

LEAD *to* GREEN

By Alex Graves

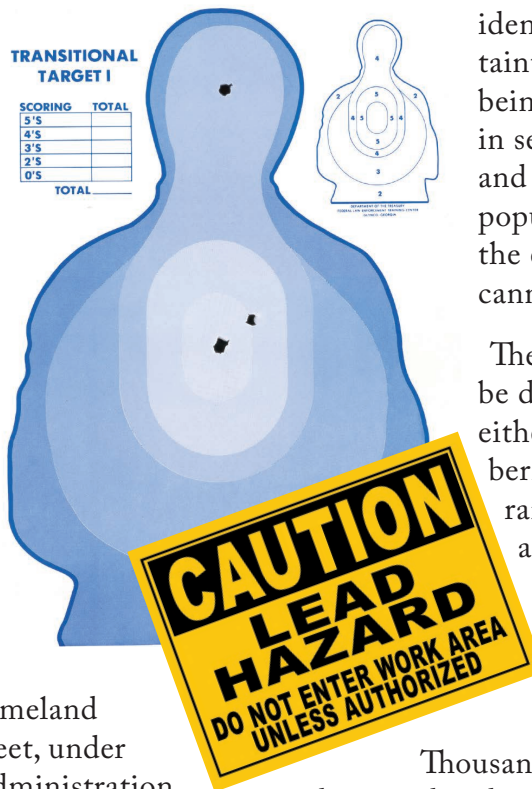
The long-term commitment of the Federal Law Enforcement Training Centers (FLETC) to the health and safety of staff and students yielded landmark industry advances in the development of Reduced Hazard Ammunition (RHA), which is now being used by law enforcement agencies throughout the country for training purposes.

In addition to the many health and safety benefits of RHA, there is also a considerable economic value in using RHA at training facilities. By switching from lead-use ranges to RHA-use ranges, FLETC has been able to save approximately \$100,000 per year on cleaning costs. The significant cost reduction is largely attributed to the differences in wage rates for specialized lead abatement cleaning staff compared to regular janitorial staff. Further costs are realized by fewer training requirements associated with RHA ranges, as well as a reduction in equipment costs.

As stated in the Department of Homeland Security's March 30, 2006, Fact Sheet, under Occupational Safety and Health Administration (OSHA) regulations, "...workers in a lead environment require a lead management plan, lead awareness training, specialized protective equipment, and medical surveillance."

There are also additional hidden costs associated with lead ammunition, including personal protective equipment necessary for range clean up; specialized equipment and supplies for range clean up; lead hazard awareness training for staff, cleaning crews, and grounds keepers; medical surveillance for staff, cleaning crews, and grounds keepers; lead management plans and updates; projected remediation or abatement costs for lead contaminated environment; waste disposal for lead contaminated weapon cleaning equipment and products; ventilation equipment maintenance and cleaning; and the cost of potential Federal and/or state fines for regulatory compliance violations.

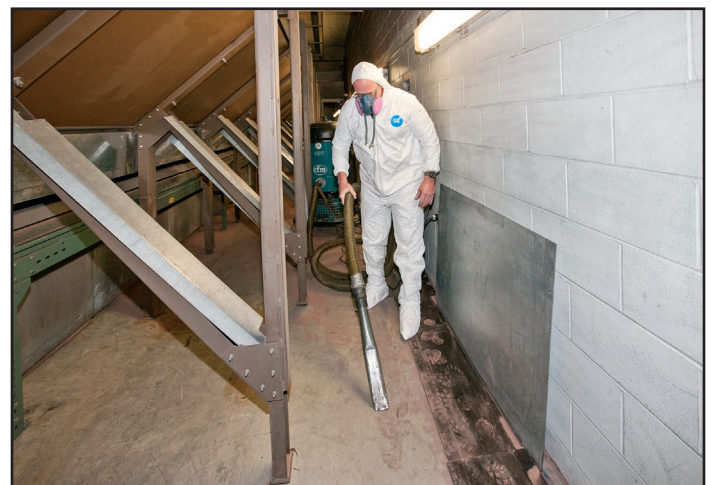
As fiscally responsible as it is to switch to RHA ranges, FLETC is also motivated by improving the health and safety of its staff, students, and



the environment. Lead has been identified as being responsible for tainted soil and water, and it is being ingested by wildlife resulting in serious threats to the health and safety of human and animal populations. The effect of lead on the environment and human health cannot be taken lightly.

