Fire Protection & Safety Engineering

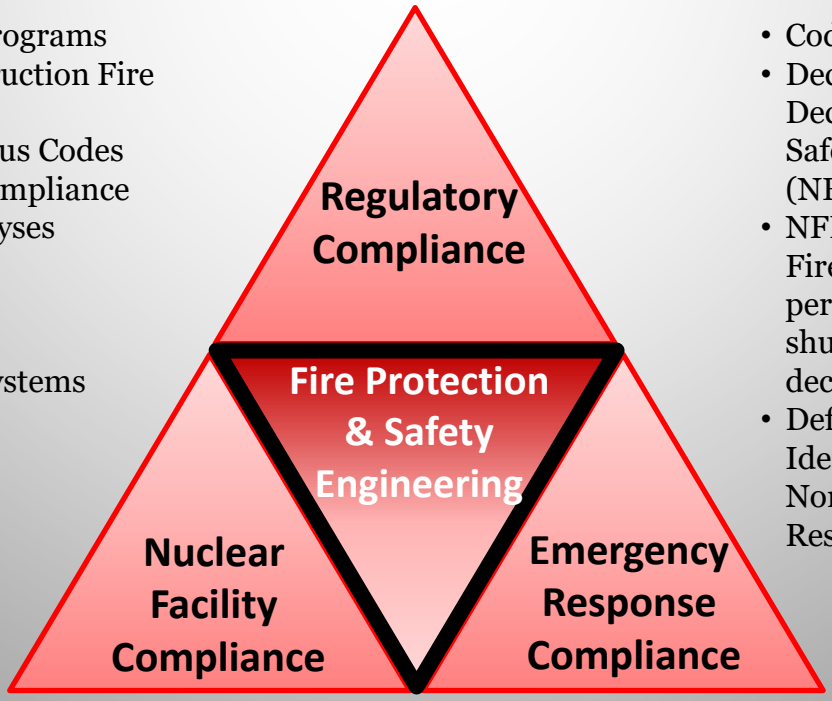
U.S. DOE East Tennessee Technology Park, K-25 Building

Fire Protection and Safety Engineering is the application of scientific and engineering principles, National Consensus Codes and Standards, and expert judgment, based on an understanding of the phenomena and effects of fire and smoke and of the reaction and behavior of people to fire and smoke.

These principles provide measures to minimize loss of life, injuries, environmental impacts and property from the destructive effects of fire and smoke.

TetraTek, Inc. provides a broad spectrum of Fire Protection and Safety Engineering support services to include the following:

- Fire Protection Programs
- Industrial/Construction Fire Safety
- National Consensus Codes and Standards Compliance
- Engineering Analyses & Assessments
- Fire & Explosion Investigations
- Fire Protection Systems Engineering



- Code Analysis
- Decontamination & Decommissioning Fire Safety Compliance (NFPA 241)
- NFPA 801, Chapter 8, Fire Protection during permanent facility shutdown / decommissioning
- Deficiency Identification and Noncompliance Resolution

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Fire Protection and Safety Engineering
Code Analysis

As former regulators, TetraTek, Inc. industry consultants have in-depth experience performing Code Analyses for Facilities, Fire Protection Programs and Processes throughout the industry determining conformance to National Consensus Codes and Standards and Regulatory Requirements. As NFPA Technical Committee Members, not only does TetraTek, Inc. interpret National Consensus Codes and Standards, we also develop them through the policy making process (we write the codes). Additionally, TetraTek, Inc. staff have the knowledge and are successful utilizing alternative approaches and innovative solutions (Code Equivalency Process) to meet the regulatory intent. This Code Equivalency Process is then formulated to meet the objectives of the Organization, Regulator and/or Authority Having Jurisdiction.

As NFPA Technical Committee Members on several pertinent National Consensus Codes and Standards, TetraTek, Inc. interpretations are well received by Organizations, Regulators and Authorities Having Jurisdiction. TetraTek, Inc. personnel are NFPA Technical Committee Members on the following NFPA National Consensus Codes and Standards:

NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials for U.S. DOE Nuclear Facilities and Enrichment Facilities (Fuel Cycle Facilities)

NFPA 805, Performance Based, Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants for Nuclear Power Plants as an alternative to 10 CFR 50, Appendix R

NFPA 804, Standard for Fire Protection for Advanced Light Water Reactor Electric Generating Plants for Nuclear Power Plants

