Applied Occupational and Environmental Hygiene

ISSN: 1047-322X (Print) 1521-0898 (Online) Journal homepage: http://www.tandfonline.com/loi/uaoh20

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To cite this article: Dawn Tharr Column Editor & Chris Lovelace (1996) Case Studies: Environmental and Worker Protection Practices Observed during Lead-Containing Paint Removal in Four European Countries, Applied Occupational and Environmental Hygiene, 11:11, 1269-1272, DOI: 10.1080/1047322X.1996.10389411

To link to this article: http://dx.doi.org/10.1080/1047322X.1996.10389411

Published online: 24 Feb 2011.

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Case Studies

Environmental and Worker Protection Practices Observed During Lead-Containing Paint Removal in Four European Countries

Dawn Tharr, Column Editor

Reported by Chris Lovelace

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Introduction

In the past many steel bridges were coated with corrosion-inhibiting, lead-containing paint. Adverse effects on the environment and human health associated with the removal of lead-containing paint from structures, and particularly bridges, is a growing concern in the United States and elsewhere. This report will focus on observed environmental and worker protection methods used during the removal of lead paint by abrasive blasting at five sites in four European countries.

In October 1995, an eight-member panel drawn together by the U.S. Federal Highway Administration (FHWA) toured sites in Switzerland, Germany, the Netherlands, and Great Britain. This was one in a series of transportation-related tours conducted by the FHWA International Technology Scanning Program. The overall purpose of the tour was to gather information about steel bridge maintenance coatings. The panel met with representatives of government and industry to discuss formulation, selection, application, and removal of maintenance coatings.

The tour was planned and administered under contract by the Loyola College Transportation Technology Evaluation Center (TTEC). TTEC talked with established contacts in government and industry in the four countries, explained the purpose of the trip, and provided information concerning the various areas of interest. These key European contacts talked with experts in formulation, selection, application, and removal of bridge coatings. TTEC, FHWA, and the Europeans then decided how best to cover as many areas of interest as possible in four countries during a trip of about 2½ weeks. The wide range of interests and severe time limitations placed considerable constraints on the number and type of stops and the time allowed at each stop. As a result of these logistical constraints, typically 1 hour or less was spent at each site.

Two major factors, season and geography, influenced the lead paint removal site selection process and created a fairly narrow window of opportunity. October is late in the painting season, and therefore fewer total sites were available than if the tour had been conducted during the summer. Geographic accessibility further narrowed the number of possible sites due to the limited time available for remote site visits. In spite of these constraints, the five sites visited were represented as typical by the hosts of the various countries.

Methods

Observations were based on a comparison between actual practices observed at each site and U.S. regulations and guidance documents pertaining to environmental and worker protection issues. U.S. regulations and associated documents considered included those from the U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration. Guidance and reference documents included publications by the government, other organizations, and individuals. A generalized checklist based on the above was used to evaluate each site. Topics included containment construction, ventilation, and dust collection; air, soil, and water quality; waste disposal; and worker training, medical monitoring, personal protective equipment, and decontamination procedures.

No environmental or personal sampling of any type was conducted during the brief site visits.

Observations

Based on the similarity of observations made at all sites and the fact that only about 1 hour was spent at each of the five sites, observations are lumped together for all four countries. Variations from these generalities are noted for specific countries. All projects were apparently conducted according to performance specifications. The only specifications seen, however, were on the German project. Time constraints disallowed scrutiny of these large and obviously detailed documents.

Environmental Protection

Environmental protection was found to be of great concern. To that end, containment systems were used during the removal of lead-containing paint at all sites. The observed containments were constructed around elevated support structures on bridges or suspended under the bridges. Abrasive and debris were not supposed to escape the containment and settle in the environment. The impression was, however, that a 95 percent capture rate for spent abrasive and debris was acceptable. All projects visited during the tour potentially released minor amounts of nonrecoverable abrasive and debris into the environment. Several individuals queried indicated that the capture of the remaining 5 percent would probably double the cost of the project. Specific areas of discussion concerning environmental protection include containment systems, air monitoring, soil monitoring, and waste disposal.

CONTAINMENT SYSTEMS. Construction materials included scaffolding, plywood, dimension lumber, and reinforced impermeable or permeable tarps. Sizes of

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the containments varied but were generally very large in comparison to those being used in the United States today. The containment visited in Germany was a massive suspended platform approximately 125 m long, 25 m wide, and 5 m high. Despite the extensive investment of time and materials used in construction, most of the containments visited had a variety of uncontrolled openings and access areas. With the exception of the containment in Great Britain, the systems would be classified as variations of Steel Structures Painting Council (SSPC) class 3A containment systems.[1] The containment in Great Britain was essentially an SSPC class 4A containment system.[1] Mechanical ventilation, when used, was inadequate to provide even minimal directed air flow through these large containment systems. Directed air flow, as used in the United States,[2–4] helps increase visibility and potentially reduces worker exposures. Spent abrasive and debris, sometimes several centimeters thick, was found on the floor of all containments. