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FIRING RANGES

The Airborne Lead Dust Hazard

Employer's Guide

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Texas Department of Health

THE AIRBORNE LEAD DUST HAZARD

Exposure to lead dust and fumes at the firing range can present a potential health risk to firearms instructors and other range employees. Protecting the health of range employees and shooters, while minimizing environmental contamination from lead exposures, is an important element in the safety plan for firing ranges.

HEALTH EFFECTS

Lead is a strong poison that serves no useful purpose once absorbed by the body. Lead dust can be inhaled or ingested.

It can adversely affect:

- the brain and nervous system,
- the ability to make blood,
- the digestive system,
- the kidneys, and
- the reproductive system.

The blood, body organs, and bones store the lead when it enters the body.

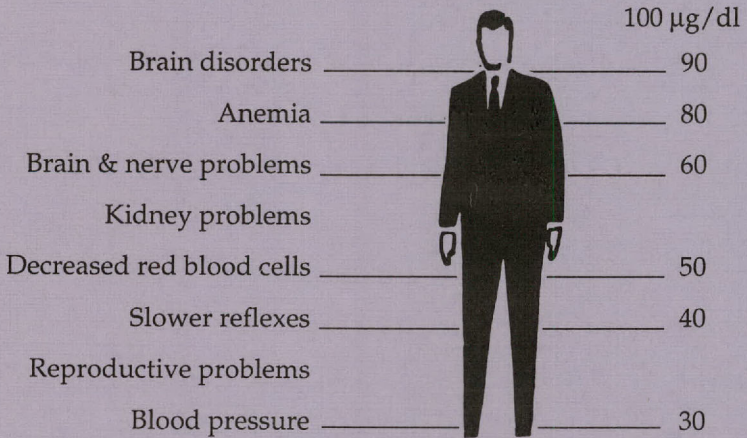
Lead stays in the *blood about 1 month, soft tissues* (liver, kidney) *about 3 months*, but remains in the *bones for decades*.

To determine the amount of lead in the body, a blood sample can be drawn from an adult or child and analyzed. An elevated blood lead level is an indication that lead is building up in the body faster than it can be eliminated. Small amounts of lead can build up in the body and may cause either temporary symptoms or permanent damage.

Adults can absorb lead at work or from hobbies by breathing in lead dust and fumes. Adults also can swallow lead accidentally when drinking, eating, or smoking in contaminated areas or by not washing their hands and faces after being in a contaminated area.

Lead dust from work or hobbies can be carried into the home on clothes, shoes, or other objects.

