Known Hazard; Unrecognized Danger

Lead Exposure in Maine's Workforce

March 2005

MAINE LABOR GROUP ON HEALTH

ENVIRONMENTAL HEALTH STRATEGY CENTER

PREVENTING HARM WHERE WE LIVE, WORK & PLAY

Acknowledgements

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"Where there is lead some case of lead poisoning sooner or later develops, even under the strictest supervision."
Alice Hamilton, MD
Pioneer in occupational medicine and environmental health, in 1925[1]

"The continuing overexposure of American workers to lead and the persistent occurrence of occupational lead poisoning is a national scandal. It is not necessary. It is entirely preventable. The question is not one of technology or of feasibility, but rather of national will to act upon the abundantly available medical data."
Philip J. Landrigan, MD, Chair, Department of Community & Preventive Medicine, Mount Sinai School of Medicine, New York, in 1990[2]

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The Maine Labor Group on Health is Maine's Committee on Occupational Safety and Health (COSH). The Maine Labor Group on Health was founded in 1977 by trade unionists concerned with health and safety issues in the workplace and with other health care issues such as the cost of health insurance. MLGH provides Maine's workers with a wide range of health and safety information, videos and hands-on training in hazardous materials, lead and asbestos.

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The Environmental Health Strategy Center is a public health organization that exists to protect human health from exposure to toxic chemicals. The Center promotes safe alternatives and clean industry and builds partnerships that focus on environmental solutions as a public health priority. The Center conducts strategic issue campaigns that help set the pace for national chemicals policy reform.

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Executive Summary

Tens of thousands of Maine workers remain at high risk of harmful exposure to lead on the job, according to a first-ever analysis of the state and federal data on employment and occupational health. Lead poisoning is the oldest known occupational health threat, yet preventable lead hazards persist. Rampant lead hazards still exist from disturbing old lead painted buildings and structures and from the continued use of lead in plastics, electronics, building materials, batteries and other products.

Tens of thousands of Maine workers remain at high risk of harmful exposure to lead on the job.

In 2003, more than 37,000 jobs in Maine were in occupations that often bring workers into contact with known lead hazards. These workers include 5,830 carpenters; 5,290 maintenance & repair workers; 3,620 auto mechanics; 3,300 construction laborers; 3,150 electricians; 2,330 construction supervisors; 2,240 machinists; 2,060 police officers; 1,850 plumbers, pipefitters & steamfitters; and 1,840 painters, among others.

Exposure to lead hazards regularly occurs in industries that employ more than 50,000 Maine workers. These industries include building and construction (22,310 jobs), ship and boat building & repair (11,798), police protection (4,022), repair & maintenance (3,011), metal product & machinery manufacturing (2,439), waste management (1,856), plastics & minerals (1,841), furniture and miscellaneous manufacturing (1,476) and electronic & electrical equipment manufacturing (1,073).

Lead is a persistent, bioaccumulative and toxic (PBT) chemical. It builds up in the human body, especially in bone, and doesn't readily break down. This creates a lifetime health risk from exposure.

Lead exposure on the job poses serious yet preventable threats to adult and children's health. Occupational exposure to lead can damage the central nervous system, heart, blood, kidneys and cause reproductive harm. Exposure of pregnant workers to lead affects the developing brain of the fetus, which can cause learning disabilities, attention deficits, lowered intelligence and behavioral problems later in life. Workers can also bring lead dust home on their clothes contributing to dangerous lead exposure to young children.

Despite the high number of Maine workers at risk, very few are screened for lead exposure. Limited surveillance coordinated by the Maine Bureau of Health shows that the workers with the greatest documented exposure to lead include painters (43% of elevated blood

lead levels), contractors/construction workers (13%), hobbyists (13%), radiator repair workers (8%) and lead abatement workers (6%).

An analysis of the employment data and occupational makeup of Maine, as well as a review of statewide resources for addressing occupational lead exposure, has led to the following conclusions:

- **An unacceptably high number of Maine workers are at risk of lead poisoning;**
- **There is a relatively low level of awareness of occupational lead hazards; and**
- **Existing programs for lead hazard awareness are under-funded and need strengthening.**

To address these serious deficiencies, Maine needs a more comprehensive approach to raise awareness of lead hazards on the job and at home. The state should take aggressive action to eliminate lead hazards and move towards safer alternatives to lead containing products. The current lead programs embrace a medical model, which looks for lead poisoned adults (and children) before making a clinical intervention. This approach relies upon diagnosis and removal of a lead poisoned worker from the job (or treatment of a lead poisoned child with chelating agents) until blood lead levels drop.

Maine needs to shift our emphasis to a public health model based on primary prevention which prompts action to steadily reduce lead hazards to prevent lead exposure in the first place. Toward a more protective strategy for reducing lead hazards and preventing occupational lead exposure, we recommend the following actions.

