



## Department of Energy

Washington, DC 20585

May 15, 2001

The Honorable John T. Conway  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW, Suite 700  
Washington, DC 20004

Dear Mr. Chairman:

Consistent with the Department's Implementation Plan for the Defense Nuclear Facilities Safety Board (Board) Recommendation 2000-2, enclosed is the deliverable for Commitment 13 that was due in April 2001.

Commitment 13 calls for the Department to develop a plan for conducting a comprehensive study that provides for an in-depth evaluation of the capability to respond to wildfires and emphasizes facility fire safety, including fire detection and suppressed systems and programs that support those systems.

The enclosed Evaluation Plan has been reviewed and discussed with the Board staff during its development. We have begun initial efforts in implementing the Plan.

If you have any questions, please contact me at (202) 586-6151 or Mr. Frank Russo at 301-903-1845.

Sincerely,

A handwritten signature in black ink that reads "Steven V. Cary".

Steven V. Cary  
Acting Assistant Secretary  
Office of Environment, Safety and Health

Attachment



Printed with soy ink on recycled paper

Office of Independent Environment, Safety, and Health Oversight  
Environment, Safety and Health

# *Evaluation Plan*

*Department of Energy  
Facility Fire Safety Review*



May 2001

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### Abbreviations Used in This Report

ASTM	American Society for Testing and Materials
CAIRS	Computerized Accident/Incident Reporting System
CFR	Code of Federal Regulations
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
EH	DOE Office of Environment, Safety and Health
FHA	Fire Hazards Analysis
IP	Implementation Plan
ISM	Integrated Safety Management
NFPA	National Fire Protection Association
NWCG	National Wildfire Coordinating Group
OA	DOE Office of Independent Oversight and Performance Assurance
ORPS	Occurrence Reporting and Processing System
QA	Quality Assurance
QC	Quality Control
QRB	Quality Review Board

# OVERSIGHT

## Executive Summary

During the year 2000 the United States suffered significant loss of private property and natural resources due to wildfires. The Department of Energy experienced a number of wildland fires at several of its sites. The most notable was the Cerro Grande Fire that caused extensive damage to the Los Alamos National Laboratory and the adjoining community. Based on the “lessons learned” from these fires and recognizing that potential future vulnerability exists, the Secretary of Energy decided to undertake a multi-faceted fire safety initiative. Key facets of this initiative include the performance of a wildland fire safety review; creation of an advisory commission on fire safety and preparedness pursuant to the Federal Advisory Committee Act; and a comprehensive study of facility fire safety.

The report, entitled *Initial Joint Review of Wildland Fire Safety at DOE Sites*, was published in December 2000. The *Review* identifies opportunities for improvement that can reduce vulnerability to wildfires. Department of Energy headquarters and field elements have been directed to prepare implementation plans for these recommended improvements, which are to be institutionalized prior to the year 2001 fire season.

The Department of Energy Commission on Fire Safety and Preparedness has recommended that the Department’s wildland fire safety programs be enhanced, consistent with the findings from the *Initial Joint Review*. The Commission has organized four subcommittees and is continuing to develop recommendations for Secretarial consideration on departmental fire safety programs.

An interagency agreement on wildland fire management has been issued. The Department of Energy is currently developing its prescribed burn policy and associated guidance in light of this agreement.

This Evaluation Plan addresses all essential elements of a comprehensive fire safety program in accordance with the Secretarial directive of October 2, 2000. It fulfills the Department of Energy’s Commitment #13 to the Defense Nuclear Facilities Safety Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*.

The review will be conducted as a formal action by the Headquarters Office of Independent ES&H Oversight. It will focus on fire protection programs, vital safety systems, and interactions with local affected agencies and communities specific to selected sites that collectively are indicative of Departmental operations complex-wide.

### Scope

This review will build upon existing knowledge regarding current fire safety and emergency preparedness issues within the Department of Energy (DOE). This knowledge and these issues have been delineated in recent summary reports prepared by both the DOE and the Defense Nuclear Facilities Safety Board (DNFSB). These reports include the January 1999 summary of field responses to the 1998 Secretarial Memorandum on fire safety programs; DNFSB Technical Report 26, *Improving Operation and Performance of Confinement Ventilation Systems at Hazardous Facilities of the Department of Energy*; DNFSB Technical Report 27, *Fire Protection at Defense Nuclear Facilities*; DNFSB Recommendation 2000-2, *Configuration Management, Vital Safety Systems*; and the *Initial Joint Review of Wildland Fire Safety at DOE Sites*.

The objective of this review is to provide the Secretary and the Commission an assessment of DOE’s fire safety program and emergency response systems. This assessment will include an identification of noteworthy practices as well as complex-wide and site-specific recommendations for improvement.