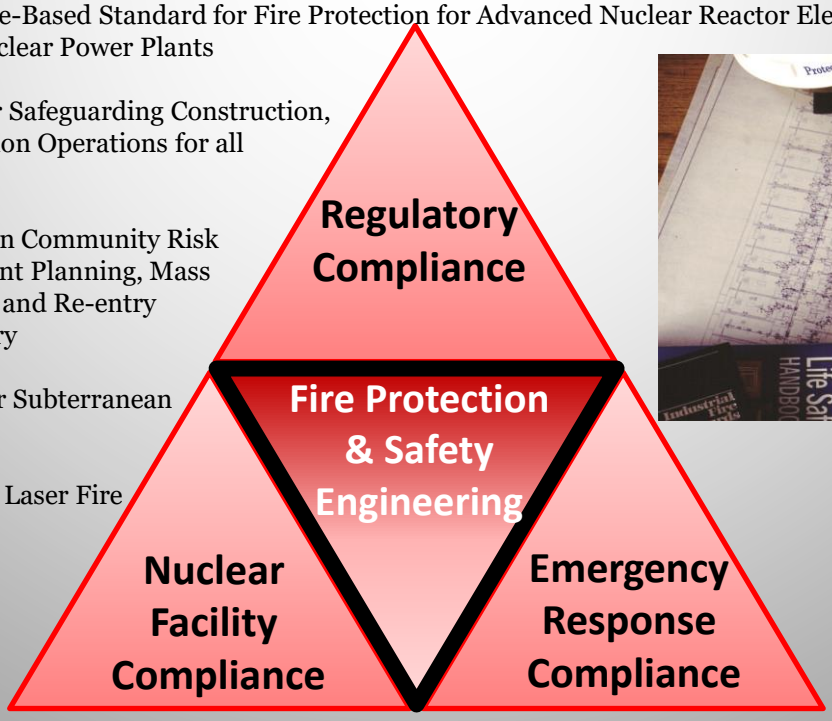
NFPA 806, Performance-Based Standard for Fire Protection for Advanced Nuclear Reactor Electric Generating Plants Change Process For Nuclear Power Plants

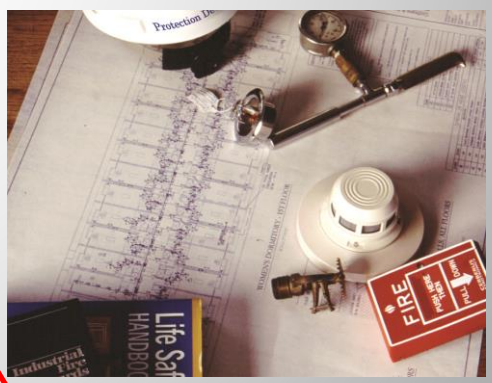
NFPA 241, Standard for Safeguarding Construction, Alteration and Demolition Operations for all industry

NFPA 1660, Standard on Community Risk Assessment, Pre-Incident Planning, Mass Evacuation, Sheltering, and Re-entry Programs for all industry

NFPA 520, Standard for Subterranean Spaces

NFPA 115, Standard for Laser Fire Protection





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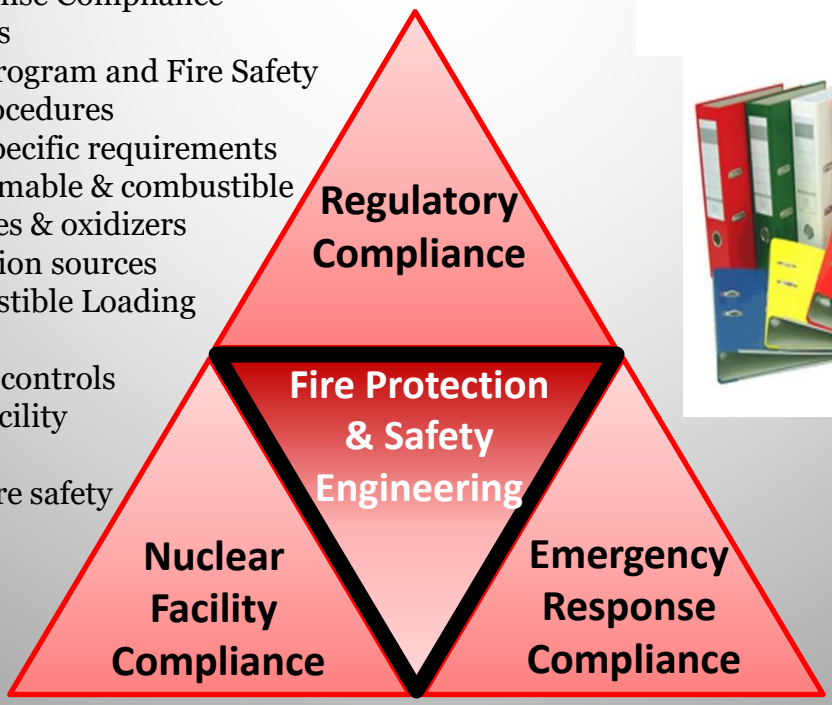
Fire Protection and Safety Engineering