Maine needs to shift our emphasis to a public health model based on primary prevention which prompts action to steadily reduce lead hazards to prevent lead exposure in the first place.

Recommendations

1. **Establish ongoing funding for educational outreach to prevent occupational lead exposure.**
2. **Eliminate lead hazards for construction workers through a significant increase in funding for lead paint cleanup.**
3. **Identify and promote safer alternatives to the lead-based products that remain in use**
4. **Improve and enhance existing state and federal lead hazard prevention programs.**

Background on Lead

What is Lead?

Lead is a heavy metal which is persistent, bioaccumulative and toxic (PBT). It is a natural element found in small amounts in the earth's crust. It has no characteristic taste or smell. Lead, like many heavy metals, is known to be very hazardous to health. Historically lead has been used in building materials, paint, cosmetics, ammunition, food containers, and gasoline. Humans have used lead in these items because of the "beneficial" aspects of the element. Lead is known to prevent corrosion, kill mold and mildew, and block radiation. It is easily melted and worked with, and has been used as a color pigment and a drying additive in paint.

Where is Lead Used?

Today, lead still has many different uses. It is used in the production of car batteries and other lead acid batteries, ammunition, metal products (such as sheet lead, some brass and bronze products, and pipes), consumer electronics (due to lead solder), ceramic glazes, and leaded glass.

The amount of lead added to paints and ceramic products, caulking, gasoline, and plumbing solder has been reduced in recent years to minimize lead's harmful effects on people and animals. Lead used in ammunition, which is the largest non-battery end-use, has remained fairly constant in recent years. However, the U.S. military has begun to introduce lead-free small arms ammunition. Lead is used in a large variety of medical equipment (radiation shields for protection against X-rays, electronic ceramic parts of ultrasound machines, intravenous pumps, fetal monitors, and surgical equipment). Lead is also used in scientific equipment, circuit boards for computers and other electronics, military equipment (jet turbine engine blades, military tracking systems), and cathode ray tubes in television and computer monitors.[3]

Health Effects Associated With Lead

Generally, lead enters the body through inhalation (breathing) or ingestion (eating or drinking). The effect of lead is the same on the body regardless of how exposure occurs. For most Americans, lead exposure has been significantly reduced in the last thirty years due to bans on the use of lead in gasoline and house paints. However, lead exposure remains a serious public health threat for workers exposed to lead products on the job and children who live in old housing where they are exposed to lead contaminated paint, water, and soil.

Workers' exposure to lead can damage the central nervous system, heart, blood, and kidneys.

The toxic effects of lead are well documented in both children and adults. Workers' exposure to lead can damage the central nervous system, heart, blood, and kidneys. Workers' lead exposure can also cause reproductive toxicity and harm development of their unborn children. Miscarriage and stillbirth can be triggered in exposed women and depression of sperm counts and hormone disturbances can affect highly exposed men.[4]

Lead has recently been added to the list of carcinogens by the Department of Health and Human Services. The agency lists lead and lead compounds as "reasonably anticipated to be human carcinogens" due to increased lung and stomach cancer risk in humans and cancer of the kidney, brain, and lung in lab animals. [5]

Unfortunately, lead poisoning often goes undetected since many of the acute symptoms, such as stomach pain, headaches, anxiety, irritability, and poor appetite, are nonspecific and may not be recognized as symptoms of lead poisoning.

Ingested lead enters the bloodstream and is distributed to the soft tissues such as the brain, kidneys, bone marrow, and liver. In adults roughly 90% of lead is stored in the bones. Lead in bone can serve as a continuing source of lead in blood long after exposure has ceased, and can be released during pregnancy and lactation, and in persons with osteoporosis.[6]

The main target of lead toxicity in both adults and children is the nervous system. Children are far more vulnerable to lead exposure than adults and can be exposed while in the womb if the mother has lead in her body. Lead exposure may also cause weakness in the fingers, wrists or ankles. Epidemiological studies have also shown an association between lead exposure and increases in blood pressure.[7]

Regulation of Occupational Lead Exposure in Maine

Lead poisoning is the oldest known occupational health threat, yet preventable lead hazards still persist. Many workers exposed to or using lead at Maine worksites are currently regulated by the federal Occupational Safety and Health Administration (OSHA) and in some cases by the Maine Department of Environmental Protection (DEP). Renovators and lead abatement companies also fall under federal Housing and Urban Development (HUD) guidelines and Maine DEP regulations. OSHA's general industry and construction standards have lead regulations. These two standards cover a vast majority of Maine's workers in the private sector. However, a great many of these workers may not be receiving the information necessary to protect themselves and their families.

Lead poisoning is the oldest known occupational health threat, yet preventable lead hazards still persist.