Seven sites have been preliminarily identified for review that will achieve a cross-section of the diverse characteristics represented by DOE operations throughout the complex. The final determination of sites to be reviewed will be made after consultation with representatives of the responsible Program Secretarial Offices. The seven sites selected for review are as follows:

- Brookhaven National Laboratory (BNL)
- East Tennessee Technology Park (ETTP)
- Hanford (HAN)
- Idaho National Engineering and Environmental Laboratory (INEEL)<sup>1</sup>
- Los Alamos National Laboratory (LANL)
- Oak Ridge National Laboratory (ORNL)<sup>2</sup>
- Strategic Petroleum Reserves (SPR)

No on-site review is planned for the Y-12 site, as several comprehensive fire safety reviews have been conducted at Y-12 and various fire safety weaknesses have already been identified. However, the Office of Independent ES&H Oversight does plan to meet with Y-12 personnel in the near future. The purpose of the meeting will be to obtain an improved understanding of recent internal assessment activities performed by Y-12 relative to the fire safety program, proposed compensatory measures, and the status and effectiveness of long term corrective actions that have been planned or implemented to address weaknesses identified. The Office of Independent ES&H Oversight will routinely monitor the status and effectiveness of these corrective actions.

Collectively these sites provide a strong representation of the breadth of DOE operations, fire hazards, and loss-potential indicators (e.g., occurrence

reports). As shown in Table 1, the sites selected have characteristics spanning a wide spectrum that is consistent with the diversity of activities within the Department. If alternative sites are chosen as a result of the above-referenced consultative process, they will be comparably representative.

Selection criteria for site-specific facilities (buildings and other structures) to be reviewed will include process hazard type, fire risk, fire loss history, facility construction, and existing active (i.e., fire detection and suppression systems) and passive (i.e., barriers and spatial separation) fire protection. When appropriate, consultation will be sought from authoritative individuals, such as representatives of the responsible Program Secretarial Offices, fire protection program managers, cognizant engineers, and fire chiefs to facilitate facility selection and to avoid duplication of oversight activities. This will coincide with a planned “scoping visit” to the site by selected EH review team members.

It is noted that assessments of vital safety systems, which may include fire protection systems, are underway at a number of facilities, as documented in DOE’s Implementation Plan (IP) to address DNFSB Recommendation 2000-2. Efforts to be completed for this fire safety review will not duplicate those being taken to fulfill the Department’s commitments that are delineated in the IP, as further clarified below.

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<sup>1</sup> Information recently obtained on the site fire protection program will be used. Reference the report titled: “*Focused Safety Management Review of the Idaho National Engineering and Environmental Laboratory*,” dated January 2001.

<sup>2</sup> The Oak Ridge National Laboratory (ORNL), Y-12 Plant (Y-12), and the East Tennessee Technology Park (ETTP) comprise the Oak Ridge Reservation (ORR). Programmatic reviews and focused evaluations are planned of selected facilities and activities at ORNL and ETTP.

**Table 1. Salient Features of Department of Energy Sites Selected for Fire Safety Review**

Feature	Site						
	BNL	HAN	INEEL	LANL	SPR	ORR	
						ORNL	ETTP
Physical and Demographic Characteristics							
Acreage	5,300	358,388	571,000	27,520	1,696	24,600	4,689
Aging facilities	•	•	•	•		•	•
Aging fire safety systems	•	•	•	•		•	•
Deactivation and dismantlement	•	•	•	•	•	•	•
Employment (full-time Federal and contractor)	3,244	10,000	6,380	8,055	1,150	4,240	1,778
Geographic location	Northeast	Northwest	West	West	Southwest	Southeast	Southeast
Incineration capability	•		•				•
Legacy waste	•	•	•	•		•	•
Number of key facilities	6	10	8	10	4	19	10
Proximity to populated areas (approximate miles)	1	1	50	1	20	1	4
Reactors	•	•	•	•		•	•
Weapons activities		•	•	•		•	•
Wildlands	•	•	•	•	•	•	•
Contract Type	M&O	M&I	M&I	M&O	M&O	M&I	M&I
Energy research	•	•	•	•		•	•
Environmental management and restoration	•	•	•	•	•	•	•
Fossil energy					•		
History of fire loss	•	•	•	•			•
Lead Headquarters program office	SC	EM	EM	DP	FE	SC	EM
Nuclear energy	•	•	•	•		•	•
Privatization initiatives			•				•
Responsible field office	CH	RL	ID	AL	SPRO	OR	OR

