

5. FIRE PREVENTION AND SAFETY

This section first describes how to recognize those hazards that can lead to a fire and then describes guidelines for fire prevention and safety in the office and in the field. The following information is provided:

- Recognition of fire hazards
- Fire extinguishers
- Fire safety in the office
- Fire safety in the field

RECOGNITION OF FIRE HAZARDS

Fire and explosions are pretty easy to recognize--but the goal is to recognize those conditions that can lead to a fire or explosion.

Fires and explosions occur when there is oxygen or air, a fuel, and a heat or ignition source. For a fire to occur, the oxygen and fuel (a combustible or flammable substance) must be present in the proper proportions. However, these proportions differ because every combustible or flammable substance has a specific flammable or explosive range. The lower-end point of that range (typically a mixture of 1% to 5% of the substance and the rest air) is the lower flammable limit (LFL) or the lower explosive limit (LEL). Below this point, there is not enough fuel to support the fire or cause an explosion.

The upper-end point is the upper flammable limit (UFL) or upper explosive limit (UEL), which is typically a mixture of 10% to 15% of the substance and the rest air. Above this concentration of the substance, there is not enough air or oxygen to support the fire or explosion.

Another important factor is the flash point of the substance. The flash point is the temperature at which a substance begins to give off enough vapor to form an explosive or flammable atmosphere. Following are some typical flash points for some of the substances you may encounter:

Acetone: 0°F	Gasoline: 45°F
Isopropyl alcohol: 53°F	No. 2 Diesel Fuel: 110°-190°F
Kerosene: 100°F	Mineral Spirits: 102°-110°F
Ethyl benzene: 59°F	
2-Butanone (MEK): 21°F	
Toluene: 40°F	

Identification of a Fire Hazard

To identify a fire hazard you need to know the difference between a flammable substance and a combustible substance. A flash point of 200°F is the usual dividing line between what is considered flammable and what is considered combustible. If the substance has a flash point of less than 200°F, it is considered to be flammable. If a substance has a flash point of 200°F or higher, it is considered to be combustible.

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The table below shows the different classifications of flammables and combustibles based on their flash point and boiling point temperatures.

Combustible and Flammable Classifications

Temperature Category	Temperature		Classification
	Centigrade	Fahrenheit	
Flash point temperature	93.4°C or above	200°F or above	Class IIIB - Combustible
	60.0°C or above	140°F or above	Class IIIA - Combustible
	37.8°C or above	100°F or above	Class II - Combustible
	22.8°C or above	73°F or above	Class IC - Flammable
Boiling point temperature (Flash point less than 73°F)	37.8°C or above	100°F or above	Class IB - Flammable
	Less than 37.8°C	Less than 100°F	Class IA - Flammable

Class IA Flammable, Class IB Flammable, and Class II Combustible materials are considered "ignitable" for waste disposal purposes. **Class IA Flammable materials are extremely ignitable and require special handling precautions.**

If you know the identity of the substance you are working with you can look up the flash point on the manufacturer's Material Safety Data Sheet (MSDS), if one is available.

However, in many (probably most) situations, you will be working with mixtures of chemicals or unknowns. Therefore, in identifying the hazards of fire and explosion of a substance, you should make some assumptions:

- If the substance is liquid and it smells, it is vaporizing and the vapor is mixing with air.
- Unless you are certain that the substance is not flammable, assume that it is.

Evaluation and Measurement

After identifying that the hazards of fire or explosion exist, you need to evaluate the risk of that happening. In some cases, you may need to measure the presence of combustible or flammable vapors in the atmosphere using a direct reading instrument, usually called a combustible gas meter. Two factors must be remembered when using a combustible gas meter:

- The instrument must be calibrated. In most cases, unless you know or need to know exactly the substance you are dealing with, the meter is calibrated using methane gas. Therefore, you will not be measuring the concentration of a specific substance in the air, but the amount of non-specific combustible vapors in the air.
- The meter is set to indicate a percentage of the lower flammable limit (LEL) of methane (or the specific substance used in the calibration). The needle is not indicating the percentage of substance measured in the air. The instrument is usually set to alarm at 10% of the LEL.

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Control of Fire Hazards

Separation of fuel, air, and ignition sources will lead to fire prevention. However, it is not always possible or practical to separate the fuel and air, but the ignition sources can usually be controlled or minimized. For example, static electricity is one of the most common ignition sources for fire and explosion. Grounding and bonding of equipment and containers of hazardous materials is the most effective way to control static electricity.

