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DOE STANDARD

FIRE PROTECTION ENGINEERING FUNCTIONAL AREA QUALIFICATION STANDARD

DOE Defense Nuclear Facilities Technical Personnel



U.S. Department of Energy
Washington, D.C. 20585

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APPROVAL

The Federal Technical Capability Panel consists of senior Department of Energy managers responsible for overseeing the Federal Technical Capability Program. This Panel is responsible for reviewing and approving the Qualification Standard for Department-wide application. Approval of this Qualification Standard by the Federal Technical Capability Panel is indicated by signature below.



Chairman
Federal Technical Capability Panel

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ACKNOWLEDGMENT

The Assistant Secretary for Environment, Safety and Health is the Sponsor for the Department-wide Fire Protection Functional Area Qualification Standard. The Sponsor is responsible for coordinating the development and/or review of the Standard by fire protection engineering subject matter experts to ensure that the technical content of the standard is accurate and adequate for Department-wide application for those involved in fire protection engineering. The Sponsor, in coordination with the Federal Technical Capability Panel, is also responsible for ensuring that this Standard is maintained current.

The following subject matter experts (SMEs) participated in the development and/or review of this qualification standard:

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FUNCTIONAL AREA

Fire Protection

PURPOSE

The Department's Federal Technical Capability Program Policy, issued by the Secretary in December 1998, commits the Department to continuously strive for technical excellence. The Technical Qualification Program, along with the supporting technical Functional Area Qualification Standards, complements the personnel processes that support the Department's drive for technical excellence. In support of this goal, the competency requirements defined in the technical Functional Area Qualification Standards should be aligned with and integrated into the recruitment and staffing processes for technical positions. The technical Functional Area Qualification Standards should form, in part, the primary basis for developing vacancy announcements, qualification requirements, crediting plans, interviewing questions, and other criteria associated with the recruitment, selection, and internal placement of technical personnel. Office of Personnel Management minimum qualifications standards will be greatly enhanced by application of appropriate materials from the technical Functional Area Qualification Standards.

The technical Functional Area Qualification Standards are not intended to replace the U.S. Office of Personnel Management's (OPM) Qualifications Standards nor other Departmental personnel standards, rules, plans, or processes. The primary purpose of the Technical Qualification Program is to ensure that employees have the requisite technical competency to support the mission of the Department. The Technical Qualification Program forms the basis for the development and assignment of DOE personnel responsible for ensuring the safe operation of defense nuclear facilities.

APPLICABILITY

The Fire Protection Functional Area Qualification Standard establishes common functional area competency requirements for Department of Energy federal fire protection engineers who provide assistance, direction, guidance, oversight, or evaluation of contractor technical activities impacting the safe operation of defense nuclear facilities. This Standard has been developed as a tool to assist DOE Program and Field offices in the development and implementation of the Technical Qualification Program in their organization. Program and Field offices may choose to use this technical Functional Area Qualification Standard as-is, or they may use parts of it to facilitate the development of their own unique Technical Qualification Standards. In either case, satisfactory and documented attainment of the competency requirements contained in this Standard, or similar Standards, ensures that fire protection engineers possess the requisite competence to fulfill their functional area duties and responsibilities. Office/Facility-Specific Qualification Standards supplement this technical Functional Area Qualification Standard and establish unique operational competency requirements at the Headquarters or Field element, site, or facility level.

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IMPLEMENTATION REQUIREMENTS

This Standard identifies the technical competency requirements for federal fire protection engineers. Although there are other competency requirements associated with the positions held by fire protection engineers, this Functional Area Qualification Standard is limited to identifying the specific technical competencies. The competency statements define the expected knowledge and/or skill that an individual must meet. Each of the competency statements is further explained by a listing of supporting knowledge and/or skill statements. **The supporting knowledge and/or skill statements are not requirements and do not necessarily have to be fulfilled to meet the intent of the competency.**

The competencies identify a familiarity level, a working level, or an expert level of knowledge; or they require the individual to demonstrate the ability to perform a task or activity. These levels are defined as follows:

Familiarity level is defined as basic knowledge of or exposure to the subject or process adequate to discuss the subject or process with individuals of greater knowledge.

Working level is defined as the knowledge required to monitor and assess operations/activities, to apply standards of acceptable performance, and to reference appropriate materials and/or expert advice as required to ensure the safety of Departmental activities.

Expert level is defined as a comprehensive, intensive knowledge of the subject or process sufficient to provide advice in the absence of procedural guidance.

Demonstrate the ability is defined as the actual performance of a task or activity in accordance with policy, procedures, guidelines, and/or accepted industry or Department practices.

