

Guidance for Local Health Departments: Targeted Intervention to Prevent Take – Home Lead

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GLOSSARY OF KEY TERMS AND ACRONYMS

- **BLL** - Blood Lead Level; usually measured in micrograms per deciliter ($\mu\text{g}/\text{dL}$).
- **Clearance Standards** - The maximum amount of lead that can be found on surfaces (e.g., floors, windowsills, and window wells) after a home has had lead abatement.
- **CLPPP** - Childhood Lead Poisoning Prevention Program.
- **EBLL** - Elevated Blood Lead Level; defined as any blood lead level greater than or equal to 10 micrograms per deciliter ($\geq 10 \mu\text{g}/\text{dL}$).
- **Exposure** – Contact with a harmful material that can be absorbed by (i.e. taken into) your body. Example, eating lead-paint chips will result in exposure to lead, because lead can be taken-up by your gut.
- **HUD** - United States Department of Housing and Urban Development.
- **$\mu\text{g}/\text{dL}$** - Micrograms per deciliter, the common unit of measurement for blood lead levels.
- **Michigan Occupational Safety and Health Administration (MIOSHA)** - work collaboratively with employers and employees to better prevent workplace injuries, illnesses, and fatalities. MIOSHA health and safety activities include: setting and enforcing occupational safety and health standards; providing extensive safety and health training and education; and working with partners to develop innovative programs to prevent workplace hazards.
- **Take-Home Exposure** – Some dust could have lead in it (i.e. “lead dust”). Lead dust can be carried into the home by parents or caregivers on their shoes, clothes, skin or hair from jobs or hobbies that involve lead. This means lead inside the home was “taken-home” from an outside location.

INTRODUCTION

The purpose of this document is to assist local health departments in their development of a public health intervention program to prevent children's exposure to lead brought home on the shoes and/or clothes of adults who encounter lead in the workplace. This guide provides background information, recommended steps for initiating and implementing a worksite intervention program, as well as additional electronic resources.

The guide described here will assist you to:

1. Develop a list of establishments and employers with the potential for employee lead exposure.
2. Contact establishments to learn about employee work practices and the potential for take-home lead activities, especially among employees who either have children under the age of six or are of childbearing age.
3. Provide employers and employees with recommendations on how to minimize lead exposure in the workplace and reduce the amount of lead that is taken home.
4. Aid employees in obtaining blood lead tests for themselves and their children to measure the impact of take-home lead exposures.
5. Measure the extent of take-home lead exposures by performing dust-wipe sampling of employee homes and vehicles.
6. Follow up with establishments and employees to encourage them to have their children receive blood lead testing and reaffirm best practices in reducing take-home lead.

BACKGROUND INFORMATION

Children with parents/guardians whose jobs or hobbies involve contact with lead may be at risk from lead that is “taken-home” on the parent/guardian’s skin, clothes, or shoes. Previous investigations have shown high lead levels of dust in the homes or vehicles of workers in the construction¹ and lead-based paint remediation² industries. Other studies have found elevated blood lead levels (BLLs) in the children of construction³, radiator repair⁴⁻⁶, battery production and recycling^{3,7-10}, scrap metal recycling^{7,11}, and bridge painting¹² workers. One analysis of take-home lead exposures found that overall, 52% of children of workers that contact lead had BLLs over 10 µg/dL (which is considered an elevated blood lead level), compared to 8.9% of children in the general U.S. population¹³.

Children in Michigan with parents who work with or are exposed to lead at work have elevated blood lead levels more commonly than do children in Michigan in general. The 2015-2016 Report of the Michigan Adult Blood Lead Epidemiology and Surveillance (ABLES) Program showed that only a third of children under six years whose parent(s) had an elevated blood lead had been tested for lead themselves; out those that had been tested, though, 35% of the children under six also had an elevated BLL¹⁴. This percentage of children with elevated blood lead is much higher than what is typically observed in children in Michigan (only 3.4% statewide with elevated blood lead levels). These data point to the need for an increased emphasis on protecting the children of lead-exposed adults from lead poisoning. These data also highlight the need to reduce lead being taken home from the workplace.

There were over 500 adults in Michigan each year in 2015 and 2016 with blood lead levels above 10 µg/dL. From that, we can estimate that there are 175 (35% of 500) cases of children with elevated BLLs in Michigan every year caused by lead being taken home by a parent. These data from Michigan highlight two major problems:

- 1) Children under six years old who have parents with elevated blood lead are not being tested for lead; and
- 2) These children have a higher risk for lead poisoning than children in the general population.

More comprehensive monitoring of blood lead levels in children of lead-exposed adults is an important public-health action. There are Michigan Occupational Safety and Health

Administration (MIOSHA) standards that require lead-exposed workers change their clothing and shower before leaving their jobsite. MIOSHA only inspects about 5% of companies a year and the likelihood they will inspect a small radiator repair or metal recycling facility is even lower. Additionally, gun clubs, which do not have employees and therefore are not regulated by MIOSHA have no oversight to ensure children of users of the firing range are protected from take-home lead.

Children that come into contact with lead that was taken home by adults is an important part of the total amount of lead that some children will contact. Take-home lead is in urgent need of targeted intervention. The Michigan Child Lead Poisoning Elimination Board recognized the role of occupational lead exposures in its report “A Roadmap to Eliminating Child Lead Exposure”, calling for the reduction of “lead exposures in occupational spaces to protect children, pregnant mothers, and the unborn”. When the Michigan State University Division of Occupational and Environmental Medicine developed and tested this program in Genesee County, we found lead in nearly every dust sample taken from employee’s personal vehicles at a level above the Department of Housing and Urban Development’s clearance level for house floors of $10 \mu\text{g}/\text{ft}^2$. We also found that a majority of employees in these industries do not change their clothes or shoes after work before returning home and have not received training regarding lead hazards in the workplace. The results of our pilot testing in Genesee County support the need for more education among employers and employees throughout the state.

OBJECTIVE 1: IDENTIFYING ESTABLISHMENTS

a. Searching for establishments where contact with lead is likely

For public health interventions to target take-home lead exposures from adults most likely to be bringing lead dust into their homes, the relevant establishments must first be identified. As a first step to identify lead-using establishments, the program should focus on the following industries and occupations that have been identified as contributing to adult lead poisoning in Michigan:

Michigan Industries that use Lead

- Firing ranges (lead dust from lead bullets)
- Lead-based paint abatement and remediation
- Automobile lead-acid battery production, repair, and recycling
- Scrap metal recycling
- Bridge/Water tower painting (and other industrial coatings)
- Brass and Bronze foundries (brass/bronze is 8% lead unless facility makes lead-free product)
- Demolition workers

Note that this is not a complete list of all possible jobs that involve lead exposure. If you decide to look into industries beyond those prioritized here, see Appendix A for a longer list of possible industries and jobs that may involve lead exposure (adapted from Koh et al., 2015, which also contains more comprehensive measurements of lead exposure in each of the industries listed¹⁵).

