

Memorandum No. 17-002

Date: 1 May 2017

TO: Risk Management Committee Members

FROM: Mark Goeller, Chair, NWCG Risk Management Committee

SUBJECT: Drip Torch and Burn Injuries

Firefighters have reported multiple burn injuries involving drip torches and several more from accidental fuel ignition in the last several years. The [Flammable Liquid Ignitions](#) article, found at the [Wildland Fire Lessons Learned Center](#), has links to 14 fuel ignition incident reports. These accidents happen to all types of firefighters with varying levels of fire experience from all regions of the country.



Day of burn injury

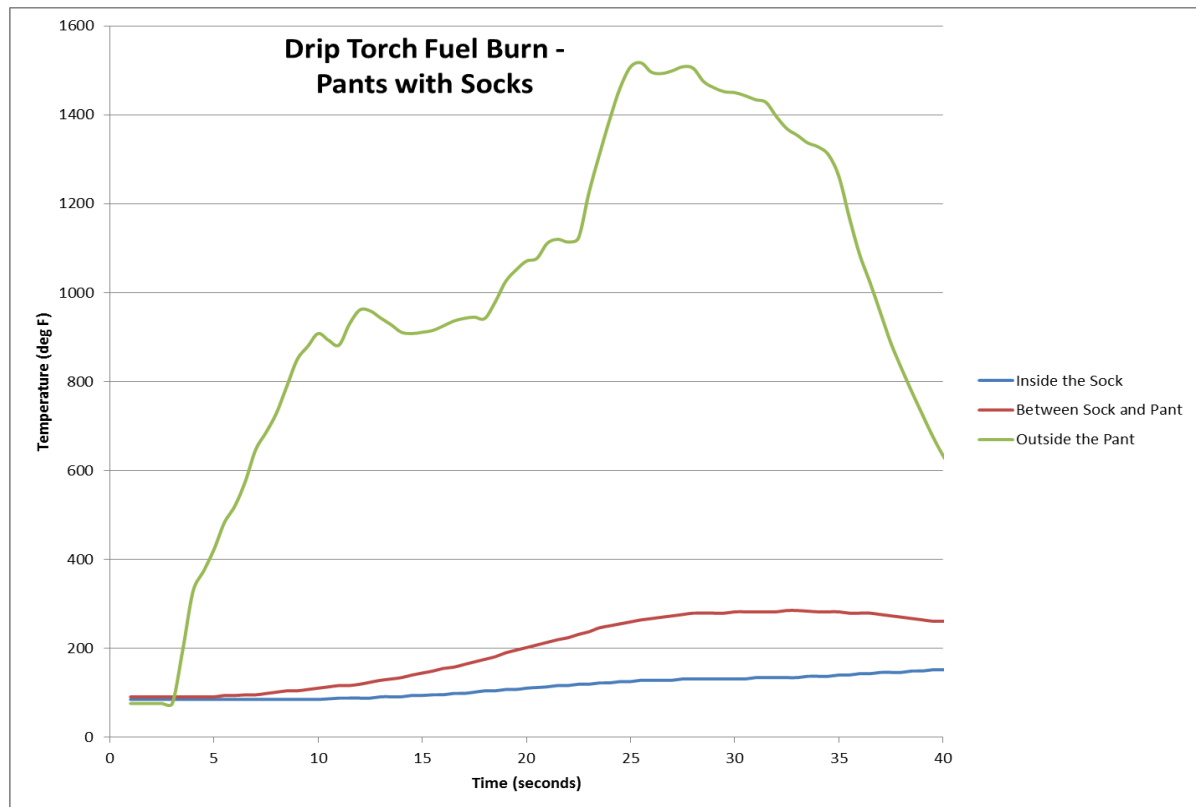


5 Days after burn injury

Pants worn by individual above during burn injury incident



Equipment specialists and engineers from the National Technology and Development Program (T&D) conducted tests using a drip torch, flame resistant (FR) pants, wool-blend socks, and a piece of wood to simulate a leg. T&D performed the experiment to compare the temperatures outside the pants, inside the pants, and inside the sock with burning drip torch fuel on the pants.



Graph shows temperatures recorded during experiment. Human skin starts to 2nd degree blister when it reaches 130 degrees F

This video (<https://youtu.be/2DwMMQpSSJQ>) demonstrates the dangers of wearing fuel-soaked clothing, effect of wool socks on reducing burn injury to a leg and a few ways to extinguish burning pants.

Testing Results and Accident Observations

- Swatting at burning fuel can increase the fire intensity.
- Stop, drop and roll does not readily extinguish fuel fires on clothing.
- Fuel-soaked clothing burns hotter and for a longer duration than clean clothing.
- Wool-blend socks provide significant protection to the wearer from thermal burn injuries caused by burning drip torch fuel.

- Pouring water from a readily available water bottle onto the clothing is an effective way to extinguish the fire.
- Dropping the pants to the ankles removes heat from next to the skin. Flames can then be extinguished with a reduced chance for burn injury.

Recommendations and Reminders

FR clothing has a limited ability to protect human skin from the heat generated by burning fuel. Because the majority of burn injuries associated with drip torch use occur on the calf and lower leg, using over-the-calf, wool-blend socks would most likely reduce the amount and severity of burn injuries associated with drip torch use. The temperature between the pants and socks would be directly on the skin without over-the-calf socks.

Prevention is optimal, but drip torch burn injuries typically result from inadvertently pouring burning fuel onto the legs. To help prevent this type of burn injury:

- Bring extra FR clothing to the field to change into in case of an accidental spill.
- Ensure drip torches have functioning gaskets and properly adjusted vent tubes.
- Respect the torch. Be vigilant about when and where you drip fuel, especially when you are negotiating obstacles.
- Wear over-the-calf, wool-blend socks. Fabric tests and past incidents show that skin areas covered by wool-blend socks suffer very little burn injury.

Remember, no one intends to light themselves on fire, but drip torch burn injuries do happen. If you are on fire, time is critical and rapid use of these methods may reduce burn injury.

Burn Treatment

The “Emergency Care Guidelines” section (red pages) of the [“Incident Response Pocket Guide”](#) provides burn injury guidelines for treatment in the field. Applying clean, cool water directly onto the burned area can be a very good initial field treatment. Keep in mind that burns can become more severe than they initially appear due to the body’s response to burn injury.

Burn injury treatment protocol can be found in the [“Interagency Standards for Fire and Fire Aviation Operations” \(Redbook\), chapter 7.](#)

Please direct comments and questions to Tony Petrilli, NTDP Fire Equipment Specialist, at 406-329-3965, or by email at apetrilli@fs.fed.us