Health Effects in Adults - Lead Exposure

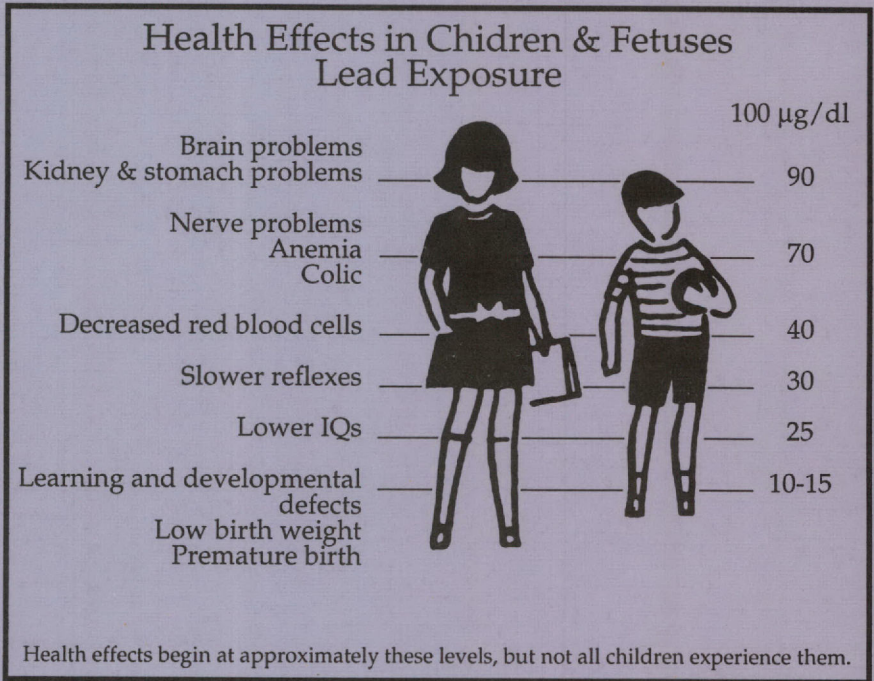


Health effects begin at approximately these levels, but not everyone experiences them.







Children

Children's toys and other things they handle also can become contaminated when parents bring lead dust home on clothes, shoes, and other objects. A young child's developing brain, nervous system, and other organs can be damaged by even small amounts of lead.

Lead absorbed by children can cause permanent damage, including learning disabilities and stunted growth.



LEAD DUST IN A FIRING RANGE

-  Exploding primers containing lead styphnate and the friction from the lead slug against the gun barrel create airborne lead.
-  High lead dust levels can accumulate inside indoor ranges with inadequate ventilation.
-  Slugs hitting the bullet trap, walls, floors, or ceiling of the range also create lead dust.
-  Airborne lead dust can concentrate in outdoor ranges, depending on weather conditions.
-  Spent bullets and settled dust can contaminate both indoor and outdoor ranges.
-  Improperly cleaning the range also can cause settled dust to become airborne.

**YOU CAN TAKE IT
HOME WITH YOU!**

High levels of lead dust in firing ranges can settle

1. on the bodies of employees and shooters
2. on their hair and clothes, and
3. can be picked up on their shoes.

The dust can be carried to their cars and homes, where it can present a hazard to their children.

OTHER HIGH LEAD DUST SOURCES

Bullet loading creates a fine dust that is very difficult to clean. Melting lead to cast bullets produces a fume, which condenses into a minute dust that can remain airborne up to 10 hours. The fine dust from these activities is readily inhaled, and can contaminate household surfaces. Never load bullets or melt lead in an unventilated area, inside the home, or anywhere children may frequent.

STEPS TO MINIMIZE LEAD ABSORPTION

- Make sure the range is correctly ventilated and that the ventilation system is working properly.
- At the range, wash your hands and face before eating, drinking or smoking.
- Wash hands and face before leaving the range.
- Wash range clothes separately from the rest of the family's clothes.
- Always load bullets in a ventilated area.
- Do not load bullets in the home or in areas where children frequent.
- Do not allow children into the bullet loading area.
- Keep the bullet loading area clean by using a high-phosphate detergent.

HOW CAN LEAD DUST EXPOSURE BE REDUCED?

WHAT AN EMPLOYER SHOULD DO

Reduce the lead dust exposure to employees and shooters by following these recommendations.

INDOOR RANGES

LIMIT LEAD DUST EXPOSURE

The Occupational Safety and Health Administration (OSHA) has set a limit for the lead an employee can be exposed to [Lead Standard (29 CFR 1910.1025)].

The limit is:

- Airborne lead should not exceed the permissible exposure limit (PEL) of 50 micrograms of lead per cubic meter of air ($\mu\text{g}/\text{m}^3$) averaged over an eight-hour day.
- Blood lead levels should not exceed 40 $\mu\text{g}/\text{dl}$ of blood for a firing range employee working 40 hours a week.

Instructors are especially at risk because they spend more time on the firing range.

ISOLATE

The range instructor has the greatest potential long-term exposure to lead.

A separate booth, with its own tempered and filtered air supply can be installed in the range.

The construction will not reduce lead exposures to other range users, but, it will reduce the range instructor's lead exposure.

