



KEAN

# Fundamentals of **Fire Fighter Skills and Hazardous Materials Response**

**FOURTH EDITION**

January 1, 2021



**New Jersey Firefighter  
Skills Addendum**

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The sections of this Addendum for the NJ Incident Management System, Firefighter Safety, Uniform Fire Code, New Jersey Fire Service Resource Emergency Deployment, Cancer Prevention, Critical Incident Stress, Solar Power, Traffic Incident Management, and Truss Identification were developed by Fire Chief Robert G. Moran, Englewood (NJ) Fire Department (ret) and current Fire Chief Brewster (MA) Fire Rescue and Lieutenant John J. Lewis Passaic (NJ) Fire Department (ret) utilizing public documents developed by the State of New Jersey, publicly obtainable fire department documents, and the writers individual experience, education, certification, and expertise concerning the New Jersey Fire Service.

# **THE NEW JERSEY FIREFIGHTER SKILLS ADDENDUM**

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The Division of Fire Safety in partnership with Kean University has developed the New Jersey Firefighter Addendum to address the state specific regulations and standards responsible for firefighter safety and health. This booklet is the work of members of the fire service including retired City of Englewood (NJ) and current Brewster (MA) Fire Chief Robert Moran, retired City of Passaic Fire Lieutenant John Lewis, along with various agencies and public entities, such as;

- New Jersey State Office of Public Employees Occupational Safety and Health (PEOSH)
- New Jersey Department of Health and Senior Services
- New Jersey Board of Public Utilities
- New Jersey Statewide Utility Safety Team
- Public Service Electric and Gas
- New Jersey Natural Gas
- Elizabethtown Gas Company

## **NEWJERSEY DIVISION OF FIRE SAFETY**

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The New Jersey Division of Fire Safety wishes to acknowledge the Training and Education Advisory Council of the New Jersey State Fire Commission for assisting in the development of the material in this manual.

# **ACKNOWLEDGEMENTS**

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# NOTICE TO THE READER

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The material presented in Chapter B “New Jersey Fire and Emergency Service Resources”, and Chapter C “New Jersey Fire Service Standards and Regulations”, is declared public domain material obtained from adopted Acts, Statutes, Rules, Regulations and/or Standards from the U.S. Federal Government, State of New Jersey Government, and other safety/testing, engineering or fire service industry organizations. Information presented is obtained from public domain documents, or created through the New Jersey Division of Fire Safety for the specific purpose to convey pertinent fire safety information to the New Jersey Fire Service.

The material presented in Chapter D “Natural Gas, Propane, and Carbon Monoxide Hazards” Chapter III and Chapter IV are based on the work of the NJ Statewide Utility Safety Team and used with their permission for the purpose of training the New Jersey Fire Service. Other information presented in the Addendum represent official Guides, Models, Standards, Regulations, and Acts which have been either adopted and/or created for fire service emergency operations.

While every effort is made to ensure that the information contained in this document is accurate and complete at the time of printing, the frequency of changes in the regulations makes it impossible to guarantee the complete accuracy of the information that follows. Therefore, neither Robert Moran, John Lewis, the State of New Jersey, nor Kean University, shall be liable for any damages arising from the use of any of the aforementioned these materials.

The following individuals developed the written material for Chapter D identified below:

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# NEW JERSEY STATE FIRE MARSHAL

## NEW JERSEY DIVISION OF FIRE SAFETY

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*Dear Firefighter Recruits:*

Welcome and congratulations on taking the first step in your training to become a New Jersey firefighter. We commend you for your desire, your commitment of time and energy, and lastly, your commitment to serve your community with enthusiasm as you join the brother/sisterhood of the fire service.

As you advance through your Firefighter I training, please embrace the subjects that are contained in this basic recruit curriculum. Keep in mind that your future success and safety will be forged by the course's 200 hours of classroom and fireground instruction.

The New Jersey Division of Fire Safety has partnered with our county and municipal fire training academies to ensure that all training is standardized and that your textbook, New Jersey addendum materials, study guide, and instructional materials are identical. We believe this training curriculum provides the best instructional and student learning resources possible and will be the foundation as you enhance your firefighting knowledge and practical skills.

The fire service instructors who work to develop your knowledge and performance capabilities are dedicated, skilled professionals. They bring extensive "know-how" and many years of experience into the classroom to guide you through this nationally accredited Firefighter I training program. You may have heard that "no two fires are the same." We believe this is true, but there are common elements and lessons to be learned from each fire incident. Your instructors will bring these common threads together to provide you with fireground survival information and skills.

Firefighter I is just the beginning of your professional development, and we urge you to continue to attend additional training programs throughout your career and be recognized as a true fire service professional. Through the combined efforts of your fire department, our county/municipal training academy's, community college, national fire service training institutions, and the New Jersey Division of Fire Safety, we are committed to serve your continuing educational needs as you forge ahead into "the greatest job in the world".

**Richard Mikutsky**  
State Fire Marshal, Director  
New Jersey Division of Fire Safety

# DEDICATION

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This manual is dedicated to those brave men and women in the New Jersey Fire Service who have lost their lives in the battle to fight fire and save the lives of their fellow community members.



*Courtesy of Wyckoff Fire Department (DRH)*

Additionally, the manual acknowledges the hard work, professionalism, and dedication exhibited by New Jersey's Fire Instructors to ensure our State's Firefighters perform to his or her best ability at every emergency incident.

# WELCOME

## CHAPTER A

### INTRODUCTION AND WELCOME

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#### Welcome to the fire service in New Jersey!

This special supplement was designed especially for you, the new firefighter, as you join the proud and dedicated men and women who make up New Jersey's fire and emergency service system. As a firefighter, you play an important role in keeping communities, businesses, and private industries safe. You are the first line of community defense, and you have the potential to touch many lives as you respond to emergencies throughout your time in the fire service.

The New Jersey Division of Fire Safety, along with a variety of other state and local governmental agencies, stand behind you to provide the resources that will help you do your job. The goal of providing this special supplement is to provide consistent training across the state and the many academies and training centers and expand the quality and depth of knowledge to get firefighters started on their career, and enhance the safety of personal operating at emergency incidents.

#### HOW TO USE THIS ADDENDUM

This manual is provided to firefighters entering the New Jersey fire and emergency services system to become familiar with the state government structures; state standards and regulations that are important to firefighters. This addendum serves as a supplement to providing firefighters with a well-rounded and basic introduction to firefighting in the State of New Jersey.

The best use of this addendum is to read and study the material, and then do some exploration on your own to expand your learning. The addendum provides other resources, including websites, where you can find further information about a variety of topics. Use these resources to answer the questions you have while reading through the material, and to examine more closely the subjects covered in the addendum.



**Figure A-2** The Fire Instructor is the first link in Firefighter Safety. *Morris County Firefighters Academy.*

Firefighters know that continuous training and learning is what keeps them safe and most effective at emergency incidents.

For this reason, it is important that you make a commitment to lifelong learning as you enter the fire service. Keep this addendum with your notes and refer to them occasionally after your initial training. Add information about changing state regulations or state resources as these become available. Talk to others in your department about these changes, and make learning a team effort in the fire service. Remember, you and you alone have the ability to build your personal knowledge, skills and abilities into a superior asset.

# NEW JERSEY FIRE AND EMERGENCY RESOURCE

## CHAPTER B

### OUTLINE

- New Jersey Government
- New Jersey Division of Fire Safety
- Other State Resources

### OBJECTIVES

- Describe the responsibilities of the Division of Fire Safety.
- Explain the relationship between Departments and Agencies of the State of New Jersey.
- Explain the responsibilities of the various bureaus and units within the Division of Fire Safety.
- Describe who enforces the Uniform Fire Code in municipalities.
- Describe the make-up of the membership of the Fire Safety Commission.
- List and explain the three co-equal branches of the State of New Jersey government.

## NEW JERSEY GOVERNMENT

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The government of the State of New Jersey, like that of the United States, is divided into three co-equal branches: the legislative, the executive, and the judicial. The principal function of the Legislature is to enact laws.

The Executive Branch (the Governor and State agencies) carries out the programs established by law. The Judiciary (the Supreme Court and lower courts) punishes violators, settles controversies and disputes, and is the final authority on the meaning and constitutionality of laws.

There are a variety of departments and agencies that comprise the State Government, Figure B-1.

More information about the State and Local governments of New Jersey and the departments and agencies that make up state government can be found at <http://www.nj.gov>.

## New Jersey State Government Departments and Agencies

<i>Departments</i>	<i>Agencies</i>	
Agriculture	Administrative Law, Office of	Health Care Facilities Financing
Banking & Insurance	Board of Public Utilities	Authority
Commerce	Building Authority	Student Assistance Authority
Community Affairs	Casino Control Commission	Homeland Security
Corrections	Clean Air Council	Housing and Mortgage Finance
Education	Commission on Cancer Research	Agency
Environmental Protection	Commission on Higher Education	Information Technology
Health & Senior Services	Commission on Science and	Interstate Environmental
Human Services	Technology	Commission
Labor	Council on Local Mandates	Lottery
Law & Public Safety	Delaware River Basin Commission	Motor Vehicle Commission
Military & Veterans Affairs	Economic Development Authority	New Jersey Meadowlands
Personnel	Election Law Enforcement	Commission
State	(Campaign and Lobbying	New Jersey Network (NJN)
Transportation	Disclosure)	New Jersey Redevelopment
Treasury	Executive Commission on Ethical	Authority (NJRA)
Higher Education	Standards	New Jersey School Construction
	Garden State Preservation Trust	Corporation
	Governor's Council on Alcoholism	New Jersey Transit
	and Drug Abuse	

**Figure B-1** New Jersey state government departments and agencies their purposes and functions. For further information regarding the Division of Fire Safety's programs, please call the telephone number listed for each particular program. Call the main telephone number at (609) 633-6106, or visit the web site at <http://www.nj.gov/dca/dfs/>.

## NEW JERSEY DIVISION OF FIRE SAFETY

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Within the New Jersey Department of Community Affairs is the Division of Fire Safety.

The Division of Fire Safety is the central fire service agency in the State, responsible for the development and enforcement of the State Uniform Fire Code, public education programs, and firefighter training programs.

The Division of Fire Safety includes two bureaus:

- Bureau of Fire Code Enforcement and the Bureau of Fire Department Services.
- Director Rich Mikutsky, who also functions as the State Fire Marshal, leads the

Division of Fire Safety. The following section outlines the various programs of the Division of Fire Safety and their purposes and functions.



The mailing address for the Division of Fire Safety is:  
New Jersey Department of Community Affairs, Division of Fire Safety, PO Box 809, Trenton, NJ 08625-0809

<https://www.nj.gov/dca/divisions/dfs>.

**Figure B-2** The Division of Fire Safety oversees a variety of programs, including training programs for firefighters. *Lee Calderio.*

## Fire Safety Commission

**Type of Assistance:** Advisory.

**Description:** Works closely with the Division of Fire Safety to promote fire safety in the State. The commission comprises 23 members, including state legislators and citizens with expertise or interest in fire safety. It was created by law to assist and advise the Commissioner of the Department of Community Affairs on all matters of fire safety.

**Assistance Provided To:** State government, the fire service and the general public.

**Other Information:** Meets five times each year to consider fire safety issues, amendments to the Uniform Fire Code, new fire safety programs and to hear comments from the public on matters of fire safety.

## Division of Fire Safety Programs Legislative and Regulatory Services

**Type of Assistance:** Technical and Advisory.

**Description:** The Legislative and Regulatory Office is responsible for monitoring local enforcement of the Uniform Fire Code and implementing regulations. The office provides guidance regarding local enforcement, routine monitoring, develops and amends program rules, provides assistance to Peer Review Committee to assess sanctions against certified

officials, undertakes appropriate corrective or enforcement action for violations of the Act and Code, and maintains quarterly registry of agencies having jurisdiction within each municipality in the State.

**Assistance Provided To:** Municipalities, fire services or private individuals.

### **Volunteer Emergency Service Organization Loan Program**

**Type of Assistance:** Financial.

**Description:** Provides loans to fire departments and ambulance/rescue squads.

Funding Source: State Appropriation, Special Revenue.

**Award Period:** July 1 to June 30.

**Assistance Provided To:** Volunteer and partially-paid fire companies, first aid squads and rescue squads.

**Other Information:** Two percent interest, 10-year repayment, maximum loan: \$50,000.

**Procedure for Applying:** Request for proposals mailed annually. Submission of an application.

### **Volunteer Recruitment and Retention Program**

**Type of Assistance:** Advisory / Programmatic.

**Description:** Provides guidance, visual aids and assistance to local volunteer fire departments and first aid, ambulance and rescue squads trying to recruit new members and retain current members.

**Other Information:** A toll-free, 800-telephone line answers calls from the public regarding recruitment. Callers are referred to their local organization's recruitment officer by Division staff.

**Assistance Provided To:** Volunteer and Combination fire departments, first aid, ambulance and rescue squads.

## Bureau of Fire Code Enforcement Programs

### Fire Code Services

**Type of Assistance:** Technical and Advisory.

**Description:** Provides technical assistance to fire officials/fire inspectors involved in the enforcement of the Uniform Fire Code and Regulations for Fire Code Enforcement.

**This unit encompasses the following programs:** Life Hazard Use Registration Unit, Code Inspections, Local Assistance, Permits/Carnival Events, Smoke Detector Certifications.

**Assistance Provided To:** Local enforcing agencies and private individuals.



**Figure B-3** Local Fire Prevention Bureaus can request assistance from the Division of Fire Safety Bureau of Code Enforcement. *John Lewis.*

## Inspections

**Type of Assistance:** Technical.

**Description:** The Inspection Unit enforces the Uniform Fire Code in municipalities that do not elect to establish local enforcement agencies. The Bureau is responsible for the inspection of high-rise and life hazard use buildings/structures when the Department has retained direct enforcement authority.

**Assistance Provided To:** Any municipality that has not established an enforcement agency for the Uniform Fire Code.

## Life Hazard Use Registration

**Type of Assistance:** Technical and Advisory.

**Description:** Life hazard use is defined as the use of a building or structure that may constitute a potential risk to human life, public welfare or firefighters. This program enforces the registration of high-rise and life hazard use buildings/businesses to facilitate the inspection and enforcement of the Uniform Fire Safety Act. Records of these structures

are maintained and lists distributed to local enforcement agencies. The program collects fees from life hazard use owners and establishes criteria to disburse funds to local agencies enforcing the Uniform Fire Code Regulations.

**Assistance Provided To:** Any fire service local enforcement agency or individual.

## **Local Assistance**

**Type of Assistance:** Technical.

**Description:** The Local Assistance Unit provides technical assistance to 526 local enforcing agencies involved in the enforcement of the Uniform Fire Code and Regulations for the fire code enforcement. Local Assistance performs audits of local enforcing agencies and provides recommendations to improve the agency's efficiency, makes recommendations regarding daily operations, and provides interpretations of the Uniform Fire Code.

**Assistance Provided To:** Municipalities and local enforcing agencies.

## **State Building Fire Safety Inspections**

**Type of Assistance:** Technical.

**Description:** Supervises fire prevention and protection programs in all state-owned, state-leased, and state-occupied structures.

**Assistance Provided To:** Mandatory for all state-owned /state-leased properties.

## **Bureau of Fire Department Services Programs**

**Type of Assistance:** Technical.

**Description:** The Bureau of Fire

**Department Services encompasses the following programs:** Office of Training & Certification, Arson K-9 - Fire Investigations, Fire Department Preparedness, Contractor Certification, Youth Firesetters Program, Smoke Detector Program, NFIRS, Community Risk Reduction.

**Assistance Provided To:** Fire service organizations, emergency medical services, state, county or municipal governments.

## Office of Training and Certification

**Type of Assistance:** Technical, Advisory and Training.

**Description:** Provides statewide educational and training programs relating to fire protection, fire prevention, fire safety inspection, and to certify fire officials/fire inspectors who enforce the Uniform Fire Code.

**Assistance Provided To:** Fire service training academies, any fire service organization or private individual.



**Figure B-4** The Fire Instructor has various forms of media available along with support from the Division of Fire Safety to provide training. *John Lewis.*

## Fire Investigations/K-9 Unit

**Type of Assistance:** Technical, Advisory and Investigative.

**Description:** This unit has the responsibilities for conducting cause and origin investigation of fires and explosions that occur in any municipality where the Division of Fire Safety is the fire code enforcing agency. In addition, this unit has primary responsibility for fires in any owned, leased, or occupied state facility. The unit also has the statutory responsibility to investigate any serious injury or fatality that occurs to a firefighter in the line of duty.

## The Office of Fire Department Preparedness

**Type of Assistance:** Technical and Advisory.

**Description:** This unit is responsible for coordinating the use of fire service mutual aid and the movement of fire service resources, particularly during a declared State of Emergency. The unit assists each County Fire Coordinator with the development of local and county Fire Mutual Aid plans. A Regional Fire Coordinator is assigned to each of New Jersey's four regional response areas.

## **Contractor Certification Unit**

**Type of Assistance:** Technical and Advisory.

**Description:** The Contractor Certification Unit licenses businesses and individuals involved in the installation, service, and maintenance of fire protection equipment including fire extinguishers, kitchen and specialized fire suppression systems and fire sprinkler systems. Business permits and individual certifications are valid for three years after which time they must be renewed.

**Other Information:** Currently, there are six license classifications established within this program: Fire Protection Equipment; Fire Sprinkler System; Special Hazard Fire Suppression System; Fire Alarm Equipment; Portable Fire Extinguisher; and Kitchen Fire Suppression System. Businesses that provide any type of service on fire safety equipment must obtain an annual business permit.

## **The Youth Firesetter Program**

**Type of Assistance:** Technical and Advisory.

**Description:** This unit coordinates a statewide effort to establish a Juvenile Firesetter Prevention Program in each of the 21 counties.

## **Fire Department Programs**

**Type of Assistance:** Technical and Advisory.

**Description:** Investigates serious injuries or deaths of firefighters in the line of duty and publishes the findings in a formal report. Additionally, this unit works with the Juvenile Firesetter Committee to research and develop a statewide policy for preventing juveniles from setting fires and for educating the public and the fire service about the problem.

**Other Information:** In cooperation with the Department of Treasury, the program develops specifications for firefighters' protective clothing and equipment for inclusion on the State Cooperative Purchasing Contract. This ensures that protective clothing meets the standards established in the Public Employees Occupational Safety and Health Act.

## **Division of Fire Safety Programs Fire Incident Reporting System**

**Type of Assistance:** Technical.

**Description:** Administers a statewide fire incident reporting system that also serves as a central depository for the National Fire Incident Reporting System. Participating fire departments report emergency incidents in a standardized format that is passed on to the U.S. Fire Administration to be included in national statistics and analyses.

**Assistance Provided To:** Any fire service organization or interested individual.

### Persons with Disabilities or Oxygen Use Emblem Program

**Type of Assistance:** Technical.

**Description:** Issues a person with a disability or who uses oxygen one of two identification emblems. The disability emblem is affixed to a window of a residential dwelling and alerts firefighters, medical, rescue or law enforcement personnel, when responding to an emergency situation, that a person with a disability may be present therein and may require special assistance. The oxygen emblem is also affixed to a window of a residential dwelling to warn firefighters that oxygen is in use within that dwelling. A person with a disability or who uses oxygen may apply for an emblem by contacting the Division.



**Figure B-5** The Bureau of Fire Department Services offers public education assistance and materials. *Lee Calderio.*

## Community Risk Reduction Unit

**Type of Assistance:** Technical and Advisory.

**Description:** Increases public awareness of fire safety by developing educational fire safety materials such as brochures, flyers, posters and booklets for distribution to schools, fire departments and the general public; develops specific fire safety programs for schools, preschools and senior citizens, and helps coordinate an annual fire safety poster contest for school children throughout the State.

**Assistance Provided To:** Municipalities, schools, fire departments and the general public.



**Figure B-6:** Division of Fire Safety publishes a newsletter for members of the fire service and other individuals and organizations interested in fire safety.

## **OTHER STATE RESOURCES**

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**New Jersey Department of Community Affairs, Division of Codes and Standards**

<http://www.state.nj.us/dca/codes/>

**New Jersey Department of Health and Senior Services, Office of Emergency Medical**

Services, <http://www.state.nj.us/health/ems/index.html>

**New Jersey Department of Law and Public Safety, Division of Highway Traffic Safety**

<http://www.state.nj.us/lps/hts/index.html>

**New Jersey Department of Law and Public Safety, Office of Counter-Terrorism**

<http://www.state.nj.us/lps/oct/index.html>

**New Jersey Department of Labor & Workforce Development**

<http://www.nj.gov/labor/lispeosh.html>

**New Jersey Homeland Security**

<http://njhomelandsecurity.gov/>

**New Jersey State Firemen's Mutual Benevolent Association**

<https://www.njfmbs.org/>

**The Emergency Management Institute**

<https://training.fema.gov/emi>

**International Association of Arson Investigators (IAAI)**

<https://www.firearson.com>

## **NATIONAL AND FEDERAL RESOURCES**

### **Underwriters Laboratory**

<https://www.ul.com>

### **National Fire Protection Association**

<https://www.nfpa.org/>

### **National Institute of Standards and Technology**

<https://www.nist.gov>

### **National Fire Academy**

<https://www.usfa.fema.gov/training/nfa/>

### **Federal Emergency Management Agency**

<https://www.fema.gov/>

### **United States Fire Administration**

<https://www.usfa.fema.gov>

### **International Association of Firefighters**

<https://www.iaff.org/>

### **FEMA – Emergency Management Institute (EMI)**

<https://training.fema.gov/emi>

### **International Association of Arson Investigators (IAAI)**

<https://www.firearson.com>

### **NJ IAAI Chapter**

<http://njiaai.org>

### **International Association of Fire Chiefs (IAFC)**

<https://www.iafc.org>

## REVIEW QUESTIONS

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1. Describe the main responsibilities of the Division of Fire Safety.
2. Review the list of the departments and agencies within the State of New Jersey government.
3. What are the names of the two bureaus within the Division of Fire Safety?
4. Which bureau is responsible for the Fire Incident Reporting System and Office of Training and Certification?
5. What are the main responsibilities of the Department of Community Affairs Fire Safety Commission?
6. Name the co-equal branches of the New Jersey State government.
7. Enacting laws are the principal function of which branch of government?
8. Which branch of government has the principal function of carrying out the programs established by law?
9. The final authority on the meaning and constitutionality of law is the principal function of this branch of government.
10. Which unit within the Division of Fire Safety investigates serious firefighter injuries or fatalities? Why is this an important component of firefighter safety and survival?

# NEW JERSEY FIRE SERVICE STANDARDS AND REGULATIONS

## CHAPTER C

### OUTLINE

- Public Employees Occupational Safety and Health Act (PEOSHA) Standard
- New Jersey Uniform Fire Code
- New Jersey Fire Service Resource Emergency Deployment
- Fire Service Incident Management
- New Jersey Personnel Accountability System (NJPAS)
- Identifying Emblems for Structures with Truss Construction
- Standards for Fire Service Training and Certification
- State of New Jersey Traffic Incident Management Safety Guidelines
- Personal Motor Vehicle Emergency Response Lighting
- New Jersey Division of Fire Safety Firefighter Cancer Reduction and Decontamination Suggested Guideline
- Critical Incident Stress/Firefighter Suicide Prevention
- Public Employees Occupational Safety and Health Program Bloodborne Pathogens
- New Jersey Worker and Community Right-to-Know Act
- Hazard Communication Standard

### OBJECTIVES

- Explain the difference between federal and state regulations concerning occupational safety and health of government employees.
- Describe the protective clothing that firefighters wear and its limitations.
- Explain what a pathogen is and how it can threaten the health of firefighters.
- Describe how a fire department's accountability system is used to track the location of all firefighters at an incident.
- Describe how a Personal Alert Safety System (PASS) works and the importance of using this type of equipment.
- Explain the significant differences between the new Hazard Communication Standard and the Worker and Community Right-to-Know Act.
- Explain why there are so many regulations concerning firefighting and the operation of fire departments.

# PUBLIC EMPLOYEES OCCUPATIONAL SAFETY AND HEALTH (PEOSHA) STANDARD

In 1970, the Williams-Steiger Occupational Health and Safety Act was passed by Congress. It required the adoption of occupational safety and health standards for employees. This act, known by its acronym OSHA, has been applied nationwide to all private employers and employees. State and local public employees were not covered by this Act. In 1984, the New Jersey State Legislature enacted the Public Employees Occupational Safety and Health Act (PEOSHA) to establish safety and health standards for state and local public employees. For the full text of the PEOSHA Act please visit [https://www.nj.gov/labor/lse/laws/peosha\\_law.html](https://www.nj.gov/labor/lse/laws/peosha_law.html).



**Figure C-1** Fire officer conducts equipment check of a firefighter's personal protective equipment". *Lee Calderio.*

In order to implement PEOSHA, regulations establishing these standards (the standards in the Federal OSHA law and regulations) were adopted in 1984. In 1992, 1994, and 1998, the New Jersey Department of Labor adopted additional PEOSHA regulations that describe updated standards for protective clothing for the fire service. These state regulations include many new standards, including requirements for protective hoods, aerial ladder testing, and the adoption of the OSHA Respiratory Protection Standard 29 CFR 1910-134.

There are various compliance dates in these new regulations. Some call for eventual compliance with the new standards based on replacing existing equipment when it wears out rather than disposing of existing equipment. Others require compliance by a particular date. Each is discussed in detail, like earlier PEOSHA regulations, the 1992, 1994, and 1998 regulations apply to:

1. “The State, or any department, division, bureau, board, council, agency or authority of the State, except any bistate agency”
2. “Any county, municipality, or any department, division, bureau, board, council, agency or authority of any county or municipality, or of any school district or special purpose district created pursuant to law.”

## WHAT STANDARDS APPLY TO FIREFIGHTERS?

Certain sections of the PEOSHA regulations apply only to firefighters. These are the regulations setting standards for fire protective clothing and equipment, and may be found in the regulations of the New Jersey Department of Labor. These regulations may be cited as N.J.A.C. 12:100-10 et seq. A copy of these regulations can be found at <https://www.state.nj.us/health/workplacehealthandsafety/peosh/peosh-health-standards/ff.shtml>.



**Figure C-2** The New Jersey Department of Labor adopted additional PEOSHA regulations that describe updated standards for protective clothing for the fire service. *Robert Moran.*

## HOW REGULATIONS ARE ENFORCED

The New Jersey Department of Labor enforces these regulations, except for the provisions related to respiratory protective equipment. The state Labor Department enforces all matters related to protective clothing and equipment.

The New Jersey Department of Health enforces the parts of this regulation related to respiratory protective equipment. The state Health Department also enforces PEOSHA regulations related to hazardous materials.

The New Jersey Department of Community Affairs (DCA) is responsible for all matters related to building safety under the Uniform Construction Code or Fire Safety under the Uniform Fire Safety Code. DCA does not enforce regulations or standards related to protective clothing for firefighters. However, DCA maintains information on these standards and works with the New

Jersey Department of Treasury to update the state contract for protective clothing.

Any employees or employee representatives who believe that a violation of these regulations or imminent danger exists should notify their employer immediately. They may also contact the State and request an inspection. Firefighters can use the previous explanation as a guideline to which agency should be contacted. When in doubt, contact the New Jersey Department of Labor.

Requests for inspections must be in writing and must describe the violation or danger that is believed to exist. While such letters must be signed by the employee or employee representative to be acted upon, the State must withhold the name of anyone who requests an inspection if that person asks that his or her name be withheld.

Once contacted, the relevant state agency must perform an inspection at the earliest date possible. At this inspection, the employee who requested the inspection, a representative of the employer, and a representative of the employee are allowed to accompany the inspector to aid the inspection. Employees who participate in such inspection must receive normal pay for the time on the inspection.

Notices of violation and recommendations for improvements will be provided to the employer by the relevant State agency (Labor, Health, or Community Affairs) after the inspection. In most cases, the agency that performed the inspection will communicate with the employer. In the case of hazardous material inspections, however, the Department of Health will perform the inspection, but notices of violation, if any, will come from the Department of Labor, on the report of the Department of Health. Inspection reports and notices calling for corrections are generally sent to the mayor of a municipality or the board of a fire district, with copies provided to the chief of the fire department.

This document must be available for inspection by:

1. Employees
2. Their designated representatives (for example, labor unions); and
3. Department of Labor

## **12:100- 10.1 SCOPE AND STANDARDS INFORMATION**

These regulations apply to both career and volunteer members of the fire service. For purposes related to PEOSHA, use of the term “public employee” does not depend on whether or not the employee is paid. In some cases, different implementation details are set for career and volunteer members of the fire service, but the PEOSHA Act and regulations fully apply to career and volunteer firefighters.

These regulations are applicable to all firefighters. A “firefighter” is a public employee who engages in the physical activity of rescue, fire suppression, or both in buildings, enclosed structures, vehicles, vessels, or like properties that are involved in a fire or emergency situation. These regulations are not intended for those employed in the industries of construction, maritime, agriculture, airport crash rescue, or forest firefighting.

The protective clothing mandated by this regulation must be provided to all firefighters who participate in interior structural firefighting and overhaul. Interior structural firefighting is the physical activity of fire suppression, rescue, or both, which is conducted inside buildings or enclosed structures, after the incipient stage of the fire. Overhaul is the final control of a fire, with suppression of the main body of the fire and other pockets of fire, while searching for victims and performing salvage operations.

## **NJ DEPARTMENT OF LABOR AND WORKFORCE DEVELOPMENT**

### **10.3 ORGANIZATION, TRAINING AND EDUCATION**

Employers must prepare a written description of:

1. The organizational structure of the fire department;
2. The expected number of members of the fire department;
3. The functions the fire department is expected to perform.

The organizational statement shall be made available to the Commissioner of Labor and by the employees or their designated representative. Training and Education requirements are as follows.

The employer shall provide training and education for all fire service members commensurate with those duties and functions that fire service members are expected to perform. Such training and education shall be provided to fire service members before they perform any fire service emergency activities. Fire service leaders and training instructors shall be provided with training and education, which is more comprehensive than that provided to the general membership of the fire service.

They shall ensure that training and education is conducted frequently enough to ensure that each member of the fire service is able to perform the members assigned duties and functions satisfactorily and in a safe manner so as not to endanger fire service members or others. All fire service members shall be provided with training at least annually. In addition, fire service members who are expected to perform interior structural firefighting shall be provided with an education session or training at least quarterly.

The quality of the training and education program for fire service members shall be similar

to those conducted by nationally recognized training schools such as; Maryland Fire Rescue Institute, Iowa Fire Service Extension, West Virginia Fire Service Extension, NY State Office of Fire Prevention and Control. Specialized fire service training for unique hazards shall be similar to those conducted at Texas A&M University, Reno Fire School or the Delaware State Fire School.

The employer shall inform fire service members about special hazards such as storage and use of flammable liquids and gases, toxic chemicals, radioactive sources and water reactive substances to which they may be exposed during fire and other emergencies.

The employer shall provide each member of the fire service, training in HAZMAT Operations Level 1, Bloodborne Pathogens, Incident Management System Training Orientation (I-100) annually, and where applicable Confined Space entry Rescue Operations, Trench Rescue Operations and High Angle and Technical Rescue Techniques. All training shall be consistent with the applicable PEOSH Standard. The employer shall comply with the Hazard Communication Standard (HCS) (N.J.A.C.12:100-7) and relevant parts of the New Jersey Worker and Community Right to Know Act.

#### **10.4 PERSONNEL LIMITATIONS ON ABILITY TO PERFORM**

The employer is required to assure that employees who are expected to fight interior structural fires are physically capable of performing duties which may be assigned to them during emergencies. The employer shall assure that compliance with above shall be in compliance with the provisions of the American with Disabilities Act of 1990. The Division of Fire Safety recommends that firefighters be given physical evaluations upon entry and periodically thereafter. The Division of Fire Safety also recommends that fire departments encourage physical fitness.

#### **10.5 PROTECTIVE CLOTHING**

The employer shall provide, at no cost to the employee, and assure the use of, protective clothing that complies with this subchapter. Firefighters performing interior structural firefighting and overhaul shall be provided with and required to wear, the equipment covered in this subchapter. The employers shall assure that protective clothing protects the head, body and extremities and consists of at least the following components: body protection, eye, face and head protection and must provide, at no cost to the employee, the protective clothing described in this regulation. Employees who perform interior structural firefighting and overhaul must be provided with this equipment.

This law calls for cooperation from both employers and employees. Employers must assure that employees wear the protective clothing, use the safety equipment, and follow safety procedures. Employees must wear the required protective clothing, use the required equipment, and follow safety

procedures at the time and in the ways specified by the law and their employer. The responsibility of wearing turnout gear and other PPE provided by the employer at emergency incidents rests squarely on the shoulders of the individual firefighter in the fire service supports a casual attitude toward the proper and effective use of PPE at all emergency incidents. New firefighters coming into the New Jersey Fire Service must change this by adopting a “no exceptions” rule when it comes to properly wearing their assigned personal protective equipment to protect their health and safety and that of their team members.

**Structural Firefighting PPE Ensemble Components**

- |         |               |
|---------|---------------|
| Helmet  | Hood          |
| Goggles | Gloves        |
| SCBA    | Flashlight    |
| Coat    | PASS Device   |
| Pants   | Pockets Tools |
| Boots   | Radio         |



**Figure C-3.** A firefighter’s structural firefighting ensemble. *Lee Calderio.*

For the most part, these regulations call for the eventual replacement of current equipment with new equipment that complies with more stringent standards. However, career firefighters must wear protective coats, pants, station uniforms, and boots that comply with these new standards.

Firefighters must remember that meeting standards for protection or resistance to certain substances or forces does not mean that a product will protect a firefighter from every possible condition experienced in the line of duty or that exceeds the tests performed. Exposure to conditions that exceed the product’s tested performance can lead to serious injury or death.

**10.6 PROTECTIVE CLOTHING, FOOT AND LEG PROTECTION**

Foot and leg protection shall comply with this section for ALL firefighters. Protective footwear shall comply with NFPA 1974-1987, “Protective Footwear for Structural Fire Fighting.” This standard is the 1987 edition of NFPA standard number 1974.

Footwear that meets the NFPA standard will bear a label or stamp specifically stating that it complies with NFPA 1974-1987. Only boots with such a label will be considered to comply with the law.

The standard requires that boots will be at least 8 inches high, water resistant with a puncture resistant sole, a ladder shank bend resistance, and an impact and compression resistant toe cap. There are several options for footwear available to firefighters, see figure C-4, C-5, C-6.



**Figure C-4.** Common Rubber Boot

- Easy to don
- Excellent Water Repellency
- Easy Decontamination
- Inexpensive
- Sloppy Fit



**Figure C-5.** Leather Pull-Up Boot

- Lightweight
- Durable
- Comfortable
- Minimal Ankle Support
- Difficult to Decon
- Expensive



**Figure C-6.** Leather Lace-Up Boot

- Tight Fit
- Ankle Support
- Durable
- Expensive
- Height Decreases Water Resistance
- Difficult to Decon

## 10.7 PROTECTIVE CLOTHING, BODY PROTECTION

Body protection shall comply with this section for ALL firefighters. This section covers both turnout (bunker gear) and station uniforms. In 2007, the National Fire Protection Association (NFPA) adopted a new protective clothing standard titled “Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting” (NFPA 1971-2007). This revised standard regulates the identical components of the prior standard such as, structural firefighting PPE, foot and leg protection, head protection, along with hand. However, some major safety related additions/revisions to this standard were adopted by the NFPA. These new sections include standards on the testing of the materials used to construct PPE, the inclusion of safety features such as a drag rescue device (DRD) within each individual set of PPE, and an optional CBRN section that allows departments who may respond to terrorist incidents the opportunity to purchase PPE that will afford their members enhanced protection against certain CBRN agents.

Body protection shall be achieved by the wearing of a fire resistive coat and pants both of which shall be at least equivalent to NFPA 1971-2007 “Protective Clothing for Structural Fire Fighting” incorporated herein by reference. For Career firefighters, body protection must be worn

in combination station/work uniform or apparel that complies with NFPA 1971-1986 “Station Work Uniforms for Firefighters. If the employer issues or requires the wearing of uniforms for Volunteer Firefighters these too shall comply with the same standard. The performance, construction and testing of station/work uniforms shall be equivalent to the referenced standard, all apparel shall be of non-meltable material such as cotton. Station uniforms are not meant to take the place of turnout gear.

## 10.8 PROTECTIVE CLOTHING, HAND PROTECTION

Hand protections shall consist of protective gloves or a glove system which will provide protection against cuts, punctures and heat penetration. The performance, construction and testing of gloves for structural firefighters shall be at least equivalent to NFPA 1973-1993 “Gloves on Structural Firefighting” incorporated herein by reference. This standard provides design and performance requirements for gloves used in structural firefighting. The standard is intended to provide the wearer with protection against flame contact and physical hazards encountered in structural fires. Compliant gloves must provide protection to the whole hand, including the region which extends one inch above the wrist crease. When wristlets are included as a part of gloves, they must extend at least two inches above the wrist crease. Glove materials may be a single layer or a composite of materials which meet the performance requirements of the standard (Gloves meeting the revised form of this standard may also provide limited protection from chemicals and infectious agents).

## 10.9 PROTECTIVE CLOTHING HEAD, EYE AND FACE PROTECTION

Head protections shall consist of a protective head device with ear flaps and a chin strap, full facepieces, or goggles and a hood, all of which must meet the performance, construction and testing requirements of 29 CFR Part 1910.156(00), or NFPA 1972-1992. The NFPA performance requirements for helmets cover protection from impact, penetration, heat, flame, and electricity. Ancillary features such as the chinstrap, ear covers, face shield, and retroreflective markings are also designed to meet NFPA criteria, although the criteria and testing are not necessarily identical to those for the body of the helmet. NFPA 1972, Standard on Helmet for Structural Fire Fighting, provides design and performance criteria for helmets used in structural firefighting. These criteria cover the need to protect the fire fighter’s head from flame, heat, and physical hazards of fire ground activity and during other aspects of fire response. The helmet, in conjunction with structural firefighting protective clothing and self-contained breathing apparatus, provides



**Figure C-7.** Helmets must meet current standards to protect the head and include reflective decals all the way around. RGM update page 40. *John Lewis.*



**Figure C-8.** A Faceshield, Earflaps, a Chinstrap are required on a Firefighters Helmet. *John Lewis.*

protection to the face and neck. Helmets that meet the NFPA standard will bear a label specifically stating that it fully complies with the standard. Helmets that comply with the OSHA standard will also bear a label specifically stating that it complies with the appropriate OSHA standard. Only helmets bearing one of these labels will be considered to comply with the law.



**Figure C-9.** A Nomex / Fire Resistive Hood shall be worn under the helmet and over the SCBA Facepiece. *John Lewis.*

Protective hoods must comply with NFPA 1971-1991. “Protective Clothing for Structural Fire Fighting.” Protective hoods meeting the NFPA standard will bear a label specifically stating that it fully complies with NFPA 1971-1991. Protective hoods must provide protection to the head, face, and neck in areas of the body not protected by the collar, helmet, or SCBA facemask. NFPA addresses the protective hood as a separate piece of clothing, an interface component which protects the fire fighter where other components of the ensemble do not. This generally includes the sides and back of the head. Protective hoods must not interfere with other ensemble

components. The protective hood must be designed so that it does not interfere with the proper fit of the SCBA mask, protective coat, or protective helmet.

## 10.10 RESPIRATORY PROTECTION DEVICES

The Employer shall ensure that respirators are provided to and used by firefighters and that respirators meet the requirements of 29 CFR 1910.134 and this section. Any respiratory protection equipment must comply with NFPA 1981, “Standard on Open-Circuit Self-Contained Breathing Apparatus for Firefighters”, sets performance criteria which extend beyond requirements set in the NIOSH certification of positive pressure open circuit self-contained breathing apparatus. This OSHA standard has been adopted by PEOSHA in its entirety. PEOSHA Standard 1910.134 (c)(1), requires “that in any workplace where respirators are necessary to protect the health and safety of the employee, the employer must develop and implement a written respiratory protection program, which includes fit testing procedures for tight-fitting respirators.”

Respiratory protection equipment that complies with the NFPA standard will bear a label specifically stating that it complies with NFPA 1981. The additional requirements of NFPA 1981 address flame/thermal and physical hazards specific to the fire ground. A self-contained breathing apparatus (SCBA) is a respirator which supplies a respirable atmosphere to the user, carried in or generated by the apparatus independent of the outside environment.



**Figure C-10.** Approved SCBA with a full facepiece or with approved helmet or hood configuration shall be provided to and worn by firefighters. *John Lewis.*

Respirators must be used when airborne hazards are present and effective engineering controls

are not feasible. Respirators have their limitations and are not a substitute for effective engineering controls. Where respirators are required to protect worker health, public employers must comply with the PEOSH Respiratory Protection Standard (29 CFR 1910.134).