The General Duty Clause of OSHA states that each employer shall furnish each employee with employment, and a place of employment, which are free from recognized hazards that are causing or likely to cause death or serious physical harm to the employees; and shall comply with occupational safety and health standards promulgated under this Act. Employers seeking to fulfill this duty must do hazard assessments at their worksites. When a hazard is identified, steps to reduce or eliminate the problem must be taken and action steps must be communicated to employees. To apply the general duty clause to lead, employers must take steps to determine if lead is present at their worksites and take appropriate measures to ensure employee safety in the event that lead is found.[8]

Presently, larger employers and construction companies tend to do a better job at following the OSHA standards than small employers and small construction contractors. This has to do with a number of factors including resources available at larger facilities that allow access to safety staff or consultants who can do hazard assessments. Likewise, many companies and organizations that are not in the construction industry may simply be unaware that lead can be a serious issue at work.

HUD and DEP regulations tend to focus on residential housing units built prior to 1978. Many people falsely believe that lead paint has been phased out of use in commercial sites or that the restriction of lead paint applied to all facilities. However, lead paint has been and still can be used in commercial and industrial buildings. While HUD

and DEP regulations primarily govern residential housing, their recommended work practices and definitions should be followed in all workplaces where lead may be present to protect all workers.

Under DEP regulations, lead paint is defined as paint containing more than 0.5% of lead by weight or by a reading of 1.0 milligram of lead per centimeter squared of surface area (mg/cm^2) taken by an x-ray fluorescence (XRF) inspection device.[9] Lead paint which is in excellent or good condition is normally not considered a hazard, because workers exposed to the paint would have a difficult time taking the lead toxins into their bodies. When the lead paint begins to peel, chip, flake or otherwise degrade, or when lead paint dust is formed by paint breaking down at impact and friction surfaces, these conditions cause a lead hazard to exist. Workers need to be informed about all lead hazards in their work area and must be instructed on how to protect themselves. Companies located in old commercial facilities particularly need to recognize the fact that there is a strong chance that lead may be present.

Lead is a danger to workers if ingested or inhaled. OSHA has air monitoring requirements and a permissible exposure level (PEL) for lead which is 50 micrograms of lead per cubic meter of air (ug/m^3) (time weighted average for an eight hour workday). Inhalation dangers exist to workers who impact lead and lead coated surfaces (e.g. sanding, grinding, torch cutting, burning, or spray painting) and to anyone else in the immediate area. Demolition, construction and industrial/maritime painting tend to be the areas where the OSHA PEL is particularly relevant to protect workers. If the concentration of lead in the air reaches or exceeds the PEL then employers must set up a written worker protection plan following either the General Industry standard (29 CFR 1910.1025) or the Construction Standard (29 CFR 1926.62).

For most workers, the PEL will not be reached in their places of business. Exposure to lead will come from unintended ingestion of lead dust. Fine lead dust is invisible and dangerous. Lead dust is measured in micrograms of lead per square foot of surface area (ug/ft^2). HUD guidelines consider lead cleanup to be adequate if the resulting lead levels for residential dwellings are below 40 ug/ft^2 on floors, 250 ug/ft^2 on window sills and 400 ug/ft^2 in window wells. OSHA does not have a dust level hazard threshold associated with workplaces. Employers still need to be diligent in hazard assessment as required by OSHA.

In old buildings with lead paint, dust can get onto workers' hands by opening a window, from the desk, computer keyboard, or many other places where minute particles can gather. Once on the workers' hands,

ingestion of lead by chewing on the fingernails, eating, drinking, putting on lipstick, or chewing on a pen can occur. Lead will slowly build up in a worker's system causing subtle damage. Presently, very few employers check lead dust contents because they are unaware of the risk. Family members may be exposed to lead from workers who unintentionally bring home lead dust on their tools, clothes, and body.

The Final Interim Lead in Construction Standard is known and followed by many contractors in the state (29 CFR 1926.62). Through various training programs and outreach initiatives, many companies have been informed of the regulations and guidelines. Hundreds of individuals have been trained as Lead Smart Renovators and Lead Abatement Workers. The business market has driven these trainings because in order to work on HUD housing a contractor, at a minimum, must be certified as Lead Smart.

Enormous gaps exist in lead hazard assessment, recognition and communication in Maine workplaces.

Funding for the training and for doing the work has come from HUD and has been administered by various organizations and cities (primarily Maine State Housing Authority, Childhood Lead Poisoning Prevention Program, and the cities of Lewiston, Auburn and Portland). While several of the building trades have taken advantage of the training, a few have not, particularly electricians and plumbers. Hundreds of carpenters, general contractors, and window/siding specialty companies have participated in Lead Smart training. In addition, thousands of others remain untrained with either no desire to know about lead or no desire to work with lead. Presently the HUD funding for many of these programs has been eliminated, saddling state agencies with the task of trying to piece together financial resources to keep the projects going.