FIRE EXTINGUISHERS

Because Oz Directional Drilling rents or leases our office facilities, it is the owner's responsibility to supply and maintain appropriate fire extinguishers. The following guidelines from the National Fire Protection Association may represent minimum requirements. State or local requirements may be more rigorous.

A fire extinguisher, rated not less than 2A, should be provided for each 3,000 square feet of protected building area. Travel distance from any point of the protected area to the nearest fire extinguisher should not exceed 75 feet. Each floor should have at least one 2A fire extinguisher.

The building owner should also:

- Protect extinguishers subject to freezing
- Have all fire extinguishers inspected periodically and maintained in accordance with Maintenance and Use of Portable Fire Extinguishers, National Fire Protection Association (NFPA)

Employees should familiarize themselves with the location of fire extinguishers in their office.

Oz Directional Drilling provides fire extinguishers, rated not less than 10B, in any vehicle that carries flammables with a flash point below 100° F. This requirement does not apply to the gasoline in the integral fuel tanks of motor vehicles.

The classification of the fire hazard determines the type of extinguisher that is needed.

The table below lists the types of extinguishers.

Types of Extinguishers

<u>Fire Hazard Classification and Extinguisher Marking</u>	<u>Fire Hazard Description</u>	<u>Extinguishing Effect Necessary</u>	<u>Extinguishing Agents</u>
Class A Green Marking	Ordinary combustible materials (e.g., wood, paper textiles, rubbish)	Cooling quenching	Loaded stream, soda acid, foam water on anti-freeze. Solution, multi-purpose dry chemical

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Class B Red Marking	Flammable liquids (e.g., grease, oil, paint, gasoline)	Smothering blanketing	Foam, carbon dioxide, loaded stream, dry chemical, multi- purpose dry chemical
Class C Blue Marking	Electrical equipment (energized)	Nonconducting agent	Carbon dioxide, dry chemical, multi- purpose dry chemical
Class D Yellow Marking	Combustible materials	Smothering blanketing	Special powder agents

Most, if not all, of our offices are considered “light fire hazard” facilities, meaning that the fire hazards are mainly Class A or Class B. The following table lists the minimum extinguisher rating that is needed to provide adequate fire protection in a given area for these types of hazards.

Minimum Extinguisher Rating Requirements

<u>Type of Fire Hazard</u>	<u>Minimum Extinguisher Rating for Area Specified</u>	<u>Size of Area to be Protected by Extinguisher (sq ft)</u>	<u>Maximum Travel Distance to Extinguisher (ft)</u>
Class A	1A	3,000	75
	2A	6,000	75
	3A	9,000	75
	4A	11,250	75
	6A	11,250	75
Class B	4B	---	50

FIRE SAFETY IN THE OFFICE

Fire Prevention

Good housekeeping will eliminate many conditions that can cause fires in or around our offices and buildings. Rubbish, trash, or other combustible materials should not be permitted to accumulate in buildings or on grounds, and weeds and brush that constitute fire hazards should be cleared from the vicinity of buildings and structures.

Spilled flammables should be cleaned up immediately. Materials used to absorb flammables should be disposed of safely, with particular care given to prevent spontaneous combustion. Never allow rags or paper soaked with volatile flammable liquids to be placed in wastebaskets or similar containers. Either allow them to thoroughly dry first, or place them in containers designed specifically for that purpose.

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Gasoline and other highly flammable liquids must be stored in proper containers or cabinets and should not be used for cleaning or degreasing.

Smoking Policy

Smoking is not allowed in any Oz Directional Drilling office facility.

Emergency Action Plan

If the local area emergency agency cannot be reached by dialing 911, the phone number of the local fire department and reporting instructions should be conspicuously posted at phones and at employee entrances. Employees should be familiar with evacuation procedures in case of fire.