The Standard contains requirements for:

- Program administration
- Worksite-specific procedures
- Respirator selection
- Employee training
- Fit-testing
- Medical evaluation
- Respirator use, cleaning, storage, maintenance and repair

Some public sector occupations where respirators are commonly required include firefighting.

- Firefighters shall wear the following respiratory protection:
- Approved SCBA with a full facepiece or with approved helmet or hood configuration shall be provided to and worn by firefighters as follows;
- While engaged in structural firefighting,
- While working in confined spaces where toxic products of combustion or an oxygen deficiency may be present,
- During emergency situations involving toxic substances and
- During all phase's firefighting and overhaul.

The employer shall establish and maintain a respiratory protection program, which includes the requirements of 29 CFR 1910.134 Respiratory Protection, with amendments published in the Federal Registry through April 23, 1998 and any subsequent amendments thereto, are incorporated and adopted herein by reference as standards applicable to firefighters for respiratory protection.

To view a model NJ Fire Department Respiratory Protection Program visit [https://www.nj.gov/dca/divisions/dfs/publications/publication/reference\\_booklet\\_6.pdf](https://www.nj.gov/dca/divisions/dfs/publications/publication/reference_booklet_6.pdf)

## **10.11 LIFE SAFETY ROPE, HARNESS AND HARDWARE**

This section applies to fire departments that train and perform rope rescue services. All employees that are required by the fire department to participate in such rescue shall be provided at no cost with the proper equipment meeting the requirements of this section. Life-safety rope, harnesses, and hardware must comply with NFPA 1983-1985 "Standard on Life Safety Rope and Equipment for Emergency Services". This standard is the 1985 edition of NFPA standards number 1983. The performance, construction and testing of ropes, harnesses, and hardware for firefighters shall be equivalent to the referenced standard.

This equipment need only be provided in those departments that train and perform rope rescue services. Life-safety rope that meets the NFPA standard will bear a label specifically stating that it complies with NFPA 1983, it will also contain an identification tape wound into the full length of the rope bearing the same statement. Only life-safety ropes with both the label and the tape will be considered to comply with the law. Rope with a tape but without a label should, not be used for rescue purposes, because removal of the label is one way of marking rope that is no longer suitable for rescue work. Life-safety rope that has been previously used for rescue or non-rescue purposes should be destroyed or removed from use for rescue purposes. Failure to observe this recommendation could lead to serious injury or death because no acceptable means of testing used rope exists.

***Life-Safety Harnesses:*** Life-safety harnesses meeting the NFPA standard will bear a cloth label or a riveted metal tag stating that it complies with NFPA 1983. Only harnesses with such a label or tag will be considered to comply with the law. Webbing for these harnesses must be constructed of virgin continuous fibers and be at least 1-3/4 inches wide. Webbing, structural stitching, and rivets are designed and tested to meet and exceed their intended use situations. Harnesses are designated as being from one of three classes. Class I harnesses fasten around the waist.



**Figure C-11.** A Class I harness is secured only around the waist. *John Lewis.*

They are designed to secure one person to a ladder or to bear the weight of one person in an emergency rescue. Class I harnesses, should not be worn by firefighters during efforts to rescue another person.



**Figure C-12.** A Class II Harness is secured around the waist and thighs. *John Lewis.*

Class II harnesses, are worn around the waist and around the thighs or under the buttocks, Figure C-10. They are designed for use in rescue situations where two-person loads (e.g., one firefighter and one victim) may be encountered.



**Figure C-13.** A Class III harness is secured around the waist, buttocks and shoulders. *Robert Moran.*

Class III harnesses, are fastened around the waist, around the thighs or under the buttocks, and over the shoulders, Figure C-11. They are designed for rescue situations where a two person load and inverting may be encountered.

***Life-Safety Hardware:*** There is no NFPA label applied to life-safety hardware, but load-bearing hardware will carry the name of the manufacturer and the MIL-SPEC number, if applicable. All hardware must be able to withstand corrosion in a laboratory salt spray test. In addition, all load-bearing hardware, buckles, rings, snap-links, ascent devices, and descent devices are tested to withstand forces that match and exceed expected use conditions. Snap-link gates, which are load-bearing, gated fasteners, must lock automatically.

Recently, many fire departments have begun to purchase personal safety harnesses and personal escape devices for individual firefighters. These lifesaving units are designed to allow firefighters the capability to safely and rapidly remove themselves from an IDLH atmosphere should an emergency event occur. While these devices are not mandatory, the proactive manner by which individual departments are assuming the responsibility of enhancing firefighter safety through these purchases should be commended.

## **10.12 PERSONAL ALERT SAFETY SYSTEM (PASS)**

The employer shall provide at no cost to the employee and assure the use of a Personal Alert Safety System (PASS) device which complies with this section.

The employer shall ensure all firefighters wear (PASS) devices that comply with NFPA 1982-1988 “Standard on Personal Alert Safety Systems (PASS)” this standard establishes requirements intended to ensure reliable performance of (PASS) device that enable emergency responders to signal or help if they get lost, disoriented, trapped, injured, or run out of breathing air during emergency operations. PASS devices are motion-detector-based devices, worn by individual firefighters, that emit an alarm when a firefighter has not moved in approximately 30 seconds or when the firefighter manually operates the alarm switch. The purpose of a PASS is to alert other firefighters that the wearer may be unable to move and may be in need of assistance. They must be worn by firefighters in the following situations:

- While engaging in interior structural firefighting,
- While working in confined spaces
- During all phases of overhaul.

The PASS device may be attached to the exterior of the firefighter’s turnout gear when not wearing an SCBA or integrated into the SCBA during all operations in an IDLH Atmosphere. PASS devices that meet the standard will bear a label specifically stating that it fully complies. Only devices with labels specifically mentioning the appropriate standard will be considered

to comply with the law. PASS devices are designed to be operated in three modes—automatic, manual, and off.

In automatic mode, the motion detector will activate a pre-alarm warning after approximately 30 seconds of no motion by the wearer. This warning sound will be distinct from the alarm sound. Motion sensed after the pre-alarm warning sound will return the device to automatic mode. Under normal operating conditions, the device will be able to sound its alarm for at least one hour. When the wearer or operator switches the device to manual mode, the alarm will sound within one second.

In the off mode, the device does not function and there is no drain on battery power. The device must also emit a low battery warning sound when the battery is drained to the point it would be unable to sustain a full alarm sound for one hour. The low battery warning is distinct from other sounds emitted by the device. The switch used to change modes must be operable by a hand wearing a heavy glove. Turning the switch to the off position requires two distinct motions to limit the possibility of accidental shutoff.

Many fire departments have begun to use Integrated PASS units: which provide PASS devices and SCBA in the same appliance. This application meets the previous intent of regulation so long as the Integrated PASS unit meets all the previously stated requirements and is worn, not only while engaged in interior structural firefighting, but while working in a confined space, during all phases of overhaul, and whenever there is a possibility that the previously mentioned actions could occur.



**Figure C-14.** Various types of PASS Devices are available. Including those that are integrated with SCBA.  
*John Lewis.*



**Figure C-15.** PASS Devices should be provided for all firefighters on the fireground. *John Lewis.*

### 10.13 HEARING PROTECTION

This section is intended to provide hearing protection to firefighters in non-emergency situations. An example of non-emergency situation requiring hearing protection would be during the testing of power tools or any other noise-emitting devices / equipment. PEOSHA hearing protection standards do not apply to working in emergency situations.

In general, noise above 90 decibels, when encountered in a non-emergency situation, requires hearing protection provided by the employer. However, hearing protection is not required (even in a non-emergency situation) if its use would create an additional hazard to the user.

Employers must engage in a noise reduction program to identify potentially harmful noise sources and reduce or eliminate these sources. The program should be described in writing by the employer and may be incorporated into the employer's Standard Operating Procedures. Federal and state regulations on general workplace noise (N.J.A.C. 12:100-4.2(a) 6 and US CFR 1910.95) also apply to firefighters. Career and volunteer firefighters are covered by PEOSHA hearing protection rules at this time.



**Figure C-16** Apparatus headsets provide hearing protection for firefighters. *John Lewis.*

#### **10.14 FILLING AIR CYLINDERS**

Annual training on the procedure to fill air cylinders is a required component of within a respiratory protection program. The charging stations shall be equipped with proper facilities to ensure the safety of charging station operator and nearby personnel. It is recommended that hearing protection be worn during this operation. These regulations on filling air cylinders are effective at this time.

#### **10.12 FIRE APPARATUS OPERATIONS**

Whenever a fire apparatus leaves the fire station in response to an alarm or other emergency, all firefighters except the driver of the fire apparatus shall have donned their protective clothing before the apparatus is in motion. The term fire apparatus does not include an automobile. The employer shall provide restraining devices for all personnel aboard a fire apparatus. Restraining devices may include protective seating, seatbelts or vehicle harnesses for all firefighters aboard. No firefighter is allowed to put on a protective gear while riding on moving apparatus.



**Figure C-17** Employers must provide seat belts or harnesses for all firefighters riding apparatus. *John Lewis.*

All the fire apparatus purchased or remanufactured after January 4, 1993, must have enclosed seating with seatbelts for all personnel riding on the apparatus complying with the following standards:

- Pumpers – NFPA 1901-1991
- Initial Attack – NFPA 1902-1991
- Mobile Water Supply – NFPA 1903-1991
- Aerial Ladder and Elevating Platform – NFPA 1904-1991

These standards call for fully enclosed seats with seatbelts for whatever number of personnel is specified by the purchasing empower. A seat must be provided for each firefighter the apparatus is designed to carry.

## **10.16 MAINTENANCE OF FIREFIGHTER EQUIPMENT**

All Fire department aerial apparatus is required under these revised standards to be tested annually in accordance with NFPA 1914-1991, “Standard for Testing Fire Department Aerial Devices”. This standard calls for annual visual, operational, and load testing.

Complete inspections and tests including, the non-destructive testing as described in the standard shall be conducted whenever visual inspection or load testing indicates a potential problem or at

least every five (5) years. Any device that fails a test shall be immediately removed from service and shall not be returned to service until properly repaired and retested.

In addition Pumper Apparatus shall be inspected at least annually in accordance with the criteria of NFPA 1911-1987 “Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles”. Initial attack for apparatus and mobile water supply fire apparatus shall be inspected at least annually in accordance with the referenced standard. Each inspection shall include road worthiness.

## **NEW JERSEY UNIFORM FIRE CODE**

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Fire prevention activities in New Jersey fall under the authority of local Fire Prevention Bureaus or the State of New Jersey which are identified as the Authority Having Jurisdiction or (AHJ). These entities use the NJ Uniform Fire Code as their guiding operational and administrative document. It is vitally important for all firefighters within the State to gain an awareness of the existence of these regulations which are meant to protect the life safety of the occupants residing in and the firefighters operating within certain structures. The code is also designed to assist in reducing the extent of property damage resulting from a fire or other hazardous condition that may occur within certain structures. Knowledge of this information and the mandates contained within the code can significantly improve a firefighter and incident commanders ability to complete their assigned fireground tasks. This awareness can also be used to identify, document, and pass on safety issues and code violations found during emergency responses to local inspectors so that appropriate action can be taken. New Jersey firefighters desiring to become fire inspectors are required to obtain State certification as a Fire Inspector and those wishing to be able to supervise inspectors and oversee a Fire Prevention Bureau are required to obtain both Fire Inspector and Fire Official certification. The intent and purpose of the Code is indicated below.

Additional information and regulations contained within the New Jersey Uniform Fire Code can be found at: <https://www.nj.gov/dca/divisions/dfs/codes/> or <https://www.keanfiresafety.com/uniform-fire-code/>

### **N.J.A.C 5:70-1.3 INTENT AND PURPOSE**

**(a)** It is the intent of this Code to prescribe regulations consistent with nationally recognized good practice for the safeguarding to a reasonable degree of life and property from the hazards of fire and explosion arising from the storage, handling and use of hazardous substances, materials and devices, and from conditions hazardous to life or property in the use or occupancy

of buildings or premises.

**(b)** Where no specific standards or requirements are specified in this Code, or contained within other applicable laws (or adopted codes) or ordinances, compliance with the standards of the National Fire Protection Association or other nationally recognized fire-safety standards as are approved by the fire official shall be deemed as prima facie evidence of compliance with the stated intent of this Code.

## **NEW JERSEY FIRE SERVICE RESOURCE EMERGENCY DEPLOYMENT**

In 2007, the NJ Fire Safety Commission directed the Division of Fire Safety in conjunction with many emergency responses require the use of regional mutual aid and/or State resources. Severe reductions in the number and accessibility of volunteers across New Jersey coupled with known career department staffing limitations have led to a significant increase in the use of mutual and automatic aid resources at emergency incidents. To ensure these responses are properly coordinated and receive the appropriate requested resources the State has adopted a regulation identified as the Fire Service Resource Emergency Deployment. This regulation mandates that “each municipality or fire district, as the case may be, in this State shall prepare and adopt a local fire mutual aid plan in a form or manner established by the State fire coordinator”. The regulation also gives the authority to requisition and manage mutual aid requests to authorized local, county, and State fire coordinators. To ensure New Jersey firefighters are aware of this important mutual aid regulation several key sections are included below.

### **5:75A-1.3 Intent and purpose**

**(a)** This chapter establishes a mechanism for the coordination of fire service resources throughout the State to facilitate a quick and efficient response to any emergency incident or situation that requires the immediate deployment of those resources in order to protect life and property from the danger or destruction of fire, explosion or other disaster while recognizing that fire departments have a primary mission to provide fire protection to their respective communities.

**(b)** The State fire coordinator system is intended to be utilized for, but not limited to, acts of terrorism, incidents requiring significant fire mutual aid, declarations of emergency by the Governor, and interstate requests for fire resource assistance.

**(c)** The State fire coordination system is intended to prevent resource excesses or depletions by giving the State fire coordinator the power to require fire service resources to standby or to not respond.

### **N.J.A.C 5:75A-1.4 Scope**

This chapter shall apply to State, county and local coordination and utilization of fire service and

other emergency resources in response to fire-related emergency incidents and disasters.

### **N.J.A.C 5:75A-1.5 Definitions**

The following terms shall have the meanings indicated except where the context clearly indicates otherwise:

**“County fire coordinator”** means the individual appointed by the State fire coordinator pursuant to N.J.A.C. 5:75A-2.3.

**“County fire mutual aid plan”** means a plan, prepared and adopted by a county in accordance with N.J.A.C. 5:75A-2.4, which sets forth the measures that are to be implemented in those instances where the fire service resources of an individual municipality within the county are unable to respond adequately to an emergency incident or a local fire emergency disaster and, therefore, it is necessary for the county to coordinate the delivery of fire service resources and assistance to that municipality from other municipalities in the county.

**“Deputy county fire coordinator”** means an individual appointed by the county fire coordinator pursuant to N.J.A.C. 5:75A-2.3 to assist the county fire coordinator with the duties and responsibilities of his or her position and to serve as the county fire coordinator in his or her absence.

**“Deputy State fire coordinator”** means an individual at least as qualified as a county fire coordinator appointed pursuant to N.J.A.C. 5:75A-2.3(d)1 appointed by the State fire coordinator from the employees of the Division of Fire Safety to assist the State fire coordinator with the duties and responsibilities of his or her position and to serve as the State fire coordinator in his or her absence.

**“Division”** means the Division of Fire Safety in the Department of Community Affairs.

**“Emergency incident”** means any situation to which a unit of the fire service responds to deliver emergency services including, but not limited to, rescue, fire suppression, special operations and other forms of hazard control and mitigation.

**“Fire service resources”** means firefighters and other personnel utilized by a unit of the fire service to provide rescue, fire suppression and related activities whether those fire fighters and personnel are volunteer or career; trucks, rescue vehicles and other vehicles used for fire fighting and emergency purposes; and fire fighting and rescue equipment used for fire or emergency purposes, including communications and protective equipment. Fire service resources shall not include emergency medical service providers and personnel, except that any unit or personnel

that provides both fire and emergency medical services shall be subject to this chapter while performing fire suppression and related activities.

**“Forest fire service”** means the agency within the Department of Environmental Protection that is responsible for the protection of life, property and natural resources from wildfire.

**“Incident commander”** means the individual in overall command or control of the fire service personnel, and associated emergency equipment and emergency vehicles, at the site of an emergency incident.

**“Local fire emergency disaster”** means an emergency incident which, in the judgment of the incident commander, is of such severe degree and nature that it presents a significant threat to the health, safety and welfare of a municipality and its residents and, therefore, may warrant the implementation of the municipality’s municipal emergency operations plan.

**“Local fire mutual aid plan”** means a plan, prepared and adopted by a municipality or fire district in accordance with N.J.A.C. 5:75A-2.2, which sets forth the measures that are to be implemented in those instances when the fire service resources of the municipality or fire district cannot adequately respond to an emergency incident or a local fire emergency disaster and, as a consequence, it is necessary for the municipality or fire district to request assistance and fire service resources from contiguous municipalities.

**“Order of deployment”** means an order issued by the State fire coordinator pursuant to this chapter to a unit of the fire service requiring the immediate response, recall or standby of that unit’s fire service personnel, emergency equipment or emergency vehicles, or any part thereof.

**“Regional fire coordinator”** means an individual appointed by the State fire coordinator pursuant to N.J.A.C. 5:75A-3.2 to assist the State fire coordinator with the duties of his or her position.

### **N.J.A.C 5:75A-2.2 Preparation, adoption of local fire mutual aid plans**

(a) Each municipality or fire district, as the case may be, in this State shall prepare and adopt a local fire mutual aid plan in a form or manner established by the State fire coordinator.

(b) The plan shall set forth policies and procedures to coordinate the effective utilization of fire service resources in those instances where the implementation of the local fire mutual aid plan is determined to be necessary or appropriate.

(c) Each local fire mutual aid plan shall be based upon the planning criteria, objectives, requirements, responsibilities and concepts of operation essential for the implementation of all necessary and appropriate protective or remedial measures to be taken in response to emergency incidents.

- (d) Each local fire mutual aid plan shall be adopted no later than March 10, 2004.
- (e) Following adoption, each municipality or fire district shall file a copy of its local fire mutual aid plan with the county fire coordinator.
- (f) In any instance where a local fire mutual aid plan provides for the provision of assistance and fire service resources by or to a political subdivision of another county, the municipality or fire district also shall file a copy of that plan with that county and regional fire coordinator. The inclusion of assistance by or to a political subdivision of another county in the local fire mutual aid plan does not automatically trigger the activation of the county fire mutual aid plan.
- (g) In any instance where a local fire mutual aid plan provides for the provision of assistance and fire service resources by or to a political subdivision of another state, the municipality or fire district also shall file a copy of that plan with the State fire coordinator.
- (h) Each local fire mutual aid plan shall be reviewed and updated every two years.
- (i) Each local fire mutual aid plan shall consider the anticipated fire service resources for occupancies or possible incidents likely to require local mutual aid and shall be referenced in the county Emergency Operations Plan Fire Rescue Annex.

## **FIRE SERVICE INCIDENT MANAGEMENT**

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The following rules for fire service incident management are designed to provide Incident Commanders throughout New Jersey with a standardized, structured, and coordinated system for use when managing the operational components of an emergency incident.

### **N.J.A.C. 5:75-1.1 Title; division into subchapters**

- (a) The rules contained in this chapter shall be known as “Rules for Fire Service Incident Management System” and are referred to herein as the rules.
- (b) The rules are divided into two parts:
  - 4. Subchapter 1 is entitled “General Provisions” and may be cited throughout the rules as N.J.A.C. 5:75-1, and when referred to in subchapter 1 of this chapter, may be referred to as this subchapter.
  - 5. Subchapter 2 is entitled “Incident Management System” and may be cited throughout the rules at N.J.A.C. 5:75-2, and when referred to in subchapter 2 of this chapter, may be referred to as this subchapter.

### **N.J.A.C 5:75-1.3 Intent and purpose**

- (a) It is the intent of these rules to establish a mandatory incident management system to

be used by the fire service and to define and describe the essential elements of an incident management system.

**(b)** An incident management system is utilized to afford structure and coordination to the management of emergency incident operations in order to provide for the safety and health of fire service members and other persons involved in those activities.

#### **N.J.A.C 5:75-1.4 Applicability**

These rules shall apply to operations conducted by the fire service at the scene of emergency incidents and provides a standard approach to the management of those incidents.

#### **N.J.A.C 5:75-1.6 Penalties**

The Commissioner shall enforce and administer this chapter and is authorized to issue compliance orders to persons and public entities in violation thereof, to petition the Superior Court for injunctive relief enforcing any compliance order, to levy and collect civil penalties of not more than \$ 500.00 per violation and to institute summary proceedings under the Penalty Enforcement Law (N.J.S.A. 2A:58-1 et seq.) in the Superior Court to recover penalties previously levied. Each day that a violation continues after notice to cease has been given by certified mail or personal service shall be deemed a separate violation.

#### **N.J.A.C. 5:75-1.5 Definitions**

The following terms shall have the meanings indicated except where the content clearly indicates otherwise:

**“Branch”** means an organizational level having functional or geographical responsibility for major aspects of incident operations.

**“Commissioner”** means the Commissioner of Community Affairs.

**“Division”** means the organization level having responsibility for operations within a defined geographic area.

**“Emergency incident”** means any situation to which the fire department responds to deliver emergency services including, but not limited to, rescue, fire suppression, emergency medical care, special operations, and other forms of hazard control and mitigation.

**“Fire department”** means a fire service organization providing rescue, fire suppression and related activities. The term “fire department” shall include any public, governmental fire

service organization engaging in this activity.

**“Group”** means an organizational level having responsibility for operations within a defined functional area.

**“Hazardous area”** means any location(s) that may pose a safety and/or health risk to firefighters due to, but not limited to, the presence of products of combustion, the existence of hazardous or otherwise oxygen deficient or oxygen enriched atmosphere, the potential for any immediately dangerous to life and health atmosphere, the use of hazardous equipment or operations, or the potential for any of these situations to exist. Additionally, any area or location that predisposes a firefighter to become lost, disoriented, or trapped, including any structure, confined space and wild land areas, shall be considered a hazardous area.

**“Incident action plan”** means an oral or written plan containing general objectives reflecting the overall strategy for managing an incident.

**“Incident commander”** means the individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources.

**“Incident management system”** means a nationally recognized and organized system of rules, responsibilities and standard operating procedures used to manage emergency operations.

**“Logistics section”** means the section responsible for providing facilities, services, and material support for an incident.

**“Member”** means a person, at least 18 years of age, who is involved in performing the duties and responsibilities of a fire department, under the auspices of the organization. For the purpose of this chapter, a fire department member may be a full-time or part-time employee, a paid or unpaid volunteer, may occupy any position or rank within the department and may or may not engage in emergency operations.

**“Personnel accountability officer (POA)”** means the person designated by the Incident Commander to monitor entry into and exit out of hazardous areas for the purpose of ensuring accountability of all personnel in the hazardous area or structure.

**“Personnel accountability report (PAR)”** means the results of an accounting of all personnel on the emergency incident scene to the Incident Commander.

**“Personnel accountability roll call”** means the process of accounting of all personnel on the emergency incident scene.

**“Safety officer”** means a member of an incident command staff responsible for monitoring and assessing safety hazards and unsafe conditions, and for developing measures for ensuring personnel safety.

Amended by R.2002 d.179, effective June 3, 2002 (operative January 2, 2003); R.2008 d.142, effective June 2, 2008.

### **N.J.A.C 5:75-2.1 Incident management system adopted**

(a) Pursuant to authority of P.L. 1995, c.266 (N.J.S.A. 52:27D-25) the Commissioner hereby adopts the model standard of the National Fire Protection Association, known as “NFPA 1561/Standard on Fire Department Incident Management System/1995.” This standard is hereby adopted by reference as the New Jersey Incident Management System, subject to the modifications set forth in N.J.A.C. 5:75-2.2.

(b) Copies of this standard may be obtained from the sponsor at: National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

(c) When used alone, the terms “subchapter,” “section,” and so forth, refer to that portion of these rules. When used in N.J.A.C. 5:75-2.2, the terms “section,” “subchapter” or “chapter,” and so forth, refer to the NFPA Standard.

### **N.J.A.C 5:75 -2.3 Geographical Identification of the Incident Scene**

Commanding and controlling fireground operations and maintaining strict accountability of operating firefighters is a challenging task. To assist incident commanders with this responsibility one of the components of the adopted regulations requires incident commanders to divide an incident scene and/or the exterior of a fire building into geographic sides using the postal address or other side as selected by the incident commander as “Division A” then continuing clockwise around the location (Division B, C, D). It also requires the identification of each level or floor of a structure as a “Division” beginning at ground level with Division 1 and moving upward as required. Specific areas of the structure such as the roof or basement shall be identified as “basement” or “roof” division. By using this system incident commanders are able to maintain enhanced accountability of companies operating at an emergency incident and their assigned tasks. The full text of the geographical identification regulation indicated below.

### **N.J.A.C 5:75-2.3 Geographical identification of the incident scene**

(a) To provide for uniform identification of locations and operational forces within an incident scene, the scene shall be divided geographically into smaller parts which shall be designated as divisions. Specific areas of the incident scene shall be designated as follows:

1. Sides of incident scenes designated as divisions shall be further identified by the addition of a letter of the alphabet beginning with the letter “A.”

- i. The side of the incident scene that bears the postal address of the location shall be designated as division “A” by the incident commander. Where the incident scene has no postal address, the incident commander shall select any side to designate division “A”.
  - ii. Continuing in a clockwise rotation, the side adjacent to the division “A” side shall be designated as division “B.”
  - iii. Continuing in a clockwise rotation, the side adjacent to the division “B” side shall be designated as division “C.”
  - iv. Continuing in a clockwise rotation, the side adjacent to the division “C” side shall be designated as division “D.”
2. When operating at an incident containing more than one level, each level shall be designated as a division and shall be further identified by the addition of an Arabic numeral beginning with the number “1.”
    - i. The ground level of the incident scene shall be designated as division “1.”
    - ii. The next level above the ground level shall be designated as division “2.”
    - iii. Subsequent levels above division “2” shall be assigned division numbers in progressing order in this manner.
  3. Additional areas of the incident scene shall be designated through the use of terms common to the fire department including, but not limited to, basement, roof, interior, etc.

## **SAFETY OFFICER**

NFPA 1500 and 1561 mandate the assignment of an Incident Safety Officer (ISO) at emergency incidents and a Department Health and Safety Officer whose responsibilities lie in the requirements related to firefighter health and wellness. Since the inception of these standards and the adoption of New Jersey’s Incident Management regulations in 1995, fire departments have been required to operate within the parameters of a uniform incident management system (IMS) that includes the assignment of a Safety Officer at every response. NFPA 1521 Standard for Fire Department Safety Officer Professional Qualifications contains JPR’s for the positions of Incident Safety and Health and Safety Officer. Although these roles contain diverse responsibilities a single individual may serve in the dual roles.

The NJ Firefighter Safety regulations adopted in June of 2008 mandate the assignment of a safety officer at every significant emergency event (N.J.A.C. 5:75-2.5 Safety Officer). In this method the new regulations integrate seamlessly with the current IMS regulations and should not pose any additional burden on fire department emergency operations. As written the new regulation allows the incident commander to serve as both the IC and the safety officer at an emergency incident. However, the staffing of the safety officer position in this manner is not conducive to

ensuring an appropriate level of firefighter safety at an emergency incident. It is a documented fact that the IC has a significant amount of responsibility at an incident. This responsibility makes it extremely difficult, if not impossible, to effectively complete his or her own duties and those of the safety officer. To ensure an IC assigns personnel to this operational fireground position the regulation specifically defines a significant emergency event as “any occasion or instance for which, in the determination of an incident commander, he or she cannot effectively monitor conditions to insure the safety of assigned personnel or he or she deems an operations section is needed or where firefighters are exposed to conditions immediately dangerous to life or health (IDLH) a safety officer shall be appointed.” Based on this definition, it is clearly recognized that every fire department response during which firefighters operate in an IDLH atmosphere or are faced with other life safety related hazards should be categorized as a significant event requiring the assignment of one or more Safety Officers. Many fire departments across the State have taken a proactive approach to ensuring this position is properly staffed prior to an emergency response through the implementation and assignment of the Safety Officer position within their operational table of organization. While this method of assigning personnel to this position prior to an incident has rapidly become the standard by which most fire departments operate it is important to remember that it remains the sole responsibility of the Incident Commander to follow the mandatory regulation of assigning a Safety Officer at every significant emergency event. The full text of the safety officer regulation is indicated below.

### **N.J.A.C. 5:75-2.5 Safety Officer**

- (a)** An incident commander shall appoint a safety officer at every significant emergency event.
  - 1. “Significant emergency event” means any occasion or instance for which, in the determination of an incident commander, he or she cannot effectively monitor conditions to insure the safety of assigned personnel or he or she deems an operations section is needed or where firefighters are exposed to conditions immediately dangerous to life or health (IDLH)
  - 2. Complex incidents or those that cover a large geographic area may require the appointment of assistant safety officers, who shall be assigned to branches, divisions, or groups.
- (b)** The following items shall govern the appointment of a safety officer:
  - 1. The safety officer shall be assigned as early in the incident as possible and shall be knowledgeable in the actions being implemented;
  - 2. The safety officer shall report directly to the incident commander;
  - 3. The safety officer shall identify existing or potential hazards and inform command of those findings;
  - 4. The safety officer shall recommend to the incident commander any changes to the incident action plan as a result of on-going surveys;
  - 5. The safety officer shall have the authority to alter, suspend, or terminate any activity that

is an unacceptable safety risk. The safety officer shall inform the incident commander and other affected operational personnel immediately if he or she changes any operational activities for safety reasons; and

6. When operating in hazardous positions, the safety officer shall be attired in appropriate personal protective equipment (PPE), including self-contained breathing apparatus (SCBA); have radio communication equipment; and be accompanied by another firefighter.

(c) If a safety officer has not been appointed, the incident commander shall be the safety officer.

To ensure firefighters receive the requisite training necessary to be assigned as an Incident Safety or Health and Safety Officer the Department of Community Affairs recently adopted N.J.A.C 5:73-16.1 FIRE DEPARTMENT SAFETY OFFICER which identifies the 2015 edition of NFPA 1521 Standard for Fire Department Safety Officer Professional Qualifications as the training and certification standard for the New Jersey fire service. By adopting this standard the State sets a clear and distinct path to ensuring that personnel assigned to these critical safety related positions will be knowledgeable of the job performance requirements (JPR's) for the two roles and proficient in completing the tasks required of the positions.



**Figure C-18.** The Incident Safety Officer must be mobile on the fireground to effectively monitor conditions and to ensure the safety of assigned personnel. *John Lewis.*

## EMERGENCY RADIO TRAFFIC

Common terminology, a clear and concise voice, calm demeanor, and professional radio conduct are the key ingredients to effective radio communications. It is therefore a learned skill not commonly associated with the standard classroom environment. This fact alone forms a basis as to how important it is for firefighters to practice effective communications and understand how the dynamics of communication can affect the overall operation of an emergency incident.

Incident commanders, company officers, and firefighters who employ substandard radio communication skills create stressful situations that can generate an emergency incident environment filled with confusion, disorder, and incompetent incident management under normal

conditions. A much more serious communication problem can develop during incidents at which firefighters become trapped or disoriented within a structure or area ultimately requiring rescue from a rapid intervention crew or other emergency responders. If incident commanders and firefighters cannot effectively manage radio communications and deliver accurate information at a common everyday incident they will be unable to be effective during an intense, dynamic, and duress filled operation requiring the rescue of trapped or distressed firefighters.

In order to provide the New Jersey fire service with direction and a common standard operating guideline to place into effect during these types of life-threatening incidents the State regulations adopted in 2008 include a section on Emergency Radio Traffic. Essentially, this section details the radio protocol and step by step standard operating guidelines that are mandated to be written and utilized by fire departments throughout the state in the event a firefighter becomes lost, disoriented, or injured at an emergency response thus ensuring the use of common terminology at emergency incidents. Experience has shown that strict adherence to a standard set of emergency communication procedures by disciplined firefighters is a critical component of controlling the turmoil created during the issuance of a “mayday” message and subsequent rescue operation. To further reduce the opportunity for disorder during these events the emergency radio traffic section of these guidelines include specific details on the prioritization of emergency radio traffic or “mayday messages” over routine communication, identifying who can call a “mayday”, distinguishing conditions requiring a “mayday”, confirming the procedure used to call a mayday, accurate use of the LUNAR acronym, and management of the PASS alarm during a “mayday” situation.

Fire Chiefs and those serving as Incident commanders are ultimately responsible for the fireground safety of their firefighters. One of the most positive ways to ensure this obligation is fulfilled is to support and follow the mandates included in these regulations. A proactive fire department committed to the safety of their members will write effective standard operating guidelines that meet the emergency radio traffic regulations indicated below and train their firefighters to use them as necessary during emergent situations.

In an effort to gain enhanced command and control of the dynamic and stressful fireground situations resulting from the issuance of a “mayday” message it is highly suggested that Incident Commanders develop and utilize a definitive step by step “mayday” check list at the command post to support the successful management and rescue of a firefighter during the transmission of a “mayday” message. Using a document of this type during an emergency event will vastly improve the likelihood of a positive outcome while ensuring precise compliance with the regulation. The full text of the emergency radio traffic regulation is indicated below.

## **N.J.A.C. 5:75-2.6 Emergency radio traffic**

- (a)** A fire department communication system shall provide a standard method for giving priority, over that of routine radio communication, to the transmission of emergency messages and notification of imminent hazards to all levels of the incident command structure.
- (b)** When firefighters encounter conditions that pose a non-routine threat to their life or safety or that of others, they shall convey that situation via two-way radio to incident commanders and/or rescue crews utilizing clear text (see (f) below).
- (c)** Fire departments shall have a written standard operating guideline or procedure that uses the radio terms “emergency traffic” or “mayday” as a designation to clear radio traffic. An incident commander, safety officer, division or group supervisor, or any member who is in trouble or sees an emergency condition can declare emergency traffic.
1. Various radio tones may also be used to draw attention to an “emergency traffic” or “mayday” message.
- (d)** Examples of emergency conditions that warrant emergency radio traffic include:
1. A firefighter down or has fallen;
  2. A firefighter missing;
  3. A firefighter trapped;
  4. A firefighter lost;
  5. A firefighter “stuck”;
  6. The need to immediately evacuate the building or area;
  7. A building or structure collapse or imminent collapse;
  8. A wind direction shift, such as from north to south;
  9. Changing from offensive to defensive operations;
  10. Equipment failure posing an imminent danger;
  11. Fire discovered entering an exposure to a degree that any delay may considerably enlarge the fire problem;
  12. Necessity to change from an interior to an exterior attack mode; or
  13. Loss of water or other extinguishing agent that would endanger members.
- (e)** Whenever “emergency traffic” or “mayday” is transmitted via two-way radio, all communications on that frequency shall cease except those between the firefighter initiating the emergency radio transmission and the incident commander and/or the fire department dispatch center. Normal two-way radio use may be resumed upon completion of the emergency message, unless the incident commander orders otherwise.
- (f)** When a member has declared an emergency traffic or “mayday” message, he or she shall use clear text terms identified in their fire department standard operating guidelines or procedures, such as “firefighter down,” “firefighter missing,” etc.
1. The term “mayday” shall not be used when operating with aviation or marine personnel.
- (g)** The procedure for the use of “emergency traffic” or “mayday” is as follows:
1. Firefighters in life-threatening situations shall immediately contact the incident

commander via two-way radio stating “emergency traffic” or “mayday and then identify themselves;

2. The incident commander, upon hearing the “emergency traffic” or “mayday radio transmission, shall acknowledge the person issuing the “ emergency traffic” or “mayday” via two-way radio by stating “emergency traffic, clear the channel”;
  3. The person making the “emergency traffic” or “mayday” call shall respond to the incident commander by repeating “emergency traffic” or “mayday,” shall identify themselves, their unit and assignment, shall report the nature of the situation including resources needed and shall give their location (LUNAR-location, unit, name or number, assignment and resources needed). Repeating the “emergency traffic” or “mayday” radio transmission shall give any emergency personnel monitoring the radio frequency that may have missed the first transmission an opportunity to hear and react to the “emergency traffic” or “mayday” call accordingly;
  4. A person in distress who initiates an “emergency traffic” or “mayday” call shall first activate their personal alert safety system (PASS) device and, if applicable, their radio’s emergency button. A person in distress who initiates an “emergency traffic” or “mayday” call shall coordinate his or her radio transmissions with the activation of his or her PASS device;
  5. “Emergency traffic” or “mayday” transmissions that are not acknowledged shall be repeated until they are acknowledged.
  6. Any fire officer or firefighter hearing an “emergency traffic” or “mayday” signal and realizing that it is not being acknowledged shall acknowledge the radio transmission, ascertain its nature and promptly relay all information to the incident commander;
  7. Upon receipt of an “emergency traffic” or “mayday” radio transmission, the incident commander shall be responsible for determining appropriate actions to mitigate the situation at hand; and
  8. At the conclusion of the emergency condition, an “all clear for emergency traffic” shall be transmitted to allow a return to normal operations.
- (h)** Fire departments should use communication systems that are appropriate for emergency radio communications.
- (i)** Fire departments shall develop and utilize written standard operating procedures/guidelines that comply with the requirements of this section for the use of emergency radio transmissions.
- (j)** Fire departments shall assure that all emergency response personnel receive training adequate to ensure proficiency in the procedures as set forth in this section.



**Figure C-19.** Emergency radio procedures should be trained for on a consistent basis. *John Lewis.*

## EVACUATION SIGNAL

Emergency incident operations are extremely fluid events that place firefighters in exceptionally hazardous environments. Added to this fact is the constant threat of a significant major occurrence during the operation such as a collapse, flashover, or back draft. These rapid and unpredictable changes have been known to transform a common everyday response into a chaotic and life threatening situation.

When an incident such as this occurs during a response the incident commander is required to make swift and confident decisions regarding the continuation or termination of the operation. These difficult decisions are typically measured by the level of risk imposed on the firefighters by that catastrophic event. If the decision to terminate the operation and evacuate an area or structure is made by the IC, he or she is responsible to account for and assure the safety of all firefighters at the scene. This can be an intimidating and complicated task marked by extreme danger and disorder.

It is conclusively acknowledged that the incident commander is responsible to ensure the evacuation process is managed properly. However, firefighters operating at a scene must also understand the critical role they play in the overall effectiveness of the evacuation procedure. In reality, the responsibility of evacuating an area is a team oriented procedure ordered by the IC, but carried out by the personnel operating in the IDLH environment. Its effectiveness is therefore based on excellent communication of the evacuation order and well-disciplined firefighters who acknowledge and comply with the message.

In an effort to provide the incident commander and firefighters with the resources necessary to conduct an effective evacuation a common statewide procedure has been adopted. By adopting and mandating the use of this standard the state has provided fire departments with a universal evacuation system capable of being effortlessly integrated into an individual department's standard

operating guidelines, IMS system, and state mandated accountability procedures. The full text of the evacuation signal regulation is indicated below.

### **N.J.A.C. 5:75-2.7 Evacuation signal**

**(a)** When the risk posed to firefighters is so great that an incident commander or his or her designee must order an evacuation from a hazardous area, a uniform procedure and accompanying audible signal recognizable by all personnel operating on an incident scene shall be established, adopted and utilized by all fire departments.

**(b)** The evacuation signal shall consist of repeated short blasts of an air horn for a period no longer than 10 seconds, followed by 10 seconds of silence. This sequence of repeated short air horn blasts for 10 seconds followed by a 10- second period of silence shall be done three times; the total evacuation signal, including periods of silence, shall last 50 seconds.

1. To reduce the possibility of missing radio messages while the evacuation signal is sounding, incident commanders shall designate apparatus away from the command post as the signal sounder.
2. For fire departments operating at multidiscipline scenes, the evacuation signal shall be as designated in the incident action plan.

**(c)** Whenever an emergency evacuation signal is being sounded, there shall also be a radio message transmitted either from the incident scene or from the designated fire department dispatch center announcing the evacuation order. To the extent possible, the radio message should be coordinated with the sounding of the evacuation signal to insure the radio messages are heard.

**(d)** The emergency evacuation signal shall be activated whenever it becomes necessary for firefighters and related agency personnel to immediately evacuate a building or an area in which emergency operations are taking place due to conditions posing an immediate and probable hazard to life. The evacuation order shall only be conducted upon the order of the incident commander or his or her designee.

**(e)** Upon being alerted to an emergency evacuation signal, all personnel shall evacuate the hazardous area to an area of obvious safety. As all personnel evacuate, they shall warn others in the event they have not been alerted by the signal. During an emergency evacuation, it may be necessary to abandon equipment in order to evacuate the hazardous area quickly and safely. Firefighters should retain any equipment needed to insure personal firefighter safety during the evacuation, that is, self-contained breathing apparatus (SCBA), personal protective equipment (PPE), etc.