Headquarters and Field elements shall establish a program and process to ensure that federal fire protection engineers possess the competencies required of their position. That includes the competencies identified in this technical Functional Area Qualification Standard or a similar Standard developed by the organization. Documentation of the completion of the requirements of the Standard shall be included in the employee's training and qualification record.

Equivalencies may be granted for individual competencies based upon an objective evaluation of the employee's prior education, experience, and/or training. Equivalencies shall be granted in accordance with the policies and procedures of the program or field office. The supporting knowledge and/or skill statements, while not requirements, should be considered before granting equivalency for a competency.

Training shall be provided to employees in the Technical Qualification Program that do not meet the competencies contained in the technical Functional Area Qualification Standard. Departmental training will be based upon appropriate supporting knowledge and/or skill statements similar to the ones listed for each of the competency statements. Headquarters and Field elements should use the supporting knowledge and/or skill statements as a basis for evaluating the content of any training courses used to provide individuals with the requisite knowledge and/or skill required to meet the technical Functional Area Qualification Standard

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competency statements. Undergraduate and graduate level fire protection courses offered by the educational institutions listed in Appendix A may be supplemented by engineering courses at accredited institutions to meet the minimum requirements of OPM Occupation Series 804.

EVALUATION REQUIREMENTS

Attainment of the competencies listed in this Standard should be documented by a qualifying official or the immediate supervisor of federal fire protection engineers using any of the following methods:

- Documented evaluation of equivalencies
- Written examination
- Documented oral evaluation
- Documented observation of performance

CONTINUING EDUCATION, TRAINING AND PROFICIENCY REQUIREMENTS

Fire protection engineers shall participate in continuing education and training as necessary to improve their performance and proficiency and ensure that they stay up-to-date on changing technology and new requirements. This may include courses, training and/or professional association meetings provided by:

- Department of Energy
- Other government agencies
- Industry associations
- Educational institutions

A description of suggested learning proficiency activities, and the requirements for the continuing education and training program for federal fire protection engineers are included in Appendix A of this document.

DUTIES AND RESPONSIBILITIES

The following are the typical duties and responsibilities expected of DOE defense nuclear facility technical personnel assigned to the Fire Protection Functional Area:

1. Serve as the subject matter expert in the area of fire protection and fire department emergency services.
2. Review fire hazard analyses, assessments, and other fire safety documentation for compliance with applicable requirements.
3. Evaluate the adequacy of the site fire department/brigade emergency services program. This includes; organization, staffing, apparatus, equipment, training, and other program elements.
4. Review the adequacy of contractor fire protection programs to ensure compliance with applicable codes, regulations, Departmental Orders, standards, guides, and accepted "Improved Risk" practices.

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5. Participate in site fire investigations and other accident/incident investigations as required.
6. Interpret fire protection and fire department/brigade emergency services directives and make recommendations to Department management, facility representatives, contractor management, and line organization.
7. Represent the site and/or the Department at fire protection meetings, professional conferences, and technical standards committees.
8. Provide oversight of the site fire protection and fire department/brigade emergency services programs and their implementation.
9. Evaluate the adequacy of facility design and occupancy in accordance with applicable fire protection criteria and recommend changes as applicable.
10. Review and evaluate requests for fire safety exemptions and equivalencies.
11. Participate in the development of fire safety-related contract requests, the annual budget, and planning for future fire safety and fire department/brigade emergency services activities.
12. Maintain proficiency in fire protection engineering and fire department/brigade emergency services concepts and practices through practice, education, training, and a periodic review of fire protection codes and standards which apply to DOE and its contractors.
13. Participate in special assignments and perform assessments related to fire protection.

Position-specific duties and responsibilities for federal fire protection engineers are contained in their Office/Facility-Specific Qualification Standard or Position Description.

BACKGROUND AND EXPERIENCE

The U. S. Office of Personnel Management's (OPM) Qualification Standards Handbook establishes minimum education, training, experience, or other relevant requirements applicable to a particular occupational series/grade level, as well as alternatives to meeting specified requirements. Federal Fire Protection Engineers are required to meet OPM standards for Occupational Series 804 or equivalent for the grade level of their position.

If an individual position is classified under another OPM Series such as "General Engineer" (801) or "Safety Engineer" (803), the incumbent should be evaluated by a personnel classification specialist and/or qualified safety manager to verify that the requirements, including alternatives, for series 804 are met for the grade of the position.

Where an incumbent fire protection engineer does not meet all the requirements for OPM Series 804 at the appropriate grade level, compensation may be achieved by designating another federal fire protection engineer in writing to assist with identified types of tasks.

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REQUIRED TECHNICAL COMPETENCIES

Classification under OPM Series 804 at the appropriate grade level provides sufficient technical competency to satisfy this Standard. To establish their competency in fire protection and emergency services concepts as related to the Department, the following should be used in the evaluation process.

