Managing Lead Exposure During Cable Removal Operations

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What is Lead?

Heavy metal that is:

- Solid at room temperature;
- Bluish-gray;
- Low melting point; and
- Pliable
Ancient Awareness

6500 BC. - Lead discovered in Turkey, first mine.

500 BC-300 AD. - Roman lead smelting produces dangerous emissions.

100 BC. – Greek physicians give clinical description of lead poisoning.
Properties of Lead

Some of the properties of lead that make it a useful structural material are:

- Low melting point;
- Very abundant;
- High molecular weight;
- High density; and
- Very malleable (easy to shape).
History of Lead-Sheathed Cable

- Lead-sheath cable began to be installed prior to the 1880s.
- Advancements in the 1890s made modern communications possible.
- Two attributes that contributed to the success of the lead-sheath:
  - Ability to reduce noise (interference) from power, etc.
  - Ability to seal out water.
Effects of Soil on Lead-Sheathed Cable

- When lead-sheathed cable is removed, abrasion can cause surface lead compounds to rub off, and some become airborne.

- It is not possible to remove the lead and lead compounds while in the ground or air; therefore work practices and personal protective measures must be taken in connection with the extraction, to reduce the amount of lead entering the air and the amount employees on the job are exposed to.
Ways Lead Enters the Body

- **Inhalation** - Breathing lead fumes (over 900° F) or dust. This is the most common route of entry in the workplace.

- **Ingestion** - Swallowing lead dust via hands, food, cigarettes, etc.
  - Contamination of hands or other objects that may make contact with the mouth allowing lead to pass into the mouth.
Training Program Detailed by OSHA

Hazard communication including:

- Reproductive/developmental toxicity
- Central nervous system effects
- Kidney effect
- Blood effects
- Acute toxicity effects

- Content of OSHA standard
- Parts of job causing exposures
- Respirator training
- Engineering controls
- Med surveillance program
- Still more- look at standard
Exposures During Lead Cable Removal

In the case of lead-sheath cable extraction, we have reason to believe that exposures may exceed the Action Limit (AL) and the Permissible Exposure Limit (PEL).
Pre-Job Requirements

OSHA regulations require several steps to be taken before arriving on the jobsite. This includes training and medical surveillance.
Disclaimer

The following slides reflect how AT&T trains its workers. Sites and company operations vary. So these procedures are not guaranteed to keep your company’s operations in compliance or to keep worker exposures below health-based levels.

Rather, the following is intended to stimulate thought and discussion.
Medical Surveillance

- Blood lead and ZPP test required prior to any job where exposure is over the PEL (50 micrograms/m3).

- A medical qualification is also required in order to wear a respirator.

- A more extensive physical MAY accompany either if the medical professional has cause for concern.
Biological Monitoring

Blood testing is commonly referred to as “biological monitoring.” Initial blood-lead test to be taken to establish a baseline.

- **Blood Lead Levels (BLL)**
  - Actual concentration of lead in the blood.

- **Zinc protoporphyrin test (ZPP)**
  - Determines the degree to which lead adversely affects the body's ability to produce certain components of blood.
Biological Monitoring, cont’d

- Blood lead units: micrograms of lead per 100 gm of blood ug/dl:
  - Normal adult < 10
  - Abnormal adult > 25
  - Abnormal child > 10
  - Adult lead intoxication > 80

- Normal ZZP levels in adults and children are less than 35 ug/dl.
Pre-Job Preparedness

Respirator Fit Testing

- Medical exams required to verify extra strain will not harm user.
- Qualitative fit tests are required for all tight-fitting face pieces at time of initial fitting and at least every 12 months thereafter.

Respirator Medical
Medical Surveillance Follow-ups

- Only required if exposed over the AL for over 30 days/year.
- If lead exposure is less than 30 days per year, then no further blood testing is REQUIRED by OSHA.
- May still be beneficial to document exposures (or lack thereof).
- Should offer if reason to believe one has been overexposed.
Work Practices required by OSHA

Work practices include:

- Housekeeping;
- Hygiene;
- Facilities;
- Use of personal PPE;
- Use of warning signs;
- Proper preparation of the manhole and surrounding area; and
- Engineering Controls.
Set-Up for Aerial and Underground Lead-Sheathed Cable Removal Jobs

The Responsible Manager must ensure that the work area is properly staged before any lead-sheathed cable is pulled, as follows:

- Establish temporary traffic control, if needed; (if in traffic).
- Position the cable removal vehicles.
OSHA Standard

- OSHA standard is designed around lead abatement jobs.
- Change Rooms and Showers are difficult to establish in Outside Plant Operations.
Place Lead Work Warning Sign

This sign is intended to inform technicians involved in the job, not the public. Therefore it can be placed on the truck used to remove the cable, or anywhere else where it will be visible to technicians involved in the removal operation.
Establish Clean Area for Eating

- The Responsible Manager, in coordination with the technicians, must ensure that a clean eating area is identified prior to starting work.