**(f)** Once personnel have exited the hazardous area, they shall report to their company officer or assemble in a predetermined area where officers shall take roll of those present. Personnel accountability tags (PATs) shall be retrieved by firefighters at the time of roll call. A personnel accountability report (PAR) shall be communicated to the incident commander when the roll call is complete. If it is determined that personnel are missing, resources shall be immediately

focused on the goal of rescuing or locating those persons missing.

**(g)** Re-entry to an evacuated hazardous area for normal firefighting-rescue operations shall be permitted only upon the order of the incident commander or his or her designee.

**(h)** Fire departments shall develop and utilize written standard operating procedures/guidelines for using emergency evacuation signals that comply with the requirements of this section.

**(i)** Fire departments shall assure that all emergency response personnel receive training adequate to ensure proficiency in the procedures as set forth in this section.

## **RAPID INTERVENTION CREWS (RIC's)**

A rapid intervention crew can be defined as a team of firefighters specifically designated by the incident commander to standby in a state of readiness should the need arise to initiate a rescue effort of a distressed, downed, or missing member at an emergency incident. Due to the many hazards faced at emergency incidents it is imperative that a highly skilled and well-trained team such as the one described above be readily available to rescue one of their own should the need arise. The use of these “firefighter rescue” crews (RIC's) has been inherently built into fire department emergency incident operations for over fifteen years and in that time have evolved into the most formidable, effective and accessible resource an incident commander possesses to enhance the safety of firefighters operating at emergency incidents.

Historically these teams have been called either firefighter assistance teams (FAST) or rapid intervention teams (RIT). However, the State of New Jersey has adopted the term of rapid intervention crew (RIC) as a common statewide designation. This designation follows NFPA and IMS standards.

Within the State RIC regulations incident commanders are granted the discretion to request the response of a RIC when he/she deems the “circumstances dictate” the need. One could assume that allowing this generous level of discretion may create a significant gap in the standard level of safety provided to firefighters across the state. In essence, “What one incident commander may deem as mandatory, another may not.” In order to ensure this unpredictable disparity is removed from an emergency operation and a standard level of RIC usage is maintained throughout the state, incident commanders and those acting in that position must adopt a “no exceptions” attitude regarding the use of RIC's at emergency incidents. When taken, this stance will not only solidify the intent of the regulations, but also significantly increase firefighter safety and survival at emergency scenes.



**Figure C-20.** Rapid Intervention Crew standing by in a state of readiness at an emergency incident. *John Lewis.*

Current State regulations follow NFPA standards adopted in 2010 which state “a minimum of two (2) firefighters who are trained, equipped, and attired to perform the necessary action(s) of rescuing a downed member shall be assigned as the RIC from the initiation of an incident”. These directives also meet existing NJPEOSHA regulations. Fortunately, over the last several years, a number of nationally recognized rapid intervention based studies and high profile, real-life rapid intervention crew deployments have provided explicit documented evidence that this minimum number of two (2) rescue firefighters does not provide an effective number of personnel to affect the rescue of a downed or distressed firefighter. In an effort to enhance firefighter safety and meet the staffing level evidence provided in these documented studies the most recent NFPA Rapid Intervention Standards adopted in 2020 mandate the assignment of at least four (4) members (1 officer and 3 firefighters) to each rapid intervention crew.

Although the state proactively adopted two firefighters as the minimum number of RIC members to comply with PEOSHA regulations and NFPA standards when the current regulations were written, incident commanders looking to enhance the safety of their firefighters at emergency incidents, follow nationally recognized practices, and reduce potential liability in the event of a fireground injury or fatality should commit to following the minimum RIC staffing levels of one (1) officer and three (3) firefighters identified in this most recent NFPA standard. While these increased minimum staffing levels are a vast improvement over past mandates many Incident Commanders will further enhance the operational effectiveness of the RIC by assigning one (1) officer and five (5) firefighters to each crew. This expanded staffing ensures an adequate number of personnel is available to complete the multitude of tasks required to be completed by the rapid intervention crew during a rescue deployment. Additionally, it is important for the IC to recognize that emergencies involving specialized rescue operations, large scale incidents, hazardous material events, sizeable buildings, and/or other complex responses may require the assignment of multiple rapid intervention crews.

To assist with managing RIC teams during an emergency event many Incident Commanders assign a Chief Officer to the position of Rapid Intervention Supervisor. Personnel assigned to this role provide direct supervision to the RIC teams at the incident and serve as a direct link between the team members and the Incident Commander when deployed. Firefighters assigned to rapid intervention crews must be extremely skilled, well trained, and experienced in operating within dangerous and complex environments.

In order to obtain the expertise required to complete the successful removal of a distressed firefighter from an IDLH atmosphere, firefighters must consistently train on the hands-on and classroom based complex skills and abilities required to successfully complete an operation of this type.

To ensure New Jersey firefighters receive the requisite training identified above the Department of Community Affairs recently adopted Rapid Intervention Crew (RIC) training and certification standards. Specifically, N.J.A.C. 5:73-13.1 FIRE SERVICE RAPID INTERVENTION CREWS requires all Rapid Intervention training programs developed and provided within the State of New Jersey to follow the 2015 Edition of NFPA 1407 Standard for Training Fire Service Rapid Intervention Crews. Adopting this training Standard as the foundation for programs throughout the State further solidified the ability of firefighters assigned to the Rapid Intervention Crew to be proficient in completing the tasks required of the position and standardized the job performance requirements (JPR's) for the roles of Rapid Intervention Crew Member, Rapid Intervention Crew Instructor, and Rapid Intervention Crew Leader on a statewide basis.

### **N.J.A.C. 5:75-2.8 Rapid intervention Crews (RIC's)**

- (a)** If the circumstances dictate it, a rapid intervention crew/company (RIC) shall be designated to standby in a state of readiness should the need arise to initiate a rescue effort for downed or missing firefighters.
- (b)** A RIC shall be comprised of a minimum of two firefighters who are trained, attired and equipped to perform the actions necessary to facilitate the immediate rescue of other emergency workers.
- (c)** The RIC shall have awareness of where resources are committed on the incident.
- (d)** To the extent possible, the RIC shall not be assigned to other duties that would in any way delay or impede their rescue effort.
- (e)** More than one RIC may be required for large scale or complex operations. 1. A rapid intervention group supervisor shall be assigned to manage multiple RIC's.
- (f)** Fire departments shall develop and utilize written standard operating procedures/guidelines for using RIC's including specialized training for members who will serve on the RIC.

For the full text of the NJ Rapid Intervention Training Guidelines please visit [https://www.state.nj.us/dca/divisions/dfs/publications/publication/reference\\_booklet\\_12.pdf](https://www.state.nj.us/dca/divisions/dfs/publications/publication/reference_booklet_12.pdf)

## **INCIDENT TIMEKEEPING**

It is a very well-known fact that incident commanders have a multitude of critical tasks they are responsible for at an emergency incident. The dynamic and changing environment of an emergency incident is rarely conducive to allowing the implementation of a methodical well thought out decision making process. As a result, the process used by the IC in developing an effective incident action plan includes many variables that can have a major impact on overall operation. One of the more influential but less thought of factors included in this process involves the capability to accurately confirm the elapsed on-scene time of emergency response personnel. Simple stated, all emergency responses can be viewed as time-sensitive events. However, the more complex multi-agency structure fire will provide a greater challenge to the incident commander than a simple single engine response regarding his/her ability to accurately record the on-scene time of all emergency responders. In order to reduce this uncertainty and enhance the safety of personnel operating at the scene the IC must develop a system of benchmarks to use as a guide in determining the exact duration of time on scene and whether or not the adopted incident action plan is successfully mitigating the emergency.

The standardized incident time-keeping regulations adopt a procedure utilizing elapsed time on scene announcements from the local communications center to the IC in 10-15 minute intervals as the model benchmark system to be utilized throughout the state. Departments are mandated to develop and employ written standard operating guidelines conforming to these regulations. In writing these guidelines departments must be cognizant of the dangers associated with today's modern fire environment (fire behavior, structural compromise, lightweight/truss construction, operational time) and the detrimental effect it has on incident operations and the duration of time firefighters are allowed to operate on the interior of structures. Simply stated, increased on scene operational time translates into increased hazards. Therefore, it is critically important for the IC to be provided with time-keeping announcements that begin at time of dispatch and not time of arrival. This will offer the incident commander a more solid foundation as to an accurate time count from which he/she can develop adequate standards to determine if revisions to strategic and tactical operations are necessary. An additional benefit of the timekeeping mandate is that it also provides the incident commander with a prompt from which accountability roll calls can be implemented. The regulation states the IC shall use the 30-minute time interval (or other standard time) to conduct incident roll calls. The full text of the Incident time-keeping regulations is indicated below.



**Figure C-21** Incident timekeeping and updates from the dispatch center are vital to strategic and tactical decision making.  
*John Lewis.*

### **N.J.A.C 5:75-2.10 Incident Time Keeping**

- (a)** For time sensitive incidents, fire departments shall develop a system that provides the incident commander with elapsed time on-scene, in 10- or 15-minute intervals, from their communications center.
- (b)** The elapsed time on-scene shall be used to provide the incident commander with time frames that could signal the need for a change in tactical operations.
- (c)** The elapsed time on-scene shall be used every 30 minutes or some other standard time as established with dispatch for required roll calls.
- (d)** Fire departments shall develop and utilize written standard operating procedures /guidelines for incident time-keeping.

To access the full text of the NJ Model Fire Department Incident Management Standard Operating Guidelines visit [https://nj.gov/dca/divisions/dfs/publications/publication/reference\\_booklet9.pdf](https://nj.gov/dca/divisions/dfs/publications/publication/reference_booklet9.pdf).

For more information on how the NJ Incident Management System integrates into the National Incident Management System and training opportunities please visit <https://www.nims.nj.gov/>



**Figure C-22.** Medical monitoring and hydration should be part of your Rehab Plan. *Courtesy of PAD Photography.*

## MEDICAL UNIT/RESPONDER REHABILITATION

Over the past several years fire departments have favorably accepted the need to implement an effective rehabilitation program and provide properly trained and equipped medical evaluation unit(s) at emergency incidents as required. This has been accomplished through the development and definitive use of standard written operational policies reflecting current NFPA standards and PEOSHA regulations related to this fundamental component of firefighter health and safety.

Emergency incident rehabilitation is an integral component of ensuring the health and safety of firefighters operating at an emergency scene. The Incident Commander is ultimately responsible for the health and well-being of all personnel operating at an emergency incident or training evolution. The IC should consider the circumstances of each incident or event to ensure adequate provision early on in an incident for rest and rehabilitation of all personnel. These provisions may include but are not limited to: medical evaluation, monitoring and treatment, food and fluid replenishment, physical and mental rest, and relief from extreme climate conditions or any other environmental parameters of an incident. It is recommended the IC ensure the following:

- (a)** Incident Commanders shall ensure that the physical and mental condition of emergency responders operating at a scene of an emergency does not deteriorate to a point where it effects the safety of each member or it jeopardizes the safety and integrity of the operation.
- (b)** Responder rehabilitation (rehab) shall be used to evaluate and assist personnel who may be suffering from the effects or sustained physical exertion during emergency operations.
- (c)** Command officers should consider the need for rehab during the initial planning stages of an emergency response. Climatic or environmental conditions (for example, high or low temperatures) shall not be the sole justification for establishing rehab. Any activity or incident that is large in size, long in duration, and/or labor intensive will rapidly deplete the energy and strength of personnel and therefore merits the establishment of rehab.
- (d)** All supervisors shall maintain an awareness of the condition of each member operating

within their immediate span of control and ensure that adequate steps are taken to provide for each member's safety and health. The command structure shall be used to request relief and the reassignment of fatigued crews.

**(e)** When the circumstances dictate it, responder rehabilitation shall be the responsibility of a medical unit under the logistics section.

**(f)** A medical unit shall provide a specific area where personnel will assemble to receive:

1. A medical assessment;
2. Nourishment and re-hydration;
3. Treatment for injuries;
4. Monitoring of physical condition;
5. Transportation for those requiring treatment at medical facilities;
6. Initial Critical Incident Stress debriefing

**(g)** Critical components of a rehab operation shall include:

1. Nourishment and re-hydration;
2. Rest;
3. Recovery;
4. Medical evaluation and treatment; and
5. Accountability.

**(h)** Fire departments shall develop and utilize written standard operating procedures/guidelines or rehab. Each of the elements in (g) above shall be included when developing standard operating guidelines or procedures for carrying out rehab operations.

**(i)** Rehab shall be responsible to identify resources that have been cleared from rehab and ready for reassignment through staging or released from the incident.

Members operating should be rotated through rehab overall operation. One of the more influential but less thought of factors included in this process involves the capability to accurately confirm the elapsed on-scene time of emergency response personnel.

Recognizing the need for and requesting rehabilitation services must be accomplished early in an incident. It is essential that incident commanders identify with and adopt this position in order to improve the level of safety of emergency responders. Extreme temperatures (extreme heat or cold) should not be the lone motivating factor for establishing a rehab sector at an incident. Any activity or event that requires a large number of firefighters, is long in duration, large in size, or involves labor intensive tasks will quickly exhaust the physical capabilities of personnel resulting in the required establishment of a dedicated rehabilitation/ medical sector under the logistics section of the IMS.

Although the incident commander maintains full responsibility for the formation of the rehab section, to be effective, rehabilitation should be viewed in a team-oriented approach beginning with the individual firefighter and moving upward to the IC. Additionally, it is acutely important

for all supervisors to maintain an awareness of the condition of each member operating within their company or area. Competent supervisors should maintain an intimate knowledge of the physical and mental limitations of their company or department personnel and be proactively prepared to request relief for these members based on this knowledge.

For further information regarding the Statewide Incident Rehabilitation Guidelines for Emergency Responders please visit [https://www.state.nj.us/dca/divisions/dfs/publications/publication/ref\\_booklet11.pdf](https://www.state.nj.us/dca/divisions/dfs/publications/publication/ref_booklet11.pdf).



**Figure C-23.** Rehab areas should be set up for long term and for adverse weather conditions. *Robert Moran.*

# NEW JERSEY PERSONNEL ACCOUNTABILITY SYSTEM (NJPAS)

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In 2001, the NJ Fire Safety Commission directed the Division of Fire Safety in conjunction with the Firefighter Safety and Health Advisory Council to develop a statewide standard for fire department personnel accountability systems. It was felt that in order to provide uniform accounting of firefighters at emergency incidents throughout the state, especially where two or more departments worked together, one system utilizing the same operational components was necessary.

Such a system had to be easy to use yet effective; as inexpensive as possible; and be as compatible with existing systems in use by fire departments as possible. After weighing many options, the parties involved with the system's development agreed on a two-tag system that would allow incident commanders to know where firefighters were operating at any given time.

The proposal was presented to the Fire Safety Commission who, with their endorsement, presented it to Department of Community Affairs Commissioner Levin for adoption into regulation. The Commissioner adopted the regulations on May 3, 2002 and the regulations became operative on January 3, 2003.



**Figure C-24.** The Incident Command Post is established for accountability and assignment of all resources. *Courtesy of R. Berry, REFD.*



as determined by SOG or the incident commander (IC). Such a point might be the incident command post or the apparatus that the firefighter responded with. Career firefighters might place this tag on their apparatus at the beginning of each shift if that is the department's policy. A central collection point is necessary so that the IC and command staff have a reliable way to know who is operating on the incident scene as a whole.



**Figure C-26.** Accountability tags are placed at a central collection point.  
*Robert Moran.*

The second tag is to be given to the Personnel Accountability Officer (PAO) upon entering any hazardous area. Usually, this will be when the firefighter enters a structure or space where they will be performing firefighting or rescue operations in an Immediately Dangerous to Life and Health (IDLH) atmosphere. However, this requirement also applies where firefighters may be involved in wildland operations or confined space operations where there is a risk of becoming lost or disoriented either in wide expanses or mazelike areas. Upon leaving the hazardous area, the tag is to be retrieved by the firefighter.

The secondary tag should also be used when a firefighter checks into a rehabilitation station or a decontamination station or other specialized operational area at an incident scene. In this way, there is always someone other than the firefighters themselves that knows where they are and what they are doing.

It is usually advisable to limit the number of points of entry into a hazardous area. In this way, it is easier to monitor entry and egress of firefighters and can reduce the potential for freelancing. However, where there are different points of entry into a hazardous area, firefighters entering will need to be accounted for. Many times more than one entry point is observable by one PAO such as at a corner of a structure. Other times it may be advantageous to designate more than one PAO if it is necessary to operate multiple points of entry. Some volunteer departments have found if feasible to utilize Fire Police who are not assigned to their normal duties to act as PAOs. In some career departments, an Incident Management Specialist position has been instituted. These individuals may be utilized as PAOs.

Fire departments may, at the very beginning of operations at an incident, find it difficult to

provide staffing for the accountability function. While the lack of staffing does not relieve the department from maintaining proper accountability of its members, some innovation may be necessary. One method may involve the placing of a large traffic cone with a metal ring attached near the entry point. In this way, members entering a hazardous area can “tag in” on the cone. It must be remembered that until a PAO is assigned, the incident commander retains the responsibility for the function in accordance with the requirements of the NJ Incident Management System. It is recognized that the incident management system and the personal accountability system in use at an emergency incident will require expansion as additional staffing arrives.

Another way of providing accountability until a PAO is assigned is for the “two-out” personnel to maintain accountability. These are the two individuals that are required to be outside the hazardous area in a ready state in case it becomes necessary to rescue the initial team of firefighters in the hazardous area. In the event an Incident Commander moves in this direction and assigns the “two-out” personnel to conduct accountability in the initial stages of a fire suppression operation he or she is removing a key component of the overall level of fireground safety provided to operating members. It is a practice that should be avoided.

These previously referred to “interim actions” must only be utilized prior to the assignment of a PAO and should not be relied upon as a means of providing accountability throughout an incident. A PAO should be assigned as soon as it is possible. If departmental staffing is so short that it is often difficult to staff the accountability function, then additional staffing in the form of mutual aid may be an option.

It must be noted that the scope of the PAS does not simply involve the transfer of tags between personnel on the incident scene. The tags are only the tools for the PAO to use to monitor personnel with regard to location, function and time.

Taken individually beginning with location, the PAO by monitoring entry into a hazardous area knows the approximate location of firefighters. By using some type of accountability board divided by location i.e. basement; division 1; roof etc., tags can be grouped into the area where the firefighting team is assigned.

In the same way, function can be monitored in conjunction with location i.e. division 1 search; roof division, ventilation division etc. depending upon assignment.

Time can be monitored by the PAO by utilizing a dry erase marker on a suitable accountability board for example. By marking the time of entry of each crew and knowing the average duration of the department’s SCBA, the PAO can gauge as to when to expect the crew to exit or if they might be in trouble if they are overdue. The key to all of this working effectively is communication between the crews and the PAO regarding where the crew is assigned and what their function is,

and between the crews and the IC or designated officer with regard to regular situation/status reports should inform those outside what they are experiencing and accomplishing and those on the outside should be asking for information on a regular basis. All players have an equal responsibility to ensure that every firefighter is accounted for at all times.

## PERSONNEL ACCOUNTABILITY REPORT

Another important part of the PAS is the Personnel Accountability Report (PAR) and roll call. If there is any question regarding the whereabouts or safety of firefighters, or if there is a change in firefighting mode, or if an evacuation is ordered, the IC will call for a PAR. A PAR is actually the result of a roll call conducted by the PAO and company officers to ensure all firefighters are accounted for and in a safe location.

The primary reasons for the IC to call for a PAR are the following:

- If there is a report of a firefighter missing.
- When an emergency evacuation is ordered.
- When the incident is declared under control.
- When changing attack modes (i.e. offensive to defensive).
- Anytime the IC feels it necessary to conduct a PAR.



**Figure C-27.** The Local Dispatch Center has a vital role in Personnel Accountability Reports. *John Lewis.*

Once the roll call is completed the PAR is then conveyed to the IC and if there are any firefighters unaccounted for, search and/or rescue operations are then undertaken. Usually if the PAO is holding firefighter's tags when a PAR is ordered, the PAO must try to ascertain where the firefighters that he/she is holding tags for are. It cannot be more strongly stressed that all those operating on the incident scene play an important role in the PAS from the individual firefighter up to the Incident Commander. It is for this reason that all members must be trained in the use of and apply the PAS system at every emergency scene except those that are so minor all firefighters

are in plain sight. Using the system in this manner reinforces a firefighters ability to acquire proficiency and consistency in its use.

## **INTEGRATION WITH NJ INCIDENT MANAGEMENT SYSTEM**

Since the inception of New Jersey's Incident Management regulations, fire departments have been required to operate within the parameters of a uniform incident management system (IMS). Part of the requirements of the IMS has always been that a fire department must utilize a PAS. The NJPAS regulations have expanded upon that requirement by providing a specific uniform method of complying with the original regulations. In this way the regulations integrate seamlessly with the IMS system and pose little if any additional obligations on a fire department than what was originally required.

## **ACCOUNTABILITY OPTIONS**

As stated earlier in this booklet, the regulations for PAS are the minimum requirements that must be adhered to by fire departments. There are many enhancements that a department may want to implement to make the PAS more effective or easier to use. Tools such as dry erase accountability boards provide an easy way to organize firefighters' tags by location and function in the hazardous area, they can provide the PAO a quick reference to rapidly assess the location all the firefighters he/she is responsible for. Additionally, some departments find that medical information on a personnel accountability tag (PAT) relating to the firefighter is useful in the event a firefighter is injured and transported to a hospital. Normally the most suitable type of PAT for this would be the laminated type where the inner part of the tag is folded in half with the confidential medical information inside. The tag is then laminated and if it is necessary to access the information, the tag is cut open.

If medical information is to be collected and included on the PAT, it must be remembered that all information is confidential and should not be shared beyond those responsible for the collection of the information without the permission of the information's owner. Information collection should also never be mandatory. A firefighter may not want to share all or any of their personal information and they should be informed that it is their right to provide only what they wish to. Any information provided should not be used for any other purpose.

Another consideration is whether the information collected will be utilized by EMS or a hospital. Some health care providers may not want to rely on what could be outdated or incorrect information. It would probably be best for the fire department to meet with their normal EMS and healthcare providers to find out whether the information provided will be used in an emergency, and if so, what information in particular would be useful to collect.

Some departments may wish to issue additional PATs above the two that are required by the regulations. Departments are free to do this if for instance it is desired for a firefighter to have a PAT on his/her person at all times in the unfortunate circumstance where identification of a severely injured or deceased firefighter must be made. Other reasons for extra PATs may be secondary access to smaller areas inside a larger hazardous area such as high rise buildings or large complexes; or where firefighters may travel on vehicles to remote locations before being assigned to tasks, such as a large wildland fire scenario.

One key element of the new PAS regulations is the ability for newer technology that provides at least the same level of firefighter safety to be utilized. There are some advanced systems that are basically like simple tag systems with features that integrate computerization. An example is a system that utilizes bar coding, where instead of a tag with readable printing, the bar code contains the firefighter's information. This code is scanned into a computer and a task and location are input to show where the firefighter is and what his/her assignment is. With a standard tag system, an accountability board and dry erase marker perform the same function manually.

There are newer systems on the horizon that utilize Global Positioning System (GPS) technology where firefighters have "sending units" attached to their gear or integrated into their SCBA that send signals to satellites and then to a central computer on the incident scene. The location and movements of each firefighter are tracked accurately within a few feet of their position and displayed on the computer screen. Some of these systems provide for telemetry between the computer location and the individual firefighters and are capable of monitoring breathing rate, air supply and interior temperature. Additionally, they can provide for the activation of integrated PASS devices and the transmission of distress signals to the outside. The full text of the personnel accountability regulation is identified below.

#### **N.J.A.C 5:75-2.4 Personnel Accountability**

**(a)** As an integral part of the incident management system used by the fire service, personnel accountability shall be maintained through the use of a personnel accountability system meeting the requirements of this section as a means to track and locate all fire department personnel operating at all emergency incidents.

**(b)** Every member of a fire department shall be issued a minimum of two personnel accountability tags.

1. Such tags shall be constructed of (but not limited to) metal, plastic, plastic laminated paper, plastic laminated cardboard, or similar durable material.
2. Each tag shall be equipped with a latch hook that will allow attachment of the tag to the firefighter's protective clothing. The clip or latch hook shall be designed to be attached and removed by a firefighter with a gloved hand.
3. At a minimum, the tag shall be engraved, imprinted, or otherwise marked or

electronically coded with the firefighter's name and fire department affiliation.

**(c)** At each incident, the Incident Commander shall designate a personnel accountability officer. The personnel accountability officer shall be responsible for ensuring that all personnel are accounted for. The personnel accountability officer may serve other functions at an incident scene if he or she is able to safely perform the accountability function. At minor incidents, the Incident Commander may retain this function as he or she sees fit.

**(d)** To ensure personnel accountability, each firefighter shall take the following steps:

1. Upon arrival at an incident scene, each firefighter shall surrender the primary personnel accountability tag at a central collection point as designated by the Incident Commander or departmental policy. Such point may be a command post or the apparatus to which the firefighter is assigned;
2. Upon leaving the incident scene, each firefighter shall immediately retrieve his or her personnel accountability tag from the designated collection point and reattach it to the designated area of his or her protective gear as determined by the fire department;
3. Firefighters assigned to a specific piece of apparatus for the duration of a tour of duty shall leave their primary personnel accountability tag on that apparatus for the duration of their tour.

**(e)** Upon entry in a hazardous area, each firefighter shall surrender the secondary personnel accountability tag to the personnel accountability officer who shall be in close proximity to the entry point into the hazardous area. Upon leaving the hazardous area, the member shall immediately retrieve his or her personnel accountability tag from the personnel accountability officer and re-attach it to the designated area of his or her protective clothing.

**(f)** If the need arises to evacuate a hazardous area and an evacuation is ordered, the personnel accountability officer shall:

1. Order an immediate personnel accountability roll call of all members operating at the incident to be conducted as soon as they exit the hazardous area;
2. Assure that every member who has surrendered his or her accountability tag retrieves it and reattaches it to their protective gear;
3. Report immediately to the Incident Commander when crews have not retrieved their personnel accountability tags after a reasonable time, members are unaccounted for, and the need for search and rescue exists or if conditions indicate that the area is immediately unsafe for crews and/or the personnel accountability officer to operate in safely; and
4. Report to the Incident Commander that all members are accounted for if the personnel accountability officer is not holding any personnel accountability tags after an evacuation is ordered.

**(g)** The Incident Commander shall call for a personnel accountability report:

1. If there is a report of a firefighter missing;
2. When an emergency evacuation is ordered;
3. When the incident is declared under control;

4. When changing attack modes (that is, offensive to defensive); or
5. Anytime the Incident Commander feels it necessary to conduct a personnel accountability report.

**(h)** When it is announced that a personnel accountability report is to be provided to the Incident Commander, all companies will:

1. Conduct a personnel accountability roll call of the members in that company to ensure all members are accounted for;
2. Cease all but emergency radio communications; and
3. Report all members accounted for or report members missing.

**(i)** Nothing in this section shall restrict the use of more sophisticated accountability systems utilizing bar coding, geographic positioning systems or similar methods providing the intent of this section is met.

To access the full text of the NJ Personnel Accountability System and a Model SOP go to [https://nj.gov/dca/divisions/dfs/publications/publication/reference\\_booklet10.pdf](https://nj.gov/dca/divisions/dfs/publications/publication/reference_booklet10.pdf)

## **IDENTIFYING EMBLEMS FOR STRUCTURES WITH TRUSS CONSTRUCTION**

Numerous firefighters across the United States have been fatally injured in the line of duty due to the failure and collapse of truss and pre-engineered, lightweight wood support systems. In New Jersey alone, our fire service history identifies two specific incidents at which ten Bergen County firefighters were killed while conducting fire suppression operations in buildings with truss roofs (see below). Due to these tragic incidents and many more like them which have occurred across the country the State of New Jersey introduced and adopted a law requiring all structures built with truss roofs and/or truss flooring to be identified with a truss identification emblem on the exterior of the building or in the case of a planned real estate development at each entrance to the complex. The intent of the regulation is to reduce the potential for firefighter injuries and fatalities from occurring at fires involving these structures and enhance the level of fireground situational awareness of first arriving and command staff personnel.



**Figure C-28.** Truss Roof Identifiers for Roof (R), Floor (F) and Floor /Roof (F/R). *NJDFS UFC.*

The use of truss-type construction (a very common, affordable and safe structural system) is a reliable means of spanning large distances and creating open floor space. Lightweight truss construction consists of top and bottom members that run parallel. These are referred to as chords

and are made of wood or other materials such as lightweight gauge steel. These chords are cross-connected for support by wood that forms a web like pattern. All wood usually consists of 2x4's or 2x3's. The wood members are connected with various methods; Gusset Plates, Gang Nails, Glues and Finger Jointed, each present their own hazards. Another type of popular pre-engineered structural component used in the construction industry is a truss joist I-beam commonly referred to as a TGI beam. These joists are built to span varying lengths and can be used to construct floor and roof systems. They are composed of an upper and lower chord or flange and a vertical web member consisting of glued oriented strand board or OSB. Like a truss they are strong and can span long distances. However, when exposed to fire, both truss constructed and TGI beams present a significant collapse hazard to firefighting personnel.

Underwriter Laboratories (UL) and the National Institute of Standards and Technology (NIST) have conducted numerous studies during which these components have been placed under model fire and heat conditions easily attained during a structure fire. All of these fire studies have resulted in the rapid weakening and total collapse of these systems within six minutes. On average this is about the same time first-arriving units are stretching attack lines and making entry into a building.

Developing and implementing a robust pre-fire planning system and conducting proactive building familiarization sessions is the first step toward improving firefighter safety and gaining knowledge of the buildings within your local community. By proactively preplanning and analyzing a buildings construction classification firefighters will increase their suppression success rate and reduce the possibility of being injured or killed. Because of the inherent danger firefighters must face while operating within these lightweight wood and truss buildings, the Truss Identification Sign Compliance has been instituted.

## **N.J.A.C. 5:70-2.20 Identifying Emblems for Structures with Truss Construction**

**(a)** Identifying emblems shall be permanently affixed to the front of structures with truss construction.

1. The emblem shall be of a bright and reflective color, or made of reflective material. The shape of the emblem shall be an isosceles triangle and the size shall be 12 inches horizontally by six inches vertically. The following letters, of a size and color to make them conspicuous, shall be printed on the emblem:
  - i. "F" to signify a floor with truss construction;
  - ii. "R" to signify a roof with truss construction; or
  - iii. "F/R" to signify both a floor and roof with truss construction.
2. The emblem shall be permanently affixed to the left of the main entrance door at a height between four and six feet above the ground and shall be installed and maintained by the owner of the building.

**(b)** Detached one and two family residential structures with truss construction that are not part of a planned real estate development shall be exempt from the requirements of (a) above, unless otherwise provided by municipal ordinance.

**(c)** Individual structures and dwelling units with truss construction that are part of a planned real estate development shall not be required to have an identifying emblem if there is an emblem affixed at each entrance to the development.

There have been a number of collapses of bowstring truss roofs that have killed and injured many New Jersey firefighters including;

**October 15 1967**, five Ridgefield (N.J.) firefighters were killed after they stretched two hose lines to a rear door when a bowstring truss roof collapsed as they were headed in. The collapse caused the toppling of a concrete wall, pinning the members under the burning structure. These five firefighters were operating mutual aid at the Cardinal Lanes Bowling Alley in Cliffside Park.

**July 1, 1988**, five Hackensack (N.J.) firefighters were killed when a bowstring truss roof they were working under collapsed just over 30 minutes after the fire was reported in the Hackensack Ford Automobile Dealership. (For more on this fire, visit <https://www.nj.gov/dca/divisions/dfs/publications>)

## **STANDARDS FOR FIRE SERVICE TRAINING AND CERTIFICATION**

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### **DIVISION OF FIRE SAFETY**

- Standards for Fire Service Training and Certification Adopted Amendments: N.J.A.C. 5:73-1.1 through 1.7, 1.9, 1.11, and 2.1 through 2.5
- Adopted Repeals and New Rules: N.J.A.C. 5:73-4 through 8
- Adopted New Rules: N.J.A.C. 5:73-3 and 9 through 18
- Adopted: January 9, 2018, by Charles A. Richman, Commissioner, Department of Community Affairs.
- Authority: Uniform Fire Safety Act (P.L. 1983, c. 383, N.J.S.A. 52:27D-192 et seq., specifically 52:27D 198 and 52:27D-219). Effective Date: February 5, 2018.

The Uniform Fire Safety Act and related legislation, specifically N.J.S.A. 52:27D-25a et seq., have been adopted to ensure public safety and welfare. In order for fire suppression activities to be conducted adequately and effectively, members of the fire service need to have sufficient knowledge and competence. This is best achieved through the creation of an education and training program and the development of certification requirements. It is the purpose of this chapter to establish standards and procedures for the certification of persons involved in fire suppression activities including but not limited to firefighter recruits, firefighters, fire officers, fire service instructors, and fire investigators. The intent of these standards is to ensure the Department of Community Affairs through the Division of Fire Safety is able to control all matters relating to qualifications for, and the training and certification of all members of the fire service. It provides authority to the Office of Training and Certification to adopt training programs and training materials, develop policies and procedures for training and credentialing, develop and administer examinations, establish instructor requirements for program delivery, approve all training organizations, facilities, and equipment, and to issue national credentialing, where approved by the National Board on Fire Service Professional Qualifications (“Pro Board” or “NBFSPQ”) and the International Fire Service Accreditation Congress (IFSAC).

The New Jersey Department of Community Affairs and the Division of Fire Safety have obtained accreditation from both the National Board on Fire Service Professional Qualifications “Pro Board” and the International Fire Service Accreditation Congress “IFSAC”. Attaining these levels of professional accreditation is a testament to the efforts of these regulatory agencies to improve the safety of firefighters within the State of New Jersey through the development and adoption of standardized levels of Fire Service Training and Certification. Agencies that achieve Pro Board accreditation are recognized as having met the rigors of review by an independent organization. This third-party independent review is the best way to assure that the agencies programs meet the mandated national standards. By obtaining this accreditation the Department of Community Affairs is now able to offer 115 separate fire service certifications for the New Jersey Fire Service.



[www.theproboard.org](http://www.theproboard.org)

The purpose of the Pro Board is to establish an internationally recognized means of acknowledging professional achievement in the fire service and related fields. The accreditation of organizations that certify uniform members of public fire departments, both career and volunteer, is the primary goal. However, other organizations with fire protection interests may also be considered for participation. Accreditation is generally provided at the State or Provincial level to the empowered certifying authority of that jurisdiction.

An agency that is accredited by the Pro Board makes certification available to its members. Members are then eligible to be entered into the Pro Board's certification registry and receive a certificate from the accredited agency, or apply for a certificate from the Pro Board, affirming that they were certified by a Pro Board accredited agency and that they are entered in the Pro Board's certification registry. In addition, the Pro Board encourages reciprocity among certifying agencies. This helps assure that Pro Board certification will be recognized by the department as the members seek advancement, and by other departments should they seek to transfer within the fire service.



[www.ifsac.org](http://www.ifsac.org)

The International Fire Service Accreditation Congress (IFSAC) is a not-for-profit, peer-driven, self-governing system of both fire service certifying entities and higher education fire-related degree programs. IFSAC's mission is to plan and administer a high-quality, uniformly delivered accreditation system with an international scope. The IFSAC Certificate Assembly provides accreditation to entities that certify the competency of and issue certificates to individuals who pass examinations based on

National Fire Protection Association (NFPA) fire service professional qualifications and other standards approved by the Assembly. The accreditation is made at the state, provincial, federal government, or territorial level for firefighter certification programs.

New Jersey firefighters will greatly benefit from the adoption of these training and certification standards in several ways including the statewide development of training programs consistent with nationally accepted standards, the enhanced ability to obtain national certification for potential employment opportunities outside of the State, strengthened standardization of local and mutual aid fire operations, increased levels of operational safety, and the establishment of certified minimum training standards for both career and volunteer fire agencies. In addition to the benefits outlined above firefighters who commit to obtaining these national certifications significantly improve their own level of the knowledge, skills, and abilities required of their positions and increase their credibility as a professional member of the New Jersey Fire Service. Local departments and communities also benefit by having members certified to national consensus standards that are designed to improve the level of professional fire services delivered by the organization to its residents.

The adopted regulations contain the following subchapters. Each subchapter includes specific training standards, job performance requirements, rules, and/or components of requisite knowledge and skills specific to the standard.

## **SUBCHAPTER 1 GENERAL PROVISIONS**

The rules contained in this chapter shall be known as “Standards for Fire Service Training and Certification” and are referred to herein as the Standards.

### **5:73-1.11 Referenced standards and publications**

- (a)** Copies of National Fire Protection Association (NFPA) standards incorporated by reference in this chapter may be obtained by writing to: NFPA, 1 Batterymarch Park, Quincy, MA 02269.
- (b)** Copies of the training programs and associated publications may be purchased through the specific publisher. Contact information may be obtained by writing to: New Jersey Division of Fire Safety, Office of Training and Certification, PO Box 809, Trenton, NJ 08625-0809.
- (c)** Copies of Jones and Bartlett Publisher publications adopted by the Office of Training and Certification may be obtained by writing to: Jones and Bartlett Publishers, 40 Tall Pine Drive, Sudbury, MA 01776.
- (d)** Copies of International Fire Service Training Association (IFSTA) publications adopted by the Office of Training and Certification may be obtained by writing to: Fire Protection Publications, Oklahoma State University, 930 North Willis, Stillwater, OK 74078-8045.
- (e)** Copies of the Federal Emergency Management Agency (FEMA) courses and publications, which are incorporated herein by reference, may be obtained by writing to: Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.
- (f)** Copies of the National Fire Academy (NFA) courses, which are incorporated herein by reference, may be obtained by writing to: National Fire Academy, 16825 South Seton Avenue, Emmitsburg, MD 21727.
- (g)** Copies of the American Psychiatric Association Publishing Inc. publications, which are incorporated herein by reference, may be obtained by writing to: The American Psychiatric Association Publishing Inc., 1000 Wilson Boulevard, Arlington, VA 22209.
- (h)** Copies of International Association of Arson Investigators (IAAI) publications, guidelines, and training programs, which are incorporated herein by reference, may be obtained by writing to: IAAI, 2111 Baldwin Avenue, Suite 203, Crofton, MD 21114.
- (i)** Copies of National Association of Fire Investigators (NAFI) publications, guidelines, and training programs, which are incorporated herein by reference, may be obtained by writing to: NAFI, Suite 104, 4900 West Manatee Avenue, Bradenton, FL 34209.
- (j)** Pursuant to P.L. 1983, c. 382, the Commissioner incorporates herein by reference the following training standards of the New Jersey Public Safety and Occupational Safety and Health Administration (PEOSHA), and the New Jersey Department of Environmental Protection (DEP), which are incorporated within the adopted training programs in this chapter:
  - 1. PEOSHA Hazardous Materials Standard, 29 CFR 1910.120;
  - 2. PEOSHA Eye and Face Protection Standard, 29 CFR 1910.133;

3. PEOSHA Respiratory Protection Standard, 29 CFR 1910.134;
4. PEOSHA Head Protection Standard, 29 CFR 1910.135;
5. PEOSHA Foot Protection Standard, 29 CFR 1910.136;
6. PEOSHA Hand Protection Standard, 29 CFR 1910.138;
7. PEOSHA Chapter 10 Standard for Firefighters, N.J.A.C. 12:100; and
8. DEP Right-to-Know Standard, N.J.A.C. 7:1G.

## **SUBCHAPTER 2 EDUCATIONAL PROGRAMS AND FACILITIES**

To carry out their responsibilities, fire service personnel must be fully knowledgeable and adequately prepared. This subchapter adopts standards for fire service training and education programs. It includes the adoption and mandatory use of specific National Fire Protection Association (NFPA) Standards as the basis for developing training programs for each specific certification level, fire training facility requirements, eligible organization status, and live fire training mandates.

In addition to the adopted mandatory NFPA training program standards, pursuant to P.L. 1983, c. 382, the Department of Community Affairs incorporated the following training standards of the New Jersey Public Safety and Occupational Safety and Health Administration (PEOSHA), and the New Jersey Department of Environmental Protection (DEP), for various fire service training course content sanctioned and/or suggested by the Office of Training and Certification. The referenced training standards include: PEOSHA Hazardous Materials Standard, 29 CFR 1910.120; PEOSHA Eye and Face Protection Standard, 29 CFR 1910.133; PEOSHA Respiratory Protection Standard, 29 CFR 1910.134; PEOSHA Head Protection Standard, 29 CFR 1910.135; PEOSHA Foot Protection Standard, 29 CFR 1910.136; PEOSHA Hand Protection Standard, 29 CFR 1910.138; PEOSHA Standard, N.J.A.C. 12:100; and DEP Right-to-Know Standard, N.J.A.C. 7:1G. By incorporating these training regulations into the adopted standards the Department of Community Affairs has imposed the need for each New Jersey Fire Department to develop and implement training programs and standard operating guidelines designed to follow these mandatory Public Employee safety requirements.

