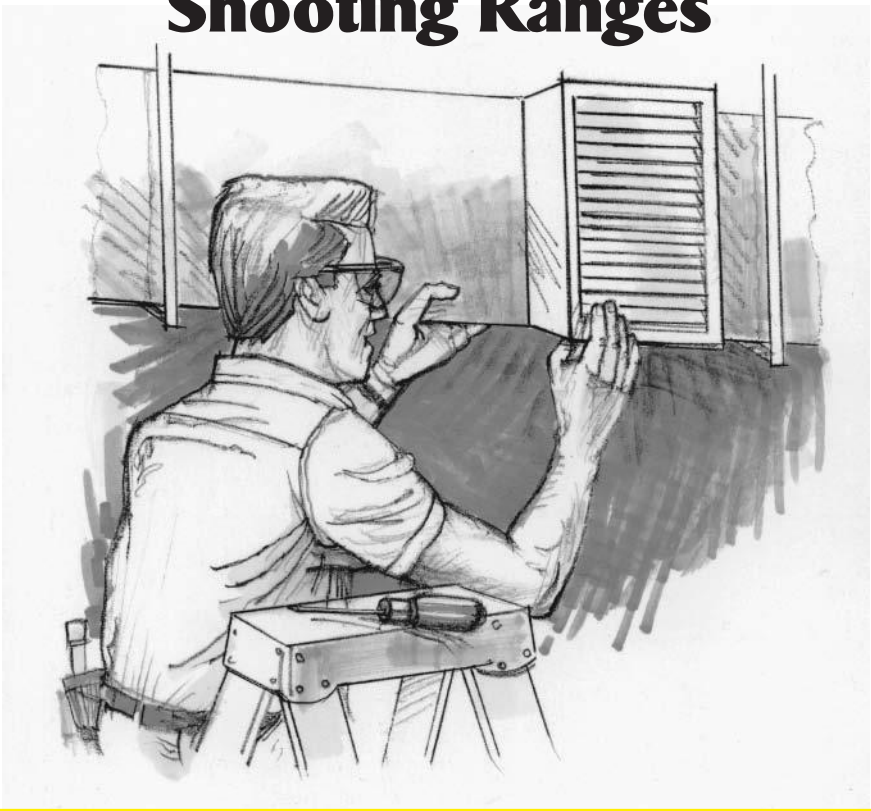
FACILITY DEVELOPMENT SERIES NUMBER 15

Lead Management & OSHA Compliance for Indoor Shooting Ranges



National Shooting Sports Foundation, Inc.
Facility Development Division
11 Mile Hill Road, Newtown, CT 06470-2359
203/426-1320

Lead Management and OSHA Compliance for Indoor Shooting Ranges

DISCLAIMER

This manual is intended only to provide useful general information to shooting range managers. While every effort has been made to provide accurate and up-to-date information, this manual is not to be used or relied upon as a substitute for consultation with insurance agents, legal counsel and other appropriate and qualified professionals. Range Managers should seek advice from appropriate and qualified professionals regarding the unique needs of their ranges.

TABLE OF CONTENTS

PAGE

ACKNOWLEDGEMENTS

The National Association of Shooting Ranges, a division of the National Shooting Sports Foundation, gratefully acknowledges the hard work of many people in putting this guide together. This guide would not exist without the efforts and teamwork of the following individuals:

Rick Patterson, Project Leader, Sporting Arms and Ammunition Manufacturers' Institute

Cathleen Cronin, US Department of Labor—Occupational Safety and Health Administration

Lee Anne Jillings, US Department of Labor—Occupational Safety and Health Administration

Sandi Khan, US Department of Labor—Occupational Safety and Health Administration

Bradley King, Centers for Disease Control and Prevention—National Institute for Occupational Safety and Health

Nilgun Tolek, US Department of Labor—Occupational Safety and Health Administration

Ira Wainless, US Department of Labor—Occupational Safety and Health Administration

U.S. Department of Labor-Office of Occupational Medicine

The following people provided valuable reviews and comments that helped to improve this document and make it more "user friendly:"

Robin Ball, Sharp Shooting Indoor Range

Brian Danielson, Meggitt Defense Systems/Caswell

Miles Hall, H&H Gun Range

Holden Kriss, Indian River County Shooting Range

Don Turner, Arizona Game and Fish

Mike Yacino, Gun Owners Action League.

INTRODUCTION

Shooting ranges serve many diverse and important functions in today's society. The local range provides a safe venue of participation for the nearly 20,000,000 Americans who go target shooting every year. Ranges have also played a key role in the historic reduction in the number of firearms related accidents. By providing a place to learn and practice firearms safety first-hand, shooting ranges have joined with industry, the National Rifle Association, International Hunter Education Association and others to effect a reduction in the number of accidental fatalities to the lowest level in history.

Ranges also serve as training centers for law enforcement and military personnel. The valuable training received at the range gives our peacekeepers the skills needed to fulfill their role of helping to protect the public safety.

Managing a safe and successful target shooting facility requires many diverse management functions. This document is designed to assist with the management of airborne lead. Airborne lead is generally considered to be an indoor shooting range issue. However, changes in outdoor shooting range designs may introduce the possibility of airborne lead exposure. Encroaching development may result in a need for more extensive structures designed to contain projectiles and sound. These structures may limit airflow and result in an airborne lead exposure risk at outdoor ranges.

Lead's properties make it the preferred material for ammunition. However, lead can be ingested or inhaled and enter the body. When lead enters the bloodstream it can be harmful, affecting many body systems.

Workplace lead hazards could impact employees' families as well. Lead taken home on work clothes and shoes can expose children and other household members. Employers may be legally responsible if household members are adversely affected by this "take-home" lead.

You can work with lead safely without endangering your health, the health of your employees or their families. This manual is designed to provide information that will help you minimize or eliminate lead exposures and operate a shooting range in a safe and responsible manner.

In the long run properly managing lead exposure can also save you money. With an effective Lead Management Program in place you will lower your potential liability and-more important-have the satisfaction of knowing that you, your employees, and their families are not being unnecessarily exposed to lead.

Background

Lead is a naturally occurring element that can be found in many forms. In its metallic form, lead has very low reactivity. However, lead can also be found in the form of various lead compounds. Some of these lead compounds can be readily absorbed into the bloodstream.

Most of the lead used in ammunition is in the metallic form. A small amount of a lead compound-either "lead styphnate" or "lead azide"-is used in the primer.

So, if most of the lead in ammunition is in the relatively inert metallic form and only a small amount of lead is in the form of a lead compound, why should lead be a concern to range operators?

When shooting a firearm airborne lead can be created which can pose a potential health risk if not properly managed. The microscopic size of airborne lead particles makes any ingested lead susceptible to being transformed into lead compounds by the digestive system. When heated, metallic lead can be transformed into airborne lead compounds that can pass through the linings of the lungs and enter the bloodstream. Furthermore, employees may be exposed to lead on a daily basis. Short-term low-level exposures do not usually present a significant health risk. However, consistent daily exposure has the potential if not properly managed to result in a lead poisoning problem.

How Can Lead Enter the Body?

Lead can enter the body by being inhaled or by being swallowed. Lead can be inhaled when lead dust, mist, or fumes are in the air. Particles of lead can be swallowed if lead gets on a worker's hands or face. Lead can also be swallowed if food, beverages, cigarettes, or tobacco products become contaminated with lead and then consumed. If contaminated cigarettes are smoked, lead can be both inhaled and swallowed.

When lead enters the bloodstream, it circulates throughout the body. Some of the lead that is absorbed is eliminated by the kidneys and is excreted from the body in urine. The lead that is not eliminated right away is stored in the organs and bones. Stored lead is released back into the bloodstream over time.

The amount of lead in the blood can be measured. This test is called a blood lead level (BLL). A second test, the zinc protoporphyrin (ZPP), measures the long-term storage of lead in the body. We will discuss these tests in more detail in the section on Medical Surveillance.

What Health Problems Can Lead Cause?

Lead that has been absorbed can affect many important body systems. In high enough concentrations, lead has been shown to damage the brain, nerves, red blood cells, kidneys and reproductive systems of men and women. Depending on the intensity and frequency of

exposure, symptoms can manifest suddenly in the case of acute lead poisoning or gradually in the case of chronic lead poisoning.

Both acute and chronic lead poisoning may be difficult to distinguish from other diseases. Since damage from lead can become permanent, early detection and treatment of lead toxicity is important to prevent lead poisoning and disease.

Symptoms of Acute Lead Poisoning

- Cramping, abdominal pain weakness
- Nausea
- Vomiting
- Black, tarry stools
- Headache
- Confusion
- Stupor
- Sudden decrease in amount of urine
- Jaundice-yellowing of skin and eyes

Symptoms of Chronic Lead Toxicity

- Brain and Nervous System-Fatigue, apathy, irritability, insomnia, impaired concentration, memory problems, confusion, extreme weakness, seizure, coma
- Blood-Anemia, jaundice
- Kidneys-Chronic renal failure possibly requiring dialysis, high blood pressure, gouty deposits in kidneys
- Digestive Tract-Vague gastrointestinal symptoms, lead colic
- Reproduction-Decreased libido, abnormal sperm production, infertility, irregular menses, miscarriage
- Muscles and Joints-Muscle and joint aches and pains particularly in shoulders and back, gout

Treatment

The primary recommendation for individuals with lead poisoning is to prevent further exposure and allow the body to remove the lead on its own. Occasionally adults with very high Blood Lead Levels (BLLs) and serious symptoms require drug treatment called "chelation therapy." Only a licensed physician with experience treating adult lead poisoning should make decisions regarding chelation for an individual worker.

SOURCES OF LEAD AT YOUR RANGE

The most significant potential source of airborne lead at the firing line is caused by the hot flames of burning gunpowder acting on the exposed lead base of a projectile. The metallic lead in the projectile can also become airborne lead particles through heat from friction between the bore of the firearm and an unjacketed lead projectile. Using jacketed projectiles that enclose

and protect the lead core at the base and the bearing surfaces, or using non-lead projectiles, will eliminate airborne lead from these potential sources.

The primer-the part that ignites when struck by the firing pin, which in turn ignites the gunpowder-contains lead styphnate or lead azide. The lead compound becomes airborne when a shot is fired. Primers that do not contain lead compounds are under development. At this time non-lead primers are available for limited use in handgun ammunition.

Downrange, lead may become airborne from splatter caused by projectiles hitting backstops, floors, walls or baffles. The amount of lead from this source can vary widely depending on the equipment, design and materials used in the construction of the facility.

Maintenance and/or repair of the backstop or other range equipment may cause settled lead dust to become airborne. Improper cleaning of a range may also cause lead dust to become airborne. Dry sweeping is a particularly hazardous practice that will significantly increase airborne lead levels. Ranges that allow lead dust to accumulate have increased lead exposure risks, since the accumulated dust can become airborne from muzzle blast and/or shooter movement.

Keep in mind that lead may be present in other areas of your facility in addition to the range. Many common products such as solders, metal alloys and lubricants may contain lead. Review the Material Safety Data Sheet (MSDS) for each product used in your facility. Your supplier is required to provide you with an MSDS. Also, certain metalworking processes such as melting, soldering, brazing, welding, machining, grinding or cutting can create a very high risk of airborne lead exposure.

