Oregon Adult Lead Poisoning Program: Five-Year Report (1996-2000)

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Glossary of Terms

ABLES – Adult Blood Lead Epidemiology and Surveillance Program
EBLL – Elevated Blood Lead Level
NIOSH – National Institute for Occupational Safety and Health
OR-OSHA – Oregon Occupational Safety and Health Division
SIC – Standard Industrial Classification
µg/dl – micrograms per deciliter of whole blood

Executive Summary

Oregon ABLES has been part of the national ABLES program through NIOSH since 1991. The objectives of our program are to:

- Identify adults with EBLLs and determine the source of their exposures.
- Assure they receive appropriate medical management.
- Assist the individuals, their employers and their providers to reduce or eliminate the exposure.
- Identify other family members who may be affected.
- Develop intervention strategies and educational information to prevent future lead exposures.

Oregon ABLES made major progress in adult blood lead surveillance in the five-year period from January 1996 – December 2000. Surveillance of all blood lead test results for adults (18 or older) began during this time. During this period there were nearly 16,000 tests, of which 2,478 (15.7%) were elevated (≥ 25 μg/dl). All EBLL cases were investigated, and had the following characteristics:

- 90% were in the 25-39 μg/dl range, 8% were 40-49 μg/dl and 2% were 50 μg/dl or greater.
- 95% percent involved men.
- 90% of the exposures were occupationally related and involved 83 employers.
- 75% of the occupational exposures were in manufacturing industries, followed by construction with 14%.
- Number of occupationally related elevated tests declined by 38% during the 5-year period, primarily due to exposure reductions in the manufacturing sector.
- Home remodeling was the most frequent source of non-occupational exposure.

In the 5-year period, Oregon ABLES undertook several intervention and education/outreach activities to reduce or prevent lead exposure from several sources. These included:

- Working closely with a major manufacturer to develop a lead exposure reduction plan that resulted in a 65% decline in elevated blood lead results between 1996 and 2000.
- Conducting investigations of imported tableware from Mexico and Asia that resulted in the issuing of health advisories, media coverage and development of educational materials.

A. Introduction

Lead poisoning in both adults and children has been a targeted health condition in Oregon since August 1, 1991, when elevated blood lead level (EBLL) test results (i.e. greater or equal to 25 µg/dl) for adults (≥ 18 years of age) became a reportable condition for health care providers and laboratories. The Oregon Department of Human Services (DHS), Office of Disease Prevention and Epidemiology have the responsibility for monitoring all cases of adult and childhood lead poisoning. DHS directly administers the adult lead poisoning program under a contract with the National Institute of Occupational and Health (NIOSH), Adult Blood Lead and Epidemiology and Surveillance Program (ABLES). Oregon ABLES is the state surveillance program that identifies, investigates, and works to prevent adult cases of lead poisoning in occupational and non-occupational settings. Oregon is one of 28 states that participate in ABLES.

B. Program Description and Objectives

The primary objective of ABLES, as identified in ***Healthy People 2010: Understanding and Improving Health, 2nd ed.***[1], is to reduce the number of adult blood lead test results that are ≥ 25µg/dl. Additional objectives for managing adult lead poisoning are listed below:

- Assess the prevalence of the lead exposure problem in Oregon.
- Identify all tested individuals with EBLLs, and determine the source and nature of these exposures.
- Identify childhood and family member cases related to adult and/or worksite lead "take-home" exposures.
- Ensure people with EBLLs receive appropriate medical management, including clinical follow-ups, until EBLLs are reduced to acceptable levels.
- Ensure adequate and timely follow-up occurs for environmental and occupational cases in order to reduce, or eliminate risks of further lead exposure from identified sources.
- Provide technical assistance and consultations to physicians, affected individuals, and employers and provide appropriate referrals to state and local enforcement agencies.
- Develop intervention strategies and educational information to facilitate the prevention and reduction of adult and family lead exposures.

