USACHPPM
Readiness thru Health

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Just the Facts... Solid Waste Burning (Trash and Feces Fires) - Medical

GENERAL INFORMATION	Solid and liquid wastes produced under field conditions can amount to as much as one hundred pounds per soldier per day! A camp or bivouac area without proper waste disposal methods can soon become an ideal breeding area for flies, rats, and other vermin. These conditions may result in the development and spread of diseases such as dysentery (amoebic and bacillary), typhoid, paratyphoid, and cholera among soldiers. Proper waste disposal in the field is essential in preventing the development and spread of disease. There are several methods that can be used to dispose of human and solid wastes in accordance with US Army procedures (FM 4-02.17 and FM 21-10). Chemical latrines are the preferred human waste disposal devices for use during field exercises or missions. When chemical latrines are not available or cannot be used, individuals and units must use other methods. Human wastes can be burned or buried. The burn-out latrine may be used when the soil is hard, rocky, or frozen, making it difficult to dig a deep pit latrine. It is also particularly suitable in areas with high water tables because digging a deep pit is impossible. Burial of garbage and rubbish is almost always the best method of disposal. It is the preferred, and most frequently selected method. When burial is not possible, the combustible solid waste (trash and sanitary wastes) can be burned. The selection of the Army-approved disposal method is based on many factors including the mission and operational conditions, length of stay in the area, terrain, weather conditions, and, when applicable, local regulations. Open burning of wastes is not desirable when wind and other conditions cause the smoke plume to remain close to the ground and in the direction of personnel. One of the most important hazards associated with the open burning of human and other solid wastes comes from the fuel that is used to ignite and help burn the wastes. Highly flammable fuels, such as gasoline, should not be used! JP-8 can be used for this application when the general precautions for its handling are followed.
ROUTINE EXPOSURES IN THE DEPLOYED SETTING	Personnel conducting solid waste burning operations may be exposed to fire, heat, smoke, and possibly, viable pathogenic organisms. These personnel have the highest exposures. Personnel located adjacent to the burn site may be exposed to the smoke when the terrain and weather conditions cause the smoke plume to remain, or settle, on the ground. The exposure to these personnel is much less intense. It is very unlikely that these adjacent personnel will have any significant exposure to viable pathogens under most conditions.
PERSONAL PROTECTIVE EQUIPMENT (PPE) and COUNTERMEASURES AVAILABLE FOR DEPLOYED PERSONNEL	Care should be taken to locate burn-out sites and to select burning opportunities that minimize exposure of personnel to smoke. Changing environmental conditions may cause a smoke plume to change directions or fall toward the ground after the fire is started. Under these circumstances, personnel may become exposed to varying amounts of smoke. When possible, personnel should be relocated, or action should be taken to minimize personnel exposure by reducing smoke entry into spaces (tents, vehicles, structures) by closing openings to the outside. Personnel involved in igniting and maintaining the burning material should be appropriately protected from the fire and the heat. Immunizations against bacterial and viral enteric pathogens (typhoid, Hep A) provide protection for personnel directly involved in burning operations. Viable organisms may become aerosolized during the burning process. These organisms may include pathogenic strains. Personnel involved in the burning process should practice good personal hygiene and not stand in the smoke plume. When recommended by preventive medicine staff, personnel in the immediate area who are conducting the burning operation should be appropriately fitted with air-filtering respirators (N-95 or -99) and placed in the Respiratory Protection Program. Adjacent personnel in the path of the smoke plume should be relocated, if possible, or actions should be taken to reduce their exposure.