**Key:**

- AL Albuquerque Operations Office, Albuquerque, NM
- BNL Brookhaven National Laboratory, Brookhaven, NY
- CH Chicago Operations Office, Chicago, IL
- DP Office of the Assistant Secretary for Defense Programs (Headquarters)
- EM Office of the Assistant Secretary for Environmental Management (Headquarters)
- ETTP East Tennessee Technology Park, Oak Ridge, TN
- HAN Hanford Site, Richland, WA
- ID Idaho Operations Office, Idaho Falls, ID
- INEEL Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID
- LANL Los Alamos National Laboratory, Los Alamos, NM
- M&I Management and Integrating Contractor
- M&O Management and Operating Contractor
- ORR Oak Ridge Reservation, Oak Ridge, TN
- OR Oak Ridge Operations Office, Oak Ridge, TN
- ORNL Oak Ridge National Laboratory, Oak Ridge, TN
- RL Richland Operations Office, Richland, WA
- SC Office of Science (Headquarters)
- SPR Strategic Petroleum Reserves, Bryan Mound and Big Hill, TX; West Hackberry and Bayou Choctaw, LA
- SPRO Strategic Petroleum Reserves Project Office, New Orleans, LA
- Y-12 Y-12 Plant, Oak Ridge, TN

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## Methodology

The minimum requirements governing the scope and frequency of DOE's fire safety assessment activities are codified in DOE Order 420.1, *Facility Safety*, and its corresponding Implementation Guide (G-420.1/B-0) for fire safety programs. Supplementing these directives are assessment guidelines developed by the DOE Headquarters Office of Oversight, along with fire protection assessment criteria and "model" assessment reports that are contained in the DOE Fire Protection Handbook (DOE-HDBK-1062-96).

The scope, methodology, and specific lines-of-inquiry contained in this evaluation plan are consistent with Departmental oversight protocols and reflect the experience and knowledge gained from historic fire safety appraisal programs and recommendations from recent initiatives. The document entitled, *A Report to the Secretary of Energy: Initial Joint Review of Wildland Fire Safety at DOE Sites*, dated December 2000, provided new information that supplemented the existing DOE fire safety database.

Lines-of-inquiry will address the essential elements of comprehensive fire protection and emergency services programs consistent with the principles of an effective integrated safety management (ISM) system, applicable DOE directives and existing contract requirements. "Vertical slice" reviews, which evaluate all essential facets of effective fire safety programs for a given focus, will be conducted on representative facilities, some "essential" fire protection systems, certain work activities that pose unique fire risks, and select fire department training evolutions.

The review will assess line management commitments to ensure that "vital" fire protection systems are adequately addressed in the overall ISM framework. This will include a review of a number of Phase I assessments of these systems that are being performed in response to DNFSB Recommendation 2000-2. Where Phase II assessments have already been completed for certain fire protection systems, the review will focus on other fire protection systems to verify that an adequate program is in place to assure system

operability. Where Phase II assessments have not yet been completed, the review will include selected vital fire protection systems. The documented results from this review may be considered as meeting the Department's 2000-2 commitments for those systems.

All review team members will possess qualifications commensurate with their assigned tasks, which will include fire protection program management, code compliance, fire modeling, hazards analysis, fire protection system design, system testing and maintenance, ISM principles and practices, fire safety assessments, and environmental impact from fires. Qualified fire protection engineers, and other safety professionals with fire department management, command, "field," and "systems evaluation" experience will also be included on the review team. Office of Independent Oversight and Performance Assurance (OA) personnel will provide support in evaluating the emergency management aspects of the review. DOE Program and Field Office fire protection engineers will participate in the review, consistent with the direction provided in the Secretary's tasking memorandum. Concern for the physical safety of the team members, as well as security concerns, may result in the exclusion of some facilities from the review.

**Planning Activities:** Prior to each site evaluation, the team will conduct a "scoping visit" to facilitate facility selection, to identify and obtain relevant project documents for review, to prepare appropriate lines-of-inquiry, and to understand any site specific constraints. Because a principal goal of the scoping visit is to facilitate development of an effective evaluation plan, the team leader will request that DOE site contractor fire protection and emergency services personnel provide an overview of the fire safety program within its overall scheme of integrated safety management. This overview should be concise and provide information and points of contact for the following areas:

- Manifestations of management commitment to fire safety



- Fire safety and emergency response roles and responsibilities
- Community “outreach” activities related to fire safety (e.g. established relationships, risk communication, community concerns)
- Sampling capabilities and applicable standards for a potential release due to fires
- Contractual and other requirements governing the fire safety program
- Applicable fire safety performance measures
- Major fire safety and emergency response issues on site
- Common or mutual fire emergency response agreements
- Response to the 1998 and 2000 Secretarial Fire Safety Initiatives, DNFSB Technical Reports 26 and 27, and commitments made to satisfy DNFSB Recommendation 2000-2
- Status of pending actions in response to recommendations provided in the December 2000 “Initial Joint Review of Wildland Fire Safety at DOE Sites”
- Issues tracking system related to fire protection
- Status of pending action on fire safety self-assessment findings
- Basis for risk determination
- Inspection, Testing and Maintenance Program
- Description of construction activities on site
- Recent fire events of significance, “off-normal” and “unusual occurrences”

- Fire protection engineering and fire department or fire brigade points of contact in relation to the current review’s delineated lines of inquiry.