C. History of Oregon Adult Lead Poisoning Assessment

With mandatory reporting requirements, laboratories operating within Oregon have been reporting EBLLs (≥ 25 µg/dl) for adults since 1991. We also coordinated EBLL reporting with the adjoining ABLES states of Washington and California by routinely exchanging information and data on individuals who may have a lead exposure in a particular state, yet reside in another state. Oregon ABLES also notified states outside this Pacific Northwest

1 Published by U.S. Department of Health and Human Services, Washington, DC: U.S. Government Printing Office, Nov. 2000.

Table 1. Number of Adult EBLLs by Draw Year and Lead Range: Oregon, January 1996 - December 2000.

Draw Year	25-39mg/dl	40-49mg/dl	50+mg/dl	Sum
1996	573 (89.8%)	58 (9.1%)	7 (1.1%)	638
1997	609 (92.3%)	39 (5.9%)	12 (1.8%)	660
1998	382 (95.5%)	7 (1.8%)	11 (2.8%)	400
1999	345 (90.1%)	32 (8.4%)	6 (1.6%)	383
2000	329 (82.9%)	55 (13.9%)	13 (3.3%)	397
Total	2,238 (90.3%)	191 (7.7%)	49 (2.0%)	2,478

region of EBLL cases when an affected individual resided in another state, but had an Oregon lead exposure.

As early as 1995, Oregon ABLES began encouraging laboratories to voluntarily report all blood lead level (BLL) tests. Before 1995, only EBLL test results were routinely reported. By 1998, most laboratories operating within the state were reporting all BLLs. This additional reporting enabled the state's public health agency to monitor changes in an individuals' BLL over time. Additional reporting has also aided efforts in prevention, consultation and targeted interventions.

The actual number of firms and industries operating within the state that utilize or produce lead, or lead-based products continue to be significantly under-identified. For example: between 1996-2000 Oregon ABLES received 1,804 EBLL reports for 28 firms and self-employed individuals in the manufacturing sector. These reports accounted for 75% of all occupationally related EBLLs during the period. However, according to Oregon, Employment Department statistics for 2000, there were nearly 7,000 firms in the manufacturing sector employing approximately 242,000 people. This indicates a limited number of firms are doing blood lead monitoring for their employees who may be at risk for exposure. The small number of firms actually testing has limited our program's ability to assess the extent of adult lead poisoning in Oregon and to develop appropriate prevention and intervention strategies.

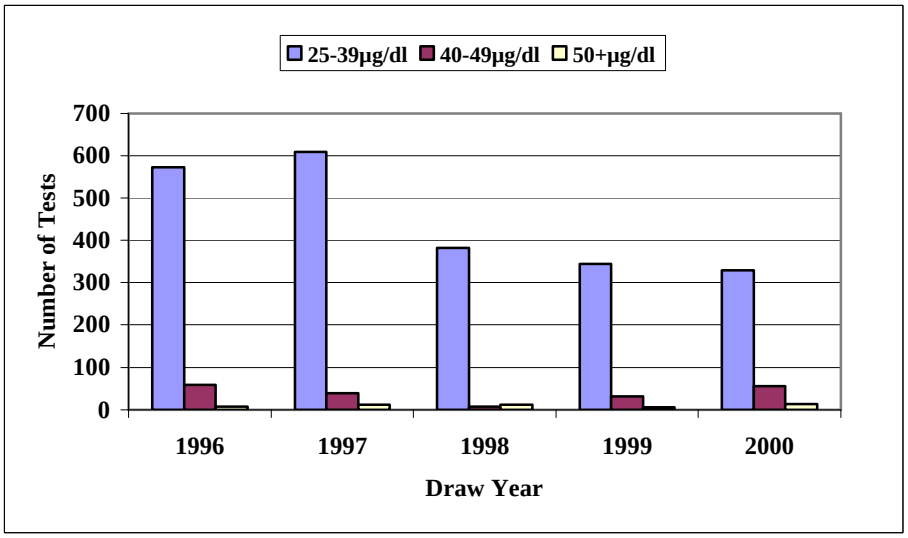
In an attempt to identify additional occupational cases, we reviewed the Oregon Worker's Compensation database. This database contained information on all disabling claims[2]. We also analyzed non-disabling claims for several major private Worker's Compensation insurers[3]. Our analysis of both sources of data found no new cases to augment our records.

