



# Safety Brief

JCFPD Training Division

2013-January

2013-1



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## Chainsaw Safety

In the past few months, JCFPD firefighters have used chainsaws to cut down burning trees and cut downed timber to create a fire line. In addition to wildland fire usage, chain saws have also been used to conduct vertical ventilation and overhaul on burning structures. Chainsaws are a handy tool, but require safe usage.

### Hazards for Firefighters

Chainsaw safety falls primarily on the shoulders of the saw operator. However, officers and firefighters are also responsible for chainsaw safety. Officers need to consider the hazards associated with operating chainsaws in close proximity to other firefighters or close to uncontrolled fire. Firefighters must be aware of chainsaw operations and not place their body in the way of the saw or cut/falling timber or structural components.

Chainsaws should be inspected regularly and before each use. During station maintenance, chainsaws should be checked for loose/missing bolts and screws; all missing fasteners should be replaced and all loose fasteners tightened. The chain and bar should be inspected. The bar should be seated correctly for safe operation. The chain itself should be checked for sharpness. Recently, multiple chains at both wildland and structural fires have been found to be so dull that the chainsaw was effectively out of service. Tightness should also be checked. Chains should be snug, but not tight, when cold. As the chain moves through the wood, it will heat and lengthen slightly, becoming looser.

At the scene, chainsaws should be inspected before use. While at the truck, check the fuel and chain oil levels. Also check the sharpness and tightness of the chain. If problems are found, fix them before leaving the truck. Chainsaws should be started on the ground and warmed up before being taken to the roof for ventilation operations.



## Avoiding Injury

Chainsaw operators should consider the following issues during fireground operations:

- PPE-Always wear proper PPE when using chainsaws. Eye protection is essential-safety glasses should be stored with each chainsaw. Gloves should be worn. No loose clothing or loose boot laces should be present while operating a chainsaw.
- Inspection-Check the chainsaw, bar, and chain prior to use. Check fuel and bar oil to ensure chainsaw can complete an assigned task before running low.
- Chain brake-The chain brake is there for your safety. Always engage the chain brake before starting the saw, or when moving with a running saw (even a few steps!). Engage the chain brake before setting a running saw on the ground.
- Be aware of your surroundings-Locate all personnel in the work area and advise them before starting the saw. Use a spotter to watch for hazards while operating the saw. Watch your footing, whether on loose, rocky steep terrain during a wildfire, or on a roof during structure fires. Always look up, watching for snags, power lines, or other overhead obstructions.
- Cutting trees-Always plan your escape route when falling trees. Use a spotter to watch for spreading fire or other firefighters moving into the fall zone.
- Ventilation-Recognize the hazards of operating above the fire. Use a roof ladder or halligan to provide safe footing.
- Safe operation-Make sure you are properly trained to operate the chainsaw. If you are not comfortable with the assigned task, notify your supervisor. Mitigate the safety issues with the task before proceeding.

## Protect Yourself

Chainsaws can quickly cause injury or death if operated unsafely. Inspect your equipment, use PPE and a spotter, and operate the chainsaw safely. Let's all safely go home after each incident.



# Safety Brief

JCFPD Training Division

2013-February

2013-2



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## Severe Weather

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. In our area, severe weather may take the form of thunderstorms, tornadoes or straight-line winds, flash flooding, or hail.

### Hazards for Firefighters

Thunderstorms affect relatively small areas when compared to hurricanes or winter storms. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Only 10% of the estimated 100,000 thunderstorms each year are classified as severe.

Tornadoes consist of a violently rotating column of air extending from a thunderstorm to the ground. Tornadoes can be up to one mile wide and stay on the ground for over 50 miles. The strongest tornadoes have rotating winds of more than 250 mph. While a tornado can move in any direction, the average tornado moves from southwest to northeast. The average forward speed of a tornado is 30 mph, but may vary from nearly stationary to 70 mph. Tornadoes cause an average of 70 fatalities and 1,500 injuries in the U.S. each year.

Straight-line winds are responsible for most thunderstorm wind damage. Straight-line winds can exceed 100 mph. Downbursts, a small area of rapidly descending air beneath a thunderstorm, can cause damage equivalent to a strong tornado, knocking down trees and buildings.