Identify establishments by using web searches. Based on our experience, combining the results of searches from Google, Yellow Pages, Manta, and Yelp yields the most complete results. For every industry, use all four directory services to grow a list of possible establishments. The search word or words you use will change the results noticeably; see below for the key words that are recommended to be used when searching for establishments within each industry. Use these key search words in addition to your country's name or specific cities within your country to limit your results to just those establishments located in your county. Your search will likely result in finding more establishments than are operating. The list of establishments should be narrowed

by calling establishments to check if they are still in business, by looking at their addresses using Google Maps street view, and by visiting the establishment in person.

Use the list of key words below when conducting your online searches:

Firing Ranges: Huntsman Clun, Gun Range, Gun Club, Shooting Range, Indoor Firearm Range

Lead-Based Paint Abatement, Remediation, and Inspection: Use this MDHHS website https://www.michigan.gov/mdhhs/0,5885,7-339-71550_2955_2983-95171--,00.html to look up all of the lead-based paint abatement workers, supervisors, and contractors operating in your community (by area code).

Radiator Repair: Radiator Repair, Automobile Radiator Repair, Lead Solder Repair, Radiator Shop, Automobile Welding

Automobile lead-acid battery production and recycling: Car Battery Recycling, Industrial Battery Repair, Battery Production.

Scrap metal recycling: Car Salvage, Metal Recycling, Scrap Metal Recycling, Junk Yard, and Recycling Center

Bridge painting: Bridge Painting, Industrial Painting, Sand Blasting, Commercial Painting, Industrial Coating

Brass and Bronze Foundries: Foundry, Brass Foundry, Bronze Foundry, Brass and Bronze.

Demolition workers: Demolition, Excavation, Abatement (overlap with lead-based paint abatement above). Also, use your county's land bank or similar organization to find companies that are performing demolitions.

Industry-specific considerations: In Michigan, lead-based paint abatement contractors, supervisors, and workers are required to be certified by the Michigan Department of Health and Human Services. The list of certified establishments and workers can be downloaded from the MDHSS website: https://www.michigan.gov/mdhhs/0,5885,7-339-71550_2955_2983-95171--,00.html. While this type of construction contractor/firm has a greater potential for lead exposure than demolition contractors and construction firms and workers in general, workers in these other construction industries also have the potential for lead exposure.

Similarly, prioritize your search for automobile shops for those that perform or specialize in radiator repair.

For lead-acid battery recycling specifically, most of the search results may be establishments that collect and ship out the battery to be recycled and not a facility that recycles

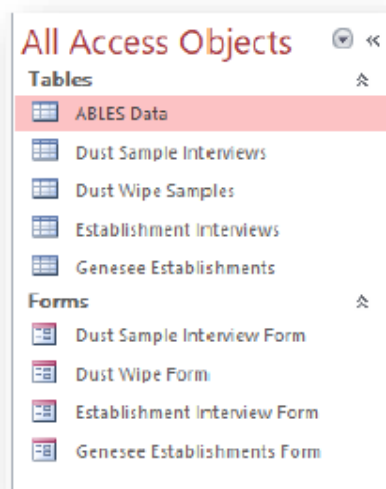
the batteries onsite. The best way to find out if they are recycling onsite, and therefore more likely to have employees who are exposed to lead, is to call and ask if 1) they recycle onsite or if batteries are picked up by another group and 2) the group who collects them is located in Michigan.

Once an initial list of establishments targeted for outreach has been created, the following characteristics of should be prioritized:

- Above all, target industries with the highest lead exposures: brass/bronze foundries, battery recycling, lead-based paint abatement contractors, firing ranges, radiator repair with lead solder.
- Smaller worksites (those with 10 or fewer employees) should be prioritized because they are both less likely to employ (or have consulted with) health and safety professionals and because they are less likely to have been inspected by MIOSHA. The lack of involvement of health and safety specialists in small companies will increase the likelihood take-home lead exposures.
- Establishments that do not have paid employees and are therefore not regulated by MIOSHA should be prioritized. This would also include self-employed or “owner-operator” individuals that have no employees and gun/rifle/shooting clubs, where club members staff the ranges.

b. Creating a Database

We recommend the development of a database to organize and maintain the list of establishments, the survey answers from the establishments and individual employees who have their personal vehicle samples for lead dust, and the dust sample results. At MSU, we use Microsoft Access and assign each establishment an ID number, which serves as the “key” to link together multiple tables (for example following one establishment across the tables List of Establishments, Questionnaire Results, and Lead Dust Sampling Results) in the Access database. Another benefit in using Access is the ability to create forms, identical to the surveys, which is an easy way to enter data into a table in Access:



Each 'Table' has a 'Form' that helps make data entry easy and quick.

Below is first an example of the Genesee Establishment Form, which would be used to enter a new establishment found online. After entering the information about the establishment, you can see that the form submitted shows up in the Genesee Establishments Table.

Genesee Establishments Form

Genesee Establishments

ID: 1 Phone: 123-456-7890

Date Visited: 2/18/2019

Industry List: Automobile Shop

Name: Example 1 Interview: ☐

Address: 123 Road Dust Sample: ☐

City: City Example Notes: Test

ID	Industry	Name	Address	City	Phone	Date Visited	Follow Up	Interview	Dust Sample	Notes
1	Automobile Shop	Example 1	123 Road	City Example	123-456-7890	2/18/2019		☐	☐	Test
2	Police Department	Police	0987 Lane		111-111-1111	2/1/2019		☐	☐	Test 2
(New)								☐	☐	

MSU can share with any local health department our full Access file. Other data management software may be appropriate given expertise and compatibility within each local health department.

Tables and individual data fields that should be included in any database include (many of these fields are explained in upcoming sections):

Establishment Information

- Establishment ID number (assigned by the local health department)
- Name of establishment
- Industry
- Address
- City
- Phone
- Date visited
- Interview completed (yes/ no check box)
- Dust sample(s) taken (yes/no check box)
- Notes

Survey Answers from Interview with the Employer/Operator of the Establishment

- Establishment ID number
- Establishment name
- Answers to survey questions, with each question as a separate field
- Notes

Survey Answers from Employees of the Establishment

- Establishment ID number
- Employee name
- Employee contact information (email or mailing address)
- Answers to employee survey, with each question as a separate field
- Notes

Lead Dust Wipe Samples

- Establishment ID number
- Wipe number
- Description of sample site or field blank (e.g. "driver side floorboard", "rear passenger side floorboard", "living room floor", "child bedroom windowsill")
- Date collected

- Results ($\mu\text{g}/\text{ft}^2$) (calculating this result is explained in the section on Dust Wipe Sampling)
- Date results were sent to analysis
- Notes

As outreach and worksite visits begin, the list of establishments included in the take-home lead intervention program should be updated with additional locations that are either newly established or were not identified via the methods used to initially construct the list but later came to the attention of the program via referral from other establishments, or even by noticing an establishment while out on other site visits.