Fire Protection Programs

TetraTek, Inc. has in-depth experience evaluating, developing, implementing and managing (if applicable) comprehensive Fire Protection Programs and/or evaluating, revising and updating existing Fire Protection Programs. A compliant Fire Protection Program will meet the fire safety policy objectives of the Organization, Regulator and/or Authority Having Jurisdiction. As NFPA Technical Committee Members, not only does TetraTek, Inc. interpret National Consensus Codes and Standards, we also develop them through the policy making process (we write the codes). The industry standard Fire Protection Program includes:

- Overall Directive and Management Policies
- Conformance to National Consensus Codes and Standards
- Staff organization, training and responsibilities
- Fire Protection Engineering Analyses and Assessments, including Fire Hazards Analysis
- Design review program
- Inspection, Testing & Maintenance requirements for fire protection systems and equipment including systems engineering requirements
- Impairment process and compensatory measures
- Emergency Response Compliance
- Pre-Incident Plans
- Fire Prevention Program and Fire Safety Implementing Procedures
  - Organization specific requirements
  - Control of flammable & combustible liquids and gases & oxidizers
  - Control of ignition sources
  - Facility Combustible Loading (CL) Program
  - Administrative controls
  - Documented facility inspections
  - Construction fire safety
- Water supply requirements
- Site specific requirements



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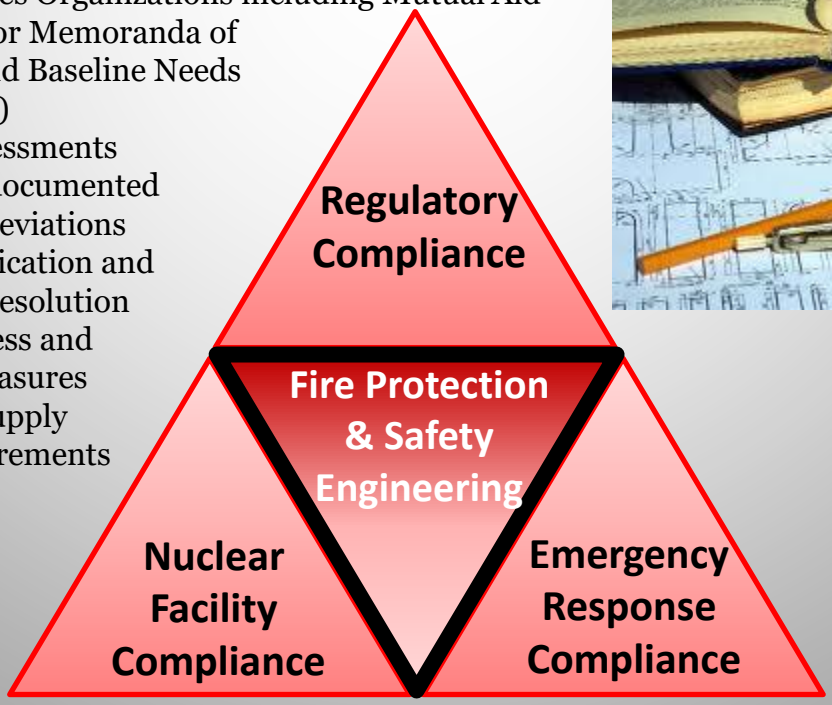
Fire Protection and Safety Engineering

Fire Protection Program Assessments

TetraTek, Inc. has in-depth experience conducting Fire Protection Program Assessments throughout the industry utilizing National Consensus Codes and Standards to meet regulatory requirements. The principal objective of a Fire Protection Program Assessment is to identify deficiencies that would prevent achieving the Organization, Regulator and/or the Authority Having Jurisdiction fire safety policy objectives. This Fire Protection Program Assessment will result in a compliance based corrective action guidance report. The Fire Protection Program Assessment is utilized to evaluate the comprehensiveness of the Fire Protection Program elements to include:

- Comprehensiveness of the Fire Protection Programs
- Conformance with National Consensus Codes and Standards Compliance & Regulatory Requirements
- Management commitment
- Fire protection engineering staff (number, qualifications, training)
- Procedures for engineering design and review
- Fire Prevention Program and Fire Safety Implementing Procedures
- Procedures and records for maintenance, testing, and inspection of installed fire protection systems and features, including Systems Engineering requirements
- Emergency Services Organizations including Mutual Aid Agreements and/or Memoranda of Understanding and Baseline Needs Assessment (BNA)
- Analyses and Assessments
- Exemptions and documented equivalencies or deviations
- Deficiency Identification and Noncompliance Resolution
- Impairment Process and compensatory measures
- Adequate water supply
- Site specific requirements



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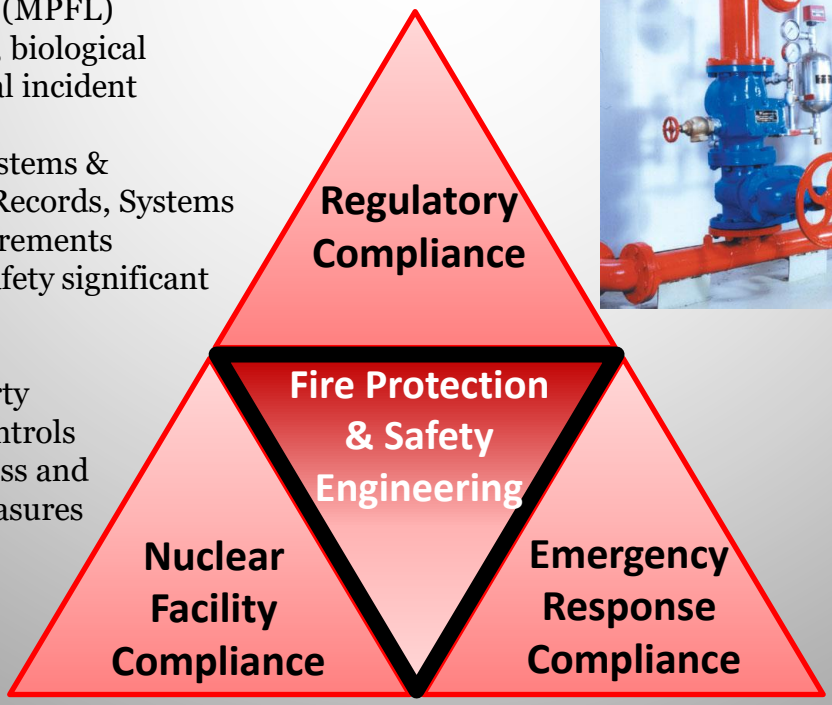
Fire Protection and Safety Engineering

Fire Protection Facility Assessments

TetraTek, Inc. has in-depth experience conducting Fire Protection Facility Assessments throughout the industry utilizing National Consensus Codes and Standards to meet regulatory requirements. The principal objective of a Fire Protection Facility Assessment is to identify deficiencies that would prevent achieving the Organization, Regulator and/or Authority Having Jurisdiction fire safety policy objectives. This Fire Protection Facility Assessment will result in a compliance based corrective action guidance report. The Fire Protection Facility Assessment is utilized to evaluate the fire hazards and life safety and fire protection features inherent in specific facilities to include:

- Conformance with National Consensus Codes and Standards and Regulatory Requirements
- Analyses and Assessments
- Adequacy of water supply
- Water runoff impact
- Life safety considerations
- Fire apparatus accessibility
- Facility fire prevention planning documents and Fire safety training
- Fire barrier integrity
- Fire loss potential (MPFL)
- Potential for toxic, biological and/or radiological incident due to fire
- Fire Protection Systems & Equipment; ITM Records, Systems Engineering requirements
- Safety class and safety significant equipment
- Vital programs
- High-value property
- Administrative controls
- Impairment Process and compensatory measures
- Deficiency Identification and Noncompliance Resolution
- Site specific requirements



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Fire Protection and Safety Engineering