D. Elevated Blood Lead Levels: January 1996 – December 2000

For the five-year reporting period, 15,878 BLL tests, were entered in the ABLES surveillance system, 2,478 (15.7%) were elevated. Ninety percent of the EBLLs were between 25-39 µg/dl; 8% were within 40-49 µg/dl; and 2% were ≥ 50 µg/dl (Table 1).

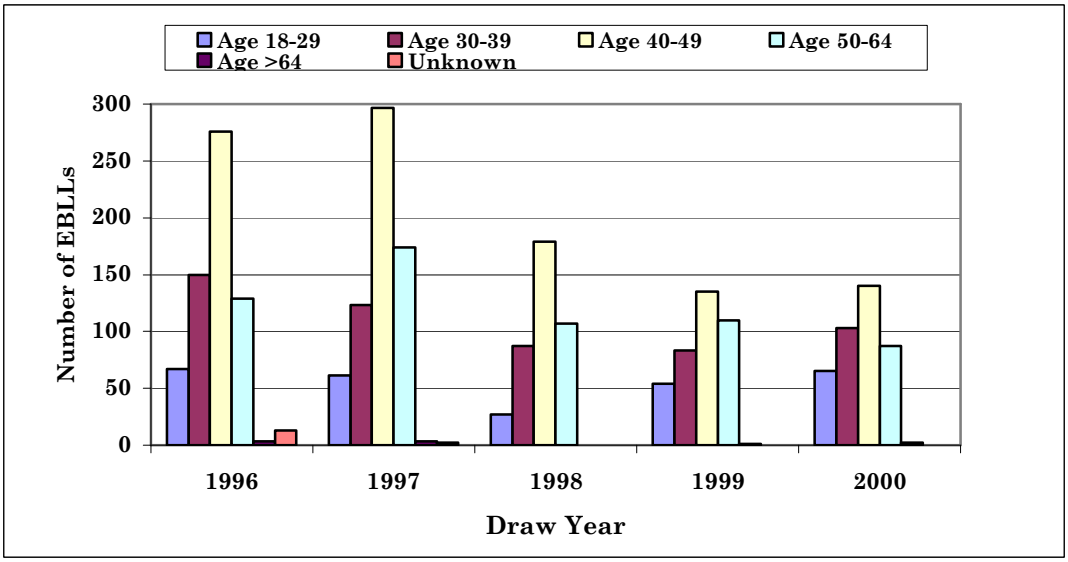
2 Disabling claim in Oregon is defined as having at least three lost days of work.
3 Insurer had a cooperative agreement with DHS.

Figure 1. Number of Adult EBLLs by Draw Year and Lead Range: Oregon, January 1996 - December 2000 (N=2,478).



Over this time period, with the exception of 1997, the total number of EBLLs, as well as the total number within the 25-39 µg/dl range decreased each year. However, the number of EBLLs ≥ 40 µg/dl remained unchanged. The highest number of EBLL tests occurred in 1997 with 660 and the minimum was 383 in 1999. The largest number of tests in range 25-39 µg/dl was 609 in 1997, and lowest number was 329 in 2000. At the 40-49 µg/dl level, the number of EBLLs reported was similar each year with a significant decrease between 1997-1999 (Table 1). Lastly, the number of EBLLs for 50+ µg/dl increased from 7 in 1996 to 12 in 1997, and then held relatively steady through 2000 (Figure 1).

Figure 2. Number of Adult EBLLs by Draw Year and Age: Oregon, January 1996 – December 2000 (N= 2,478).



Males comprised 95% of all EBLL results. Gender was unknown for 0.6% of the results. The age range 40-49 years accounted for the largest number of EBLLs in each of the five years (Figure 2), although the percentage of EBLLs in this age category decreased each year.