OBJECTIVE 2: ESTABLISHMENT CONTACT

At MSU, we do not have any regulatory authority over the establishments we contact. What follows has been our approach to contact establishments. As a representative from a local health department that *does* have regulatory authority, you may have a different way to approach and interact with establishments in your jurisdiction.

a. In-Person Visits

At MSU, our first choice for contacting an establishment is to visit the worksite in person. Automobile shops, furniture repair, scrap metal recycling yards, and gun stores with a shooting range are frequently open to the public and, in our experience, employees are not apprehensive about answering a few questions about the work they do. During this part of the project it is important to remember that a main goal of this work is to educate the establishment's employees about take-home lead.

Typically, a site visit includes: introducing yourself, a brief program description, asking survey questions, and providing educational information. If you have the resources, also obtain permission to sample their personal vehicle for lead.

Introduction –

Walk into the establishment, approach an employee, and introduce yourself with your name and where you are from. Note that, while it would be good to ultimately talk with some sort of manager or business owner, if the employee you initially encounter is receptive, taking the time to talk to them as well (as opposed to immediately asking to be referred to a manager) can often give you a different point of view on operations at that establishment.

Brief Program Description –

Script this before and practice delivering it a few times, "I am from the ____ Department of Health and I am working on a program to reduce children's contact with lead. We are focusing on how children's contact with lead can come from the parent's workplace because employees that work with lead can bring it home in dust on their clothing or shoes. If you have a minute, I would like to have a conversation about the work you do here?" At this point

you should hand them materials explaining your program; a letter used by MSU for this purpose is included as Appendix B.

Questionnaire –

The questionnaire used by MSU is included in Appendix C. Familiarize yourself with the questionnaire attached as it helps guides a conversation from:

General Tasks → Preventative Practices at Work → Lead Training → Lead Testing → Employees' Children Under the Age of Six → Personal vs. Work Vehicle

It is not necessary to read from the questionnaire itself if the interviewee is open to a general/casual conversation. Just make sure that each topic is covered over the course of the conversation.

Use the list of lead-associated industries and activities in Appendix A to educate the employee if they seem unaware of any possibilities for lead exposure in their workplace.

Ask specifically if you may talk with any employees who are known to have young children (under the age of six). Also, when possible, it is a good idea to survey more than one employee (or any employee if your initial contact is with the manager). Various positions may have differing views of the work practices (for example, regarding how common usage of protective equipment is) and surveying multiple individuals helps generate a more complete picture of the establishment. Survey employees separately whenever possible to avoid one employee's answers influencing another employee's answers.

Providing Information -

When the survey is complete, share with the employee materials that include information on your program and recommendations on how to reduce the potential for take-home lead exposures and how to clean up lead dust. A brochure on take-home lead (with recommendations) created by the Michigan Department of Health

and Human Services should be given to everyone at the establishment you have contact with (the brochure and a similar poster are attached as Appendices D and E, respectively). Direct them to the inside middle panel titled “Preventing Take Home-Lead”. An additional brochure we provided regarding how to clean up take-home dust from homes and vehicles (developed by the North Carolina Division of Public Health) is attached as Appendix F. Additionally, you should include a short letter or brochure describing the scope of your particular program (including dust sampling and blood lead testing, discussed below) and contact information so that questions (or requests for dust sampling or blood lead testing) that an employee doesn’t think of or want to voice in his workplace during your visit may be addressed.

Dust Sampling -

Use the information about your program to start a conversation about taking a wipe sample from the employee’s personal vehicle. (More information regarding the dust sampling for lead can be found under Objective 5 below). As with the survey, focus your efforts on any employees with children under the age of six at home. That said, samples collected from other employees still provide important information to both them and you about whether lead dust is being taken out of the workplace. Dust sampling requests from such employees should not be refused if resources allow for it. Do not be afraid to be direct with requests for participation – for example, with dust sampling, employees responded better to “if possible, it’s important to sample the dust in your car” instead of “would you be interested in having your car sampled for lead?”

Similarly, employees should be asked if it would be possible to schedule a time to sample the dust in their homes.

Ask the employee you interviewed to share the brochure and program information with coworkers (suggest posting it near other

health and safety information) and emphasize that any employee interested can have their house/car sampled or blood lead tested. Finally, point out your contact information and ask them to contact you with questions or if they want to participate further.

Blood Lead Testing –

Arranging blood lead testing to be done at a local clinic is another critical way to look at the impact of take-home lead exposure (more about this can be found under Objective 4, below). While Michigan state law require kids to have their blood lead tested, evidence from CLPP suggests that there are still a lot of children under the age of 6 to be tested. In many of these industries investigated, it is standard or common for the employer to have his employees tested at the beginning of employment to serve as a base line and then to have all employees screened annually. When asking parents to have their children's blood lead tested, allow the employee to think about it and use the contact information from the interview to follow up with them at a later time.

If at any point they indicate they are not interested in participating, the educational materials should still be explained and left with the employer/employee, even if that means leaving them on the counter. Employees will have a variety of responses from joking with you, short and direct, to mocking the idea of lead exposure/hazards, but it is important to be patient. You will also have to be flexible when employees may hand you off to someone else or must stop the interview to help a real customer. The goal is to share information about take-home lead exposure and its prevention, so focus on the distribution and brief explanation of the educational and program materials if you sense that your attempts at completing the questionnaire are upsetting the employee/employer.

b. Contact via phone or email

Establishments without a storefront for customers are difficult to visit in-person without prior contact. These establishments should be contacted by phone (use the same methods for locating establishments described above to locate a phone number) whenever possible. The goals for this phone call include:

1. Arranging for an in-person workplace visit.
2. If an in-person visit is not possible:
 - Obtaining a mailing or email address to send program and educational materials to.
 - Completing the survey over the phone
 - Arranging for home dust sampling and/or blood lead testing.

It is important to take notes about these phone calls in the notes section of the establishment table in your Access database because you will leave a lot of messages, people will ask you to call them back or say, "Only call me Mondays after 5:00," and so on. In general, a successful call would start with the brief program description, move on to the survey, receive an address or email to send brochure and project letter to, and arrange for dust sampling and/or blood lead testing. Again, the most important goal is to share information about take-home lead, therefore before the conversation is over, or if it feels to be ending soon, obtain their contact information. While this is the most important goal, people are not usually willing to handover their more personal information before trust has been established.

OBJECTIVE 3: PROVIDING RECOMMENDATIONS

Most of the recommendations given will come from the MDHHS brochure (Appendix D) left with, or mailed to, establishments. The following recommendations are listed in the brochure:

- Don't eat, drink or smoke on the job.
- Wash hands before eating, drinking, smoking or touching your face.
- Wear the proper protective equipment on the job, including a respirator.
- Shower, wash your hair and change into clean clothes before leaving work.
- Store street clothes in a separate locker from your work clothes.
- Wash work clothes separately from other laundry. After washing lead-contaminated clothing and removing them from the machine, run the rinse cycle once

The first two bullet points will help protect the employee from lead dust exposure, but the remaining bullet points help prevent the lead dust from coming home. Employees need to change their clothes and shoes before they go home and shower if possible. These steps will help reduce take-home lead from the workplace and from lead related hobbies. In addition, reducing the amount of the lead exposed in the workplace can reduce the amount of lead brought home. Important steps in reducing the amount of lead exposure in the workplace, and therefore lowering the extent of take-home exposures, include:

- Practice wet sweeping or vacuuming with a vacuum equipped with a high efficiency particulate (HEPA) filter as opposed to dry sweeping. Dry sweeping increases exposure to lead by increasing amount of lead in the air.
- Ventilate the workplace as well as possible.

