

PRELIMINARY COST-BENEFIT ANALYSIS (CBA)
LEAD
CHAPTER 296-857 WAC
WASHINGTON STATE DEPARTMENT OF LABOR AND INDUSTRIES
APRIL 17, 2006

This cost benefit analysis, prepared in compliance with the Administrative Procedure Act (APA), chapter 34.05 WAC, spells out the assumed benefits and costs of the proposed construction site safety rules set forth under proposed chapter 296-857 WAC, Lead. The proposed changes requiring economic analysis are:

WAC 296-857-40040, Showering, Changing, and Eating Facilities
WAC 296-857-30010, Blood Testing and Medical Examinations
WAC 296-857-30020, Medical Removal

INTRODUCTION

The Washington State Department of Labor and Industries (L&I) is proposing changes to Washington Industrial Safety and Health Act (WISHA) rules that regulate employee exposure to lead contaminants. Specifically, the department plans to propose amendments to WAC 296-155-176, Lead Rules for Construction, and WAC 296-62-07521, Lead Rules for General Industry. The requirements in these chapters are being moved to a new chapter: chapter 296-857 WAC, Lead. These changes are intended to modernize, streamline and make consistent rules pertaining to employee exposures to lead.

LANGUAGE CHANGES WITH AN ECONOMIC IMPACT

New language to WAC 296-857-40040, Showering, Changing and Eating Facilities, will create an increase in requirements for construction industry employers only. Under the existing rule, construction employers are not required to provide showers for employees exposed to lead until the initial exposure evaluation determines exposures are above the permissible exposure limit (PEL). The proposed rule, if adopted, will require construction employers to provide showers from the first day of work at each worksite where exposures to lead are reasonably expected to be above the PEL¹. For most construction employers whose employees conduct job tasks like those listed in Table 4 “Examples of Tasks Likely to Have Exposures Above the PEL” the new language will require that they have showers on site from the first day of work. Providing the showers from the first day means they will have to provide the showers earlier than they would under the existing rule. Employers are required to provide a ratio of one shower per 10 employees of each gender.

¹ “Permissible Exposure Level” or PEL is the level of exposure where the employer is required to control exposures and protect employees (i.e. use of a respirator). For lead, the PEL is defined as employee exposures to an airborne concentration of lead of 50 micrograms per cubic meter of air, calculated as an 8-hour-time-weighted average. For work shifts longer than 8 hours, the PEL will be adjusted. For example a 10-hour shift has a PEL of 40 micrograms per cubic meter of air.

The only exception to the shower rule occurs when a competent person has determined that one of the following applies:

- Employees will perform short-duration tasks with limited lead exposure during the work shift.
- or**
- Showers with a self-contained water supply can't be located at the jobsite due to lack of space or exposure to a significant danger such as uncontrolled traffic,
- or**
- The presence of adverse environmental conditions (climate), such as freezing temperatures or high winds.²

New language to WAC 296-857-30010, Blood Testing and Medical Examinations, would create an increase in requirements for general industry employers only. With respect to blood testing and medical examinations, the existing rule requires employers to provide initial blood testing for employees with more than 30 days of exposure above the action level³ in any 12-month period, and provide blood testing for employees every 6 months after the initial blood test. The proposed rule, if adopted, will require that employers provide initial blood lead testing for all new employees with the potential for at least 1 day of exposure above the action level in any 12-month period, as well as additional blood lead tests at 2 and 4 months.

New language to WAC 296-857-30020, Medical Removal, would also increase requirements for general industry employers only. The existing rule requires that employers remove the employee from exposure above the action level when blood lead level results are confirmed at 60 ug/100g of whole blood, or for blood lead levels less than 60ug/100g of whole blood, when the average of 3 consecutive blood tests results are greater than 50 ug/100 g of whole blood. The proposed language states that if the employee has a confirmed blood lead level above 50 ug/dl of blood, then they must be immediately removed from the exposure. Employers will no longer be allowed to average the results of 3 consecutive lead tests. Once this individual is removed, the employer is required to pay their salary and benefits, but may not allow the employee to work in areas where exposures to lead are above the action level.

ASSESSING COMPLIANCE COSTS

A cover letter and compliance cost survey were sent to firms believed likely to be affected by the proposed rules. Because proposed changes to the showering, changing and eating facilities section will, if adopted, impact only construction industry employers, and proposed changes to the blood testing and medical removal sections will, if adopted, impact only general industry employers, separate surveys, addressing the pertinent rule language, were created for each type of employer.

² It is believed that these circumstances are rare and therefore, for the purpose of the survey, we assumed that all employers would be required to rent, purchase or build showers to be used at work-sites.