Enormous gaps exist in lead hazard assessment, recognition and communication in Maine workplaces. As the research results presented in this report suggest, there are thousands of workers in specific occupations and industries where known lead hazards exist. It is safe to assume that thousands of other workers (teachers, office workers, etc.) work in older buildings with lead paint hazards present.

Basic information about lead is widely accessible. All worksites that were built before 1978, when most lead paint was finally banned, should develop a plan to address lead.

Analysis of Occupational Lead Exposure in Maine

This report seeks to estimate and shed light on the magnitude of potential exposure to lead hazards among Maine workers. Two areas of interest were studied to help estimate this exposure.

The first is the Adult Blood Lead Epidemiological Survey data collected by the state Bureau of Health to record known or reported lead blood levels of Maine workers.

Second, for the first time ever, this report analyzes and compares Maine specific employment data with industries and occupations that present known lead hazards.

Elevated Adult Blood Lead Levels

The Adult Blood Lead Epidemiological Survey (ABLES) program is a state-based surveillance program of laboratory-reported adult blood lead levels. It is intended to identify and prevent cases of elevated blood lead levels in adults. ABLES started in 1987 in four states, grew to 35 states in 2002, and then to 37 states in 2004. The Center for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH) ABLES program provides funding and technical assistance to participating states. The public health objective of the ABLES program (Objective 20.7 in Healthy People 2010) is to "Reduce the number of adults who have blood lead concentrations of 25 micrograms per deciliter (ug/dL) or greater of whole blood." *

The federal occupational lead standard is not adequately protective or routinely enforced. According to leading environmental and occupational health scientists: "… studies in the mid-1990's showed that the 1978 federal 'trigger level' of 50 ug [50 micrograms of lead per deciliter of blood], above which workers must be removed from the job, did not protect workers from lead's toxic effects. OSHA's standard for airborne lead often went unenforced, and in at least fifty-two industries using lead, exposure exceeded the OSHA standard. There were also tremendous gaps in coverage for workers 'engaged in demolition, lead paint abatement and bridge repair,' where many cases of lead poisoning were reported over the fifteen years ending 1997." [11]

*Note: There is no known safe level of exposure to lead. Biological effects in adults have been detected below 25 ug/dL. Maternal blood levels of 10 ug/dL have been shown to produce harmful effects on the development of the human fetus during pregnancy. [10]

State ABLES programs collect blood lead level data from local health departments, private health care providers, and from both private and state reporting laboratories. State ABLES programs:

- collect, analyze, and report their data;
- conduct follow-ups with physicians, workers, and employers;
- target on-site inspections of work sites;
- provide referrals to cooperating agencies;
- identify new exposures and failures in prevention, and;
- target educational and other interventions.

ABLES states are required to have a mandatory state requirement that laboratories report blood lead level results to the state health department or designee. While the lowest reportable blood lead level varies from state to state, the reporting of all blood lead levels is recommended because it is extremely useful for the analysis of trends in these data. ABLES states are strongly encouraged to develop effective working relationships with childhood lead poisoning prevention programs, and with other programs to prevent lead exposures within their state.

The ABLES program is intended to identify and prevent cases of elevated blood lead levels in adults.

Analysis and dissemination of results is at the core of the national approach to elimination of lead poisoning. Analysis of blood lead level data has helped in the identification of high risk industries and occupations; most recently including: home remodeling, furniture restoration and PVC plastics compounding. The most important ABLES activity to help achieve the 25 ug/dL blood lead objective is to direct resources toward increasing the network of states conducting lead surveillance and enhancing the surveillance systems in the states already participating.

National data indicates that ninety to ninety-five percent of adults with elevated blood lead levels are exposed occupationally. In 2000, about 10,361 adults were reported by twenty-four ABLES states to have blood lead levels greater than or equal to 25 ug/dL. This number is known to be an underestimate because many lead-exposed adults do not have routine blood lead level testing. Of the 10,361 reported, 2001 (19%) adults had blood lead levels greater than or equal to 40 ug/dL, which is the level at which workers may return to work if medically removed under Occupational Safety and Health Administration (OSHA) regulations (29CFR 1926.62).[12]

Adults exposed to lead can experience anemia, nervous system dysfunction, kidney problems, hypertension, decreased fertility, and increased miscarriages. Workers can bring lead home from their workplace, and unknowingly expose their families. It is estimated that two to three percent of children with blood lead levels of 10 ug/dL or

greater were exposed by lead brought home from work. Children exposed to low levels of lead may exhibit symptoms of neurological damage, including learning disabilities and short attention spans. Children who come in contact with lead-exposed workers should be targeted for blood lead screening.

