



# Safety Brief

JCFPD Training Division

January 2007

2007-1



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## Hazards of Overhaul

Firefighters recognize the hazards associated with fire suppression activities. Often, we forget that the overhaul phase of firefighting has its own share of safety issues. We will focus on the hazards of overhaul in this issue.

### Hazards for Firefighters

Overhaul takes place at the end of the fire suppression phase. Firefighters search for hidden fire in order to prevent rekindles. Common hazards during overhaul include:

- Structural instability;
- Carbon monoxide (see the October 2005 issue for more information);
- Use of tools (See the November 2006 issue for more information);
- Falling building materials; and
- Tired firefighters.

### Avoiding Injury

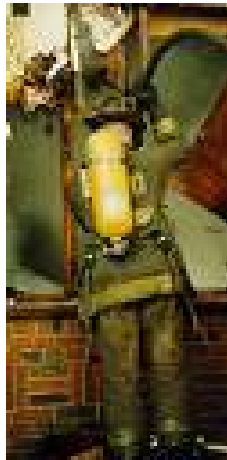
During overhaul, firefighters should consider how much fire damage has occurred and how much water has been used. Fire damage can weaken the structural elements of the building, and water adds significant weight to the structure. (Each gallon weighs a little more than eight pounds; 250 gallons of water adds a ton of weight to the building!) Other issues related to structural instability include:

- Weakened floor joists and roof trusses;
- Walls pushed out by elongated steel beams;
- Loose brick veneer caused by the melting of wall ties exposed to heat; and
- Missing brick mortar from walls and chimneys.

Carbon monoxide (CO) is almost always present during the overhaul phase. Smoldering fires produce large quantities of CO. Firefighters should wear SCBA during overhaul until the incident commander determines that the CO level has fallen to an acceptable level. SCBA should be removed only after the CO level is determined to be safe. The use of ventilation fans can aid in reducing the CO level inside a

building. CO levels below 35 ppm are generally considered an acceptable exposure during overhaul.

Hand tools always present a hazard. Axes and pike poles rely on sharp points and edges to accomplish their tasks. When using tools, allow sufficient room between firefighters so that tools can be utilized safely. When removing debris, ensure that no one is working outside the window or doorway being utilized.



Falling building materials can injure firefighters. Recently, two JCFPD firefighters were struck by falling sheet rock, causing serious injury to one firefighter and minor injuries to a second firefighter. Building materials may fall on their own because of fire damage or because they become waterlogged. Overhaul crews should watch for these hazards. In addition, the removal of ceilings and walls during overhaul can also result in falling material. Before removing ceilings, remove all personnel from the

room and stand in the doorway. Always pull the ceiling down and away from doorway. In this manner, falling ceilings should not strike firefighters.

Fire officers should recognize that firefighters are often tired by the time overhaul is begun. Exhaustion and dehydration can often lead to small lapses in mental judgment. Fire officers should ensure that suppression crews have an opportunity for rehabilitation before assigning them to overhaul. Fresh crews (late arriving firefighters and drivers) may operate more safely because they were not part of the suppression team.

### Protect Yourself

Overhaul presents many hazards to firefighters. While all firefighters should look out for each other, senior firefighters and fire officers have a special obligation to search for hazards and remind others of safe practices to adopt. By being aware of the hazards of overhaul, we can minimize the risks by adopting safe work practices. Be safe!



# Safety Brief

JCFPD Training Division

February 2007

2007-2



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## Working Around Vehicles

Every emergency incident requires firefighters to work safely around vehicles. Firefighters mount apparatus, drive to the scene, dismount the apparatus, and repeatedly remove and replace tools and equipment. In addition, many of our incidents require that we work around other responder vehicles (ambulances and police cars), in addition to civilian vehicles.

### Hazards for Firefighters

Firefighters must be aware of the hazards of working around responder and civilian vehicles. Firefighters work around vehicles:

- When preparing to respond;
- When arriving on the scene;
- When working on the scene; and
- When in the station.