OSHA'S GENERAL INDUSTRY LEAD STANDARD

The Occupational Safety and Health Administration (OSHA), a division of the U.S. Department of Labor, is charged with protecting employee health and safety in the workplace. OSHA has a comprehensive lead regulation, see 29 CFR 1910.1025. These regulations define your legal responsibilities to limit employee exposure to airborne lead, provide protective equipment and hygiene facilities, maintain a clean workplace, and provide employees with safety training and medical care. Failure to comply with the requirements of the Lead Standard could result in fines to your business. OSHA does not endorse any specific equipment or process for complying with these regulations. Their only function is to regulate the impact on the employee.

While by law OSHA regulations only apply to employees, every indoor range, including club ranges, can use them as an important reference.

Twenty-four states and two territories currently administer their own occupational safety and health program under a provision of the Williams-Steiger Occupational Safety and Health Act of 1970. To determine what lead regulations are enforced in the state where you operate a firing range, contact the appropriate authority in your state. A complete listing of these "State Plan States" is available on-line at www.osha.gov.

The following is a summary of the key elements of the OSHA General Industry Lead Standard. It is not a complete discussion of all the requirements. It is presented as an aid to understanding the Standard and is not to be considered legal advice. For a more detailed explanation you should consult with a knowledgeable attorney.

Scope

The General Industry Lead Standard applies to all occupational exposures to lead with the exception of the construction industry and the agricultural industry (these are regulated separately). The General Industry Lead Standard applies to all employees at your shooting range.

Employee Exposure

The OSHA General Industry Lead Standard establishes specific airborne lead exposure levels for employees working in areas where airborne lead is present. Lead exposure is determined through air sampling that measures the number of micrograms of lead present in a cubic meter of air. The results of air samples taken at your range will determine specific actions you will need to take to be in compliance with the OSHA Lead Standard. The Lead Standard establishes two threshold levels of airborne lead exposure that trigger certain requirements that are important to range operators. The first of these is the Action Level and the second is the Permissible Exposure Limit.

Action Level. The OSHA Action Level (AL) is 30 micrograms of lead per cubic meter of air (30 $\mu g/M^3$) as an eight-hour time-weighted average (The eight-hour time-weighted average divides the total results of an employee's airborne lead monitoring by a full workday, which is defined as an 8-hour shift. The person you hire to conduct airborne lead monitoring will perform the appropriate calculations).

Airborne lead exposures at or above the AL trigger additional management and monitoring requirements such as periodic exposure monitoring, biological monitoring, medical surveillance as well as specific requirements for employee training. Each of these requirements will be addressed in more detail.

Permissible Exposure Limit. The Permissible Exposure Limit (PEL) for lead is 50 micrograms of lead per cubic meter of air (50 $\mu g/M^3$) as an eight-hour time-weighted average.

Employers must control airborne lead exposure so that no employee is exposed to lead at concentrations over the PEL.

EXPOSURE MONITORING

Initial Determination. If any lead is used in the workplace, the employer must measure the amount of lead in the air for a representative number of employees who are reasonably believed to have the highest exposure levels. The employer must conduct personal air monitoring for each job classification and (at a minimum) the shift with the highest exposure level. The monitoring must be performed while employees perform tasks that are representative of their normal

tasks and responsibilities. The purpose of this initial determination is to find out whether airborne lead levels are at or above the Action Level. The employer must collect full-shift, personal samples in the employee's breathing zone. Depending on the results of the initial determination, employers may have additional responsibilities.

If the initial determination is less than the AL, no further assessment is needed. You do, however, need to make a written record of how you arrived at the determination.

If there is a determination that exposure levels are at or above the AL, personal air monitoring must be repeated at least every six months for a representative number of employees.

If personal air monitoring shows that airborne lead levels are above the AL for more than 30 days per year, the employer must provide a pre-placement medical exam and biological monitoring every six months for each employee that will be exposed to lead.

If the initial determination is at or above the PEL, the employer must reduce employee exposure below the PEL. In addition, personal air monitoring must be done quarterly.

If personal air monitoring shows that airborne lead levels are above the PEL for more than 30 days per year, the employer must implement all feasible engineering, work practice, and administrative controls to reduce air lead levels to below the PEL. When all feasible controls are in place and are still insufficient to reduce air lead levels below the PEL, respirators must be used to reduce employee exposure so that no employee is exposed above the PEL on any day.

The employer must develop and implement a plan to reduce air lead levels to or below the PEL. This plan must be in writing and must be reviewed and updated at least every six months. At a minimum, the plan must include:

- Description of each operation in which lead is emitted.
- Description of the specific means that will be used to achieve compliance.
- Report of the technology considered in meeting the PEL.
- Air monitoring data that documents the source of lead emissions.
- Detailed schedule for implementation of the program.
- Work practice program.
- Administrative control (job rotation) schedule, if applicable.

Additional Monitoring. If there is a change of equipment, process, control, personnel or a new task has been initiated which could increase the concentration of lead in the air, you must retest to make a new determination.

Employee Notification. The employer must notify each employee in writing of the results of personal air monitoring that represents the employee's exposure within 5 working days of receiving the results. If air lead levels are above the PEL, the employer must also include a written notice telling employees that the air lead levels exceeded the PEL and describing the corrective action the employer has taken or will take to reduce exposure to or below the PEL.

AIR MONITORING FOR LEAD

You can't manage what you don't measure. Air monitoring measures the amount of lead dust and fumes in the air your employees breathe. Air monitoring is an important tool that can tell you:

- Whether your operation and work methods are creating too much airborne lead. The results of air monitoring will help you determine whether you need to initiate or improve engineering, work practices or administrative controls designed to reduce airborne lead exposure. After you make changes, air monitoring will help you determine whether these changes have been effective at reducing airborne lead levels.

- Whether you are in compliance with the OSHA legal exposure limits for lead.

To perform air monitoring, a worker wears a small battery-powered air pump on the waist that is connected by tubing to a filter cassette attached at the collar. The pump pulls air from the worker's "breathing zone" and the dust and fumes in this air are collected on the filter. The filter is sent to an analytical laboratory, which measures the amount of lead collected on the filter. A calculation is then done to estimate the average amount of airborne lead each worker was exposed to during the shift.

Conducting Airborne Lead Monitoring

- Identify which work processes generate lead dust or fume and which employees are potentially exposed to lead. At your range this would mean instructors, range officers and especially personnel who do range cleaning, reclaiming or maintenance.
- Identify a qualified individual to do air monitoring. Some workers' compensation insurance carriers will do free air monitoring. The OSHA Consultation Service will also do a free one-time air monitoring. An industrial hygiene consultant can be hired to develop and help implement an effective program.
- Conduct an initial determination of airborne lead exposures. If the results exceed the AL or PEL, you will need to repeat monitoring periodically as outlined in the previous chapter.

Measuring the amount of lead in the air employees' breathe provides important information on employee lead exposure, but it doesn't give you the complete picture. Air monitoring is usually done on one day. The levels of lead in the air your employees breathe may vary from one day to the next, depending on the activities at your facility. To ensure proper range evaluation, samples should include periods of maximum range use. Also, in order to get a complete picture of your employees' lead exposure, you may need to measure the amount of lead in employees' blood. The chapter entitled "Lead Medical Program" on page 20, will discuss when blood tests are appropriate or required.

NON-LEAD AMMUNITION - AN EMERGING TECHNOLOGY

The most basic way to reduce employee exposure to lead is to not use lead in the first place. Non-lead ammunition is an emerging technology. Ammunition companies, the military, metallurgists and others have been committing significant amounts of time and money to try to develop effective non-lead primers and projectiles. Most ammunition manufacturers now have some form of lead-free products available in their product line.

There are advantages and disadvantages to requiring non-lead ammunition at your range, given the state of current technology.

ADVANTAGES
Significantly reduces and potentially eliminates employee exposures to lead.
The exclusive use of non-lead ammunition may allow the use of less costly ventilation equipment.
May reduce the need and associated costs of other lead management procedures.
Partial use of non-lead ammunition can lower airborne lead levels and keep levels below the OSHA regulatory threshholds.
Using non-lead ammunition may reduce the start-up costs of a new facility.

DISADVANTAGES
You may need to develop and strictly enforce operating procedures that ensure ALL range users will only shoot the lead-free ammunition.
If non-lead ammunition is used along with ammunition that contains lead, mixing the different types of metals may increase the cost of recycling spent ammunition.
Non-lead ammunition is currently more expensive than traditional ammunition.
Today's non-lead primers have a short "shelf-life" and inconsistent ignition (resulting in poor accuracy or failure to ignite the gunpowder).
There are potential, and possibly as yet unknown, health and environmental concerns from the non-lead alternatives. Further study and monitoring of the non-lead alternatives may reveal that they are as harmful as, or even more harmful than the lead they replace.

MECHANICAL VENTILATION

Ventilation is perhaps the single most effective management tool to reduce airborne lead exposure. Most indoor ranges use some form of mechanical ventilation to reduce employee and shooter exposures to airborne lead. There are two different types of ventilation systems: the closed-loop system and the direct exhaust system. Each system has its advantages and its disadvantages. Some of the best sources for detailed evaluations and information include indoor shooting range equipment suppliers, found on **www.rangeinfo.org** and other range operators.

Regardless of the system used, there are some general guidelines to follow. The goal is to have airflow of at least 50 feet per minute (fpm) past the shooter. Many companies recommend installing a system that moves more air (for example 75 fpm) to accommodate potential future loss of performance and diminished airflow (note that airflows higher than 75 fpm can be counterproductive and increase the potential for airborne lead exposure). You also want to spread the flow evenly across the width of the shooting range by using multiple supply ducts. This is important to prevent "eddies" and uneven airflows that could create pockets of stagnant air in breathing zones. One system even goes so far as to use a perforated material (it looks like pegboard made out of plexi-glass) for the entire wall behind the firing line to ensure good air distribution. You also want to create negative pressure by pulling more air from the downrange return ducts (or exhaust vent) than enters the range from the supply ducts behind the shooter. The exhaust air capacity should exceed the air supply capacity by at least 10%. This ensures air moves downrange, away from the firing line.

Be sure to check your community's local building and zoning codes to see if they address Heating, Ventilation and Air Conditioning (HVAC) systems and installation.

Closed Loop System. A closed loop system recirculates the air in the range. If you recirculate the air, you must use a HEPA (which stands for High Efficiency Particulate Air) filter. The HEPA filter removes lead particles from the air. A series of inexpensive pre-filters should be used upstream of the HEPA filter so the more expensive HEPA filter will last longer. As filters become clogged, they must be replaced or airflow may diminish to the point that the system will cease to protect employees and users. OSHA also requires that you have a backup filter, you monitor the concentration of lead in the return air[1] and you have controls that automatically bypass the recirculation system if the filter system fails.

NOTE: To eliminate the possibility of creating a lead exposure risk in adjacent areas within the facility, shooting range ventilation systems should be dedicated to the range and not tied into the general HVAC system.

In general, the closed loop system is more expensive to install than the Direct Exhaust System, but easier to maintain in the long run. Closed loop systems are best used where there is a significant need to reduce the energy costs associated with heating and/or cooling or you can't isolate the area around the exhaust vent in a direct exhaust system to prevent human or wildlife exposures.