Maine state law now requires that any physicians or hospitals diagnosing specific occupational diseases, including exposure to heavy metals such as lead, must report them to the Maine Department of Human Services, Bureau of Health (BOH). The Maine Bureau of Health has been a participant in the National ABLES program since late 2001. By rule, the Bureau of Health has established that adult blood lead levels greater than 25 ug/dL are a reportable occupational disease.

Figure 1 and Table 1 show blood lead levels in Maine from 2002, the first full year in which Maine was an ABLES reporting state. Table 1 indicates that in 2002, there were 2,546 case reports with blood lead levels submitted to the Bureau of Health, which conducted extensive follow-up on cases with blood lead levels greater than 25 ug/dL.

As described in the 2003 poster on the Maine ABLES program,[13] there were 80 reports of blood lead levels greater than 25 ug/dL, and nearly half of these were associated with workers involved in painting (see Figure 1).

Figure 1

Distribution of Maine Occupations Associated with Reportable Blood Lead Levels, 2002
(Source: Maine ABLES, ME Bureau of Health)

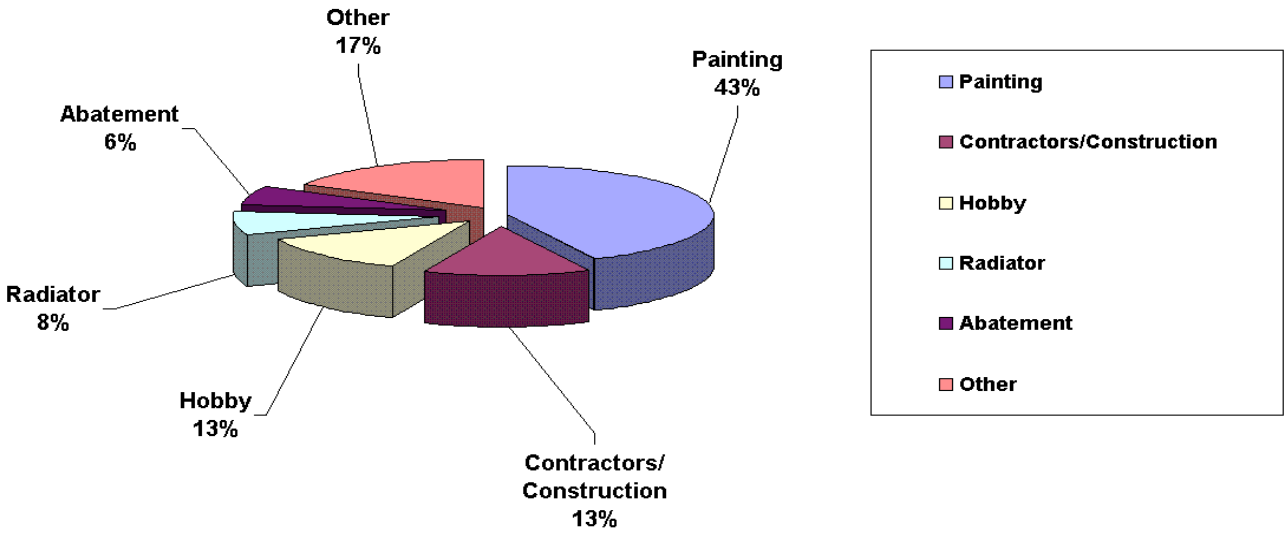

Table 1

Distribution of Blood Lead Levels Among Year 2002 Case Reports in Maine

Maine ABLES (Adult Blood Level Epidemiology and Surveillance)[13]

Blood Lead Level (ug/dL)	Number of Reports (N = 2546)	Percent of Reports (%)
<5	1,784	70.1
5-9	470	18.5
10-14	108	4.2
15-19	67	2.6
20-24	37	1.5
25-39	63	2.5
40-49	13	0.5
≥50	4	0.2

Maine Workers At Risk of Lead Exposure: Analysis of State Employment and National Occupational Hazard Data

This report pioneers a new method of analysis that should prove useful in profiling occupational lead hazards enabling more effective targeting of prevention programs in Maine.

We analyzed and compared Maine employment data by industry and occupation with information from the Haz-Map occupational toxicology database. Haz-Map is an extensive research database on occupational diseases and their links to jobs and industries.

For this report, specific occupational toxicology data on industries and jobs associated with lead exposure were obtained from Haz-Map.[14] Using this as a starting place, Maine employment data was analyzed to determine how many Maine workers might be at risk of lead exposure in their workplaces, based on their industry or occupation.

The results for Maine workers at risk from workplace-based lead are shown in Table 2 (by occupation) and in Table 3 (by industry). Further specific methodological details on this analysis are described in the section on Methodology at the end of this report.