The human body will always lose when it comes in contact with moving vehicles. Apparatus drivers have many blind spots, so dismounted personnel must always be aware of where vehicles may be operating.

### Avoiding Injury

Firefighters preparing to respond to an emergency call must work in close proximity to moving vehicles. Firefighters should enter the station through walk-in doors instead of walking in apparatus doors. Moving vehicles can trap firefighters against the door jambs. Firefighters should don their gear before mounting the vehicle. When mounting the vehicle, use the handrails and grab bars provided on the truck. Never run to get on moving apparatus! If the vehicle is moving, get on the next vehicle.

When apparatus arrives on the scene, firefighter must exercise caution to avoid injuries. Wait for the apparatus to come to a complete stop before removing seatbelts. Instead of immediately jumping off the vehicle, wait for orders from the driver or crew chief before dismounting the vehicle. Drivers should look for traffic on the road side of the vehicle. Many of our roads have

deep ditches along the edge of the road—be cautious when stepping from the vehicle. Always use the handrails and grab bars, as steps may become slippery during response in inclement weather.

Operations on the fireground often place firefighters in close proximity to parked and moving vehicles. Most structure fires require the



use of a water supply operation. When possible, have tankers dump from the side to avoid backing. Backing vehicles can pinch firefighters against another vehicle or a folding tank. Always have an escape plan to avoid moving vehicles. If backing a tanker is necessary, stand beside the backing tanker rather than behind the vehicle.

Ground cover fires often require firefighters to work near moving brush trucks. Drivers should utilize dismounted guides when backing to avoid running over firefighters. When firefighters use hose lines from moving vehicles, be prepared to let go of the hose to avoid being knocked over or dragged by the hose.

Finally, vehicles are often in motion in the station. Non-emergency vehicle movement allows enough time to ensure safety. Firefighters must exercise caution when moving vehicles for maintenance or training activities. Firefighters must identify safe places to stand or talk. Drivers should ask personnel to move if there isn't enough room to safely move the vehicle.

### Protect Yourself

Moving vehicles can kill firefighters. Dismounted firefighters must always be aware of moving vehicles. Drivers of vehicles must be on the lookout for firefighters on the ground. Firefighters serving as ground guides must look for firefighters unaware of moving vehicles. When we all work together, we can keep JCFPD personnel safe when working around moving vehicles.





# Safety Brief

JCFPD Training Division

March 2007

2007-3



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## Foam Facts and Safety

Firefighting foam is created when concentrated foam is mixed with water and air. The mixing can be done with an In-Line Foam Eductor that has been provided to every station in the district. Pictured below are two types of Akron Eductors the district has purchased.



Two types of concentrated foam have also been provided to each station. They are Supertrain and Ansulite 3x6 (Alcohol Resistant Concentrate). Each foam product has a Material Safety Data Sheet (MSDS) that provides information about the chemicals in the products and their effects on the environment, health and safety of people. Attached to this Safety Brief are the two copies of the MSDS's for the foam.

According to the MSDSs both foam products have minimal health risks to firefighters. However, the foam is mildly corrosive and can irritate the skin and the eyes. If the foam is ingested it can cause irritation to the mouth, throat and stomach.

For contact on the skin simply wash off the foam with water. If the foam gets into the eyes, the eyes should be flushed with copious amounts of water and if irritation persists, seek medical attention. If the foam is ingested, and the patient is conscious, give them large quantities of water and induce vomiting. If the patient is not conscious seek immediate medical attention. Provide a copy of the MSDS to the attending medical personnel.

Foam is very effective and useful on fuel fires like gasoline, diesel or alcohol. When air, water and concentrated foam is mixed together they become lighter than the fuel. In fact the foam mixture will float on these fuels. The floating property allows the foam to cool, smother, move with and protects the flammable fuels that are spilled and on fire. Even if the fuels are free flowing and not burning, the floating foam can be used to reduce or prevent the ignition of the spilled fuels by creating a vapor barrier.