1. An OSHA letter of Standards Interpretation dated September 17, 1982 identifies the costly nature of monitors for the lead concentration in air and therefore states "[the standard] is only enforced when there is a potential hazard (e.g., where the employee exposures could exceed the PEL for the lead standard, 50 (g/M3). Citations would not generally be issued for [the standard] when there is only a technical violation of the standard (e.g., employee exposures to lead are very low)."

Used filters must be disposed of properly, since they may be classified as a hazardous waste. The federal law that covers disposal of waste is the Resource Conservation and Recovery Act (RCRA). Lead captured by the filter may be recycled. Recycling activities are exempt from RCRA regulations. If you do not recycle the lead in the filters, the filters should be tested using the Toxicity Characteristic Leaching Procedure (TCLP). If the TCLP results are less than 5 parts per million (ppm), the filters can be disposed of as normal solid waste (trash). If the TCLP results are above 5 ppm, the filter must be disposed of as hazardous waste through a licensed hazardous waste company. You should keep all test results and shipping manifests in a file so you can demonstrate that the waste has been disposed of properly.

Direct Exhaust System. The direct exhaust system brings fresh air into the range from outside and then vents the range air outside. The air being exhausted from the range may be filtered or unfiltered (however, you should check local regulations).

If the air isn't being filtered, the exhaust vent should be located away from areas of human activity. The exhaust vent should also be located away from the fresh air intake for the range or other buildings (otherwise air being exhausted from the range may be sucked into the intake and redistributed back into the range or to other rooms/buildings).

Over time, lead will likely accumulate in the area directly under an unfiltered exhaust vent. You should limit access to this area so you don't create a possible exposure pathway. It would also be wise to manage the area around the exhaust vent as spelled out in the National Association of Shooting Range's (NASR) *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges* to make sure the lead doesn't pose an environmental risk.

A direct exhaust system, whether filtered or unfiltered, has the advantage of being less expensive to install than a closed loop system, but will increase heating and/or cooling costs in climates with high or low temperatures.

Monitoring System Effectiveness

Regardless of the ventilation system used to reduce employee exposure, measurements that demonstrate the system's effectiveness must be made under the following circumstances:

- When the system is first installed.
- Every three months while the system is being operated.
- Within five days of any change in firing range activities or engineering/work practice/administrative controls that might result in a change in employee exposure to lead.

Measurements may include capture velocity, duct velocity, air velocity at the firing line (measured at the floor, ceiling and walls) or static pressure. Many newer closed loop ventilation systems have an automatic alarm that constantly monitors the ventilation system and sounds an alarm if there is a problem. Use of an alarm does not change the need for demonstrating system effectiveness as outlined above.

It is advisable to keep written documentation of all tests on file as proof of successful implementation of an effective lead management plan.

Quick Tip
To visualize the airflow currents of an existing ventilation system, use a "smoke machine" (the kind used in theatres) or smoke tubes to fill the range with "smoke." Have people stand at the firing line (or place mannequins at the firing line) and turn the ventilation system on. Look for rapid clearance of the smoke at the firing line and make sure there aren't any lingering pockets of smoke. Any place that smoke remains represents an area where there may be an increased exposure risk for airborne lead.

Other Range Equipment Considerations
The ventilation system isn't the only range equipment that may impact airborne lead levels at an indoor range. The bullet trap system used at the range can have an effect on airborne lead levels. Some systems will result in more airborne lead than others. Any bullet trap system that results in deformation or fragmentation of the projectile will increase the airborne lead levels. The rangeinfo web site contains several articles that evaluate different bullet trap technologies. There is also a discussion of bullet traps in the US Environmental Protection Agency's document *Best Management Practices for Lead at Outdoor Shooting Ranges* (www.epa.gov/region2/waste/leadshot).

RANGE HOUSEKEEPING

Good housekeeping is one of the most important management practices you can implement to reduce exposure to lead. You need to keep all surfaces as free as practicable of accumulated lead dust and do it in a manner that will not increase the risk of lead exposure. A clean range has the added benefit of being more attractive to members and customers.

How you clean the range area is very important. Inadequate and/or inappropriate range cleaning procedures can actually create a greater risk of lead exposure. Perhaps the worst thing you can do is clean the range by dry sweeping. Similarly, compressed air can't be used to clear floors or other surfaces of accumulated lead. Both procedures will stir up lead dust and increase airborne lead levels and exposures.

There are two methods that should be considered for the routine cleaning of your range. One is wet mopping and the other is using a HEPA vacuum system. Both systems prevent settled lead from becoming stirred up and exposing employees to elevated airborne lead levels. Be aware that if you use a wet mop procedure for range cleaning, the water may need to be managed as a hazardous waste. If you plan to use a HEPA vacuum system, make sure it is designed to be explosion proof so unburned or spilled gunpowder isn't accidentally ignited. The HEPA filter may also need to be managed as a hazardous waste. When working on the range the ventilation should be turned on (unless performing work on the ventilation system or performing other activities where running the ventilation system could create a hazard to the worker).

Good housekeeping involves a regular schedule to remove accumulations of lead dust and debris. The schedule should be adapted to range conditions based on range use and exposure potential. Employees should be trained in the safe performance of housekeeping and maintenance activities. The performance of range maintenance, cleaning or reclaiming activities are tasks that are likely to have the highest airborne lead exposure levels. For this reason, the use of protective clothing during these activities may be a consideration.

Changing Filters

Your HEPA vacuum will require periodic filter changes. There is an increased risk of airborne lead exposure if this is done in a haphazard manner. Follow the manufacturer's instructions and take care to prevent reintroducing trapped lead particles back into the air. Avoid any movements that will shake lead dust loose from the filter. Immediately place the used filter into an appropriate sealed container. Put a fresh HEPA filter in the vacuum per manufacturers instructions and then properly dispose of the used filter (see page 10).

Filters in your ventilation system will also need to be replaced periodically. As with changing the vacuum filter, follow all instructions provided by the manufacturer. It's a good idea to use your HEPA vacuum to clean around the access door. Carefully pull the filter out and place it in an appropriate sealed container. Vacuum around the filter housing, put a fresh filter in place and then close the access door. Properly dispose of the used filter (see page 10).

Cleaning the ductwork in your ventilation system presents significant risks of airborne lead exposure if done incorrectly. Proper procedures for ductwork cleaning and maintenance are beyond the scope of this document. Information is available from the National Air Duct Cleaners Association (1518 K street, NW, Suite 503, Washington, DC 20005) or you can hire a professional firm to perform the work.

HYGIENE PRACTICES

Some basic hygiene practices are good ideas for all range users and workers. Preventing the presence and consumption or use of food, beverages, tobacco products and cosmetics on the range and recommending people wash their hands prior to eating, drinking, smoking or applying cosmetics are two examples of simple practices that are easy to implement.

In addition, all workers involved in housekeeping and maintenance activities should be careful not to leave the workplace wearing any contaminated clothing or equipment worn during the work shift.

Good practices notwithstanding, OSHA requires employers to take certain steps and provide certain facilities if air monitoring reveals that airborne lead levels exceed the PEL. In all areas where employees are exposed to lead at levels above the PEL, the employer must:

- Prohibit the presence and consumption or use of food, beverages, tobacco products and cosmetics.
- Ensure that employees wash their hands and face prior to eating, drinking, smoking or applying cosmetics.
- Provide a clean change room with separate storage facilities (such as lockers) for work clothing and equipment and for street clothing to prevent cross contamination with lead.
- Provide shower facilities and ensure that employees shower at the end of the work shift.
- Ensure that employees do not leave the workplace wearing any contaminated clothing or equipment worn during the work shift (including shoes and undergarments).
- Provide readily accessible lunchroom facilities with a temperature controlled, positive pressure and filtered air supply.
- Ensure that employees do not enter lunch room facilities with protective clothing and equipment unless lead dust has been removed by HEPA vacuuming, downdraft booth, or other cleaning method beforehand.

ADMINISTRATIVE CONTROLS

Another management tool at your disposal is the use of administrative controls to limit employee lead exposures. Administrative controls include employee scheduling and task assignments that serve to limit lead exposure for any one employee. In short, shooting range-related tasks can be rotated among all employees so no one employee is in the range area for a prolonged period of time. For instance, instead of an employee working 8 hours on the range per workday, two employees would divide the range tasks so each is on the range for only 4 hours a day. This may keep you below the regulatory thresholds (AL and/or PEL) administered by OSHA. This works because the airborne lead levels are determined using an 8-hour time-weighted average. So if an employee is only on the range for 4 hours, the monitoring would only measure 4 hours' worth of exposure. The calculation to determine the airborne lead level, however, would divide those results by a full (8-hour) workday.

Using administrative controls to limit employee airborne lead exposure does require additional supervision/management. Employee schedules must ensure that no employee spends more time on the range than established by the monitoring.

An employer using administrative controls to limit employee time-weighted average airborne lead exposures must establish and implement a job rotation schedule that includes the following:

- Name or ID number of each affected employee
- Duration and exposure levels where the affected employees are located
- Any other information that may be useful in assessing the reliability of administrative controls to reduce lead exposure.

Some ranges have found they can reduce workers' compensation insurance costs by assigning the fewest number of employees to tasks that include potential lead exposure. Workers' compensation insurance premiums are significantly higher for employees that have a lead exposure risk. If an employee has even a small task that includes potential lead exposure, a higher workers' compensation insurance premium rate may apply. So, if you divide range-related work tasks among a greater number of employees you will pay the higher premium for all of those employees. If you reduce the number of employees with range-related tasks and assign the rest to tasks that do not have a lead exposure risk (such as cashier, administrative assistant, floor sales clerk, etc), you may only have to pay the higher premium for the small number of employees working on the range and a much lower premium for the rest of your staff. Limiting the number of employees with potential lead exposure can also result in lower costs for medical surveillance and other functions related to lead management.

There are advantages-and disadvantages-to both approaches.

PROTECTIVE WORK CLOTHING

Whenever personal air monitoring shows that air lead levels are above the PEL or an employee experiences skin or eye irritation, OSHA regulations require the employer to:

- Provide, at no cost to the employee, appropriate protective work clothing and equipment such as coveralls or other full body clothing, gloves, hats, shoes, eye protection, etc.
- Provide the protective clothing in a clean and dry condition at least weekly. Clothing must be provided daily to workers who work in areas where airborne lead exposure levels exceed an eight-hour time-weighted average of 200 ($\mu g/M^3$).
- Provide for cleaning, laundering, or disposal of protective clothing and equipment.
- Repair or replace protective clothing and equipment as necessary.
- Prohibit the removal of lead from protective clothing or equipment by blowing, shaking, or any other means, which disperses lead into the air.
- Ensure that employees use appropriate protective clothing and equipment, remove contaminated work clothing at the end of the shift in change rooms provided for that purpose, and place it in a closed container. OSHA requires the container to be labeled as follows: **CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD-CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.**
- Inform, in writing, any person who cleans or launders protective clothing or equipment of the potential harmful effects of lead.

The performance of range maintenance, cleaning or reclaiming activities are tasks that are likely to have the highest exposure levels. For this reason, the use of protective clothing during these activities may be a consideration.