Because individuals often get tested more than once, the 2,478 total EBLLs represent 497 individual cases, of which 386 (77.7%) were actually new cases. Each individual is counted as a case during the year in which they first appeared in our database along with their highest EBLL for that year. Of the 497 total cases, 46 (9.3%) were non-occupationally related. In 16 (3.2%) cases an investigation was unable to determine the exposure source.

E. Identifying Adult Lead Poisoning in Occupational and Non-Occupational Settings

Oregon ABLES provides telephone consultations for all workers with EBLLs ≥ 40 µg/dl and their health care providers. These consultations help identify sources of lead exposure, and provide Oregon ABLES the opportunity to recommend prevention and hygiene strategies. In cases below 40 µg/dl, follow-up is by letter, sent to the affected individuals.

Local health departments are informed of all adult EBLL cases so additional follow-up could be performed for non-occupational cases. Non-occupational cases may be referred back to Oregon ABLES when additional resources are necessary to prevent on-going lead exposure.

Home visits are initiated to determine the source of lead exposure when children or other family members are reported with EBLLs. Telephone consultations with employers are also provided to develop medical monitoring programs and other strategies to reduce lead exposure.

1. Occupational Cases:

In 1996, the Oregon ABLES program conducted a survey of Oregon industries to identify the level of lead use, awareness of lead hazards and efforts to reduce these hazards. The

survey revealed that the number of employees within a firm, and the amount of lead used by that firm were specific indicators of a firm's:

- Knowledge of the Oregon Lead Standard.
- Participation in workplace lead monitoring programs.
- Use of worksite assistance from health and safety professionals.

Industries selected for the survey were identified by the amount of lead in their waste stream, as reported by Oregon Department of Environmental Quality. Generally, it was found that firms with more workers, and utilizing larger lead quantities in manufacturing were more likely to develop, and utilize the above indicators as resources in a positive way. However, the amount of lead in the firm's waste stream was not a good predictor of worker EBLLs. During this five-year period, seven of the ten major ***Standard***

Table 2. Number of Adult Occupational EBLLs by Major SIC Listing by Draw Year and Lead Range: Oregon, January 1996 – December 2000.

SIC	SIC Group	25-39mg/dl	40-49mg/dl	50+mg/dl	Sum
1500-1799	Construction	237 (70.3%)	81 (24.0%)	19 (5.6%)	337
2000-3999	Manufacturing	1,745 (96.7%)	53 (2.9%)	6 (0.3%)	1,804
4000-4971	Transportation	10 (83.3%)	2 (16.7%)	0 (0.0%)	12
5000-5199	Wholesale	15 (71.4%)	4 (19.0%)	2 (9.5%)	21
5200-5999	Retail	18 (81.8%)	3 (13.6%)	1 (4.5%)	22
7000-8999	Services	158 (79.8%)	32 (16.2%)	8 (4.0%)	198
9000-9721	Public Admin.	0 (0.0%)	3 (100.0%)	0 (0.0%)	3
Total		2,183 (91.1%)	178 (7.4%)	24 (1.0%)	2,397

Industry Classification (SIC)[4] divisions were associated with EBLLs. Listed in Table 2, these divisions were: Construction, Manufacturing, Transportation, Wholesale, Retail, Services, and Public Administration. Construction and Manufacturing accounted for 89.3% of all EBLLs as well as 90.8% of all EBLLs within 25-39 µg/dl, and 75.3% of all EBLLs at 40-49 µg/dl. Construction firms had the highest number of EBLLs ≥ 50 µg/dl with 19, (79.2% of the EBLLs in that range). The fewest number of EBLLs was found with Public Administration, 3 cases, (0.1% of all EBLLs). In light of these results, the top three industries within these divisions (i.e. battery manufacturing, bridge renovators and radiator repair shops) reporting EBLL tests were targeted for outreach and education. These three industries accounted for 83% of all occupational EBLLs during the period.

Oregon ABLES worked very closely with the battery manufacturing industry. The numbers of EBLLs in this industry have decreased dramatically from a high of 529 in

Table 3. Number of Battery Manufacturing EBLLs by Draw Year and Lead Range: Oregon, January 1996 – December 2000.