Flash flooding is the #1 cause of deaths associated with thunderstorms. More than 140 fatalities occur in flash floods each year. Most flash flood fatalities occur at night and most victims are people who become trapped in cars. Six inches of fast-moving water can knock you off your feet. A depth of two feet will cause most cars to float!

Hail causes more than \$1 billion in damage to property and crops each year. Hail is made when droplets of water are carried by strong updrafts (rising currents of air within a

thunderstorm) to elevations where freezing occurs. The frozen water droplets repeatedly fall and are lifted by updrafts until the ice particles become too heavy to be lifted by the rising air. Large hail stones can fall at speeds faster than 100 mph.

### Avoiding Injury

Firefighters should be aware of weather conditions forecast for the region. When severe weather is possible, the local weather service office will issue severe weather watches and warnings. A watch or warning may be issued for severe thunderstorms, tornadoes, or flash floods.

- Weather watch. A watch is issued when conditions are favorable for the development of the specified severe type of weather.
- Weather warnings. A warning is issued when a specified type of weather has been observed by eye or radar in the area.

Tornado watches are issued when conditions are favorable for the development of tornadoes. Tornado warnings are issued when trained observers or radar indicates that tornadoes have formed within the watch area. A severe thunderstorm watch/warning is issued when conditions include damaging winds greater than 58 mph, and/or damaging hail of 3/4" diameter or greater. A high wind watch/warning is issued when winds of 40 mph or greater are expected for one hour or longer, or frequent gusts of 58 mph are expected. Flash flood watch/warnings are issued 6 to 24 hours in advance of expected flood potential.



### Protect Yourself

Although JCFPD does not provide storm spotters during severe weather, firefighters should be aware of the possibility of severe weather. Storm spotter training will be offered by Johnson County EMA on March 21, 2013 on the UCM campus. The flyer for this training is reproduced on the back of this issue. Consider attending this course to be better prepared for severe weather. Remember, our goal is for everyone to go home safely at the end of each incident.



# Storm Spotter Training

Where: University of Central Missouri  
WC Morris Science Building  
Nahm Auditorium

Parking available in the lots at South St and Holden St

When: March 21, 2013

Time: 7:00 PM

Presented by:  
The National Weather Service

Hosted by:  
University of Central Missouri Public Safety  
and  
Warrensburg/Johnson County Emergency Management



# Safety Brief

JCFPD Training Division

2013-March

2013-3



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## Firefighters Struck By

Firefighters can be injured in many different ways. One type of injury type occurs when firefighters are struck by an object. Firefighter "struck by" injuries can result from many different objects.

### Hazards for Firefighters

According to the NFPA, during 2011 11.7% of firefighter injuries were caused by being struck by or coming into contact with an object. These types of injuries can occur in many different ways. The following are recent examples of how firefighters can be struck by objects.

#### Struck by vehicles

-A Pennsylvania firefighter was struck by a vehicle driven by an impaired driver while closing the road assisting a police investigation.



-A Missouri firefighter suffered minor injuries when his firetruck was struck on I-44. The firetruck was in a median crossover with its warning lights on when it was struck by a truck towing another vehicle. The two occupants of the second vehicle had serious injuries.

#### Struck by falling objects

-An Arkansas firefighter was struck by a falling garage door when the cable burned through. The firefighter's leg was pinned by the door until the door was raised by fellow firefighters.

-Several Virginia firefighters were struck by a collapsing ceiling and received minor injuries. The firefighters had to be pulled from the rubble by other firefighters.

-An Idaho Forest Service firefighter was struck by a falling 150-foot tall cedar tree while working on a wildland fire.

#### Struck by other objects

-A Wisconsin firefighter was struck by a supply hose when a fire truck was moved without disconnecting the supply hose. As a result, the hose disconnected from the hydrant and struck the firefighter, causing leg and pelvis injuries.

-Two Chicago firefighters suffered minor injuries when a porch roof collapsed on them, forcing them through the floorboards into the basement.

### Avoiding Injury

With all of the different types of "struck by" injuries, how can firefighters protect themselves and fellow firefighters? Emergency scenes are often chaotic and it is difficult to remove all hazards prior to operations.

Here are some suggestions to protect against "struck by" injuries:

- Look up! Often the object that can fall and strike a firefighter are located above the work zone. We often do a good job of looking around, but fail to look above where we are operating. Some hazards should be anticipated, including the possibility of falling ceilings and porches.
- Anticipate inattentive drivers, especially on divided highways. When working at roadway incidents, use apparatus to block lanes and provide some safety for operations. When directing traffic, always watch approaching traffic and pre-plan an escape route to get away from drivers who do not stop.
- Apparatus operators should slow when approaching intersections and be prepared to stop if other vehicles do not stop. Consider coming to a complete stop if traffic lanes are obstructed from view.
- Consider the potential energy stored in hose lines, fire pumps, and equipment located high on apparatus. Use extra firefighters to avoid dropping objects located at heights.

### Protect Yourself

"Struck by" injuries are possible at all emergency incidents, including structure fires, wildland fires, and roadway accidents. Look up to identify possible hazards, and watch for approaching vehicles which fail to yield. Let's all safely go home after each incident.



# Safety Brief

JCFPD Training Division

2013-April

2013-4



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## Target Hazards-Churches

Firefighters respond to many different types of structures. It is not possible to create a preincident plan for every property in our district, so we try to identify those properties that pose an increased risk to firefighters. These properties are called Target Hazards. Over the next few months, we will address hazards associated with different types of target hazards. This month's issue will discuss the hazards of church buildings when they burn.

### Hazards for Firefighters

According to the U. S. Fire Administration, an average of 1,300 church fires are reported each year. The single leading cause of church fires is arson (causing 25% of all church fires). But mechanical failures such as faulty wiring, and malfunctioning heating systems also cause a large number of fires, often because these systems are located in older structures. Fires in churches do not cause many fire deaths, but firefighters are injured and killed while fighting church fires.



Most church fires originate in the exterior walls and ceiling/roof structures of churches (about 18%). Fires also start in large assembly areas (10%) and kitchens (10%).

Interior operations present numerous life hazards for firefighters. Fires in churches are often in concealed spaces, making it difficult to recognize signs of potential collapse. Often, firefighters will see no smoke or flames inside the church because the fire is burning inside the walls or ceiling.

Although many large churches have heavy timber or masonry construction, smaller churches are often built with lightweight combustible dimensional lumber. Roof assemblies can fail quickly, presenting little warning to firefighters advancing hose lines or conducting a search inside the building. Bell towers and steeples can also collapse, leading to firefighter injuries/death. Firefighters also may attempt to make an aggressive attack to prevent

fire from traveling into attached offices, schools, or residences.

Church fires will often require extensive water supply operations. Some churches in our district will have hydrant water supplies, but many churches will require tanker shuttles to provide adequate water.

Access to church buildings can be complicated by their size and placement on the building lot. Some may have parking lots nearby, which provide extra space for fire suppression unless the church is occupied at the time of the fire.

Interior construction can also complicate fire attack. Although churches have large open worship spaces, there will also be many small meeting rooms, storage spaces, kitchens, and utility spaces. These small spaces will present a challenge for extinguishment and overhaul.

### Avoiding Injury

During church fire operations, offensive operations can lead to firefighters operating inside a building which may collapse, rapidly flash over, or even develop a backdraft condition. Fire

officers need to watch for fire extension, especially in hidden areas. Defensive operations should anticipate building collapse and include bell towers and steeples when identifying collapse zones.

Many rural churches are not near other buildings. This can lead to delayed alarms, which often result in substantial fire damage prior to our response. We must anticipate a well-established fire compromising the structural integrity of the building when we arrive on scene.

### Protect Yourself

Church fires are not like residential structure fires! Respect the differences of large buildings. Stay safe, and make sure everyone goes home!



# Safety Brief

JCFPD Training Division

2013-May

2013-5



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## Pipeline Safety

Missouri has more than 37,000 miles of buried pipelines. There are more than 5,500 miles of hazardous liquid pipelines, more than 4,500 miles of gas transmission lines, and more than 27,000 miles of gas distribution lines serving more than 1.5 customers. During the past decade, there were 105 pipeline incidents in Missouri, which caused 2 fatalities and 6 injuries. So far during 2013, there have been 3 pipeline incidents in Missouri causing 1 fatality and 4 injuries.

In Johnson County, there is a total of 268 miles of gas pipelines and 100 miles of liquid pipelines. JCFPD's run area has both gas and liquid pipelines, crossing through every station's run area. It is important for firefighters to recognize the safety issues associated with pipeline emergencies.

