Preventing Death and Injuries of Fire Fighters Operating Modified Military Surplus Vehicles

Summary

Fire fighters may be at risk for crash-related injuries while operating military surplus vehicles that have been modified for fire service use. The National Institute for Occupational Safety and Health (NIOSH) has summarized recommendations to prevent injuries and deaths while operating these vehicles.

Description of Exposure

Fire departments with limited financial resources often craft fire apparatus out of surplus military vehicles as an affordable alternative to new or used apparatus designed for fire fighting. Some surplus military vehicles are loaned to fire departments by the Federal Excess Personal Property Program. Fire departments are responsible for any modifications, maintenance, and upkeep of these vehicles [US Forest Service 2009]. The U.S. Fire Administration (USFA) has reported crash risks attributed to overloaded water tankers that were once used as military fuel tankers [USFA/FEMA 2003].

The NIOSH Fire Fighter Fatality Investigation and Prevention Program (FF-FIPP) investigated five fatal incidents involving crashes that occurred when fire fighters were operating modified surplus vehicles. These investigations identified factors that can create safety concerns for fire departments using these types of vehicles for fire fighting: poor maintenance, exceeding weight and payload capacities, using fuel tankers for hauling water, unsafe riding locations, lack of seat belts, and inappropriate vehicle modifications. Two of the cases are described below.

Case Study 1

On June 21, 2005, a 52-year-old male volunteer Chief died from injuries sustained during a tanker rollover. While driving on a gravel road at approximately 40 miles per hour, the left front tire ruptured causing him to lose control, leave the road, and roll over several times. The Chief was ejected and died on the scene from his injuries. Seat belts were not used during the incident [NIOSH 2006].

The apparatus was a 1981, 2½-ton, 3-axle, 6 × 6 military tanker truck originally designed to carry gasoline (Figure 1). It had a gross vehicle weight rating (GVWR) of 13,530 pounds empty, 16,530 pounds cross country, and 23,530 pounds highway. Both of the rear axles had dual wheels. The tanker was equipped with lap seat belts. The tanker still had the original split rim wheels. Eight out of ten tires were bias-ply* tires manufactured in 1981. The tank was baffled into three sections and had a capacity of 1,200 gallons. The estimated fully loaded water weight was 9,960 pounds, which exceeded the cross country weight by approximately 7,000 lbs. The apparatus was acquired by the department in 1998 through a loan program. The fire department did not inspect or make any modifications to the apparatus.

*Bias-ply tire is a pneumatic tire having crossed layers of ply-cord set diagonally to the center line of the tread.
Case Study 1

On June 26, 2003, a 46-year-old male volunteer Assistant Chief was fatally injured after being ejected from a water tanker as a result of a rollover crash. The victim was driving to a wildland fire on an unpaved road within a national forest. The tanker failed to negotiate a curve and rolled down into a canyon. The victim was ejected from the cab during the rollover and was found lying unresponsive on the ground. He was pronounced dead at the scene [NIOSH 2003].

The apparatus was a 1954 2½-ton military fuel servicing truck acquired through a loan program (Figure 2). The truck had a 1,200-gallon tank that was originally used to transport diesel fuel. The estimated fully loaded water weight was 9,960 pounds, which exceeded the recommended payload weight (without personnel) of 7,500 lbs for highway operation. State police reported that the tanker probably had brake failure before the incident; the master cylinder was leaking brake fluid, and the emergency brake was inoperable. Both front shock absorbers and three tires were defective. The vehicle did not have seat belts.

Controls

NIOSH recommends that fire departments take the following precautions and actions to minimize hazards and risks to fire fighters when using modified military vehicles for emergency response:

- Ensure that fire apparatus meets general vehicle standards for fire service use as specified in National Fire Protection Association (NFPA) standards such as NFPA 1901, 1500, and 1906 before being placed into service.
- Ensure that vehicles are fully inspected, repaired as needed, and road tested by a certified emergency vehicle technician (EVT) before being placed into service (NFPA 1911, 1500). The EVT should meet requirements in NFPA 1071.
- Ensure that the weight of a fully loaded vehicle does not exceed the axle and/or gross vehicle weight ratings. This is especially important when using former military fuel trucks as water tankers since water weighs 20% more than fuel.
- Ensure that tanks are baffled for safe handling of water (NFPA 1901). Fuel tanks generally lack appropriate baffles to allow for the safe transport of water.
- Provided that payload capacity is not exceeded, ensure the surplus vehicle is not operated with a partially filled water tank because of the sloshing effects of water during vehicle operation. The vehicle’s maneuverability may become unsafe when changing lanes or negotiating curves.
- Ensure that the vehicle’s center of gravity has not been raised higher than originally manufactured. A low center of gravity contributes to improved vehicle stability. Roscommon Equipment Center [2009] provides calculators and guidelines to determine center of gravity and weight distribution.
- Implement a vehicle maintenance program following the recommendations in NFPA 1911.
- Ensure that the vehicle maintains ample suspension, steering, and braking ability, through periodic vehicle inspections and maintenance.
- Service and maintain vehicles and have them professionally inspected at least annually to keep them in safe operating condition and comply with Federal and State motor vehicle regulations and military vehicle operation guidelines. Surplus agencies should provide fire departments with manufacturer manuals and vehicle data.
• Inspect tires often for uneven wear, proper inflation, and deterioration. Adequate tread does not mean that tires are safe. Tires of vehicles stored outside are likely to experience weather cracking. Maintain tire pressures and replace tires according to the manufacturer’s recommendations (e.g., replacing tires of a certain age). Replace tires that show signs of dry rot or cracking.

• Develop procedures to declare a vehicle deficient or unsafe, and immediately remove it from service until it is repaired or replaced.

• Develop standard operating procedures (SOPs) or guidelines (SOGs) for operating modified military vehicles.

• Ensure that all fire fighters are seated in appropriate riding positions and are secured by seat belts whenever the vehicle is in motion. Vehicles without a restraint system should have one installed that meets current standards of the Society of Automotive Engineers (SAE) [1994, 1995a, 1995b].

• Ensure that vehicle operators are properly trained through procedures, guidelines, or policies that comply with NFPA 1002, 1451, 1500, 1901, and 1906.

• Provide training before driving and operating to ensure that drivers understand the handling characteristics, capabilities, and limitations of each vehicle. Provide refresher training at least twice per year (NFPA 1500).

• Ensure that funds are available for routine maintenance, safety modifications, and appropriate operator training. Grants are available through the Federal Emergency Management Association, Federal Excess Personal Property Program, and Volunteer Fire Assistance Program [USFA 2009].

For information about the NFPA Standards listed in this document, visit http://www.nfpa.org/aboutthecodes/list_of_codes_and_standards.asp.


For more information about the U.S. Forest Service Federal Excess Personal Property Program, visit http://www.fs.fed.us/fire/partners/fepp.

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References


For More Information

The information in this document is based on fatality investigations and expert review. More information about the Fire Fighter Fatality Investigation and Prevention Program is available at www.cdc.gov/niosh/fire.

More information about fire fighter safety is available at
http://www.usfa.dhs.gov
http://www.fs.fed.us/fire/partners/fepf/
http://www.nfpa.org
http://www.fireigrantsupport.com
http://www.fs.fed.us/fire/partners/vfa

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