In the event of a fire in one of our offices or in a building complex housing one of our offices, employees must respond promptly and appropriately. The following emergency action plan should be followed:

- If the building is equipped with a fire alarm system, activate the alarm system immediately.
- Notify emergency response authorities by dialing 911 or the appropriate telephone number.
- Notify the office receptionist/switchboard operator and request that an evacuation announcement be made over the public address system.
- If the fire is localized, small, and appears to be controllable with an available fire extinguisher, attempt to extinguish the fire. Do so only if you have been trained in the operation of fire extinguishers, and feel your safety is not in danger. Never compromise your personal safety.
- Evacuate the building immediately.
 - Use designated exits or evacuation routes
 - Do not try to collect valuables or return for them
 - Do not use elevators
 - Assist others who may need help in leaving the area
 - Do not attempt to re-enter the building for any reasons
- Remain in the area to assist emergency personnel in determining if all employees are accounted for.

FIRE SAFETY IN THE FIELD

Employees will likely encounter a variety of fire hazards in the field.

Smoking Policy

On project sites, smoking is prohibited at or in the vicinity of operations that constitute a fire hazard. When such hazards exist at Oz Directional Drilling' controlled locations, they should be conspicuously posted as "No Smoking or Open Flame" if appropriate.

Transporting Flammable and Combustible Liquids

Only approved containers, e.g., approved metal, red, Type II, spring-loaded "safety" cans, should be used for the storage, handling, and transporting of flammable and combustible liquids of one gallon or more.

Transporting of flammable liquids should be avoided. If necessary, only the minimal amount needed should be transported. For quantities of one gallon or less, only the original container or an approved metal safety can should be used for storage, use, and handling of flammable liquids. Larger volumes must be kept in approved metal safety cans with spring-loaded caps.

All solvent waste, oily rags and flammable liquids should be kept in a fire-resistant covered container until removed from the site.

Compressed Gases

The use of compressed gases, including those in aerosol cans, can lead to safety (fire and explosion) hazards as well as health hazards. Appropriate employees will be trained in:

- Inspection of compressed gas cylinders
- Proper use (how to turn on, bleed line)
- Proper storage
- Appropriate action in the event of a leak or defect

Use the following procedures when dealing with compressed gases:

- Check that all compressed gases are listed on the Chemical Inventory and that each cylinder is labeled with the identity of the gas.
- Obtain the Material Safety Data Sheet for each gas.
- Handle all cylinders carefully and inspect before use for cracks or defects in the valve assembly.
- Store cylinders securely, either attached to the wall or placed so that they will not fall over. Store cylinders in an upright position at all times, except, if necessary, for short periods while cylinders are being hoisted or carried.
- Keep the cylinder valve closed whenever the cylinders are moved, the cylinders are empty, or the work is finished.
- Protect cylinders from the weather and from extremes of temperature. Use and store cylinders away from sources of ignition and place them where they will not become part of an electrical circuit.
- Never smoke in any areas where compressed gases are used.

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- Protect cylinders from damage due to falling objects or work activity in the area. Never use cylinders as rollers or supports.
- Keep cylinder valves, couplings, regulators, and hoses clean and free from oil or grease and never handle cylinders with oily hands or gloves. Keep valve protection caps in place and secure. Never use valve caps for lifting the cylinder.
- Handle and store empty cylinders in the same manner as full cylinders.
- Handle aerosol cans with the same care as the gas cylinders. Never use aerosol cans, full or empty, as a hammer.
- If an aerosol can is punctured, remove the can to an area, preferably outside, where there is adequate dilution ventilation. A punctured aerosol canister may contain flammable substances as well as chlorofluorocarbons that can lead to acute health effects.

Flammable Gases and Liquids

Construction sites commonly have a variety of flammable gases and liquids that present potential flammability hazards during storage, handling, and use. These substances include the following:

- Gases
 - Acetylene
 - Oxygen
 - Liquefied petroleum gas
 - Methane (from landfills or sewage)
- Liquids
 - Gasoline
 - Kerosene
 - Fuel oil
 - Petroleum
 - Solvents
 - Form oils
 - Turpentine
 - Paints
 - Varnishes
 - Cleaning fluids

This listing is not inclusive; there are many other types of flammable gases and liquids, such as adhesives, accelerators, and solvents. All gases and liquids should be considered flammable unless their label clearly indicates otherwise. Conditions on construction sites change so rapidly that extreme care is necessary whenever flammable gases or liquids are being used.

Flammable liquids and gases can be ignited by open flames, sparks, and excessive heat and should always be properly stored, handled, and used.