### Hazards for Firefighters

Some pipeline emergencies can originate with the pipeline itself. Leaks or spills from a pipeline are not common, but they can occur. Firefighters operating near a pipeline should use their senses to identify the possibility of a pipeline emergency.

First, recognize the signs marking the presence of a pipeline near road crossings, fence lines, or railroad crossings. Look for liquid spills on the ground or on water, or vapor clouds or mist in the air. Also, look for bubbles in waterways passing over pipelines. Finally, look for discolored vegetation in the middle of green growth. Obviously, fires can also be seen, especially at night.

The sense of smell can also detect leaks and spills. However, remember that many gases being moved through transmission pipelines may not have any odorant in the product. Finally, the sense of hearing may be used to detect leaks or spills. Hissing, whistling, or

roaring sounds near pipelines may indicate a problem.

Not all pipeline emergencies may originate with the pipeline itself. In some cases, the pipeline should be considered an exposure of another primary emergency. For example, a ground cover fire burning over a pipeline right-of-way or near a control station should be reported to Dispatch for relaying to the pipeline operator. Also, significant structure fires near pipelines may also create an exposure issue.



Pipeline Markers

### Avoiding Injury

When responding to reported pipeline emergencies, responders should approach the scene from uphill and upwind. Do not drive into clouds or park over manholes, storm drains, or low-lying creeks. Establish an incident command structure and establish

control over the scene and deny entry to the hazard area. Don't forget to notify the railroad if it runs through the hazard area.

Next, identify the problem. Determine the product type that is entering the environment and environmental conditions which may make the problem worse, including temperature and wind speed.

Protect people, property, and the environment from damage. Evacuate those at risk, or protect them in place if they cannot be evacuated. Do NOT extinguish any fires originating from the pipeline itself! Don't attempt to operate pipeline equipment. Provide information to Dispatch for relaying to the pipeline operator. Work with the pipeline operator's representatives when they arrive on-scene.

### Protect Yourself

Know where the pipelines in your response area are located, and whether they move liquid or gaseous products. Encourage your neighbors and construction companies to use the state one-call system (8-1-1) at least 48 hours before digging. Stay safe, and make sure everyone goes home!







# Safety Brief

JCFPD Training Division

2013-August

2013-8



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## Target Hazards-Storage Units

Throughout our fire district, more and more storage unit buildings are being built. Many of these buildings are specifically built to contain multiple storage units, although existing buildings can be converted to contain individual storage units. As basements, garages, and attics get converted to living spaces, people often move their household storage to these storage units. We can analyze the problems of storage units (or any other type of building) by using the acronym COPE, which stands for Construction, Occupancy, Protection, and Exposures.

### Hazards for Firefighters

Just like residential occupancies, we can begin by assuming that any hazard found inside a residence can be found inside a storage unit. Although most storage businesses do not allow the storage of flammable liquids or hazardous materials, the owner of the storage building usually has no idea what is stored inside each unit. Storage units have even been used as meth labs, or used as illegal residences.

Storage units are not only used for residential storage. Small businesses or self-employed tradesmen can rent units for their business activities. As a result, firefighters should expect that a storage unit can include almost any type of industrial equipment.

**CONSTRUCTION.** Newly-built structure can be built of wood-frame, unprotected steel, or noncombustible construction. Remember, there are no building codes in unincorporated portions of our fire district. Often steel panels are used for both the exterior and interior skin of the building. However, individual units are not usually separated by fire-resistant construction. Gaps in the corners, or at the top of unit below the roofline, may allow fire and smoke to spread from unit to unit before walls are compromised.

Heat can be conducted through interior metal walls from one unit to another. Lightweight construction can lead to rapid collapse under fire conditions.

**OCCUPANCY.** As noted above, almost any type of product may be stored in a storage unit. Because units are a fixed size, renters may fill the space from floor to ceiling and wall to wall to maximize the storage capacity. It may be difficult to penetrate the stored materials with hose streams. Renters will place their own locks on the unit door, which means that entry will have to be forced by cutting the lock or going through the door.

**PROTECTION.** In our fire district, storage units will likely not have sprinkler systems or smoke detectors installed. Hydrants may located at distance from the building, requiring tanker water supply evolutions.



**EXPOSURES.** Each unit will have an exposure on the sides and the rear, if built two units deep. Additionally, many units offer outside storage near the building.