### **5:73-2.1 Standards for educational programs**

**(a)** To carry out their responsibilities, fire service personnel must be fully knowledgeable and adequately prepared. This subchapter adopts standards for fire service training and education programs.

1. Programs for firefighters must meet certain standards to ensure firefighters have the necessary skills and knowledge which the specialized and hazardous nature of fire fighting requires.
2. Programs for fire service instructors must meet certain standards to ensure they have the knowledge and skills necessary to provide instruction for fire service members.

3. Programs for airport rescue and firefighting training must meet certain standards to ensure firefighters have the necessary skills and knowledge that the specialized and hazardous nature of airport rescue and firefighting requires.
4. Programs for marine firefighting training must meet certain standards to ensure firefighters have the necessary skills and knowledge that the specialized and hazardous nature of marine firefighting for land-based firefighters requires.
5. Programs for industrial fire brigade training must meet certain standards to ensure members have the necessary skills and knowledge that the specialized and hazardous nature of industrial firefighting requires.
6. 6. Programs for live fire training must meet certain standards to ensure that training is conducted in a safe manner under live fire conditions that the specialized and hazardous nature of firefighting requires.
7. Programs for fire officers training must meet certain standards to ensure they have the knowledge and skills necessary to provide leadership and management of fire service members and resources, that the specialized and hazardous nature of firefighting requires.
8. Programs for fire department safety officer training must meet certain standards to ensure they have the knowledge and skills necessary to provide leadership and ensure the health and safety of fire service members during training, emergency incidents, and during non-emergency time periods.
9. Programs for hazardous materials training must meet certain standards to ensure safety and technical competency of first responders.
10. Programs for fire investigators training must meet certain standards to ensure they have the knowledge and skills necessary to investigate fires to determine the origin, cause, and responsibility of a fire.
11. Programs for fire apparatus driver/operator training must meet certain standards to ensure that apparatus is operated safely and that the services expected from the apparatus are delivered at an emergency incident.
12. Programs for technical rescuer training must meet certain standards to ensure the safety and technical competency of rescuers by rescue specialty.
13. Programs to train fire and life safety educators, public information officers, youth firesetter intervention specialists, and youth firesetter program managers must meet certain standards to ensure these positions are performed to national job performance requirements.
14. Programs for rapid intervention crews training must meet certain standards to ensure they have the knowledge and skills necessary to rescue firefighters who may become trapped or incapacitated during firefighting operations.
15. Programs for wildland firefighters training must meet certain standards to ensure firefighters have the necessary skills and knowledge that the specialized and hazardous nature of wildland firefighting requires.

16. Programs for fire police officer training must meet certain standards to ensure roadway safety during emergency incidents and fire department support operations.
- (b)** Pursuant to P.L. 1983, c. 382, the Commissioner hereby adopts the following National Fire Protection Association (NFPA) Standards, incorporated herein by reference, as amended and supplemented:
1. NFPA 472, 2018 Edition, Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents, as the training standard for Hazardous Materials Awareness, Hazardous Materials Operations, Mission-Specific Competencies, Hazardous Materials Incident Commanders, Hazardous Materials Specialist Employees, Hazardous Materials Officers, Hazardous Materials Safety Officers, Hazardous Materials Technician, and Hazardous Materials Technician in the State of New Jersey;
  2. NFPA 600, 2015 Edition, Standard on Facility Fire Brigades, as the Fire Brigade standard that controls the organizing, operating, training, and equipping of industrial fire brigades in the State of New Jersey;
  3. NFPA 921, 2017 Edition, Standard that establishes a Guide for Fire and Explosion Investigations, as a recommended guide and resource to conduct Fire and Explosion Investigations within the State of New Jersey;
  4. NFPA 1001, 2013 Edition, Standard for Fire Fighter Professional Qualifications, as the Firefighter I and II training standard in the State of New Jersey;
  5. NFPA 1002, 2017 Edition, Standard for Fire Apparatus Driver/Operator Professional Qualifications, as the Fire Apparatus Driver/Operator training standard in the State of New Jersey;
  6. NFPA 1003, 2015 Edition, Standard for Airport Fire Fighter Professional Qualifications, as the Airport Firefighter training standard in the State of New Jersey;
  7. NFPA 1005, 2014 Edition, Standard for Professional Qualifications for Marine Fire Fighting for Land-Based Fire Fighters, as the Marine Firefighting training standard in the State of New Jersey;
  8. NFPA 1006, 2017 Edition, Standard for Technical Rescuer Professional Qualifications, as the Technical Rescue training standard in the State of New Jersey;
  9. NFPA 1021, 2014 Edition, Standard for Fire Officer Professional Qualifications, as the Fire Officer training standard in the State of New Jersey;
  10. NFPA 1031, 2014 Edition, Standard for Professional Qualifications for Fire Inspector and Plan Examiner, as the Fire Inspector (Uniform Fire Code) training standard in the State of New Jersey;
  11. NFPA 1033, 2014 Edition, Standard for Professional Qualifications for Fire Investigator, as the Fire Investigator training standard in the State of New Jersey;
  12. NFPA 1035, 2015 Edition, Standard for Professional Qualifications for Fire and Life Safety Educator, Public Information Officer, Youth Firesetter Intervention Specialist, and Youth Firesetter Program Manager, as the Fire and Life Safety Educator, Public

Information Officer, Youth Firesetter Intervention Specialist, and Youth Firesetter Program Manager training standard in the State of New Jersey;

13. NFPA 1037, 2016 Edition, Standard for Professional Qualifications for Fire Marshal, as the Fire Marshal training standard in the State of New Jersey;
14. NFPA 1041, 2012 Edition, Standard for Fire Service Instructor Professional Qualifications, as the Fire Service Instructor training standard in the State of New Jersey;
15. NFPA 1081, 2012 Edition, Standard for Industrial Fire Brigade Member Professional Qualifications, as the Industrial Fire Brigade Member training standard for Industrial Fire Brigade Members and Leader in the State of New Jersey;
16. NFPA 1142, 2017 Edition, Standard on Water Supplies for Suburban and Rural Fire Fighting, as the Water Supplies for Suburban and Rural Fire Fighting training standard in the State of New Jersey;
17. NFPA 1403, 2018 Edition, Standard on Live Fire Training Evolutions, as the Live Fire Training standard in the State of New Jersey;
18. NFPA 1407, 2015 Edition, Standard for Training Fire Service Rapid Intervention Crews, as the Rapid Intervention Crews training standard in the State of New Jersey;
19. NFPA 1451, 2013 Edition, Standard for a Fire and Emergency Vehicle Operations Training Program, as the Fire and Emergency Vehicle Operations Training Program in the State of New Jersey; and
20. NFPA 1521, 2015 Edition, Standard for Fire Department Safety Officer Professional Qualifications, as the Safety Officer training standard in the State of New Jersey.

(c) Pursuant to P.L. 1983, c. 382, the Commissioner incorporates herein by reference, the following training standards of the New Jersey Public Safety and Occupational Safety and Health Administration (PEOSHA), and the New Jersey Department of Environmental Protection (DEP), incorporated within the adopted training programs of this chapter:

1. PEOSHA Hazardous Materials Standard, 29 CFR 1910.120;
2. PEOSHA Eye and Face Protection Standard, 29 CFR 1910.133;
3. PEOSHA Respiratory Protection Standard, 29 CFR 1910.134;
4. PEOSHA Head Protection Standard, 29 CFR 1910.135;
5. PEOSHA Foot Protection Standard, 29 CFR 1910.136;
6. PEOSHA Hand Protection Standard, 29 CFR 1910.138;
7. PEOSHA Chapter 10 Standard for Firefighters, N.J.A.C. 12:100; and
8. DEP Right-to-Know Standard, N.J.A.C. 7:1G.

### **SUBCHAPTER 3 INCIDENT MANAGEMENT SYSTEM CERTIFICATION**

It is the purpose of this subchapter to establish criteria for certifying various levels of Incident Management System certification. For purposes of this subchapter, credentialing shall not apply

to wildland firefighters in the State of New Jersey Forest Fire Service. All fire service personnel (except Wildland Firefighters) are required to satisfactorily complete the following training programs: “I-100 Introduction to Incident Command System” and “I-700 National Incident Management System (NIMS), An Introduction.” Members of the fire service who move through the ranks to the position of company or Chief Officer and/or who may assume the position of Incident Commander at an emergency incident are expected to obtain upgraded levels of Incident Management Certification such as, I-200 ICS for Single Resources and Initial Action Incidents, I-300 Intermediate ICS for Expanding Incidents, and I-400 Advanced ICS for Command and General Staff. Serving as the incident commander at an emergency incident is a dynamic and challenging situation. This is particularly accurate when an event expands beyond local control requiring multiple mutual aid, or state wide resources. Having the requisite training and certification essential to managing these events is a fundamental component of the basic requirements a firefighter needs to serve in the position of company and/or Chief Officer. To ensure incident commanders meet the minimum requirements the following standard is mandatory for all fire departments.

### **5:73-1.6 Certifications required**

- (a)** No person shall serve as a fire service instructor for any module or course which is approved or offered by the Division if such person does not possess a valid instructor certification and/or special instructor certificate required pursuant to this chapter for the teaching of such module or course. Except as may otherwise be expressly provided in this chapter, no course taught by any person not so certified shall serve as a basis for credit towards certification.
- (b)** No person shall be promoted into a fire service position the duties of which require the management of emergency operations if such person has not first obtained, at least, an Incident Management Level 1 certification, per N.J.A.C. 5:73-3.2(b).
- (c)** No fire service supervisor shall assume, nor be assigned to, any position the duties of which require the management of emergency operations unless such supervisor has obtained, at least, an Incident Management Level 1 certification, per N.J.A.C. 5:73-3.2(b).

### **5:73-3.2 Incident management system certification**

- (a)** All fire service personnel shall satisfactorily complete the following training programs: “I-100 Introduction to Incident Command System” and “I-700 National Incident Management System (NIMS), An Introduction.”
- (b)** A certification for Incident Management Level 1 shall be granted to a member of the fire service who meets the following requirements, he or she shall:
  1. Have been a member of a fire department who has been qualified and performed as a “structural firefighter” for at least three years prior to application. Proof of structural firefighting experience shall be verified in writing by the chief of department on fire department letterhead. Experience as a junior firefighter shall not count for structural firefighter verification;

2. Be at least 21 years of age;
  3. Have obtained Firefighter I certification per N.J.A.C. 5:73-4; and
  4. Have satisfactorily completed a classroom instructor-led program of the Federal Emergency Management Agency (FEMA) course titled “I-200 ICS for Single Resources and Initial Action Incidents.”
- (c) A certification for Incident Management Level 2 shall be granted to a member of the fire service who meets the following requirements, he or she shall:
1. Have obtained Incident Management Level 1 certification under (b) above; and
  2. Have satisfactorily completed a classroom instructor-led program of the Federal Emergency Management Agency (FEMA) course titled “I-300 Intermediate ICS for Expanding Incidents.”
- (d) A certification for Incident Management Level 3 shall be granted to a member of the fire service who meets the following requirements, he or she shall:
1. Have obtained Incident Management Level 2 certification under (c) above; and
  2. Have satisfactorily completed a classroom instructor-led program of the Federal Emergency Management Agency (FEMA) course titled “I-400 Advanced ICS for Command and General Staff.”
- (e) A classroom instructor-led program of instruction that is considered by the applicant to be substantially the same as the training program may be submitted for review and approval by the Office of Training and Certification. The Office of Training and Certification shall maintain a list of reviewed and approved substitute courses.
- (f) Incident management system certification is permitted for Emergency Medical Service (EMS) response personnel who meet the following criteria: Personnel whose role and duty is exclusively limited to emergency medical services response may substitute a current valid Emergency Medical Technician-Basic (EMT-B) certificate or Emergency Medical Technician-Paramedic (EMT-P) license issued by the New Jersey Department of Health, Office of Emergency Medical Services in lieu of the Firefighter I certification as specified in (b)3 above. Proof of three years’ experience as a credentialed EMT-B or EMT-P shall be verified in writing by the EMS chief/captain on organizational/departement letterhead, which shall substitute for the firefighter experience requirement established in (b) 1 above.

## **SUBCHAPTER 4 FIREFIGHTER I AND II**

It is the purpose of this subchapter to establish criteria for certifying various levels of Firefighter. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-4.2 Certification and adopted training programs**

The following firefighter titles, which are associated with the adopted standard, shall be issued

by the Office of Training and Certification:

1. Firefighter I; and
2. Firefighter II.

## **SUBCHAPTER 5 INSTRUCTORS**

It is the purpose of this subchapter to establish criteria for certifying various levels of instructors of fire service courses. This subchapter also includes requirements for instructor re-certification, instructor titling, examination requirements, and requests for continuing education credits for attendance at supplemental training programs. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-5.2 Certification and adopted training programs**

The following instructor titles, which are associated with the adopted standard, and the Drill Ground and Adjunct Instructor certification programs, shall be issued by the Office of Training and Certification:

1. Instructor I;
2. Instructor II;
3. Drill Ground Instructor; and
4. Adjunct Instructor.

## **SUBCHAPTER 6 HAZARDOUS MATERIALS**

It is the purpose of this subchapter to establish criteria for certifying various levels of Hazardous Materials/Weapons of Mass Destruction Incidents responders. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-6.2 Certification and adopted training programs**

The following hazardous materials titles, which are associated with the adopted standard, shall be issued by the Office of Training and Certification:

- i. Hazardous Materials-Awareness Level;
- ii. Hazardous Materials-Operations Level;
- iii. Mission-Specific Competencies: Personal Protective Equipment;
- iv. Mission-Specific Competencies: Mass Decontamination;
- v. Mission-Specific Competencies: Technical Decontamination;
- vi. Mission-Specific Competencies: Evidence Preservation and Sampling;
- vii. Mission-Specific Competencies: Product Control;
- viii. Mission-Specific Competencies: Air Monitoring and Sampling;

- ix. Mission-Specific Competencies: Victim Rescue and Recovery;
- x. Mission-Specific Competencies: Response to Illicit Laboratory Incidents;
- xi. Hazardous Materials-Incident Commander;
- xii. Hazardous Materials-Specialist Employees;
- xiii. Hazardous Materials Officer;
- xiv. Hazardous Materials Safety Officer;
- xv. Hazardous Materials-Technician Level;
- xvi. Hazardous Materials Technician-Tank Car Specialty;
- xvii. Hazardous Materials Technician-Cargo Tank Specialty;
- xviii. Hazardous Materials Technician-Intermodal Tank Specialty;
- xix. Hazardous Materials Technician-Marine Tank and Non-Tank Vessel Specialty;
- xx. Hazardous Materials Technician-Flammable Liquids Bulk Storage Specialty;
- xxi. Hazardous Materials Technician-Flammable Gases Bulk Storage Specialty; and
- xxii. Hazardous Materials Technician-Radioactive Material Specialty.

## **SUBCHAPTER 7 FIRE POLICE OFFICER**

It is the purpose of this subchapter to establish criteria for certifying personnel who are appointed to the position of Fire Police Officer. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-7.2 Certification and adopted training programs**

The following fire police title, which is associated with this subchapter, shall be issued by the Office of Training and Certification:

1. Fire Police Officer.

## **SUBCHAPTER 8 FIRE OFFICERS**

It is the purpose of this subchapter to establish criteria for certifying various levels of fire officers. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-8.2 Certification and adopted training programs**

The following fire officer titles, which are associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Fire Officer I;
2. Fire Officer II;
3. Fire Officer III; and

4. Fire Officer IV.

**SUBCHAPTER 9  
FACILITY FIRE BRIGADES**

It is the purpose of this subchapter to establish criteria for certifying various levels of facility fire brigade members and leaders. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

**5:73-9.2 Certification and adopted training programs**

The following fire brigade titles, which are associated with the adopted standards, shall be issued by the Office of Training and Certification:

1. Incipient Industrial Fire Brigade Member;
2. Advanced Exterior Industrial Fire Brigade Member;
3. Interior Structural Industrial Fire Brigade Member;
4. Industrial Fire Brigade Leader; and
5. Industrial Fire Brigade Support Member.

**SUBCHAPTER 10  
AIRCRAFT RESCUE FIREFIGHTER**

It is the purpose of this subchapter to establish criteria for certifying an airport firefighter. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

**5:73-10.2 Certification and adopted training programs**

The following airport firefighter title, which is associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Aircraft Rescue Firefighter.

**SUBCHAPTER 11  
MARINE FIREFIGHTER**

It is the purpose of this subchapter to establish criteria for certifying a Marine Firefighter. The intent is to provide credentialing for marine firefighting for land-based firefighters. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

**5:73-11.2 Certification and adopted training programs**

The following marine firefighter title, which is associated with the adopted standard, shall be

issued by the Office of Training and Certification:

1. Marine Fire Fighter.

## **SUBCHAPTER 12 TECHNICAL RESCUER**

It is the purpose of this subchapter to establish criteria for certifying various levels of technical rescuer. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-12.2 Certification and adopted training programs**

The following technical rescue titles, which are associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Technical Rescue-Tower Rescue Awareness;
2. Technical Rescue-Tower Rescue Operations;
3. Technical Rescue-Tower Rescue Technician;
4. Technical Rescue-Rope Rescue Awareness;
5. Technical Rescue-Rope Rescue Operations;
6. Technical Rescue-Rope Rescue Technician;
7. Technical Rescue-Structural Collapse Rescue Awareness;
8. Technical Rescue-Structural Collapse Rescue Operations;
9. Technical Rescue-Structural Collapse Rescue Technician;
10. Technical Rescue-Confined Space Rescue Awareness;
11. Technical Rescue-Confined Space Rescue Operations;
12. Technical Rescue-Confined Space Rescue Technician;
13. Technical Rescue-Vehicle Rescue Awareness;
14. Technical Rescue-Vehicle Rescue Operations;
15. Technical Rescue-Vehicle Rescue Technician;
16. Technical Rescue-Animal Technical Rescue Awareness;
17. Technical Rescue-Animal Technical Rescue Operations;
18. Technical Rescue-Animal Technical Rescue Technician;
19. Technical Rescue-Wilderness Search and Rescue Awareness;
20. Technical Rescue-Wilderness Search and Rescue Operations;
21. Technical Rescue-Wilderness Search and Rescue Technician;
22. Technical Rescue-Trench Rescue Awareness;
23. Technical Rescue-Trench Rescue Operations;
24. Technical Rescue-Trench Rescue Technician;
25. Technical Rescue-Mine and Tunnel Rescue Awareness;
26. Technical Rescue-Mine and Tunnel Rescue Operations;
27. Technical Rescue-Mine and Tunnel Rescue Technician;

28. Technical Rescue-Helicopter Rescue Awareness;
29. Technical Rescue-Helicopter Rescue Operations;
30. Technical Rescue-Helicopter Rescue Technician;
31. Technical Rescue-Surface Water Rescue Awareness;
32. Technical Rescue-Surface Water Rescue Operations;
33. Technical Rescue-Surface Water Rescue Technician;
34. Technical Rescue-Swiftwater Rescue Awareness;
35. Technical Rescue-Swiftwater Rescue Operations;
36. Technical Rescue-Swiftwater Rescue Technician;
37. Technical Rescue-Dive Rescue Awareness;
38. Technical Rescue-Dive Rescue Operations;
39. Technical Rescue-Dive Rescue Technician;
40. Technical Rescue-Ice Rescue Awareness;
41. Technical Rescue-Ice Rescue Operations;
42. Technical Rescue-Ice Rescue Technician;
43. Technical Rescue-Surf Rescue Awareness;
44. Technical Rescue-Surf Rescue Operations;
45. Technical Rescue-Surf Rescue Technician;
46. Technical Rescue-Watercraft Rescue Awareness;
47. Technical Rescue-Watercraft Rescue Operations;
48. Technical Rescue-Watercraft Rescue Technician;
49. Technical Rescue-Floodwater Rescue Awareness;
50. Technical Rescue-Floodwater Rescue Operations; and
51. Technical Rescue-Floodwater Rescue Technician.

## **SUBCHAPTER 13**

### **FIRE SERVICE RAPID INTERVENTION CREWS**

It is the purpose of this subchapter to establish criteria for certifying various levels of fire service rapid intervention crew personnel. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

#### **5:73-13.2 Certification and adopted training programs**

The following rapid intervention crew titles, which are associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Rapid Intervention Crew Member;
2. Rapid Intervention Crew Instructor; and

### 3. Rapid Intervention Crew Leader

## **SUBCHAPTER 14 FIRE APPARATUS DRIVER/OPERATOR**

It is the purpose of this subchapter to establish criteria for certifying various levels of fire apparatus driver/operator. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-14.2 Certification and adopted training programs**

The following apparatus driver/operator titles, which are associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Driver/Operator-Apparatus Equipped with Fire Pump;
2. Driver/Operator-Apparatus Equipped with an Aerial Device;
3. Driver/Operator-Apparatus Equipped with a Tiller;
4. Driver/Operator-Wildland Fire Apparatus;
5. Driver/Operator-Aircraft Rescue and Fire-Fighting Apparatus; and
6. Driver/Operator-Mobile Water Supply Apparatus.

## **SUBCHAPTER 15 FIRE AND LIFE SAFETY EDUCATOR, PUBLIC INFORMATION OFFICER, YOUTH FIRESETTER INTERVENTION SPECIALIST, YOUTH FIRESETTER PROGRAM MANAGER**

It is the purpose of this subchapter to establish criteria for certifying various levels of fire and life safety educator, public information officer, youth fire setter intervention specialist, and youth fire setter program manager. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-15.2 Certification and adopted training programs**

The following fire and life safety educators, public information officer, and youth fire setter intervention personnel titles, which are associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Fire and Life Safety Educator I;
2. Fire and Life Safety Educator II;
3. Fire and Life Safety Educator III;
4. Public Information Officer;
5. Youth Fire setter Intervention Specialist; and
6. Youth Fire setter Program Manager.

## **SUBCHAPTER 16 FIRE DEPARTMENT SAFETY OFFICER**

It is the purpose of this subchapter to establish criteria for certifying various levels of fire department safety officer. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-16.2 Certification and adopted training programs**

The following health and safety officer titles, which are associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Health and Safety Officer; and
2. Incident Safety Officer.

## **SUBCHAPTER 17 WILDLAND FIRE FIGHTER, WILDLAND, FIRE OFFICER, WILDLAND/URBAN INTERFACE PROTECTION SPECIALIST, WILDLAND/URBAN INTERFACE COORDINATOR**

It is the purpose of this subchapter to establish criteria for certifying various levels of wildland firefighter, wildland fire officer, wildland/urban interface protection specialist, wildland/urban interface coordinator. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-17.2 Certification and adopted training programs**

The following wildland fire fighters, wildland fire officers, and wildland/urban interface personnel titles, that are associated with the adopted standard, shall be issued by the Office of Training and Certification:

1. Wildland Fire Fighter I;
2. Wildland Fire Fighter II;
3. Wildland Fire Officer I;
4. Wildland Fire Officer II;
5. Wildland/Urban Interface Protection Specialist; and
6. Wildland/Urban Interface Coordinator.

## **SUBCHAPTER 18 FIRE INVESTIGATOR**

It is the object of this subchapter to establish criteria for certifying Fire Investigators. This

certification shall not supersede the statutory authority of the New Jersey Department of Law and Public Safety, Division of Criminal Justice through N.J.S.A. 40A:14-7.1 to train and credential fire personnel assigned to certified arson investigation units in municipal fire departments. For purposes of this subchapter, credentialing shall not apply to wildland firefighters in the State of New Jersey Forest Fire Service.

### **5:73-18.2 Certification and adopted training programs**

Certification for Fire Investigator shall be granted to an individual who meets the following requirements:

1. Be at least 18 years of age;
2. Has a high school diploma or equivalent;
3. Holds one of the following certifications, licenses or titles:
  - i. Firefighter I;
  - ii. Fire Inspector or Fire Official;
  - iii. Police Officer or Police Detective or Police Investigator;
  - iv. Certified Fire Investigator (CFI) through IAAI;
  - v. Certified Fire and Explosion Investigator (CFEI) through NAFI; or
  - vi. Certified Fire Investigator designated by the U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (U.S. ATF);
4. Satisfactorily completes a Basic Fire Investigation course of at least 80 hours of instruction that meets the requirements of NFPA 1033, 2014 Edition, Standard for Professional Qualifications for Fire Investigator; and NFPA 921, 2017 Edition, Guide for Fire and Explosion Investigations, incorporated herein by reference, as amended and supplemented.

## REVIEW QUESTIONS

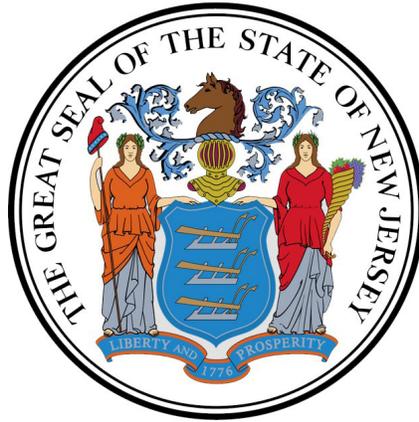
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1. What is the difference between United States Federal OSHA and the State of New Jersey PEOSHA?
2. Describe the protective clothing that firefighters wear and its limitations.
3. Explain which departments of the New Jersey State government enforce standards and regulations pertaining to firefighters.
4. List the types of bloodborne pathogens that can threaten the health of firefighters.
5. What is the role of the Safety Officer at an emergency scene?
6. What do the terms, Mayday and LUNAR stand for?
7. How and why does a Firefighter issue a Mayday message?
8. Explain the evacuation signal regulation and its use as a fireground resource.
9. What is a Rapid Intervention Crew (RIC)? How is it utilized at an emergency incident?
10. List three reasons how a personal alert safety system (PASS) enhances the safety of firefighter.

# STATE OF NEW JERSEY

## TRAFFIC INCIDENT MANAGEMENT SAFETY GUIDELINES

### FOR EMERGENCY RESPONDERS VERSION 3



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Safety Guidelines Mission: Provide a sustainable, multi-disciplined, and consistent traffic incident management program to promote: first responder safety; safe, quick clearance practices; and prompt, reliable incident communication.

Incidents of firefighters being fatally injured while operating at emergency responses involving public roads have been steadily increasing on a nationwide basis. Numerous post incident analysis of these tragic occurrences have identified a lack of standard operating guidelines and/or the failure to implement these guidelines as major contributing factors to the fatalities.

To improve the level of all New Jersey first responders operating at these incidents and reduce the potential for injuries and fatalities the State has developed the Traffic Incident Management Safety Guidelines document which can be found at <http://www.njtim.org/NJTIM/>. The purpose of the document is to provide uniform operational guidelines to ensure safe operations by emergency responders dispatched to incidents on limited access highways and other roadways as applicable in the State of New Jersey. These operational guidelines were formulated based on nationally recognized practices, with guidance from those agencies listed under Acknowledgements in the document. The information should be used by emergency responders as a guideline for on- scene decision-making and pre-planning responses to roadway systems.

The guidelines identify safe vehicle positioning as well as common general safety and on-site practices for all emergency responders. It provides guidance for maximum protection and safety for all emergency responders operating at limited access highway incidents and other roadways as applicable. These guidelines also identify the need to provide mobility for the motoring public. All emergency responders should understand and appreciate the special hazards and high risk that personnel are exposed to when operating at roadway related incidents with motor vehicle

traffic, high vehicle speeds, adverse weather conditions, heavy trucks, and exposure to motorists with varying degrees of ability, with possible vision, alcohol, and drug impairment. All emergency responders shall understand that the objective is to get onto the roadway, perform their duties, and get off the roadway as quickly and efficiently as possible. This will reduce high-risk exposure and help to get traffic patterns back to normal. Emergency responders should always operate within a protected environment at any type of incident on or near a roadway, and when exposed to motor vehicle traffic.

The guidelines in the traffic safety document are general since they cannot cover all incidents or unique site- specific conditions. The document is not intended to be a textbook, nor a substitute for training, technical knowledge, experience, or effective judgment. Local and/or regional geographic conditions may necessitate the need for additional sections to be added to the guideline when developed for use.

# **PERSONAL MOTOR VEHICLE EMERGENCY RESPONSE LIGHTING**

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## **BLUE LIGHTS**

### **N.J.S.A. 39:3-54.7. Members of certain organizations; display of emergency warning lights**

**(a)** An active member in good standing of any of the following organizations may mount and operate, on a motor vehicle operated by that member, an emergency warning light or lights as provided in P.L.1977, c. 223 (C.39:3-54.7 et seq.):

1. a volunteer fire company or a volunteer first aid or rescue squad recognized by and rendering service in any municipality; or
2. any county or municipal volunteer Office of Emergency Management recognized by and rendering service in any county or municipality, provided the member's official duties include responding to a fire or emergency call.

**(b)** The Chief Administrator of the New Jersey Motor Vehicle Commission shall not require the member to specify on which motor vehicles the emergency warning light or lights may be mounted utilizing bar coding, geographic positioning systems or similar methods providing the intent of this section is met. New Rule, R.2002 d.179, effective June 3, 2002 (operative January 2, 2003). The first section will provide an overview of the use of blue lights. The second section provides information on the use of red lights for emergency purposes.

### **N.J.S.A. 39:3-54.8. Time of operation**

Emergency warning lights may be operated only while the vehicle is being used in answering a fire or emergency call.

### **N.J.S.A. 39:3-54.9. Specifications**

Emergency warning lights shall be removable or permanently attached, of the flashing or revolving type, equipped with a blue lens and controlled by a switch installed inside the vehicle or shall be blue of the light bar type, in accordance with the specifications prescribed by the chief administrator.

### **N.J.S.A. 39:3-54.10. Placement on motor vehicle**

No more than two emergency warning lights shall be installed on a vehicle. If one light is used it shall be installed in the center of the roof of the car, or on the front of the vehicle so that the top of

the emergency warning light is no higher than the top of the vehicle's headlights, or in the center of the dashboard. It may be a low profile light bar of the strobe, halogen or incandescent type, or a combination thereof. If two lights are used they may be placed on the windshield columns on each side of the vehicle where spotlights are normally mounted, or on either side of the roof at the front of the vehicle directly back of the top of the windshield. Under no circumstances may one light be placed on the roof and one on the windshield column in the spotlight position. Light elements shall be shielded from direct sight or view of the driver.

**N.J.S.A. 39:3-54.11. Display of emergency warning lights; identification cards**

(a) The Chief Administrator of the New Jersey Motor Vehicle Commission shall prepare suitable identification cards bearing the signature of the chief administrator which, upon the request of the mayor or chief executive officer of any municipality recognizing and being served by a volunteer fire company or a volunteer first aid or rescue squad on a form and in a manner prescribed by the chief administrator, shall be forwarded to the mayor or chief executive officer, to be countersigned and issued by the mayor or chief executive officer to the members in good standing of the volunteer fire company or first aid or rescue squad.

(b) Identification cards issued pursuant to this section and sections 5 and 6 of P.L.2005, c. 34 (C.39:3-54.22 and C.39:3-54.23) shall be considered permits to mount and operate emergency warning lights as provided for in P.L.1977, c. 223 (C.39:3-54.7 et seq.) and shall apply to any motor vehicle driven by the member of a volunteer fire company, a volunteer first aid or rescue squad or a volunteer Office of Emergency Management. Emergency warning lights shall not be mounted prior to the issuance of the identification cards. Each member of a volunteer fire company, a volunteer first aid or rescue squad or a volunteer Office of Emergency Management must carry the identification card while an emergency warning light or lights are operated on the vehicle.

**N.J.S.A. 39:3-54.12. Rights of motor vehicle with emergency warning lights in operation**

Nothing contained herein is intended to grant to any member of a volunteer fire company, a volunteer first aid or rescue squad or a volunteer Office of Emergency Management any privileges or exemptions denied to the drivers of other vehicles, and such members operating emergency warning lights shall drive with due regard for the safety of all persons and shall obey all the traffic laws of this State including R.S.39:4-81, provided, however, that the drivers of nonemergency vehicles upon any highway shall yield the right of way to the vehicle of any member of a volunteer fire company, a volunteer first aid or rescue squad or a volunteer Office of Emergency Management operating emergency warning lights in the same manner as is provided for authorized emergency vehicles pursuant to R.S. 39:4-92.

### **N.J.S.A. 39:4-81. Observing traffic signals**

(a) The driver of every vehicle, the motorman of every street car and every pedestrian shall obey the instructions of any official traffic control device applicable thereto, placed in accordance with the provisions of this chapter, unless otherwise directed by a traffic or police officer.

(b) When, by reason of a power failure or other malfunction, a traffic control signal at an intersection is not illuminated, the driver of a vehicle or street car shall, with respect to that intersection, observe the requirement for a stop intersection, as provided in R.S.39:4-144.

### **N.J.S.A. 39:3-54.13. Violations; penalty**

Any person authorized to operate emergency warning lights pursuant to P.L.1977, c. 223 (C.39:3-54.7 et seq.) who willfully operates such emergency warning lights in violation of the provisions of P.L.1977, c. 223 (C.39:3-54.7 et seq.) shall be liable to a penalty of not more than \$ 100 and the person's privilege to operate such emergency warning lights may be suspended or revoked by the Chief Administrator of the New Jersey Motor Vehicle Commission. A person who is not authorized to operate emergency warning lights who willfully operates such emergency warning lights shall be liable to a penalty of not more than \$200.

## **RED LIGHTS**

### **N.J.S.A. 39:3-54.15. Red emergency warning lights and/or siren on motor vehicles owned by current volunteer fire chief or first assistant chief or chief officer of first aid or rescue squad**

A current chief or first assistant chief of a volunteer fire company, or chief officer of a first aid or rescue squad, recognized by and rendering service in any municipality may mount and operate on a motor vehicle owned by him and registered in his name a red emergency warning light or lights, a siren, or both, as prescribed in P.L.1985, c. 171 (C.39:3-54.15 et seq.). The size and type of lights and siren, and the location of their controls, shall be determined by the Chief Administrator of the New Jersey Motor Vehicle Commission.

### **N.J.S.A. 39:3-54.16. Placement of red emergency warning lights**

All red emergency lights shall be mounted on the exterior of the motor vehicle. No more than two red emergency warning lights shall be installed on a vehicle. If one light is used it shall be installed in the center of the roof of the vehicle, or on the left windshield column in a position

where a spotlight is normally located. If two lights are used they may be placed on the windshield columns on each side of the vehicle where spotlights are normally mounted, or on either side of the roof at the front of the vehicle directly back of the top of the windshield. Under no circumstances may one light be placed on the roof and one on a windshield column in the spotlight position. They shall be operated only while the vehicle is being used by the registered owner chief or first assistant chief in answering a fire or emergency call.

**N.J.S.A. 39:3-54.17. Placement of sirens**

All sirens shall be mounted under the hood of the motor vehicle and shall be operated only while the vehicle is being used by the registered owner chief or first assistant chief in answering a fire or emergency call.

**N.J.S.A. 39:3-54.18. Identification cards for chief or first assistant chief; issuance; purpose**

The Director of the Division of Motor Vehicles shall prepare suitable identification cards bearing the signature of the director, which, upon the request of the mayor or chief executive officer of any municipality recognizing and being served by a volunteer fire company, on a form and in a manner prescribed by the director, shall be forwarded to the mayor or chief executive officer, to be countersigned and issued by the mayor or chief executive officer to the chief or first assistant chief of the volunteer fire company. Identification cards issued pursuant to this section shall be considered permits to display and operate red emergency warning lights, sirens, or both, as provided for in this act, and no lights or sirens shall be mounted prior to the issuance of the identification cards. Each chief or first assistant chief of a volunteer fire company shall carry the identification card while red emergency warning lights, sirens, or both, are displayed on his vehicle.

**N.J.S.A. 39:3-54.19. Operation of motor vehicles with red emergency warning lights or sirens; yielding right of way**

This act shall not grant to any chief or first assistant chief of a volunteer fire company any privileges or exemptions denied to the drivers of other vehicles, and persons displaying red emergency warning lights, sirens, or both, shall drive with due regard for the safety of all persons and shall obey the traffic laws of this State; but drivers of nonemergency vehicles upon any highway shall yield the right of way to the vehicle of any chief or first assistant chief of a volunteer fire company displaying red emergency warning lights, sirens, or both, in the same manner as is provided for authorized emergency vehicles pursuant to R.S. 39:4-92.

**N.J.S.A. 39:3-54.20. Unlawful use of red emergency warning lights or sirens; penalty**

Any person authorized to display red emergency warning lights, sirens, or both, pursuant to this

act, who willfully displays or uses the lights or sirens in violation of the provisions of this act, shall be liable to a penalty of not more than \$50.00 and his privilege to display the lights or sirens may be suspended or revoked by the Director of the Division of Motor Vehicles.

## **NEW JERSEY DIVISION OF FIRE SAFETY FIREFIGHTER CANCER REDUCTION AND DECONTAMINATION SUGGESTED GUIDELINE**

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It is an unfortunate reality that cancer has become a leading contributor to firefighter deaths. In order to reduce the level of these types of diseases from occurring in the New Jersey Fire Service members must adopt and follow policies that ensure strict compliance to local standard operating guidelines and State laws regarding the use of self-contained breathing apparatus in IDLH atmospheres and the application of proper personal and facility related decontamination processes. In support of reducing cancer related illnesses from affecting New Jersey firefighters the Division of Fire Safety offers the following information.

Firefighting is a dangerous profession, and a growing body of research and data shows the contributions that job-related exposures have in the development of cancer. The National Institute for Occupational Safety and Health recently undertook two large studies, (<https://firefightercancersupport.org/wpcontent/uploads/2013/10/NIOSH-Firefighter-Cancer-Study-w-Summary.pdf>) which focused on firefighter cancer and concluded that firefighters face a 9 percent increase in cancer diagnoses, and a 14 percent increase in cancer-related deaths, compared to the general population in the U.S.

Latest statistics suggest that firefighters have a 63% increased risk of developing some form of cancer than the citizen population. Increased risk for firefighters compared with the general population is as follows:

- Testicular cancer (2.02 times greater risk)
- Multiple myeloma (1.53 times greater risk)
- Non-Hodgkin's lymphoma (1.51 times greater risk)
- Skin cancer (1.39 times greater risk)
- Prostate cancer (1.28 times greater risk)
- Malignant melanoma (1.31 times greater risk)
- Brain cancer (1.31 times greater risk)
- Colon cancer (1.21 times greater risk)
- Leukemia (1.14 times greater risk)

Some of the more hazardous carcinogens are Benzene, Formaldehyde, PCB's, and Asbestos, among many others. Additionally, there are significant chemical hazards, such as Carbon Monoxide, Hydrogen Cyanide and Phosgene, just to name a few. The microscopic particles of incomplete combustion are heavily laden in the smoke of all types of fire to which we respond. These known cancer-causing toxins are present in structure fires, car fires, dumpster fires, wildland fires and smoke from any fire in general.

The risk of absorbing these chemicals through the skin has been shown to occur, even through firefighting personal protective equipment (PPE). Chemical / carcinogen absorption increases as the body temperature increases from physical exertion. Skin becomes 400% more absorptive for every 5 degrees increase in core body temperature. In general, body temperature increases between 3-5 degrees while performing firefighting activities. The body takes approximately 30-50 minutes to return to normal temperature after firefighting. Additionally, PPE off gasses vapors of the chemicals found in smoke well beyond extinguishment of the fire.

The guideline below provides minimum recommendations to reduce the hazards of cancer-causing agents related to firefighting.

## **ON-SCENE MEASURES**

- Always wear full PPE during firefighting activities.
- Use Self Contained Breathing Apparatus (SCBA) from the initial attack until completion of the investigation. Don SCBA mask and go on air prior to entering smoke / hazard zone.
- Recognize the need for decontamination.
- Utilize positive pressure decontamination upon exiting an Immediately Dangerous to Life and Health (IDLH) environment.
- Upon leaving IDLH /smoke atmosphere, do not remove PPE until gross decontamination is completed.
- Perform gross field decontamination of PPE with water and dish detergent soap to remove any potential carcinogens.
- Utilize hand wipes to remove products of combustion from the head, neck, jaw, throat, underarms and hands immediately while on scene.
- Use nitrile exam type gloves for cleaning equipment.
- Rinse all hose, tools, equipment, and SCBA's with water and dish detergent soap before placing back on the apparatus.

## **PPE DOFFING PROCEDURE**

- Remove structural gloves and use latex gloves for remainder of doffing.
- Remove helmet.
- Remove SCBA mask.
- Remove hood quickly to reduce spreading contaminants on face and neck.
- Remove SCBA.
- Remove turnout coat.
- Use wipes to clean neck, face, hands & groin.
- Remove bunker pants and boots.
- Clean inside helmet with wipes.
- Place all gear in a plastic bag for storage and washing.