Each of the competency statements defines the level of expected knowledge and/or skill that an individual must possess to meet the intent of this Technical Qualification Standard. **The supporting knowledge and/or skill statements further describe the intent of the competency statements but are not requirements.**

Note: When regulations or Department of Energy directives or other industry standards are referenced in the Qualification Standard, the most recent revision should be used.

1. Fire protection engineers shall demonstrate a working level of knowledge of the fire protection related aspects of the following directives:

- DOE Order 420.1, "Facility Safety"
- DOE Order 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees"
- DOE G-420.1/B-0, "Implementation Guide for use with DOE Orders 420.1 and 440.1, Fire Safety Program"
- DOE-STD-1066-99, "Fire Protection Design Criteria"
- DOE-STD-1088-95, "Fire Protection for Relocatable Structures"
- DOE-HDBK-1062-96, "DOE Fire Protection Handbook"

Supporting Knowledge and/or Skills

- a. Describe the essential fire safety principles, requirements, relationships, and importance of these Orders and Standards with respect to fire protection issues.
- b. Discuss the Contractors fire protection responsibilities associated with implementation of these Directives.
- c. Describe the role of the Department's fire protection engineers with respect to implementation of the fire protection requirements of these Directives.

2. Fire protection engineers shall demonstrate a working level of knowledge of the requirements for fire protection related design control processes identified in DOE Directives.

Supporting Knowledge and/or Skills

- a. Describe the key elements of the design, construction and acceptance process as practiced on site.
- b. Identify who may conduct fire protection system and/or component design verifications.

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- c. Describe the conditions to be considered when inspecting and testing fire protection systems so as to be able to verify or validate design features.

3. Fire protection engineers shall demonstrate a working level knowledge of typical fire suppression systems.

Supporting Knowledge and/or Skills

- a. Identify the various types of fire protection systems and their suitability for protecting typical site fire hazards.
- b. Identify the applicable National Fire Protection Association (NFPA) Code or Standard.
- c. Identify some of the fundamental design principles of each system.
- d. Identify some of the basic inspection, test and maintenance requirements for typical systems.

4. Fire Protection Engineers shall demonstrate a working level knowledge of fire barriers and their related appurtenances.

Supporting Knowledge and/or Skills

- a. Define a fire barrier and describe typical devices which provide protection for openings therein.
- b. Identify the applicable NFPA standards that apply to fire barriers, fire doors and fire dampers.
- c. Identify some of the basic inspection, test and maintenance requirements for fire barriers, fire doors and fire dampers.

5. Fire Protection Engineers shall demonstrate a working level knowledge of a fire water distribution system.

Supporting Knowledge and/or Skills

- a. Describe the various components of a fire water distribution system.
- b. Identify the applicable NFPA standards that apply to a fire water distribution system.
- c. Identify some of the more fundamental design principles associated with a fire water distribution system.
- d. Identify some of the basic inspection, test and maintenance requirements for a fire water distribution system.
- e. Calculate pressure and flow availability.

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6. Fire Protection Engineers shall demonstrate a working level knowledge of a fire alarm and signaling system.

Supporting Knowledge and/or Skills

- a. Describe the various components of a fire alarm and signaling system.
- b. Identify the applicable NFPA Code that applies to a fire alarm and signaling system as well as other Standards that are applied in conjunction with it.
- c. Identify some of the fundamental design principles associated with a fire alarm and signaling system.
- d. Identify some of the basic inspection, test and maintenance requirements for a fire alarm and signaling system.

7. Fire Protection Engineers shall demonstrate a working level knowledge of the Life Safety Code.

Supporting Knowledge and/or Skills

- a. Describe the basic elements of a means of egress.
- b. Describe how occupancy considerations influence emergency egress requirements.
- c. Describe several emergency egress issues on site and how they have been resolved.
- d. Define the "equivalency concept" as and the "exemption process" delineated in NFPA Standard 101 and DOE directives.

8. Fire Protection Engineers shall demonstrate a working level knowledge of a fire department/brigade "Baseline Needs Assessment."

Supporting Knowledge and/or Skills

- a. Describe the fundamental responsibilities of a DOE fire department or brigade.
- b. Describe the activities that are typically performed by a fire department/brigade at the scene of a fire.
- c. Identify some of the NFPA Standards that are applicable to a DOE fire department/brigade.

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9. **Fire Protection Engineers shall demonstrate a working level knowledge of the essential elements of a documented fire safety program.**

Supporting Knowledge and/or Skills

- a. Explain the importance of a comprehensive fire safety program.
- b. List some of the policies, practices and procedures that are encompassed by a fire protection program.