The analysis of Maine's occupational employment in Table 2 suggests that 37,570 workers in Maine are at risk of lead exposure based on the type of job that they hold. Each occupation has been assigned a unique standard occupational classification (SOC) code by the federal government. The five largest occupational categories in Maine which are at risk from lead exposure are a diverse group: carpenters (5,830); maintenance and repair workers (5,290), automotive mechanics and service technicians (3,620), construction craft laborers (3,300), and electricians (3,150). Although the inclusion of carpenters in the "at-risk" Haz-Map list of occupations is based primarily on one job task, removal of old lead paint, this number is probably an underestimate since many carpenters are self-employed. Self-employed workers are not included in the employment data.

Table 2

Number of Maine Workers with Potential Lead Exposure, by Occupation, 2003 (in rank order)[14] [15]

Occupational Category	Estimated Employment	SOC Code
Carpenters (at risk based on 1 job task: removing old lead paint)	5,830	47-2031
Maintenance & Repair Workers, General	5,290	49-9042
Automotive Mechanics & Service Technicians	3,620	49-3023
Construction Craft Laborers	3,300	47-2061
Electricians (at risk based on 1 job task: splicing electrical cable using lead)	3,150	47-2111
Front-line Supervisors/Managers of Construction Trades & Extractive Workers	2,330	47-1011
Machinists	2,240	51-4041
Police and Sheriff Patrol Officers	2,060	33-3051
Plumbers, pipefitters, & steamfitters	1,850	47-2152
Painters, Construction & Maintenance	1,840	47-2141
Sheet Metal Workers	1,070	47-2211
Industrial Machinery Mechanics	700	49-9041
Millwrights	700	49-9044
Electrical & Electronic Equipment Assemblers	690	51-2022
Electrical Power-Line Installers & Repairers	660	49-9051
Roofers	340	47-2181
Detectives & Criminal Investigators	330	33-3021
Hazardous Materials Removal Workers	250	47-4041
Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators/Tenders, Metal/Plastic	230	51-4033
Lathe and Turning Machine Tool Setters, Operators & Tenders, Metal & Plastic	220	51-4034
Helpers - Pipelayers, Plumbers, Pipefitters, & Steamfitters	190	47-3015
Archivists, Curators & Museum Technicians (Haz-Map: "Museum Technicians & Conservators")	120	25-4010
Boilermakers	120	47-2011
Milling & Planing Machine Setters, Operators, & Tenders, Metal & Plastic	110	51-4035
Chemical Technicians	80	19-4031
Helpers - Roofers	80	47-3016
Helpers - Painters, Paperhangers, Plasterers, & Stucco Masons	60	47-3014
Materials Engineers	40	17-2131
Heat Treating Equipment Operators/Tenders, Metal/Plastic	40	51-4191
Materials Scientists	30	19-2032
TOTAL	**37,570**	

The industry data for lead exposure risks in Maine, as shown in Table 3, also suggest that tens of thousands of Maine workers are potentially at risk. Each industry has been assigned a unique North American industrial classification system (NAICS) code by the federal government. The four industries with the largest number of workers at risk of lead exposure are transportation equipment manufacturing, including ship and boat construction and repair (11,798), specialty trade contractors (9,773), heavy and civil engineering construction (6,419), and construction of buildings (6,118). The latter three industries account for 22,310 jobs in the building and construction trades. Other significant industries for lead exposure include police protection (4,022) repair & maintenance (3,011), metal product & machinery manufacturing (2,439), waste management (1,856), plastics & minerals (1,841), furniture and miscellaneous manufacturing (1,476) and electronic & electrical equipment manufacturing (1,073).

The occupation and industry data for Maine suggest that tens of thousands of Maine workers are at risk of lead exposure.

The industry-based total of almost 51,000 at-risk workers is probably an overestimate since not all of the employees in these industries are involved in activities that may result in lead exposure. However, it is clear that large numbers of Maine workers are at potential risk of exposure from lead in the workplace, even if the occupations and industries data include a significant proportion of workers who are not at risk. Even if a fraction of 51,000 workers are at-risk of lead exposure this still represents thousands of people. Furthermore, the families of workers exposed to toxic substances such as lead may also be at risk, if workers inadvertently come home with lead dust on their clothes.

There are also significant numbers of at risk workers not included in Tables 2 and 3, who work in occupations and industries where lead exposure has been a documented issue. Perhaps the largest single group of at-risk workers excluded from these numbers is that of self-employed painters, as well as painters and related crafts workers who are not working in establishments covered by Unemployment Insurance.