## **IN-STATION MEASURES**

- Use latex gloves when handling any contaminated equipment or PPE.
- Ensure that PPE is laundered and dried as soon as possible after exposure to carcinogens.
- Shower thoroughly after exposure to products of combustion.
- Change to a clean uniform and wash contaminated uniform immediately, and separate from other laundry, after a fire.
- Do not take contaminated PPE or station uniforms home or store in lockers or vehicles.
- Decontaminate apparatus interior immediately after a fire.
- Open all bay doors or use mechanical exhaust system when apparatus is entering or exiting the station to facilitate diesel exhaust removal.
- Perform vehicle and equipment checks outside of the station; including running of small equipment.
- No vehicle idling in the apparatus bay.
- Keep turnout gear out of living and sleeping space.
- Keep doors between apparatus floor and living spaces closed and limit traffic through these doors as much as possible.
- Wear work or latex gloves when possible and wash hands frequently.

Cancer prevention is not an easy, one-step project. The practices for prevention are as varied as the exposures firefighters encounter at any given incident. Attached is a list of resources to help you develop a comprehensive cancer reduction program, including on-scene decontamination. The most important recommendation is to get the ball rolling with your own practices, in your own department. Whether motivation comes from the top down or the bottom up, prevention is a long-term and evolving process that must start today.

## Fire Service Cancer Reduction Resources:

- Post Fire On Scene Decontamination: <https://www.youtube.com/h?v=rWT4Ia0sU1s&index=7&list=WL&t=0s>
- Firefighter Cancer Support Network: <https://firefightercancersupport.org/>
- Firefighter Cancer Alliance:  
<http://www.firefightercanceralliance.org/>
- Firefighter Cancer Foundation:  
<http://www.ffcancer.org/>
- Cleaning and Decontamination Considerations after the Fire / IFSI research resources:  
<https://www.firehouse.com/safety-health/ppe/turnoutgear/article/12352711/ifsi-research-supplement-cleaning-and-decon-considerationsafter-the-fire>
- Fire Service Research: 10 Considerations Related to Cardiovascular & Chemical Exposure Risks:  
<https://clarity.firehouse.com/issue/59b1aabf57ab464f74618fe5>
- IAFC - Best Practices for Preventing Firefighter Cancer:  
<https://www.iafc.org/topics-and-tools/resources/resource/best-practices-for-preventingcancer-poster>
- UL / FRSI Cardiovascular and Chemical Risks Faced by Firefighters:  
<https://ulfirefightersafety.org/research-projects/assessing-the-cardiovascular-andchemical-risks-faced-by-firefighters.html>
- The Silent Killer - Firefighter Cancer:  
[https://www.youtube.com/watch?v=fyZ\\_HQM9Z\\_c](https://www.youtube.com/watch?v=fyZ_HQM9Z_c)
- Lexipol:  
<http://www.lexipol.com/firefighter-cancer-prevention/>
- United States Fire Administration, (USFA):  
[https://www.usfa.fema.gov/current\\_events/032218.html](https://www.usfa.fema.gov/current_events/032218.html)

## **FIREFIGHTER CRITICAL INCIDENT STRESS/SUICIDE PREVENTION**

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Firefighters face extreme dangers operating at hazardous emergency scenes on a daily basis. Risks such as burns, cardiac arrest, building collapse, apparatus crashes, becoming lost, trapped, or disoriented inside a structure are well known and acknowledged by firefighters across the State of New Jersey. However, firefighters are also exposed to another type of exposure that is not readily recognized or accepted by members of the service. Years of repeated contact or even one exposure to a horrific incident involving firefighter fatalities, victim fatalities, victim rescues, automobile deaths, child fatalities, and other highly stressful and traumatic events can inflict severe emotional grief and behavioral distress on firefighters. Additionally the life stressors created by challenging schedules, marital discord, child care, financial difficulties, alcohol use, and personal health issues

can also have detrimental effect on individual firefighters. With increasing frequency, the mental health of firefighters is being compared to those who have served in the military and have suffered post-traumatic stress disorders requiring mental health treatment. The most recent statistics show that from 2013 to 2018 the number of firefighters taking their own lives have consistently exceeded those that have died in the line of duty. In 2017 there were 93 firefighter line of duty fatalities and 103 firefighter suicides. Firefighters who are faced with mental or behavioral health issues, stress created by responding to traumatic emergency incidents, home or work related problems, or any other emotional stressor should immediately seek out aid for these issues so that the correct physical and emotional support can be offered without delay. The days of hiding and internalizing these emotions and playing “superman” amongst your peers must end. Members of the fire service must work diligently to ensure their brother and sister firefighters suffering from these issues are identified and provided the mental health assistance they require.

There are a number of local, regional, and nationally recognized organizations that firefighters can reach out to for mental health and critical incident stress debriefing and counseling services. The State of New Jersey along with numerous counties in the State have regional resources capable of providing these services. In addition, firefighters should check with their local municipalities to ascertain whether or not local Employee Assistance Programs (EAP’s) are offered. Included below is a list of potential resources many of which are available 24/7 either by phone or direct contact.

- New Jersey Disaster Critical Incident Stress Response  
<https://www.njdcisr.org/cism.html>
- Firefighter Behavioral Health Alliance  
<http://www.ffbha.org/>
- New Jersey Firefighters Mutual Benevolent Association  
[https://www.njfmba.org/critical\\_incident\\_stress](https://www.njfmba.org/critical_incident_stress)
- International Association of Firefighters  
<https://www.iaffrecoverycenter.com/behavioral-health/suicide-prevention/>
- National Fallen Firefighters Foundation  
<https://www.everyonegoeshome.com/16-initiatives/13-psychological-support/>
- National Volunteer Fire Council  
<https://www.nvfc.org/>

## **PUBLIC EMPLOYEES OCCUPATIONAL SAFETY AND HEALTH BLOODBORNE PATHOGENS STANDARD**

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Many workers risk on-the-job contact with blood and other body fluids, these materials may

contain pathogens (organisms that can cause serious disease). Of major concern are the hepatitis B virus (HBV), the hepatitis C virus (HCV), and the human immunodeficiency virus (HIV), the cause of Acquired Immunodeficiency Syndrome (AIDS).

On December 6, 1991, federal OSHA adopted 29 CFR 1910.1030. "Bloodborne Pathogens." This standard protects workers in the private sector who come in contact with blood or other potentially infectious materials. On July 6, 1993, the federal OSHA Standard was adopted under the New Jersey Public Employees Occupational Safety and Health (PEOSH) Act to protect public employees in New Jersey. For the full text of the NJ PEOSH Bloodborne Pathogens Standard visit <https://www.state.nj.us/health/workplacehealthandsafety/peosh/peosh-health-standards/bbp.shtml>

This information was prepared for the New Jersey Department of Health and Senior Services, Public Employees Occupational Safety and Health Program by the University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, Department of Environmental and Community Medicine, and the Division of Consumer Health Education.

The standard covers all public employees who may have contact with blood or other potentially infectious materials because of their work. Employees most likely to be covered include but are not limited to:

### **Potentially Infectious Materials**

The standard defines other potentially infectious materials, such as semen and vaginal secretions; fluid from the brain, spine, lungs, and amniotic sac; fluid around joints, the heart, and the abdominal lining; saliva in dental procedures; all body fluids that are visibly contaminated with blood; and all body fluids when you cannot tell which type they are. Also considered as potentially infectious materials are any unfixed human tissue or organs other than skin, and animals or cells infected with HIV for medical research. (Research laboratories for other bloodborne pathogens, such as hepatitis C, could also be included.)

### **How Are Employees Exposed?**

Occupational exposures occur when employees do tasks that can cause blood or other potentially infectious materials to enter their bodies. These exposures happen through cuts, cracks, or abrasions in the skin; splashing, or spraying into the eyes, mouth, or nose; and puncture wounds from contaminated sharps (needles, broken glass).

### **Major Requirements of the Standard**

The major requirements of the standard are as follows:

- Employee exposure control plan;
- Methods to prevent exposure;

- Hepatitis B vaccinations;
- Medical evaluation and follow-up;
- Employee training;
- Recordkeeping;
- Health care workers (e.g., medical and dental personnel, school nurses);
- Emergency medical services employees;
- Firefighters (including volunteers);
- Police officers;
- Correctional officers;
- Some laundry and housekeeping staff;
- Lifeguards;
- Workers in institutions for the developmentally disabled.
- Special precautions for HIV and HBV research laboratories. (Research laboratories for other bloodborne pathogens, such as hepatitis C, could also be included.)

***The Exposure Control Plan.*** Employers must prepare a written plan that includes the job classification tasks and procedures in which employees have occupational exposure, the schedule and methods for implementing the requirements of the standard, and procedures for documenting the circumstances surrounding an employee's exposure. The plan must be accessible to employees. It also must be updated at least annually or more often if work tasks or control methods change.

***Methods to Prevent Exposure.*** The standard describes the following methods to prevent occupational exposure to bloodborne pathogens:

- Universal Precautions—Handle all human blood or other potentially infectious materials as if they were contaminated. This approach is known as universal precautions.
- Engineering Controls—Use engineering controls whenever possible. These are methods that contain or remove the hazard, such as puncture resistant containers for sharps, splash guards, or self-sheathing needles.
- Work Practice Procedures—Use work practice procedures that reduce the chances of exposure. Employers must provide the necessary equipment to implement them. These procedures include:
  - Immediately wash hands (and other parts of the body as needed) following any contact with blood or other potentially infectious materials. This may not be possible for certain jobs, such as police work or emergency medical services. In these cases, employers must provide antiseptic hand cleansers, as well as paper or cloth towels.
  - Employees must wash with running water and soap as soon as they can after the exposure.
  - Wash hands as soon as possible after removing gloves or other protective equipment.

- Do not recap, break, or bend by hand any contaminated needles. Put used needles and other sharps into special containers until they can be processed or disposed of. These containers must be closable, puncture-resistant, and leakproof. They should be labeled and put close to the area where sharps are used. Containers should never be overfilled.
- Do not eat, drink, smoke, apply makeup or lip balm, or handle contact lenses in areas where exposure might occur. Don't store food or drinks in potentially contaminated areas like refrigerators used to store lab specimens.
- Use methods to prevent splashing, spraying, or spattering when doing any procedures involving blood or other potentially infectious materials. Don't use your mouth for suctioning or pipetting.
- Use leakproof containers for collecting, handling, processing, storing, carrying, or shipping blood specimens or other potentially infectious materials.
- Label or use color codes on containers and refrigerators used for storage, carrying, or shipping. (See the standard for information on using the biohazard symbol.)
- Decontaminate any equipment before it is sent out for repair.
- Personal Protective Equipment – Wear personal protective equipment when exposure cannot be avoided by other means. This equipment includes gloves, face shields, goggles, gowns, lab coats, mouthpieces, pocket masks, and resuscitation bags, see Figure C-29. Employers must provide the equipment free of charge. (They must also provide alternatives to employees who are allergic to the gloves normally used.) Personal protective equipment must be accessible and available in sizes to fit each employee. It should be taken off and put in designated containers for cleaning, repair, or disposal if it becomes contaminated or damaged. Figure C-30.



**Figure C-29**

Employers are required to clean and repair equipment that can be reused. This includes lab coats that are used as personal protective equipment. [www.osha.gov](http://www.osha.gov).

## Housekeeping Requirements

These requirements include the following:

- Establish written procedures and schedules for regular cleaning of the worksite and for disinfecting contaminated surfaces and materials.
- Do not pick up potentially contaminated broken glassware. Use tongs, forceps, or a brush and dust pan.

- Only use containers made for storing, carrying, and shipping sharps.
- Handle contaminated laundry as little as possible and wear gloves (and other protective equipment, if necessary). It must be stored and transported in labeled, leak proof containers.
- Follow state laws for handling and disposing of regulated waste. Contact the New Jersey Department of Environmental Protection, Bureau of Technical Assistance, PO Box 414, 120 South Street, Trenton, NJ 08625-0414 or (609) 984-6985.



**Figure C-30** Contaminated needles and sharps must be disposed of in special containers. *www.osha.gov*.

- Hepatitis B Vaccinations—Employers must offer free hepatitis B vaccinations to all employees who have anticipated exposure to blood or other potentially infectious materials. The vaccinations must be given within 10 working days after employees begin jobs that have the potential for exposure. Employees may decline the vaccination, but must sign a “declination” statement if they do so.
- Medical Evaluation for Exposed Employees—Employers are required to offer free, confidential medical evaluation and follow-up to all employees who receive an occupational exposure to blood or other potentially infectious materials. These services must include: a written report of how the exposure occurred; testing the source person if possible; testing the exposed employee’s blood if she or he consents; and post exposure treatment and counseling.
- Employee Training About Potential Hazards—Employers are required to provide initial training for employees who have anticipated occupational exposure. This training must cover all of the major parts of the standard and be repeated annually.
- Employees must also have access to a copy of the standard and the exposure control plan.
- Recordkeeping – confidential records about employee exposures, medical evaluation, and follow-up must be kept for the length of employment plus 30 years. Records showing that employee training has occurred must be kept for three years.

- Special Precautions for HIV and HBV Research Laboratories—Additional procedures, employee training, and equipment are required for HIV and HBV research laboratories. Consult the standard for details.

## Training Resources

TABLE C-1 Standard Precautions for Infection Control. <https://www.osha.gov/>.

Standard Precautions for Infection Control	
	<p><b>WASH HANDS (PLAIN SOAP)</b> Wash after touching blood, body fluids, secretions, excretions, and contaminated items. Wash immediately after gloves are removed and between patient contacts. Avoid transfer of microorganisms to other patients or environments.</p>
	<p><b>WEAR GLOVES</b> Wear when touching blood, body fluids, secretions, excretions, and contaminated items. Put on clean gloves just before touching mucous membranes and nonintact skin. Change gloves between tasks and procedures on the same patient after contact with material that may contain high concentrations of microorganisms. Remove gloves promptly after use, before touching non-contaminated items and environmental surfaces, and before going to another patient, and wash hands immediately to avoid transfer of microorganisms to other patients or environments.</p>
	<p><b>WEAR MASK AND EYE PROTECTION OR FACE SHIELD</b> Protect mucous membranes of the eyes, nose, and mouth during procedures and patient care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions.</p>
	<p><b>WEAR GOWN</b> Protect skin and prevent soiling of clothing during procedures that are likely to generate splashes or sprays of blood, body fluids, secretions, or excretions. Remove a soiled gown as promptly as possible and wash hands to avoid transfer of microorganisms to other patients or environments.</p>
	<p><b>PATIENT CARE EQUIPMENT</b> Handle used patient care equipment soiled with blood, body fluids, secretions, or excretions in a manner that prevents skin and mucous membrane exposures, contamination of clothing, and transfer of microorganisms to other patients or environments. Ensure that reusable equipment is not used for the care of another patient until it has been appropriately cleaned and reprocessed and that single-use items are properly discarded.</p>
	<p><b>LINEN</b> Handle, transport, and process used linen soiled with blood, body fluids, secretions, or excretions in a manner that prevents exposures and contamination of clothing and avoids transfer of microorganisms to other patients or environments.</p>
	<p><b>USE RESUSCITATION DEVICES AS AN ALTERNATIVE TO MOUTH-TO-MOUTH RESUSCITATION.</b></p>

## **NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES**

### **Public Employees Occupational Safety and Health (PEOSH) Program**

CN 360, 7th Floor Trenton, NJ 08625-0360

(609) 984-1863

The PEOSH Program has developed a model Exposure Control Plan which is intended to serve as an employer compliance guide to the Bloodborne Pathogens Standard. The model plan is available from the PEOSH Program at the above address or from our Internet site at <http://www.state.nj.us/health/eoh/peoshweb/>.

### **American Hospital Association Services, Inc.**

PO Box 92683

Chicago, IL 60675-2683

(800)AHA-2626, Fax: (312) 422-4505

AHA has several publications of interest, including OSHA's Final Bloodborne Pathogens Standard: A Special Briefing.

### **Center for Disease Control**

AIDS Clearing House

(800) 458-5231

### **Federal Emergency Management Agency (FEMA)**

National Fire Academy Publications Department

16825 S. Seton Avenue Emmitsburg, MD 21727

(301) 447-6771

FEMA has a free curriculum for firefighters and emergency responders.

### **International Association of Fire Fighters**

1750 New York Avenue Washington, DC 20006

(202) 737-8484

IAFF has free materials for firefighters.

### **National Institute for Occupational Safety and Health**

Attention: Publications

4676 Columbia Parkway Cincinnati, OH 45226

(800) 356-4674

NIOSH has two publications that are especially useful: Guidelines for Protecting the Safety and Health of Health Care Workers, 1988. DHHS (NIOSH) Publication #88-119.

A Curriculum Guide for Public Safety and Emergency-Response Workers, 1989. DHHS (NIOSH) Publication #89-108. Some unions and professional organizations have developed materials for their members.

In addition, a few of the manufacturers of hepatitis B vaccine have prepared information.

# **NEW JERSEY WORKER AND COMMUNITY RIGHT-TO-KNOW ACT**

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## **PEOSH Hazard Communication Standard (29 CFR 1910.1200 / N.J.A.C. 12:100-7)**

This fire service reference is designed to assist fire departments in complying with the regulations of the Worker and Community Right-to-Know Act and for personnel to understand their rights with regard to working with or around hazardous substances.

This information was developed with the invaluable assistance of the New Jersey Department of Health and Senior Services, Right to Know Program.

Agencies and Organizations with free or low-cost training materials about bloodborne pathogens are listed below.

## **PURPOSE**

Public sector workers have potential exposure to numerous chemicals in the workplace such as petroleum-based products, solvents, acids, caustics, cleaning agents, agricultural chemicals, adhesives, and coatings. New Jersey's Hazard Communication Standard (HCS) has been adopted to ensure that employees working with hazardous chemicals receive effective information and training prior to working with such chemicals.

New Jersey PEOSH has adopted the OSHA Hazard Communication Standard of 2012, which incorporates the United Nations' Globally Harmonized System of Classification and Labeling of Chemicals (GHS). GHS provides for a uniform approach for the classification and presentation of hazard information.

Effective June 5, 2017, PEOSH added additional HCS requirements for training and documentation, providing stronger protection for New Jersey's public employees. The PEOSH Hazard Communication Standard requires that employers:

- Maintain a list of hazardous chemicals in each workplace.
- Ensure all hazardous chemicals are labeled. All labeling of hazardous chemicals must include pictograms, a signal word, hazard and precautionary statements, the product identifier, and supplier information.
- Have Safety Data Sheets available for each hazardous chemical and ensure they are readily accessible to employees when they are in their work area(s). Safety Data Sheets (previously referred to as Safety Data Sheets) now require a consistent 16 section format and universal pictograms.
- Train all workers who are potentially exposed to hazardous chemicals. Hazard Communication Standard training must be provided by a technically qualified person,

on paid time, and in a manner consistent with the educational level, literacy, and language of the employee being trained (N.J.A.C. 12:100-7.3 - Employee information and training).

- Provide refresher training every-other-year and upon introducing a new hazard to the workplace.
- Maintain a written Hazard Communication Program that includes the employer's plan for doing the above tasks.

Internationally recognized Pictograms have been developed to ensure all hazardous chemicals are labeled. All labeling of hazardous chemicals must include pictograms.

The Federal OSHA Hazard Communication Standard (29 CFR 1910.1200) provides the framework for a written program, chemical inventory, safety data sheets, and initial training. The New Jersey Hazard Communication Standard (N.J.A.C. 12:100-7) adopts the Federal standard and includes additional documentation and training requirements. Finally, the New Jersey Worker and Community Right-to-Know Act includes reporting and labeling requirements and provides for employee access to chemical-specific information via New Jersey's Hazardous Substance Fact Sheets. Fact Sheets are prepared for substances on the New Jersey Right to Know Hazardous Substance List. More than 2,000 Fact Sheets have been completed and more than 900 have been translated into Spanish. The Fact Sheets are prepared on pure substances and contain information on health hazards, exposure limits, personal protective equipment, proper handling, first aid, and emergency procedures for fires and spills.

The RTKHSL identifies the following for each chemical: the Chemical Abstracts Service (CAS) number, common name, chemical name including synonym(s), RTK substance number, the US Department of Transportation number, and the source(s) from which the hazardous substance was obtained. Public employers in New Jersey must comply with all three standards when developing an effective hazard communication program.



**Figure C-31.** Firefighters should be informed and aware of the types of facilities and the associated hazards that may be located in their districts. *John Lewis.*

## **Providing RTK training and Posting the RTK poster**

If the fire department is an independent private employer, it is the municipality's responsibility to ensure that all employees receive RTK training. The requirements of a RTK survey, RTK central file, RTK labeling and RTK poster do not have to be met at the facility of a private fire department.

## **Completing and Submitting the Right to Know Survey**

If the fire department is considered part of the municipality or fire district, then the municipality or fire district is responsible for completing the RTK survey. If the fire department is considered a private employer, it is not responsible for completing the RTK survey.

## **How Do I Determine Who Is Responsible?**

If you are not sure if the fire department, the municipality or the fire district is the employer, check with the municipal clerk or the fire district administrator, the municipal or fire district attorney, or the local ordinance that created the fire department.

## **Right to Know Survey**

All employers in the public sector are required to complete a RTK Survey developed by the DHSS every year. A complete inventory of products containing hazardous chemicals present at the fire house must be reported every five years. In the intervening years, only new products have to be reported.

## **Do I Have to Ask for a Right to Know Survey?**

No. The New Jersey DHSS will automatically send all public employers a RTK Survey. A volunteer private company that owns its own building will not receive a survey and does not have to fill one out. However, if you do not receive a survey and need one, you may request a survey from the DHSS at the address listed.

## **SECTION 2**

### **The Fire Department as an Employer**

Depending on how it is organized, a fire department may be to ensure compliance with the considered part of the municipality, part of a fire district or a private employer. If it is part of the municipality or a fire district, it is the employer's responsibility RTK law by:

- Completing and submitting a RTK Survey.
- Maintaining Hazardous Substance Fact Sheets (HSFS) and Safety Data

- Sheets (SDS) for all hazardous substances at the workplace in the RTK central file.
- Labeling all containers in the workplace.

The municipality or fire district is responsible for each hazardous substance listed on the RTK Hazardous Substance List (RTKHSL) which is present at its facilities. The information to be included on the survey includes the product name and a list of hazardous substance ingredients by:

- RTK Substance Number (see RTKHSL)
- Hazardous Chemical Name
- Chemical Abstracts Service (CAS) Number (see RTKHSL)
- DOT Identification Number (see RTKHSL)
- Type of container (using a code), Mixture percentage (using a code)
- Inventory quantity (using a code)
- Whether it is a solid, liquid or gas
- The number of employees exposed or potentially exposed to the chemical
- Special health hazard codes, if any
- Location (required only for large quantities at a single location)

### **How Do I Figure out What Has to Be Reported?**

Consult the RTK instruction booklet that came with the RTK survey and the RTKHSL. This booklet and the list will provide the information needed for completing the Survey.

### **Who Do I Send the Survey To?**

Send the original survey to NJDHSS, and copies to the local police department, health department, RTK county lead agency and the Local Emergency Planning Committee. Keep a copy in your RTK central file.

### **What Is a Hazardous Substance Fact Sheet (HSF5)?**

Once the fire department has submitted a completed survey for each of its facilities, the DHSS will send a HSFS for each hazardous substance reported on the RTK Survey. A sample fact sheet is found in Appendix D. The HSFS contains the following information:

- Chemical name, Chemical Abstracts Services (CAS) Number, DOT number, and other names (synonyms) that the hazardous substance is known by.
- Definitions and common questions and answers.
- How to identify the number.
- Solubility in water, vapor pressure and flash point.



**Figure C-32** Hazardous substances are stored or transported in a wide variety of containers. *John Lewis.*

- Toxicity, carcinogenicity, mutagenicity, teratogenicity, flammability, explosiveness, corrosivity and reactivity (including with water).
- A description in non-technical language of the acute and chronic health effects from exposure to the chemical, including medical conditions that may be aggravated by exposure.
- Potential routes and symptoms of exposure.
- Proper precautions, work practices, necessary personal protective equipment, and other necessary measures for safe handling and storage.
- Information on how to control and extinguish a fire that involves the hazardous substance.
- Appropriate emergency and first aid procedures for spills, fires, explosions and accidental air emissions.

### **What Should We Do with the Hazardous Substance Fact Sheets?**

If a fire department has reported any hazardous substances present at its facilities, it must maintain the fact sheets in a central file, and make them available to all employees. This will allow firefighters and other employees' access to information that is very specific to the hazardous substances that are present at the worksite. Additionally, the fire department may request an entire set of 1,055 HSFS for free from the DHSS for emergency response purposes. Page 6 of the fact sheet is specially prepared to provide important information to firefighters. The fact sheets are also available on computer (CD-ROMs and on-line services). Contact the DHSS for further information.

## What Is the RTK Central File?

If the fire department has reported any hazardous substances present at its facilities, it is required to establish and maintain a central file at each facility containing a completed RTK Survey, appropriate HSFS and SDS, and the RTK Hazardous Substance List.

## Right to Know Poster

Every fire department is required to post on a bulletin board readily accessible to its employees, a poster giving notice of the availability of the RTK survey, HSFS, SDS, and the RTK Hazardous Substance List for those substances found at the fire station. The poster can be obtained from the DHSS.



Figure C-33 Exterior product labels may not indicate correct contents of container. *John Lewis.*

## III. Labeling All Containers in the Workplace

A pamphlet explaining RTK labeling requirements is available from the DHSS. In general, all containers in the workplace must be labeled. There are exemptions for certain consumer products and products labeled according to certain federal labeling laws (such as for pesticides, Figure C-33). Contact the DHSS for further information if needed.

## IV. Providing Right to Know Training for Firefighters What Type of Training Is Required for Firefighters?

All municipal, county, and state employers, including fire districts, must develop an education and training program to inform all employees who are exposed or potentially exposed to hazardous substances of the hazards of those substances and of the provisions of the Worker and Community RTK Act. All firefighters, both paid and volunteer, are considered employees and are considered potentially exposed to hazardous substances in their work. Paid firefighters must receive RTK training within one month of hire. Volunteer firefighters must receive RTK training within six months of acceptance and both paid and volunteer firefighters must receive refresher training every two years. Fire departments may want to check with their municipality or fire district to see if an existing program already exists. Municipalities are required to certify on their Right to Know

survey, every year, that new paid and volunteer firefighters have received initial Right to Know training that year, and to certify, every other year, that existing paid and volunteer firefighters have received refresher Right to Know training within the prior two years. (N.J.A.C. 8:59-6.1(d)) A similar training requirement for paid and volunteer firefighters exists under the Hazardous Waste Operations and Emergency Response Standard (pursuant to the New Jersey Public Employees Occupational Safety and Health Act). 29 CFR 1910.120(q) In order to prevent duplication of training, the Right to Know regulations allows much of the 1910.1204 training to substitute for Right to Know training. The regulations say:

- Firefighters will be in compliance with Right to Know training requirements by taking the New Jersey Haz-mat Emergency Response Course—Awareness, and the New Jersey Haz-mat Emergency Response Course—Operations (using the manual dated May 10, 1990 or later), both developed by a committee under the auspices of the New Jersey State Police, Office of Emergency Management.
- In addition, firefighters should receive training on any hazardous materials in the firehouse which do not fit within the solid article or consumer product exemptions, if not already covered in other training.
- Training in the use of personal protective equipment must be given if not covered in other training.
- Instructors must provide documentation to the fire company that they are “technically qualified persons” and a signed attendance roster must be maintained at the firehouse.
- (Biennial) Right to Know training can be combined with the annual refresher training required by 29 CFR 1910.120(q), however, “demonstrated competency” will not be allowed as a substitute for Right to Know (biennial) training.
- A Right to Know brochure must be distributed to all firefighters during the (biennial) training course.
- Awareness and Operational courses developed by other organizations may be used in place of the State Police program for Right to Know compliance upon submission to and approval by the Department of Health and Senior Services, Right to Know Program.



**Figure C-34** An example of hazardous material personal protective equipment (proper training must be provided by the employer prior to donning this PPE). *John Lewis.*

### **Maintenance of Right to Know Records**

Training records are required to be maintained by the employer. Fire departments should check with their municipality or fire district to determine where training records will be maintained.

## **SECTION 3**

### **The Fire Department as a Planner and Responder to Emergencies**

#### **Right to Know Surveys**

All fire departments will receive copies of RTK Surveys completed by public employers and Community RTK Surveys completed by private employers for facilities located within their jurisdiction every year. The surveys tell WHAT hazardous chemicals are present at those facilities, their quantities and locations, and their DOT Guidebook number from the Emergency Response Guidebook.

#### **What Should a Department Do With the Right to Know Surveys That it Receives?**

Fire departments should use both the RTK surveys and Community RTK surveys to help develop an emergency operations plan for facilities within its jurisdictions that report having hazardous substances. A sample Emergency Operations Plan (EOP) is available from the NJ State Police, Office of Emergency Management. HSFS are available from the DHSS for the hazardous substances reported on the surveys.

#### **How Do You Use a Hazardous Substance Fact Sheet or Safety Data Sheet?**

The fire department may maintain a file of the complete set of 1,055 HSFSs or SDSs which it

receives from certain reporting facilities, or both. This will allow firefighters to look up specific information on hazardous substances for any facility that they may be required to respond to. The HSFS and SDS information can also be used in training and can be carried on apparatus or otherwise made available to officers during an incident.

If a firefighter is subject to hazardous chemical exposure during an incident, the HSFS and SDS can be used in diagnoses and treatment at the hospital and in subsequent medical monitoring. Fire departments should drill their firefighters and officers in the use of RTK surveys. Community RTK surveys and the accompanying HSFS and SDS so that all are familiar with how to locate chemical information as well as the pertinent response information required during an emergency.



**Figure C-35** A fire officer consulting the DOT Emergency Response Guidebook. *John Lewis.*

Drills could both be in-house and practical evolutions using hazardous substance scenarios that would require the use of surveys as well as HSFS and SDS. Walkthroughs of specific facilities to confirm the information on the surveys and check container labels would also be beneficial.

### **What Type of Response Training, If Any, Is Required?**

The emergency response training that is required by the Worker and Community RTK Act is covered in Section 2. Similar emergency response training is required by the Public Employees Occupational Safety and Health Act under 29 CFR 1910.120. A pamphlet describing the requirements of 29 CFR 1910.120 is available from the DHSS, PEOSH Program, at the address listed on page 1. The relationship between required RTK training and 29 CFR 1910.120 training is covered in section 2. It is a good idea to incorporate RTK Surveys, Community RTK surveys,

HSFS and SDS into regular firefighter training so that firefighters can become familiar with them. Additionally, as emergency operations plans are developed utilizing the information from the RTK Surveys, Community RTK surveys, HSFS and SDS, time should be allotted during company training to cover these areas. Both surveys and HSFS are accessible by dialing into the NJDEP computer at (609) 633-6099.

### **Further Information**

To view the full text of the NJ Worker and Community Right to Know Act please visit <https://www.nj.gov/health/workplacehealthandsafety/right-to-know/>

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## **HAZARD COMMUNICATION STANDARD**

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The purpose of this bulletin is to inform public employers and employees that the federal Hazard Communication Standard, 29 CFR 1910.1200, has been adopted with amendments under the New Jersey Public Employees Occupational Safety and Health Act, at N.J.A.C. 12:100-7. The Standard overlaps with the New Jersey Worker and Community Right to Know (RTK) Act, N.J.A.C. 8:59, administered by the Department of Health and Senior Services Right to Know Program in the area of education and training of public employees. In order to prevent public employers from being subjected to two sets of rules regarding education and training, certain provisions of RTK education and training have been added to the Hazard Communication Standard and all education and training requirements are being removed from the RTK rules. This bulletin provides an overview of the Public Employees Occupational Safety and Health Program (PEOSH) Hazard Communication Standard (HCS) and explains the public employer's responsibilities under the Standard.

### **Background**

On January 11, 2001, the US Department of Labor, Occupational Safety and Health Administration (OSHA) approved New Jersey as a State-Plan State for public employees only. In accordance with the federal OSHA-approved PEOSH State Plan, New Jersey must operate an occupational safety and health program that is at least as effective as the federal program. Therefore, the New Jersey Department of Labor (DOL), PEOSH Program, has adopted the Hazard Communication Standard (HCS) with amendments to bring New Jersey's regulatory requirements and standards in line with OSHA requirements.

### **PEOSH HCS And the Right to Know Act**

OSHA adopted the federal Hazard Communication Standard in 1983, after the New Jersey

Worker and Community Right to Know (RTK) Act had already been enacted. The public sector was not covered under the federal OSHA Standard, but was covered by the RTK Act. As a result of New Jersey's OSHA-approved State Plan and the adoption of the Hazard Communication Standard by the PEOSH Program, public employers are now required to comply with both the PEOSH HCS and the RTK Act.

All references to RTK education and training are being removed from the RTK rules while certain provisions have been added to the federal Standard to create the PEOSH HCS. The New Jersey Department of Labor and Department of Health and Senior Services agreed to this change in order to eliminate confusion among public employers regarding the need to educate and train employees about hazards in the workplace.

Public employee training will now be solely enforced under the Hazard Communication Standard adopted by the PEOSH Program.

The PEOSH HCS amendments are listed below. It is strongly recommended that you read the PEOSH HCS and Appendix E of the PEOSH HCS in its entirety to become familiar with all of the Standard's requirements.

### **PEOSH Hazard Communication Standard Summary of Amendments**

- N.J.A.C. 12:100-7.3 new definitions added:
- Hazardous Substance Fact Sheet (HSFS);
- RTK Hazardous Substance List (RTK HSL);
- RTK Survey; Technically Qualified Person;
- Workplace Hazardous Substance List; Workplace Survey
- N.J.A.C. 12:100-7.8(a) refresher training must be provided every two years, during regular working hours, and at no cost to employees
- N.J.A.C. 12:100-7.8(a) chemical specific information must be made available to employees through HSFSs I N.J.A.C. 12:100-7.8(b)(3) employees must be informed of the location and availability of HSFSs, the RTK Survey, and the RTK HSL
- N.J.A.C. 12:100-7.8(c)(5) training must include an explanation of applicable provisions of the RTK Act (RTK Survey, RTK HSL, labeling, HSFS, central file, poster)
- N.J.A.C. 12:100-7.8(c)(6) a copy of the RTK brochure must be provided to employees
- N.J.A.C. 12:100-7.8(d) a "technically qualified person" must be used to conduct training
- N.J.A.C. 12:100-7.8(e) a list of the items to be included in training records
- N.J.A.C. 12:100-7.8(f) training records must be maintained
- N.J.A.C. 12:100-7.8(g) an employer is required to make available all training records
- N.J.A.C. 12:100-7.8(h) training materials must be appropriate in content and vocabulary to the educational level, literacy, and language of employees

## **Who is Covered?**

The PEOSH HCS applies to all public employees in New Jersey who use or store hazardous chemicals or products containing hazardous chemicals. A hazardous chemical is defined as a chemical which is a physical hazard or a health hazard (See N.J.A.C. 12:100-7.3). Refer to the PEOSH HCS for sources of information that are used to identify hazardous chemicals, N.J.A.C. 12:100-7.4, and those products to which the PEOSH HCS does not apply, N.J.A.C. 12:100-7.2(f).

## **Purpose of the Hazard Communication Standard**

The purpose of the PEOSH HCS is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information regarding the hazards of the chemicals is passed on to employers and employees. Under the PEOSH HCS, communication of the hazards of chemicals is achieved through a comprehensive hazard communication program which includes:

- A written hazard communication program;
- Container labeling and other forms of warning;
- Use of Safety Data Sheets (SDSs) and HSFs; and
- Employee training.

The evaluation of chemical hazards is the responsibility of manufacturers and importers. Employers who use hazardous chemicals must comply with the parts of the PEOSH HCS that require development and maintenance of a written hazard communication program and the communication of the hazard information to their workers.

## **Employers with Limited PEOSH HCS Coverage**

Sealed container operations and laboratories have limited coverage under the PEOSH HCS. These limitations are explained below and are found in N.J.A.C. 12:100-7.2.

1. Chemicals in sealed containers - Employees who handle hazardous chemicals in sealed containers which are not opened under normal conditions of use, such as in warehouses and transportation facilities, are exempt from the full requirement of the Standard, but the employer is still required to:
  - Ensure that labels are not defaced or removed from incoming containers;
  - Obtain and maintain Safety Data Sheets (SDSs) and make them readily accessible to employees in their work areas during each work shift; and
  - Provide information and training for employees, except for the location and availability of the written hazard communication program, so they know how to protect themselves in the event of a chemical spill or leak from a sealed container.
2. Laboratories—Employers are required to perform only the following under the PEOSH HCS:
  - Ensure that labels are not defaced or removed from incoming containers;

- Obtain and maintain Safety Data Sheets (SDSs) and make them readily accessible to employees in their work areas during each work shift; and
- Provide information and training for laboratory employees in accordance with the PEOSH HCS, except for the location and availability of the written hazard communication program.

For laboratories covered under the Occupational Exposure to Hazardous Chemicals in Laboratories Standard, 29 CFR 1910.1450 (laboratories where chemical manipulations are carried out on a “laboratory scale,” multiple chemical procedures or chemicals are used, the procedures involved are not a part of a production process, and protective laboratory practices and equipment are available and in common use), the requirements of the PEOSH HCS are superseded. In this case the more specific Standard 29 CFR 1910.1450 applies. However, these laboratories are still required to comply with the provisions of the RTK Act.

**Note:** Laboratory employers that ship hazardous chemicals are considered to be either chemical manufacturers or distributors. They must, therefore, ensure that any containers of hazardous substances leaving the laboratory are labeled as required by the PEOSH HCS, and that an SDS is provided to distributors and other downstream employers as required by the PEOSH HCS.

### Provisions of the PEOSH HCS

1. Chemical hazard evaluation
2. A written hazard communication program
3. Container labeling and other forms of hazard warning
4. Preparation, distribution, and maintenance of Safety Data Sheets (SDSs)
5. Development and implementation of employee information and training programs
6. Trade Secrets

Each provision of the PEOSH HCS is summarized below. The standard may also be obtained from the website listed in the box below.

**Note:** The PEOSH Program has developed a document, “Public Employer’s Guide and Model Written Program for the Hazard Communication Standard,” to assist public employees in complying with the PEOSH HCS. To obtain a copy, visit our web site [www.nj.gov/health/eoh/peoshweb](http://www.nj.gov/health/eoh/peoshweb), or call 609-984-1863.

## Written Hazard Communication Program

All employers must develop and maintain a written hazard communication program at each workplace. The employer must describe in the program how the PEOSH HCS requirements for labeling, training, and SDSs will be met. The written program must be made available upon request to employees, the employees' representative, the Commissioner of the New Jersey Department of Labor and the Commissioner of the New Jersey Department of Health and Senior Services or their designees.

The written Program must contain, at a minimum:

1. A list of hazardous chemicals in the workplace;
2. A description of how employees will be informed of the hazards of non-routine tasks and the hazards of chemicals contained in unlabeled pipes;
3. Information about the availability of SDSs and HSFs and methods to provide access to SDSs and HSFs;
4. A description of container labeling and other forms of warning;
5. A description of the employee training program;
6. Procedures for training new employees initially, when new products are introduced, and for refresher training;
7. Methods for providing hazard information and protective measures to other employers on site who may be exposed.

A list of hazardous chemicals (List) must be compiled using the identity of the hazardous chemical or product that appears on the container and SDS. The PEOSH HCS is a Performance Based Standard. It allows the public employer flexibility in using existing lists of hazardous chemicals, such as the RTK Survey, to comply with the requirements to compile a list of hazardous chemicals. The public employer has the option under the PEOSH HCS to develop a separate List to be included in the written Program or to use their RTK Survey as the List. The employer must be certain, however, that their RTK Survey contains all of the hazardous chemicals in the workplace if it is to be used as the required List. This would require them to have a complete inventory RTK Survey. Each hazardous chemical must be evaluated for its ability to cause adverse health effects and its potential to cause physical hazards, such as flammability, based on established criteria for defining a hazardous substance. Conducting this hazard evaluation is a responsibility of the producers, importers, and distributors of hazardous chemicals. This section may not apply to public employers unless you create or ship hazardous chemicals to others. The majority of public employers will only need to focus on items 2-6 above under "Provisions of the PEOSH HCS."

## HCS Labeling Requirement and Other Hazard Warnings

Products containing hazardous chemicals must be labeled to inform employers and employees

of the hazards associated with the product or chemical.

Chemical manufacturers, importers, and distributors must label, tag or mark containers with the identity of the hazardous chemicals contained in the product and must show hazard warnings to protect the employee. The identity of the hazardous product must correspond to the name listed on the SDS for that product. The warning may be in the form of words, pictures, or symbols, and must be legible and prominently displayed. Any target organs affected by the product or chemical must be identified. The name and address of the manufacturer or importer must also be included on the label.

Under the PEOSH HCS, public employers are required to make certain that the chemical products entering their facility are labeled and the labels are not defaced or removed.