Liquid fuel fires provide some unique hazards to firefighters. First thing to consider is that water from a fire hose can and will move burning liquid fuels around, sometimes quite a distance. This can cause the fire to spread very quickly and in many directions.

For a fuel fire, all firefighters attacking the fire must be in full bunker gear with SCBA. When dealing with a fuel fire it is recommended to begin the attack up wind and uphill when ever possible. Firefighters should pay attention where the fuel is spilled and do not walk or stand in the spilled fuel. Bunker gear with flammable fuel on them can and will burn.

The foam contains a chemical called Diethylene Glycol Monobutyl Ether which has the possibility to cause a fish kill if the concentrated foam is released into a creek, river, pond or lake.

According to the Missouri Department of Natural Resources care must be exercised when using foam firefighting agents. If the foam is used to extinguish a fuel fire, both the foam and water will become contaminated with the unburnt spilled fuel and may be considered a hazardous waste that may need to be contained and properly disposed of. The foam concentrate can cause a fish kill if released in to a creek, river, pond or lake, and if firefighter's cause a fish kill, the state regulators may be asked to investigate the incident.

Foam is a tool that firefighters can use to fight liquid fuel fires, but with any tool, know how to use it and how to protect yourself from its hazards.



# Safety Brief

JCFPD Training Division

April 2007

2007-4

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## Highway Safety for Fire Fighters

“Firefighters responding to calls need to operate as if someone is trying to run them over.” A quote by *James Joyce, Fire Commissioner, Chicago Fire Department.*

There is a Motor Vehicle Accident (MVA) on the Highway. When the fire department arrives on the scene, they stop and begin emergency operations at the scene. Several seconds later a driver does not see the fire truck and strikes the rear end of the fire truck. The fire truck and fighters become part of the problem, not the solution.



In 2001 there were 33 incidents involving Fire & EMS personnel with 8 Firefighter EMT Fatalities, 26 Firefighter EMS responders injured and 13 fire apparatus or ambulances struck. Of these, 19 mishaps which happened while operating on public streets, 9 involved personnel “directing traffic”, 9 happened while operating at fire scenes, 4 were while backing units into the stations and 4 incidents involving fire apparatus that “moved” while parked at the incidents.

The highway incident can be a very dangerous place. We as fire fighters need

to be aware of the hidden dangers that face us while performing our duties on the highways.

The following are some recommendations provided by Respondersafety.com

- ✓ Never trust approaching traffic.
- ✓ Always look before opening doors and stepping out of apparatus or emergency vehicle into any moving traffic areas.
- ✓ When walking around fire apparatus or emergency vehicle, be alert to your proximity to moving traffic.
- ✓ Avoid turning your back to approaching traffic when at all possible.
- ✓ Establish an initial “block” with the first arriving emergency vehicle or fire apparatus.
- ✓ Always wear structural firefighting gear with helmet and a highway safety vest at all vehicle-related emergencies between the hours of dusk and dawn or whenever lighting levels are reduced due to inclement weather conditions.
- ✓ Turn off all sources of vision impairment to approaching motorists at nighttime incidents including vehicle headlights and spotlights.
- ✓ Use fire apparatus and police vehicles to initially redirect the flow of moving traffic.
- ✓ Establish advance warning and adequate transition area traffic control measures upstream of incident to motorists.
- ✓ Use traffic cones and/or cones illuminated by flares where appropriate for sustained highway incident traffic control and direction.

Remember to keep your eyes and ears open when working on the highway scene it can be very dangerous. Remember, the life you protect and save may be your own, or another first responder.



# Safety Brief

JCFPD Training Division

May 2007

2007-5



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## Tanker Truck Safety

Most of the time getting water to the fire is done by the Tanker Truck. The U.S. Fire Administration (USFA) estimates that tankers account for 3 percent of the country's total fire apparatus, yet they account for 21 percent of the apparatus collision deaths, more than pumpers and aerials combined.

