An FHA shall be performed under the direction of a qualified fire protection engineer.

b. **Physical Features of the Program.**

DOE facilities shall incorporate the following elements to assure that the objectives of paragraph 4, are met:

- (1) **Safety Class Equipment.** In areas where a fire could cause damage to safety class equipment and where no redundant safety capability exists, a redundant fire protection system shall be provided for the safety class equipment. For new facilities, redundant Safety Class Equipment shall be located in separate fire areas. Fire suppression systems shall be designed such that their actuation will not damage safety class equipment or cause a criticality incident.

- (2) **Life Safety.** Life safety provisions shall be provided for all facilities in accordance with the Life Safety Code (**LSC**), **NFPA** Standard 101. The methods outlined in **NFPA 101M** may be used to obtain an equivalent level of life safety where strict compliance is not possible. Exit requirements for toxic and explosive environments shall be as determined by the AHJ. In addition, for explosives environments, **exits** shall reflect the criteria contained in the DOE Explosives Safety Manual, (**DOE/EV 06194**). Where noncompliance with some Life Safety Code provisions may be required for public safety, as in some containment structures, additional protective systems and personnel limits should be maintained. Compliance with the Life Safety Code shall be considered to satisfy the exit requirements of the applicable building code and OSHA 29 **CFR 1910**.
- (3) **Automatic Fire Protection.** Complete automatic fire suppression systems designed in accordance with applicable **NFPA** standards shall be provided as follows:
- (a) In all new structures over 5,000 square feet.
 - (b) In all structures having an **MPFL** in excess of \$1,000,000. or where the maximum credible fire will result in the loss of use of a vital structures for a period longer than that specified as acceptable by the applicable **PS0**.
- (4) **Redundant Fire Protection.**
- (a) When the **MPFL** exceeds \$50 million, a redundant fire protection system is provided that, despite the failure of the primary fire protection system, will limit the **loss** to \$50 million.
 - (b) When the **MPFL** exceeds \$150 million, a redundant fire protection system and a **3-hour** fire barrier are required to limit the maximum possible fire loss to \$150 million.
- (5) **Testing and Maintenance.** Fire protection systems shall be tested and maintained in accordance with the applicable **NFPA** standards and as supplemented by criteria in the DOE Fire Protection Resource Manual.
- (6) **Quality Construction.** New permanent structures in excess of 5,000 square feet of area shall be of noncombustible or fire resistive construction.

- (7) Fire Department. A fully staffed, trained, and equipped fire department/brigade shall service all DOE facilities, except as determined by the **PSO**. (Refer to the fire protection positions on minimal staffing levels in the DOE Fire Protection Resource Manual.) DOE or Contractor-operated organizations with the responsibility for providing fire protection for DOE property may enter into mutual aid agreements with other fire departments in accordance with Public Law 46 (Title 42 **USC** Section 1856).
- (8) Fire Protection Water Supply. An automatic water supply for fire protection having a minimum two hours stored water capacity shall be maintained. Municipal supplies having the same capability are acceptable. Facilities having a **MPFL** in excess of \$50 million shall be provided with an additional, independent source of fire protection water.

A water supply dedicated for fire protection may be necessary as determined by the **PSO**. A dedicated system shall be able to meet hose stream and sprinkler system demands.

A combined **fire** and process/domestic system shall be able to deliver the fire demand plus the maximum daily domestic demand for the required duration.

- (9) Underground Piping. Mains shall be sized for the largest fire flows anticipated but in no case shall be less than **8-inch** diameter. Supply piping to individual fire sprinkler systems shall be at least as large as ~~the~~ fire sprinkler system riser.
- (10) Liquid Run-off Control. Natural or artificial means of controlling liquid run offs from a maximum credible fire shall be provided so that contaminated or polluting liquids will not escape the site, including potentially contaminated water resulting from fire fighting operations. The amount of fire water that must be controlled and the design of the containment system shall be determined based on consultations with the cognizant DOE fire protection engineer.
- (11) Fire Alarm Systems. Where fire suppression or fire alarm systems are provided, local alarms in the protected area and alarm transmission to an acceptable remote attended location shall be provided.
- (12) Containment Systems for Ventilation. Facilities which require ventilation containment systems shall be protected from the effects from fire to preclude release of radioactive, toxic, or other hazardous materials.

