



Managing Spent Lead Acid Battery Casings at Residential Sites

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This guidance document is intended to help residential property owners and their contractors properly manage and dispose of buried battery casings and any associated lead-contaminated soils that are discovered.

Background

Lead acid batteries used in automobiles contain lead plates that can be removed and recycled back into lead product. Currently, the outer casing of automobile batteries can also be recycled. However, in the past, battery casings were discarded. Scrap dealers would collect the batteries, remove the lead, then dispose of the casings.

Although most battery casings were disposed of in landfills, the Minnesota Pollution Control Agency (MPCA) has discovered that during the 1950s, 60s, and early 70s, some of these battery casings were used as fill on construction sites, including residential sites.

Environmental Concerns

A few residential sites have been identified where battery casings have been used as fill beneath driveways, enclosed in septic tanks, and used in septic drain fields as non-enclosed drainage media. The battery casings are contaminated with lead and often contaminate surrounding soil to lead levels above standards allowed in residential areas.

To date, a majority of the battery casing burial sites discovered in Minnesota are located in Dakota County.

Lead contamination is the main concern at these battery casing burial sites. When battery casings remain buried, it is unlikely that lead will move significantly into surrounding soils, groundwater, or nearby surface water, such as wetlands, lakes and streams. Also, because risk to animals and humans comes primarily through direct contact, buried casing have probably not posed a significant risk to human health and the environment.

However, when battery casing materials and potentially contaminated soils are uncovered and spread on the surface of the ground, humans and animals could be at risk from inhaling (breathing) or ingesting (eating) lead contaminated soil or dust. To lessen the risk, one must eliminate or significantly reduce the potential for contact with the lead-contaminated soil and battery casings.

Managing and Testing Waste and Soil

If you discover battery casings on your property, it is your responsibility to make sure that cleanup of the battery casings and contaminated soil meets all federal, state and local rules and regulations.

To reduce the possible risk of exposure to lead contamination from the battery casings, it is important that you use the four-step approach presented in this guidance document: (1) notification, (2) assessment, (3) waste management, and (4) removal verification. Each step is described separately; however, you may do steps at the same time.

Note: Following this guidance exactly may not be appropriate for all sites. But, before making any changes, you (and your consultant) need approval from, and close oversight by, county or MPCA staff.

1. Notification

Notify the State Duty Officer and, if you reside in the seven-county metropolitan area, your county waste staff.

If you discover battery casing material on your property, Minnesota law requires you to

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report your discovery to the Minnesota State Duty officer at 651-649-5451 or toll free at 1-800-422-0798. (The State Duty officer will contact the MPCA). If your property is in one of the seven metropolitan counties, also call your county staff. (See numbers on page 4). Your county staff can offer assistance and clarification beyond what is supplied here.

2. Assessment

Assess the situation: determine the volume of buried casings and the extent of soil contamination. Assessment may also include the collection and analysis of soil samples to determine how much lead they contain.

Because it is difficult for a property owner to do this, the MPCA recommends that you hire a qualified environmental consultant to properly sample, manage, and dispose of the battery casings and any contaminated soil for you. You can find a list of environmental consultants and commercial testing laboratories on this MPCA Web site:

<http://www.pca.state.mn.us/publications/w-hw6-05.pdf>.

Although sampling can be done at any time, sampling conducted before removal activities may help the property owner with estimates for the cost of excavating, treating and disposing of the battery casings and contaminated soil. Discuss sampling needs with your environmental consultant and your county or MPCA staff to determine the timing of sampling that is best for your situation.

Sampling and Testing Procedures

Depending upon where casings are located and what other excavation work is being done on the property, you may need to use an auger, shovel or backhoe to determine the volume of casings, their exact location and how deeply they are buried. During this process, take precautions to minimize exposure to any lead-contaminated material. If using a backhoe, be careful not to mix clean soil with the contaminated material to avoid contaminating additional material that will need to be disposed of as waste.

Collect representative samples from the casing material and surrounding soil to characterize the material and to help select the best disposal option. You must do two types of analysis for lead:

- total lead, and
- toxicity characteristic leaching procedure (TCLP) lead.

Total lead analysis is a procedure designed to measure the concentration of all lead contained in the sample.

Experience with buried battery casings indicates that total lead concentrations in the battery casing and surrounding soil close to the casing material will exceed the MPCA residential cleanup target of 300 mg/kg (milligrams per kilogram). Therefore, the MPCA requires the removal of all battery casing deposits unless sampling can show that contamination is below 300 mg/kg. Also, be aware that the Minnesota Department of Health has a bare surface soil lead limit of 100 mg/kg total lead. Analysis for total lead is different than TCLP lead and is described further in the *Removal Verification* section on page 4.