A volunteer fire fighter was responding to a brush fire when the tanker he was driving overturned. The tanker was traveling south on a two-lane county road when it drifted off the right side of the road, causing the driver to lose control. The driver tried to correct the direction of travel of the tanker but was unable to recover. The tanker went down a slight embankment and overturned. The victim was ejected from the tanker and then the tanker rolled over him. The victim was extricated and then transported to a local hospital by ambulance where he was pronounced dead.

JCFPD's tankers are two axel commercial vehicles with air brakes that do not handle like a car or pickup truck. On top of the truck frame is mounted a 2,000 gallon tank for the water. The water alone will weigh 16,680 pounds (8.34 X 2000). There are baffles installed in the tank to keep the water from sloshing around, however the water can and will effect the handling of the truck. The tanker truck is very top heavy and can easily roll over.

A 2003 report on fatal tanker collisions by the USFA noted that the primary cause of two-thirds of the fatal tanker collisions were directly attributable to the vehicles' right-side wheels leaving the driving surface. These accidents often occur because the vehicles are driven too fast and the drivers are unable to keep the vehicles on the road.

The report also found that 82 percent of firefighters who were fatally injured in tanker accidents were not wearing seat belts.



### Recommendations:

Wear a seatbelt while operating or riding in any vehicle. It's the Law to buckle up and the District's policy to wear seatbelts on all District vehicles. There is no excuse for not buckling up.

Slow down when driving a tanker truck and arrive on the scene safely. It is far more important to arrive on the scene with the water, than it is to get there as fast as possible and become a statistic. Often times, slowing down will increase travel time by only two to three minutes.

Be aware of the characteristics of driving tanker trucks. Air brakes have a slight delay when you first apply the brakes.

The trucks are top heavy and can easily roll over or go off the road into the road ditch.

Many of the fatalities from tanker accidents could have been prevented by slowing down. Finally, if you have not driven a tanker in awhile, get with your station officers and go on a training drive to refresh your driving experience with the tanker truck.





# Safety Brief

JCFPD Training Division

July 2007

2007-7



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## Two-in Two-out

On February 18, 2004, a career fire fighter (the victim) was fatally injured in a commercial restaurant/lounge structure fire. The victim had been searching for the seat of the fire with two volunteer fire fighters from another department when one of the fire fighters lost the seal on his self contained breathing apparatus (SCBA) face piece. That fire fighter immediately abandoned the nozzle position and retreated out of the closest door. The backup fire fighter also retreated out of the building when his partner left. In the black smoke and zero visibility, the fire fighters were unaware that the victim was still inside the structure. Soon after, the Incident Commander (IC) ordered an emergency evacuation because of an imminent roof collapse and an air horn signal was sounded. Personnel accounting indicated that a missing fire fighter (the victim) was still inside the building when the roof partially collapsed. After several search attempts, the victim was found in a face-down position with his mask and a thermal imaging camera cable entangled in a chair. His facemask was dislodged and not over his mouth. He was pronounced dead on scene. (NIOSH, July 2004, Death in the Line of Duty).

What does "Two-in Two-out" mean to you? In reality there are several things that this title can and does mean. This safety brief will discuss two meanings.

The two-in two-out buddy system states you stay with the individual from the time you enter the structure to the time you both leave the structure. Take care and look out for each others safety and well being.



In the fire service we work in a very dangerous environment especially when we go into burning buildings. In a burning building filled with

smoke, the air available for us to breath is considered to be Immediately Dangerous to Life and Health (IDLH). According to the Occupational Safety and Health Act (OSHA) IDLH means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Because the environment is considered to be IDLH, OSHA has established a standard to protect all employees that may enter an IDLH environment. The actual regulation is called the Respiratory Protection, Title 29 Code of Federal Regulation Part 1910.134.