RESPIRATORS

When changes in engineering controls and/or work practices/administrative controls can't effectively reduce lead exposure to a level at or below the PEL, OSHA requires the use of respirators to further lower your employees' lead exposure (see 29 CFR Part 1910.134). This management option has not typically been used for normal shooting range activities. However, the use of respirators when performing range maintenance, cleaning or reclaiming activities is an especially important consideration since these activities are likely to have the highest exposure levels.

Using respirators properly isn't as simple as buying a respirator and putting it on, but with some planning and commitment it can be an effective tool. This chapter guides you through the steps in setting up an effective respirator program.

Written Respirator Program

If respirators are required to protect employee health, OSHA requires employers to have a written respiratory protection program. This chapter addresses the elements of an effective respirator program.

Selecting The Right Respirator For The Job

The purpose of a respirator is to prevent the inhalation of harmful airborne substances and/or provide protection in an oxygen deficient atmosphere. Functionally, a respirator is designed as an enclosure that covers the nose and mouth or the entire face or head.

Respirators provide protection in one of two ways: either by removing contaminants from the air before they are inhaled (air-purifying respirators) or by supplying a source of clean air that is independent of the surrounding atmosphere (supplied-air respirators).

The kind of respirator you use depends on the amount of lead in the air. The more lead in the air, the more protection the respirator must provide. For most-if not all-shooting range applications an air-purifying respirator will be adequate. Selecting the right respirator for the job is the first step in a good respirator program.

Air-Purifying Respirators. An air-purifying respirator filters out harmful substances from the ambient air the employee breathes. There are different kinds of filters available. The choice of filter depends on what toxic substance you are trying to protect against. Air-purifying respirators can also have different types of face pieces, half-mask and full-face. Air-purifying respirators are inexpensive and easy to maintain.

A powered air-purifying respirator (PAPR) is another type of air-purifying respirator that uses a small battery-powered fan to force air through air-purifying elements and into the mask. PAPRs cost more and need more maintenance but they do provide greater protection than standard air-purifying respirators.

Supplied-air Respirators. Supplied-air respirators supply clean air to the respirator through an airline from a source independent of the work area; they do not filter the air from the work area. These can be expensive systems that provide protection against very high levels of lead. They are also called airline respirators.

Select the Right Respirator for the Job

- Measure the amount of lead in the employees' personal breathing zone. Air monitoring is discussed in detail on page 7.
- Select the type of respirator based on the amount of lead in the air. The person who did the air monitoring, or a safety equipment supplier, can help you choose the right respirator. Also, see Table 1 in Standard S-29 CFR 1910.13Y for information on which respirator is required at specific air lead levels.
- When using an air-purifying respirator, use P-100, R-100, or N-100 respirator filters to protect against lead. (These are sometimes generically referred to as HEPA filters.)

  When oil mists are also present, be sure to use P-100 or R-100 filters. (NOTE: The R-series filters should only be used a maximum of 8 hours when oil mist is present. P-series filters can be worn for a longer period of time. As with all filters, they should be replaced when damaged, soiled or difficult to breathe through.)
- NEVER use disposable dust masks to protect against lead dust and fume. They do not fit well enough to offer adequate protection.
- Respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH).

Medical Evaluation

Not everyone can wear a respirator. Respirators can put too much stress on the heart and lungs for some people. If an employee is assigned to wear a respirator, you must provide the employee with a medical evaluation to determine if he/she can safely wear a respirator. Employees must be medically evaluated and found eligible to wear the respirator selected for their use prior to fit testing or first-time use of the respirator in the workplace. Medical eligibility is to be determined by a physician or other health care professional licensed to do so in the state in which they practice.

In assessing the employee's medical eligibility to use a respirator, the health care professional must perform a medical evaluation using the medical questionnaire - in Appendix C to section 1910.134- and completed by the employee. An alternative is to provide a medical examination that obtains the same information as the questionnaire. If there is a medical examination, it must be administered confidentially and at a time and place that is convenient to the employee. Employers are not required by the standard to provide a medical examination unless the employee gives a positive response to specific questions on the questionnaire.

The physician or health care professional will tell you how frequently the employee needs to be reevaluated. You must also provide a reevaluation whenever an employee reports or exhibits difficulties breathing from wearing a respirator.

Steps to Take for Employees Assigned to Wear Respirators

- Identify a licensed physician or other healthcare professional (such as a nurse, nurse practitioner, or physician assistant) licensed to perform the medical evaluations.
- Schedule medical examinations for employees required to wear respirators, OR
- Give the OSHA Respirator Medical Evaluation Questionnaire to any employee required to wear a respirator and tell employees how to deliver or send the completed questionnaire to the health care professional reviewing them. You should allow employees to complete the questionnaire during work hours. Employee questionnaires are CONFIDENTIAL. You may not look at employee's answers.
- Get a written recommendation from the health care professional regarding each employee's ability to wear a respirator. Keep a copy in your files. You must comply with any limitations placed on respirator use.
- Provide repeat medical evaluations whenever the health care professional informs you that an individual needs to be reevaluated or whenever an employee reports or exhibits difficulty breathing when wearing a respirator.

Fit Testing

Respirators come in different sizes and shapes. If the respirator does not fit well it will not provide good protection. There are two kinds of fit tests, qualitative and quantitative. Both tell you whether the respirator leaks around the face seal.

The qualitative fit test is simple and inexpensive to do. This test can only be used for half-mask air purifying respirators or full-face respirators used where air lead levels are not in excess of 500 ($\mu g/M^3$).

In the qualitative fit test, either a testing chemical with a strong smell or taste or an irritant smoke is released around the respirator face seal. If the wearer can smell or taste the chemical or detect the irritant smoke the respirator has failed the fit test. Before conducting a qualitative test, you must first test the employee's ability to taste, smell or react to the chemical or smoke being used.

The quantitative fit test uses electronic equipment to numerically measure the amount of leakage into the respirator. The advantage of this test is that it tells how well the respirator fits without relying on an individual employees' response to a test agent. For exposures in excess of 500 $\mu g/M^3$, a quantitative fit test must be conducted for full-face respirators.

Test the Respirator Fit

- Contact a safety equipment supplier to get help conducting fit testing. You may buy a qualitative respirator fit testing kit so that you can conduct fit testing yourself.
- Ask the medical provider who performs the medical evaluations for employees wearing respirators whether they provide fit testing.
- Have each employee perform an initial test fit of their respirator and re-test the fit at least once a year after that. If there is a change in the respirator face piece (size, style, model or make) the employee must perform an initial test fit of the new/repaired respirator.

Maintenance, Storage, And Cleaning

If you don't take care of respirators, they won't take care of your employees. Setting up a respirator maintenance program is simple and very important. You must ensure that respirators are properly cleaned, disinfected, stored and regularly inspected for defects and repaired or replaced when necessary. Follow the manufacturer's recommendations for maintenance and care that come with the respirator and follow the basic instructions below.

Set up a Respirator Maintenance Program

- Clean and disinfect respirators after every use. Wash your hands first. Remove the respirator filter cartridges and wipe clean, if possible. Respirators should be washed with mild detergent in warm water. Rinse well and dry.
- Store the respirator in a rigid plastic container of sufficient size so it is protected from deformation, physical damage and contamination. In addition, the container must be stored to protect the respirator from direct sunlight, extreme temperatures, excessive moisture and damaging chemicals. Filters should be stored in a resealable plastic bag.
- Inspect the respirator before each use and during cleaning. Replace worn or damaged parts using only NIOSH approved components from the original manufacturer.
- Replace filters with new filters at the first sign of increased breathing resistance.

Employee Respirator Training

You must train your employees on how respirators work, how to wear them, and how to take care of them. If employees are not trained well, your respirator program will not be effective. Training must take place before an employee uses a respirator in the workplace.

Make sure the training includes instructions on conducting a respirator "user seal check."

How To Do A User Seal Check

It is important to do a "user seal check" every time you put on a respirator. Getting into the habit is the best thing a wearer can do to ensure good protection.

User seal checks are simple, quick to do, and absolutely essential to ensure good protection. Contact a safety equipment supplier for training materials. Some suppliers will also provide training for customers. Use the manufacturer's recommended procedures or follow the directions in Appendix B-1 to 29 CFR 1910.134 (User Seal Check Procedures).

Negative Seal Check

1. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand.
2. Inhale gently so the facepiece collapses slightly. Hold your breath for 10 seconds.
3. If the facepiece doesn't remain in its slightly collapsed condition and an inward leakage of air is detected, adjust the straps, check the valves, and try again.
4. If air does not leak and the mask stays collapsed against your face, it has passed the negative face seal check.

Positive Seal Check

1. Cover the exhalation valve with the palm of your hand without breaking the respirator face piece to face seal.
2. Inflate the mask slightly by exhaling gently. Hold your breath.
3. If there is evidence of outward leakage of air at the seal, adjust the straps, check the valves, and try again.
4. If the face seal holds the air and the mask stays inflated, it has passed the positive face seal check.

Repair, Disposal and Replacement

Respirators must be in good working condition to function. It is imperative that they not be used if they are damaged in any way. Damage can include things like a broken strap, loss of respirator shape or a face seal that can no longer be maintained. Respirators that are not properly functioning must be replaced, repaired or discarded. The respirator manufacturer can supply a replacement for parts that have been damaged.

EMPLOYEE INFORMATION AND TRAINING

You need to inform all employees with potential exposure to airborne lead at any level of the contents of Appendices A and B of the OSHA General Lead Standard (29CFR 1926.62 and 29CFR 1910.1025). OSHA further requires employers to provide a training program when personal air monitoring shows airborne lead levels are at or above the AL, or where employees may be subjected to eye or skin irritation from exposure to lead. This training program must be given at least annually and include the following information:

- Contents of the OSHA Lead Standard and its appendices. The employer must also make a copy of the General Industry Lead Standard and its appendices available to any employee exposed to lead. Posting this information on an employee bulletin board is one way to easily satisfy the requirement.
- Types of operations or job functions that may result in employee lead exposure above the AL.
- Engineering controls and work practices that have been put in place to reduce exposure. This can include Policies and Procedures for operating range equipment, cleaning the range and personal hygiene.
- Purpose, selection, fitting, use, cleaning and limitations of respirators (if the use of respirators is part of your lead management program).
- Purpose and description of medical surveillance and medical removal protection program, including information concerning the adverse health effects associated with excessive exposure to lead.
- Contents of any lead-related compliance plan in place at the facility.
- Prohibition on the use of chelating agents to prevent BLLs from rising, except under the direction of a licensed physician.

An effective training program must be presented in an understandable way. You should develop training programs based upon the employees' education level and language background. This approach will ensure that all employees receive training that allows them to maximize the effectiveness of your lead exposure reduction program.

Employee Reporting

You must establish a way for employees to report work-related injuries and illnesses promptly. You must also teach each employee how to report work-related injuries or illnesses. There are several ways to fulfill this requirement. Instructing employees to report all work-related injuries and illnesses to the manager in charge is a starting point. Some range owners carry a pager 24 hours a day, 7 days a week and give every employee the pager number as well as posting the number near every phone. If you have a Policies and Procedures Manual you should have a section that details the process employees must follow in case of a work-related injury or illness.