Generally, the employer receives the product or chemical already labeled by the producer based on OSHA HCS labeling requirements. In addition, public employers must check that the product is labeled according to the PEOSH HCS and the RTK law. Public employers must comply with the labeling requirements of both PEOSH HCS and the RTK Act. Refer to the PEOSH HCS for specifics on container labeling. N.J.A.C. 12:100-6.6.

## **Safety and Data Sheets**

Employers must obtain and maintain an SDS for each product containing hazardous chemicals. The SDS is an informal bulletin that describes in detail: the physical and chemical properties, physical and health hazards, routes of exposure, precautions for safe handling and use, emergency and first aid procedures, and control measures for the hazardous chemical or product. It is provided to the distributor and employers who use the product or chemical.

Under the PEOSH HCS, public employers must obtain an SDS for each hazardous chemical or product and make them readily accessible to employees in their work area during each work shift.

If the RTK Central File provides the required accessibility for employees in their work area, it meets the PEOSH HCS requirement. If SDSs are not received with a shipment of products containing hazardous chemicals, the public employer must contact the manufacturer for the missing SDSs. A sample letter requesting an SDS is included in the Public Employer's Guide and Model Written Program for the Hazard Communication Standard.

## **Employee Training**

Employers must develop an information and training program for those employees who are exposed to hazardous chemicals under normal conditions of use or in a foreseeable emergency. Exposure means the employee comes in contact with the hazardous chemical during their job activities by any route of exposure (e.g., inhalation, skin absorption, or ingestion).

Under the PEOSH HCS, employees must be trained at the time of their initial assignment to work with hazardous chemical and when physical or health hazard is introduced into the workplace.

This requirement differs from the RTK training requirement which allowed the employer 30 days to initially train the employee. Refresher training shall be provided every two years for all employees who continue to be exposed to hazardous chemicals. Refresher training is an abbreviated version of the initial training. The training must be provided during working hours and a no cost to the employee. The public employer shall ensure that all employees participate in a training program conducted by “a technically qualified person.” A technically qualified person means, for training purposes:

- A person who is registered nurse, Certified Safety Professional, or Certified Industrial Hygienist, or a person who has a bachelor’s degree or higher in industrial hygiene, environmental science, health education, chemistry, or a related field, and understands the health risks associated with exposure to hazardous substances; or
- A person who has completed at least 30 hours of hazardous materials training and understands the health risks associated with exposure to hazardous substances, and has a least one year of experience handling hazardous or working with hazardous substances; or
- For teaching the recruit firefighting training course established by the New Jersey Department of Community Affairs (DCA), a person who has fulfilled the requirements of Firefighter Instructor Level I as certified by DCA. The definition of a “technically qualified person” can be found in the PEOSH HCS, at N.J.A.C. 12:100-7.3.

The PEOSH HCS information and training program must be appropriate in content and vocabulary to the educational level, literacy, and language of the employees in the training session and contain, at a minimum:

1. An explanation of the requirements of the PEOSH Hazard Communication Standard;
2. A description of operations in the work area where hazardous materials are present;
3. The location and availability of the written hazard communication program and other health and safety information (SDS, HSFS, RTK HSL);
4. Details of the facility’s hazard communication program;
5. An explanation of the applicable provisions of the RTK act(RTK Survey, RTK Labeling, HSFS, RTK HSL and Poster);
6. Methods used to identify and recognize hazardous materials in the work area (e.g. labels, SDS, HSFS);
7. A discussion of the physical and health hazardous chemicals;
8. Control measures and specific procedures used to prevent exposure;
9. Standard operating procedures regarding the use, storage, and emergency clean up of hazardous chemicals; and

10. A copy of the RTK brochure.

Additionally, Hazardous Substance Fact Sheets (HSFSs) are required to be made available to employees for chemical specific information, N.J.A.C. 12:100-7.8.

### **Recordkeeping**

Public employees' training records shall be maintained by the employer for the duration of the employee's employment, and shall be made available to the Commissioner of Labor or the Commissioner of Health and Senior Services or their designees for examination and copying. The training records shall be provided upon request for examination or copying to employees and employee representatives.

Training records shall include:

- Date of the training session;
- Location of the training session;
- Type of training (initial or refresher);
- Name and qualifications of the trainer;
- Names and job titles of the persons attending the training session;
- The content or summary of the training session.

### **Trade Secrets**

Under the PEOSH HCS chemical manufacturers, importers, or employers are allowed to withhold the specific chemical identity of a hazardous chemical from an SDS if certain conditions are met:

1. The trade secret claim can be supported;
2. The SDS contains information on the properties and effects of the hazardous chemical;
3. The SDS indicates that the specific chemical identity is being withheld as a trade secret; and
4. The specific chemical identity is made available to health professionals, employees, and designated representatives under certain specified situations.

In general, a request for the disclosure of a trade secret must be in writing and a statement to maintain the confidentiality of the disclosed information must be included in the request. The identity of a trade secret chemical must be released in cases of medical emergencies or first aid treatment regardless of the existence of a written statement.

Review the PEOSH HCS for more specific details regarding the trade secret provision.

For further information regarding NJ PEOSH Hazard Communication Standard please visit <https://www.state.nj.us/health/workplacehealthandsafety/peosh/peosh-health-standards/hazcom.shtml>

For Additional Information Contact:

**NJ Department of Health and Senior Services Public Employees Occupational Safety and Health Program**

PO Box 360, Trenton, NJ 08625-0360

(609) 984-1863

<http://www.nj.gov/health/eoh/peoshweb>

**NJ Dept. of Labor and Workforce Development**

Division of Public Safety and Occupational Safety and Health

(609)-633-2587

PO Box 386, Trenton, NJ

08625-0386

**NJ Division of Fire Safety (NJ DFS)**

<https://www.nj.gov/dca/divisions/dfs>

# PUBLIC AND PRIVATE UTILITY EMERGENCIES

## CHAPTER D

The following four chapters discuss the potential hazards associated with electric, natural gas, and propane facilities and carbon monoxide emergencies. What first responders do not know about utility hazards can and has killed them. It is vital that potential hazards associated with electric, natural gas, and propane facilities and carbon monoxide be integrated into your fire departments emergency standard operating guidelines (“SOGs”) and hazard assessments. These chapters on utility and energy safety provide a starting point for first responders to recognize and avoid potential utility hazards. It is strongly recommended that fire departments meet periodically with utilities and energy providers in their emergency response area to review capabilities and specific facility concerns and establish SOGs based on the specific potential utility and energy hazards in their area.

Subchapter I: Electrical

Subchapter II: Photovoltaic / Solar Power

Subchapter III: Natural Gas & Carbon Monoxide

Subchapter IV: Propane

## **SUBCHAPTER I: RECOGNIZING AND AVOIDING THE HAZARDS OF ELECTRICAL EQUIPMENT**

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### SECTION 1

Over the past years there has been many documented fatalities to Fire Fighters by electrocution. The purpose of this program is to:

- give you a basic knowledge of how electricity works
- help you to understand basic construction
- configurations of the electric utilities
- make you aware of the hazards of electricity.

This chapter will help you better understand what precautions need to be taken when working around electrical equipment.

Electricity cannot be seen in its natural state. It seems harmless enough when you look at an electric wire that could be energized from 120 volts all the way up to 500,000 volts. That is why

electrical energy is often referred to as the SILENT KILLER and remains a hazardous form of energy that has to be dealt with safely. No matter what the voltage is in an electrical conductor, it is dangerous and it can injure and/or kill emergency workers.

Some people believe that 120 volts (normal household current) is harmless. However, throughout the electrical industry there have been people killed when they have made contact with 120 volts.

**ANY VOLTAGE CAN KILL!!!!** It all depends on the situation, the amperage and voltage involved, the part of the body that was affected, the duration of contact and environmental conditions (wet or dry) at the time of contact.

Electricity is a blessing that is often taken for granted and must be treated with respect. Electrocution is the fifth leading cause of workplace death. The majority of these fatalities are caused by contacting energized wires or equipment and failure to use personal protective equipment (PPE).

If you discover someone who has made an electrical contact, do not attempt to pull the victim away from the source of contact with your hands. The power supply should be disconnected by the power company first. This may be done remotely by phoning the power company.

If someone is working from an elevated aerial apparatus and they make contact with an energized electrical conductor, do not climb onto the vehicle to lower the injured by using the lower controls of the aerial apparatus until the power source has been de-energized or the aerial apparatus is clear of the electrical conductor.

The risk of electrical shock or contact can be reduced by:

- being able to identify electrical wires and equipment as you arrive at incident.
- maintaining a safe working distance from any electrical wires or equipment.

## **SECTION 2**

### **Electricity - The Basics**

#### **Objective:**

This section provides a general summary of electricity and electrical equipment. Key safety and tactical points are indicated.

Nothing is coming out of this hose. But there is water and pressure inside it. Open the valve, the force of that pressure releases a spray of water. A wire is similar. The force which causes electrons

to flow is called voltage, and like water, the greater the pressure pushing electricity through a line, the higher the voltage. In water terms the pressure is measured in pounds per square inch.

With electricity, pressure is measured in volts.

- Voltage is the electric force that causes the free electrons to move from one atom to another just like water needs pressure to force it through a hose, electrical current needs some force to make it flow. A volt is the measure of electric pressure. Voltage is usually supplied by a battery or a generator.
- Current is electricity in motion. It measures the amount of electrons that can flow through a material like a conductor. Electrical current is measured in amperes or “amps” for short. Amperes is like the amount of water flowing through a hose in a certain amount of time or the amount of electricity flowing through a wire.
- Resistance – The opposition to electrical current flow, measured in ohms.
- Conductor – are made of materials that electricity can flow through easily. These materials are made up of atoms whose electrons can move away freely.

Some examples of conductors are:

- Copper
- Aluminum
- Platinum
- Gold
- Silver
- Water
- People and Animals
- Trees

Electricity will always take the shortest path to the ground. Your body is 70% water and that makes you a good conductor of electricity. If a power line has fallen on a tree and you touch the tree you become the path or “conductor” to the ground and could get electrocuted.

Insulators are materials opposite of conductors. The atoms are not easily freed and are stable, preventing or blocking the flow of electricity.

Some examples of insulators are:

- Glass
- Porcelain
- Plastic
- Rubber

The rubber or plastic on an electrical cord provides an insulator for the wires. By covering

the wires, the electricity cannot go through the rubber and is forced to follow the path on the aluminum or copper wires. A comparison that is often made is that electricity flowing through a conductor is similar to water flowing through a pipe.

If you take a water pipe with the faucet shut off, there is water in the pipe putting pressure (volts) on the pipe. However, there is no flow of water (amps) since the faucet is turned off. This is the same situation found in a home when the electrical wiring is connected to a TV or other appliance and the switch is turned off.

When the faucet is opened, water starts to flow (amps). The rate at which the water flows depends on two things:

1. The size of the pipe. (resistance)
2. The pressure of the water. (volts)

Once you have pressure (volts) and flow (amps) you now have accomplished work (power, watts). Just like the water that comes out of a faucet to fill a pot, water the lawn, etc., the electricity is running the TV, VCR, lighting, etc.

The length of time that you let the water flow will determine the gallons that are used and this is measured by the water meter. Likewise, the length of time the power is used is measured in watts by the electric meter and billed as a kilowatt-hour. (1 kw= 1 000watts)

Electricity is always trying to reach earth, which is ground through the path of least resistance. In order to control electricity, insulators are used to isolate the energized conductors from all sources of grounds potential. Air is a natural insulator, once an electrical arc has started the air becomes ionized which is now contaminated. The arc will continue until it is interrupted. Consider all downed wires as **ENERGIZED** until the utility representative confirms they are safe.

## **SECTION 3**

### **The Electric System**

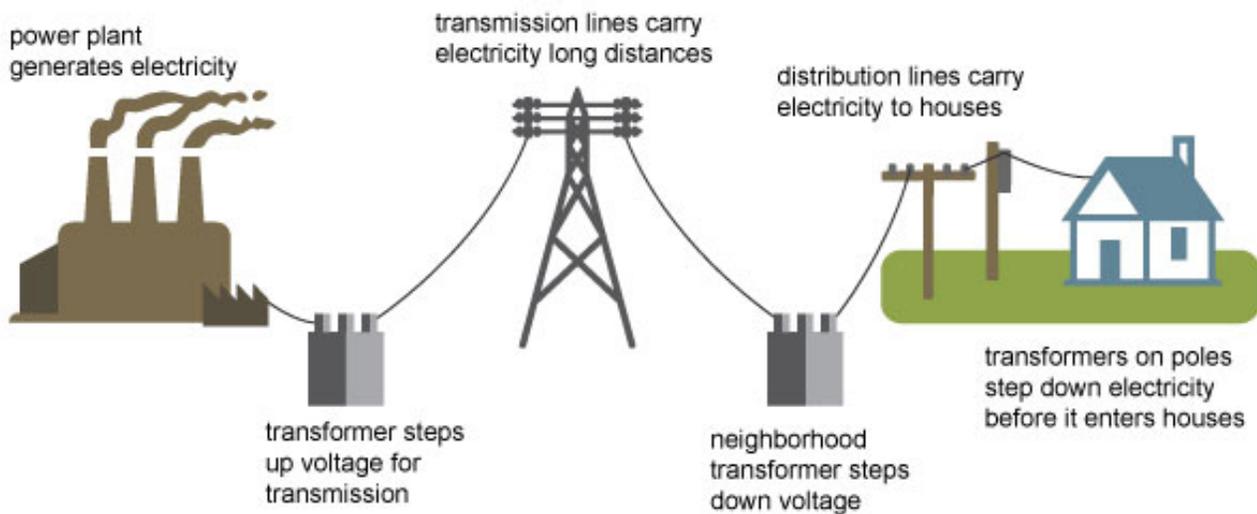
Generation—Electric generating plants or power plants may be large or small hydro, fossil or nuclear plants. Generation is produced by several means, fossil, hydro or nuclear. Appearances of the power plants differ, so does the equipment in the plant. However, there are certain conditions and equipment that is somewhat common, such as the turbine rooms, boiler rooms, and condenser rooms and electrical switch rooms.

The voltage that is produced by the generators is stepped up through the use of power transformers to a voltage used to transmit the power to locations miles from the generating stations. This voltage ranges from 15,000 to 500,000 volts. The electrical conductors that carry this high voltage are found on transmission towers that are 100 -200 feet high and run in a straight line along power right of ways.

In most cases, the wires with the highest voltage are those at the top of utility poles. And keep in mind that most poles have other utility wires such as telephone and cable. The electrical power is carried great distances on these towers to large substations. At these substations the voltage is stepped down, again by the use of power transformers, to 34,500 volts.

The 34,500 volt electrical conductors are carried to smaller substations on high utility poles ranging from 60 to 90 feet in height that run along power right of ways.

## Electricity generation, transmission, and distribution



Source: Adapted from National Energy Education Development Project (public domain)

**Figure D-1** The Electric Distribution System. From prior edition of NJ FF Addendum from Bob Green PSEG.

At these smaller substations, the voltage is once again reduced. This time to the primary voltage level (2400 - 19,900) volts These conductors are carried on smaller utility poles (40 - 50 feet in height) along residential streets.

Substations – an electric substation performs one or more of the following functions: (1) It transforms electric energy from one voltage to another, (2) it serves as a control center, or (3) it serves as a center for distributing electric energy to its customers.

Substations can be classified into three categories, inside, outside and a combination of both.

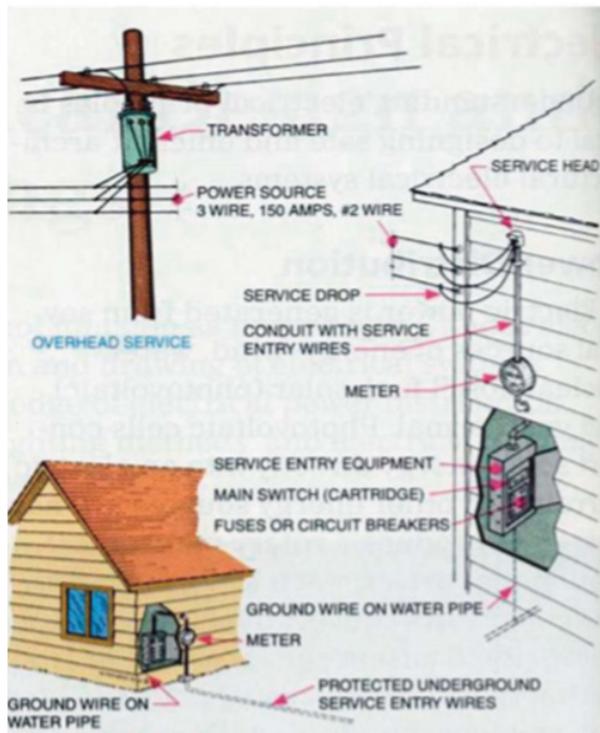
Some are hidden from site by constructing a three-side house around the station. All substations contain electrical equipment, some have insulating mineral oil filled, some insulating gas filled.

Fire fighters should never enter a substation property unless accompanied by a utility representative.

First objective is to size-up and communicate as much information to the utility as possible. Transmission Substations are located with generating stations, there are used to step-up the voltage from the generator. Example 24,000 up to transmission voltage of 230,000 or higher. Distribution Substations are located throughout the communities; it steps the voltage down for distribution throughout neighborhoods. Distribution voltage may vary from 2,400 to 34,000 volts.

In order to reduce the voltage for residential use, there are transformers located on these poles that step the voltage down to 120 volts. This is the voltage that is carried on the wire running from the utility pole to your home. As you turn on a light switch in your home the electrical power is then transmitted to the light bulb.

Electric utility primary (higher voltage) lines contain 10 - 500 amps and their secondary (household current) lines contain 60 - 400 amps. Even though the voltage is lower in household currents the amperage is the same or higher than higher voltage lines. There is enough amperage in secondary lines to cause serious injury or a fatality if contact is made.

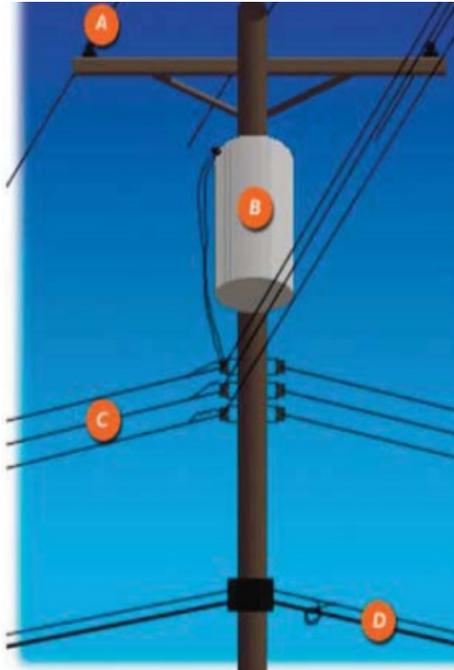


**Figure D-2.** Diagrams the typical distribution to a residential property. *From prior edition of NJ FF Addendum from Bob Green PSEG.*

At the top of a utility pole is the power company's primary conductors. These conductors may be insulated or bare. The voltage in these conductors could range from 2400 volts to 19,900 volts. There could be a single wire or as many as four at this location on the pole.

The next area down from the primary location is the power company's secondary conductors. The voltage in these conductors is usually 120 volts (residential areas). However, in some situations the voltage may be as high as 480 volts (industrial areas) Voltage in the primary lines usually is 2400 volts to 19,900 volts and secondary voltages ranges from 120 volts to 480 volts.

**Figure D-3 Pole Top Utility Facilities**



A. Distribution power lines - generally are 23,000 volts - carry electricity from substations -- are located approximately 40 feet above ground.

B. Transformers - reduce high voltage to secondary voltage, are located approximately 35 feet from the ground.

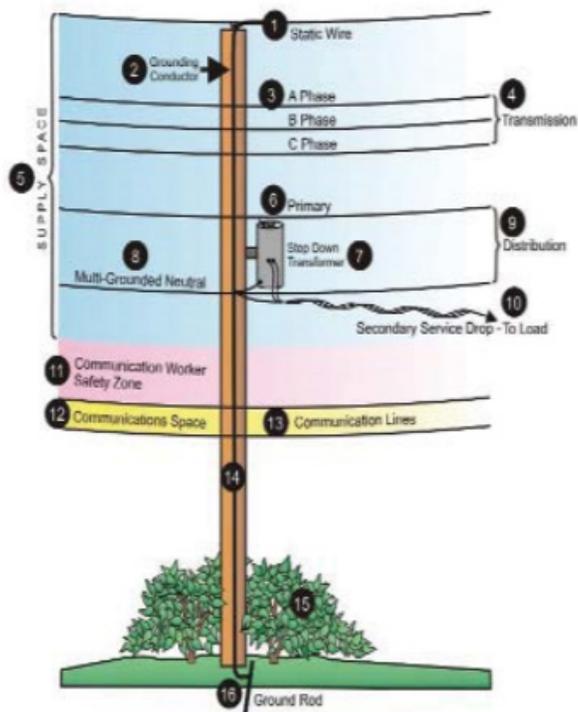
C. Secondary lines - generally are 120/140 volts - carry electricity to homes and businesses -- are located approximately 32 feet from the ground.

D. Telephone/Cable Television Wires - generally about 20 feet from the ground.

Insulators are made from high di-electric materials such as glass, porcelain, polymer, plastic, etc.

Insulators provide a mechanical means of clearance to prevent voltage from tracking to ground or another energized phase.

The amount of individual insulators at any given point will give you a general indication of the voltage level. The more insulators on a single string, the higher the voltage.



**Figure D-4** Secondary Wires. *From prior edition of NJ FF Addendum from Bob Green PSEG.*

In order to reduce the voltage for residential use, there are transformers located on these poles that step the voltage (2400 - 19,900) down to secondary voltage (120 - 480). Power transformers are located between the primary and secondary conductors. This is the voltage that is carried on the wire running from the utility pole to your home.

Overhead electrical wires are all installed under strain. That is one of the reasons fire apparatus should be staged any closer than two pole lengths either side of the pole that is involved in the incident.

Pole mounted equipment can contain mineral insulating oil, if there is a spill immediate notify the electric utility.

- Protect with diking techniques any water run off area that could be affected by the oil spill. Do not attempt to wash away the oil spill.
- Never position yourself or an apparatus directly under a pole involved in the incident.
- Positioning of Aerial Apparatus must be considered upon arrival, survey the area, located overhead wires, position the apparatus maintaining a minimum of 10 feet from all overhead conductors.
- Consider all downed wires as **ENERGIZED** until the utility representative confirms they are safe.

Storm conditions: Extreme caution should always be taken during storm conditions. Downed

power lines may or may not be energized. - Do not take chances, call the local power company for help. During a storm, stay away from any downed lines.

Identifying the type of a downed wire (power, phone, fire alarm or cable TV.) is difficult when the lines are covered with debris, ice or snow. Again, just stay away and call for help.

Whenever there is a downed energized electrical line, a phenomenon known as “step & touch” may be experienced while walking on the ground around the fallen power conductor. The energized conductor has a rippling effect around the point where it is making contact with the ground and the voltage decreases as you go out from the center of this point.

## **RESIDENTIAL UNDERGROUND SYSTEM**

The power, gas, phone and cable television companies all have underground cables in certain areas to serve their customers. The first sign that you might be in an underground area is that there are no utility poles around.

The voltages in the power company’s underground system are the same as their overhead systems.

Many times the power, phone, cable television and even the gas companies lines and cables look alike and identification may not always be easy. Underground distribution lines are distribution lines directly buried cables underground to padmount transformer installations. The voltages can range from 2,400 volts to 34,500 volts. These are locked and should only be handled or opened by a utility representative.

## **SECTION 4 Electrical Shock**

Electrical shock remains the biggest hazard in an electrical contact. Besides the pain that is suffered, there is often a loss of muscle control and continued contact could lead to a fatal injury.

Electric shock will occur when a person, by contacting an energized conductor or other energized objects, provides a path for the flow of electricity to a ground. Simultaneous contact with two energized conductors will also cause electric shock, which may result in serious injury or death.

When you unintentionally become part of an electrical circuit current flows through your body, which could cause electrical burns and/or death. The following is a brief anatomy of an electrical shock.

The human body provides limited protection from electricity. The first line of defense is our skin.

Let's return to the concept of "resistance".

Skin has a high resistance to shock. Recall that resistance is measured in "ohms," and dry, unbroken skin can have up to 50-thousands ohms in resistance. But inside the body, which is about 70% water, this resistance drops to only 300 to 500 ohms in resistance.

To measure the effect of electricity on the body, let's take common household voltage, 120 volts, and divide it by a resistance factor of 40 thousand ohms, typical for human skin. The result of voltage divided by resistance is "Amperes," the amount of current which flows through human skin. Only here, the amount is small, only 3-thousands of an ampere, or 3 milliamps of current.

Before we go any further, let's talk about the principles of electricity and its effects on the human body.

### **Anatomy of an Electric Shock**

- Resistance of the human body
- Voltage / Resistance = Amperes

Current (amps) plays a major part in the killing factor in electrical shock. Voltage is important only because it determines how much current will flow through the resistance of the human body. The current necessary to operate a 10 watt light bulb is eight to ten times more current than the amount that would kill the average person.

### **Effects of current on body**

**1 Milliamp or less** Causes no sensation and is not felt.

**1 to 8 Milliamps** Sensation of shock, not painful. Individual can let go at will, as muscle control is not lost. (5 ma. is the acceptable maximum harmless current intensity).

**15 - 20 Milliamps Painful shock.** Cannot let go. Muscle control is lost.

**20 - 50 Milliamps Painful.** Severe muscular contractions. Breathing is difficult.

The severity of a shock determines the severity of the injuries received. Three factors affect the severity of a shock:

1. The amount of current passing through a body. The higher the current, the more potential for injury. A current as little as 50 milliamps--that's 50/1,000 of an amp--can cause death.
2. The path of the current through the body. A shock that takes a path through one finger and out another finger on the same hand (such as when touching the prongs on a plug) might cause only a painful, temporary injury. On the other hand, the same current flowing through the chest can cause death through ventricular fibrillation.
3. The length of time that current flows through the body. Obviously, the longer the

duration of a shock, the greater the potential for an injury.

***NOTE: A 7 watt night light draws 60 milliamps of current, enough to cause ventricular fibrillation.***

Electric utility primary (higher voltage) lines contain 10 - 500 amps and their secondary (household current) lines contain 60 - 400 amps. Even though the voltage is lower in household currents the amperage is the same or higher than higher voltage lines. There is enough amperage in secondary lines to cause serious injury or a fatality if contact is made.

Voltage in the primary lines usually is 2400 volts to 19,900 volts and secondary is voltages ranges from 120 volts to 480 volts.

Current (amps) plays a major part is the killing factor in electrical shock. Voltage is important only because it determines how much current will flow through. The resistance of the human body. The current necessary to operate a 10 watt light bulb is eight to ten times more current than the amount that would kill the average person.

***NOTE: A small electric drill (¼ HP) draws 1,550 milliamps or 7 times enough current to burn you and 31 times enough to cause your heart to go into ventricular fibrillation.***

Electric arcs or flashes are another form of an electrical hazard. Heat generated from an electrical flash could be as high as 43,000° F. This is equivalent to the temperature on the surface of the sun.

An electrical arc will occur when there is a fault on a line, usually caused by a tool or piece of metal equipment getting across the lines. The resulting electrical arc is similar to an arc weld.

Electrical arcs or flashes may also be the result of a failed or faulted piece of equipment.

Electrical burns are another form of an electrical hazard that results from contact with an energized conductor or from the heat generated from an electrical arc.

Rain gear (Jackets, Boots, Gloves, etc.) and Firefighter's turnout gear have virtually no protection to an electrical circuit. Electricity because it cannot be seen must be approached with extreme care. To assume that the wire is not energized could be a deadly mistake. Always assume the wire is energized until it is tested by a qualified person.

## SECTION 5

### Responding to Injuries

Anytime someone has been shocked there are any number of possible injuries that you may need to address. First, second and third degree burn's, broken bones from a fall due to electrical contact and the most serious is cardiac arrest. Once certain the victim is not still in contact with any energized items( energized fence, ladder, car, etc.) you can then treat the victim accordingly.

When electrical shock traumatizes a nerve center in the brain, breathing often stops, and your response needs to be appropriate. Time is of the essence, but do not sacrifice yourself in the process.

It's essential to protect yourself from disease. The skin is a natural barrier protecting us from disease, but skin that's broken (cut, scrapes, etc.) will not protect you. The wearing rubber gloves, a mask and eye protection provides protection from disease.

When checking a victim for life signs remember do not move the victim unless he/she is in imminent danger. If no life signs are found (breathing or a pulse) treat the victim accordingly.

Current entering the body produces heat, which can cause damage at the entrance and exit points. Electrical burns are doubly dangerous, because tissues and organs beneath the skin may also be burned.

For any burn, the burning process must first be stopped. For a major burn where skin has been destroyed, apply dry sterile dressings.

When a powerful electrical current passes through the air or gas and reacts with particles in it, an intense arc can result, instantly emitting huge amounts of radiation and ultraviolet light. Exposed skin can be severely damaged, as if from an intense sunburn, as well as the eyes. By cooling the skin additional damage can be reduced. Superficial skin burns are treated like a sunburn, with cool compress.

Talk to the victim to insure them that you have things under control. Talking also helps to calm them down and helps to keep them from going into shock

#### **Points to Remember:**

- Cardiac arrest
- Electrical burns are another form of an electrical hazard that results from contact with an energized conductor or from the heat generated from an electrical arc.
- Protect yourself from electric arcs or flashes are another form of an electrical hazard. Heat generated from an electrical flash could be as high as 43,000° F. This is equivalent

to the temperature on the surface of the sun.

- An electrical arc will occur when there is a fault on a line, usually caused by a tool or piece of metal equipment getting across the lines. The resulting electrical arc is similar to an arc weld.
- Electrical arcs or flashes may also be the result of a failed or faulted piece of equipment.

Electrical shock remains the biggest hazard in an electrical contact. Besides the pain that is suffered, there is often a loss of muscle control and continued contact could lead to a fatal injury. Electric shock will occur when a person, by contacting an energized conductor or other energized objects, provides a path for the flow of electricity to a ground. Simultaneous contact with two energized conductors will also cause electric shock that may result in serious injury or death.

Eye damage may not show up immediately, but symptoms to look for are burning and a sensation of sand irritation.

## SECTION 6

### Approaching Energized areas



**Figure D-5** All downed wires should be treated as if they were energized. *John Lewis.*

#### Overview

Being a first responder, you are most likely to be on scene before the local electric company. Safety is extremely important.

Coordination between the first responders and the local electric company is extremely important. The best safe way to make sure that a wire is de-energized is the on scene representative from the electric company. They will do the actual disconnection of the wire.

It is very important that the local utility be notified of any wires that are down. Even if it is suspected that they are not electric lines i.e. CATV or Telco, they could be energized due to a downed wire not in site of your location. You're better safe than sorry to have the local electric

company to come out and secure it.

### **Precautions when approaching downed lines**

A long time misconception is that the rubber in the tires of vehicles will insulate you from an electric contact. This is not true. Due to steel belted radials, the tire can actually conduct electricity. The rubber protection that the utility uses is tested twice a year and is designed to protect against conductivity. The same goes with rubber fire boots or rubber rain boots. They are not designed to protect against electric shock.

Regardless whether or not you know if the wire down is CATV or telephone, or electric, you should always consider the wire to be live. You should never attempt to move it or handle it in anyway. Let the utility do the work.

### **Circle of safety**

When approaching a downed wire, great care needs to be taken. A general rule a thumb is to maintain a minimum distance of 30 ft away. This is known as the “circle of safety. When in doubt keep away and wait.

### **Storm Conditions**

Extreme caution should always be taken during storm conditions. Downed power lines may or may not be energized. Do not take chances, call the Local power company for help. During a storm, stay away from any downed lines.

Identifying the type of a downed wire (power, phone, fire alarm or cable TV.) is difficult when the lines are covered with debris, ice or snow. Again, just stay away and call for help.

Whenever there is a downed energized electrical line, a phenomenon known as “step & touch” may be experienced while walking on the ground around the fallen power conductor. The energized conductor has a rippling effect around the point where it is making contact with the ground and the voltage decreases as you go out from the center of this point.

## **SECTION 7**

### **Vehicle Rescue from Downed Power Lines**

Vehicle accidents involving utility poles are very common. In cases where energized lines land on the vehicle the best practice is to instruct the driver and occupants in the vehicle to remain in the vehicle. Instruct them not to attempt to exit the vehicle and wait for the Power Company to arrive. Remember the circle of safety. Keep at least 30 feet away and try to keep the occupants calm.

If the vehicle is operational, instruct the driver to attempt to move the vehicle. There are a few safety points to remember. Keep all personnel far away until they car is 30 feet away. On important factor to remember is coil memory. This means that the wire that maybe pinned under a tire, when released will recoil back to where it is connected. So be very aware of this. Keep all personnel far away until the wire comes to rest and stops moving.

If you encounter a vehicle on fire with people trapped inside this can be a very dangerous situation. The first responder's initial reaction is to rush right in to get the fire out and help the people. This can be fatal. **DO NOT USE WATER!** If you do this the water, hose, engine and all personnel making physical contact to it can be come energized. If you have a situation where you have to suppress the fire use dry chemical extinguishers. Don't forget to keep a safe distance away from the vehicle. A dry chemical usually has a stream of about 15 to 20 feet. So when you're approaching be very aware of your surroundings. Use a spotter/safety officer to keep and extra eyes on the situation. Remember that foam has water in it so it too can become energized. If there is no one in the vehicle and it is on fire let it burn. Protect exposures and wait for the electric company.

Once the fire is out wait the lines still may be energized and by forgetting this you can become a victim or fatality.

Persons in vehicles which may be energized should be told to remain in the vehicle.

### **Step potential**

As you take each step the voltage between you feet and the ground will vary. This is known as step potential. The difference of voltage from one foot to another is enough to stop your heart. If you suspect that you are in an energized area there are two ways to exit the area. On is a shuffle step. Keep both feet on the ground and shuffle your feet without leaving contact with the ground. Another way is to hop away. With both feet tighter making contact at the same time, make very short hops. Remember water is a conductor, so be very aware of puddles and streams of water. Avoid them at all costs.

### **Exiting the vehicle**

In the case that a trapped person must exit the vehicle there are a few safety tips to remember. It is critical that they do not make contact with the ground and the vehicle at the same time. Have them open the vehicles door the widest they can. Have them stand on the door sills of the car and jump clear away and to land with both feet together. Once they are clear have them hop or shuffle step away. The best practice is to try and keep the people in the vehicle until the electric company representative on scene tells you that it is de-energized.

## SECTION 8

### Emergencies Involving Electrical Facilities

The common use of the term “electrical fire” (Class “C”) refers to a fire involving electricity. Once the electricity is disconnected the fire becomes a Class “A” or “B”. Small Class “C” fires can be extinguished safely with carbon dioxide, dry chemical or halon extinguishers. Water in the form of fog is also safe.

If utility company equipment is burning, allowing it to burn is the best course of action. Once damaged, it will be replaced, and no utility company wants responders to risk their lives to save a piece of equipment that won't be repaired.

Attempting to extinguish a burning pole mounted transformer from the ground or a ladder is mostly futile, and extremely dangerous. Remember that since electricity seeks a path to the ground, the hose stream may provide that path through your body.

The utility company experts will advise you on what to do when they arrive. They may very well direct you to let it burn...or wait until power is shut off before trying to suppress the fire. This doesn't mean there aren't actions which can be taken to provide a safer outcome. There are usually numerous exposures such as trees and buildings that need to be protected from fire.

Also, making the scene safe includes keeping the public at a safe distance until the emergency is resolved. Dealing with burning transformers the transformers on utility poles, high amounts of current move through this structure, and both contain oil for cooling which can present an additional hazard if released. Considerations for underground chambers.



**Figure D-6** A Pad Mounted Transformer. *From prior edition of NJ FF Addendum from Bob Green PSEG.*

This is a “Pad Mounted Transformer.” Similar to utility poles (padmounted transformers are sometimes struck by vehicles) they are susceptible to vehicles accidentally smashing into them. As before, all safety precautions regarding distance, step potential and the assumption that anything in contact such as the vehicle is energized needs to be followed.

If fire is involved, don't use water or foam to suppress it--only dry chemical. And if a safe distance

cannot be maintained...let the electrical fire burn and concentrate on protecting exposures while waiting for utility company assistance. And again, as a rule, it is less expensive to replace damaged equipment than to repair it, so safety is the critical issue.

Much of the electric distribution system, especially in urban areas, is underground. Any number of environmental changes can trigger fires in the passages and vaults housing electrical wires and equipment. If you detect signs of fire, but don't observe any workers, vehicles or signs of work right here, most likely no one is in the underground vault or manhole. Don't make any attempt to investigate further, but report what you have seen to the utility company. "Those covers got blown off by exploding gases" .

Once on sight, the utility company, after de-energizing the area, may need some assistance from the fire department to clear the smoke out from the chamber so they can enter to make repairs.

When work is being done, as a rule, someone from the crew will always be above ground. Instinct may tell you to rush down into the chamber, but don't. Because you have no idea of what may be energized, and poor visibility. Make sure the utility company has been notified, and wait for them to de-energize the area.

Once power has been shut off, with full protective equipment and breathable air supplied and monitored, the chamber can be entered. All the rules for confined space entry must be followed... and extra caution has to be taken to avoid any sparking, such as from flashlights being turned on, or metal scraped, because of the possible presence of combustible gases.

You should stay well clear of the opening, because underground gases and damaged cables are capable of exploding.

## **SECTION 9**

### **Electricity in Building Fires**

Most electrical fires are caused by excessive heat from wires, machines and appliances, which have been overloaded or poorly insulated. When fires break out in buildings, you're almost always exposed to energized electrical wiring and power lines. Industrial facilities such as this have heavy-duty electrical systems with equipment operating at over 10-thousand volts.

Residential systems mostly have 120 and 240 volt service. While much lower than industrial voltage, it's still very dangerous. Here are some guidelines that should be followed at all times:

1. When you enter a building, you may want to keep power on to aid you in investigating the fire.
2. However, because visibility is usually limited, keep your palms turned inward. Why?

If you come into contact with any energized sources, and you experience muscle contractions, your arms and hands will be pulled toward your body, and away from the source of electricity.

3. Many firefighters believe that when responding to fire emergencies, the pulling of an electric meter is an acceptable procedure. It isn't. Meters can arc and explode.

What you want to do if possible is locate the main breaker box, or panel, and shut off the power from there. And when doing so, turn away from the power source to avoid being burned if it arcs. All electrical wires are approached as if they were energized. And as shown earlier, while they are weather coated, don't make the mistake of thinking that means they are insulated. Fire fighter gloves are not designed to handle energized electric lines. Don't be fooled into thinking it's safe to touch the lines it's not. Nor is it safe to use any of your tools to cut power lines. This attempt to de-energize power to the burning structure is extremely dangerous.

Even after you have cut power, take care not to come in contact with machinery or appliances. Especially in commercial and industrial facilities, there may be alternate or emergency sources still supplying electricity. When you're fighting any kind of fire with overhead electric lines in the area, special precautions need to be taken.



**Figure D-7** If a bucket or an extension ladder needs to go over or near any power lines a minimum of 10 foot clearance from the energized lines is required. *John Lewis.*

Dense smoke often has carbon particles and moisture in it, which can become energized and produce a potentially lethal arc. This guideline also applies to any equipment and tools you are using. So make absolutely sure you're keeping that safe distance before jumping into action. Because of these dangers, only essential crew members should be anywhere near vehicles exposed to this risk.

Anyone working on the vehicle must avoid any contact with the ground because of the possibility of electrical arcing.

Large scale fires involving multiple vehicles and possible different companies and agencies compound the complexities in responding.

A "Prefire Plan" should be in place too insure that everyone is aware of the location of power lines and other electrical sources, so coordination of all parties' actions create a safe outcome.

When the utility company experts arrive, they will probably cut the service wire taps on the utility pole, or open a switch to cut power to the area. Only when they test to make sure all sources

of electrical energy are removed, will you get an all clear to move about safely.

## SECTION 10 Substation, Plant and Transmission Fires

An electric power substation has transmission and distribution lines coming in and out of it. Typically, some of the components include a control building...large transformers...structures to keep the lines elevated...and circuit breakers. Both transformers and circuit breakers are filled with oil, which insulates the internal electrical components. If a fire breaks out, the high voltage levels mandate special guidelines for responding safely.



**Figure D-8** Sub Station Control Room. *From prior edition of NJ FF Addendum from Bob Green PSEG.*

### Components of a substation

The transmission and distribution substation consists of many components such as transformers, distribution breakers/reclosers, power circuit breakers, voltage regulators, reactors, capacitors, circuit switchers, switchgear and switches which should be located and arranged in the substation yard in the most effective manner. One should take into account the physical aspects of the equipment as well as the operating, safety and maintenance requirements when designing the electrical layout. The

following subsections discuss the various aspects of the types of substation equipment used in the subtransmission and distribution substation.