According to OSHA two-in two-out means that not only will the buddy system be used for every two firefighters that enter an IDLH environment there will be two firefighters outside with the sole purpose to rescue the two firefighters inside the IDLH environment. The team outside is called the Rapid Intervention Team (RIT) or Rapid Entry Team (RET). The concept behind RIT is to have these two firefighters in full bunker gear, SCBA, tools and a charged hose, whose sole job is to be ready to go into the IDLH environment to rescue the two firefighters that are in, if they need assistance.

Both concepts of two-in two-out are designed to protect and save firefighters that are working in a very dangerous environment. The buddy system for the entry team doing the fire attack and the two RIT team members should all work together as a team so that all firefighters go home alive at the end of the operation. Remember to keep track of your buddy when in an IDLH environment.



# Safety Brief

JCFPD Training Division

August 2007

2007-8



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## Safety Glasses and Your Eyes

Over 2000 eye injuries occur everyday at work in the US. Most of these injuries are preventable. Construction workers have one of the highest eye injury rates. Particles of dust, metal, wood, slag, drywall, cement etc. are the most common source of eye injury to carpenters. Even "minor" eye injuries can cause life-long vision problems and suffering—a simple scratch from sawdust, cement, or drywall can cause corneal erosion that is very painful.

### Potential Eye Hazard Examples

- Hammering, grinding, sanding, and masonry work that may produce particles
- Handling chemicals may lead to splashes in the eye
- Wet or powdered cement in the eye can cause a chemical burn
- Welding leads to exposure to arcs and flashes (intense UV radiation) for welders, helpers, and bystanders
- Dusty or windy conditions can lead to particles in the eye
- Eye injuries can result from simply passing through an area where work is being performed
- Coworkers around or above you may generate the hazard

### Do workers at your site wear proper eye protection when needed?

- How many firefighters at your station wear any eye protection at any time? None, some, or a lot?
- Are they wearing the correct or proper eye protection? Never, sometimes, usually, or always?
- The most common answer given by construction workers with eye injuries when asked why they weren't wearing safety glasses:

***I didn't think that I needed it!***

### What is safety eye and face protection?

Safety eye and face protection includes non-prescription and prescription safety glasses, clear or tinted goggles, face shields, welding helmets, and some full-face type respirators that meet the ANSI Z87.1 Eye and Face Protection Standard

- The safety eyewear must have "Z87" or "Z87+" marked on the frame and in some cases the lens

### What are the lenses in safety glasses made of?

- Most non-prescription ( plano ) safety glasses have polycarbonate lenses
- The non-prescription safety glasses are tested by shooting a 1/4" BB at 100mph at the lens and dropping a 1 pound pointed weight from 4 feet on the lens—if it breaks in either test it won't have the Z87 mark
- Prescription safety glasses may have polycarbonate, glass, or a plastic called CR39 but these glasses only have to pass a test of dropping a 2 ounce steel ball from 4 feet unless they are marked Z87+; then they must pass the high velocity/impact tests
- Polycarbonate lenses are much more impact resistant than glass or plastic lenses. Glass and plastic lenses usually shatter into small sharp pieces, but polycarbonate usually just cracks

**Don't accept eye injuries as just a part of the job!**





# Safety Brief

JCFPD Training Division

September 2007

2007-9



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## Electrical Safety

Firefighters often respond to emergencies where uncontrolled electrical wires may be present. We often think of structure fires as one location where energized electrical wires may be found, but downed wires can also be found at automobile accidents and grass fires, among other types of emergencies.

### Hazards for Firefighters

Upon arrival, the apparatus operator should look for overhead wires before spotting the truck. The first-in crew should survey the scene as they dismount to determine what hazards might be present. Always look for the electrical wires, including looking for the downed lines. Firefighters should always:

- ⚠ Consider **ALL** electrical wires to be energized until controlled by the utility company;
- ⚠ Consider **ALL** victims in contact with electrical wires or equipment to be energized;
- ⚠ Control access to the scene and mark areas with downed wires with traffic cones;
- ⚠ Turn off power inside buildings by throwing the main breaker; and
- ⚠ Have Central Dispatch contact the utility company for all outdoor electrical emergencies.