Table 3

Number of Maine Workers with Potential Lead Exposure, by 3-digit Industry, 2003 (in rank order) [14 16]

NAICS Industry Category	Estimated Employment*	Estimated Number of Businesses 2002*	NAICS Code
Transportation Equipment Manufacturing	11,798	99	336
Specialty Trade Contractors	9,773	2,043	238
Heavy and Civil Engineering Construction	6,419	322	237
Construction of Buildings	6,118	1,169	236
Police Protection ** (Public Administration)	4,022	143	922120
Repair and Maintenance	3,011	726	811
Fabricated Metal Product & Machinery Manufacturing., combined categories	2,439	118	332 & 333
Waste Management & Remediation Services	1,856	270	562
Plastics & Nonmetallic Mineral, combined categories	1841	79	326 & 327
Furniture/Related and Misc. Manufacturing, combined categories	1,476	70	337 & 339
Computer/Electronic & Elect. Equipment/ Appliance Manufacturing, combined	1,073	13	334 & 335
Primary Metal Manufacturing	357	8	331
Recyclable Material Merchant wholesalers **	312	35	423930
Fine Arts Schools **	234	39	611610
Chemical Manufacturing	136	10	325
Prepress Services ** (Printing & Related)	57	7	323122
Wood Preservation ** (Wood Product Mnf.)	31	2	321114
TOTAL	**50,953**		

* = Numbers do not include cases or establishments for which there were missing data
** = 6-digit industry codes used only for these specific sub-industries

Larger establishments are more likely to be monitored for occupational toxics exposure and risks, both by OSHA and by health and safety personnel, with a greater likelihood of a health and safety system in place. In contrast, smaller establishments, self-employed workers, and small independent contractors are less likely to have a systematic occupational health and safety structure which would help to protect against lead exposure. Adding insult to injury, these are also the workers least likely to have health insurance and easy access to medical screening and treatment.

Conclusions

1. An unacceptably high number of Maine workers are at risk of lead poisoning.

While the data cannot provide a definitive number of workers actually exposed to lead, tens of thousands of Maine workers remain at high risk of harmful lead exposure on the job. Many of these employees may not even be aware of simple practices that would greatly reduce the chance of lead being ingested, inhaled or taken home.

2. There is a relatively low level of awareness of occupational lead hazards.

Small employers, self-employed and sub-contractors, particularly in the construction fields, are at the greatest risk of being exposed to lead and historically have received the least amount of training. Raising lead hazard awareness at all worksites is an essential step to reduce worker and worker family exposure.

3. Existing programs for lead hazard awareness are under-funded and need strengthening.

The same employer base that is at the most risk of lead exposure, also has the least resources to provide adequate training for their employees. These employers, many of whom work side by side with their employees, need a way to get vital training programs to protect themselves and their workers.

Recommendations

1. Establish ongoing funding for educational outreach to prevent occupational lead exposure

Expanded lead awareness programs should target high risk workers, their employers, and property owners. Many of the high-risk workers identified in this report are part of small to very small businesses. Most of these employers have a very limited ability to provide an occupational safety and health training program. Providing sufficient funds for these employers to access lead hazard awareness training programs is essential to protect Maine's workers and their children.

Landlord associations, Maine State Housing Authority, the Community Action Programs and Maine Realtors have been doing the best they can at distributing lead awareness brochures and information about lead disclosure. Assisting these organizations to expand their efforts will result in more property owners understanding the health risks associated with lead exposure. Additionally, property owners will also learn how to access technical assistance, maintenance training opportunities and funding options to complete lead hazard control work.

2. Eliminate lead hazards for construction workers through a significant increase in funding for lead paint clean-up

Both the ABLES data and our analysis show that construction workers are at the greatest risk of lead exposure. This risk is due to the presence of lead in pre-1978 construction. Maine has one of the oldest housing stocks in the nation. As an immediate first step the legislature should approve $10 million in bond funding for lead paint clean-up in low income housing to make up for recent federal funding cuts. Lead hazard control work is an important investment in Maine's health and well-being. Extending low interest loans and grants to Maine property owners for lead paint remediation is a crucial strategy to end childhood lead poisoning.

3. Identify and promote safer alternatives to the lead-based products that remain in use

While lead in residential paint has been restricted for over 25 years, industrial paints and many other products still contain lead. Many companies are trending away from lead-containing products, but a comprehensive study into safer alternatives needs to be undertaken. Identifying cost-effective and safer alternatives to lead used in all products is essential in order to assist businesses to do the right thing and in getting lead out of Maine workplaces and homes. Innovative companies are beginning to eliminate lead solder in electronics and are developing alternatives to PVC plastic sheathing, which contains lead additives, used in electrical wires and cabling.

4. Improve and enhance existing state and federal lead hazard prevention programs

The state and municipalities should become model employers when it comes to identifying lead in the workplace. All public buildings should be assessed for lead paint hazards. Thousands of public employees are potentially at risk across the state. One of the biggest gaps in occupational lead assessment is in old office buildings, including town halls, and in public safety buildings.