You cannot discriminate against an employee for reporting a work-related fatality, injury or illness. OSHA also protects the employee who files a safety and health complaint, asks for access to records or otherwise exercises any rights afforded by the OSHA Act.

LEAD MEDICAL PROGRAM

A Lead Medical Program is an employer-sponsored program to monitor the health of employees. It is a critical part of a comprehensive approach to the prevention of lead-related diseases. It is also one of the best ways to ensure that employees are not being overexposed to lead and facilitates the detection of medical effects associated with lead exposure.

A Lead Medical Program acts as a "barometer" of the company's lead safety program. The program also complements your company's lead safety training. Employees may hear about lead safety from their supervisor, but it makes a difference hearing it from a doctor. Having a doctor involved may help change behavior and demonstrates to the worker that the company is serious about lead safety.

You are required to establish a Lead Medical Program if an employee's airborne lead exposure is at or above the AL for more than 30 days per year. The program must be performed by or under the supervision of a licensed physician. The physician should be familiar with signs and symptoms of lead toxicity. It must also be provided at a reasonable time and place and at no cost to the employee.

The purpose of a good Lead Medical Program is to protect employees from exposure to lead by:

- Identifying employees with elevated blood lead levels.
- Detecting lead-related ill health in an employee.
- Guiding your efforts to control lead exposure.
- Providing education to employees on avoiding lead exposure.

A Lead Medical Program includes:

- Biological monitoring.
- Medical exams and consultations (and treatment if needed).

Biological Monitoring
Biological monitoring under the OSHA lead standard consists of blood sampling and analysis for lead and zinc protoporphyrin (ZPP) levels. Both tests are done with the same blood sample. The test for lead in the blood (also referred to as the Blood Lead Level or BLL) and the ZPP together provide the physician and employer with more complete exposure information.

The most accurate test method is to draw the blood sample from a vein in the arm. A blood sample taken using the "finger-prick" method (where a tiny lancet pierces the finger) is likely to result in exaggerated lead levels because of lead that may be present on the surface of the finger.

Blood lead level (BLL) testing. A BLL test measures the amount of lead in the blood. It is a good measure of recent exposure, but will not tell you how much lead is stored in the bones or if any health damage has occurred. BLL test results are reported as micrograms of lead per deciliter of blood (μg/dl).

Zinc Protoporphyrin (ZPP) testing. A ZPP test measures a substance in red blood cells that increases when lead interferes with the production of hemoglobin. (Hemoglobin is a protein found in red blood cells that carries oxygen to other body tissues.) An increase in ZPP shows that lead is affecting the body and is a better indicator of longer-term exposure (exposures in the last 2-3 months).

The Physician will use the BLL and ZPP test results to identify which employees may need additional medical care and/or removal from further lead exposure. You should also review the results to determine the degree of employee exposure and whether additional control measures are needed.

The employer must make biological monitoring available on the following schedule:

- At least every 6 months for each employee with a lead exposure above the AL more than 30 days per year.
- At least every 2 months for an employee whose last blood sampling and analysis indicated a BLL at or above 40 µg/dl (until two consecutive tests are below 40 µg/dl).
- At least monthly for an employee during a period of temporary medical removal due to an elevated BLL.

Medical Exams
All medical examinations and procedures must be performed by or under the supervision of a licensed physician and at no cost to employees. Exams must be given at a reasonable time and place.

Medical examinations must consist of the following elements:

- A work and medical history.
- A physical examination.
- Blood pressure measurement.
- Determinations of BLL (for lead).
- Hematocrit, hemoglobin, peripheral smear morphology and red cell indices.
- Levels of ZPP.
- Routine urinalysis (specific gravity, sugar, protein determinations, micr scopic examination), blood urea nitrogen (BUN) and serum creatinine (S-Creat).

The employer is obligated to provide medical examinations and consultation to an employee prior to the employee being assigned for the first time to an area in which airborne lead levels are at or above the AL for more than 30 days per year.

The employer is required to provide annual medical examinations if the employee's BLL has been at or above 40 µg/dl at any time during the last 12 months.

In addition, when an employee's airborne lead exposure is at or above the AL for more than 30 days per year, medical examinations and consultations are required upon notification by an employee that the employee:

- Has developed symptoms commonly associated with lead-related disease.
- Desires advice concerning the effects of past or current lead exposure on his or her ability to have a healthy child (or is pregnant).
- Has demonstrated difficulty in breathing during fit testing or use of a respirator, if required.
- Or as medically appropriate.

Temporary Medical Removal
If BLL is 60 µg/dl or Higher — You must remove an employee from work in an area that has a lead exposure at or above the Action Level on each occasion that both a periodic and a follow up blood test (the follow up test must be taken within 2 weeks of the periodic test) show the employee's BLL is at or above 60 µg/dl.

If BLL is at or above 50 µg/dl — Temporary medical removal is also required when an employee is both exposed to lead at or above the Action Level and the employee's average BLL is at or above 50 µg/dl. The average BLL is based on either the last three blood tests or all blood tests conducted over the previous 6 months (whichever is longer). However, an employee does not have to be removed if the most recent blood test shows a BLL at or below 40 µg/dl.

Return to Former Job Status - An employee temporarily removed from work based on their BLL may return to previous job status and work activities when two consecutive blood tests show the employee's BLL is at or below 40 µg/dl.

The employee cannot return to a job function that includes lead exposure until the BLL drops below 40 µg/dl on two tests in a row and the doctor says the employee can return.

What To Do If You Have An Employee With An Elevated BLL
Your physician must provide you with the BLL and ZPP test results for your employees. You should review all the reports. If you have employees with elevated BLLs, you may have a problem. It is a good idea to catch increasing blood lead levels early and take appropriate protective action before any employees are lead-poisoned. One of the first things you should do is make sure your lead management program is being followed and work with your physician to reduce the employee's lead levels. Then try to identify how the employee became exposed and take actions that will reduce or eliminate that exposure pathway in the future.

Medical Removal Protection (MRP)
MRP is a means of protecting employees when other methods, such as engineering controls, work practices and respirators have failed to provide adequate protection. MRP involves the temporary removal of an employee from their regular job to a work area with airborne lead exposures below the AL. The purpose of this program is to reduce lead absorption and allow an individual's body to naturally excrete lead that has been absorbed.

Temporary medical removal can result from an elevated BLL or a written medical opinion. MRP benefits must be provided as a result of either form of removal.

In most cases employers will transfer removed employees to other jobs with airborne lead exposure below the AL. Alternatively, an employee's hours may be reduced so the time-weighted average exposure is reduced, or they may be temporarily laid off if no other alternative is feasible. It is important to note that in all cases where removal is required, respirators cannot be used as a substitute.

In all of these situations, MRP benefits must be provided during the period of removal. MRP benefits means that an employer shall maintain the earnings, seniority and other employment rights and benefits of the employee as though they had not been removed from their normal job.

When an employee is medically eligible to return to their previous job, the employer must return the employee to their former job status. This means the employee is entitled to the position, wages, benefits, etc. he or she had prior to removal. MRP seeks to maintain an employee's rights only, not to expand, diminish or change them.

Review the BLL Results for your Employees

- See whether employees have elevated BLLs.
- If more than one employee has an elevated BLL, determine if employees with elevated BLLs do similar tasks or whether they work in similar areas of the workplace.
- Investigate whether work has changed in a way that may increase the amount of airborne lead. If it has, you must conduct additional air monitoring.
- Investigate whether employees are following policies and procedures in the operation and implementation of the lead management plan.
- Investigate whether your hygiene and housekeeping policies are being consistently followed, particularly if an employee has an elevated BLL but air monitoring shows low lead exposures.
- Give employees refresher lead safety training.
- Conduct follow-up BLL tests to ensure that lead exposure has been adequately controlled.

How to Create a Lead Medical Program
A Lead Medical Program helps you determine whether your lead safety program is working and will save you money in the long run by identifying exposure problems early before an employee becomes poisoned. You should:

1. Select a physician to be in charge of your Lead Medical Program. Ask the physician if he/she has experience caring for lead exposed workers and is familiar with the OSHA Lead Standard. To find a physician you can ask other business owners for recommendations; visit

the Web Site of the Association of Occupational and Environmental Clinics (www.aoec.org) or look in the Yellow Pages under "Physicians Occupational Medicine" or "Physicians - Industrial Medicine."

2. Identify which workers are exposed to lead.

Provide the physician with the following information:

- A copy of the OSHA Lead Standard (29C FR Part 1904) including all appendices,
  - A description of the affected employees duties as they relate to lead exposure,
  - A description of any personal protective equipment used or to be used by the employee,
  - Prior determinations of employee airborne lead exposure levels,
  - Prior BLL determinations and
  - All prior written medical opinions concerning the employee(s) that are in the employer's possession or control.
- Schedule appointments for exposed workers with the Medical Supervisor for BLL and ZPP tests.
- Notify employees in writing of their own BLL and ZPP test results. You must notify them within 5 working days of receiving the test results.

RECORDKEEPING

Employers are required to document and retain certain information. Some of these requirements are covered in the OSHA lead standard and others are found in the OSHA recordkeeping standard (29 CFR Part 1904). This is a summary of those requirements. As with other information provided in this document, please refer to OSHA regulations or contact your OSHA representative for more complete information.

Why is recordkeeping important?

OSHA has specific regulations and requirements for documenting your efforts to protect human health. Recordkeeping is an important part of your safety and health efforts for several reasons:

- Records help you keep track of work-related injuries and illnesses and can help you prevent them in the future.
- Using injury and illness data helps identify problem areas. The more you know, the better you can identify and correct hazardous workplace conditions.
- Recordkeeping helps you better administer company safety and health programs
- Recordkeeping can be used to increase employee awareness about injuries, illnesses and hazards in the workplace, resulting in workers who are more likely to follow safe work practices.
- Documentation of your efforts is one of the best ways to demonstrate your commitment and actions to protect human health.

Who must keep records?
All employers must maintain exposure monitoring, medical surveillance and medical removal records. It is strongly recommended that all employers keep records of employee training and equipment testing and maintenance as well.

Employers with 11 or more employees in the prior year must complete and maintain OSHA form 301 (individual incident reports), OSHA form 300 (Log of Work-Related Injuries and Illnesses) and OSHA form 300A (Summary of Work-Related Injuries and Illnesses) for the next year. Operations with 10 or less employees are exempt from these recordkeeping requirements. Recordkeeping requirements are based on the number of employees the previous year. If you had 11 or more employees one year and 10 or less the next, you would need to keep records. Conversely, if you had 10 or fewer employees the first year and 11 or more the second, you would not need to keep records during the second year (you would, of course, need to keep records the third year, regardless of the number of people employed during the third year).

OSHA has specifically exempted certain low-risk businesses from having to keep OSHA Forms 300, 300A and 301. These exempted businesses have been identified by Standard Industry Code (SIC). Sporting goods retailers (SIC industry group 594) are identified as exempt. Gun shops (SIC 5941) are therefore exempt. Shooting ranges (SIC 7997 for member-only clubs and 7999 for public facilities) are not exempt. Neither are hunting preserves (SIC 0971).

Many facilities have multiple activities (such as a gun shop AND a shooting range). Your SIC would be determined by the activity that generates the most revenue.

