

Diesel trucks, fuel tank vent systems, refuelling, and the risk of flash fires

A log transport truck quit running while driving up a steep hill on a main highway. The driver got out to investigate the cause. While he was investigating, a flash fire occurred after he removed the diesel tank fuel cap. The driver was seriously burned.

Today's diesel trucks have complex fuel systems, and any blockages in these systems can have catastrophic consequences. In addition, modern diesel fuel presents risks of its own, particularly during refuelling.

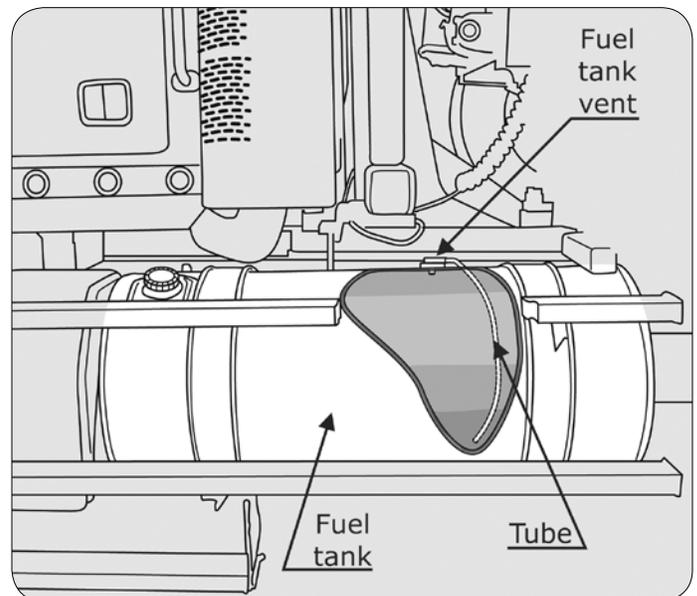
In a modern diesel truck, diesel fuel is pumped on demand from a tank to the engine, where the fuel is mixed with air and supports combustion and ignition. Some unburned, hot diesel then returns to the fuel tank for later use.

The role of fuel tank vent systems

Fuel tank vent systems are common features on diesel trucks and fuel tanks. These systems help to prevent excessive vacuum and pressure buildup in the fuel tank. The vent allows any excess buildup to escape through a narrow tube that discharges near the ground.

After the incident noted above, investigators found that the end of the tube was blocked with mud. This blockage caused a pressure differential in the fuel system that starved the truck of fuel and caused it to shut down. When the driver opened the diesel tank fuel cap to investigate, he was exposed to hot diesel vapours that ignited.

The investigation identified several potential ignition sources, including static electricity, contact with hot exhaust surfaces, and contact with energized electrical equipment.



In this fuel tank vent system, the vent allows excess pressure and vacuum buildup in the tank to escape through a narrow tube (shown above on the far side of the tank) that discharges near the ground.

Modern diesel fuel and the risk of static ignition

Diesel fuel has changed substantially in recent years due to tighter emissions standards aimed at improving air quality. Since 2010, ultra-low sulfur diesel (ULSD) fuel has been required for on- and off-road use in Canada. While ULSD fuel results in lower emissions, it presents a higher risk of static ignition than older diesel fuel.

As noted in a 2013 bulletin from the Association of Equipment Manufacturers (AEM), the removal of sulfur and other compounds in ULSD fuel “decreases [the fuel’s] conductivity and increases its ability to store static charge. Refineries may have treated the fuel with a static dissipating additive. However, there are many factors that can reduce the effectiveness of the additive over time. Static charges can build up in ULSD fuel while it is flowing through fuel delivery systems. Static electricity discharge when combustible vapors are present could result in a fire or explosion.”

The AEM bulletin recommends ensuring proper grounding and bonding of the entire system used to refuel a machine (including the fuel supply tank, transfer pump, transfer hose, nozzle, etc.).

Safe work practices

Employers of truck drivers

- Develop and implement written safe work procedures for maintaining fuel tank vent systems and for refuelling, and educate and train drivers in those procedures.
- Ensure that drivers are educated and trained in WHMIS (the Workplace Hazardous Materials Information System).
- Provide proper supervision to drivers.

For more information

ULSD...Not Your Same Old Diesel Fuel Anymore (Association of Equipment Manufacturers)

aem.org/AEM/media/docs/ULSD_BP_Bulletin-Two-Column_07-03-13.pdf

Awareness and control of static electricity (WorkSafeBC)

worksafebc.com/en/resources/health-safety/hazard-alerts/awareness-and-control-of-static-electricity

Occupational Health and Safety Regulation
worksafebc.com/en/law-policy/occupational-health-safety/searchable-ohs-regulation

- [Section 4.1, Safe workplace](#)
- [Section 5.28, Grounding or bonding](#)
- [Section 16.5, Operator’s responsibility](#)
- [Section 16.34, Start of shift inspection](#)

Truck drivers

- Check your vehicle’s fuel tank vent system as part of your daily pre-trip inspection. Make sure the end of the tube is not clogged with mud or other debris. Clean it if needed. If you are unsure about how to clean the tube, ask for help from a qualified person (for example, a mechanic).
- Make sure you’ve been educated and trained in WHMIS. Comply with the material safety data sheet (MSDS) or safety data sheet (SDS) for the diesel fuel you use.
- Bond and ground equipment when refuelling.

- Check that fuelling hoses meet the Underwriters Laboratories of Canada (ULC) standard for discharging static electricity. Look for a ULC label or sticker on the hose assembly. Where possible, identify fuel suppliers who meet the ULC standard before your trip.
- Locate the emergency stop button prior to refuelling.
- Don't top off when refuelling. Topping off increases the risk of injury from fire.
- Wear appropriate personal protective equipment when refuelling, including:
 - High-visibility apparel. To further reduce the potential for static discharge, do not wear high-visibility vests that use Velcro fasteners.
 - Safety eyewear (i.e., certified safety and/or prescription glasses with sideshields).

Fuel suppliers (fixed and mobile)

- Install and maintain fuelling hoses in accordance with the ULC standard for discharging static electricity.