### POWER TRANSFORMERS

All substation type power transformers are liquid filled transformers for two or three winding oil insulated, three phase outdoor power transformers. Most all transformers that are used are of the core form, circular coil winding construction. In the core form type of construction, the transformer windings are surrounded by the core steel.

### POWER CIRCUIT BREAKERS

A power circuit breaker is a device used to open or close an electric power circuit either during normal power system operation or during abnormal conditions. Circuit breakers used are vacuum,

oil filled or insulating gas filled.

## **DISTRIBUTION CIRCUIT BREAKERS/RECLOSERS**

Interrupting devices used in the low voltage portion of a distribution substation consist of circuit breakers and/or circuit reclosers. These devices may use vacuum, insulating oil or SF<sub>6</sub> gas as the interrupting medium. Both devices are used to protect transformers, circuits and other equipment in a distribution substation. Both have all relaying such as reclosing, phase and neutral relaying included in their own control cabinet.

### **Control Buildings**

Control buildings are generally deemed necessary when the installation of large batteries and relaying/control equipment on switchboard control panels is required for substation operation. Both transmission and distribution substations may have control buildings.

The overall size of the building is determined by the number of switchboard frames required plus the amount and size of additional equipment that must be housed within the building. Both initial and future requirements must be considered. The near future requirements are generally accommodated in the initial size of the building, while distant future requirements are accommodated by allowing ample space for additions to the building and laying out the building so that future expansion is practical.

The purpose of switchboard panels or frames is to provide a convenient and vertical surface for mounting and wiring control and protective equipment for the various line exits, transformer circuits, transfer circuits, etc. located within a particular substation.

Under no circumstances should you attempt to enter the substation before the utility company experts are on the scene. Because of the high voltage and possibility of explosion, the danger zone is extended much further a minimum of 300 feet.

Make sure your vehicles are parked at a safe distance, and be careful to avoid putting them underneath a power line. When utility company personnel arrive, they'll provide guidance in approaching all the structures and equipment safely. They may decide to let the equipment burn itself out, while directing firefighters to protect exposures. Metal ladders should not be used only ladders made of non-conducting materials. A good guideline to follow when inside the substation is to have no equipment extend beyond shoulder height, because any overhead equipment may be energized.

Complete personal protective equipment for operating personnel should be mandatory including SCBA.

Upon entering an area involved in an event of this nature, the responder needs to be immediately aware of the condition and presence of overhead conductors. The overhead conductors should therefore be considered to be energized until proven otherwise by owner or utility personnel. Isolation at the point of the emergency should not be considered as sole evidence of safety as the conductors may be fed in both directions and therefore may be energized at any time. The best advice is to ensure that they are isolated from both ends by competent and authorized personnel.

Most times the fire is coming from oil in circuit breakers or transformers. Because large amounts are housed inside, it's a major concern, which requires special guidelines.

With equipment de-energized, the oil fires can be extinguished by using protein foam sprays and water fog streams. Never use a solid stream of water on oil or any pools of oil, which could actually spread the fire. However, the fire may continue burning inside the equipment. Re-ignition is not uncommon, and the oil may burn for an extended period of time. Continued burning on and off could go on for days. Be aware that the oil vapors are also capable of exploding, so full PPE and safe distances from equipment need to be maintained.

The high concentration of carbon particles that give the smoke its characteristic color will also conduct electricity from high level energized equipment to the ground. Further, any firefighting operations will add to the conductivity by providing a steam component in the plume. Even dry chemical particles have been known to become conductive in high humidity environments by absorbing moisture and therefore acting like "airborne mud". Typically, this effect is seen between high-energy points such as exposed conductors or bushings on transformers.

The utility company may de-energize only the affected section within the substation, choosing to keep as many customers as possible in service. So they will work with you to set up a safe corridor of operations, which avoids areas, which will remain energized. As electric power experts, following their advice produces the safest outcome.

The equipment, which has been severely damaged by fire most likely, will not be repaired, and the utility company doesn't want anyone being injured in trying to rescue it. So unless it poses a wider threat, it will be leave it to burn itself out. But if the heat is intense enough, other structural systems may collapse, so these exposures need to be protected.

Another danger: because glass and ceramics are excellent insulators, this equipment, under intense heat can explode when water is applied.

There are other hazards to be aware of, such as toxic gases which can arise from insulation or batteries, so it's best to limit the number of people involved to only the most essential...and to

confine the fire within the substation fence line.

Transmission towers are constructed in “right of way” corridors that isolate them from traffic, construction and trees. A large fire and smoke can extend upward far enough to present a different and dangerous scenario. Smoke contains carbon and carbon is a conductor of electricity. At a distance of approximately six feet, with enough heat, the particles of smoke can trigger arcing, with an intense burst of electrical energy flashing to the ground. So, when you recognize these conditions forming, put at least a hundred feet of distance between you and the fire.

Generating stations such as these that burn fossil fuels to produce electricity rely on you to bring fire emergencies under control. If such a facility is in your coverage area, you need to be meeting with the utility company to discuss emergency preparedness to deal with possible dangers associated with the generation plant.

Prefire plans include plant layout: know where chemical and oil tanks are located, hydrant and fire pump locations.

Inside these generating stations you could encounter hazards from water, steam, natural gas, and toxic substances. If a fire starts at a generating plant, you will be met by a utility company specialist. This person, will work with you to make sure that all of the contingencies you have discussed for this situation are addressed so that the safest course of action can be followed in a dangerous situation.

Power plants use some of the same equipment as found in a substation. The same guidelines apply in carrying tools and equipment: be sure to keep everything at shoulder height or below.

## **SECTION 11 DEFINITIONS:**

**AC Voltage** -Alternating Current changes at a rate of 60 times a second, major source is generators.

**Circuit** - A conductor or system of conductors through which an electric current is intended to flow.

**Communication Lines** - The conductors and their supporting structures for telephone, telegraph, railroad signal, data, clock, fire, police alarm, community television antenna and other systems that are used for public or private signal or communication service.

**Conductor** - A material, usually in the form of a wire or cable suitable for carrying an electrical current.

**Current** - The flow of electricity through a conductor.

**DC Voltage** - Direct current steady consistent voltage, major source is batteries.

**Direct Contact** - When any part of the body touches or contacts an energized conductor or an energized piece of electrical equipment.

**Ground (noun)** - A conductive connection by which an electric circuit or equipment is connected to ground.

**Ground (verb)** - The connecting of an electric circuit or equipment to ground.

**High Voltage** - Greater than 600 volts.

**Indirect Contact** - When any part of the body touches any object that is in contact with an energized electric conductor or an energized piece of electrical equipment (EXAMPLES: Tree limbs, tools, equipment, trucks, etc.)

**Insulated** - Separated from other conducting surfaces by a dielectric substance offering a high resistance to the passage of current.

**Low Voltage** - 600 volts or less

**Manhole** - A subsurface enclosure which personnel may enter and is used for the purpose of installing, operating and maintaining submersible equipment and or cables.

**Step & Touch Potential** - The area around an energized conductor that is in contact with the ground and how far the voltage field extends from the contact point.

**Resistance** - The opposition to the flow of electricity measure in ohms.

**Voltage** - The speed that electricity flows through power lines.

# Useful Emergency Scene Electrical Safety Tips

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## DO

- Treat all utility lines as High voltage.
- Look for overhead lines when arriving at emergency scenes.
- Check for and avoid utility lines on the ground, in trees or on vehicles.
- Notify the electric utility when there are downed lines or other electrical problems.
- Beware of step voltage and keep at least 30 feet away from downed lines.
- Have occupants remain in vehicles that are in contact with downed lines until the “all clear” is given by the electric utility.
- Instruct occupants of energized vehicles to jump clear and hop or shuffle away from their vehicles.
- When utility electrical equipment is on fire, let it burn, protect the exposures and contact the utility company.

## DON'T

- Park emergency vehicles under or near overhead lines.
- Touch downed lines, even with gloves, sticks or tools.
- Assume the electric utility has already been notified when you encounter downed lines.
- Allow aerial device equipment such as ladder trucks to approach closer than 10 feet to an overhead utility line.
- Pull electric meters or cut service lines.
- Apply water or foam to burning electrical equipment.
- Enter electric utility substations without the OK form the electric company.
- Enter underground vaults or manholes until the “all clear” is given by the electric utility.

## SUBCHAPTER II: RECOGNIZING AND AVOIDING THE HAZARDS OF PHOTOVOLTAIC / SOLAR AND ALTERNATE ENERGY EQUIPMENT

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### Solar Power or Photovoltaic (PV) as Alternate Electrical Sources

As Photovoltaic electrical systems become more popular (NJ is now the second largest market in the US) firefighters must become familiar with the hazards associated with alternate energy sources during an emergency. Unlike traditional electrical systems that are connected to the power grid and can be de energized by disconnecting the power from the grid portions of a PV system are always energized.

In the last two decades, solar power has exploded across the United States. In 2009, only 30,000 American homes had solar panels; by 2013, that number had jumped to 400,000. With that growth, firefighters have had to contend with new threats to their safety—and that of the buildings and people they're sworn to protect. At the beginning of the decade, the Department of Homeland Security took up the issue of solar panels for first responders. "We acknowledged their concerns before a major event took the life of a firefighter," in 2011, a DHS-funded project began to identify the dangers posed by solar panels. It established obvious risks, like spraying water over electrified solar panels, and uncovered more hidden ones: The illumination from the apparatus mounted scene lighting during nighttime emergencies, can give off enough light to electrify a photovoltaic system.

A year later, the National Fire Protection Association and the International Code Council started to incorporate language about photovoltaic panel installation into their fire codes. Modern fire and electric codes require enough space between panels for firefighters to walk and rapid shutdown systems that can quickly de-electrify panels.

With more than 9,000 solar energy installations, the Garden State is the second largest solar energy market in the United States after California, according to a 2010 report, "Solar Power and its Impact on the Fire Service," produced by the New Jersey Division of Fire Safety.

Although the maximum voltage of a solar panel system is just 600 volts, a low voltage, according to the Division of Fire Safety, from "even a momentary contact ... can produce continuous shock, thermal injury and ventricular fibrillation." This information has been utilized to have legislation introduced and passed regarding Identifying emblems for structures with solar panels.

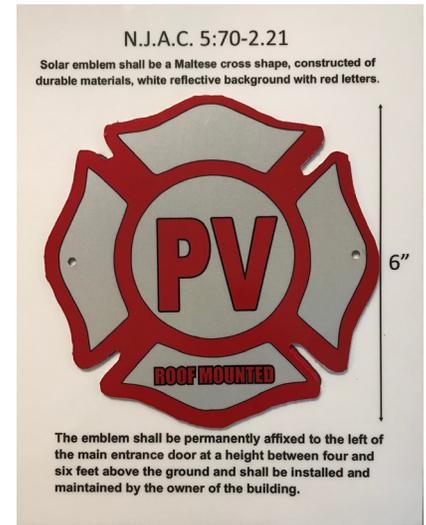


Figure D-9 NJDFS UFC

For firefighters to gain a better understanding of PV electrical systems and their hazards go to the NJ Division of Fire Safety Website and review the power point program titled “ Solar Power and its Effects on the Fire Service” at <http://www.nj.gov/dca/divisions/dfs/offices/training.html>

The New Jersey Fire Code requires the placement of exterior signage to notify firefighters that a roof mounted solar photovoltaic system is present on both residential and commercial buildings in their response areas and that reasonable precautions may be necessary when operating at the emergency.

**5:70-2.21 Identifying emblems for structures with solar panels**

(a) Identifying emblems shall be permanently affixed to the front of structures hosting or being powered by photovoltaic electrical power either on the roof or adjacent to the building.

1. The solar emblem shall be a Maltese cross shape, constructed of durable material, with a white reflective background with red letters. Numerals and letters shall be Roman or Latin as required.

2. The sign shall be six inches by six inches (152 mm by 152 mm). 2. The height or width of each Maltese cross wing area shall be one and one-eighth inches (29 mm) and have a stroke width of one-half inch (13 mm).

3. The center of the Maltese cross, a circle or oval, shall be three inches (76 mm) in diameter and have a stroke width of one-half inch (13 mm).

4. All letters and numerals shall be one and one-quarter inch (32 mm) in height and have a stroke width of one-quarter inch (six mm).

5. The letters PV shall be located in the center circle of the Maltese cross to identify the presence of solar photovoltaic systems. The wording ROOF MOUNTED \*and/or\* ADJACENT shall be located immediately beneath the Maltese cross identifying where the solar panels are located.

6. The emblem shall be permanently affixed, to the left of the main entrance door at a height between four and six feet above the ground and shall be installed and maintained by the owner of the building.

7. Premises already equipped with a truss construction sign may install the solar sign immediately above the truss sign.

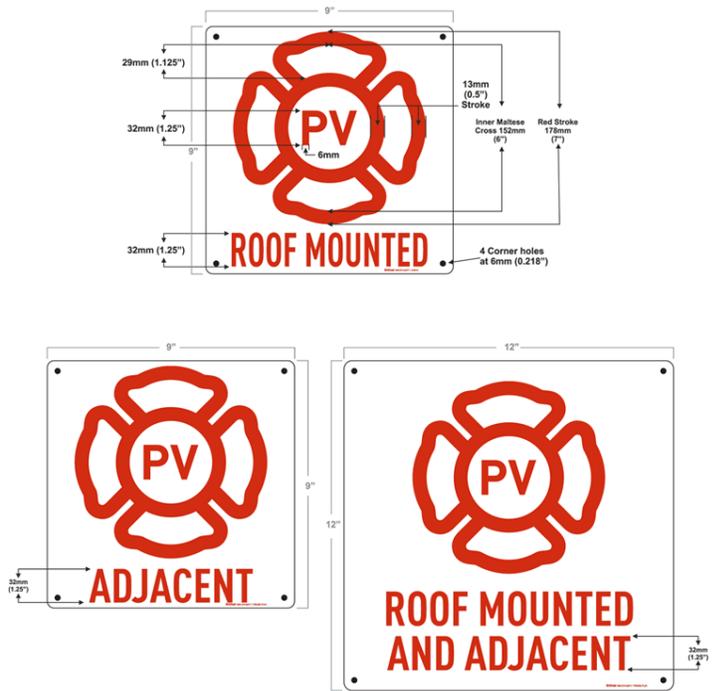


Figure D-10 NJDFS UFC

# SUBCHAPTER III

## RECOGNIZING AND AVOIDING THE HAZARDS OF NATURAL GAS & CARBON MONOXIDE

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### Section 1: Introduction

Natural Gas and Carbon Monoxide incident responses have increased for the fire service in recent years. Therefore, it is imperative that responders are prepared and able to handle these true emergencies when they arise. Natural Gas Leaks and Emergencies should be addressed in the same manner as a Hazardous Materials (HazMat) incident. A HazMat is a type of incident that involves the uncontrolled release of one or more hazardous materials into an environment in which humans are or could be present or that otherwise holds the potential to put humans or the environment at risk if not addressed. Recent large-scale Natural Gas and Carbon Monoxide emergencies and the resulting fatalities of first responders should be a major cause for concern.

The purpose of this program is to:

- Make you aware of the hazards associated with natural gas and carbon monoxide (CO)
- Help you to understand the properties of natural gas & carbon monoxide
- Give you a basic knowledge of how the gas distribution system works and what causes carbon monoxide and
- Offer approaches for responding to natural gas and carbon monoxide emergencies.



**Figure D-11** The NJ Statewide Utility Safety team meets quarterly to assess the training and response needs of the emergency services.

The New Jersey Statewide Utility Safety Team (NJSUST) is focused on enhancing coordination between the Local Gas Distribution Utility Companies, the New Jersey Division of Fire Safety other and emergency response groups to expand on the public-private partnership. Working together to better understand the response needs and protocols of the different emergency response agencies, the NJ Statewide Safety Team develops coordinated approaches, best practices and shares information that enhances coordinated response capabilities and teamwork. This chapter will help you better understand the precautions that should be taken when responding to natural gas and carbon monoxide incidents.

This training material is targeted to fire departments for a coordinated response to gas leaks.

The primary job aid for a coordinated gas response is the Gas Coordinated Emergency Response Checklist, and fire department's standard operating guidance or procedures.

While coordinating with other response agencies is not new to the fire service, the integration of gas company responders into a unified command post and teaming up together may be. It is hoped that this training material will lead to continued collaboration, coordination and sharing lessons learned on a continual basis. This material provides considerations that first responder organizations should evaluate prior to responding to emergencies involving or that could involve natural gas facilities. While the material was prepared relative to natural gas hazards and utility facility considerations, not all hazards or aspects of natural gas utilities may have been considered. For specific facility and emergency response needs in your service area, meeting with your local gas utility company on a periodic basis is strongly recommended.

**Natural gas cannot be seen, and is odorless in its natural state. Natural gas and carbon monoxide can be dangerous and can injury and / or kill emergency workers**

The fire service and the utility companies both have commitments to the public they serve and the people under their command, these commitments all begin with the same initial objectives and priorities. Initial actions taken at any hazardous incident are based on based on the following priorities:

- |        |                        |
|--------|------------------------|
| First  | Life safety            |
| Second | Incident stabilization |
| Third  | Property Preservation  |

The incident priorities of the different responding agencies are similar and consistent, the capabilities and expertise are different.

Utility company priorities:

- |        |                                 |
|--------|---------------------------------|
| First  | Protect Life                    |
| Second | Protect Property                |
| Third  | Protect the distribution system |
| Fourth | Demobilization                  |

## Section 2: Properties & Characteristics of Natural Gas

### Objective:

This section provides a general summary of the properties of natural gas. Understanding the properties of natural gas will aid in better understanding the potential hazards and response tactics to choose. Natural gas is a petroleum-based compound that was created just as the name implies, naturally. Like crude oil, natural gas is formed underground from the breakdown and decay of organic matter (plant and animal material) over millions of years due to pressure and heat from the changes that have taken place during the evolution of our planet. It is non-toxic but may displace oxygen that can result in asphyxiation if a person is in a confined space. Natural gas, a hydrocarbon, is composed primarily of methane, between 85 to 95 percent with a small portion of ethane (3% to 9%), and trace amounts of other hydrocarbon compounds. Methane is however the major component of natural gas. The small portion of ethane is considered the identifier for natural gas, Ethane is not found in sewer gas or swamp gas. For this reason, ethane detection equipment is utilized whenever an investigation needs to confirm the actual presence of natural gas. Natural gas is found underground, sometimes on top of reservoirs of oil or by its self, in a pocket of gas only. Natural gas is odorless, colorless and tasteless.

For safety reasons, Mercaptan, an odorant with a distinctive “rotten egg” smell, is added to natural gas. The odorant makes gas leaks easier to detect before reaching the LEL, due to its distinctive odor. This odorant may not always be effective, as we will discuss later.

Natural gas is about 40% lighter than air. Generally, this means that when natural gas is accidentally released into the outside air, it will rise and vent harmlessly into the atmosphere, thus dissipating from the site of a leak. When a gas-and-air mixture within the flammable range collects in a confined space, it can easily ignite given a source of ignition and explode. When natural gas burns the by-products of combustion include Carbon Monoxide (CO), Water, and of course heat. However, when the combustion is incomplete, traces of carbon monoxide (CO), are produced. CO is an extremely dangerous gas and will be discussed at a later point.

Natural gas has a flammable or explosive range from just below 5% in air to just below 15% in air. These percentages are known as the “LEL” (Lower Explosive Limit) and “UEL” (Upper Explosive Limit).

As previously stated, Natural gas is non-toxic. This means inhaling natural gas will not cause ill effects. Heavy concentrations, however, can cause drowsiness and breathing may become difficult followed by eventual loss of consciousness or death. Before this happens, a very strong odor would likely alert you to the presence of gas. An odor similar to rotten eggs (Note: The odorant added is Mercaptan, the same odorant is used for both natural gas and propane. This odorant may be stripped and/or due to prolonged exposure or a person may become desensitized to the odorant.) The first code in the United States for the odorization of natural gas was brought about by an incident in Texas in 1937, when an undetected natural gas leak led to an explosion in a school causing tremendous loss of life. Natural gas has a limited range of flammability within a 5-15% gas-to-air mixture, it has an ignition temperature of 930°F or greater. If the gas mixture is below the 5%, it is too lean to burn. If it is above 15%, it is too rich to burn. It is important that we look at some of the items and conditions that can cause an ignition, as we may never think of all the potentially dangerous ignition sources. A lit cigarette is hot enough to ignite natural gas. Matches, lighters, even the sparks generated by the starter or alternator of motor vehicles can ignite natural gas. It goes without saying that precaution flares used for traffic control supply more than enough heat than is necessary to ignite natural gas. A vehicle driving through a natural gas concentration within the explosive range could in turn ignite the gas. Cell phones, handheld lights, and cameras all have switches that when activated can generate sparks sufficient to ignite natural gas. Any and all portable electronics should be considered as a potential for ignition, even the radios utilized by the fire, police and other emergency responders may not be intrinsically safe. In and around a structure the list of sources of ignition grows even longer. Door bells, light switches, smoke and fire alarms, telephones, pilots on appliances, filaments in light bulbs, (including flashlights) if the bulb or lens breaks, can all generate an arc or heat source sufficient to ignite natural gas. Even static electric arcs from your cloths, body or other sources can create sparks of sufficient heat to ignite the gas. Understanding the potential for an electric arc it is recommended to never turn any switches on that may be off and also to never to turn off any switches that may be in the on position. This is especially important to remember while evacuating residents.

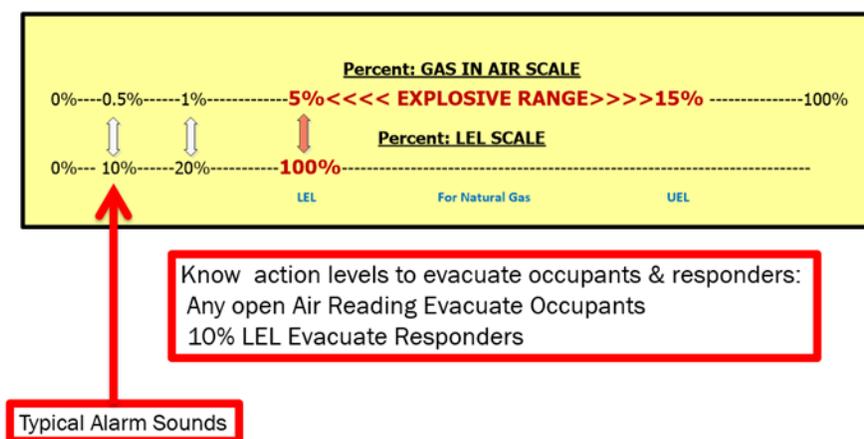
**These signs can help to identify leaking natural gas:**

**Smell:** An odor similar to rotten eggs (Note: the same odorant is used for both natural gas and propane. This odorant can be scrubbed and/or a person may become desensitized to the odorant.)

**Sound:** Hissing, whistling, or roaring. The high pressure and transmission pressure systems can create a loud blowing noise.

**Sight:** Blowing dirt or vapor. Transmission and high-pressure gas would create a potential of a much greater amount of dirt / vapor released. Dead vegetation in an otherwise green area may be another sign of a gas leak.

It is best to use calibrated combustible gas detection equipment to determine if there is a gas leak and what danger the leak poses. Calibrated combustible gas detection equipment should be utilized to determine the gas in air mixture and there are typically two scales used:



**Figure D-12** A comparison scale of the Lower Explosive Limits (LEL-UEL) versus Gas in the Air. *NJ Statewide Gas Utility Safety Team.*

1. Measures the percent of gas in air or
2. Measure the percent of the LEL – which is the percent of the lower explosive limit.

Monitoring the atmosphere for the presence of natural gas should be conducted only with a calibrated combustible gas indicator (CGI)/meter. Any readings received on this device should be reported to the Incident Commander, the fire department shall develop an SOG that addresses what actions to take during a gas leak investigation and what actions to take when the meter indicates the presence of gas. Most fire departments monitoring equipment is designed to alert at 10% of the LEL, that equates to .5% of gas in the air. The lowest concentration (percentage) of a gas in air capable of burning in presence of an ignition source (such as an arc, flame, or heat) is the lower flammable or explosive range. Concentrations lower than Lower Explosive Limits are 'too lean' to burn. The Lower Explosive Limit for natural gas is 5% on the gas in air scale or 100

% on the percent LEL scale.

A few issues to consider when using combustible gas detection equipment:

1. Gas detection equipment is calibrated to a specific gas, detecting any other gases may “under” or “over” indicate the actual concentration levels.
2. Different responders may use different equipment with different detection scales.
3. Gas Utilities typically use percent of gas in air to determine the level of hazard present.
4. Fire departments typically use the percent LEL scale. It is important when sharing information between agencies, you specify the scale used when reporting to avoid confusion.
5. Using calibrated combustible gas detection equipment can aid with determining what actions to take.

Gas detection equipment typically used by fire departments should trigger an alarm at 10% LEL. Responders should understand how their (meter) gas detection equipment functions, ensure the unit is properly calibrated and what the alert levels indicate and what alarms or readings mean including readings obtained above the 100% LEL level. Your SOP or SOG should clearly establish action levels and respond accordingly. Realize that readings taken at one specific location maybe at a lower percent of the LEL; there may be other areas in the structure at or above the explosive limit. Readings can also change over time.

At the time of alert all members and civilians should evacuate the structure, and venting of the structure should be considered, although this a lower percent of gas in the air, consider the potential for higher reading in other areas of the structure. The utility company designates the structure as a hazardous structure when their monitoring equipment indicates 20% of the LEL or 1% gas in air, at that time they will evacuate the structure and not continue monitoring until the flow of gas to the structure has been stopped at either an outside meter or by locating and operating a curb/street valve.

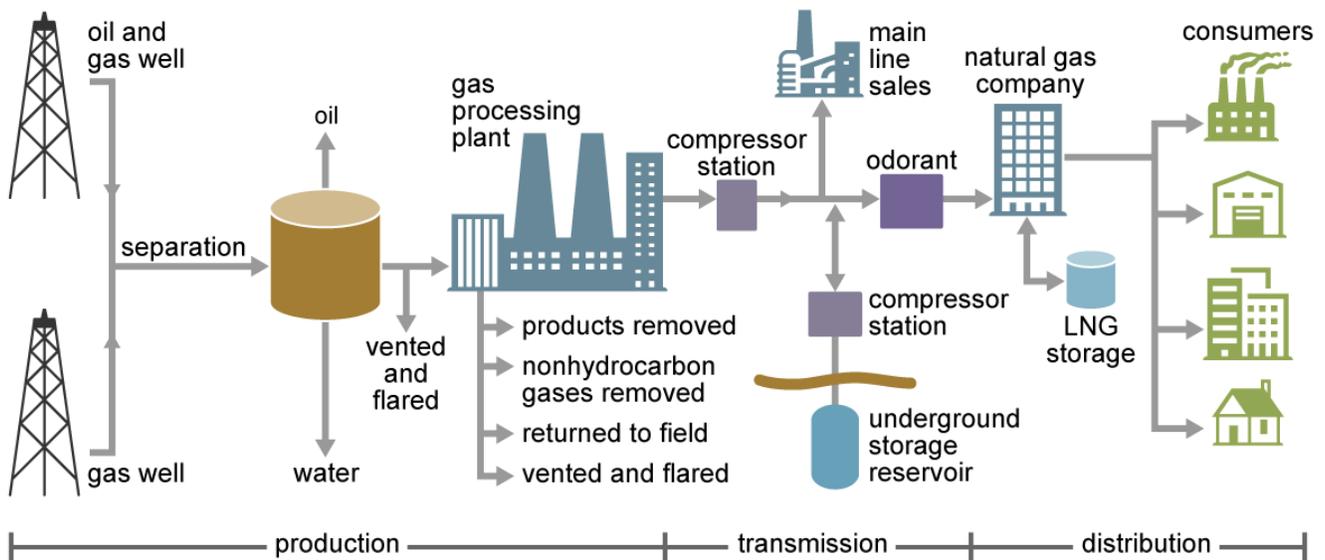
Never rely solely on your sense of smell to determine the hazard or lack of hazard in a gas leak area, always utilize a calibrated Combustible Gas Indicator/Meter to detect the presence of gas. This equipment should be turned on and purged in a fresh air atmosphere before entering a suspected gaseous atmosphere.

In other words, if the concentration of the gas mixed with air, reaches a level just below 5%, the gas can ignite. If the concentration increases to a point just above 15% gas in air, the gas will not ignite. While natural gas will ignite anywhere within this range, the ideal gas to air mixture for the burning of natural gas is approximately 10%. Remain aware that an indoor gas leak has the potential for an explosive force when ignited, due to the gas being confined within the structure. Keep in mind that if one encounters a natural gas concentration below the “LEL”, whether outdoors or indoors, there may very well be a flammable concentration in an area nearby. DO NOT assume that an area is safe just because it appears safe where you are standing at any given moment.

## THE NATURAL GAS DELIVERY SYSTEM

This section provides an overview of the natural gas delivery system. Key safety and tactical points are identified. For specific facility and special emergency response needs in your service area, meeting with your local gas and pipeline company on a periodic basis, and developing pre-plans and SOG's is strongly recommended.

### Natural gas production and delivery



Source: U.S. Energy Information Administration

**Figure D-13** A Diagram of the Gas Delivery System. *US Department of Energy.*

From the wellhead natural gas is transported via a pipeline to a processing plant where it is cleaned having water and other contaminants removed. From that point it begins its journey across the country in a complex system of high pressure, trans continental pipelines. This steel pipeline can be as large as four feet in diameter and carry product at pressures as high as 1200psi. Along the way the friction in the pipe causes the natural gas to slow down. To counter this, every 50 to 60 miles, the natural gas goes through a “Compressor Station” where the pressure is boosted and the gas is moved quickly along its way. These transmission lines follow “Right-of-Ways” or property that is dedicated to the use of the pipeline. These “right-of-ways” are identified with markers to verify their location. While the style of the markers may vary, the information they impart is similar “Warning: Underground Gas Pipeline”. The location of these transmission lines in your response area can be identified by using the National Pipeline Mapping System website—see the reference information provided on NJ Learn, keyword search: gas leak. In most cases there will be “Emergency Contact” phone numbers included on Pipe Line markers. Typically, gas transmission leaks will sound much louder than a gas distribution leak due to the much higher

pressures than in the distribution system.



**Figure D-14** Pipeline Markers vary in shape and size, they also provide contact emergency contact information. *Pipeline and Hazardous Materials Safety Administration (PHMSA)*.

Larger stand-off distance will typically be required for transmission gas leaks. See the USDOT Emergency Response Guide - Guide number 115 (800 meters or ½ mile or greater).

Following this stage of its journey the natural gas arrives at a location known as a Gate Station or Metering and Regulator Station (M&R Station). Two important things happen to the natural gas at these stations. The odorant is added and the pressure is reduced for delivery to the utility company's local distribution lines. The distribution lines, called mains, can range in size from around 2" to 20" inches in diameter. These mains carry natural gas from the M&R Stations to business, residential, and industrial customers. In the early years of natural gas, distribution mains were actually made of wood, hollowed out tree trunks and handled very low pressures. Over the years, this material was gradually replaced by cast iron, and then steel, and plastic. In New Jersey the local gas distribution companies are in the process of modernizing the existing infra-structure, today the primary material for natural gas piping is coated steel and plastic. Pressures in these mains can vary greatly depending on application and demand in a given area. A utility company's "Transmission Mains" can be pressurized up to 1200 psi while at the other end of the scale, "Low Pressure" (usually older Cast Iron) Mains can be regulated at pressures as low as ¼ psi. The vast majority of these "Mains" are located underground. The exception is to underground mains is the occasional bridge crossing. It is sometimes much more economical and practical to suspend a natural gas main from a bridge than to utilize Directional Drilling to cross under a waterway.



**Figure D-15** A typical meter set with a relief valve. *John Lewis.*

The pressures in these different “mains” or “distribution lines” are set and controlled by “regulator stations”. The regulator station is a collection of valves and regulators that maintain correct pressures for a given section of distribution and also include safety devices to overt over pressurization. These safety devices are known as “relief valves”. The “relief valve” is designed to act as safety devise that prevents over pressurization in the system. This valve is a mechanical device that stays closed up to a preset pressure. If the preset pressure is exceeded, the “relief valve” begins to open and vent off the over pressured natural gas. If the pressure continues to build, the valve opens farther and farther to relieve or lower the over pressure situation. Once the pressure returns to the normal, preset pressure of the “relief valve” the valve will close automatically.

If a “Relief Valve” is venting or blowing, it is doing its job properly. Do not try to shut it off, notify your local gas utility company You may create an even larger problem on another part of the Distribution System.

The “regulator station” may be located above ground or below ground, in a pit or vault. These pits and vaults, commonly known as “confined spaces” present a whole new set of safety concerns and problems. Before entering a confined space, one must perform many safety checks and procedures. It is strongly advised that when responding to a situation at a pit or vault that you only take actions equivalent to the training your fire department has provided and to keep the area around the pit or vault as safe as possible, under your control, and accessibility as restricted as possible.

You may create a situation where the Utility worker can not access the area to make repairs. And keep in mind, if a natural gas fire is not affecting life or property, it may be better to let it burn until the utility company can bring the situation under control.

By extinguishing a natural gas fire you may only be trading a known, visible hazard for an invisible cloud of natural gas that can create a potentially explosive situation in another area. Instead, determine the life safety profile of any exposed structure(s), protect the exposures, and let the gas burn. The best was to extinguish a natural gas fire fire is for the proper utility company to manage or shut off the flow of natural gas.

The flow of natural gas throughout the utility companies “distribution mains” is controlled by valves and regulators, these are the primary valve for stopping gas flow to a structure.

While there are many valves used to control a natural gas distribution system the first responder should never attempt to turn, close, or open any underground valve. Whether service valves, street valves, main valves, or regulator station valves, you should never turn or attempt to close or adjust any valve other than a shut-off on an outdoor or indoor meter set.

Without the knowledge of the function of a particular valve, operating any underground valve can create a potentially severe hazard and potentially dangerous consequences in another section of the distribution system. **Never turn (operate) underground natural gas valves.**

#### **Section 4: Natural Gas Utility Oversight**

##### **Objective:**

This section provides a reference of the regulations applicable to the natural gas distribution and transmission system in New Jersey.

The United States Department of Transportation and the New Jersey Board of Public Utilities regulate the natural gas industry and the gas delivery system. Title 14 of the New Jersey Administrative Code and Section 49 of the Code of Federal Regulations Part 192 are the applicable codes. Gas utilities are required to report certain gas incidents to the New Jersey Board of Public Utilities and or the National Response Center. The National Transportation Safety Board and the New Jersey Board of Public Utilities investigates the most serious transportation incidents including natural gas and liquid pipeline incidents.

#### **Section 5: Keeping the Gas System Safe – Damage Prevention & Response**

##### **Objective:**

This section provides information on preventing damage to gas facilities. Understand that one of the primary causes of gas incidents is the result of excavating equipment damaging underground gas facilities and that preventing damage to utility facilities can prevent an emergency response.

There are on average around 3000 cases of gas facilities being damaged each year in New Jersey. Many states have enacted laws to protect underground facilities.

The Underground Facility Protection Act requires excavators, both professional contractors and the general public, in New Jersey to notify the New Jersey One Call Center at least 3 business

days prior to the planned excavation to submit an underground utility markout request. These requests can be made by calling 811 or 1.800.272.1000, remote entry via ITIC, or by Fax. In the case of an emergency excavation the request must be made by phone. The One-Call Center is toll free and available 24 hours a day 7 days a week. After a mark-out request has been obtained, underground facility owners and utilities are required to mark their facilities according to the law and in colors that identify the facility type. The color coded system which identifies the different types of buried utilities can aid you when you respond to a hazard call at or near a construction site, it's important for you to know what systems could be affected. For more detailed information or training call the New Jersey Board of Public Utilities at 973.648.2066.



**Figure D-16** State Law mandates that contractors and the general public call for a Mark-Out at least 3 business days prior to planned excavation.. *NJ One Call.*

**Prevention:**

The best approach to avoid a damage facility incident is damage prevention. Calling New Jersey's One-Call Center 1.800.272.1000 prior to excavating and or ensure excavators have markings are actions that can avoid an incident.

If you encounter an excavator who you believe does not have a mark-out request, notify the New Jersey Board of Public Utilities at 973.648.2066. Besides endangering the public, a willful violation of the Underground Facility Protection Act carries civil fines from \$1,000 to \$500,000 and criminal penalties. In addition, excavators can be liable for the incident damage and associated costs. Local utilities can also assist in determining if a mark-out has been requested.

## **When Gas Escapes the System**

This section provides approaches for responding to natural gas emergencies. Despite every effort to monitor and maintain the integrity of the natural gas system, its size and complexity, combined with the forces of nature, prevent it from being totally immune to uncontrolled gas leaks. There are many different types of gas leaks. The most dangerous is a blow to the pipe, causing a puncture and rapid venting. Environmental conditions like freezing and thawing cause cracks in cast iron pipes, also resulting in rapid escaping of gas. But the most prevalent kind are slow leaks brought on by corrosion, producing slow seepages...obviously much harder to detect. Underground leaks usually mean migrating gas. The odorant added to the gas can become less effective making the gas difficult to detect due to the odorant being scrubbed in the soil. The gas travels laterally, through the ground, following the path of least resistance, because it wants to vent. It can enter into any number of spaces and accumulate, such as sewer lines, storm drains, any underground utility line, new construction trenches or a building. It also seeps naturally through the ground over time, and once it permeates, since it's lighter than air, it will rise. Not until then will the tell tale odor be detected. Of course, there are factors that can make detection difficult. Natural causes are wind, which can carry away the odor...rain, snow or frost, which may keep it from coming up, or man-made barriers like concrete and asphalt.

The majority of calls involving natural gas don't involve fires...and typically, when someone such as a homeowner smells gas, that person will dial "9-1-1" to report the problem. What's important is that all responders coordinate their activities and take every precaution to protect lives...including your own. If some of the guidelines and ignition sources seem overly cautious...they're not. Expect the unexpected. Investigating gas leaks presents a number of hidden dangers.

## **Leaking Gas**

There are many different types of gas leaks, inside and outside of structures. The most common outside leaks are from damage from an external force (improper digging causing a leak or damage), environmental breakdown (conditions like freezing and thawing of cracks in the steel pipe) and the last being corrosion which produce slow leaks which are harder to detect. Underground leaks usually mean migration of the gas as it travels laterally through the ground rather than up and out of the ground. Inside leaks can be caused by various factors such as human intervention, corrosion of interior piping and also can come from the migration of gas coming from an outside leak.

## **Gas Leaking Inside the Structure**

Leaking Natural gas inside a structure will again try to find a way to naturally rise and travel upward. For example, gas leaking from an appliance in a basement will work its way up stairways, via the open interior stairway, pipe chases, duct work, electrical wiring runs, etc., and even up

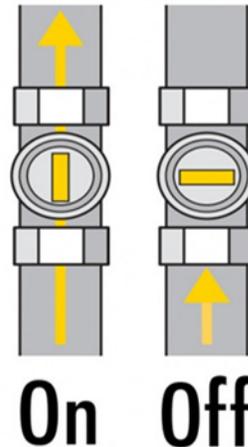
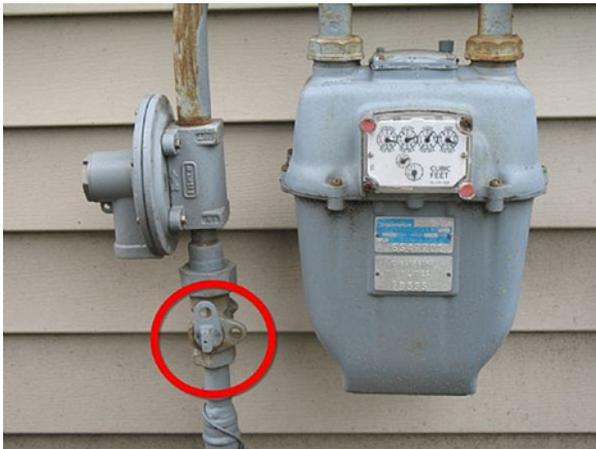
the interiors of walls. Once on the next floor, the process continues to the next floor(s) or attic. When checking for Natural gas indoors, always check near the area where the service enters the structure, then any drains or sump pumps in the basement, check the ceilings and in openings created by pipe chases through floors under cabinets etc. And remember, always maintain control of potential ignition sources. There are many possible indicators discussed earlier, another is Sound, should you hear a hissing sound coming from the area around a gas appliance is a sign of a gas leak. When natural gas is identified, notify your local Gas Company immediately. Don't be complacent. Park / Approach the scene from an up-wind direction. If initial apparatus placement does not permit this, then have any other responding unit's stage in an area that will allow a safe approach to the incident. Do not park in front of the structure. It may be tempting due to pre-connected fire hoses to stay close; however, the blast zone can be quite significant and cause injuries to firefighters and damage to vehicles.

Perform checks with calibrated gas detection equipment prior to entering the building. If the gas meter feeding the structure is visible, then check the flow dials to see if there is excess flow (possibly indicating gas leaking inside the building.) Remember that gas can also migrate underground into the building. When open air readings inside the structure are found and no occupants are determined to be inside, withdraw to a safe distance and await the arrival of a Gas Company representative.

### **When Gas is Leaking Inside a Building**

When gas is inside buildings attempt to turn off gas at meter if it is an outside meter and notify the gas utility company right away. If it is an inside meter do not attempt to turn it off. The final control before the customer's equipment is the customer regulator and shut off valve. Whether indoors or outdoors the shut off valve is usually located just before the regulator or just before the gas meter. These valves are the only valves that you should operate. In most cases, the gas shut off valve is a ¼ turn valve, it is an indicating type valve. In other words, one quarter rotation is all that is necessary to close or open this type of valve. When the wing on the valve is aligned with or parallel to the gas pipe, the valve is open. When the valve wing is positioned across or perpendicular to the gas pipe, the valve is closed. The simplest tool for operating these valves is either an adjustable wrench or properly sized open-end wrench. This is the only type valve the fire service should attempt to shut down. Prior to shutting this valve assess the piping in and around the immediate area for any rust or corrosion. If rust or corrosion is present the piping may be compromised and could fail while being operated. When in doubt leave this task for the proper utility. In some cases, one may find a gate style valve in these locations. Gate valves require several full rotations to either open or close, it is not recommended that the fire service operate this or any other type of non-indicating operating valve. It should be noted that while the function of these valves is the same as ¼ turn valves, be sure you know the difference. If you only turn a gate valve ¼ turn, the gas will continue to pass through the valve.

If it is necessary to shut off meter valves to stop gas flow to a fire, utilize a lock-out/tag-out procedure to ensure it can NOT be turned back on. Ensure the utility company is able to contact the person that applied the Lock/Tag when the time comes to restore gas service. Only the utility company should turn on a gas service valve after it has determined the safety of such an action. In some cases where the fire is confined to an individual appliance, it may be just as practical to turn off that appliances shut off valve only rather than shutting down an entire structure.



**Figure D-17** An outdoor meter set with indicating valve, when the valve shows inline the gas is turned on, when it is against the flow it is turned off. *NJ Statewide Gas Utility Safety Team.*

Never ring the doorbell for the structure reporting the gas leak, never take cell phones, pagers, radios, or walkie-talkies into the suspected leak area. Do not operate any appliances or turn anything off or on (including light switches) in a suspected gaseous atmosphere. The arc created when unplugging an appliance from a wall outlet is sufficient to ignite natural gas. First responders have a difficult and often hazardous job. Remember, controlling sources of ignition in a possibly explosive area can keep a dangerous situation from becoming a deadly one.

### **When Gas is burning inside Buildings**

When you find gas burning inside a building, notify the gas utility company immediately. The Incident Commander should determine if the gas can safely be shut off at the service entrance inside the building. If there is an above ground or outside meter this valve can be shut using the proper tools after inspecting the piping for excess corrosion. If the supply can not safely be shut off, a hose line should be utilized to prevent the surrounding combustibles from becoming involved. If it appears that inside piping or meter may be endangered from fire notify the gas utility company immediately. The Gas Company is best equipped with the knowledge and tools to shut off the gas supply. In some cases when gas is buring at an appliance, shut off the valve to the appliance if it is accessible. In a multiple dwelling building there may be difficulty locating and securing the proper

meter and valve, attempt to locate the main feed and shut that off before the meter. Any valve that was turned off by the fire department or the utility company should not be turned back on by a fire service member. Remember coordination with the utility workers on location is imperative, establish a unified command to set the goals and objectives for the incident.

### **Gas Leaking Outside, Underground or Damage by External Force**

Damage to underground facilities is a top priority of the United States Department of Transportation Office of Pipeline Safety due to high number of significant incidents that have occurred. Annually, New Jersey experiences up to five thousand incidents where underground facilities are damaged. Sixty percent involve natural gas facilities. Many involve multiple facilities being damaged including water, sewer, electric and communications. Damage to water facilities can affect fire hydrants in the area. Gas released into the atmosphere outdoors has the ability to naturally rise, however the fire service should not discount the fact that gas could also be flowing underground, could be still connected a structure will again try to find a way to naturally rise and travel upward. Whether from an underground leak or some type of damage to underground facilities natural gas will always attempt to make its way to the surface, Natural gas will always try to travel upward. Underground, the gas may be diverted by obstacles such as rocks, frost, paving, or other objects that can stop its upward travel causing the gas to migrate underground until a path of least resistance is found. The density of the soil or the depth of frost in winter the more the gas is diverted, the larger the spread or migration of the gas.

Natural Gas released outdoors can be from damaged or compromised underground facility or piping, should also be treated in the same manner as that of an inside leak. Sources of ignition should be eliminated. Immediately, an initial isolation zone and a unified command post should be established. Extinguish all open flames unless it is fed by the leaking gas, prohibit smoking and restrict the use of electronic devices while working in the vicinity of the gas leak. Check surrounding structures, basements in particular, for any presence of gas odor by using calibrated gas detection equipment. Anticipate multiple leaks. Team up with Gas Company Responders to perform these checks. Document all readings and findings and keep a list of structures that have been checked and the status of occupants. Restrict or reroute traffic until personnel from Gas Company are able to control the gas flow. Restrict all non-gas company individuals from entering an excavation site.

Never flow water into an excavation that has gas flowing, this could introduce water into the gas system which will create a bigger problem for the utility company and for the repair. When necessary to dissipate fumes outdoors, utilize a master stream appliance with a fog type nozzle to flow water into the escaping gas in air, again being cautious not to have water fill the damage site.

## Damage to Gas Facilities

- Remember when responding to any damage to gas facilities, Emergency personnel should make every effort to keep the area safe while waiting for gas company assistance. This includes checking the extent of the gas leak in the immediate area and monitoring buildings on both sides of the street, since multiple leaks could become active at the same time.
- Under no circumstances should the Fire Department attempt to make a repair of any damage to gas facilities. Only gas company personnel have the proper personal protective equipment and knowledge to safely control the gas flow.

## When Gas is Burning Outdoors

- Personnel, other than those from the gas company, should make no attempt to extinguish a gas fire unless life is in jeopardy.
- When gas is believed to be involved in a fire, don't assume the fire is consuming all of the gas. Always check nearby buildings and sewers to make sure gas is not migrating. Clear the danger area and barricade it off. Notify the gas company immediately. Never operate an underground gas valve. Operating the wrong valve could further endanger life or property. Leave the decision to operate valves to gas company personnel. They are properly trained in operating gas valves and handling gas emergency procedures. Remember that gas may also be leaking elsewhere check surrounding structures.
- Protect any exposed buildings in the area, wet down any surrounding combustibles if there is danger of ignition. If it is necessary to extinguish a fire because life is in jeopardy, use dry chemical and water fogging equipment. Do not direct a solid water stream onto burning gas at the source of ignition. Remember - burning gas will not explode.
- Coordination between the fire service and the utility workers on location is imperative, establish a unified command to set the goals and objectives for the incident.

Natural gas can be diverted to the point that an underground leak can migrate into a structure from great distances. Natural gas can very easily follow a path of less resistance along sewer lines, underground electric, cable and phone conduits, and even the more loosely packed soil around underground pipes and cables and then into surrounding structures.

Gas detection equipment requires training, calibration, and compliance with the manufacturer's procedures for use. The fire service should develop SOGs to address monitoring for gas inside and outside of a structure, these SOGs should include use of calibrated gas detection equipment and guidelines for actions to be taken when there is a notification of a hazardous concentration /level of gas detected, the time of the incident is not the time to train on the proper use of the detection equipment.

Anytime you respond to a call where a gas odor is reported, and there is construction in the area, check the markers along the ground, because they might indicate that the source of the leak is construction related. By investigating the roadway of the work it may indicate where the underground utility is located in relation to the work that is being conducted. Remember that the damage may have caused multiple leaks or damage to the gas facilities at the construction site and / or away from the construction site like across the street or inside buildings. Besides the normal emergency response precautions and evacuation criteria check nearby buildings and buildings across the street or surrounding the construction area. Remember we spoke about gas migrating along soft soil, and other underground piping. Any odor of gas evacuate, as a precaution, an initial isolation zone of 300 meter (330 feet) is recommended by the US DOT Emergency Response Guide (ERG). This isolation zone can be expanded or reduced based upon further investigation on scene. A Unified Command Post is also recommended while working with the local gas company to determine the full extent of the gas leak and safe area. The fire service Incident Commander and the Utility IC should meet to discuss the goals and objectives and the scope of the incident to determine the needs of mitigating the incident. The two case studies below provide examples of why a complete evaluation of the emergency situation is required to safe guard your life and public safety.

The two New Jersey case studies investigated by the National Transportation Safety Board are typical incidents that have occurred in many states. New Jersey besides being the most densely populated state also has the highest underground facility density of any other state.

### **CASE STUDY 1 SUMMARY:**

#### **National Transportation Safety Board Pipeline Accident Report NTSB: PAR-95-01 Edison, N.J.**

At about 11:55 pm on March 23, 1994, a 36 inch diameter pipeline owned and operated by Texas Eastern Transmission Corporation ruptured catastrophically in Edison Township, New Jersey. The force of the rupture and of natural gas escaping at a pressure of about 970 psi (pounds-per-square-inch) excavated the soil around the pipe and blew gas hundreds of feet into the air, propelling pipe fragments, rocks, and debris more than 800 feet within 1 to 2 minutes of the rupture. One of several possible sources ignited the escaping gas, sending flames upward 400 to 500 feet in the air. Heat radiating from the massive fire ignited several building roofs in a nearby apartment complex. Occupants, alerted to the incident, fled from the burning buildings. The fire destroyed eight buildings and approximately 1,500 apartment residents were evacuated. No resident of the complex suffered a fatal injury as a result of this accident. Most injuries were minor foot burns and cuts that apartment residents sustained from the hot pavement and glass shards as they fled the complex. Damage from the accident exceeded \$25 million. Contributing to the rupture were the brittle properties of the pipe material at the operating temperature.

### **CASE STUDY 2 SUMMARY:**

#### **NTSB/PAB-07/01 “National Transportation Safety Board Pipeline Accident Report: Excavation Damage to Natural Gas Distribution Line Resulting in Explosion and Fire, Bergenfield, N.J.”**

On December 13, 2005, at 9:26 am, an apartment building exploded in Bergenfield, New Jersey, after natural gas migrated into the building from a damaged pipeline. Investigators found a break in an underground 1 ¼ -inch steel natural gas distribution service line that was operating at 11 ½ pounds per square inch. The break occurred at an underground threaded tee connection downstream from where excavators were removing an oil tank that was buried under the asphalt parking lot adjacent to the building. The break occurred, under the parking lot, about 7 feet 4 inches from the building’s wall. Three residents of the apartment building were killed. Four residents and a tank removal worker were injured and transported to hospitals. The property damage consisted of the apartment building, which was a complete loss. Damage from the accident was estimated over \$850,000.00.

## **Initial Response:**

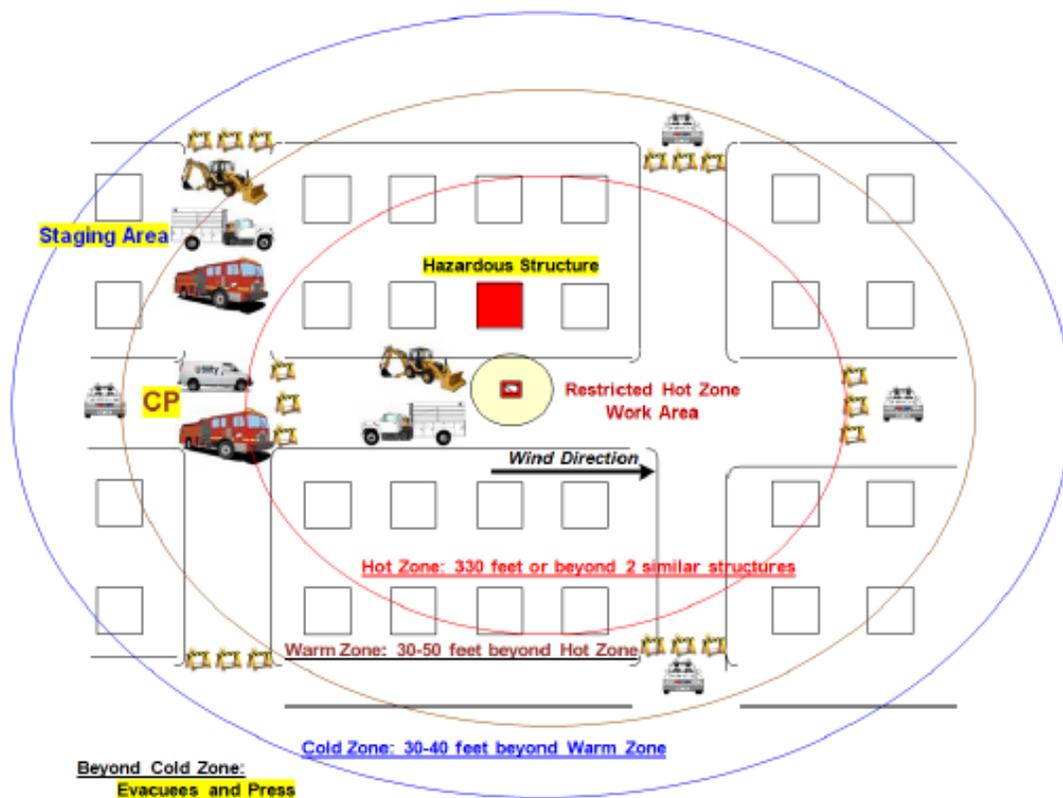
Before you arrive on the scene and prior to starting a gas leak investigation there are actions to take:

- Contact the local gas company or gas provider and request assistance
- Position emergency vehicles to avoid potential gas leak sources such as:

## **Secure the Site:**

Establish a site perimeter and reroute vehicle traffic as necessary. Eliminate sources of ignition. When the presence of gas is strong, the best rule is to evacuate people from the dwelling / immediate area of leak or damage and move them a distance far enough away that would prevent injuries if the gas were to ignite. Also, be aware that shuffling your feet on many types of surfaces can cause a static electricity discharge. Remember you are evacuating and securing the area in case of an explosion. Check surrounding houses for gas odors. Keeping in mind the capability of natural gas to migrate, evacuate other residents who live in any adjoining properties at least two similar sized houses in each direction away. And if you have either called for backup, or have been called, follow all the “make-safe” procedures just described.

As different responders arrive, it's important that everyone's activities are coordinated, and contribute to preserving life and if assisting in evacuation or traffic control. Any time you respond to a possible gas emergency, it's important that in reporting on the situation, whether directly or more likely, through your dispatch center, verify that the gas company has been notified. Many times utility companies have “hot lines” dedicated solely for emergency situations, and their role is to assist you in any way to make the situation safe. Whoever is responding, whether first or last, has a duty to protect life and property.



**Figure D-18** Initial Isolation Zone for a large-scale Gas Leak or Damage. *NJ Statewide Gas Utility Safety Team.*



**Figure D-19** Never enter a trench/excavation without proper training and NEVER attempt to kink a flowing gas line. *Lee Calderio.*

Periodic meetings with your local gas providers to discuss emergency response, local gas facilities with special needs or response criteria, your expectations, and team work are the best way to prepare before an incident and will aid in the most effective resolution when an incident occurs. Never attempt to repair or stop leaking gas unless the gas can be shut-off by an aboveground valve.

Remember that a static discharge can ignite leaking gas. Plastic pipe used to carry natural gas can build up a large static charge as the gas escapes. Any attempt to stop the gas by bending the plastic pipe or inserting a wooden plug can cause a static discharge resulting in a subsequent ignition and explosion. Secure the area and protect the surrounding structures. Leave the repair to the gas company /provider.

General considerations for electric power disconnection (limit potential ignition source):

- Do not disconnect the electric. Have the electric utility disconnect the electric if/when needed.
- Building emergency back-up generators may operate if the electric is disconnected.
- If a larger area of electric is to be disconnected, work with the electric utility to minimize the impact on critical customers, customers on life support, and water pumping stations.

## **Section 7: Detection Methods for Natural Gas**

### **Objective:**

This section provides approaches for detecting natural gas. As a general rule when a gas odor is detected in a building, evacuate the building and work with the gas company to evaluate the gas leak.

When checking for gas leaks, an invaluable apparatus is the Combustible Gas Indicator, mostly referred to as a “CGI.” Many fire departments, and an increasing number of police and EMT units have this equipment. It’s used to capture samples of the air and display any concentrations of natural gas. The first step is taking a clean air sample to have a reference point for the CGI. This is called “zeroing out,” and is done before samples are taken in the area of the suspected gas leak. While the CGI and other sampling equipment are critical for evaluating a gas leak, equally important is the proper use and calibration of such equipment. Improper use or the use of an out of calibrated device can place you in serious risk or jeopardize your life. Most gas companies and providers have established evacuation protocols for gas leak investigation personnel. Generally any open-air reading of 1% or 20% of the Lower Explosive Limit - LEL on a CGI in structure means that all persons must be evacuated including those evaluating the gas leak. In addition, a gas mixture may be too rich to ignite (greater than Upper Explosive Limit - UEL) in places and will be moving through the explosive range as the areas are vented.

Sampling needs to be done throughout the house, but before doing this, responders should be in full “PPE”--Personal Protective Equipment. You need to protect yourself against any possibility of an accidental ignition. When the utility company personnel arrives additional sampling with a CGI may also take place, including outside. They have additional tools to take underground samples where gas may be migrating. However, if the smell of natural gas is strong throughout the outside area, checking for levels inside neighborhood houses would be a sound precaution. It’s vitally important to know that this equipment is sophisticated and sensitive. In order to be

## **\*\*FIRE SERVICE DO'S AND DONT'S FOR GAS EMERGENCIES\*\***

### **DO'S**

- Notify the gas company immediately - utilize the gas company expertise.
- Treat all gas leaks as hazardous until determined otherwise by the gas company
- Only shut-off above-ground meter valves
- Evacuate structures
- Secure affected areas
- Use only properly calibrated detection equipment
- Use only intrinsically safe communications and other electrically operated equipment.
- Turn off radios, pagers, & cell phones prior to entering structures
- Natural gas has a flammable or explosive range from just below 5% in air to just below 15% in air. These percentages are known as the "LEL" (Lower Explosive Limit) and "UEL" (Upper Explosive Limit).

### **DONT'S**

- Park over manhole covers or storm drains
- Park in front or downwind of emergency locations
- Operate any in-ground valves
- Operate doorbells, light switches or other electrical devices
- Turn off venting relief valves
- Extinguish gas fires until fuel sources have been secured
- Turn on gas valves
- Shut off gas service to industrial facilities without knowledge of its effect can cause additional damage

Natural gas has a flammable or explosive range from just below 5% in air to just below 15% in air. These percentages are known as the "LEL" (Lower Explosive Limit) and "UEL" (Upper Explosive Limit) Limit).

confident that what you're reading is accurate, periodic calibration testing insures reliability and with many companies producing CGI equipment, each sets its own maintenance guidelines and training, and different brands may require different procedures for taking gas samples. It is recommended that you rely on the local gas company for gas leak evaluation.

## Section 8: Dealing with Natural Gas Fires

### Objective:

This section provides approaches for responding to natural gas fires.

- **Classes of fires**

Burning natural gas is a class B fire. However, it can cause other materials to burn around it such as wood, paper, and vegetation, all class A fires; or energized electrical wires, creating a Class C fire. So, you may be facing a multiple class fire. For machinery or fires involving electrical components, the safest way to extinguish the fire is to de-energize the circuit, and eliminate the gas supply.

- **Ways burning gas can be extinguished**

Water is not an effective method for extinguishing a natural gas fire. Dry Chemical extinguishers should be used with proper technique. Shutting off the gas supply and allowing residual gas in the pipe to burn out is often the best approach. Shut off the meter supply valve or service valve when accessible.

- **Dangers of interactions with electrical systems**

A gas fed fire may cause the insulation on overhead wires to burn. This damage may cause the live wires to fall in some cases. Don't approach fallen electrical lines until the power company disconnects them. Gas piping may also share a common underground trench with electrical facilities. In some cases both may be damaged by the blaze.

## ADDITIONAL TRAINING RESOURCES

NJDFS Awareness Gas Response Alert:

[http://www.nj.gov/dca/divisions/dfs/alerts/safety\\_alerts/awareness\\_alert\\_17\\_1\\_natural\\_gas\\_leak\\_response.pdf](http://www.nj.gov/dca/divisions/dfs/alerts/safety_alerts/awareness_alert_17_1_natural_gas_leak_response.pdf)

NJ Learn:

<https://www.njlearn.com>

Online Gas Training:

<https://ngafirstresponder.com>

PHMSA National Pipeline Mapping System (Transmission /Hazardous Liquid):

<https://www.npms.phmsa.dot.gov>

US-DOT Emergency Response Guide:

<https://www.phmsa.dot.gov/hazmat/outreach-training/erg>

### Section 9: Compressed Natural Gas Vehicle Emergency Response

#### **Objective:**

This section provides information for approaching natural gas vehicle emergencies.

#### **How to recognize a compressed natural gas vehicle**

Vehicles that use natural gas as a supplementary fuel to gasoline will have a blue symbol attached to the rear of the vehicle. The Gas is stored in a cylinder, usually in the trunk of a sedan or rear of a van. Early identification of a vehicle that is powered by Natural Gas is important.



**Figure D-20** *From prior edition of NJ FF Addendum.*

### **Gas dissipates quickly**

If the natural gas delivery system is damaged in a collision, leaking natural gas should dissipate quickly. Natural gas is lighter than air and will tend to rise up away from ground level. Note: Propane gas is heavier than air and may accumulate over the ground surface. Know which gas you are dealing with the sticker on the vehicle's rear will indicate this.

### **How to find and operate a manual shut off valve.**

Look for the shut off valve below the driver's side door, if not there check the passenger side. Use this valve to shut off gas supply in the engine compartment. If it is not there, check the passenger side. Use this valve to shut off the gas supply in the engine compartment. The shutoff valve is under the driver's or passenger's door.

## **Section 11: Carbon Monoxide – Cause, Effect & Response**

### **Objective:**

This section provides information and approaches for carbon monoxide emergency response. Carbon Monoxide (CO) gas is a colorless and often an odorless gas and potentially deadly. CO is also slightly lighter than air (Specific gravity is 0.97) and is flammable at the limits of 12.5% to 74% gas to air mixture with an ignition temperature of 1128 degrees Fahrenheit. One of the primary causes of (CO) gas is the result of the incomplete or improper burning of carbon based fuels/fossil fuels. Some types of carbon-based fuels include wood, tobacco, coal, kerosene, gasoline

and natural gas. The threat of CO is poisoning is most insidious when the gas collects unnoticed from the normally safe sources that have gone bad. Appliances should be inspected and serviced regularly if a problem is suspected. CO detectors are now law in New Jersey to be installed prior to real estate sales and are highly recommended to provide added safety. CO detector must be installed per the manufactures instructions to avoid false alarms. Some improper locations are often too close to an appliance, and a correct location in many cases is in the hallway near the bedrooms.

The annual CO calls received by New Jersey utilities are in excess of 8,000. It is important to understand the dangers and causes of CO.

**Cause:**

Although all gas equipment has been tested under rigid ANSI Standards for safety and proper combustion, it is imperative to keep in mind that the years of operation takes its toll and tends to cause breakdown and malfunction. Other causes of malfunction may result changes in the structure or blockage in flues by outside forces. Besides gas appliances other sources of CO may be kerosene heaters, internal combustion engines, fireplaces and even smoking. Many times CO is associated with a sharp pungent odor. This odor, however, is the result of aldehydes and alcohols that are also produced as a result of incomplete combustion. In addition, condensation found on the inside windows of a home could be the result from the humid condition, which arises from incomplete combustion. The risk of CO is greatest in cold weather, when homes are closed up, preventing hazardous gases from being ventilated especially in newer more insulated homes. According to the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) (Ventilation Standard 62-89), a concentration of no more than 9 parts per million (PPM) (0.0009%), of CO is permissible in residential living spaces. CO is measured in parts per million with respect to the atmosphere.

**Effect:**

CO EXPOSURE SYMPTOMS	
• Headaches	• Chronic fatigue Confusion
• Shortness of breath	• Dizziness
• Queasiness	• Nausea
• Flu-like symptoms	• Unconsciousness
• Drowsiness	• Burning eyes
• Flushed face	

## Warning Signs That CO May Be Present

- Presents of aldehydes and alcohols, which produce an acrid odor similar to vehicle exhaust.
- Condensation on walls and windows.
- Dead houseplants.
- Lethargic pets.
- Less/hot water produced by fuel-burning appliances.
- The best way for an emergency responder to detect CO in the atmosphere is through the use of an approved portable CO detection instrument, calibrated according to manufacturer instructions. This instrument is effective for monitoring for personal safety, measuring atmospheric CO concentrations for further actions, and locating and mitigating major sources of CO.

*The table below shows typical symptoms based on concentration and time of exposure.*

<b>Carbon Monoxide (CO) Exposure Limits and Symptoms</b>	
<b>CONCENTRATION IN PARTS PER MILLIONS</b>	
<b>(PPM)</b>	<b>SYMPTOMS</b>
50	No adverse effects with 8 hours of exposure.
200	Mild headache after 2 to 3 hours of exposure.
400	Headache, nausea, and dizziness after 1 to 2 hours of exposure.
800	Headache, nausea, and dizziness after 45 minutes; collapse and unconsciousness after 2 hours of exposure.
1,000	Loss of consciousness after 1 hour of exposure.
1,600	Headache, nausea, and dizziness after 30 minutes of exposure.
3,200	Headache, nausea, and dizziness after 5 to 10 minutes of exposure; collapse and unconsciousness after 30 minutes of exposure.
6,400	Headache, nausea, and dizziness after 1 to 2 minutes of exposure; unconsciousness and danger of death after 10 to 15 minutes of exposure.
12,800	Immediate physiological effects, unconsciousness, and danger of death after 1 to 3 minutes of exposure.

**Figure D-21** *Lee Calderio.*

Each year some 200 people die from accidental poisoning from CO and another 5000 receive treatment in hospital emergency rooms. The real toll is surely higher, since many of the symptoms of CO exposure are mistaken for the flu or another illness. CO readily inhibits the blood's capacity to carry oxygen simply because the body welcomes the flow of CO into the bloodstream easier than oxygen. It combines with hemoglobin the oxygen-carrying pigment in the red blood cells to form carboxyhemoglobin (COHb).

CO could kill in minutes or hours depending on the level of CO and the time of exposure. The victim inhaling the toxic concentration of the gas becomes helpless before realizing that danger exists.

When being exposed to 50 PPM most people, start feeling the effects, although even lower levels can harm people with a heart condition, small children, pregnant women, and elderly people are effected more rapidly. Some of the symptoms are headaches, queasiness, flu-like achiness without fever, drowsiness, flushed face, chronic fatigue, confusion, and dizziness. Very often pets exhibit these symptoms more quickly than humans, especially birds. Since death could occur within 1-3 minutes in a concentration of 12,800 PPM it is extremely important to monitor the air space with a calibrated CO detection instrument before entering a suspected CO residence.

### **Emergency Response:**

When responding to a CO call, the main thought is safety. You must maintain your safety if you're going to save lives. If any CO reads are found at any entrance or window of the property with the CO detector, a breathing apparatus needs to be put on before entering the premise. If you don't have CO detection equipment that has been calibrated to the manufacturers specifications, but suspect it might be CO poisoning, check for condensation on the windows and again, don't enter without breathing apparatus. If you can't make a determination and suspect CO evacuate immediately. Remember when in doubt "GET THEM OUT." When you have the proper equipment or the premises are aired out completely or you have the utility company to assist, search for anyone who may be sick or overcome by CO. CO is lighter than air, which means that it will rise slowly in the home. Once the victims have been removed from the residence, efforts should be made to find the source of the CO. The local utility is apt in finding the source from appliances and is also knowledgeable of the other gases that give false CO reads.

### **False CO reads from different sources**

- Nitrous oxide (bleaching of rayon in new carpeting)
- Nitrogen dioxide (used to bleach flour)
- Hydrogen (most abundant element known, oils, fats, and balloons)
- Chlorine (dyes, insecticides, bleach powders, cleaning solvents, plastics, fire extinguishants)
- Hydrogen cyanide (almonds, seeds in peaches, apricots, plums, insecticides, plastics, burnt silk or wool)
- Welding gases, ethylene and acetylene (ethylene is used to ripen fruits)
- Hydrogen sulfide (decaying organic matter)
- Sulfur dioxide (used in preserving fruits, disincentives, bleaching textile fibers, straw, wicker, gelatin, glue and beet sugar)
- New computers circuit boards

- Aerosol disinfectant
- Rubbing alcohol
- Batteries on trickle chargers

## **SUBCHAPTER IV :**

# **RECOGNIZING AND AVOIDING THE HAZARDS OF PROPANE**

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### **Section 1: Introduction**

Fatalities to First Responders have involved propane. The purpose of this program is to:

- make you aware of the hazards of propane,
- help you to understand the properties of propane,
- give you a basic knowledge of how the propane system works, and
- offer approaches for responding to propane emergencies.

This chapter will help you better understand and what precautions need to be taken when responding to propane incidents. Propane can be dangerous and can injury and / or kill emergency workers.

For specific facility and special emergency response needs in your service area, meeting with your local propane provider or the propane association on a periodic basis is strongly recommended.

### **Section 2: Properties & Characteristics of Propane**

#### **Objective:**

This section provides a general summary of the properties of propane. Key safety and tactical points are indicated.

Propane is a liquefied petroleum gas found trapped in pockets with either crude oil or natural gas. About 30% produced today is refined from crude oil, with the other 70% processed from natural gas. Propane is odorless, tasteless, and colorless in its natural state; an odorant (ethyl mercaptan) is added, similar to natural gas, so that leaks may be detected.

Propane belongs to a family of chemical compounds known as hydrocarbons. This means they are made up of hydrogen and carbon atoms only. Natural gas (methane) has one carbon atom and

four hydrogen atoms; propane has three carbon atoms with eight hydrogen atoms. This chemical composition makes propane similar to natural gas in many characteristics.

At a temperature colder than  $-44^{\circ}\text{F}$  and open to the atmosphere, propane will reside in its liquid state. It would appear to be water. Propane due to its chemical characteristics is portable energy as we can store it as a liquid in a container under moderate pressure and then use it as a gas when withdrawn from the container. Each unit of liquid propane in a container produces 270 units of propane vapor.

Propane in its liquid state is about half the weight of water ( $\text{SG}=0.504$ ), while in its vapor state is heavier than air and natural gas ( $\text{SG}=1.52$ ). Thus when present, propane tends to go down and lay in low areas, while natural gas being lighter than air tends to travel upward.

The ignition temperature of propane in air is  $920^{\circ}\text{F}$ . The heating value of propane is about 2500 Btu/cf, with its flammability range in air 2.15% to 9.60%. As for natural gas, propane is non-toxic. It however presents a possible inhalation hazard if released in a confined space, as it displaces oxygen and acts as a simple asphyxiate. Liquid propane is an effective refrigerant. It rapidly absorbs heat from the skin and can cause severe burns to the body.

### **Section 3: Propane Delivery System**

#### **Objective:**

This section provides an overview of the propane delivery system. Key safety and tactical points are identified. For specific facility and special emergency response needs in your service area, meeting with your local propane provider or the propane association on a periodic basis is strongly recommended.

Propane is shipped from the refinery or natural gas processing plant to a local terminal and from there to the end user. Shipment to the local terminal can be via truck, railcar, or pipeline. All propane is shipped under pressure in its liquid state. From the local terminal (“bulk plant”) to the residence or commercial property, delivery is effected by a bulk delivery truck, called a “bobtail”. This truck would hold about 2,000-3,500 gallons of propane.

The “bobtail” truck transfers propane via truck hose to the consumer’s storage container. This container could either be a United States Department of Transportation (“DOT”) cylinder, or an ASME storage tank. The design pressure of the American Society of Mechanical Engineers (“ASME”) storage tank is 250 psig, while that of the DOT house cylinder would normally be 240 psig. Either type container would have a filler valve, pressure relief valve, service valve, and liquid level gauge located within the cylinder neck-ring or the tank dome. Some of the individual process

features can be combined in one valve on the container. All process connections are protected either by an excess flow valve or a check valve in the event of a downstream piping breakage. The DOT cylinders would normally be placed adjacent to the residence or commercial building with a pressure regulator installed within the cylinder neck-ring (collar) along with the cylinder valve. The cylinder propane capacities would normally be 47 gallons (200 lbs.) or 100 gallons (420 lbs.). Two or more cylinders could be manifolded together. Entry to the building would be via aboveground copper tubing or steel piping from the cylinder with a shutoff valve in the gas service line. A gas meter or second stage regulator would be optional.

The ASME storage tanks could be installed aboveground or underground. The tanks would normally be a 500 gallon (w.c) or 1000 gallon (w.c) size. Propane is filled in a container to about 85% of its water capacity (i.e., a 1000 gallon water capacity storage tank would be filled to a maximum propane volume of 850 gallons). The ASME container would be installed 10' or further away from the building, with basically the same piping characteristics as the DOT cylinder installation, excepting that the piping run to the building from the ASME tank would normally be underground. It is important to note that all propane containers are never completely filled. The approximate 15% of the gross capacity (w.c.) of the container is used as a space for propane vapor. This is to allow for expansion of the propane liquid within the container. The propane pressure within the container is dependent on the outside ambient temperature. At 20°F the propane container pressure would be 40 psig, at 100°F the pressure would be 172 psig.

Large multiple stationary ASME propane storage tanks ranging in size from 30,000 to 60,000 gallons (w.c.) are employed at various industrial plants and gas utility plants where propane is employed as a supplemental fuel to natural gas.

## **Section 4: Keeping The System Safe**

### **Objective:**

This section provides a reference of the regulations applicable to the propane distribution system in New Jersey.

Responsibility for system maintenance would be that of the user and the propane supplier. The governing regulation in New Jersey, established by the Liquefied Petroleum Gas Act (N.J.S.A. 21:1B-1 et seq.), for propane systems is N.J.A.C. 5:18 administered by the New Jersey Department of Community Affairs ("NJDCA"). The State has adopted NFPA pamphlet #58, the LP-Gas Code, as part of the state regulation. The propane supplier at time of residential/commercial delivery is to inspect the container and outside system for acceptability and continued usage.



Figure D-22 There are many types of delivery and Storage systems for Propane

## Section 5: General Emergency Response Procedures

### Objective:

This section provides approaches for responding to propane incidents.

Upon arrival at the scene, a security perimeter should be established. Special care should be used to position emergency vehicles so that equipment is parked well outside the area of greatest risk. Control ignition sources immediately. If possible, rescue should be performed from an upstream location.

Large releases of propane may travel great distances, find ignition sources, and flash back to the source of the leak. During approach to the incident scene, avoid committing or positioning personnel and vehicles in a hazardous position or situation. Remember-unignited propane is heavier than air.

For escaping gas, hose streams with fog nozzles are to be used to disperse the propane gas away from any possible sources of ignition. Approach the leak from upwind and keep out of any vapor cloud. A combustible gas detector should be used to determine if hoselines are effective in dispersing the propane gas. When the gas indicator is considered within a safe range (below 10% of the Lower Flammable Limit - LFL) rescue and repairs to shutoff the flow of gas can be made by the fire service and the propane gas supplier.

For burning gas, approach the fire from upwind, making sure that one stays out of the range of any possible flash back. The top of the container (vapor space) supplying the fuel should first be cooled with hose streams (water should also be applied to the balance of the container). Cooling the container will cause the pressure to be reduced thus closing any relieving container relief valve that might be feeding the fire. **DO NOT EXTINGUISH THE FIRE UNTIL THE PROPANE FUEL SUPPLY CAN BE SHUT OFF.** If a container service valve is controlling the

fuel feeding the fire, the surrounding atmosphere should be cooled with converging fog streams while the fire service attempts to close the valve. Continue to cool the container well after the fire has been extinguished. The area around the container should be monitored for flammable gas using a combustible gas indicator.

If the source of the fuel cannot be shut off, let the fire burn, continuing to cool the propane containers and adjacent exposures.

A propane tank contains liquid and vapor. Any external fire creating direct flame impingement on the vapor space will heat the tank's shell. If a vessel gets intense, concentrated heat on the shell area on top (vapor space) the metal will get hot and start losing its tensile strength. The vessel will start to swell in the hot area. This is an indication that the high pressure will soon blow out as the hot steel is being drawn thinner. When the blister rips, the whole tank contents will erupt upwards, causing a brief tower of fire (BLEVE). BLEVE is an acronym for Boiling Liquid Expanding Vapor Explosion. A BLEVE is defined as a container failure with a release of energy, often rapidly and violently, which is accompanied by a release of gas to the atmosphere and propulsion of the container or container pieces due to an overpressure rupture.

## **Section 6: Propane Cargo Truck Emergency Response**

### **Objective:**

This section provides approaches for responding to propane cargo truck incidents.

A propane truck is involved in a traffic accident and a gas cloud is escaping from the vehicle. After securing the site, the objective for this operation is to control or stop the propane from escaping the truck. Firefighters in full protective clothing should deploy hoselines to disperse and dilute the flammable gas while an approach is made to ascertain exactly where the leak is. A combustible gas detector should be used to determine the effectiveness of the hoselines in dispersing the gas. If there is severe damage to the truck's piping, the truck may have to be unloaded. Considerable time may pass until a compatible vehicle is available on scene for product transfer. Some attempt to stop the leak via a fiberglass wrap, or a freeze wrap may be attempted by the fire service employing a water fog envelope. As there is no fire situation, if the ambient temperature is about 90°F, hose water fog played on the top of the tank can be effective in keeping the tank's shell cool. If the ambient temperature is below 40°F, hose water application should not be applied as it would only raise the temperature of the propane inside the vessel and thereby increase the tank pressure and the leak. Water should be available in case of fire development and the then need to cool the vessel shell.

## **Section 7: Propane Vehicle Emergency Response**

### **Objective:**

This section provides approaches for responding to propane vehicle incidents.

Propane motor fuel tanks may be installed in cars, vans, pick-up trucks, and buses. Propane motor fuel tanks are manufactured in a variety of sizes and shapes to accommodate different vehicle designs. Fuel tank capacities normally range from 20 to 65 gallons. For automobiles the tank is mounted in the trunk. The motor fuel tanks are DOT cylinders with a design pressure of 312 psig. The container relief valve is vented to the outside with the relief valve discharge directed up or down within 45 degrees of vertical. An automatic fuel shutoff valve located as close as possible to the carburetor is provided to close propane flow when the engine is not running, though the ignition switch may be in the on position. Each vehicle powered by propane is identified with a diamond-shaped label located on the lower right rear of the vehicle (the word PROPANE is centered in the diamond in silver or white reflective material on a black background).

In the event of a vehicle accident and fire, the responders should cool the propane motor fuel tank on the vehicle. If there is a propane fire in the engine compartment, this can be controlled by shutting off the engine which should automatically close the propane fuel supply valve. Rescue of people from the burning vehicle must be evaluated/rendered while the fire is attacked and extinguished. While the propane storage tank is continuously being cooled, the responders should locate the fuel supply valve on the storage tank and close it. Continue to cool the cylinder until well after the fire has been extinguished. The cylinder metal surface should be cool enough to touch. The area around the container should be monitored for flammable vapors using a combustible gas indicator.

## **Section 8: Barbecue Grill Fire/Leak Response**

### **Objective:**

This section provides approaches for responding to propane grill incidents.

Most barbecue gas grills are fitted with a 20lb. DOT propane cylinder. In the event of leaking propane gas, hose streams with fog nozzles are to be used to disperse the gas away from any possible sources of ignition. Approach the leak from upwind and keep out of any vapor cloud. A combustible gas detector should be used to determine the effectiveness in dispersing propane gas with the hose streams. When the gas indicator is considered within a safe range (below 10% of the LFL) the fire service should attempt to close the propane cylinder valve (note that this cylinder valve is right-to-tight) thus shutting off the flow of gas.

In the event of fire, the first objective is to cool the outside of the cylinder so that the cylinder pressure is reduced and the cylinder relief valve resets. Adjacent exposures should also be protected. The responders should then approach, from opposite the relief valve discharge, the cylinder under the protection of hand lines so as to manually close the cylinder valve (note that this cylinder valve is right-to-tight). Continue to cool the cylinder until well after the fire has been extinguished. The cylinder metal surface should be cool enough to touch. The area around the grill should be monitored for flammable vapors using a combustible gas indicator.



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