Exposure to Lead in Indoor Shooting Ranges

Lead is a well recognized health hazard in indoor shooting ranges. Therefore, managing and controlling lead exposure in this setting is important for protecting the health of those who work at the shooting range, shooters and others who spend time at the facility.

Why is lead a problem in indoor shooting ranges?

When a pistol, rifle or shotgun is fired, the primer ignites and releases very small lead particles into the air at the shooting line. Lead particles are also released as the bullet passes through the gun barrel, and lead particles are ejected into the air as the bullet strikes the target and trap. These lead particles spread through the air and can be inhaled. Although some of the airborne lead may be removed by an exhaust ventilation system, the hazard is not entirely controlled or eliminated. Some of the lead may also travel into other rooms or areas of the facility away from the shooting location. Lead particles may be deposited on surfaces and can build up over time if the range and other rooms are not cleaned frequently or thoroughly. Surface lead can be picked up on the hands and swallowed when eating, drinking or smoking. Lead can also be tracked out of the range area on shoes, clothing and equipment.

What are the health effects of lead exposure?

Inhaled or ingested lead can build up in the body, often without any obvious symptoms. However, frequent exposure, particularly at high levels, can harm the nervous, digestive and reproductive systems and produce a wide variety of symptoms. Lead can harm the brain, damage the kidneys and affect the ability of bone marrow to make blood. The U.S. Centers for Disease Control and Prevention (CDC) and the Pennsylvania Department of Health (PADOH) consider the blood lead level (BLL) to be elevated for both children and adults if it exceeds 10 microgram per deciliter (μ g/dL) of blood. Lead levels can be measured through a simple blood test that can be performed by most health care providers and will identify recent exposure. Lead in the bloodstream can take months to be eliminated from the body even, after exposure has ended. Lead that has been deposited in organs, teeth and bones takes much longer to be eliminated and can prolong the elevation of blood lead levels.

Blood Lead Levels and Potential Associated Health Risks

Blood Lead Level (BLL) (µg/dL)

5-9	10-19*	20-39*	40+*
Blood pressure	Spontaneous	➤ Non-specific	Kidney
changes can	abortions	symptoms	damage
occur at BBL	Developmental	Headache	Damage to
>6	delay of fetus	Fatigue	nerves in
	Impaired or	Sleep	arms, legs, and
	abnormal kidney	disturbance	organs
, i	function	Poor appetite	Reduced touch
		Constipation	sensitivity
		Diarrhea	Decreased
		Muscle & joint	reaction times
		pain	➤ Foot/hand
			drop
		Impaired brain	> Lowered
		function	sperm counts
		Decreased	and abnormal
		short term	sperm
		memory	Impaired
		Attention	development
		problems	of red blood
		Distractibility	cells
		Mood swings	

^{*} Effects are additional to those noted to occur at lower blood level levels

What protection measures should be used at indoor shooting ranges?

Persons who use the firing range, as well as those working at or frequently visiting the range, can be exposed to lead in the environment. Lead exposure at the firing range can be minimized through the following practices and procedures:

Air Handing

- Ensure that an adequate ventilation system is in place, working properly and has routine preventive maintenance performed on it.
- The ventilation system should be evaluated by a ventilation engineer or industrial hygienist with shooting range experience at installation and on a periodic basis. Swirling air currents at the shooting line increase airborne lead exposure.
- Keep the range area uncluttered. Airflow patterns and ventilation system efficiency can be disrupted by obstacles.

Cleaning and Maintenance

- Every shooting range should have a routine cleaning and maintenance plan and schedule.
- A high efficiency particulate air (HEPA) filtration vacuum is the only type of vacuum that should be used in order to prevent lead from re-entering the air from surfaces. A HEPA vacuum is different from a regular shop-type vacuum, because HEPA filters trap the very fine lead particles that are too small to see.
- Provide personal protective clothing and equipment to anyone cleaning the range. Include appropriate respiratory protection (a minimum of a half-face air-purifying respirator with P100 cartridges), shoes, clothing, hats and disposable coveralls. Disposable items should be removed and bagged before leaving the facility.
- Never dry sweep (broom/dust mop), as this will increase the level of lead in the air.
- Always use wet method floor cleaning and use high phosphate detergent and water to clean range floors and surface areas.
- Never hand pick spent bullet cartridges without the use of disposable gloves.

Always Use Good Hygiene Practices

- Provide a clean area for people to take breaks and eat.
- Never eat, drink or smoke in the range shooting booths or adjacent areas.
- Always wash your hands, arms and face with cool water and soap before eating, drinking or smoking. Fine particles of lead dust can easily adhere to your skin, hair and clothing, resulting in the accidental ingestion of lead.

- Lead dust can settle on your body, clothing, shooting mats and equipment, where it can be carried into your car and home. Always change out of contaminated clothing articles before leaving the firing range and place them in a non-mesh washable storage bag for laundering.
- Wash range clothing separately from the rest of the clothing; this prevents any possibility of contaminating other clothes.
- Shoes, boots and other specialized clothing used at the range should be left at the range, or stored in a separate sealed plastic bag for use only at the range. This will prevent lead dust from entering your automobile and home.
- Specialized clothing such as vests, jackets, gloves, etc. should be professionally cleaned on a regular basis. This will prevent the accumulation of lead particulates and reduce personal contamination.
- Shower as soon as arriving home, as this ensures that any lead residue is washed out of your hair and off the rest of the body.

Other Measures

- Provide information on lead hazards and protective measures during firearm safety courses.
- Offer non-leaded ammunition, including jacketed bullets and non-leaded primers, when possible.
- Frequent shooters, coaches and range officers should also have blood-lead tests done on a regular basis. Workers should be offered blood-lead tests on a periodic basis.

For more information about avoiding lead hazards in firing ranges, please visit the following websites:

MMWR—Lead Exposure From Indoor Firing Ranges Among Students on Shooting Teams, Alaska 2002-2004 http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5423a1.htm

Fact Sheet: Indoor Firing Ranges, Centers for Disease Control and Prevention, National Institute for Occupational Safety & Health http://www.cdc.gov/niosh/topics/ranges/

Lead Management & OSHA Compliance for Indoor Shooting Ranges www.rangeinfo.org/ resource_library/facility.../Lead-OSHA.pdf