From time-to-time OSHA and the Bureau of Labor Statistics (BLS) conducts surveys of all businesses. If you are selected, OSHA or BLS will notify you in advance that you will need to complete and maintain OSHA forms 300, 300A and 301 for the coming year. Even if you are otherwise exempt from these recordkeeping practices, if you are selected and notified you must fulfill these recordkeeping requirements for the time period requested.

What needs to be recorded?
A work-related employee fatality must be reported to OSHA. This includes fatal heart attacks that occur on the job. Also, any work-related event that results in the in-patient hospitalization of three or more employees must be reported to OSHA. The report must be made by telephone or in person at the nearest OSHA Area Office within 8 hours after the death or hospitalization. Faxes and messages left on an answering machine are not acceptable. You must verbally communicate with an OSHA representative. In case the occurrence happens when the OSHA Area Office is closed, call (800) 321-6742 or TTY (877) 889-5627.

All employers are required to maintain detailed records on exposure monitoring, medical surveillance, and medical removals. You should also keep records relating to testing and maintenance of equipment such as ventilation systems.

Starting in January 2002, OSHA implemented new requirements designed to make recordkeeping and reporting of work related illness and injury easier. Employers who are not partially exempt must complete OSHA form 301 for each work-related injury or illness. The injury or

illness must then be entered on OSHA form 300 (Log of Work-Related Injuries and Illnesses). Finally, the employer must complete OSHA form 300A (Summary of Work-Related Injuries and Illnesses) and post it with other employee notices.

Employers not otherwise exempt from the new rule must record work-related injuries or illnesses if the injury or illness results in one of the following: death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid (activities that are considered "first aid" are defined in OSHA Standard-29 CFR 1904.7 (b)(5)(ii), loss of consciousness or diagnosis of a significant illness/injury by a physician.

Record retention

Employers must establish and maintain accurate exposure monitoring and medical surveillance records. With respect to employee medical records, employers are permitted to have physicians or other health care personnel carry out employers' record retention obligations. Employers should refer to 29 CFR 1910.1025(n) to identify the specific exposure and medical information they are required to keep for their employees.

Employers are required to preserve all employee exposure monitoring and medical records for at least 40 years or for the duration of employment plus 20 years, whichever is longer. Additional retention requirements apply to records of employees who are removed from work due to their elevated exposure to lead. Employers must maintain medical removal records for at least the duration of an employee's employment.

Whenever an employer ceases to do business, the employer must transfer all employee records to the successor employer who will then be obligated to retain the employee records for any remaining retention period. If there is no successor to the business, the employer must contact affected current employees at least 3 months prior to the cessation of the business and notify them that they can access their records. Alternatively, if there is no successor to the business, the employer must transfer all employee records to the Director, National Institute for Occupational Safety and Health (NIOSH).

At the expiration of the retention period for all the records required to be maintained, employers must notify the Director at least 3 months prior to the disposal of the records and shall forward these records to the Director if requested.

You must keep OSHA form 301 (individual incident reports), OSHA form 300 (Log of Work-Related Injuries and Illnesses) and OSHA form 300A (Summary of Work-Related Injuries and Illnesses) for a period of 5 years following the end of the calendar year that these records cover.

Who has access to records?

Some of the information contained in the records that employers maintain may contain sensitive, personal information of employees which may be protected under both state and federal privacy laws[2]. Therefore, it's important that employers know which records of their employees can be accessed and who can access them.

2. Under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), as amended, 45 CFR 160-164, certain employers, which create, receive or handle employee health information, must comply with new medical records privacy rules. Employers should consult with legal counsel to verify whether HIPAA requirements apply to them. If so, they may be advised to contact their health plan carriers to ensure that proper employee medical records access and authorization controls are implemented by April 14, 2003- the date that most of HIPAA's new privacy rules become effective.

Access to employee exposure monitoring, removal and medical records is governed by 29 CFR 1910.1020. Employers must make all exposure, medical and medical removal records available upon the request of an employee, designee, as well as to the Assistant Secretary of Labor for Occupational Safety and Health or his/her designees for the purpose of carrying out OSHA's statutory functions. In certain circumstances, an employer may restrict an employee's direct access to all the information in the employee's medical records, such as when the records contain trade secrets of the employer or when the records contain information that could be detrimental to the employee's health.

Any employee or other authorized individual seeking access to or copies of medical records must provide a written request to an employer. The employer, after verifying the identity of the employee or designee, must either provide access to the records within fifteen (15) working days after receiving the written request or provide a reason why such access has been delayed along with the next earliest date the record can be accessed. Alternatively, employees or other authorized designees may obtain initial copies of any medical record free of charge from employers.

Government access to employee medical records is governed by 29 CFR 1913.10, which imposes strict regulations on government personnel to ensure that the privacy of employees is safeguarded. Generally, government personnel must provide an employer with an approved written access order prior to accessing employee medical records. However, an access order is not necessary if an employee provides written consent or when OSHA physicians consult with physicians of an employer concerning an occupational safety or health issue. If a safety or health issue exists, OSHA physicians may conduct on-site evaluations of employee medical records in consultation with physicians of the employer. No employee medical records shall be removed from an employer's premises without a written access order or the written consent of an employee.

Please note that the records access provisions under 29 CFR 1913.10 are not the same as those under 29 CFR 1904 which govern employers' obligations to submit records regarding employee work-related injuries and illnesses. Nor does 29 CFR 1913.10 govern the government's access to employee exposure records. The process through which OSHA can obtain employee exposure records is less complicated than the process through which it obtains employee medical records. However, OSHA must still provide employers with a written access order.

Employee representatives can have access to Forms 300 or 300A, but may not see personal information on an individual. If you have a union shop or other form of employee representative, please consult with OSHA for guidance on what you must do to protect individual privacy.
An employer must provide requested records to an OSHA compliance officer within 4 hours of a request.

Other recording criteria
Your state may have additional recording requirements. Contact your state labor board for assistance.

OSHA Forms and Instructions

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA
Forms for Recording
Work-Related Injuries and Illnesses

Dear Employer:

This booklet includes the forms needed for maintaining occupational injury and illness records for 2004. These new forms have changed in several important ways from the 2003 recordkeeping forms.

In the December 17, 2002 Federal Register (67 FR 77165-77170), OSHA announced its decision to add an occupational hearing loss column to OSHA's Form 300, Log of Work-Related Injuries and Illnesses. This forms package contains modified Forms 300 and 300A which incorporate the additional column M(5) Hearing Loss. Employers required to complete the injury and illness forms must begin to use these forms on January 1, 2004.

In response to public suggestions, OSHA also has made several changes to the forms package to make the recordkeeping materials clearer and easier to use:

- On Form 300, we've switched the positions of the day count columns. The days "away from work" column now comes before the days "on job transfer or restriction."
- We've clarified the formulas for calculating incidence rates.
- We've added new recording criteria for occupational hearing loss to the "Overview" section.
- On Form 300, we've made the column heading "Classify the Case" more prominent to make it clear that employers should mark only one selection among the four columns offered.

The Occupational Safety and Health Administration shares with you the goal of preventing injuries and illnesses in our nation's workplaces. Accurate injury and illness records will help us achieve that goal.

Occupational Safety and Health Administration
U.S. Department of Labor

What's Inside...

In this package, you'll find everything you need to complete OSHA's *Log* and the *Summary of Work-Related Injuries and Illnesses* for the next several years. On the following pages, you'll find:

- ***An Overview: Recording Work-Related Injuries and Illnesses —*** General instructions for filling out the forms in this package and definitions of terms you should use when you classify your cases as injuries or illnesses.
- ***How to Fill Out the Log —*** An example to guide you in filling out the *Log* properly.
- ***Log of Work-Related Injuries and Illnesses —*** Several pages of the *Log* (but you may make as many copies of the *Log* as you need.) Notice that the *Log* is separate from the *Summary*.

- ***Summary of Work-Related Injuries and Illnesses —*** Removable *Summary* pages for easy posting at the end of the year. Note that you post the *Summary* only, not the *Log*.

- ***Worksheet to Help You Fill Out the Summary —*** A worksheet for figuring the average number of employees who worked for your establishment and the total number of hours worked.
- ***OSHA's 301: Injury and Illness Incident Report —*** A copy of the OSHA 301 to provide details about the incident. You may make as many copies as you need or use an equivalent form.

Take a few minutes to review this package. If you have any questions, ***visit us online at www.osha.gov*** **Or** ***call your local OSHA office.*** We'll be happy to help you.

An Overview:
Recording Work-Related Injuries and Illnesses

The Occupational Safety and Health (OSH) Act of 1970 requires certain employers to prepare and maintain records of work-related injuries and illnesses. Use these definitions when you classify cases on the Log. OSHA's recordkeeping regulation (see 29 CFR Part 1904) provides more information about the definitions below.

U.S. Department of Labor
Occupational Safety and Health Administration

The *Log of Work-Related Injuries and Illnesses* (Form 300) is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened. The *Summary* — a separate form (Form 300A) — shows the totals for the year in each category. At the end of the year, post the *Summary* in a visible location so that your employees are aware of the injuries and illnesses occurring in their workplace.

Employers must keep a *Log* for each establishment or site. If you have more than one establishment, you must keep a separate *Log* and *Summary* for each physical location that is expected to be in operation for one year or longer.

Note that your employees have the right to review your injury and illness records. For more information, see 29 Code of Federal Regulations Part 1904.35, *Employee Involvement*.

Cases listed on the *Log of Work-Related Injuries and Illnesses* are not necessarily eligible for workers' compensation or other insurance benefits. Listing a case on the *Log* does not mean that the employer or worker was at fault or that an OSHA standard was violated.

When is an injury or illness considered work-related?

An injury or illness is considered work-related if an event or exposure in the work environment caused or contributed to the condition or significantly aggravated a preexisting condition. Work-relatedness is presumed for injuries and illnesses resulting from events or exposures occurring in the workplace, unless an exception specifically applies. See 29 CFR Part 1904.5(b)(2) for the exceptions. The work environment includes the establishment and other locations where one or more employees are working or are present as a condition of their employment. See 29 CFR Part 1904.5(b)(1).

Which work-related injuries and illnesses should you record?

Record those work-related injuries and illnesses that result in:

- death,
- loss of consciousness,
- days away from work,
- restricted work activity or job transfer, or
- medical treatment beyond first aid.

You must also record work-related injuries and illnesses that are significant (as defined below) or meet any of the additional criteria listed below.

You must record any significant work-related injury or illness that is diagnosed by a physician or other licensed health care professional. You must record any work-related case involving cancer, chronic irreversible disease, a fractured or cracked bone, or a punctured eardrum. See 29 CFR 1904.7.

What are the additional criteria?

You must record the following conditions when they are work-related:

- any needlestick injury or cut from a sharp object that is contaminated with another person's blood or other potentially infectious material;
- any case requiring an employee to be medically removed under the requirements of an OSHA health standard;
- tuberculosis infection as evidenced by a positive skin test or diagnosis by a physician or other licensed health care professional after exposure to a known case of active tuberculosis.
- an employee's hearing test (audiogram) reveals 1) that the employee has experienced a Standard Threshold Shift (STS) in hearing in one or both ears (averaged at 2000, 3000, and 4000 Hz) and 2) the employee's total hearing level is 25 decibels (dB) or more above audiometric zero (also averaged at 2000, 3000, and 4000 Hz) in the same ear(s) as the STS.