- The eating area should at least 15 feet from vehicles, equipment, and protective sheeting used in the cable removal process.

- The eating area must be kept as free as practicable from lead contamination. All PPE must be removed prior to walking into the eating area.
Establish Clean Area for Eating, cont’d

- An off-site or nearby public restaurant or space is an acceptable eating area, as long as technicians completely remove all protective clothing and wash hands and face before leaving the job site.

- If the technicians plan to leave the site for lunch, an eating area at the job site is not required.
Establish Change Area

- Technicians will put on their PPE at any clean location near the job site.

- Before removing protective clothing at breaks, lunch, and the end of day as necessary, a clean area must be established, such as by placing an 8’x8’ or larger sheet of plastic on the ground, near the work operation.

- The purpose of such a clean area is to help workers avoid getting lead dust on the clean clothing that they will wear away from the work site. At the conclusion of the job, all the technicians will remove their PPE onto the same plastic sheet.
Underground Jobs Only

- Place plastic sheeting from the front wheels of the extraction vehicle to the rear wheels (or jacks) of the cable reel truck, dump truck, or tractor trailer.

- If a cable reel is used to collect the reclaimed cable, the plastic sheeting must extend from the cable removal vehicle to the cable reel.
Dust emissions can generally be reduced by using wet methods to suppress dust.

A sprayer to keep the cable wet through the extraction process may help reduce airborne dust levels.

We do not have enough data at this time to confirm effectiveness.
Before pulling cable from a manhole, install plastic sheeting to prevent lead particles from settling onto the ground below the operation.

Start rolling the 10-foot-wide plastic sheeting from a position 2 to 3 feet on the far side of the manhole from the extraction vehicle, then across the top of the closed manhole, then extending to the rear jacks or wheels of the extraction vehicle.

Cut plastic from the manhole cover lid and remove manhole cover.
Hygiene

- **Hand Washing Areas**
  - Provided by the employer for employees working with lead. In the case of lead-sheathed cable removal, it will be necessary to provide a portable hand washing facility, such as a jug of water and soap.
  - Cannot wash hands and drink from same jug.
  - Do not store jug on vehicle used in extraction process unless in a sealed compartment.

- **Food containers, cigarettes and other tobacco products, and cosmetics** must be stored on the truck in a sealed compartment or the cab of the vehicle during work operations.
Hygiene, cont’d

- Eat, drink, or apply cosmetics away from work operations, and only after removing work gloves and washing one’s hands and face.

- Avoid touching your lips and nostrils with hands or other objects potentially contaminated with lead dust. Never put hands, pencils, or any items that may be contaminated with lead dust into your mouth.
Showers

- Must be provided, where feasible to employees where airborne lead levels are greater than PEL.
- Operations are conducted on site, and protective clothing is removed on site.
- Most work centers do not have existing shower facilities, the installation of shower facilities is not feasible at each location work could occur.
Put on Personal Protective Equipment (PPE)

PPE is required per OSHA regulations.

The following PPE is required to be worn at all times...

**When:**
- The cable is being extracted.
- The cable is being rolled onto a reel.
- If the manhole is entered after pulling has begun.
- Anytime contact is made with the cable or the cable is disturbed.

**What:**
- Tyvek (disposable) coveralls.
- Slip-resistant shoe covers (or a dedicated pair of work boots used only for lead cable salvage).
- Disposable gloves or a dedicated pair of leather gloves to be used only for lead work.
- Hard hat and Safety Glasses.
- A RESPIRATOR.
Put on Personal Protective Equipment (PPE), cont’d

- PPE is not required during the set-up before the cable has been disturbed.

- PPE must be worn throughout clean-up and should be removed:
  - After the reel or chopped section are ready for transport;
  - All manholes are closed; and
  - Plastic is folded in on itself and bagged (except for the sheeting that the disposable PPE will be deposited on).
Limits of Respirator Usage

- Engineering control measures shall be employed to control and contain airborne lead particulates to the lowest feasible level.