### Avoiding Injury

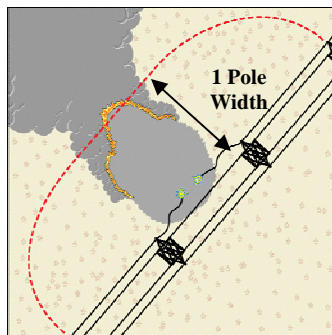
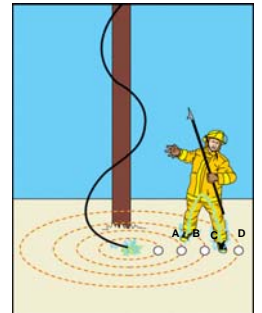
Electrical current passing through the body can cause burns, internal bleeding, respiratory paralysis, and heart failure. According to the Centers for Disease Control and Prevention, the amount of current, the length of the shock, and the path of the current determine how the body is affected. Low amperage (as low as 50 milliamps) and low voltage (as low as 49 volts) can be fatal! When the current passes through the heart, fatal injuries are more likely.

Firefighters must remember that aluminum ladders and pike poles (even wooden and fiberglass poles) can transmit electricity from

overhead lines to firefighters. Firefighters should not attempt to move downed wires with pike poles. Locate overhead wires and pass on the information to other firefighters at the scene.

Vehicles in contact with downed wires should be considered energized until rendered safe by utility company workers. A thorough survey of the rescue scene by the Incident Commander should include looking for downed wires. Recently, JCFPD personnel encountered a vehicle in contact with downed wires. Fortunately, the wires were not energized when the occupants crawled out of the vehicle.

Energized wires can also transmit electricity through the ground. Firefighters should be aware of possible electrical current in the soil. The strength of the electrical current will diminish with distance. If you spot electrical wires on the ground, shuffle your feet along the ground, keeping both feet on the ground as you back up, to lessen the chance of electrocution. The location of downed wires should be marked with traffic cones. **Do NOT move downed wires—wait for utility workers!**



During September 2007, a Kansas fire officer apparently stepped on a downed wire at a grass fire and was electrocuted to death. Upon arrival at grass fires, always locate the electrical wires to determine if they are part of the problem. When downed wires are spotted, establish a safe zone that goes one pole on either side of the downed wire.

### Protect Yourself

Firefighters may encounter downed electrical lines at almost any type of emergency—grass fires, vehicle rescues, and structure fires. Identify the location of electrical wires, control access, and warn firefighters so they can avoid electrocution.



# Safety Brief

JCFPD Training Division

October 2007

2007-10



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## Listening on the Fire Scene

On the fire scene there can be many noises; some good, some bad and some that are just too loud. But our hearing can play an important part of keeping us safe and our equipment operating properly. Sirens wailing, engines running, people screaming and then there is the sound of the fire roaring and crackling as it grows and expands.

### Listening to Your Equipment

The apparatus operator should get to know the sound of the motor and pump when it is running properly. The motor's sound may get higher in frequency, as the motor's revolutions per minute (RPMs) increase. This may occur when the pump loses its prime. The turbocharger can have a seal failure and the engine is now burning not only diesel, but also the motor oil that is used to keep the engine lubricated. Or the operator may hear knocking, hissing, or banging sounds, all of which indicate the engine is not running correctly.

When using a pump to draft water, the pump will decrease in RPMs when the water begins to enter the pump intake. The air in the pump does not have any resistance. However, the water has resistance and causes the motor to work harder and thus causes the reduction in RPMs. Listen to the apparatus that you are operating and learn its sounds.

### Listening While You Search

Your assignment is to do the initial search and rescue in a single story family residence late at night. There is a fire in the living room and the initial attack team is knocking it down. Your team is searching the back of the house in what appears to be the bedrooms. You shout, "Fire department! Is anyone in here?" Your team stops breathing and listens. You hear a muffled cry. A small child is hiding in the closet under a blanket and clothes.