The TCLP analysis is a procedure used to determine whether the waste is considered a hazardous waste, and it measures only the amount of lead that is leached under the specific conditions of the method. The MPCA strongly recommends that samples be collected by a certified environmental consultant or someone familiar with proper sampling techniques. Submit soil and casing material samples to a Minnesota-Department-of-Health-approved laboratory to be analyzed for TCLP lead using the U.S. Environmental Protection Agency (USEPA) SW-846 test method 1311. Samples submitted for analysis may be a composite of subsamples to get a sample or samples that represent the entire waste volume. Submit a minimum of one sample for TCLP lead analysis for every 50 cubic yards (yds³) of waste up to 100 yds³. For volumes greater than 100 yds³, collect an additional sample for every additional 100 yds³ of material.

Experience with buried battery casings indicates that the casing material and surrounding soil often fail a TCLP test (i.e., TCLP lead concentration is 5.0 mg/l or more) and is therefore a hazardous waste. If you assume the casings and soil fail the TCLP test for lead, you need not conduct the TCLP test until after the battery casing material and soil has been treated, as discussed in the *Waste Management* section below.

3. Waste Management

Manage the waste correctly. Depending upon the level of contamination, the amount of casings and soil involved, and the cost of cleaning it up, you may have to decide whether to remove all the contaminated soil or whether you will leave some of the less-contaminated soil buried under clean soil. Based on sampling and test results, the consultant can recommend how to manage and dispose of the waste materials. Discuss your options thoroughly with your environmental consultant and your county staff so together you can make the best decision for your situation.



If you need to temporarily store soil on your property before you dispose of it, pile it on heavy plastic so no lead can leach into the soil below. Also, totally cover the pile with plastic so rain or snow cannot get in and carry lead into surrounding soil or nearby surface water, and so lead-contaminated dust is contained.

If you do not remove all of the contaminated soil from your property, you must prepare and file an affidavit with the property deed in the Office of the County Recorder. The affidavit must be reviewed and approved by MPCA or county staff and must identify the location, volume, depth, and lead concentration of the battery casing and contaminated soil remaining on your property. Use the affidavit format located on the MPCA's Web site at <http://www.pca.state.mn.us/publications/reports/riskbased-plannedprop-affidavit.pdf>.

Waste Management

At residential sites, the MPCA recommends that all battery casing material and contaminated soil with total lead concentrations above 300 mg/kg, be removed and properly disposed of. Do not leave soil with total lead concentrations above 100 mg/kg on the surface (0–3 inches), nor place it in vegetable garden areas. In children's play areas (such as swing sets and sandboxes), the MPCA recommends total lead concentrations of 100 mg/kg or less to a depth of 0–12 inches. The MPCA recognizes that for larger volumes of battery casings and contaminated soil, complete excavation and disposal may be cost prohibitive for the property owner. This guidance discusses procedures for both complete and partial removal of casings and contaminated soil.

The TCLP results from samples collected during the assessment phase or after treatment will dictate how the battery casings and the contaminated soil will be managed after they have been excavated:

- If the results of the casing and soil sampling show concentrations below 5.0 mg/l (milligrams per liter or parts per million) TCLP lead, the excavated material may be disposed of at a permitted solid waste landfill, with the landfill's permission and only in accordance with the landfill's Industrial Waste Management Plan.
- If test results of the casing and soil sampling show concentrations of 5.0 mg/l TCLP lead or more (or if you assume the concentration is 5.0 mg/l TCLP lead or more), you may treat the waste so that it will test below 5.0 mg/l TCLP lead or transport it as a

hazardous waste to a permitted hazardous waste disposal facility. Treatment of the contaminated material may include mixing with a chemical fixation material or Portland cement.

After treatment and before removal from the property, collect another round of samples from the waste material and analyze for TCLP lead to verify that treatment is complete and TCLP lead values are below 5.0 mg/l.

If excavated casings and soil are to be stockpiled before treatment or shipment off site, store them on plastic sheeting and then cover them with plastic sheeting to prevent further migration and exposure to the lead due to run-on and runoff during precipitation events and to prevent the lead from becoming airborne via dust particles. Additionally, you may need to wet down exposed dry soil to keep dust and soil from becoming airborne during excavation. After you finish excavating contaminated material, do verification sampling discussed in the *Removal Verification* section below. Backfill all excavations with clean fill only.