Similarly, recommendations about how to clean up lead dust from homes and vehicles can help reduce the risk that children are impacted by any lead that is taken home. These recommendations are included in the brochure in Appendix F and include:

- Use a HEPA vacuum to remove lead dust from carpets
- Use a wet cleaning method to remove lead dust from hard surfaces

More information on controlling lead exposures in the workplace can be found in resources from MIOSHA and OSHA:

- https://www.michigan.gov/documents/lara/lara_miosha_constfact_lead_exposure_in_construction_413873_7.pdf
- <https://www.osha.gov/OshDoc/data/HurricaneFacts/LeadHazards.pdf>

OBJECTIVE 4: EXPOSURE MEASUREMENT: BLOOD LEAD TESTING

Measuring the level of lead in the blood of the employee's children is the ultimate measure of whether they are being affected by take-home lead. Coordinate with your health department's clinic to help arrange for blood lead testing. Blood testing efforts should focus on getting the children of employees screened, but employees themselves (as well as adult family members living in the home) are also impacted by take-home lead and testing should be also be arranged for them.

There are many routes to take while advocating for a child or worker to have a blood lead test. The best option can be determined by the health department and your team or what works best for the worker and their family. If your health department can afford it, you can purchase the Magellan LeadCare™ II by Meridian Bioscience. Rapid testing with a simple finger-stick at the point of care eliminates a separate trip to the lab ensuring more prevalent and timely testing. The results are delivered in three minutes, the instrument is easy to use and accurate, the test is CLIA-waived, and follow-up is provided immediately.

(<https://www.magellandx.com/leadcare-products/leadcare-ii/>). However, this method is limited because capillary testing is considered a screening test and is not diagnostic. Any elevated blood lead level found with a capillary testing method such as that performed by this instrument should be followed-up with a venous test to confirm the blood lead level.

Another approach is to refer employees to your local health department clinic (or other clinics/laboratories, if necessary) while speaking to them during the worksite visit. However, we have found (and you may find) that employee follow-up in getting their child tested can be low, even if they are enthusiastic during the site visit. In that case, you should try having a phlebotomist available to meet the employees and their children at their home – this way, during the worksite visit, if the employee says their child has not been tested but they would like them to be, you can have them contact the phlebotomist to schedule a visit (or you can schedule one for them, depending on your arrangement with the phlebotomist) immediately during your conversation. If possible, you should even have the phlebotomist accompany your staff on the worksite visits, to both schedule their own home visits as well as to take blood samples from any employees who agree to be tested while you are there.

Samples will need to be tested in a lab. If you do not have the resources to test blood for lead content yourselves, you may contact the Michigan Department of Health and Human Services Bureau of Laboratories Trace Metals Unit, who will analyze them for you for a small

fee. You can learn more about the Trace Metals Unit and their blood lead testing program, as well as find contact information, at this website: https://www.michigan.gov/mdhhs/0,5885,7-339-71551_2945_5103_71371-364413--,00.html

If the employee's child has already had their blood lead level tested, or the blood lead tests are not being performed through your clinic (for example, if the employee instead takes their child to their pediatrician to be tested), you should ask the parents to voluntarily share the blood results with your program so that you can continue to track the effect take-home lead is having on children in your community. Make sure you are aware of who you need to refer children with high BLLs to or who the clinic may automatically send flagged high results to (including MIOSHA, which may trigger an inspection). This information should be shared with the employee because some of them may turn down blood lead testing for fear that a potential high blood lead result would lead to inspections, fines, or legal trouble for themselves or their business.

Although most health insurance policies will cover blood lead testing for children, to increase participation you should attempt to provide this testing free of charge or otherwise secure funds to assist in covering the cost for employee's children in instances where the test would not be covered by insurance.

OBJECTIVE 5: EXPOSURE MEASUREMENT – DUST WIPE SAMPLING

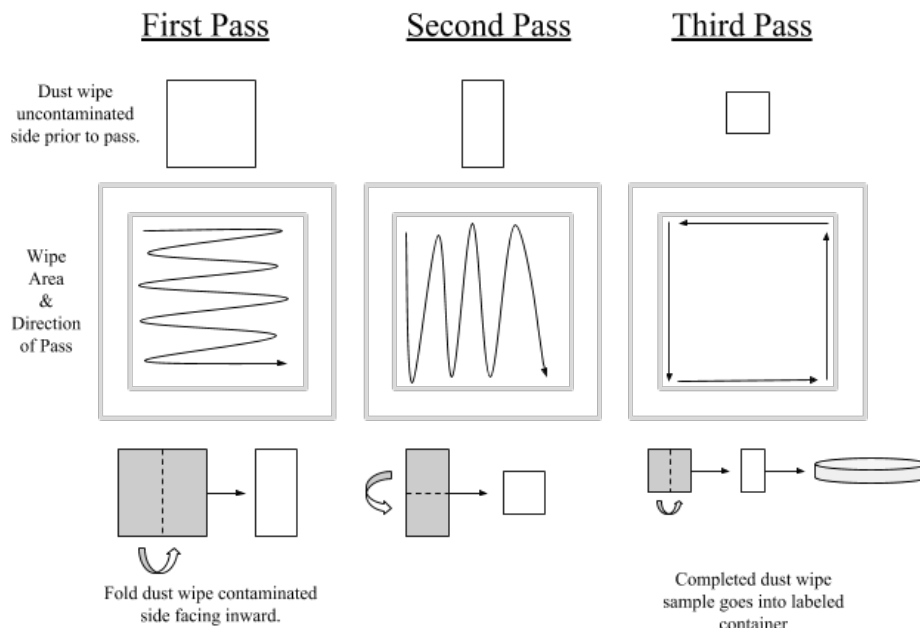
a) Personal Vehicle

Sampling the dust of an employee's personal vehicle can reveal the extent to which they are tracking dust from the workplace into their vehicle and, by extension, their home. This is the most direct measurement of take-home lead to be completed under this program. Although vehicular dust lead levels may also reflect hobbies with high lead exposure (e.g. frequent visits to the shooting range), this measurement still is the best indicator compared to home dust levels and child blood lead levels (which more specially measure the lead exposure of children, but can also reflect lead from many other sources such as lead-based paint in the home) as it is the closest measurement to the workplace itself. Therefore, if you have the resources, vehicle sampling should be completed for each employee during all worksite visits – it should be emphasized how quick and easy the sampling is to do if the employee's vehicle is on-site, and that results will be shared with the employees. You should also inquire about home dust sampling and schedule a time to visit the employee's house to do so (optimally, at the same time a phlebotomist would be visiting the house to collect a child's blood sample).