Boats and recreational vehicles may be located near the building, creating access difficulties and adding more fuel to the problem.

### Avoiding Injury

Visit the storage buildings in your run area. Determine if the buildings only have outside access, or if there are interior corridors. Identify the construction type, and consider if there will be rapid fire spread and early collapse of the structure. Watch for new storage units being built, and observe the construction techniques used.

### Protect Yourself

Identify the possibility of life hazards quickly upon arrival. If life safety is not an issue, consider defensive operations to avoid firefighter injuries. Pay attention to possible structural collapse. Remember that stored contents may become unstable under fire conditions, especially when doors are opened. Stay safe, and make sure everyone goes home!



# Safety Brief

JCFPD Training Division

2013-September

2013-9



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## Hazards of Vehicle Fires

Vehicle fires occur 17 times every hour in the United States, according to the NFPA. For the years 2006-2010, vehicle fires killed an average of four people every week. In addition, 764 civilian injuries were caused by vehicle fires during this period. The direct property damage attributed to vehicle fires in the United States totaled \$536 million.

### Hazards for Firefighters

Automobile fires are responsible for 10% of all reported U.S. fires, NFPA statistics reveal. Fires in automobiles cause 12% of the total fire deaths reported, along with 8% of civilian injuries. Firefighter injuries related to automobile fires were reported to be 4% of the total number of firefighter injuries, according to the U.S. Fire Administration.

Mechanical failures or malfunctions caused 49% of all highway vehicle fires. These types of failures include leaks or breaks, backfires, or worn-out parts. Mechanical failures contributed to 11% of the civilian fire deaths. Electrical failures or malfunctions contributed to 23% of highway vehicle fires, but less than 1% of the fire deaths. Collisions and overturned vehicles were a factor in only 3% of the vehicle fires reported, but resulted in 58% of all vehicle fire civilian fire deaths.

According to the reported statistics, 64% of all vehicle fires begin in the engine area, the running gear area, and the wheel area. Only 2% of all vehicle fires begin in the fuel tank or fuel line area.

Young adults ages 15-24 are almost twice as likely to die in a highway vehicle fire (25%) compared to their percentage of the population (14%). And 78% of all people who die in highway vehicle fires are male! One-third (35%) of all nonfatal vehicle fire injuries occur when civilians attempt to fight the fire themselves.

### Avoiding Injury

The first-arriving officer or senior firefighter must conduct an effective size-up when confronted with a vehicle fire. What type of vehicle is involved? There is a big different in

risk between an automobile and a tractor-trailer. How much of the vehicle is involved? A well-involved vehicle is not likely to have much of value left after extinguishment, but a small engine compartment fire may leave much of the vehicle undamaged.

Are there exposures? A vehicle on the side of the road is very different from one parked in the garage of the structure. Are there hazardous materials on board? This may be difficult to determine during size-up, as hazardous materials may be hidden inside the passenger or trunk compartments.

Is the vehicle a hybrid vehicle? In addition to the common vehicle fire hazards we have come to expect, hybrid electric vehicles can also present challenges, including electric shock, vehicle movement, and fire extinguishment/overhaul problems. The U.S. Fire Administration recommends the following steps for all incidents involving hybrid vehicles:

- Always assume the vehicle is powered-up despite no engine noises.
- Put vehicle in park, turn ignition off, and remove key to disable the high voltage system.
- Never touch, cut, or open any orange cable or compartments protected by orange shields
- Remain a safe distance from the vehicle if it is on fire.
- Consider the electrical system unsafe for at least a full 10 minutes after ignition shutdown.

Some manufacturers are recommending a defensive "let it burn" strategy for hybrid vehicles. If the fire must be extinguished, use large volumes of water from a safe distance to put out the fire. Also be aware of battery electrolytes, which could be released during fire conditions.

### Protect Yourself

There are many hazards at a vehicle fire, from exploding tires and struts, to leaking fuel systems. Newer hybrid vehicles also have their own fire hazards. Use caution, consider defensive operations (when appropriate), and protect your crew. Remember, everyone goes home alive!



# Safety Brief

JCFPD Training Division

2013-October

2013-10



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## Harvest Hazards

As fall begins, we will see combines in the fields as corn and soybeans are harvested. Harvest time has unique hazards that can put firefighters at risk. These hazards include fire-related and rescue-related issues.