The teams’ proposed schedule for each evaluation will be discussed with cognizant representatives of the Lead Program Secretarial Offices and DOE and contractor site representatives.

**Field Activities:** The team leader will provide an in-briefing that includes an introduction of the EH review team members and a presentation of the scope and schedule of the review. At the in-briefing, DOE site and contractor fire protection and emergency services representatives will be requested to provide information on recent changes and events associated with the site fire safety program that transpired since the scoping visit in order to update the team. Team activities will include personnel interviews; facility and site tours; review of documents and records, including maintenance inspection plans and fire protection system test results; and observations of work activities, including a fire department training activity (drill). Every effort will be made by the review team to minimize disruption of site routine. Daily briefings by the team leader will be offered to DOE and contractor counterparts to review and discuss observations from each day’s activities, to analyze key observations and areas requiring follow-up, and to plan subsequent activities. The site visit will conclude with an exit briefing by the team leader where any issues and observations requiring discussion will be surfaced, and preliminary results will be provided to site representatives.

**Site-Specific Reports:** The team will prepare a draft (site-specific) report that documents the results of the review after leaving the site. This draft report will be submitted to a Quality Review Board (QRB) and to the site for review to ensure factual accuracy prior to publication and distribution.

**Department-Wide Summary Report:** Upon completion of all of the site-specific reports, the review team will prepare a draft consolidated summary report that condenses and synthesizes the results from the overall fire safety review. It will include identification of noteworthy practices, complex-wide and site-specific recommendations for improvement, and complete information related to the nature of fire risk at DOE sites, including potential loss and damage to the environment. The report will be submitted to a Quality Review Board (QRB) and to the site for review to ensure factual accuracy prior to publication and distribution.

## Schedule

For each site, the approximate schedule will be:

- Week 1: Initial contact with DOE and contractor site representatives
- Week 4: Site scoping visit and document request
- Week 6: Receipt of documents
- Weeks 8-9: On-site evaluation (two weeks)
- Week 10: Preparation of draft report

Weeks 11-12: QRB and site factual accuracy reviews

Week 13: Preparation of final report

Week 14: Submittal of final report

A site-specific schedule is being prepared that will be coordinated with the Lead Program Secretarial Offices, Field Office representatives and other Headquarters organizations participating in the overall review.

## Approach and Lines of Inquiry for the Department of Energy Facility Fire Safety Review

### A. Inspection Approach

1. Review relevant fire protection program documentation prior to the site visit, including site policies, fire prevention procedures, authorization basis documents, fire hazards analyses (FHAs) and assessment reports, representative contracts, fire department and fire brigade baseline needs assessments, fire pre-plans, and standard operating procedures.
2. Conduct interviews with cognizant personnel, including Headquarters program managers, fire protection (and related) program managers, engineers, technicians, a “crosscut” of employees and subcontractors, fire department and fire brigade personnel, and off site “stakeholders.”
3. Tour representative facilities (including a “random” sample of all buildings) that are characteristic of the site’s diverse missions, operations, hazards, and corresponding safeguards. This will include fire department stations and training facilities.

4. Review fire protection system inspection, testing and maintenance records, and personnel training records, while on site.
5. Observe fire department and fire brigade drills, in conjunction with the regularly scheduled training program.
6. Observe representative work activity that represents a significant fire risk.

### B. Lines of Inquiry

**Performance Objective:** The site (or facility) is governed by an up-to-date (within three years), comprehensive, documented fire safety program.

#### Evaluation Criteria:

- a. Management exhibits a significant and measurable commitment to fire safety.
  1. A current policy statement or equivalent directive has been issued that articulates management expectations regarding fire safety and emergency services.