³ "Action Level" or AL for lead is defined as a level of employee exposure that requires action be taken by the employer. For lead, this level is an airborne concentration of 30 micrograms per cubic meter of air, calculated as an 8-hour-time-weighted average.

A survey pertaining to WAC 296-857-40040, Showering, Changing, and Eating Facilities were sent to all Washington State construction employers in the following SIC codes:

- 1622 Bridge, Tunnel and Highway Construction
- 1721 Painting and Paper Hanging
- 1795 Wrecking and Demolition Work

A survey pertaining to WAC 296-857-30010, Blood Testing and Medical Examinations and WAC 296-857-30020, Medical Removal was sent to all Washington State general industry employers in the following SIC codes:

- 3211 Flat Glass Manufacturing
- 3229 Pressed and Blown Glass and Glassware
- 3321 Gray and Ductile Iron Foundries
- 3364 Nonferrous Die-Castings, Except Aluminum
- 3691 Storage Batteries
- 3721 Aircraft
- 3731 Ship Building and Repair
- 5093 Scrap and Waste Metals
- 7539 Automotive Repair (Surveys for this SIC were sent only to radiator repair firms.)

In total, 492 surveys were sent to construction firms. Of these surveys, 64 were undeliverable, reducing the assumed population size to 428. Of the 428 deliverable surveys, 115 were returned, for a response rate of 27%.

In total, 615 surveys were sent to general industry firms. Of these surveys, 123 were undeliverable, reducing the assumed population size to 492. Of the 492 deliverable surveys, 108 were returned for a response rate of 22%.

Respondents were asked a series of question intended to determine whether their operations are presently in compliance with the rules, and, if not, what their expected compliance costs would be if the proposed rules were adopted. Results from these questions were used to assess the probable costs of the rule and are explained in the following sections.

PROBABLE COSTS FOR PROPOSED CHANGES TO WAC 296-857-40040, SHOWERING CHANGING AND EATING FACILITIES

In order to determine the probable costs of this section, survey respondents were asked to answer one to seven questions intended to determine the following:

- 1) Whether a firm's employees are exposed to lead in the course of their work. If they are not, the firm is not subject to the rule.
- 2) If their employees are exposed to lead, whether their operations were already in compliance with the proposed rule. In order to be in compliance with the proposed rule,

they must have answered yes to the question: “Do you presently provide showers, from the first day of work, on all work sites where employees are reasonably expected to be exposed to lead above the PEL?”

- 3) If they were not already in compliance with the rule, how many showers would they be required to purchase or rent in order to comply with the rule?

The results obtained are as follows:

Of the 115 surveys received, 19 or \cong 17% stated that their employees were exposed to lead in the course of their work. Among these 19 firms, 15 or \cong 79% do not presently provide showers from the first day of work on job sites where exposures to lead could reasonably be expected to be above the PEL. Responses from these 15 firms, which represent 13% of the sample size, are the basis of the cost evaluation for this rule. They reported the following:

- 13 or \cong 87% of them do not presently own the portable showers required to comply with the rule.
- When asked “At any one time, what is the maximum number of jobs underway where your employees are reasonably expected to be exposed to lead above the PEL?”
 - 11 responded “one to five,”
 - 1 responded “two to five”
 - 1 responded “five to ten”
- When asked “On any given job, what is the maximum number of male employees requiring shower facilities?”
 - 11 responded “less than ten”
 - 2 responded “eleven to twenty”
- When asked “On any given job, what is the maximum number of female employees requiring shower facilities?”
 - 13 responded “less than ten”

When the impact is totaled, these employers reported that if the rule language is adopted, they will be required to purchase a maximum of 150 showers in order to have the required number of showers available at all worksites. The total cost for these showers is approximately \$92,250. (150 x \$615.00)

The sample size represents approximately 27% if the total population of firms most likely to be impacted by this rule. This means that for every firm represented in the sample, there are 3.7 similar firms in the total population. Since the sample characteristics can be seen as approximating the population characteristics, the total expected costs can be calculated by multiplying the reported cost value given by the survey respondents of \$92,250 by 3.7 for a total expected cost of approximately \$341,325.

**PROBABLE COSTS FOR PROPOSED CHANGES TO
WAC 296-857-30010, BLOOD TESTING AND MEDICAL EXAMINATIONS &
WAC 296-857-30020, MEDICAL REMOVAL**

In order to determine the probable costs of these sections, survey respondents were asked to answer one to seven questions intended to determine the following:

- 1) Whether a firm's employees are exposed to lead in the course of their work. If they are not, the firm is not subject to the rules.
- 2) Whether the firm presently provides initial blood tests for new employees with follow-up blood tests at 2 and 4 months for all employees exposed to lead above the action level for at least 30 days. If they do, they are presently in compliance with the proposed language.
- 3) If they do not presently provide the blood tests required by the proposed language, the number of employees hired in 2004 that had the potential to be exposed, for at least one day and greater than 30 days, to lead at or above the action level.
- 4) The number of employee's test results that showed a blood lead level above 50 ug/dl, and above 60ug/dl. Under the new rule, if an employee's blood test showed a blood lead level over 50ug/dl, the employer is required to remove an employee from exposure at that point instead of waiting until tests confirmed a blood lead level at 60 ug/dl of whole blood OR when 3 consecutive tests showed a blood lead level greater than 50 ug/dl.