### Hazards for Firefighters

**Fire Hazards**—Every fall, combines operating in fields catch on fire. Often these fires are fueled by an accumulation of dust in the engine compartment or within the processing equipment. Corn or soybean dust on the exhaust manifold or turbocharger has been reported as the ignition source in recent studies in South Dakota. Studies have shown that fires increase as outside temperatures rise and humidity levels are reduced. Although corn dust is common, sunflower stalk dust has a lower ignition temperature and can cause problems. The larger volume of synthetic materials on modern combines can also produce a large fire load once ignited. Leaking fuel or hydraulic fluid can also present a challenge to extinguishment. Combine fires can quickly spread to unharvested crops, creating more property losses.



**Rescue Hazards**—Increased handling of corn and soybeans in the fall can bring grain bin hazards. Grain bins should be considered confined spaces, which require special considerations before entering to conduct a rescue. (See the June 2012 issue for more details on confined space safety.) Flowing grain can entrap farm workers, leaving them completely buried in less than 30 seconds. Grain bridges can result from the removal of grain from the bottom of a bin, leaving a crusted surface of grain at the top. Unfortunately, the crusted grain bridge may not support human weight, resulting in a fall into the void space below the surface. When grain is removed from the bottom of the bin, there should be a visible funnel shape on the grain surface. If the funnel

shape is not visible, a grain bridge should be suspected.

### Avoiding Injury

Harvest hazards require that the incident commander be aware of all hazards, not just the hazard we are dispatched to solve. Harvest emergencies can place the lives of firefighters and the public at risk.

For combine fires, consider the following issues:

- The combine may be off-road, requiring brush truck response. However, engines are also needed to provide SCBA and hand tools, which are needed for all vehicle fires.
- In addition to the combine fire, field fires may result. These unharvested crops are a valuable exposure which needs to be protected. Don't be afraid to request additional equipment
- Water supply is always an issue when responding to combine and field fires.

For grain-related rescue issues, consider these issues:

- All grain-moving machinery must be turned off to stop the flow of grain. Power supplies should be locked out to prevent accidental re-starts.
- Grain bins can be ventilated using grain-drying equipment without the heaters turned on.
- Don't risk rescuer lives to recover bodies. Confined space emergencies require rescuers to slow down and consider the risk-benefit ratio.

### Protect Yourself

Harvest hazards are similar to the more common emergencies we respond to daily. Slow down, consider the risks, and look for a safer way to solve the problem. Remember, **everyone goes home alive!**



# Safety Brief

JCFPD Training Division

2013-November

2013-11



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## It's Just A Gas Leak!

JCFPD firefighters get dispatched to a variety of emergency calls. The information we get from Central Dispatch can either heighten our awareness of hazards, or it can lull us into a false sense of security! What do you think when you are toned for "gas leak" call?

### Hazards for Firefighters

First, we need to establish what hazards are associated with our "gas leak" call. Which state of matter are we going to be faced with? We often get dispatched to a liquid spill of gasoline, although we may be told "it's just a gas leak." When we must deal with gasoline, it is often a good idea to use the whole word (gasoline) instead of the short version, gas. That is because we also must deal with emergencies involving gases, which are not liquids!

Liquids assume the shape of the part of the container which the liquid occupies. The atoms of a liquid can move or slide around, but are usually in contact with each other. Liquids are not easily compressible, because there is little space between the atoms. The volume of liquid in a container may expand a little when heated, but not very much. Liquids may evaporate or boil when heated, giving off a vapor. Flammable liquids are more hazardous when they can vaporize at ambient temperatures.

Gases, on the other hand, assume the shape and the volume of the container they are in. The atoms of a gas can move past each other, because there are lots of free spaces between the atoms. As a result, gases can be easily compressed, which removes the free spaces. Gases are easily affected by temperature, and expand to occupy more space as they are heated.

Some gases, such as nitrogen or oxygen, are not flammable. Other gases can be quite flammable. Propane has a lower flammable limit of 2.1% and an upper flammable limit of 9.5%. Methane has a flammability range from 4% to 15% by volume. Acetylene has a flammability range from 2.5% to 81%!