2. A complete set of fire protection and emergency services “performance measures” have been adopted, such as those developed by the DOE Fire Safety Committee.
  3. Fire safety and emergency services management roles and responsibilities are clearly delineated.
  4. Funding sources have been institutionalized to fully support the fire protection program, commensurate with established site priorities.
  5. Established and effective relationships exist between site management and off-site fire safety “stakeholders” (e.g., emergency response organizations, community groups).
  6. Two-way channels of communication (such as periodic meetings or teleconferences, etc.) exist between site management and off-site stakeholders.
  7. Fire safety professionals are represented on management working groups (e.g. safety committees and budget formulation working groups).
  8. An issues tracking system has been institutionalized, which encompasses all significant fire safety issues and complies with DOE O 414.1A, “Quality Assurance.” This system includes a means to prioritize issues, to allocate funding on the basis of these priorities, and to implement “interim compensatory measures” when there will be a significant delay with the implementation of corrective measures.
- b. A documented fire safety program exists.
1. The elements of the fire protection engineering program can be found in a fire protection program manual (or equivalent documents).
  2. The facets of the site emergency services program are delineated in fire department or brigade operating procedures and equivalent documents.
3. Site (or facility) organizational and physical changes (such as fire protection upgrades) that have occurred within the past few years have been reflected in the (fire safety) program documentation.
  4. Auditable training records exist for the fire safety staff (including emergency responders).
  5. Appropriate procedures and records are available which encompass the inspection, testing and maintenance of fire protection systems.
  6. A file(s) exists which contains the documented resolution of all significant fire safety issues related to new construction projects.
- c. The fire safety program document addresses all of the essential elements of a comprehensive fire protection.
1. Applicable regulations, DOE fire safety directives, and industry standards (such as applicable NFPA and NWCG standards) have been incorporated into the program.
  2. Site-specific policies and practices have been implemented where DOE directives and industry standards may be insufficient to mitigate risk.
  3. Comprehensive written agreements exist with off-site organizations that have roles and responsibilities for fire safety.
- d. The fire protection program applies to leases and to the activities of subcontractors to the extent that they involve operations that pose a risk to the public, site workers, DOE programs, and Government facilities.
1. Appropriate clauses related to fire safety are incorporated into contracts governing activities that represent a significant fire risk.
  2. Lease agreements for buildings in which DOE employees, assets, or program activities will be housed contain appropriate language governing fire protection.

**Performance Objective:** Fire and related safety hazards on site (or within the facility) have been identified and evaluated in conjunction with a current and comprehensive FHA and self-assessment.

**Evaluation Criteria:**

a. Current FHAs and facility (fire protection) self-assessments have been performed for all applicable facilities and other locations.

1. All facilities for which FHAs and fire safety self-assessments are required have been identified.
2. A site program exists governing the periodic updating of these documents.
3. FHAs and assessments are current as compared to the established schedule.
4. FHAs and fire safety assessments have been performed for external areas (storage yards, substations, restricted and contaminated areas).

b. The FHAs and self-assessments address all essential elements for a complete analysis.

1. The documents contain a complete description of the facility, including process operations and related hazards.
2. The FHAs and assessments include a textual description of credible fire scenarios, including those involving wildfire and radiological and chemical hazards.
3. The documents identify external fire exposures (such as those from wildland fires) and evaluate the potential for fire and smoke spread from one (fire) area to another within the facility. The potential for external smoke damage to safety systems and equipment (such as diesel generator intakes) has been evaluated.
4. The FHAs and assessments describe the spectrum of fire prevention and protection features in relation to their ability to control fire and reduce risk.

5. The documents identify significant variances from DOE directives and NFPA standards, to the extent that they adversely affect fire safety.

6. The FHAs incorporate state-of-the-art risk assessment methodologies, as appropriate.

7. The FHAs comprehensively describe and evaluate the intervention by site (and off-site) emergency services organizations.

c. The information contained in the FHA and assessment is accurate.

1. The information represented in typical FHAs and self-assessments was confirmed by a facility tour as part of the assessment.
2. Noted inconsistencies in the site FHAs and self-assessment are not significant.
3. The site USQD process has been applied adequately with regard to fire safety issues that have arisen.

d. Fire modeling or other analytical tools used in the assessment of (fire) risk are appropriate, validated and reach conservative conclusions.

1. Fire models used have been subjected to an (evaluation) process by qualified fire protection engineers/fire modelers that verifies their validity for the given situation.
2. The models have been applied by experienced and qualified fire protection engineers.
3. Risk assessment techniques are not utilized to reduce defense-in-depth.
4. All assumptions and technical bases for the use of fire models have been identified and justified.
5. Bracketing calculations for given fire scenarios are provided to validate conclusions regarding bounding results of the analyses.
6. Quantitative analyses results are not used as the sole basis for deciding levels of fire protection.

Performance Objective: Fire prevention procedures have been implemented and fire safety features have been installed to mitigate fire risk.

