

SAFETY ADVISORY

Date/Time: May 28, 2010 1500

Event: Firefighters sustain burn injuries from ash pits.

Purpose: Alert wildland fire community of the hazards associated with ash pits – how to recognize and mitigate exposure and how to respond to burn injuries.

Narrative: In April and May of 2010, three firefighters in the Southwest who stepped onto what appeared to be solid ground dropped into hot pits of ash and steam when the soil gave way. In each case, victims and witnesses say that the weaknesses in the ground were not visible before the firefighters broke through. In each case, the firefighter sustained burn injuries despite proper use of PPE and quick extraction from the pit. Observations by witnesses indicated that the use of water and presence of steam may have increased the severity of the burns; firefighters falling into similar ash pits in areas without such water



presence did not receive burn injuries. Pursuant to USDA and USDI Standard Operating Procedures (SOPs), the burn victims were transported to a local medical clinic for treatment, and in all three cases, the firefighters were referred to a regional burn center for care. In two cases a delay in transfer to the regional burn center occurred. In the first case, an attending physician was waiting for a confirmation call from the receiving burn center prior to making the transfer. The agency representative (IC) was able to expedite the transfer by making a call to the burn center, resulting in referral by the attending physician. In the second instance, the transfer to the burn center may not have been made if the agency representative had not insisted on getting a referral from the attending physician.

IC Actions: Thanks to good planning on the part of Type 3 ICs, medical care was on hand in all three cases, and transport to local medical clinics was quick and efficient. After each incident, the ICs more frequently incorporated this hazard into safety briefings to alert fireline personnel to what had happened, what to watch for, and what to do if someone is injured. In addition, ICs found different methods to mitigate the danger. One IC pulled resources from the interior of the fire and put the crews in a monitoring mode. Another IC had potential ash pit hazard areas flagged.

How to Detect Invisible Hot Ash Pits: “Ash Pit Hazards” can be found on the 6 Minutes for Safety web site (http://www.wildfirelessons.net/documents/6MFS_ashpithazards.pdf). It lists environmental factors, including the presence of extensive root systems, deep duff or peat, landscapes that have once been cultivated or manipulated by heavy equipment, old dozer piles, sawmills, timber sale yards or decking areas, and rodent holes filled with combustible debris. Indicators include white ash on the surface, swarms of hovering insects, translucent smoke that dissipates quickly above the ground, and the smell of incomplete combustion or creosote burning.

Role of PPE: All three firefighters were wearing standard issue green Nomex pants and all three

firefighter's boots met NWCG PPE standards. One firefighter's ankle straps were tightly cinched over his boots. All firefighters were quickly helped from the ash pits they fell into, but still sustained burn injuries (most likely from hot steam) through their pants. Observations indicate that firefighters wearing Kevlar pants had fallen into similar pits on other fires but had not sustained burns, suggesting that Kevlar pants may provide greater protection against these types of burn injuries.

Burn Injury SOP: Interagency firefighter burn injury protocols are outlined in the *Interagency Standards for Fire and Fire Aviation* (Red Book), Chapter 7, pages 7-19 and 7-20 (http://www.nifc.gov/policies/red_book.htm) and in BIA's *Wildland Fire and Aviation Program Management and Operations Guide* (Blue Book), Chapter 9, pages 38 and 39 (http://www.nifc.gov/policies/blue_book.htm). Because a physician referral is necessary for admission to a burn center and delays in referrals to burn centers have occurred in the past, the burn injury SOPs call for a firefighter's representative to facilitate the medical referral to a burn center – referrals to burn centers are made directly by the attending physician. **Be familiar with these SOPs and criteria.** Even if a physician does not believe the victim should go to a burn center, it is the agency designee's responsibility to coordinate with the attending physician to ensure that a firefighter whose injuries meet any of the burn injury criteria listed in the firefighter burn injury protocol is immediately referred to the nearest burn center. In one of the three burn incidents described above, the medical clinic would not have referred the firefighter to the burn center and, in this case, the burn center physician assured the IC that it was a "good thing" he insisted the physician refer the firefighter to the burn center. The chance of full recovery from a burn injury is much higher if a burn center physician attends the injured firefighter in a timely manner. **Local and assigned incident managers must know where the closest burn center is. In preparation for fire season, visit local medical clinics to discuss treatment and transfer of burn patients to minimize delays caused by staff unfamiliar with DOI and USDA burn injury protocols. Here is a list of possible burn care facilities:** <http://www.blm.gov/nifc/st/en/prog/fire/im.html>.

Other Possible Influences: Underground ash pits not visible from the surface are created by the combustion of organic matter buried under a layer of mineral soil. Steam was suspected to have significantly increased the severity of the burns in these cases. Observations by witnesses indicated that water from concentrated hose work, presence of wetting rains, and proximity to river bottoms may have contributed to the presence of steam in the pits causing the serious burns. Firefighters falling into similar ash pits without the presence of water were unharmed, but potential for injury still exists. The presence of emergency medical personnel and ambulances contributed to successful evacuation and treatment in all three cases. Morning safety briefings on ash pits did occur on these incidents, but firefighters still fell into them, mainly due to the fact that these pits were not easily recognizable.



Ash pits are not just a hazard in the Southwest and fire managers and firefighters across the country need to be aware of their dangers. If you have additional safety information or other mitigation measures, please contact your respective agencies' NWCG Risk Management Committee member: <http://www.nwcg.gov/branches/pre/rmc/contactus.htm>.