You tell him, "It's OK, we're firefighters and we're here to help you." You and your partner

quickly find the child and get him to safety. Listen for the sounds when doing search and rescue.

### Listening For Your Protection

You respond to an old multi-story farm house that is filled with smoke. You and your partner enter the structure and begin searching for the fire. You use an axe and sound the floor to see if it is solid. At first the floor sounds solid. Then you hit the floor and there is soft thud. After several hits, you realize that floor is very soft and spongy.

You and your partner back up several feet. You give the axe a good swing and hit the floor. The axe goes into the floor and when you take the axe out, there is a lot of fire, smoke and heat coming up through the hole at you. You just discovered that the fire is in the basement and has burnt the floor in front of you to the point that it is not safe. You begin to attack the fire by opening the hole up with your axe and begin applying water to the fire. Listen to the sound of the floor. It may keep you from joining the fire in the basement.

### When Is Noise Too Loud?

People have different sensitivities to noise. According to the Center for Disease Control and Prevention (CDC), there are two rules for noise. First, if you have to raise your voice to talk to someone who is an arm's length away, then the noise is likely to be hazardous. Second, if your ears are ringing or sounds seem dull or flat after leaving a noisy place, then you probably were exposed to hazardous noise. As a general rule, noise may damage your hearing if the noise hurts your ears, makes your ears ring, or you have difficulty hearing for several hours after exposure to the noise.

How long can you be exposed to noise before it is hazardous? The degree of hearing hazard is related to both the level of the noise as well as to the duration of the exposure. The safest thing to do is to ensure workers always protect their ears by wearing hearing protectors anytime they are around loud noise.



# Safety Brief

JCFPD Training Division

November 2007

2007-11



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## Cryogenic Liquids

Cryogenic liquids have a normal boiling point below  $-238^{\circ}\text{F}$  ( $-150^{\circ}\text{C}$ ). The most commonly used cryogenic industrial gases are oxygen, nitrogen, argon, hydrogen, and helium. Other gases stored, transported, and handled as cryogenic liquids are liquefied natural gas and liquefied carbon monoxide. Gases are cooled, pressurized, and liquefied so that more product can be placed in the same space, reducing transportation and storage costs.



### Hazards for Firefighters

Cryogenic liquids and their boil-off vapors can rapidly freeze human tissues. Many common materials, including carbon steel, plastic, and rubber can become very brittle when exposed to cryogenic temperatures. These materials may fracture under stress during or after exposure to cryogenics.

Cryogenic liquids are cold enough to solidify air, water vapor, or other contaminants. Ice plugs can occur in piping or vents, causing over-pressurization and container failure. Most cryogenic storage containers will have both a pressure relief device and a frangible disc to protect against over-pressurization.

Most cryogenic liquids are odorless, colorless, and tasteless when they vaporize into a gas. However, leaking cryogenic liquids will condense the water vapor in the air into a fog cloud. This fog will spread out beyond the actual cryogenic gas cloud.

### Avoiding Injury

Firefighters should avoid contact with cryogenic liquids and their vapors. Cryogenic liquids and their boil-off gases are cold enough to freeze exposed skin, eyes, and lungs. Spilled cryogenic liquids will boil and splash as the liquid encounters air, the ground, or warm objects. Stay well clear of boiling or splashing cryogenic liquids.

Never touch uninsulated pipes or containers. The extremely cold metal will freeze human tissue to the metal. The only way to remove the human tissue will be to tear it off the cold metal. Liquid oxygen presents special problems. Liquid oxygen is nonflammable, but oxygen will support combustion and accelerate the burning process. Liquid oxygen can react with organic materials (oil, grease, asphalt, or dirt contaminated with these products) and ignite with low amounts of heat or a low energy spark. If asphalt or contaminated dirt is exposed to liquefied oxygen, no one should walk or drive on the exposed material for at least 30 minutes after all frost or fog has dissipated.