#### Evaluation Criteria:

- a. A complete spectrum of fire prevention controls and procedures are in existence and have been implemented.
  1. Fire safety “defense-in-depth” exists across the site and encompasses all significant facilities and activities for which fires and related hazards represent a credible threat.
  2. Fire and related hazards that are unique to DOE and are not addressed by industry standards are protected by isolation, segregation, or special fire control systems (e.g., inert gas, explosion suppression).
  3. Passive fire safety features (such as fire walls or “defensible areas” around facilities and utilities) are favored over active systems. Engineering and design controls are favored over administrative controls.
  4. Fire prevention procedures, fire protection systems, and manual fire fighting capabilities have been confirmed by representative “vertical slice” reviews.
- b. All fixed fire protection features (appropriate construction types, fire barriers, fire alarm and signaling systems, manual and automatic fire suppression systems, etc.), that are required by authorization basis documents and FHAs have been designed and installed and are being maintained.
  1. Required fire safety features have been confirmed in comparison with authorization basis documents, FHAs, DOE directives, and NFPA standards.
  2. Fire protection features have been appropriately classified as “essential,” “important to safety,” and “defense in depth.”
  3. Fire protection systems are designed, installed and maintained such that their inadvertent operation, inactivation, or failure of structural stability will not result in the loss of vital safety functions, inoperability of safety class systems, or personal injury.
4. “As-built” drawings and related documents exist for installed fire safety systems.
- c. A process exists to assure that all fire prevention and protection features (including modifications to these systems) are reviewed and approved by a qualified fire protection engineer.
  1. The site has a program in place governing the review of construction project design packages by a qualified fire protection engineer.
  2. Projects cannot proceed without the (signature) approval of the cognizant fire protection engineer.
  3. The DOE field office and program office fire protection staffs are involved with the approval of significant projects involving fire safety.
- d. Applicable industry standards (NFPA, ASTM, etc.) were used in the design, installation and testing of the fire protection features.
  1. The utilization of industry standards was confirmed by a select review of construction plans and specifications, authorization basis documents, and self-assessment reports.
  2. Conformance with industry standards was confirmed on the basis of facility tours.
  3. Fire protection system inspection, testing and maintenance programs (scope and frequencies) conform to NFPA 25 and 72, as amended by DOE Implementation Guidance.
  4. A QA/QC program on site, which complies with DOE O 414.1A, governs the specification, purchase, inspection, acceptance-testing, and maintenance of fire protection components and systems.
  5. Preventive and corrective maintenance programs are effective in assuring the operability and availability of fire protection systems.

6. Abnormal alignment or impairments to fire protection systems are effectively managed.

**Performance Objective:** Facility fire protection systems are operated, maintained, tested, and configured in a manner that assures the availability and capability to perform the intended function as described in governing documents, including the authorization basis and FHA.

#### Evaluation Criteria:

- a. The fire protection system(s), including any essential support systems and equipment, are effectively maintained to assure operability, availability, and the capability to meet the designed fire protection function.
  1. A preventive maintenance (PM) program is established and is effective in assuring timely preventive maintenance of the system and components.
  2. An effective corrective maintenance program is established to assure the timely repair of defective systems, support systems, and equipment, and the adequacy of the material condition of systems and equipment.
  3. Procedures utilized for maintenance are effective in assuring effective maintenance and continuing operability and availability of fire protection systems.
  4. Fire protection systems or equipment removed from service or “impaired” for maintenance are adequately controlled, documented, and restored to service, and any necessary compensatory measures are implemented during the outage.
  5. Post-maintenance testing is effectively utilized to assure the adequacy of preventive or corrective maintenance and the operability of the system or equipment.
  6. A program on controls is in place to monitor and effectively mitigate the impact of aging or fire protection systems, equipment, and

components on the capability to meet the intended safety function(s).

- b. The fire protection system and equipment, including support systems, are subject to surveillance testing that assures the continuing capability to perform the intended function.
  1. An effective surveillance testing program is established to assure that the fire protection system, support systems, and equipment are capable of performing their intended functions.
  2. Surveillance tests are scheduled, planned and conducted on a timely basis and in accordance with technical safety requirements and vendor recommendations.
  3. Surveillance tests are coordinated and communicated between maintenance and operations to assure effective conduct, compensatory measures, anticipation of alarms, and restoration to service.
  4. Surveillance testing is conducted in accordance with approved procedures and the results documented on a real-time basis.
  5. Failed surveillance tests are properly documented, reported, and reviewed by engineering and management and utilized to conduct corrective maintenance as well as any necessary adjustments to surveillance testing or preventive maintenance.
  6. Effective compensatory measures are implemented when fire protection systems or equipment fail surveillance tests including assurance with technical safety requirements, fire watches, and occurrence reporting.
- c. The fire protection systems and equipment are operated in a manner that assures continuing operability and availability and proper operation to meet the intended function.
  1. The fire protection systems and equipment, including essential support systems, are operated in a standby mode that assures the continuing operability and availability to perform the intended function(s).