You should use the dust wipe protocol outlined by the State of Michigan. A copy of this protocol can be found here:

https://www.michigan.gov/documents/mdch/Dust_Wipe_Protocol_1_13_2015.1_500042_7.pdf

This graphic was also made to elaborate on the sampling protocol.



Vehicle sampling should focus on the driver floorboard as the intermediary between the workplace and the home. In addition, if sampling the vehicle of an employee with a child under the age of six, additional samples of the backseat floorboard should be taken if the child rides in the backseat frequently. The sampling works best on hard surfaces (such as rubber floor mats), although carpeted material can also be sampled, although the wiping protocol may not completely capture all the dust from a carpeted surface and thus the results are possibly an underestimate of the true amount of lead present. The protocol calls for a 1 foot x 1 foot (i.e. 1 square foot) square template. However, this is often hard to do within a vehicle, so we recommend you use a 10 cm x 10 cm (i.e. 100 cm²) template instead. Results may then need to be converted from mass of lead per 100 cm² to mass of lead per square foot (by multiplying the per 100 cm² result by 9.29) if you are seeking to compare to EPA or HUD standards in those units. The wipes specified in the protocol (https://www.skincinc.com/catalog/index.php?cPath=6000000000_601000000_601000100?osCsId=080779222b943770d17bd94d7371fed4_601000101), the 10 cm x 10 cm templates (https://www.skincinc.com/catalog/index.php?cPath=6000000000_601000000_601000350_601000351), and petri dishes in which to store the collected samples (<https://us.vwr.com/store/product/4677233/petri-dishes-50mm-sterile-pall-laboratory>) are all available online.

b) Home

Sampling inside of a home will follow similar protocol as a personal vehicle. Hard wood surfaces will work better than carpet so focus on entryways, laundry room, children's bedroom, and windowsills. You can dust sample any measured size area that does not fit the template as long as the area size sampled is recorded and reported when the wipe is analyzed. These results will be compared exactly to the EPA and HUD standard for windowsills and floors within homes: <https://www.hud.gov/sites/documents/LEADDUSTCLEARANCE.PDF>
https://www.hud.gov/sites/documents/CH15_CLEARANCE_121212.PDF
<https://www.epa.gov/sites/production/files/documents/ldstguide.pdf>

c) Analysis

The lead wipes need to be analyzed for the amount of lead present by a laboratory. Several commercial laboratories in Michigan can analyze lead wipe samples for approximately \$30-40 per sample.

d) Delivering Results

A letter should be sent directly to the individual employee (to avoid any unwanted disclosure to the employer) with the results and restating the importance of blood lead testing for workers and children under the age of six while repeating important recommendations to reduce take-home lead. In addition, the letter can offer home dust sampling if only a personal vehicle has been tested so far. An example dust sampling results letter is included as Appendix G.

OBJECTIVE 6: FOLLOWING UP

Following up with establishments persistently is an important part of the take-home lead prevention program. The first follow up will naturally happen if/when lead dust sampling results are delivered. After the results are delivered and if they are positive for the presence of lead, the importance of a blood lead test for their children under six should be emphasized to all employees at the worksite. The same is true if a blood lead test is completed but not dust sampling. Revisiting the establishments where lead dust was found with the LeadCare™ II or a phlebotomist would provide the opportunity to provide immediate testing at the worksite.

In general, if an establishment has been contacted, but has declined to participate in other parts of the program, they should also be followed up to prompt their participation. Collecting more information for the database will help identify workplaces of high concern and aid in monitoring those establishments for outreach lasting longer than a year. Finally, it may take repeated effort to make initial or follow-up contact with an establishment by phone – do not be afraid to continue to follow-up if messages are not returned. Contacting employees, or establishments where the owner is the lone worker, by phone may require making calls at hours outside of those making up a typical work day. An example follow-up letter is included as Appendix H.

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Appendices

Appendix A:
List of Industries and Activities with
Lead Exposure

Activities

Lead-based paint work (various industries)

- Lead added to paints commonly used on bridges, railways, industrial metal structures, ship hulls, structural steel, decorative metal structures, vehicle bodies, interior surfaces with increased traffic or wear, and wood and metal furniture and equipment.
 - Exterior paints typically have higher lead content (up to 90%).
 - Lead dust generated during the removal of lead-based paint and activities that disturb lead-based paint coated surfaces.
- 1971 - Lead-Based Paint Poisoning Prevention Act restricted use of lead-based paint in federally-funded housing and provided funding to identify and eliminate high-risk lead-based paint exposures in homes.
- 1978 - US Consumer Products Safety Commission bans use of >0.06% by weight lead in paints used on consumer products and residences.
- 1992 - Residential Lead-Based Paint Hazard Reduction Act initiated a multi-agency order to begin eliminating lead-based paint exposure in residential housing.

Joining or cutting metals using heat (various industries)

- Lead fumes and dust generated during metal joining or cutting with heat (weld, braze, solder, torch cut) when the metal contains lead or is coated lead-based paint or lead-containing materials.
- Amount of lead fumes increases with increasing process temperature.
- Fine lead oxide dust generated at surface during lower temperature operations such as soldering.

Leaded gasoline vehicle emissions (various industries)

- Lead alkyls (i.e., tetraethyl lead) added to gasoline from the 1920s; lead fumes and dust generated during combustion.
- 1973 - EPA regulations gradually reduce the lead alkyl content in gasoline.
- 1995 - EPA regulations prohibit leaded gasoline for on-road vehicles.

Industries (SIC2a)

Agricultural industry (SIC2:01)

- Lead arsenate insecticides used in orchards until the 1960s; lead dust generated during pesticide application and fruit handling.

Construction industry (SIC2:15–17)

- Lead-containing building materials are common: terne metal roofing and flashing, industrial and gas tank linings, lead pipe caulking, water pipes, soundproofing material, vibration-dampening material, and ionizing radiation shielding.
 - Lead dust generated during grinding, sanding, and cutting activities of lead-containing building materials.
 - Uncoated metallic lead develops a lead oxide powder coating that can be dislodged when handled.
- 1986 - Safe Drinking Water Act restricts use of lead solder or flux to <0.2% and lead pipes and fixtures to <8%; lead pipes still used in industrial settings for transporting corrosive materials.

Printing industry (SIC2:27)

- Lead alloys commonly used to make type and plates for letterpress printing.
 - Lead pigments used in newspaper and magazine color inks.
 - Lead fumes and dust generated during melting, pouring, and casting operations; lead dust generated during type and plate trimming and finishing.
- <1900s - Lead used in typeset for letterpress printing.
- 1960s - Newspapers begin replacing hot metal typesetting processes with offset and computer typesetting.
- 1970s - American Newspaper Publisher Association (ANPA) prohibits use of lead pigments in ANPA-approved inks.
- 1980s - Most newspaper lead typeset printing replaced by offset and computer typesetting.