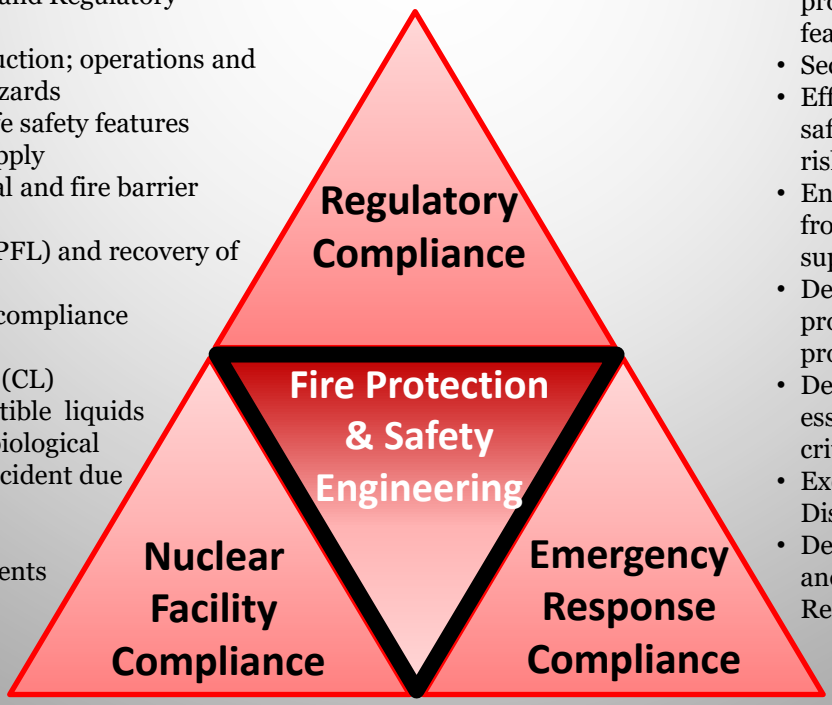
Fire Hazards Analysis

TetraTek, Inc. has in-depth experience performing Fire Hazards Analysis (FHA) throughout the industry on industrial, high value, special hazards and high-profile facilities. TetraTek, Inc. provides this expertise for any type of facility including nuclear.

The purpose of a FHA is to comprehensively and qualitatively assess the risk from fire within individual fire areas in a facility to ascertain whether the Organization, Regulator and/or the Authority Having Jurisdiction fire safety objectives are met. This includes an assessment of the risk from fire and related hazards in relation to existing or proposed fire protection and life safety features to ensure that the facility can be safely controlled and stabilized during and after a fire. The level of detail necessary for an acceptable FHA is directly related to the complexity of the facility and the potential risk to facility occupants, public and the potential impact to the environment.

The general approach taken to complete this analysis involves the identification of the fire risks associated with existing or proposed operations and the fire protection and life safety features required to mitigate the adverse consequences from fire and smoke. Major elements analyzed include:

- Conformance with National Consensus Codes and Standards and Regulatory Requirements
- Description of construction; operations and processes; and fire hazards
- Fire protection and life safety features
- Adequacy of water supply
- Exposure fire potential and fire barrier integrity
- Damage potential (MPFL) and recovery of operations
- Emergency response compliance
- Emergency planning
- Combustible Loading (CL)
- Flammable & combustible liquids
- Potential for a toxic, biological and/or radiological incident due to a fire
- Natural hazards
- Site specific requirements



- ITM records of fire protection and life safety features
- Security & Safeguards
- Effect of significant fire safety deficiencies on fire risk
- Environmental impacts from a fire including suppression run-off
- Description of vital programs and high value property
- Description & protection of essential safety class & critical process equipment
- Exemption / Equivalency Disposition
- Deficiency Identification and Noncompliance Resolution