What is medical treatment?

Medical treatment includes managing and caring for a patient for the purpose of combating disease or disorder. The following are not considered medical treatments and are NOT recordable:

- visits to a doctor or health care professional solely for observation or counseling;

What do you need to do?

1. Within 7 calendar days after you receive information about a case, decide if the case is recordable under the OSHA recordkeeping requirements.
2. Determine whether the incident is a new case or a recurrence of an existing one.
3. Establish whether the case was work-related.
4. If the case is recordable, decide which form you will fill out as the injury and illness incident report.

   You may use *OSHA's 301: Injury and Illness Incident Report* or an equivalent form. Some state workers compensation, insurance, or other reports may be acceptable substitutes, as long as they provide the same information as the OSHA 301.

How to work with the Log

1. Identify the employee involved unless it is a privacy concern case as described below.
2. Identify when and where the case occurred.
3. Describe the case, as specifically as you can.
4. Classify the seriousness of the case by recording the **most serious outcome** associated with the case, with column G (Death) being the most serious and column J (Other recordable cases) being the least serious.
5. Identify whether the case is an injury or illness. If the case is an injury, check the injury category. If the case is an illness, check the appropriate illness category.

- diagnostic procedures, including administering prescription medications that are used solely for diagnostic purposes; and
- any procedure that can be labeled first aid. *(See below for more information about first aid.)*

What is first aid?

If the incident required only the following types of treatment, consider it first aid. Do NOT record the case if it involves only:

- using non-prescription medications at non-prescription strength;
- administering tetanus immunizations;
- cleaning, flushing, or soaking wounds on the skin surface;
- using wound coverings, such as bandages, BandAids™, gauze pads, etc., or using SteriStrips™ or butterfly bandages.
- using hot or cold therapy;
- using any totally non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.;
- using temporary immobilization devices while transporting an accident victim (splints, slings, neck collars, or back boards).
- drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters;
- using eye patches;
- using simple irrigation or a cotton swab to remove foreign bodies not embedded in or adhered to the eye;
- using irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign material from areas other than the eye;
- using finger guards;
- using massages;
- drinking fluids to relieve heat stress

How do you decide if the case involved restricted work?

Restricted work activity occurs when, as the result of a work-related injury or illness, an employer or health care professional keeps, or recommends keeping, an employee from doing the routine functions of his or her job or from working the full workday that the employee would have been scheduled to work before the injury or illness occurred.

How do you count the number of days of restricted work activity or the number of days away from work?

Count the number of calendar days the employee was on restricted work activity or was away from work as a result of the recordable injury or illness. Do not count the day on which the injury or illness occurred in this number. Begin counting days from the day after the incident occurs. If a single injury or illness involved both days away from work and days of restricted work activity, enter the total number of days for each. You may stop counting days of restricted work activity or days away from work once the total of either or the combination of both reaches 180 days.

Under what circumstances should you NOT enter the employee's name on the OSHA Form 300?

You must consider the following types of injuries or illnesses to be privacy concern cases:

- an injury or illness to an intimate body part or to the reproductive system,
- an injury or illness resulting from a sexual assault,
- a mental illness,
- a case of HIV infection, hepatitis, or tuberculosis,
- a needlestick injury or cut from a sharp object that is contaminated with blood or other potentially infectious material (see 29 CFR Part 1904.8 for definition), and
- other illnesses, if the employee independently and voluntarily requests that his or her name not be entered on the log.

You must not enter the employee's name on the OSHA 300 *Log* for these cases. Instead, enter "privacy case" in the space normally used for the employee's name. You must keep a separate, confidential list of the case numbers and employee names for the establishment's privacy concern cases so that you can update the cases and provide information to the government if asked to do so.

If you have a reasonable basis to believe that information describing the privacy concern case may be personally identifiable even though the employee's name has been omitted, you may use discretion in describing the injury or illness on both the OSHA 300 and 301 forms. You must enter enough information to identify the cause of the incident and the general severity of the injury or illness, but you do not need to include details of an intimate or private nature.

What if the outcome changes after you record the case?

If the outcome or extent of an injury or illness changes after you have recorded the case, simply draw a line through the original entry or, if you wish, delete or white-out the original entry. Then write the new entry where it belongs. Remember, you need to record the most serious outcome for each case.

Classifying injuries

An injury is any wound or damage to the body resulting from an event in the work environment.

Examples: Cut, puncture, laceration, abrasion, fracture, bruise, contusion, chipped tooth, amputation, insect bite, electrocution, or a thermal, chemical, electrical, or radiation burn. Sprain and strain injuries to muscles, joints, and connective tissues are classified as injuries when they result from a slip, trip, fall or other similar accidents.

U.S. Department of Labor
Occupational Safety and Health Administration

Classifying illnesses

Skin diseases or disorders

Skin diseases or disorders are illnesses involving the worker's skin that are caused by work exposure to chemicals, plants, or other substances.

Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; friction blisters, chrome ulcers; inflammation of the skin.

Respiratory conditions

Respiratory conditions are illnesses associated with breathing hazardous biological agents, chemicals, dust, gases, vapors, or fumes at work.

Examples: Silicosis, asbestosis, pneumonitis, pharyngitis, rhinitis or acute congestion; farmer's lung, beryllium disease, tuberculosis, occupational asthma, reactive airways dysfunction syndrome (RADS), chronic obstructive pulmonary disease (COPD), hypersensitivity pneumonitis, toxic inhalation injury, such as metal fume fever, chronic obstructive bronchitis, and other pneumoconioses.

Poisoning

Poisoning includes disorders evidenced by abnormal concentrations of toxic substances in blood, other tissues, other bodily fluids, or the breath that are caused by the ingestion or absorption of toxic substances into the body.

Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by carbon monoxide, hydrogen sulfide, or other gases; poisoning by benzene, benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays, such as parathion or lead arsenate; poisoning by other chemicals, such as formaldehyde.

Hearing Loss

Noise-induced hearing loss is defined for recordkeeping purposes as a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more in either ear at 2000, 3000 and 4000 hertz, and the employee's total hearing level is 25 decibels (dB) or more above audiometric zero (also averaged at 2000, 3000, and 4000 hertz) in the same ear(s).

All other illnesses

All other occupational illnesses.

Examples: Heatstroke, sunstroke, heat exhaustion, heat stress and other effects of environmental heat; freezing, frostbite, and other effects of exposure to low temperatures; decompression sickness; effects of ionizing radiation (isotopes, x-rays, radium); effects of nonionizing radiation (welding flash, ultra-violet rays, lasers); anthrax; bloodborne pathogenic diseases, such as AIDS, HIV, hepatitis B or hepatitis C; brucellosis; malignant or benign tumors; histoplasmosis; coccidioidomycosis.

When must you post the Summary?

You must post the *Summary* only — not the *Log* — by February 1 of the year following the year covered by the form and keep it posted until April 30 of that year.

How long must you keep the Log and Summary on file?

You must keep the *Log* and *Summary* for 5 years following the year to which they pertain.

Do you have to send these forms to OSHA at the end of the year?

No. You do not have to send the completed forms to OSHA unless specifically asked to do so.

How can we help you?

If you have a question about how to fill out the *Log*,

- ❑ ***visit us online at www.osha.gov*** or
- ❑ ***call your local OSHA office.***

U.S. Department of Labor
Occupational Safety and Health Administration

Optional

Calculating Injury and Illness Incidence Rates

What is an incidence rate?

An incidence rate is the number of recordable injuries and illnesses occurring among a given number of full-time workers (usually 100 full-time workers) over a given period of time (usually one year). To evaluate your firm's injury and illness experience over time or to compare your firm's experience with that of your industry as a whole, you need to compute your incidence rate. Because a specific number of workers and a specific period of time are involved, these rates can help you identify problems in your workplace and/or progress you may have made in preventing work-related injuries and illnesses.

How do you calculate an incidence rate?

You can compute an occupational injury and illness incidence rate for all recordable cases or for cases that involved days away from work for your firm quickly and easily. The formula requires that you follow instructions in paragraph (a) below for the total recordable cases or those in paragraph (b) for cases that involved days away from work, *and* for both rates the instructions in paragraph (c).

(a) *To find out the total number of recordable injuries and illnesses that occurred during the year,* count the number of line entries on your OSHA Form 300, or refer to the OSHA Form 300A and sum the entries for columns (G), (H), (I), and (J).

(b) *To find out the number of injuries and illnesses that involved days away from work,* count the number of line entries on your OSHA Form 300 that received a check mark in column (H), or refer to the entry for column (H) on the OSHA Form 300A.

(c) *The number of hours all employees actually worked during the year.* Refer to OSHA Form 300A and optional worksheet to calculate this number.

You can compute the incidence rate for all recordable cases of injuries and illnesses using the following formula:

Total number of injuries and illnesses x *200,000* ÷ *Number of hours worked by all employees* = *Total recordable case rate*

(The 200,000 figure in the formula represents the number of hours 100 employees working 40 hours per week, 50 weeks per year would work, and provides the standard base for calculating incidence rates.)

You can compute the incidence rate for recordable cases involving days away from work, days of restricted work activity or job transfer (DART) using the following formula:

(Number of entries in column H + Number of entries in column I) x *200,000* ÷ *Number of hours worked by all employees* = *DART incidence rate*

You can use the same formula to calculate incidence rates for other variables such as cases involving restricted work activity (column (I) on Form 300A), cases involving skin disorders (column (M-2) on Form 300A), etc. Just substitute the appropriate total for these cases, from Form 300A, into the formula in place of the total number of injuries and illnesses.

What can I compare my incidence rate to?

The Bureau of Labor Statistics (BLS) conducts a survey of occupational injuries and illnesses each year and publishes incidence rate data by various classifications (e.g., by industry, by employer size, etc.). You can obtain these published data at www.bls.gov/iif or by calling a BLS Regional Office.