Chemical and allied product manufacturing (SIC2: 28)

- Organic and inorganic lead compounds used during fuel additive manufacture and blending operations and in pigment and paint manufacture.
- Lead compounds were commonly used as PVC plastic stabilizers, rubber compounders and accelerators, and as plastic and rubber pigments.
- Lead dust generated while handling powdered feedstock during blending and compounding operations.

Ceramics industry (SIC2: 32)

- Lead used in ceramic and porcelain glazes and enamels; lead dust generated during powdered lead compound handling and spray application.

Glass making industry (SIC2:32)

- Lead oxides added to crystal, optical, and radiation shielding glass; strips of metallic lead alloy used to hold pieces of stained glass together; lead fumes and dust generated during handling and grinding, engraving, and polishing operations.

Primary and secondary metal production (SIC2:33)

- Lead naturally occurs in metal ores; exposures frequently occur during primary smelting and refining of lead, copper, zinc, and other metals and during the production of metal alloys such as brass, bronze, terne, and leaded steel.
- In secondary refineries, lead can be present in scrap metals; secondary lead refineries predominantly reclaim lead-acid storage batteries.
- Lead fumes and lead oxide dust generated during melting and pouring operations, fire assaying, bag house operations, and scrap metal processing.

Metal product manufacturing (SIC2:34, 35, 38, 39)

- Metallic lead used in the manufacture of lead sheeting, panels, pipes and lead alloy products.
- Lead used in metal heat treatments (e.g., annealing, patenting) and surface treatments (e.g. tinning, electroplating, galvanizing).
- Lead fumes and dust generated when activities such as grinding, sanding, cutting, or burnishing disturb lead-containing materials.

Lead-acid battery manufacturing (SIC2:36)

- Metallic lead plates and lead oxide paste used to form positive and negative metal plates.
- Lead dust generated during plate casting, pasting and assembly operations.

1950s - Lead acid batteries become the largest end use of lead by US industry.

Electric and electronics manufacturing (SIC2:36)

- Lead commonly used in solders and bearings; lead-containing glass used as vitreous enamel coating on electronic components.
- Lead dust generated during dipping, sandblasting, sanding, and soldering operations.

Telecommunications (SIC2:48)

- Lead commonly used as protective lead sheathing around cable wires and in plastic cable coating; lead dust generated during cable splicing and repair and during cable recycling operations.

Waste incineration (SIC2:49)

- Lead-containing products commonly found in the incinerated municipal waste stream, including batteries, lead-based paint- or ink-coated items, electronic devices, leaded glass, and plastics; lead dust generated during contact with lead-contaminated incineration fly ash.

Firing ranges (SIC2:79, 92)

- Lead extensively used in firearm bullets and primer compounds; lead dust generated at the firearm muzzle and as the bullet strikes a surface.
- Lead exposures substantially lower with jacketed bullets.

Appendix B:

Example Program Letter

MICHIGAN STATE
U N I V E R S I T Y

Hello,

Children can be exposed to lead when it is brought home from their parents' jobs on their clothes or shoes. As part of the state-wide effort to stop children from being exposed to lead, our group at Michigan State University is trying to gather and share information on the risk of "take-home" lead by visiting all workplaces in Genesee County that may use lead.

To find out more about take-home lead, our project has three main parts:

- 1) Visiting your worksite with a short survey so we can learn more about your job.
- 2) Collecting dust from workers' cars and/or homes, which we will test for lead, free of charge, and give back to you.
- 3) Blood lead testing for workers and their children. If you or your children haven't had your blood lead level tested recently, we can help set that up and cover the cost if your insurance does not cover it.



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The information we get from you will help protect children in Michigan from lead. Your participation will be kept completely confidential. We are not working with any government group on this project, and your information will not be shared with them.

We've included information on take-home lead and ways you and your coworkers can help stop it from happening. Please share this letter and information with others you know in similar jobs!

If you would like to participate, or have any questions, please feel free to contact me. Thank you for your help and your time.

Sincerely,

Anthony Oliveri

Appendix C:

Example Questionnaire

TAKE-HOME LEAD QUESTIONNAIRE

Name of Establishment & Access ID :

Interview Date:

What does this company do or manufacture? What job do you have here?

Materials:

Worksite description:

Work process:

How often is this work done with lead?

How many employees work here?

How many employees do the specific work with lead?

In general, do people wear gloves while doing your job? No Yes Sometimes Unknown

In general, do people change out of your work clothes before going home? No Yes Unknown

In general, do people change out of your work shoes? No Yes Unknown

In general, do people wear the employer-supplied work clothes? No Yes Unknown

Do people wear your street clothes while working? No Yes Unknown

Where are the clothes worn while working washed? At Work At Home Laundry Mat Professional Service

At work, is there a place to shower? Do people shower before getting into your clean street clothes?

No/ No Yes/ No Yes/ Yes Unknown

Do employees receive training about lead hazards coming into this job? No Yes Unknown

Do most drive their personal vehicle to and from work? No Yes Unknown

Do any employees have children under 6? Yes No

What is your name? What is your home address or email?

What is your gender? Male Female

Are you of Hispanic origin? No Yes Don't Know

How would you be classified? The choices are

White African American Asian/Pacific Islander Native American/Alaskan Other Unknown

How many years have you been at this job?

What was your previous job? How long did you work there?

Do you wear gloves while doing your job? No Yes Sometimes Unknown

Do you change out of your work clothes before going home? No Yes Unknown

Do you change out of your work shoes? No Yes Unknown

Do you wear the employer-supplied work clothes? No Yes Unknown

Do you wear your street clothes while working? No Yes Unknown

Where are your clothes (worn while working) washed? At Work At Home Laundry Mat Professional Service

Have you ever been removed from a job before because of a high Lead level? No Yes Unknown

Have you ever had your blood lead tested? No Yes Results:

Are there children, under 6 years living or regularly spending time in your house? No Yes Unknown

How Many:

Have any of these children been tested for Lead? No Yes Unknown Results:

What year was the home you live in constructed? _ _ _ _ **Car year/ years owned?**

Have you ever smoked cigarettes? No Yes Unknown

Remodeling or Renovating (not at work)?

Painting (not at work)?

Making pottery/ceramics using glazes?

Firearms target practice?

Making stained glass?

Making fish weights / sinkers?

Reloading or casting bullets, shot, or other objects?

Soldering, brazing or tinning?

Auto body work?

Using pigments / pastels?

How Often:

Daily Weekly Monthly Seldom DK

Appendix D:
MDHHS Take Home Lead Brochure

Potential Health Effects of Lead

Lead poisoning signs and symptoms in children may include:

- Developmental delay
- Learning difficulties
- Irritability
- Loss of appetite
- Weight loss
- Sluggishness and fatigue
- Abdominal pain
- Vomiting
- Constipation
- Hearing loss
- Seizures
- Eating things, such as paint chips, that aren't food (pica)

Lead poisoning signs and symptoms in adults may include:

- High blood pressure
- Joint and muscle pain
- Difficulties with memory or concentration
- Headache
- Abdominal pain
- Mood disorders
- Reduced sperm count and abnormal sperm
- Miscarriage, stillbirth or premature birth in pregnant women

Exposure to lead is measured with a blood test. Talk with your doctor about getting a lead test for you or your child if:

- You believe you have been exposed to lead
- You are at risk of lead exposure

Protection for workers exposed to lead

The Michigan Occupational Safety and Health Administration has established lead standards for workers in general industrial and construction jobs. Both standards define minimum safety precautions that employers must provide for employees exposed to lead on the job. For more information go to www.michigan.gov/miosha.