Gases can be either heavier than air, equal to air, or lighter than air. It is important to identify the leaking gas to determine where an ignitable mixture can be found. Air is assigned a value of 1.0. Propane has a vapor density of 1.5, making it heavier than air. Methane (natural gas) has a vapor density of .55, making it lighter than air. Obviously, we need to identify the type of "gas leak" to determine if the hazard is located at the floor of a building or at the ceiling.

As we learned recently while studying chemical suicides, some liquids can be mixed, releasing a toxic vapor. Mixing household bleach with an acid, such as vinegar, can release chlorine gas. Mixing bleach with a caustic, such as drain cleaner, can also release chlorine gas.

Some gases are toxic to the human body as a whole, or specific target organs. Chlorine gas is an example of a toxic gas. Some gases are not toxic to the body, but are an asphyxiant. Asphyxiants displace oxygen from a space, leaving no air for breathing. Many simple asphyxiants have little or no warning properties. Nitrogen, propane (without an odorant), and carbon dioxide have no warning properties. Some gases, such as chlorine, have warning properties which can overwhelm the body's ability to sense their presence in high concentrations.



### Avoiding Injury

The most important step in responding to emergency calls involving "just a gas leak" is to identify the type of gas involved. Once the type of gas has been identified, firefighters must recognize the hazards associated with that gas. Flammability, toxicity, warning properties, and asphyxiation potential must be considered by the incident commander.

### Protect Yourself

Gas leaks can have many hazards. And keep in mind that some "gas leaks" may actually be liquid leaks releasing gaseous vapors. Remember, **everyone goes home alive!**



# Safety Brief

JCFPD Training Division

2013-December

2013-12



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## Driving Fire Trucks in Winter

Winter is coming (or already here, depending on when you read this month's *Safety Brief!*) You will have to deal with wet and snow-covered roads, icy streets, reduced visibility. And you will also have to deal with other drivers who are trying to deal with the same weather-related driving conditions.

### Hazards for Firefighters

We know that snow and ice are part of our winter conditions. How do we prepare for winter? We need to make sure our trucks are prepared for winter. But we also need to make sure we are mentally ready to operate during winter conditions.

Preparing fire trucks for winter conditions means that we will have to focus our monthly inspections. Some parts of the truck are more important in winter::

- Check the condition and inflation of tires. Make sure there is enough tread left on the tires to provide traction in snow.
- Check the brakes. Report any issues so they can be repaired before we have to deal with slippery surfaces.
- Wiper blades and windshield washer fluid should be checked. Worn out blades should be replaced. Windshield washer fluid should be of the anti-freeze type. Keep the levels full during inclement weather.
- Headlights and emergency lights should be inspected after each response to remove grime and caked ice/snow. Drivers should check headlights before leaving the scene to remove built up ice/snow before driving back to the station.
- Siren cones should be checked regularly during winter conditions. Snow can build up within the speaker cone, limiting the effectiveness of the audible warning device.
- Defrosters should be checked. A warm windshield helps minimize snow/ice buildup on the outside surface of the windshield during emergency responses.



- Automatic tire chains should be inspected to insure that the chains will deploy when needed. Two grease fittings on each side will keep the arm bearings functional.
- Check your on-board supply of ice melt and kitty litter. Both products can be useful to free a stuck fire truck. Both products can also be used to improve traction around pump panels, folding tanks, and other locations where water quickly turns to ice.

### Avoiding Injury

Once the trucks are in good shape, apparatus operators need to get the right "mental picture" of driving in snow and ice. Here are some suggestions to be mentally prepared:

- Remember to turn off the engine brake switch when the roads are slippery due to rain, ice, or snow.
- Think about choosing a route to the scene that minimizes snow-covered roads, hills, or sharp curves. Longer responses might be worth the time if you can actually get to the emergency.
- Turn on the automatic tire chains *before* you need them! Automatic tire chains will not improve traction if you already stuck.

Automatic tire chains can be used at speeds from 2-35 mph, but should be turned on before reaching 25 mph. Automatic tire chains should improve traction until snow depth reaches 4"-6". Snow depths above 6"

- may limit the ability of the chains to spin.
- SLOW DOWN! Slick roads require longer stopping distances and may cause fire trucks to skid sideways. Slowing the response can actually improve response time by minimizing slide-offs and accidents.

### Protect Yourself

Winter weather requires that we prepare our vehicles and attitudes for safer responses. Check your trucks, report problems for repair, and get the right "mental picture" for safe winter driving. Remember, **everyone goes home alive!**