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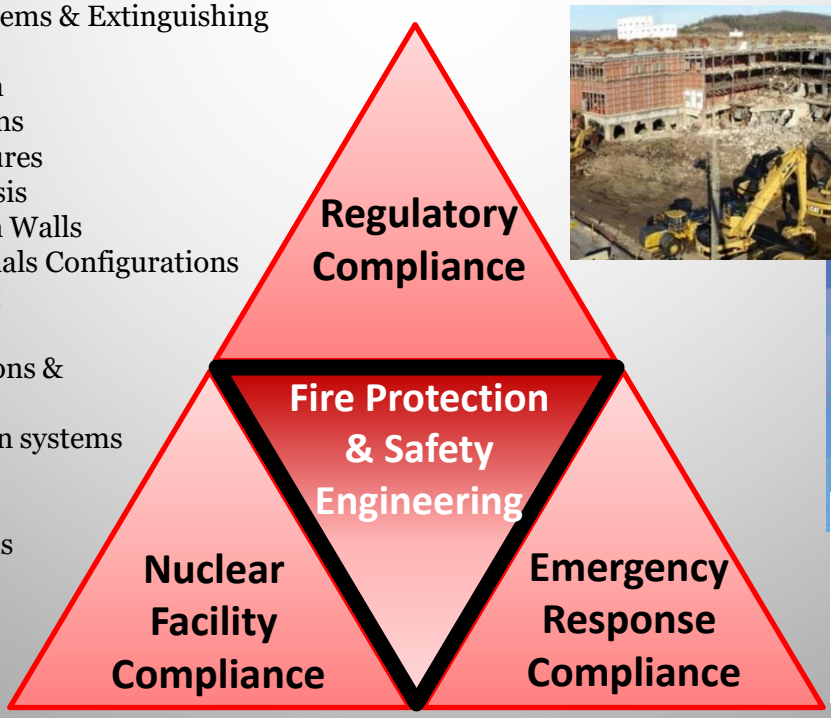
Fire Protection and Safety Engineering

Industrial, Construction and Decontamination & Decommissioning Fire Safety

TetraTek, Inc. has in-depth experience providing Industrial, Construction and Decontamination and Decommissioning (D&D) Fire Safety support services across the industry utilizing NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations. TetraTek, Inc. personnel are Technical Committee Members on NFPA 241. This expertise provides the client safeguards for construction, D&D and alteration operations in order to provide reasonable safety, while preventing and minimizing injuries and loss of life; environmental impacts and property from fire and smoke. Fire Safety elements include:

- D&D Fire Safety (NFPA 241 & 801)
- Life Safety (NFPA 101 & 101A)
- Adequate Water Supply
- Safeguarding Demolition Operations
- Safeguarding Construction & Alteration Operations
  Safeguarding Underground Operations
- Safeguarding Roofing Operations
- Fire Protection Systems & Extinguishing Equipment
- Fire Safety Program
- Hot Work Operations
- Emergency Procedures
- Fire Hazards Analysis
- Building Separation Walls
- Combustible Materials Configurations
- Heating Equipment
- Utilities
- Hazardous Operations & Procedures
- Fire Communication systems
- Pre-Incident Plans
- Flammable and Combustible Liquids
- Fire Department Access

- U.S. Department of Energy (DOE)
- U.S. Department of Defense (DOD)
- U.S. Nuclear Regulatory Commission (NRC)
- Nuclear Power Plants
- Enrichment Facilities
- Industrial



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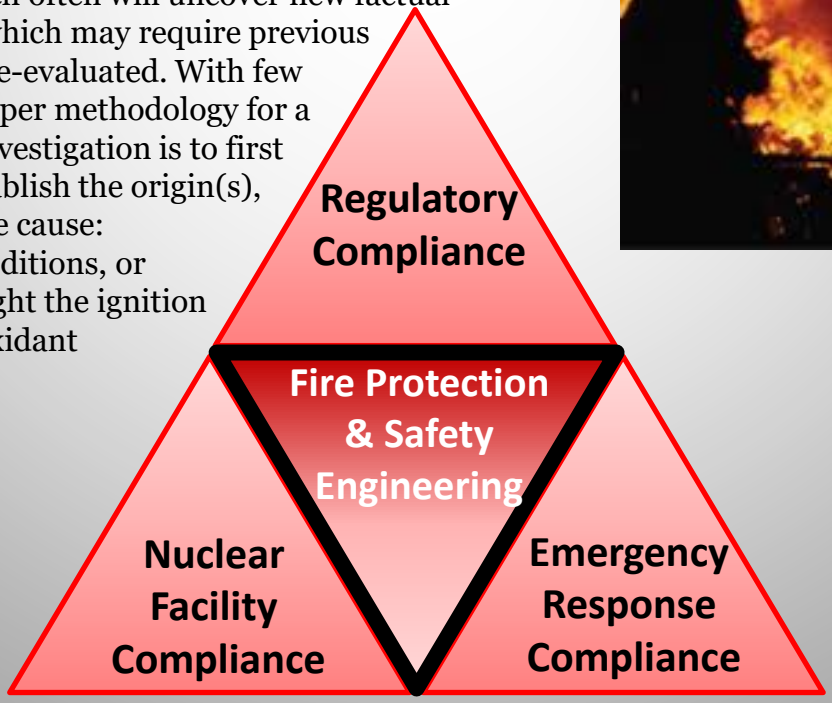
Fire Protection and Safety Engineering

Fire & Explosion Investigations

As former NFPA Technical Committee members on the original NFPA 921, Guide for Fire and Explosion Investigations, TetraTek Inc. has certification and expertise to provide fire and explosion investigations to determine and establish the fire and/or explosion origin and cause.