FOR MORE INFORMATION, CONTACT:

Michigan Department of
Health and Human Services

517-335-8885 or visit www.michigan.gov/lead



Take-home Lead: A Preventable Risk for Your Family



Take-home lead: a hazard for children and adults

Exposure to lead can have serious health effects for both children and adults. Children under the age of six, pregnant women or a developing fetus can experience particularly dangerous health effects from lead exposure.



Adults employed in occupations like construction or lead smelting, as well as those with hobbies such as refinishing antiques or making ammunition from lead shot, can be exposed to lead. Lead dust can be carried home on their clothes, shoes, skin and hair. Lead dust can also contaminate their vehicles. This lead dust can be passed on to children and other family members. "Take-home" lead can have adverse effects on children's and adults' health. Adults who work with lead can take certain safety precautions to protect themselves and their families from take-home lead.



Job- or hobby-related lead exposures don't have to go home with the working adult. The following steps can prevent take-home lead from becoming a family-wide concern.

- Don't eat, drink or smoke on the job.
- Wash hands before eating, drinking, smoking or touching your face.
- Wear the proper protective equipment on the job, including a respirator.
- Shower, wash your hair and change into clean clothes before leaving work.
- Store street clothes in a separate locker from your work clothes.
- Wash work clothes separately from other laundry. After washing lead-contaminated clothing and removing them from the machine, run the rinse cycle once before using the washing machine again.

- Eat a well-balanced diet. Lead is more easily absorbed on an empty stomach. Proper nutrition can help reduce and prevent the absorption of lead.
- Get regular blood lead tests if you work in a lead-related job or have a hobby involving the use of lead.

Jobs or hobbies associated with take-home lead:

- Battery manufacture
- Construction and demolition, including abrasive blasting
- Radiator repair
- Lead smelting
- Lead, brass or bronze casting
- Foundry operations
- Ceramic and plastic manufacture
- Fishing tackle manufacture
- Firing range instructor or janitor
- Bridge construction or repair
- Home remodeling or renovation
- Ammunition/bullet manufacture
- Plumbing and pipefitting
- Soldering of electrical circuits
- Stained glass making
- Antique refinishing

Appendix E:
MDHHS Take Home Lead Poster

CAUTION

ADULTS WHO WORK WITH LEAD NEED TO TAKE PRECAUTIONS

Protect yourself and your families from lead poisoning.

Wash hands
before eating,
drinking, smoking
or touching your
face.

Store street
clothes in a
separate locker
from your work
clothes.

Shower, wash your
hair and change
into clean clothes
before leaving
work.

Wear the proper
protective
equipment on the
job, including a
respirator.

Wash work clothes separately from
other laundry. After washing lead-
contaminated clothing and removing
them from the machine, run the rinse
cycle once before using the washing
machine again.

Talk with your doctor about getting a lead test for you or your child if:

You believe you have
been exposed to lead

You are at risk
of lead exposure

For more information, visit
www.michigan.gov/lead or call the
Childhood Lead Poisoning Prevention
Program at 517-335-8885.



Appendix F:
NC Division of Public Health Brochure
on Cleaning Take-Home Lead Dust

Cleaning Up Take-Home Lead Dust in your Home and Car

The most effective method for removing lead dust combines vacuuming and wet wiping.

Follow the instructions below, first HEPA vacuum then wet clean surfaces.

Using a HEPA vacuum

Clean all horizontal surfaces with a HEPA vacuum. These are equipped with a High Efficiency Particulate Air Filter. Be sure to wet clean dust traps such as windows, radiators, air vents/registers and ceiling fans. Do **NOT** open or change the vacuum filters and bags inside the home.

Cleaning up lead from carpets

- Only use a vacuum with a HEPA filter and a beater bar. Not all vacuums will clean up lead dust.
- Do **NOT** use bag-less vacuums, canister vacuums without bags or filters, or car wash vacuums.
- Vacuum the room in one direction, and then repeat in the other direction.
- Vacuum slowly.
- Put used vacuum bag or filter in **outside** trash when finished.
- Area rugs can be cleaned with same methods or machine washed separately. Clean both sides and under rugs.



Cleaning up lead from clothes and other soft items

- Curtains, clothing, bedding, and cushion covers exposed to lead, should be machine washed **separately** from items that were **NOT** exposed to lead.
- Use standard all-purpose detergent.
- Add **extra** rinse cycle before drying.
- Heavily contaminated furniture or mattresses should be thrown away.

Lead cleaning guidelines

- Pregnant women and children should **NOT** clean up lead dust.
- Remove children and pets from area while cleaning.
- Clean the highest surface first and work down. Work from cleanest areas to dirty. Clean floors last.
- Wear protection, such as gloves and a mask.

Cleaning up lead from hard surfaces

- Use the wet cleaning method.
- Use all-purpose cleaning detergent.
- Avoid using bleach.
- **NEVER** mix cleaners.
- See other side of this fact sheet for details on cleaning up lead from hard surfaces.



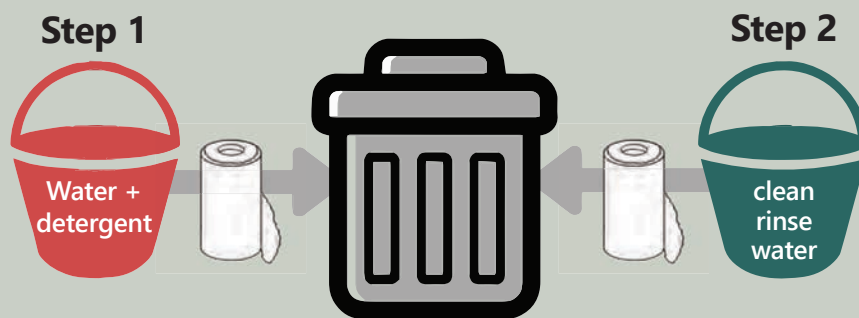
Cleaning up lead checklist

- | | | | |
|---------------------------------------|---|---|--|
| ☐ Floors/walls | ☐ Handles/knobs | ☐ Rugs | ☐ Car mats/rugs* |
| ☐ Shelves | ☐ HVAC vents | ☐ Couches/chairs | ☐ Child car seat |
| ☐ Counter tops | ☐ Dishes | ☐ Beds | ☐ Car dashboard/doors |
| ☐ Tables | ☐ Toys (hard and soft) | ☐ Curtains | ☐ Car steering wheel |
| ☐ Window sills | ☐ Doormats | ☐ Clothing | ☐ Pets |

**Consider replacing car rugs with plastic mats for easier cleaning.*

Cleaning up lead from small surfaces (window sills, counter tops, shelves)

- Use disposable paper towels, if possible.
- Use the method of clean, dispose, rinse, dispose.
- Change out water when it appears dirty.
- Flush dirty water down the toilet, **NOT** outside.
- Put used towels in outside trash when finished cleaning each room.
- Use all-purpose cleaning detergent.
- Avoid using bleach.