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QUESTIONS TO ASK REGARDING EXPOSURE	1. Was the individual directly involved in the burning of trash? Sanitary wastes? 2. How far from the fire source or smoke plume was the individual located and for what period of time? 3. Were any unusual conditions regarding the exposure present? 4. Has the individual had any medical complaints associated with the exposure?
EXPOSURE LEVELS HISTORICALLY ENCOUNTERED	**DATA IF AVAILABLE.** In contrast to municipal incinerators, which operate under highly controlled conditions designed to reduce formation and emission of air pollutants, waste-burning operations in the field are not well controlled. Low temperature burning and smoldering conditions promote the formation of air pollutants including particulates of smoke and other aerosolized materials, polychlorinated dibenzodioxins and dibenzofurans ("dioxins"), and polycyclic aromatic hydrocarbons (PAHs). These pollutants also form during backyard trash burning regardless of the composition of the material being burned. Several of the pollutants that can be released from this type of burning are regulated in the US because of their toxicity and potential ability to cause cancer. The types and the concentrations of pollutants vary considerably under different burning conditions. However, it is not likely that personnel located adjacent to burning operations will have received a significant dose based upon the concentrations and duration of exposure. When diluted in the air, pollutant concentrations fall rapidly with the distance from the source or the plume. Many of these pollutants can be detected by odor in concentrations below those known to have harmful effects. Therefore, odor is not a good indicator of the health risk associated with exposure.
AVAILABLE EXPOSURE DATA	**DATA IF AVAILABLE.**
COMMON ACUTE AND CHRONIC HEALTH EFFECTS	Some of the combustion products in smoke can irritate the eyes and respiratory tract. The personnel performing the burning operation will have the greatest exposure and the highest chance of experiencing these effects. Personnel who are not directly involved with the burning operation will likely not experience medically significant exposures (based on intensity and duration). Temporary irritation of the eyes and mucous membranes, with associated eye burning, tearing, and cough, may occur in personnel with high exposures. It is unlikely that the smoke exposure will result in any continuing health problems in these personnel and much less likely in adjacent "by-stander" personnel. There is a remote possibility that viable pathogens may be aerosolized during the burning of sanitary waste. Enteric and other diseases may be spread in this manner. Caution should be taken to insure good combustion while avoiding inhalation of smoke or aerosolized material. Respiratory protection may be recommended for personnel directly involved in sanitary waste-burning operations.
REVERSIBILITY OF HEALTH EFFECTS	The acute, mild irritation caused by smoke on the eyes and respiratory tract will likely resolve in a few hours following termination of exposure. Chronic effects are unlikely. The enteric and other pathogens that may be released in burning operations can cause a number of acute and chronic diseases. These diseases can be significant sources of morbidity and mortality. This mode of transmission should be evaluated during a disease investigation affecting personnel involved in such operations.
TREATMENT REQUIRED/AVAILABLE FOR EXPOSURE	Simple avoidance or removal from exposure is the best medical intervention for smoke exposure. Eye irritation should be appropriately treated, but is unlikely to be severe unless exacerbated by mechanical rubbing. Diseases arising from the handling of sanitary wastes should be appropriately treated and followed.
LONG TERM MEDICAL SURVEILLANCE REQUIREMENTS OF HEALTH EFFECTS MONITOIRING	Medical surveillance is not required for adjacent personnel who are/were exposed to smoke from the burning of solid waste. Based upon the exposure situation and recommendations of preventive medicine staff, personnel directly involved in the burning operations may be included in a medical surveillance program for waste water/sewage workers (see NEHC TM OM6260 of Feb, 01; Stressor 702; p 7-65) and/or a Respiratory Protection Program.
SPECIAL RISK COMMUNICATION ISSUES	Smoke exposure from solid waste burning operations is not likely to cause any serious health effects in personnel located adjacent to the burn site. The smoke contains trace pollutants that are harmful to health, but the concentration of these substances will be very low in the diluted smoke downstream from the point of release. Personnel directly involved in the burning of sanitary and other solid wastes have more significant exposures due to the concentration of the pollutants at the source, and the duration of their exposure. They are exposed to some health and safety hazards that are not a threat to other personnel not at the fire source. These personnel should practice good personal hygiene and be aware of the risks presented by the fuel used to burn the wastes. "Dioxins" are produced in virtually all combustion processes —but they are present in very small amounts. The burning of yard debris or paper produces dioxins.