Fire & Explosion Investigations (NFPA 921) - A fire or explosion investigation is a complex endeavor involving skill, technology, knowledge, and science. The compilation of factual data, as well as an analysis of those facts, should be accomplished objectively, truthfully, and without expectation bias, preconception, or prejudice.

The basic methodology of the fire investigation should rely on the use of a systematic approach and attention to all relevant details. The use of a systematic approach often will uncover new factual data for analysis, which may require previous conclusions to be re-evaluated. With few exceptions, the proper methodology for a fire or explosion investigation is to first determine and establish the origin(s), then investigate the cause: circumstances, conditions, or agencies that brought the ignition source, fuel, and oxidant together.



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Fire Protection and Safety Engineering

Deficiency Identification & Noncompliance Resolution

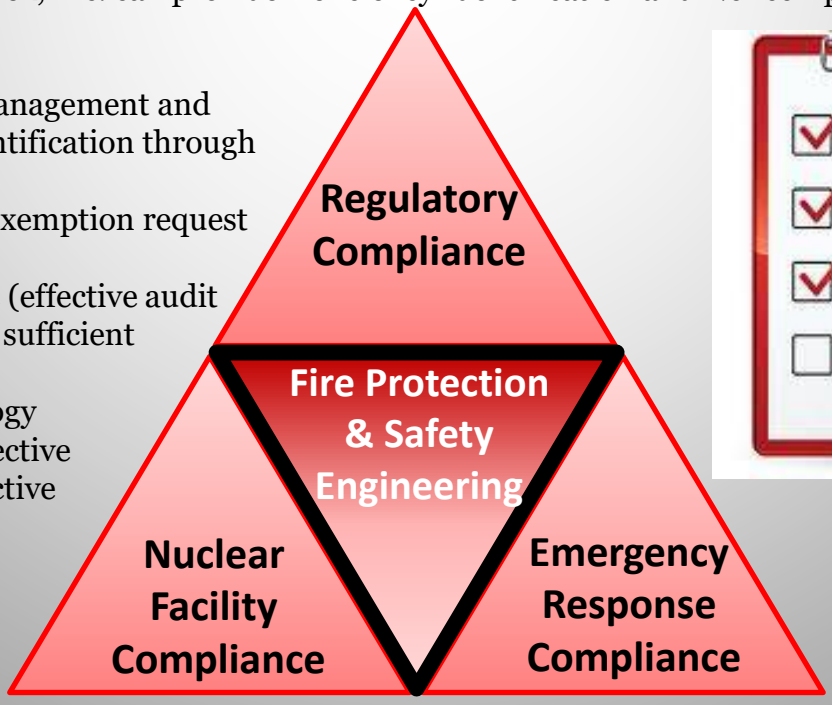
TetraTek, Inc. has expertise providing Deficiency Identification and Noncompliance Resolution on facilities and programmatic related issues ensuring the life safety of personnel and that the protection features of the facility adhere to requirements of National Consensus Codes and Standards.

The following proven TetraTek, Inc. methodology will ensure each and every issue entered into the Organizations corrective action system is effectively documented and can be effectively managed through the following:

STEP 1: Identification and/or validation of issue/noncompliance (field walkdowns, research and interviews)
STEP 2: Prioritize and group into disciplines
STEP 3: Effective illustration of issue/noncompliance and coordination with facility managers, maintenance contractors and corrective action coordinators, etc.
STEP 4: Documented evidence file and code or record
STEP 5: Status resolution

In summary, TetraTek, Inc. can provide Deficiency Identification and Noncompliance Resolution with:

- Complete issue management and coordination (identification through resolution status)
- Equivalency and exemption request support
- Issue evidence file (effective audit trail that provides sufficient closure resolution
- Proven methodology providing cost effective solutions to corrective action backlogs



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