Cleaning up lead from large surfaces (uncarpeted floors)

- Prepare 3 buckets and a mop.



- Add all-purpose cleaning solution to **bucket 1** and use to mop surfaces.
- Wring out dirty water from mop in **bucket 2**.
- Fill **bucket 3** with clean, warm rinse water and use to remove soapy film with mop.
- Again, wring out dirty water from mop in **bucket 2**.
- When practical, start with cleanest areas and work to dirtiest areas.
- Dispose of mop head in outside trash can.
- Flush dirty water from **bucket 2** down toilet, **NOT** outside.



Other considerations

- For cleaner carpets consider steam cleaning after vacuuming.
- Clean surfaces regularly to prevent dust build-up.
- Heavily contaminated homes and cars require professional lead removal cleaning services.

For more information

- Contact your local health department to have your family tested for lead in their blood.
- Contact Adult Blood Lead Epidemiology and Surveillance (ABLES) at (919) 707-5940.
- Contact Children's Environmental Health at (919) 707-5950.



For additional information about lead visit:
nchealthyhomes.com



Thanks to Washington State Department of Labor and Industries for information used in this publication.

Appendix G:
Example Dust Sampling Result Letter

MICHIGAN STATE
U N I V E R S I T Y

Hello,

The dust sample we collected from your car had lead. The level in your car is shown on the next page.

We strongly recommend that you and all children under 6 years old who live with you or spend time in your home have their blood lead tested. Most insurance plans will pay for this test. If you do not have insurance that will pay for the test, we can pay for it. Your results are confidential and will not be shared with your employer, other workers, MIOSHA or any other group. A doctor, who is part of the project, will review the results.

Also, we would like to schedule a time to visit your home and collect a lead dust sample to see if lead has been taken into your home from your car.

To reduce the chance of bringing lead home, you should:

- Change into clean clothes and shoes before leaving work. If possible, you should also shower and wash your hair before leaving work.
- Wash hands before eating, drinking, smoking, or touching your face.
- Wear the proper protective equipment on the job: gloves, work uniform or coveralls, work shoes.
- Store regular clothes away from work clothes.
- Wash work clothes alone, and run the rinse cycle before using the machine again.



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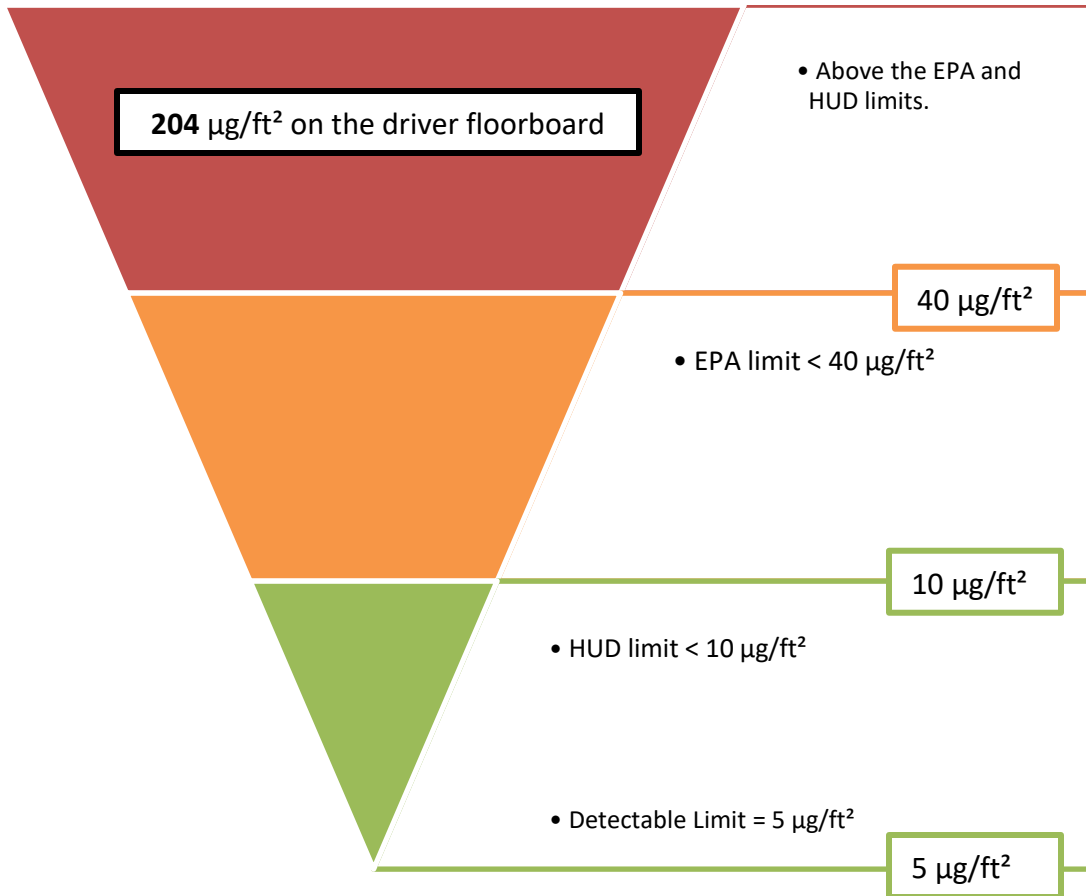
Anthony.Oliveri@hc.msu.edu

If you have any questions or concerns, please call us at 517 432-4603 or email us at Anthony.Oliveri@hc.msu.edu. Again, please contact us to plan blood and home lead testing.

Sincerely,

Anthony Oliveri & Lindsey Fagerstrom

Your Results



There is no safe level of lead for kids.

There are no guidelines for lead in cars. Two government groups, EPA and HUD, have limits for lead on home floors.

Appendix H:
Example Follow-Up Letter

Hello,

Thank you for your participation so far in our project to reduce take-home lead. We have found lead in nearly every vehicle we have tested, and are confident that take-home lead exposure is a serious danger for the children of workers in your industry. We **strongly** recommend that any adults who live with children under 6 have their children's blood lead levels tested. The test is very quick and easy, and only takes a short visit to a clinic or medical lab. We can also pay for the test, if your insurance does not.

We ask that when you have your children's blood lead tested that you share the results with us. If you or your children have already had a blood lead test done, we ask that you contact us and provide a name and date of birth so that we can request a copy of the results.

We are also revisiting workplaces to collect more lead dust samples from workers' vehicles and homes. We can take a lead dust sample at any time most convenient to you, even the end or start of the work day.

Please contact us so that we can arrange for blood lead testing and dust sampling. Your involvement in our project is highly valued and will help protect children across Michigan from the dangers of lead!

Thank you,

Anthony Oliveri



DEPARTMENT OF
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