Draw Year	25-39mg/dl	40-49mg/dl	50+mg/dl	Sum
1996	450 (95.7%)	20 (4.3%)	0 (0.0%)	470
1997	510 (96.4%)	19 (3.6%)	0 (0.0%)	529
1998	314 (99.7%)	1 (0.3%)	0 (0.0%)	315
1999	213 (100%)	0 (0.0%)	0 (0.0%)	213
2000	159 (100%)	0 (0.0%)	0 (0.0%)	159
Total	1,646 (97.6%)	40 (2.4%)	0 (0.0%)	1,686

4 Published by Executive Office of the President, Office of Management and Budget, Washington, DC: U.S. Government Printing Office, 1987.

Table 4. Number of Bridge Renovation EBLLs by Draw Year and Lead Range: Oregon, January 1996 – December 2000.

Draw Year	25-39mg/dl	40-49mg/dl	50+mg/dl	Sum
1996	5 (71.4%)	2 (28.6%)	0 (0.0%)	7
1997	2 (28.6%)	2 (28.6%)	3 (42.9%)	7
1998	7 (63.6%)	2 (18.2%)	2 (18.2%)	11
1999	67 (80.7%)	14 (16.9%)	2 (2.4%)	83
2000	90 (74.4%)	25 (20.7%)	6 (4.9%)	121
Total	171 (74.7%)	45 (19.7%)	13 (5.6%)	229

1997 to a low of 159 during 2000 (Table 3). Not only has the overall number of EBLLs decreased, the number of tests at the highest levels (≥ 40 µg/dl) have also decreased. During the last two years, no test results were > 39 µg/dl.

The number of bridge renovation projects varied widely during the reporting period. Firms could have as many as 200 employees working on large projects, and few as 15 employees for smaller projects. In the first three years of the period there were no large projects and EBLLs averaged less than ten per year. Because of the concentration of larger projects in the last two years, EBLLs averaged more than 100 per year (Table 4). Although the number of EBLLs was far higher in the last two years, the percentage ≥ 40 µg/dl declined to 23% compared to 44% in the previous three years.

Also during this reporting period, the number of Oregon radiator repair shops declined in number due to new technology that allowed manufacturing and utilization of radiators without lead solder or other heavy metals. Almost 59% of all EBLLs were in the 25-39 µg/dl range (Table 5). In 1996 there were 42 EBLLs in this industry and the number of EBLLs declined in subsequent years, and remained below 15 annually.

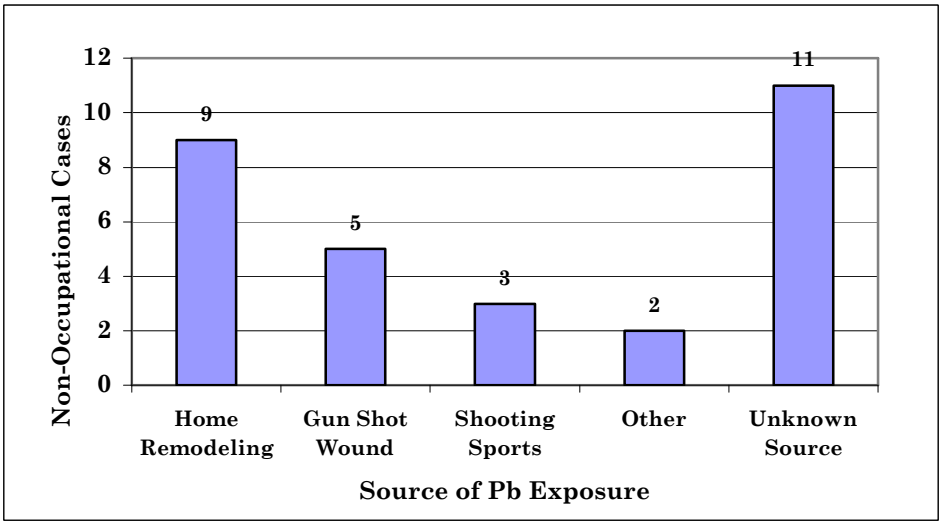
2. Non-Occupational Cases:

Although non-occupational exposures accounted for slightly more than 9% of all adult cases and 2% of EBLL results, they provided important information about exposure

Table 5. Number of Radiator Repair EBLLs by Draw Year and Lead Range: Oregon, January 1996 – December 2000.