OSHA lists lead as a priority initiative and needs to implement an active policy to ensure consistent awareness and compliance. Similar OSHA activities in the past on trenching and fall protection raised the overall awareness to a level where nearly all construction workers know the federal requirements for safe working conditions in those two areas. We need federal leadership so that OSHA achieves the same results for lead hazard prevention.

The Maine Bureau of Health is working to better coordinate programs for adult and childhood lead safety. The Bureau's Childhood Lead Poisoning Prevention Program and Adult Blood Lead Epidemiology and Surveillance Program (ABLES) will integrate knowledge of occupational lead exposure and childhood lead poisoning prevention programs. An important aspect for the Bureau to look at is the implementation of blood lead level screening for children of lead poisoned adults and investigation of adult occupational risk factors as a source of childhood lead poisoning. Additionally the ABLES program needs to be expanded with better physician buy-in.

Maine State Housing Authority has been doing an admirable job with limited federal dollars to address lead hazard control work. MSHA must continue their effective work and tap into reserve funding and expanded bond funds for lead paint remediation work.

The Department of Environmental Protection is currently responsible for regulating the lead abatement industry. The Department needs to expand its oversight to include all lead hazard control activity for residential work.

Methodology

The quantitative data for this analysis were obtained as follows.

Specific occupational toxicology data on industries and jobs associated with lead exposure were obtained from the lists "Haz-Map Industries with Potential Lead Exposure" and "Haz-Map Jobs with Potential Lead Exposure" in the Haz-Map occupational toxicology database.[14]

The Maine 2002 employment data by industry are taken from the Maine Department of Labor's Census of Covered Employment and Wages Program, 2002, "Employment Data for Selected Industries, 2002" [16], with 6-digit NAICS 2002 industry coding, obtained with the assistance of Michael Burnett from the Maine Department of Labor. These data include both the number of establishments in Maine for each specific industry, and the estimated number of employed workers in Maine in 2002.

The data are not from a sample, but rather a census of "covered" establishments in Maine, as follows: "All data are from employers subject to Maine's Unemployment Insurance Law which constitutes about 98% of Maine employers. They report quarterly to the Unemployment Tax Division of MEDOL and to Maine Revenue Services. I receive an extract twice a month from UI Tax and load the data into my database. I also receive breakouts from all Multi –site Employers… Since this information is the basis of each establishment's Unemployment Tax Contribution, and since there are legal penalties associated with bad data, we are confident as to the accuracy of the data." (Mike Burnett, Maine Department of Labor, personal communication to Valerie Carter via email, 02/06/04). The data are also subject to further 'rigorous editing" by the BLS at both the state and federal level, according to Burnett.

In cases where there were only a small number of establishments within a specific 6-digit industry category, the numbers of workers employed was not available, due to privacy and confidentiality restrictions in the Department of Labor. It is not clear how many workers were included from these industry estimates because of the missing data on establishments.

Other groups of workers left out from these estimates because they are not included in covered employment are federal employees, railroad workers, members of the military, agricultural workers on small farms, churches, self employed, elected officials, volunteer workers, student workers (in employ of college or university), interns & student nurses in employ of hospitals, and nonprofit organizations with fewer than four employees.

Mr. Burnett supplied a subset of industries from the entire dataset. The selection of industries was based on our request for industry categories which were most likely to have exposure to lead including such major industry categories as construction, agriculture, manufacturing, repair, and selected service occupations, but excluding such major categories as finance and insurance, and managements of companies and enterprises.[17] For a list of requested and excluded industry categories, contact the authors of this report. Industry categories were based on the 2002 NAICS coding (see http://www.census.gov /epcd/naics02 /naicod02.txt).

We obtained a similar list of jobs or occupations with potential lead exposure directly from Haz-Map using the "Haz-Map Jobs with Potential Lead Exposure" list.[14] The Maine employment data by occupations are taken from the May 2003 Occupational Employment and Wage Estimates, Maine; from the U.S. Department of Labor, Bureau of Labor Statistics.[15] These occupational employment data use the 2002 SOC codes.

The list of occupations in these Maine BLS data was compared to the Haz-Map list, and those occupations which involved potential exposure to lead were marked, based on Haz-Map. Since the Haz-Map occupational list uses the 1997 SOC codes, there were a few cases in which the categories were not identical. In these cases, we used the numbers if the categories were virtually identical in nature, but did not use them if they diverged significantly.

Citations

The picture on the cover of this report was found at the National Oceanic and Atmospheric Administration website located at: http://response.restoration.noaa.gov/pribilof/stg/sealplant/image015.jpg

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