2. The fire protection systems and equipment are operated in a manner that assures compliance with all applicable regulations, standards, and technical safety requirements.
  3. Abnormal alignments, impairments, or outages of fire protection systems or equipment are effectively documented, controlled, and restored to service.
  4. Procedures utilized to operate fire protection systems and equipment, including under emergency conditions, are adequate to assure the system meets its intended function.
  5. The capability of responsible personnel to operate fire protection systems is assured through adequate staffing, training, and fire drills.
  6. Dead legs, headers, and other stagnant sections of water fire protection systems are periodically flushed to prevent buildup of solid materials and sludge that could interfere with flow in sprinkler systems or fire hoses.
- d. A configuration management program is established and effective in assuring the proper configuration and operability of fire protection systems and equipment and the continuing capability to meet the intended safety functions.
1. The continuing proper alignment and configuration of fire protection systems and equipment is effectively assured through controls such as system and walk-downs, procedures, testing, alignment safety, and independent verification.
  2. Engineering drawings utilized for the operation or maintenance of fire protection systems are properly controlled and maintained current to reflect the as-built (current) system configuration.
  3. Fire protection system components including pumps, valves, electrical breakers, and instruments are properly labeled to assure proper configuration and operation.

4. Design modifications to fire protection systems and equipment are effectively controlled and implemented including engineering, management approval, installation, testing, and the updating of drawings, procedures, and operator training (prior to implementation).
5. The fire protection systems and equipment are currently designed and configured in agreement with the description in the current authorization basis.
6. Are there any required, scheduled, or committed upgrades to fire protection systems on equipment that have been deferred, and if so:
  - Justification for deferrals?
  - Duration of deferrals?
  - Potential impact of deferrals on system capability and life-safety?
7. Fire protection systems and equipment within facilities in long-term shutdown, decommissioning, or under use for storage of hazardous materials are adequately configured, maintained, and operated to mitigate all potential fire hazards to the facility, workers, the public, and the environment.
8. Temporary modifications to fire protection systems and equipment are effectively controlled, including engineering, management approval, compensatory measures, installation, and restoration to normal alignment or configuration.

**Performance Objective:** Personnel are appropriately qualified and trained to perform their work safely and responsibly when confronted by fire hazards and related dangers.

**Evaluation Criteria:**

- a. All employees receive an applicable level of “general” training in (fire) hazard recognition, appropriate safeguards and emergency response.

1. A program exists on site that provides all employees with an appropriate level of fire safety training upon initial employment and on a regular follow-on basis.
  2. Appropriate fire safety training is provided to subcontractors who perform work involving significant fire risk.
- b. Employees and off-site emergency responders, who are exposed to “special” fire hazards, are provided with appropriate initial training and “refresher” training.
1. A documented program exists that identifies which employees and responders are subjected to fire safety hazards that represent a unique risk.
  2. Appropriate training is available to employees who have been identified as needing special fire safety training (e.g., fire fighters, first responders, cutters, welders, and fire watchers).
  3. Special fire safety training has been reviewed by a qualified fire safety specialist (such as a fire protection engineer or fire department safety officer) and has been presented by an individual who has more than a rudimentary level of knowledge of the risks involved.
- c. The fire safety staff (engineers, technicians, fire fighters, managers) are appropriately educated, trained and certified.
1. The staff is encompassed by a professional development or comparable program.
  2. During a given year, the staff has received an appropriate level of continuing education and training in accordance with their individual responsibilities.
  3. Federal employees and individuals who provide assistance, direction, guidance, oversight, or evaluation of contractor fire department and fire protection engineering programs are qualified to do so by DOE-STD-1137-2000, Fire Protection Engineering Functional Area Qualification Standard.

4. Personnel responsible for the maintenance and operation of fire protection systems and equipment are appropriately trained and certified competent.

**Performance Objective:** The site (or facility) is protected by a fully capable emergency services organization.

**Evaluation Criteria:**

- a. A current “baseline needs assessment” (BNA) or equivalent document has been performed for the emergency services organization.
  1. The fire department (or fire brigade) has comprehensively defined its roles and responsibilities for site emergency services.
  2. Off-site emergency response and communications obligations are defined in a “mutual aid” agreement or equivalent document.
  3. Collateral duty roles and responsibilities have been identified and justified.
  4. The mobile apparatus inventory is sufficient for anticipated site emergencies, with appropriate reserve capability.
  5. Fire department (or brigade) staffing levels have been evaluated, defined and met.
  6. Emergency equipment inventories are complete.
  7. Fire department facilities (stations) are designed, constructed and maintained in a manner sufficient to accommodate personnel, apparatus, equipment and program responsibilities (e.g., housing, training, maintenance and storage).
  8. The site fire alarm, signaling system and emergency radio communications capability is reliable and effective.
  9. A clear line of responsibility exists between the fire department or brigade and other site organizations that may also respond to an emergency.