Draw Year	25-39mg/dl	40-49mg/dl	50+mg/dl	Sum
1996	30 (71.4%)	10 (23.8%)	2 (4.8%)	42
1997	3 (42.9%)	3 (42.9%)	1 (14.3%)	7
1998	4 (40.0%)	3 (30.0%)	3 (30.0%)	10
1999	7 (50.0%)	7 (50.0%)	0 (0.0%)	14
2000	6 (50.0%)	6 (50.0%)	0 (0.0%)	12
Total	50 (58.8%)	29 (34.1%)	6 (7.1%)	85

Figure 3. Number of Non-Occupational Cases by Source of Exposure: Oregon, January 1996 – December 2000 (N=30).



sources in the environment. Our data on non-occupational exposures found the largest percentage of cases were from unknown exposure sources, followed by home remodeling activities, and gun shot wounds (Figure 3). Gun hobbyists involved in target shooting, and reloading bullet cartridges were also found to be an important source of EBLLs.

Furthermore, unlike the occupational settings where state health and safety guidelines require medical monitoring of lead exposed workers, non-occupational testing is driven by the concern of the exposed individual, and their health care provider's recognition of non-occupational sources of lead exposure. Due to this limiting factor, we recognized a potential for under identification of non-occupational cases.

Exposures from home remodeling, and in-house lead melting for fishing weights as well as bullet cartridge reloading activities were important for identifying and monitoring exposure to other household members, especially young children.

F. Identifying Family and Household Members with Lead Poisoning

Family member exposures from employee "take-home" lead were usually identified during state and local health department investigations. If young children or pregnant women were identified during the investigation they would be advised of the risks, and urged to have blood lead tests.

On a quarterly basis, Oregon ABLES matched adult and childhood databases to identify children with elevated BLLs from "take-home" or other sources of exposure. More than a dozen childhood cases were identified when working parents did not follow good hygiene practices (e.g. not changing lead-laden clothes before leaving work), thus contaminating family vehicles, the household and furnishings, and especially children in the home. We also

found five children with EBLLs that resulted from visiting and eating lunch at a parent's contaminated work site.

G. Monitoring Occupational Adult Lead Poisoning

The ***Oregon Lead Standard*** [5] provides specific lead safety guidelines for employers that include medical monitoring of workers. These guidelines have provisions to remove workers from exposure sources when EBLLs exceed 50 µg/dl. Oregon ABLES monitored all EBLL cases in the ABLES database, and provided employer, health care provider and employee consultations. A quarterly listing of firms with any employee having an EBLL ≥ 50 µg/dl was provided to the Oregon Occupational Safety and Health Division's (OR-OSHA) enforcement program for investigation into the lead exposure. Confidential referrals for OR-OSHA investigations were made if requested by a worker or attending physician. Referrals for enforcement also occurred in instances where an employer's workers continued to exhibit high lead levels over time. In non-occupational cases, Oregon ABLES staff worked closely with county health departments and affected individuals to reduce or eliminate exposure sources.

H. Reducing the Risk of Lead Poisoning

All adults having EBLLs and their health care providers received our educational information. During 2000, educational materials about other potential sources of lead (e.g. cosmetics, food, food additives, food packaging, ceramics, home remedies, etc.) were developed and published on our web site <*http://www.healthoregon.org/lead*>. Training was also provided to county environmental health specialists. The trainings resulted in county environmental health consultants advising food establishments to remove hazardous dishware from use. Also in 2000, Oregon and Washington ABLES programs joined forces to coordinate lead exposure prevention and surveillance activities on a major bridge renovation project over the Columbia River, which is the border between the two states.