- (13) **Special Hazard Protection.** Hazards unique to DOE and not addressed by the mandatory codes and standards listed in Paragraph 5 shall be protected by isolation, segregation or use of special fire control systems (inert gas, explosion suppression, etc.) as determined by the AHJ. In addition devices for limiting or controlling the effects of a fire (relief valves, filters, blast walls, emergency shutdown systems, **scuppers**, etc.) shall be provided.
 - (14) **Halon Usage.** Future use of **Halon** will be governed under the conditions set forth in the DOE memorandum "Interim Position on the Installation of New **Halon** 1301 Fixed Fire Suppression Systems and **Halon** 1211 Portable Fire Extinguishers," dated September 27, 1990, and superseding documents.
 - (15) **Seismic Criteria.** The design of fire protection systems to withstand seismic events shall be in accordance with the criteria developed by the National Fire Protection Association, except as required by other DOE criteria.
 - (16) **Impairment Control.** A fire protection system impairment program shall be provided for control of operations and tracking of impairments during periods when fire protection **systems** are out of service.
 - (17) **Higher Standard of Protection.** A higher standard of protection, which includes fire protection features beyond those stimulated above, **may** be warranted under certain **circumstances**. These **features** shall be determined by the PSO. The following factors shall be considered:
 - (a) importance
 - (b) effect on production
 - (c) costs versus benefits
 - (d) future conditions
- c. **Administrative Features of the Program.**
- (1) **Fire Prevention Procedures.** Facilities shall have procedures governing the use and storage of combustible, flammable, radioactive and hazardous materials so as to minimize the risk from fire. Such procedures shall also exist for activities, such as smoking limitations, isolation of hot work, and other fire prevention measures, which contribute to the decrease in fire risk.

- (2) Assessment Results Tracking Program. There shall be a program to identify, prioritize and monitor the status of fire protection related assessment findings/recommendations until resolution is achieved. Resolution could be achieved by either: plant modification, procedure change, fire safety equivalency, or exemption.
- (3) Interim Compensatory Measures. When final resolution of a finding/recommendation will be significantly delayed because of funding, scheduling, or other considerations, appropriate interim compensatory measures (e.g., fire watches, fire patrols, enhanced hazards control procedures, temporary fire protection features) shall be implemented to minimize the fire risk.
- (4) Operability Specifications. Minimum requirements to establish "operability" shall be developed for fire protection features such as: fire doors, fire dampers, fire detection and suppression systems, fire protection water supplies, etc. Periodic tests, conducted to satisfy the applicable NFPA codes and standards or other DOE criteria shall confirm that these features are operable. If fire protection will be inoperable for a significant period of time, interim compensatory measures shall be implemented until operability is restored.
- (5) Emergency Planning. Information from the fire protection program shall be incorporated in the Emergency Plan. The facility fire protection organization shall be involved in the development of the Emergency Plan and in all related training and drills.
- (6) Training. Training shall be provided for the individuals within the fire protection organization, the fire department/brigade, and any other person with responsibilities for fire safety. Training programs shall reflect the criteria contained in the mandatory codes and standards listed in paragraph 5, and shall reflect site-specific considerations.
- (7) Communications. Emergency communications shall be outlined in the emergency plan. The communications capability among potential responders to an emergency shall be coordinated to avoid confusion and interference. This capability shall be tested on a frequency established by the authority having jurisdiction in accordance with DOE criteria.

BY ORDER OF THE SECRETARY OF ENERGY:



LINDA G. SYE
Acting Director of Organization
and Management