10. Run statistics are complete and current.
  11. Fire department representatives are represented on facility design reviews and the development of authorization basis documentation.
- b. The fire department (or fire brigade) conforms to applicable CFR requirements, NFPA codes and standards, and the criteria of the NWCG.
1. The fire department (or brigade) has developed pre-fire plans for all significant facilities and areas on site.
  2. A complete set of written standard operating procedures (or equivalent) exists which govern the activities of the fire department (or brigade).
  3. The fire fighter training program is complete and current.
  4. Emergency response apparatus and equipment are within acceptable service lives.
  5. Apparatus and equipment are inspected, tested, and maintained in accordance with an established schedule.
  6. The emergency services organization effectively implements the "Incident Command System."
  7. Fire prevention inspections are being performed in accordance with established frequencies.
  8. Fire department or brigade personnel meet required levels of competency and certification.
  9. A fire department or brigade safety and health program has been implemented per the requirements of NFPA Standards 1500/600.
  10. An established risk communication program (for off-site stakeholders) has been established. This includes communication of sampling data to off-site agencies and the public.
- c. In the absence of a site fire department or in the event of need, an adequate level of emergency services can be obtained through off site organizations.

1. The site has comprehensively defined its emergency service needs in relation to off-site fire departments and its obligations to the surrounding communities and related organizations.
2. Appropriate agreements (MOUs, fees for services, etc.) are in place between the site and off-site emergency responders.
3. Site familiarization tours (including hazardous and radiologically contaminated areas) and related training are performed routinely by responsible off-site emergency services organizations.
4. Off-site emergency responders comply with all site-specific training requirements so as to be able to respond safely and effectively to site emergencies.
5. Plans for extended operations, radiological monitoring, and personnel accountability have been developed and practiced.
6. Community "outreach" activities (hazard awareness, risk communication, fire prevention, education and training, communication, etc.) are established and effective.

**Performance Objective:** Data, statistics, "lessons learned" and other "feedback" from the site (or facility) fire safety program are disseminated on site and within the DOE (fire) safety community.

**Evaluation Criteria:**

- a. Performance data and statistics related to the fire protection program are collected and reported.
  1. Fire safety data and statistics are accurately and consistently documented and reported as part of the required annual summary of the fire protection program.
  2. Fires and related events are accurately and consistently documented via the CAIRS and ORPS systems, as applicable.

b. Fire safety-related “near misses” and “lessons learned” are routinely disseminated internally to the DOE community.

1. Site-specific documentation is available to confirm that small fires and other related occurrences are distributed within the contractor organization as “near misses.”

2. Documentation or other information exists to verify that the DOE field office and program office are informed of fire safety-related “near misses” and related information on a regular basis.

3. The DOE “lessons learned” program is utilized to distribute information on fires and related events that may have relevance elsewhere within the DOE complex.

## References

1. 29 CFR 1910, Subpart E, *Means of Egress*
2. 29 CFR 1910, Subpart L, *Fire Protection*
3. 29 CFR 1926, *Safety & Health Regulations for Construction*
4. DNFSB/TECH-6, *Safety Management and Conduct of Operations at the Department of Energy's Defense Nuclear Facilities*
5. DNFSB/TECH-26, *Improving Operation and Performance of Confinement Ventilation Systems at Hazardous Facilities of the Department of Energy*
6. DNFSB/TECH-27, *Fire Protection at Defense Nuclear Facilities*
7. DOE G 414.1-1, *Implementation Guide for Use with Independent Management Assessment Requirements of 10 CFR Part 830.120 and DOE 5700.6C, Quality Assurance*
8. DOE G 450.4-1, *Integrated Safety Management System Guide*
9. DOE G 440.1-5, *Implementation Guide for Fire Safety Program*
10. DOE O 420.1, *Facility Safety*
11. DOE O 440.1, *Worker Protection Management for DOE Federal and Contractor Employees*
12. DOE P 450.4, *Safety Management System Policy*
13. DOE STD-1066-99, *Fire Protection Design Criteria*
14. DOE STD-1088-95, *Fire Protection for Relocatable Structures*
15. DOE HDBK-1062-96, *Fire Protection Handbook*
16. DOE HDBK-1081-94, *Primer on Spontaneous Heating and Pyrophoricity*
17. National Fire Protection Association Codes and Standards
18. Uniform Building Code
19. Factory Mutual Loss Prevention Data Sheets
20. USNRC Guidelines of Fire Protection for Fuel Cycle Facilities
21. National Fire Protection Association Handbook
22. Society of Fire Protection Engineers Handbook