If complete removal of the battery casings and contaminated soil is cost prohibitive, partial removal may be appropriate provided you follow these guidelines:

1. Completely assess the material as described above. The assessment should include:
 - identifying depth and lateral extent of the battery casings and contaminated soil, and
 - sampling to assess total lead concentrations.
2. Ensure that any battery casing material and soil contaminated with total lead concentrations above 300 mg/kg that remains on site is deeper than four feet below ground surface.
3. Assess surface soil (0–3 inches) in the area of the battery casings to ensure total lead concentrations are below 100 mg/kg.
4. Prepare an affidavit for review and approval by MPCA or county staff. File the approved affidavit with the property deed in the Office of the County Recorder. The affidavit must identify the location, volume, depth, and lead concentration of the battery casing and contaminated soil remaining on the property. When filing the affidavit, use the format on the MPCA Web site <http://www.pca.state.mn.us/publications/reports/riskbased-plannedprop-affidavit.pdf>.



4. Removal Verification

Verify the contamination was removed. To verify contamination has been removed, the company you hire must take more samples and send them to a Minnesota Department of Health-approved laboratory to confirm that the remaining soil is clean.

After removing the battery casings and completing the verification step (or partially removing the battery casings and filing an affidavit with the property deed), you, the property owner, must notify the appropriate county staff and the MPCA of completion. If you filed an affidavit, provide a copy to both the county and the MPCA, that has been stamped by the Office of the County Recorder verifying the time and date the affidavit was filed.

If you have a drinking water well on your property, the MPCA strongly recommends that you have your drinking water tested for dissolved lead.

Verification Sampling Requirements

When all visible battery casing material and contaminated soil has been excavated, collect soil samples from the excavation base and sidewalls to verify that any remaining contamination is below risk levels. Space each sample appropriately to represent areas of equal size. For excavations with a base of less than 500 square feet (ft²), collect a minimum of two samples. Collect one additional base sample for each additional 500 ft² of excavation base. Collect a minimum of four sidewall samples from each excavation. Collect an additional sidewall sample for each sidewall greater than 500 ft². Each verification sample may consist of up to 4 subsamples from different areas on the excavation base or sidewall so that the final composite sample results are representative of the entire area.

Submit excavation base and sidewall verification samples to a Minnesota-Department-of-Health-approved laboratory for total lead analysis using USEPA analytical test method 6010, 6020 or equivalent method. Total lead analysis is different from the TCLP lead analysis in that the total analysis procedure is designed to measure the concentration of all lead contained in the sample. If concentrations of total lead in confirmatory samples exceed 300 mg/kg, either additional soil will need to be removed

from that area to bring the soil concentration below 300 mg/kg, or it will be considered partial removal and you must follow the guidelines for partial removal discussed in the *Waste Management* section above. Exposed bare soil should not have concentrations of lead above 100 mg/kg. If exposed bare soil has lead concentrations between 100 mg/kg and 300 mg/kg, the exposed soil should be covered with a minimum of 3 inches of cover. The cover may consist of black dirt and sod or other landscape cover that will prevent direct contact. Vegetable gardens and children's play equipment, such as swing sets and sandboxes, should not be placed in this area.

More Information

Your metropolitan county and the Minnesota Pollution Control Agency (MPCA) have staff available to answer waste-management questions. For more information, contact your metropolitan county environmental office or the MPCA's St. Paul office.

For more detailed guidance for risk-based evaluation and cleanup of release sites, see the MPCA Web site at <http://www.pca.state.mn.us/cleanup/riskbasedoc.html>.

Metro County Hazardous Waste Offices	
Anoka County	(763) 422-7093
Carver County	(952) 361-1800
Dakota County	(952) 891-7541
Hennepin County	(612) 348-8100
Ramsey County	(651) 773-4466
Scott County	(952) 496-8177
Washington County	(651) 430-6655
Minnesota Pollution Control Agency	
Toll free	(800) 657-3864
Brainerd	(218) 828-2492
Detroit Lakes	(218) 847-1519
Duluth	(218) 723-4660
Marshall	(507) 537-7146
Rochester	(507) 285-7343
St. Paul	(651) 297-2274
Willmar	(320) 214-3786
Web site	http://www.pca.state.mn.us
Minnesota State Duty Officer	
Toll free	(800) 422-0798
St. Paul	(651) 649-5451