The results obtained are as follows:

Of the 123 surveys received, 19 or \cong 15% reported that their employees are exposed to lead in the course of their work.

**SURVEY RESULTS PERTAINING TO
WAC 296-857-30010, BLOOD TESTING AND MEDICAL EXAMINATIONS**

Among the 19, 9 reported that they presently provide all of the blood tests required under the proposed language and, as such, will face no new costs under the proposed language. Among the 10 firms not presently in compliance:

- 4 reported that they do provide initial blood lead testing for all employees with an expected exposure to lead at or above the PEL for at least 1 day. While 6 firms reported that they do not provide this testing. Among these 6 firms, only 3 reported that they hired employees in 2004 for which they would be required to provide initial blood testing. One firm reported that they hired 20 employees while the other two reported that they hired "one to five."
- 10 reported that they do not provide follow-up blood lead testing at 2 and 4 months for those employees exposed above the action level for at least 30 days. However, only four firms reported that they hired any employees in 2004 that had the potential for exposure above the action level for at least 30 days. However, only 4 of these firms reported having hired any

employees that would fall into this group. Each of the four reported that they hired “one to five” employees in 2004 that fall into this category.

In total, these employers reported that if the rule language is adopted, they will be required to provide 50 initial medical evaluations and 25 follow up visits. The total cost for these blood tests is approximately $75 \times \$45.55 = \$3,416$ for the all blood lead tests. In addition, employers must pay employees for all time spent traveling to a medical facility, obtaining the tests and traveling back from the medical facility. On a statewide basis, the assumed average time required for is 2.5 hours and the assumed wage for skilled workers (including benefits) is approximately \$28.50 per hour. The total cost for the employee’s time is approximately $75 \text{ tests} \times 2.5 \text{ hours} \times \$28.5 = 5,343$.

The sample size represents approximately 22% if the total population of firms most likely to be impacted by this rule. This means that for every firm represented in the sample, there are 4.5 similar firms in the total population. Since the sample characteristics can be seen as approximating the population characteristics, the total expected costs can be calculated by multiplying the reported cost value given by the survey respondents of approximately \$8,760 by 4.5 for a total expected cost of approximately \$39,420.

SURVEY RESULTS PERTAINING TO WAC 296-857-30020, MEDICAL REMOVAL

Also among the 19 firms with employees exposed to lead:

- 1 firm reported that 1 employee had a blood lead test result above 50 µg/dl.
- No firm reported that any of their employees had a blood test result above 60 µg/dl.

The cost for a firm with an employee reporting a blood lead test result above 50 µg/dl can vary widely. The rule requires that, once an employee’s blood lead test result shows a blood lead level above 50 µg/dl that they be removed from any work where they are exposed to lead.

The cost of medical removal can be simply shifting the employee to other work where they are not exposed to lead, and replacing them with another, similarly skilled employee. However, if the employer does not have alternative work, they are still required to continue paying the affected employee’s salary and benefits. So, the costs can range from the cost of simply shifting skilled employees around to replacing the employee altogether while continuing to pay their salary. This worst case scenario could mean paying a full salary for a medically removed individual until their blood lead levels come down or for 18 months, whichever is shorter, and paying to hire, train and employ another individual to cover their work. Given an approximate annual wage of skilled labor of \$55,000 plus benefits of 25% (\$13,750), the total cost of employing a new individual will be approximately \$68,750. Training costs, including time required to reach productive capacity and costs for any official training courses are assumed to be approximately 20% of an individual’s salary. This gives a total cost per medically removed employee of \$68,750 plus \$13,750 for a total annual cost of \$82,500 per medically removed employee. Since the sample characteristics can be seen as approximating the population

characteristics, the total expected costs can be calculated by multiplying the reported cost value given by the survey respondents of \$82,500 by 4.5 for a total expected cost of approximately \$371,250.

SUMMARY OF COSTS

Total costs for the proposed language are summarized as follows:

- Total annual costs for WAC 296-857-40040, Showering Changing and Eating Facilities - \$341,325
- Total annual costs for WAC 296-857-30010, Blood Testing and Medical Examinations - \$39,420.
- Total annual costs for WAC 296-857-30020, Medical Removal – \$371,250

This gives a total combined annual cost of \$751,995 and represents the cost of protecting hundreds employees and their families from the affects of lead.