The toxic, heavy metal lead, can be deposited on shooting ranges either fired as bullets into impact berms, or collected in indoor range traps. Relatively small amounts of lead may also come from vaporization of lead from the heat of burning powder, barrel friction, and from lead compounds in primers.

Thousands of tons of lead have been deposited and or collected at outdoor law enforcement shooting ranges across the country. Indoor shooting ranges pose additional serious health issues, such as increased lead exposure to the firearms instructor and shooters as a result of an enclosed space. Safe operations of indoor ranges require high-capacity ventilation and air filtration systems. Handling of ammunition and



Range maintenance staff routinely perform bullet trap cleaning.



All contaminated by-products from bullet trap cleaning are managed and contained in accordance with all safety and environmental regulations.

contaminated weapons can also produce elevated lead levels in the blood by absorption through the skin.

Lead is poisonous. It interferes with the proper function of the brain, nerves, and kidneys. At high enough levels, lead is not just absorbed in tissue, but is absorbed in bone marrow. Lead poisoning can be irreversible and potentially fatal. According to a study conducted by OSHA, 89 percent of the individuals shooting with lead bullets received exposure that exceeded their standards for exposure to lead. In that same study, OSHA found that using alternative “reduced hazard” ammunition reduced that to 7 percent.

The composition of bullets most often used by law enforcement typically ranges between 90 to 99 percent lead. So in 1994, recognizing potential environmental and health impacts associated with lead on shooting ranges, staff at the FLETC began to investigate costs and benefits of an alternative to lead ammunition.

In 1998, FLETC developed performance standards for RHA, which also included frangible ammunition. The Sporting Arms and Ammunition Manufacturer’s Institute (SAAMI) defines a frangible round as a projectile that breaks up readily upon impact.

The projectiles of frangible bullets are formed from mixtures of powdered (non-heavy) metals that are pressed at room temperature to produce a high-density material. This ammunition is designed to intentionally break up into smaller pieces upon contact with harder objects or surfaces.

The term “Reduced Hazard” originated at the FLETC in 2003, though it has yet to be adopted as an official industry standard by SAAMI. However, stringent requirements established by the FLETC have become industry norms.

Ballistics experts and senior armorers at the FLETC determined no damage to weapons resulted from the use of RHA. However in the early development of RHA, semi-automatic and/or fully automatic long guns did experience some malfunctions such as interruptions in the cycle of operations when non-jacketed frangible bullets were used. The bullets showed a tendency to break off near the case mouth during the feeding into the chamber from the magazine. As a result, FLETC designed and purchased copper jacketed RHA for use in rifles. Contract stipulations with ammunition manufacturers require RHA projectiles to break into particles no larger than 5 grains, an OSHA requirement.

It is important that there be transparent characteristics between training ammunition and



SIG SAUER® pistol and samples of 9mm frangible ammunition.



Sample of .40 cal lead ammunition in its shell casing, removed and after impact.

duty ammunition. Training ammunition, whatever it may be, should be indistinguishable from the shooter's duty ammunition when fired.

Characteristics to be mirrored are:

- Recoil
- Accuracy
- Reliability
- No special weapon modifications necessary

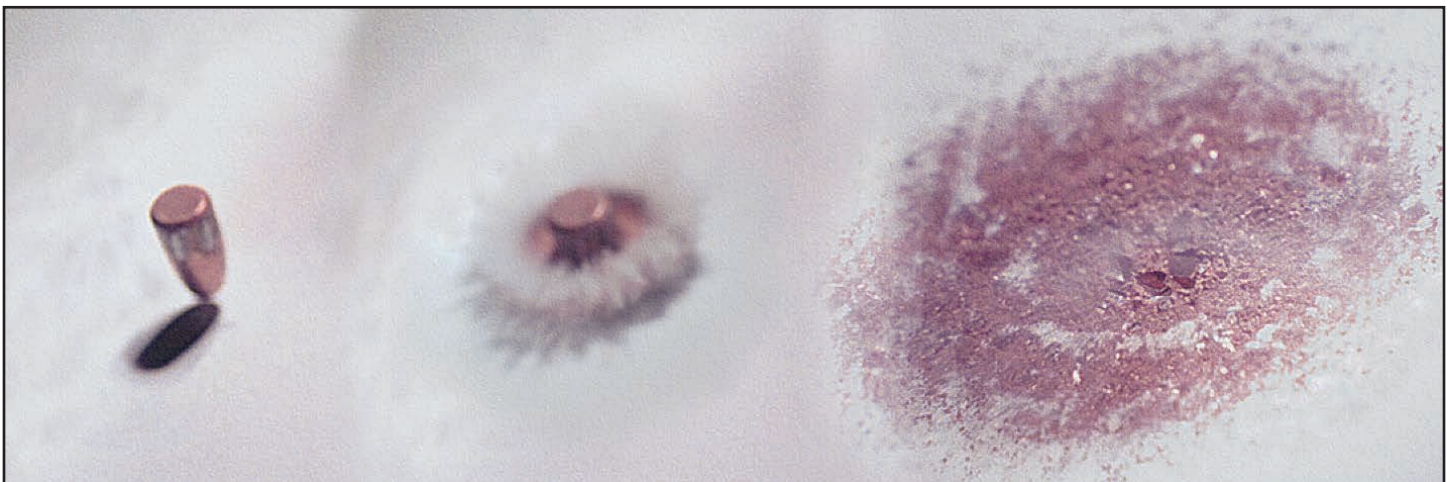
According to Ken Alexander, an ammunition development engineer at CCI-Speer Operations, only very experienced shooters, fewer than 10



Sample of 9mm frangible ammunition in its shell casing, removed and after impact.

percent, noticed recoil differences when shooting the two types of ammunition randomly placed in magazines.

A FLETC study found similar results when replacing lead ammunition with RHA. The study noted that the RHA practically replicated recoil characteristics, a result of more than 85 percent compared to the 98 percent for lead duty ammunition. The accuracy of RHA was comparable to lead duty ammunition – 6 inches at 25 yards with a mean center not more than 2 inches from that of duty ammunition. Typically, the RHA round is considerably lighter than the lead round. However, the intent of the RHA is generally for



High-speed photography shows a frangible round at point of impact.

basic and advanced marksmanship training. It is not yet designed to produce the same terminal performance characteristics as lead duty-carry ammunition.

Reliability is not an issue with using RHA. During analysis by FLETC staff, RHA produced no more interruptions in the cycle of operations with weapons used than did lead ammunition. In addition to health and safety benefits, inherent to its construction, RHA greatly reduces wear and tear on range equipment, and reduces potential for injury/damage from ricochets.

In fact, the FLETC received the Presidential “Closing the Circle” award in 2004 for leadership in driving the development, procurement, and implementation of RHA or “Green Ammunition” used at the FLETC.

As a result of the leadership role adopted by the FLETC, the amount of revenue generated from commercial contracts for RHA ammunition has resulted in a reduction in the per-round cost of RHA, which is now comparable to lead duty ammunition.

Based upon data collected for ammunition purchases at the FLETC, the cost per round of .40 caliber lead and RHA is negligible at approximately 0.27 per round. The one thousand round purchase price of RHA is slightly higher than 155 grain, but slightly less than 180 grain lead ammunition. Profound cost savings associated with the use of RHA are related to mitigating the adverse environmental and health issues resulting from the use of lead ammunition.

Millions of lead rounds are fired at law enforcement shooting ranges around the country yearly. Lead is not biodegradable, combustible nor does it become less toxic over time. Lead remains and accumulates in the environment, where it can settle into the soil or mobilize into the food chain, poisoning humans, animals, and the ecosystem. RHA offers a safe alternative to lead ammunition

for training and there is no discernible difference in performance when compared to lead ammunition.

Lead-free frangible rounds are not only as reliable in a training environment as lead ammunition, but have proven to be less destructive on ranges and equipment. Most importantly, the ammunition is safer for personnel and the environment. “Green” is clearly the most cost effective and the safest way to train the law enforcement professionals who protect our society.



Alex Graves is currently a branch chief at the Federal Law Enforcement Training Centers (FLETC) assigned to the Firearms Division. He joined the staff of the FLETC in 2005 as a law enforcement program specialist, responsible for the delivery of domestic violence training in Indian Country. He is a veteran of the U.S. Marine Corps, where he was a criminal investigator specializing in crimes against children. He served as a detective with the Hawaii County Police Department, assigned as supervisor for the West Hawaii Domestic Violence Unit. His assignments also included duties as patrol sergeant, patrol officer and firearms instructor. Alex was formerly a law enforcement training specialist for Cangleska/Sacred-Circle in South Dakota.