All liquefied gases except oxygen can displace oxygen in the air. Low lying areas or enclosed structures could have low levels of oxygen, exposing firefighters to asphyxiation. Monitoring of these spaces can be accomplished by using oxygen meters to measure the level of oxygen present in the air. Levels below 19.5% by volume require the use of self-contained breathing apparatus.



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Cryogenic liquids can be used, stored, or transported in containers ranging from small flasks to railroad tank cars, usually made of metal. All containers will have thick insulation protection surrounding the container. Some containers, especially the small flasks, will be non-pressurized. Larger containers will have two containers.

The inner container will be pressurized by the product. The space between the inner container and the outer container is generally filled with insulation and operates under a vacuum. If frost appears on the outside jacket, it may indicate that the vacuum has been compromised.

### Protecting Yourself

Firefighters will generally come into contact with cryogenic gases during transportation or during an emergency response to a facility utilizing cryogenic industrial gases. Firefighters should avoid contact with spilled liquid, boil-off gases, or cold containers and piping. Contact hazardous materials specialists for additional operational information.



# Safety Brief

JCFPD Training Division

December 2007

2007-12



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## Ten Safety Tips for Christmas

1. Christmas trees burn. It is important to first get a fresh tree with needles that do not fall off. Second, keep the tree watered. Third, keep all sources of ignition far away from the tree. Fourth, keep a fire extinguisher near the tree. Fifth, have a fire plan for your home in the event of a fire, and practice it at least once a year.
2. Strong north winds and wet bunker gear can make for a long cold night. Be prepared for the cold. Hypothermia and frostbite can happen on the fire scene in the winter time. When the pager goes off at 1:30 AM, having long underwear and your clothes laid out and ready to be put on will reduce your response time significantly. Also set out and bring along a second pair of clean dry socks. If you get your feet wet at the fire scene, a dry clean pair of socks is great.
3. Make sure the chimneys and flues are inspected and are in serviceable condition. If you burn wood, make sure to clean or have professionals clean the flue before the build up of creosol causes a flue fire.
4. Candles cause fires. Burning candles can be very dangerous any time of the year, but it seems that more people use candles at Christmas time. Keep candles away from Christmas trees. Always keep an eye on the candles when they are burning. Have a fire extinguisher near by in the event of an emergency. Keep all combustibles away from burning candles. When you leave the room with the burning candles, the candles should be put out. Remember a fire can double every fifteen seconds, and many fires are started by candles.
5. Electrical Christmas decorations can cause fires. Before installing the Christmas lights be sure to inspect the wires, cords and plugs. Look for cracks, frays, broken or missing insulation, bare wire or any other damage. If you find any damage, repair or replace them. Light bulbs can

emit heat, so take care to not have the actual bulb contact combustible materials. Be sure to use outside lights outside and inside lights inside.

6. As the decorations are installed, make sure the circuits are not overloaded. Do not stair step or daisy chain extension cords. Just because there are six plugs on the extension does not mean it can handle the electrical load. Do not place extension cords under carpets or other flammable materials.

7. Slipping and tripping hazards. Winter can bring ice and snow. These conditions can bring a person on their back in seconds. Be prepared for these conditions by wearing boots or shoes that will grip and not slip. Watch your step when walking, slow down and do not get in hurry. It may be hard on the fire scene, but it can hurt when you fall.

8. Have your personal vehicle ready for the winter. As the weather gets cold, it is a good idea to check your tire pressure. It may be low, and by airing up the tires you will not only reduce tire wear, but will get better mileage and better performance from your tires. Make sure the antifreeze will protect to -25 or better.

9. The following are some ideas for Christmas presents; Smoke detectors and batteries, a quality fire extinguisher, a flashlight and batteries or light sticks, a first-aid kit, carbon Monoxide detector, a mobile phone, a second floor escape ladder, and an "emergency kit" which can include, energy bars, water, battery radio, flashlight/light sticks and a first-aid kit packed in a small travel bag.



10. From all of us at the Training Division please have a very safe and Merry Christmas and a Happy New Year!