PROBABLE BENEFITS OF PROPOSED RULES

The proposed requirements set forth in WAC 296-857-40040, Showering, Changing, and Eating Facilities, WAC 296-857-30010, Blood Testing and Medical Examinations and WAC 296-857-30020, Medical Removal are intended to protect employees and all those who come into contact with them, from the detrimental impacts of lead exposure. Showers and changing facilities, provided from the very first day of exposure prevents long term exposure to the worker as well as all those with whom he/she comes into contact. Blood lead testing assures that all employees exposed to lead are monitored to be certain that their exposure does not harm their health, and the medical removal requirement ensures that if an employee is exposed to lead, that they are immediately removed from exposure to prevent the further exposure and possible death.

Though the detrimental health impacts of lead are well known, it is important to make clear just how devastating an impact lead exposure can have on an exposed individual. The following information is from the appendix of the existing lead standard and details the impact lead exposure can have:⁴

A significant portion of the lead inhaled or ingested gets into your blood stream. Once in your blood stream, lead is circulated throughout your body and stored in various organs and body tissues. Some of this lead is quickly filtered out of your body, but some remains in your blood and other tissue. As exposure to lead continues, the amount stored in the body increases if you are absorbing more lead than your body is eliminating. Even though you may not be aware of any immediate symptoms of disease, this lead stored in your tissues can slowly be causing

⁴Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for lead. (Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.)

irreversible damage, first to individual cells, then to organs and whole body systems. The types of damage and their affects are as follows:

Affects of Short-term (acute) overexposure

- Lead is a potent, systemic poison that serves no known useful function once absorbed by the body. Taken in large enough doses, lead can kill in a matter of days.
- A condition called *acute encephalopathy* affects the brain and may arise from a very high short-term dose of lead. It develops quickly to seizures, coma, and death from cardio-respiratory arrest. Short-term occupational exposures high enough to cause acute encephalopathy are highly unusual, but are not impossible.
- Similar forms of encephalopathy may arise from extended, chronic exposure to lower doses of lead.
- There is no sharp dividing line between rapidly developing acute effects of lead exposure, and chronic effects which from lead doses that take longer to acquire.

Affects of Long-term (chronic) overexposure

- Chronic overexposure to lead may result in severe damage to the blood-forming system, nervous system, urinary system and reproductive system.
- Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic (in lead-induced colic, there may be severe abdominal pain).
- Damage to the central nervous system in general and to the brain in particular (encephalopathy) is one of the most severe effects of lead poisoning. Encephalopathy may arise suddenly with the onset of seizures, followed by coma, and death.
- Chronic overexposure to lead also results in kidney disease:
 - Often few, if any, symptoms appear until extensive and most likely permanent kidney damage has occurred.
 - Routine laboratory tests reveal the presence of this kidney disease only after about two-thirds of kidney function is lost.
 - When overt symptoms of urinary dysfunction arise, it is often too late to correct or prevent worsening conditions
 - Progression to a need for kidney dialysis or to death is possible.
- Chronic overexposure to lead impairs the reproductive systems of both women and men:
 - **In women:**
 - There is evidence of miscarriage and stillbirth for women whose husbands were exposed to lead or who were exposed to lead themselves. Lead exposure may result in abnormal menstrual cycles and in decreased fertility and the course of pregnancy may be adversely affected by exposure to lead since lead crosses the placental barrier and poses risks to a developing fetus.

- **In men:**

- Overexposure to lead may result in decreased sex drive, impotence, and sterility and can alter the structure of sperm cells, which increases the risk of birth defects.

In children of exposed parents:

- Children born to parents where either one or both were exposed to excess levels of lead are more likely to have birth defects, mental retardation, behavioral disorders, die during the first year of life.
- Overexposure to lead disrupts the body's blood-forming system, which results in less hemoglobin being made (hemoglobin is the substance in the blood that carries oxygen to the cells) and ultimately in a condition called anemia. In anemia, the blood carries less oxygen to all cells.

Given this information, it is clear that the affect of lead exposure ranges from short term symptoms of ill health, to devastating illness, to death. The benefits of protecting the hundreds of Washingtonians exposed to lead in the course of their work are incalculable and range from a reduction in worker absenteeism from illness related to lead, to the prevention of fatalities and birth defects.

COST – BENEFIT DETERMINATION

The preliminary cost benefit determination is that the benefits of the rule far outweigh the costs, taking into account all of the qualitative and quantitative benefits and costs of the proposed rule. This analysis is preliminary and will be revised if further information becomes available.