I. Technical Consulting

Oregon ABLES provided several types of technical consultations and assistance. Among them were employer consultations, which were provided either at the employer's request, at the request of at least one EBLL worker, or by the employer's medical director. Employer and firm site visits were usually limited to cluster investigations. A cluster is defined as three of more individuals with EBLLs working for the same employer or work location.

Consultations given for health care providers included information focused on medical monitoring guidelines for workers exposed on the job as well as lead poisoning prevention strategies. Our program also regularly refers health care providers to the Oregon Poison Center for medical treatment advisories and consultations.

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5 Oregon Occupational Safety and Health Administrative Rules [OAR 437, Div. 2,Subdiv. Z, 1910.1025 Lead for General Industry]; [OAR 477, Div. 3, 1926.62 Lead for Construction]

J. Developing and Implementing Intervention Strategies

A 1998 investigation, conducted by Oregon ABLES staff, determined that decorative terra cotta pottery imported from Mexico and used as plates, baking/serving dishes, pitchers and bowls in restaurants and homes contained high levels of leachable lead and posed a significant health hazard. Eleven (85%) of thirteen specimens collected from a convenience sample of retailers throughout Oregon exceeded the United States Food and Drug Administration (FDA) standards for leachable lead for this type of dishware. The highest amount of leachable lead was 9,170 parts per million (ppm), and was found in a salad plate. For a plate of its size, the FDA limit is 3 ppm. The results of the investigation along with action recommendations were submitted to the FDA. After this investigation, we were informed of a FDA policy change that no longer allows terra cotta dishware to be imported into the United States under the guise of "decorative" pottery.

In Oregon, a health advisory was issued requesting vendors not to sell the above decorative pottery for use in cooking and as serving dishes. As part of outreach efforts, approximately 600 Latino press and community leaders received informational materials to be shared with their communities about this hazard. Furthermore, this investigation was featured in an article entitled "Ceramic and Pottery Cookware: A Potential Source of Pb" (G. Rishchitelli, MD, MPH, JD) in the October 13, 1998 issue of the Oregon Health Services' ***CD Summary***, the biweekly newsletter sent to all Oregon health care providers.

Following this investigation, a local television station did a two-part investigative series on lead in imported Mexican pottery. The series was also aired by affiliates in California. In addition, the state's largest newspaper ran a feature article in its weekly food section. Samples of pottery and posters have also been incorporated into lead awareness displays for use at community events, such as home shows and health fairs, warning the public of the hazards associated with leaded tableware.

A similar investigation in 1999 focused on imported Asian tableware. Fifty pieces from China and Japan were field-tested for lead with seventeen pieces selected for laboratory analysis. Leachable lead was found in six of seventeen items, with the highest level at 460 ppm. This was well above the FDA standard of 2 ppm for this type of tableware. Subsequently, news releases were issued warning of high lead hazards associated with some traditional patterns of Asian ceramic tableware.

Lastly, state and local food inspectors and sanitarians were trained to identify high-risk dishware used in restaurants. They provide consultations to restaurant owners and managers when suspect ceramic items are encountered.

K. Case Examples

Presented below are four case type examples recorded during the five-year reporting period. Each is a typical case from a wide range of lead exposure situations.

1. Radiator Repair:

A 54 year-old male, with ten-year history of using lead soldier as a radiator repairman, had EBLLs ranging between 28-54 μg/dl. During work, the employee claimed to have regularly used a half-face cartridge respirator, changed out of work clothes before going home and received training in lead exposure prevention. Despite this, the worker reported abdominal pain, nausea, difficulty breathing and sleeping, muscle cramping, weakness, and difficulty using his hands. The worker also reported non-occupational lead exposures from repairing and welding old cars, and removing lead paint in home renovation projects. He also said he did not wash his hands prior to eating or smoking. Although his employer had removed the worker twice from lead exposure, a referral was made to OR-OSHA for a worksite investigation. The OR-OSHA investigation resulted in mandated changes at the work site and implementation of safety measures, including the installation of a new ventilation system. The worker was provided educational materials by Oregon ABLES, and advised on safe work and home hobby practices along with personal hygiene practices to reduce exposure. However the worker did not change his personal behaviors while working with lead, and continued to have EBLL's in the 40 μg/dl range. This case illustrates some of the difficulties in reducing lead exposures in adults. Employee and employer cooperation and responsibility are critical in obtaining permanent change in worksite exposures.

