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Prevent Serious Injury: Learn the Gas Facts

Three recent incidents involving gasoline resulted in one death and seven non-fatal injuries during a 4-month period in Alaska. Two of these cases are highlighted below. All Alaskans must be aware of the hazards of gasoline, and take actions to prevent gasoline-related injuries in home, recreational, and work environments. The high Vapor Volume* of gasoline creates highly flammable vapors which rapidly diffuse throughout storage containers and rooms. Because of the extremely low Flash Point† (-45° F) of gasoline, small volume spaces containing gasoline vapors are a problem in Alaska. Such spaces include gas containers, vessel bilges, storage rooms, garages, and hangars. Vaporized gasoline can produce dangerous atmospheres capable of ignition from various sources: open flames, hot surfaces, sparks from welding/cutting machines, electrical equipment, static electricity.

Flammable liquids are among the most serious causes of burn injuries. These burns usually occur when gasoline or another flammable liquid is used as a cleaning agent or to start a fire.

Case 1

A 40-year-old welder died as a result of traumatic injuries sustained from a vessel explosion. The vessel was undergoing repairs in a shed, when a grinding operation ignited gasoline vapors in the bilge. The explosion blew a welded aluminum plate off the deck, which struck the victim. The probable source of gasoline was drainage into the bilge from loose couplings on a fuel transfer unit. Workers believe that about one pint was spilled from the unit during vessel repairs. The work crew did not know that such a small amount of gasoline could produce sufficient gasoline vapor in the bilge to create an explosive atmosphere.

Case 2

Three boys, ages 8, 10, and 11, were injured as a result of playing with a flammable liquid (probably gasoline) and a lighter in their yard. The boys poured gasoline from a milk jug into a gas container and ignited the gasoline by dropping a burning piece of cardboard into the can. When the fire appeared to have subsided, one boy attempted to re-ignite it by pouring more gasoline into the can. This initiated an explosion which blew flammable liquid onto the three boys and the surrounding area. The boys' hair and clothing caught on fire. They ran to their house, where the boy's father immediately put them in the shower and called 911. The 10-year-old boy sustained third degree burns to 80% of his body and remains in a Burn Center; the other boys received second and third degree burns and have been released from a local hospital.

Recommendations

1. Provide proper handling and storage of flammable liquids. Do not exceed storage temperature limits. Keep gasoline cans properly capped. Use metal gasoline containers with automatic re-closing lids.
2. Be aware that small amounts of vaporized gasoline can create powerful explosive forces if an ignition source is introduced into the environment.
3. All children over age three and all adults should learn what to do if their clothing catches on fire. They should stop where they are, drop to the ground, and roll back and forth to put out the flames.
4. Recognize that all potential ignition sources are not obvious. For example, the electrostatic charge that builds up on non-conductive surfaces (e.g., plastic storage containers) can create a spark discharge capable of igniting gasoline vapors.

References

1. Fundamentals of Industrial Hygiene, Third Edition, National Safety Council, 1988.
2. Educating Professionals in Injury Control (EPIC), Educational Development Center, Inc., The Johns Hopkins University, 1990.

*Vapor Volume, the number of cubic feet of vapor resulting from the complete evaporation of one gallon of liquid, provides a striking view of the inherent danger of improperly stored gasoline. The vapor volume of gasoline is 24-32 cubic feet at 75° F. Thus, a 1000 cubic foot storage shed, which contains one gallon of vaporized gasoline, can produce an atmosphere containing 2.4-3.2% gasoline vapor. Because the Lower Explosive Limit of gasoline is 1.4%, the storage shed is a clear danger. In fact, current safety practice would forbid entry into this potential death trap.

†Flash Point is the lowest temperature at which vapors produce an ignitable mixture. Flash point combined with vapor volume makes gasoline one of the most hazardous chemicals in common use today. Only two chemicals have a flash point lower than gasoline: ethyl ether and ethyl chloride.

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