Worksheet

Total number of injuries and illnesses		200,000	÷	Number of hours worked by all employees	=	Total recordable case rate
	X					

Number of entries in Column H + Column I		200,000	÷	Number of hours worked by all employees	=	DART incidence rate
	X					

How to Fill Out the Log

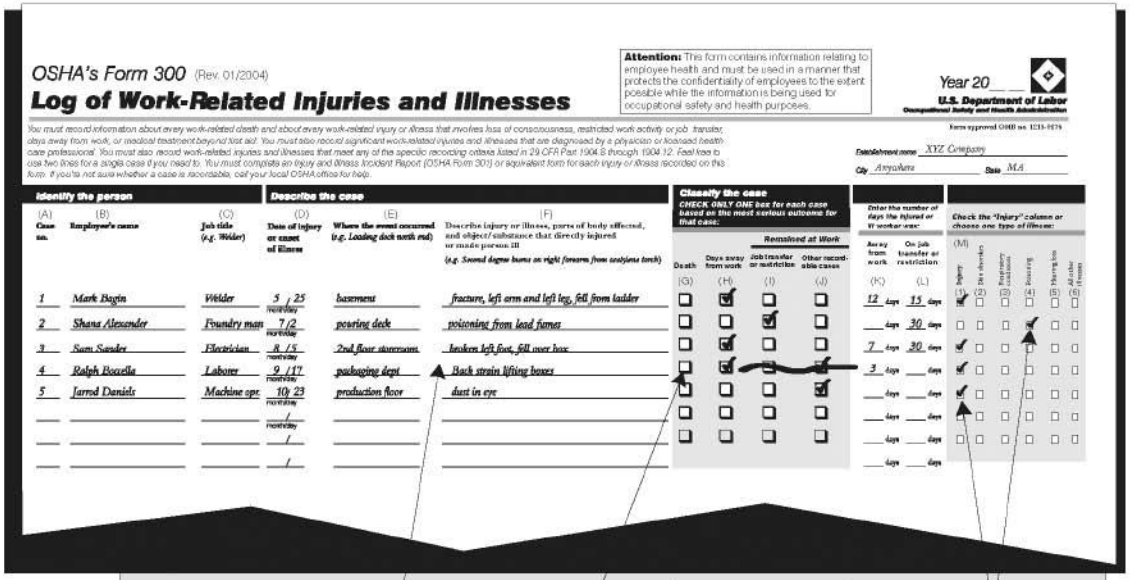
The *Log of Work-Related Injuries and Illnesses* is used to classify work-related injuries and illnesses and to note the extent and severity of each case. When an incident occurs, use the *Log* to record specific details about what happened and how it happened.

If your company has more than one establishment or site, you must keep separate records for each physical location that is expected to remain in operation for one year or longer.

We have given you several copies of the *Log* in this package. If you need more than we provided, you may photocopy and use as many as you need.

The *Summary* — a separate form — shows the work-related injury and illness totals for the year in each category. At the end of the year, count the number of incidents in each category and transfer the totals from the *Log* to the *Summary*. Then post the *Summary* in a visible location so that your employees are aware of injuries and illnesses occurring in their workplace.

You don't post the Log. You post only the Summary at the end of the year.



OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__

U.S. Department of Labor

Occupational Safety and Health Administration

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name XYZ Company

City Anywhere State MA

Identify the person			Describe the case			Classify the case (CHECK ONLY ONE box for each case based on the most serious outcome for that case)				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:						
(A) Case no.	(B) Employee's name	(C) Job title (e.g. Welder)	(D) Date of injury or onset of illness	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	(G) Death	(H) Days away from work	(I) Remained at Work: Job transfer or restriction	(J) Remained at Work: Other recordable cases	(K) Days away from work	(L) On job transfer or restriction	(M) Injury	(1) Skin disorder	(2) Respiratory condition	(3) Poisoning	(4) Hearing loss	(5) All other illnesses
1	Mark Begin	Welder	5/25	basement	fracture, left arm and left leg, fell from ladder	☐	☑	☐	☐	12	15	☑	☐	☐	☐	☐	☐
2	Shana Alexander	Foundry man	7/2	pouring deck	poisoning from lead fumes	☐	☐	☑	☐		30	☐	☐	☐	☑	☐	☐
3	Sam Sander	Electrician	8/5	2nd floor storeroom	broken left foot, fell over box	☐	☑	☐	☐	7	30	☑	☐	☐	☐	☐	☐
4	Ralph Bocella	Laborer	9/17	packaging dept	Back strain lifting boxes	☐	☑	☐	☐	3		☑	☐	☐	☐	☐	☐
5	Jarrod Daniels	Machine opr.	10/23	production floor	dust in eye	☐	☐	☐	☑			☑	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐			☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐			☐	☐	☐	☐	☐	☐
			/			☐	☐	☐	☐			☐	☐	☐	☐	☐	☐

Be as specific as possible. You can use two lines if you need more room.

Revise the log if the injury or illness progresses and the outcome is more serious than you originally recorded for the case. Cross out, erase, or white-out the original entry.

Choose ONLY ONE of these categories. Classify the case by recording the most serious outcome of the case, with column G (Death) being the most serious and column J (Other recordable cases) being the least serious.

Note whether the case involves an injury or an illness.

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name ____________________

City ____________ State ____________

Identify the person			Describe the case			Classify the case: CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness: (M)					
								Remained at Work									
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away from work (K)	On job transfer or restriction (L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
			/ month/day			☐	☐	☐	☐	days	days	☐	☐	☐	☐	☐	☐
					Page totals	___	___	___	___	___	___	___	___	___	___	___	___
												Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Page ___ **of** ___

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .	(M)		
(1) Injuries	_____	(4) Poisonings	_____
		(5) Hearing loss	_____
(2) Skin disorders	_____	(6) All other illnesses	_____
(3) Respiratory conditions	_____		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

___ ___ ___ ___

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information

(If you don't have these figures, see the Worksheet on the back of this page to estimate.)

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ _____
Company executive Title

( ) - / /
Phone Date

U.S. Department of Labor
Occupational Safety and Health Administration

Optional

Worksheet to Help You Fill Out the Summary

At the end of the year, OSHA requires you to enter the average number of employees and the total hours worked by your employees on the summary. If you don't have these figures, you can use the information on this page to estimate the numbers you will need to enter on the Summary page at the end of the year.

How to figure the average number of employees who worked for your establishment during the year:

❶ ***Add*** the total number of employees your establishment paid in all pay periods during the year. Include all employees: full-time, part-time, temporary, seasonal, salaried, and hourly.

The number of employees paid in all pay periods = ❶ _____

❷ ***Count*** the number of pay periods your establishment had during the year. Be sure to include any pay periods when you had no employees.

The number of pay periods during the year = ❷ _____

❸ ***Divide*** the number of employees by the number of pay periods.

❶ _____ / ❷ _____ = ❸ _____

❹ ***Round the answer*** to the next highest whole number. Write the rounded number in the blank marked *Annual average number of employees.*

The number rounded = ❹ _____

For example, Acme Construction figured its average employment this way:

For pay period...	Acme paid this number of employees...
1	10
2	0
3	15
4	30
5	40
▼	▼
24	20
25	15
26	+10
	830

Number of employees paid = 830 ❶

Number of pay periods = 26 ❷

830 / 26 = 31.92 ❸

31.92 rounds to 32 ❹

32 is the annual average number of employees

How to figure the total hours worked by all employees:

Include hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers subject to day to day supervision by your establishment (e.g., temporary help services workers).

Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, please estimate the hours that the employees actually worked.

If this number isn't available, you can use this optional worksheet to estimate it.

Optional Worksheet

_____ ***Find*** the number of full-time employees in your establishment for the year.

X _____ ***Multiply*** by the number of work hours for a full-time employee in a year.

_____ This is the number of full-time hours worked.

\+ _____ ***Add*** the number of any overtime hours as well as the hours worked by other employees (part-time, temporary, seasonal)

_____ ***Round*** the answer to the next highest whole number. Write the rounded number in the blank marked *Total hours worked by all employees last year.*

OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (_____)_____–_____ Date ___/ ___/ ___

Information about the employee

1) Full name _____

2) Street _____

City _____ State _____ ZIP _____

3) Date of birth ___/ ___/ ___

4) Date hired ___/ ___/ ___

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional _____

_____

7) If treatment was given away from the worksite, where was it given?

Facility _____

Street _____

City _____ State _____ ZIP _____

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the *Log* _____ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ___/ ___/ ___

12) Time employee began work _____ AM / PM

13) Time of event _____ AM / PM ☐ Check if time cannot be determined

14) ***What was the employee doing just before the incident occurred?*** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) ***What happened?*** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) ***What was the injury or illness?*** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) ***What object or substance directly harmed the employee?*** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.*

18) ***If the employee died, when did death occur?*** Date of death ___/ ___/ ___

If You Need Help...

If you need help deciding whether a case is recordable, or if you have questions about the information in this package, feel free to contact us. We'll gladly answer any questions you have.

- **Visit us online at www.osha.gov**
- **Call your OSHA Regional office and ask for the recordkeeping coordinator**

  or

- **Call your State Plan office**

U.S. Department of Labor
Occupational Safety and Health Administration

Federal Jurisdiction

Region 1 - 617 / 565-9860
Connecticut; Massachusetts; Maine; New Hampshire; Rhode Island

Region 2 - 212 / 337-2378
New York; New Jersey

Region 3 - 215 / 861-4900
DC; Delaware; Pennsylvania; West Virginia

Region 4 - 404 / 562-2300
Alabama; Florida; Georgia; Mississippi

Region 5 - 312 / 353-2220
Illinois; Ohio; Wisconsin

Region 6 - 214 / 767-4731
Arkansas; Louisiana; Oklahoma; Texas

Region 7 - 816 / 426-5861
Kansas; Missouri; Nebraska

Region 8 - 303 / 844-1600
Colorado; Montana; North Dakota; South Dakota

Region 9 - 415 / 975-4310

Region 10 - 206 / 553-5930
Idaho

State Plan States

Alaska - 907 / 269-4957

Arizona - 602 / 542-5795

California - 415 / 703-5100

*Connecticut - 860 / 566-4380

Hawaii - 808 / 586-9100

Indiana - 317 / 232-2688

Iowa - 515 / 281-3661

Kentucky - 502 / 564-3070

Maryland - 410 / 767-2371

Michigan - 517 / 322-1848

Minnesota - 651 / 284-5050

Nevada - 702 / 486-9020

*New Jersey - 609 / 984-1389

New Mexico - 505 / 827-4230

*New York - 518 / 457-2574

North Carolina - 919 / 807-2875

Oregon - 503 / 378-3272

Puerto Rico - 787 / 754-2172

South Carolina - 803 / 734-9669

Tennessee - 615 / 741-2793

Utah - 801 / 530-6901

Vermont - 802 / 828-2765

Virginia - 804 / 786-6613

Virgin Islands - 340 / 772-1315

Washington - 360 / 902-5554

Wyoming - 307 / 777-7786

*Public Sector only

U.S. Department of Labor
Occupational Safety and Health Administration

Have questions?

If you need help in filling out the *Log* or *Summary*, or if you have questions about whether a case is recordable, contact us. We'll be happy to help you. You can:

- Visit us online at: **www.osha.gov**
- Call your regional or state plan office. You'll find the phone number listed inside this cover.

OTHER RESOURCES AVAILABLE FROM THE NATIONAL ASSOCIATION OF SHOOTING RANGES

FACILITY DEVELOPMENT SERIES AND FACILITY DEVELOPMENT VIDEO SERIES
The Facility Development Series and Facility Development Video Series currently include guidance on such diverse topics as lead management, range development, funding, community relations, sound attenuation, risk management, business plan development and much more.

PROMOTIONAL MATERIALS
Promotional materials include firearm safety and responsibility, videos and handouts.

RESEARCH AND MARKETING SURVEYS
These participation surveys, range surveys and profiles of the shooting sports are important to help you with your business planning.

RANGEINFO SERIES
The Rangeinfo Series is a collection of reprinted articles covering every aspect of shooting range development, management and operations. Rangeinfo is a constantly growing resource that is available free on the Internet at www.rangeinfo.org.

For a complete catalog of the publications, research and information available from the National Association of Shooting Ranges, please write to us or visit us online at www.rangeinfo.org.

National Association of Shooting Ranges
A division of
National Shooting Sports Foundation, Inc.
11 Mile Hill Road
Newtown, CT 06470-2359