2. Gunshot Wound:

a. A 28 year-old male suffered a 12–gauge shotgun injury at an outdoor gun range that left lead pellets imbedded in his left pelvis, hip, and lower back. The man did not have a blood lead test until two years later when he began having symptoms of fatigue, insomnia and burning feet. His initial BLL two years post-injury was 50 μg/dl. Although he later had several pellets surgically removed, some lead pellets were not removable, and the victim continued to have EBLL's in the 30 μg/dl range. This case illustrates the need for blood lead monitoring in cases of gunshot injuries where lead fragments are retained in the body.

b. A pregnant woman, with a gunshot wound in the back and shoulder, had bullet fragments removed from the lung and shoulder. However, not all fragments were removable with some retained in bone. Two months post-injury, her EBLL was 44 μg/dl. Five months later, her BLL dropped to 11μg/dl. Her child was born five months after the injury, and had an EBLL of 21 μg/dl. This case illustrates the need for blood lead testing of pregnant women that have retained lead as well as the newborn to identify infants that may require monitoring or treatment.

3. Home Remodeling:

A 35 year-old unemployed male carpenter had EBLLs ranging between 33-46 μg/dl. He also had a history of cigarette smoking. Since his last job ended a year before his initial BLL test, it was suspected that he was exposed to lead during a three-year

remodeling project on his one hundred year-old home. Remodeling activities included removing old exterior paint with a power washer that produced lead paint chips and dust while he wore only a disposable particle dust mask for personal protection. The carpenter took no precautions to prevent tracking of lead contaminants into the house. It was also found that the carpenter had a pregnant wife and twelve-month-old child, with the child in the house during remodeling activities. The family pediatrician was contacted so that both wife and child could have blood lead tests. Although the wife's lead level was normal, the child had an EBLL of 22 μg/dl. Environmental testing by local county health officials found that collected dust and paint chips samples, from household floors and windows as well as from the family car, had high lead levels. Test results showed the child's bedroom window well had 7,051 $\mu g/ft^2$ of lead dust, a windowsill had 419 $\mu g/ft^2$, and the driver's seat in the vehicle had 3,814 $\mu g/ft^2$ of lead dust. U.S. Environmental Protection Agency (EPA) restrictions for lead dust on window wells and troughs are 400 $\mu g/ft^2$, and no more than 250 $\mu g/ft^2$ for windowsills. EPA had no standards for inside cars, but samples found on seat and floor surfaces exceeded all levels for interior home surfaces. The family was advised of appropriate decontamination procedures for the house and car as well as safe work practices for future home remodeling.

4. Ingestion:

A 40 year-old Asian male who worked at a mini-mart was admitted to a local hospital complaining of severe abdominal pain, fatigue, leg pain, and loss of appetite. A heavy metals blood screen showed an EBLL of 79 μg/dl that rose to 85 μg/dl three days later. Radiography and history showed no ingested items or gunshot injuries. Family members tested negative for lead poisoning. The initial assessment indicated that exposure was not work-related, but possibly due to ingestion of contaminated food and/or food served in ceramic dishware. Home inspections included searching for suspect foods, home remedies, and hazardous dishware. Unfortunately, some dishware had been discarded prior to the home visit. In a field test of the available dishes, a single plate and a coffee mug tested positive. The plate and the man's coffee mug were subsequently sent to a laboratory for leach testing, and were found below the FDA standard for those items. Samples of spices purchased by the victim from a vendor specializing in Asian food items were also tested and found negative. Despite the intensive investigation, no exposure source could be identified. Oregon health officials suspected two possible sources of lead poisoning for this individual: stored lead leaching from bone into blood from a earlier exposure, or contamination from lead leaching from the dishes that had been discarded.