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Storage of Flammable Gases and Liquids

The following storage practices will assist in reducing the fire hazard:

- Never store equipment and other materials in flammable gas or liquid storage areas.
- Mark all areas that are to be used for the storage of flammable liquids or gases and post with “No Smoking” signs.
- Locate flammable liquid and gas storage in areas where public fire protection has access.
- Clear away dry brush, grass, and other debris from all flammable gas and liquid storage areas.
- Compressed flammable and combustible gasses must be stored at least 20 feet from any compressed oxygen cylinders or be separated by a 5 foot fire resistant wall with a rating of at least 1 hour.
- Post the telephone number of the local fire department at all telephones.
- Locate areas to be used for the storage of flammable gases or liquids away from equipment, materials, or other structures that could burn if a fire were to break out in the storage area.
- Use only well-ventilated structures of fire-resistive construction for the storage of flammable gases or liquids and locate these structures away from burning, welding, and other operations involving flames or heat. Any motors, switches, and other electrical equipment (including light fixtures and bulbs) within storage areas should meet National Fire Protection Association (NFPA) Codes.
- Locate suitable fire extinguishers within the storage area so that they are readily accessible.
- Ground all containers from which flammable liquids are dispensed.
- When transferring flammable liquids, bond the dispensing container to the receiving container.
- Store all flammable gases and liquids in containers providing identification of the contents. If there is any question regarding the content of a container, the contents should not be used until they have been properly identified and the container labeled. Unidentified containers should be properly labeled to prevent improper use.
- Never use containers for a different substance than they originally contained.
- Keep the storage of flammable gases and liquids to a practical minimum.
- Use only appropriate containers for the storage of flammable liquids.
- Restrict access to flammable gas and liquid storage areas to trained workers. All other workers should be instructed to stay out of storage areas.

Handling of Flammable Gases and Liquids

Workers having access to storage areas should be trained in the characteristics of the substances, potential exposures, and precautions that should be taken. The following handling practices will help reduce the hazard of flammable gases and liquids:

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- Handle containers so that identification of their content is always possible.
- Use only appropriate containers for storing and dispensing of flammable gases and liquids.
- Inspect all containers, nozzles, and related dispensing equipment regularly.
- Keep all pumps, containers, and other dispensing equipment clean.
- Use non-sparking tools in storage and dispensing areas.
- When transferring flammable liquids from storage containers to smaller containers, bond the containers together.
- Transfer flammable liquids only in well-ventilated areas.
- Keep the sources of ignition away from all areas where flammable gases and liquids are being handled.
- Replace all damaged or faulty dispensing equipment or containers.
- Berm aboveground storage tanks to contain the entire contents of the full tank and line the berm with an impervious liner to prevent the flammable material from leaking into the ground.

Fueling Equipment

The fueling of vehicles or internal combustion engines of any type requires special attention. The following procedures should be followed.

- Shut off the ignition before beginning refueling operations.
- Avoid spillage by remaining at the nozzle until refueling has been completed.
- Never completely fill a fuel tank or container. Allow for expansion of the fuel.
- Use only appropriate dispensing pumps, hoses, and nozzles.
- Never smoke within fueling areas.
- Perform all refueling operations in open air.
- Provide all fueling areas with appropriate fire extinguishers.

Use of Flammable Gases and Liquids

The following procedures should be followed when using flammable gases and liquids:

- Use only appropriate solvents for cleaning operations. Never use gasoline.
- Never use flammable gases or liquids near welding, burning, or other operations involving open flames, sparks, or heat.
- Never use containers that do not identify the contents.
- Provide adequate ventilation where flammable substances are being used.
- Never apply heat to flammable liquids or solvents.
- Dispose of all flammable rags in appropriate containers.

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- Return all containers of flammable gases or liquids to proper storage areas after each use.
- Do not enter any vessel that has contained flammable gases or liquids without following appropriate confined space entry procedures. Many flammable gases and liquids are asphyxiates.
- Take all precautions as described in the Material Safety Data Sheets (MSDS) for the specific material. MSDS are required by OSHA's Hazard Communication Standard,

Fire Extinguisher Training

Prior to initial assignment and annually thereafter all new employees will be trained how to properly use a fire extinguisher and will be familiarized with the general principles of fire extinguisher use and the hazards involved in incipient state fire fighting.

Fire Extinguish Maintenance

Fire extinguishers will be checked visually on a monthly basis by the Site Safety Representative and will be subjected to annual maintenance check.