- Respirators alone shall not be used to achieve compliance with PELs except in the following cases:
  - During the time period necessary to implement engineering control measures.
  - In work situations in which the control methods prescribed are not technically feasible, or are not sufficient to reduce the airborne concentrations to or below the PEL.
  - Whenever an employee requests a respirator.
Put on Personal Protective Equipment (PPE), cont’d

Limits of Respirator Usage, cont’d

- Respirators will only filter dust and particles from the air. THEY WILL NOT SUPPLY ADEQUATE OXYGEN in areas (like the manhole) where the lack of oxygen may be an issue.

- Respirators selected will not filter vapors and gases.

- Does not reduce importance of Testing, Purging, and Ventilating.
Preparation of Manhole and Surrounding Area

If the manhole will be entered, follow proper manhole entry procedures:

- Purge, ventilate, and test the atmosphere of the manhole.
- Don proper PPE.
- Enter the manhole.
Engineering Controls

The Sprayer

- Tank should remain outside manhole for proper water level and pressure to be maintained.

- After safe manhole entry procedures are completed, entrant should attach sprayer where nozzles wash the cable as it is pulled out.

- A pressure of 20 – 50 psi must be maintained on the sprayer (gauge on sprayer). Safety relief valve is set for 55 psi.
Begin Extraction

After sprayer is hooked up and the sheaves or booms are placed so the cable does not scrape edge of duct, manhole lid, or other, extraction can proceed. An attachment point may need to be created in rare circumstances.
Extraction

- Improper angles and rubbing of the cable on the sides of the conduit or manhole lid frees unnecessary dust and particulate.
- Cable must be properly aligned (cannot rub the edge of conduit or manhole).
- Rate of extraction must be limited to 100 feet per minute.
Job Wrap-up/Clean Up

- All PPE including respiratory protection must be worn throughout the clean-up.
- Plastic sheeting must be rolled in on itself and placed in a large trash-bag.
- Once completed, PPE can be removed and placed into the bag or in a separate bag.
- Bag must be labeled.
- PPE can never be worn off the job site.
Job Wrap-up/Clean Up, cont’d

- All visible lead must be scooped, wiped, or swept from the ground.
- Place onto sheeting to be rolled, collected, and disposed of as waste.
- A manhole pump and clean-out must be completed before job is completed.
- Liquid will be characterized and disposed of by the AT&T Approved Vendor (AV).
- For jobs conducted by AT&T employees, PPE must be collected and disposed of as regulated waste.
Lead-Sheathed Cable Salvage

- Lead-sheathed cable, sleeves, fittings, and other material consisting largely of lead must never be thrown into the trash. Such materials, if they are in solid pieces the size of a BB pellet or larger, should be transferred to a metal recycler.

- Lead-bearing materials in a form smaller than a BB pellet, including dust or powder, are too small for recycling and should generally be treated as Hazardous Waste.
Exposure Assessment

- Exposure assessment is the process of determining whether the worker's exposure to lead will be at or above the AL.

- Air samples will be collected as often as possible on lead-sheathed cable removal jobs.

- Air samples are collected to determine lead levels in the air.
Permissible Exposure Limit (PEL)

- OSHA established a maximum PEL.

  "The employer shall assure that no employee is exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 ug/m\(^3\)) averaged over an 8-hour period."

- If an employee is exposed to lead for more than 8 hours in any work day the allowable exposure shall be reduced.
**Action Level (AL)**

- OSHA has also established an AL. "Action level" means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air (30 ug/m³) calculated as an 8-hour time-weighted average (TWA)."

- According to the OSHA regulations, exposures above the PEL or the AL require an employer take specific actions.

The AL is 30 micrograms of lead per cubic meter of air.
Initial Assessment

- OSHA requires that an initial assessment of exposure must be conducted:
  - Collect personal samples representative of a full shift.
  - At least one sample for each job classification in each work area for each shift or for the shift with the highest exposure level.

- Sampling must be representative of workers' regular daily exposure.

- Initial determinations must be based upon the assumption that workers are not wearing respirators.
Initial Protection

- During initial exposure monitoring, the employer must establish interim protective measures.

- In the case of lead-sheath cable extraction, we have reason to believe that exposures may exceed the AL and the PEL.

- The measures described in this course must be used until engineering controls are shown to be effective in reducing airborne exposure levels to below the AL.
Frequency of Monitoring

- If the initial determination reveals that employee exposure is above the PEL the employer shall perform monitoring quarterly.

- The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are at or below the PEL but at or above the action level at which time the employer shall repeat monitoring per next slide.
Frequency of Monitoring

- If monitoring indicates exposures to be at or above the action level but at or below the PEL further monitoring required at least every 6 months.

- Every 6 months until at least two consecutive measurements, taken at least 7 days apart, are below the action level at which time the employer may discontinue monitoring unless processes change.
Questions? or Comments