10. **Fire Protection Engineers shall demonstrate at the working level the ability to conduct fire protection and emergency services assessments, develop corrective actions and recommendations, communicate assessment results verbally and in writing, and develop supporting results.**

Supporting Knowledge and/or Skills

- a. Conduct a comprehensive compliance-based and performance-based fire safety assessment.
- b. Compose a comprehensive assessment report, including recommendations for corrective action.
- c. Orally communicate the results of the assessment in a public forum (meeting).

CONTINUING EDUCATION, TRAINING AND PROFICIENCY PROGRAM

The following list represents suggested continuing education, training and other opportunities that are available for *federal fire protection engineers* after completion of the competency requirements in this technical Functional Area Qualification Standard. It is extremely important that personnel involved with *fire protection engineering* maintain their proficiency through continuing education, training, reading, or other activities such as workshops, seminars, and conferences. The list of suggested activities was developed by the Subject Matter Experts involved in the development of the Functional Area Qualification Standard and is not all inclusive.

Based on the knowledge and experience of the Subject Matter Experts, it is suggested that Individual Development Plans (IDP) be the basis for determining the type and quantity of *fire protection-related* learning activities per year that are necessary to maintain proficiency in the *fire protection* functional area after completion of the competencies in the Standard and other requirements of the Technical Qualification Program.

It is recommended that 30 or more proficiency points be earned in any 3 year period after certification of satisfactory completion of the prerequisite and competency requirements for a federal fire protection engineer.

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The following paragraph provides guidance for assigning proficiency points. Additional activities of a similar nature related to fire protection engineering duties may be assigned points as agreed in the individual development plans.

Active participation in fire protection duties:

- 1 point per year for each 500 work hours performing fire protection duties
- Not to exceed 12 points in 3 years

Participation in fire protection assessments/evaluations:

- 1 point for each assessment of 2 weeks duration on site
- Assessments lasting less than 2 weeks may be rolled-up into 2 week totals
- Not to exceed 6 points in 3 years

Maintenance of PE Registration in Fire Protection Engineering

- 1 point per year

Pass EIT exam or PE exam in fire protection

- 4 points per exam
- One time only

Membership in fire protection organizations such as NFPA, SFPE, DOE FSC

- 1 point per year per organization
- Not to exceed 6 points in 3 years

Active member of technical committee in field of fire protection (NFPA, ASTM, SFPE)

- 1 point per year per committee
- Not to exceed 6 points in 3 years

Chair technical committee in field of fire protection

- 1 point per year
- Not to exceed 3 points in 3 years

Professional publications on fire protection topics

- 1 point per publication
- Not to exceed 3 points in 3 years

Successfully complete Undergraduate and graduate-level fire protection courses offered by:

- Illinois Institute of Technology
- Oklahoma State University
- University of Maryland
- Worcester Polytechnic Institute
- Other Accredited Institutions

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- 1 point per credit hour in year earned
- Not to exceed 12 points in 3 years

Successfully complete fire protection courses/seminars courses offered by:

- Department of Energy
- DOE Operating Contractors
- NFPA
- Factory Mutual Research Corporation
- Other Federal and Non-federal agencies

- 2 points per day of training or 1 point per CEU
- Not to exceed 12 points in 3 years

Attend Professional Fire Protection conferences, workshops and meetings, such as:

- Annual DOE/Contractor Fire Safety Workshop
- NFPA Annual and Fall Meetings

- 1 point per day of participation
- Not to exceed 18 points in 3 years

Presentations at fire protection conferences, meetings, seminars, courses

- 1 point per presentation
- Not to exceed 6 points in 3 years

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APPENDIX A

LIST OF CONTINUING EDUCATION, TRAINING AND OTHER ACTIVITIES

Undergraduate and graduate-level courses offered by:

- Illinois Institute of Technology
- Oklahoma State University
- University of Maryland
- Worcester Polytechnic Institute
- Other Accredited Institutions (such as Community Colleges)

Topic-specific courses offered by:

- Department of Energy
- DOE Operating Contractors
- NFPA
- Factory Mutual Research Corporation
- Other Federal and Non-federal agencies

Professional conferences, workshops and meetings, such as:

- Annual DOE/Contractor Fire Safety Workshop
- NFPA Annual and Fall Meetings
- NFPA Technical Standards Committee Meetings
- ASTM E-5 Committee Meetings
- Other Industry Meetings

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CONCLUDING MATERIAL

Review Activity:

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Field Offices

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Oak

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Preparing Activity:

DOE-EH-51

Project Number:

TRNG-0011

Area Offices

Amarillo Area Office

Kirtland Area Office

Princeton Area Office

Rocky Flats Area Office