VENTILATION

An effective ventilation system produces a smooth airflow pattern. Ineffective ventilation systems produce eddies and recirculation that can carry fumes and dusts emitted from weapons to the area behind the firing line.

Recirculation and channeling air flow can be caused by various structures in the firing range, such as:

- overhead barriers,
- sound barriers,
- booth walls,
- light fixtures,
- poorly located air inlets, or
- even the shooters.

It is very important that a ventilation system that serves the range area be completely separate from any ventilation for the rest of the building. *The exhaust air from the range should not feed into air supplies for offices, meeting rooms or other businesses.*

The planned use of a firing range determines the design of the ventilation systems. Improper use or maintenance of a firing range or the ventilation system can defeat the purpose of the ventilation system and increase the lead contamination.

BULLET TRAP

Avoid the use of angled backstops with sand traps.

Although they are somewhat inexpensive, sand traps can generate a large amount of airborne lead dust and require frequent cleaning.

Escalator backstops and their variations, which trap bullets and their fragments, generate less dust and are easier to clean. Also, the waste lead can be sold to a recycler without having to separate it from sand.

CLEANING

Indoor firing ranges require frequent cleaning. Walls, floors, ceilings, and bullet traps must be cleaned regularly.

This prevents settled dust from becoming an airborne inhalation hazard from people using the range or from air circulation.

It is essential to use appropriate methods in cleaning a firing range.

1. **DO NOT DRY SWEEP!**
2. Use a vacuum cleaner equipped with a high efficiency particulate (HEPA) filter to remove lead-contaminated dust.
3. If a vacuum cleaner with a HEPA filter is not available, then a wet cleaning method must be used.
4. Employees cleaning a range must wear appropriate protective equipment. This includes an approved respirator, working clothing, and shoes.

5. To reduce the possibility of bringing lead dust into their home, the employees cleaning the range need to shower and change clothes before leaving the site.
6. Work clothing must be disposable or laundered separately to prevent contaminating the home.

SUBSTITUTE Copper or nylon-clad bullets and non-lead primers (such as manitol hexanitrate-tetracene) can significantly reduce the amount of airborne lead discharged in firing.

Sometimes, this substitution alone can reduce lead exposure to the point that no further range alterations are necessary.

The ballistic characteristics of the non-lead primers do not equal those of conventional primers. In cases where it is necessary to use conventional primers, use this ammunition loaded with jacketed bullets.

OUTDOOR RANGES

Airborne lead dust is a concern in outdoor ranges and can contaminate the surrounding environment. Lead dust exposure can occur to employees or shooters.

Lead contamination in an outdoor environment can occur through water runoff, and from wind carrying the lead off-site.

The process of removing spent bullets, or the face of a berm, can generate large quantities of lead dust.

Steel backstops, similar to those constructed in indoor ranges, can be used instead of earthen backstops. Although the initial cost may be high, the spent bullets can be recovered and sold without soil removal. The trap holds the bullets and fragments minimizing the amount of lead pollution in the soil.

For more information on lead exposure and firing ranges, or health effects of lead, please write or call:

- Epidemiology Division
Texas Department of Health
1100 W. 49th St.
Austin, TX 78756
(512) 458-7269
- North Central Texas Poison Center
Dallas, Texas
1-800-441-0040
- Statewide Poison Center
Galveston, Texas
1-800-392-8548

References

The following references provide additional and more detailed information concerning all aspects of firing ranges:

National Rifle Association, *The Range Manual*, 1988.

Crouch KG, Peng T, Murdock DJ, *Ventilation Control of Lead in Indoor Firing Ranges: Inlet Configuration, Booth and Fluctuating Flow Contributions*, NIOSH, 1990 (draft).

Juhasz AA, *The Reduction of Airborne Lead in Indoor Firing Ranges by Using Modified Ammunition*, U.S. Department of Commerce, 1977.

Occupational Safety and Health Administration (OSHA), *OSHA Occupational Lead Standard*, 29 CFR 1910.1025, 1989.

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