

# Work **Safe!** Bulletin

## FIRE AND EXPLOSION HAZARDS WHEN SERVICING FUEL TANKS

No.: 171  
February 1996

Catastrophic results can occur when uninformed or inexperienced workers attempt to service, repair or otherwise work with gasoline and diesel fuel tanks found on vehicles and equipment. **It is strongly recommended that where possible fuel tanks be replaced rather than repaired.**

In 1995 three people died as a result of burns they sustained when the fuel tanks they were attempting to repair exploded. Several others were severely burned and disabled to varying degrees.

Three components are necessary for combustion to occur: fuel, oxygen and an ignition source. This is referred to as the combustion triangle. Recognizing these components and controlling their interaction is critical to worker safety.

In the case of gasoline and diesel fuel, the greatest flammability hazard occurs from the vapours which are present along the surface of these liquids. It is important to note that even if the tank is empty but has contained a flammable liquid, vapours may continue to be released from the interior surface of the tank.

The second component of the combustion triangle is oxygen. For combustion to occur oxygen is necessary only at normal concentrations present in the air we breathe. When a container is filled with a liquid, the liquid displaces most of the air. When the liquid is drained, air replaces the liquid again, unless the tank is continuously purged with an inert gas.

The ignition sources are perhaps the most variable and unpredictable. A welder's torch or the arc from an arc welder are not the only sources of ignition. Static electricity discharges pose a major threat as well as pilot lights, electrical arcs from tools, switches, lamps and appliances which are not explosion proof, and cigarette smoking.

Static electricity produces an electrical arc when it discharges. This arc can be of sufficient energy to be an ignition source. To create a static electricity charge all that is required are two dissimilar materials to closely pass by each other. This includes flowing liquids and gases, wood, plastics and metals. When the static energy is discharged, a spark usually occurs. In situations where steam cleaning is utilized, it is important to assure proper electrical grounding of the steam nozzle and tank to minimize the possibility of static charge buildup and spark discharge.

Again, where possible fuel tanks should be replaced rather than repaired. In the event that a fuel tank must be repaired, the work must only be done by a qualified person who has been trained in this work.

In preparation for any 'hot work' on the tank, the repair personnel must:

- ✓ Utilize appropriate bonding and/or grounding techniques to control static electric discharges during the process.
- ✓ Use effective measures to clean the tank of any of its flammable or combustible contents or residues (current environmental standards must be adhered to for the disposal of wastes).
- ✓ Maintain an internal environment which will not support combustion. This should be verified by testing for oxygen and combustibles with appropriate test equipment. This process of making the atmosphere within the container inert (unable to support combustion) must be monitored continually to assure effectiveness.

This work should be done in an outdoor area free from ignition sources or in an approved well ventilated area.

Standards, codes and regulations do exist which are associated with this type of work, they must also be considered. These would include:

- ✓ Electrical code (explosion proof lighting and appliances) -- see Manitoba Electrical Code 126/94.
- ✓ Building and fire codes -- see Manitoba Building Code and Manitoba Fire Code.
- ✓ Environmental standards -- see Storage and Handling of Gasoline and Associated Products Regulation 97/88R.
- ✓ Worker training -- see Workplace Safety and Health Act Chapter W210.
- ✓ Selection care and use of personal protective equipment -- see CAN/CSA - Z94 Series.

For additional details contact your local library to see:

American Welding Society, Safe Practices for Welding and Cutting Containers that Have Held Combustibles. Also see NFPA 327, Cleaning or Safeguarding Small Tanks and Containers. Also see Manitoba Environment, A Guideline for the Dismantling and Removal of Underground and Aboveground Petroleum Storage Tank Systems in Manitoba.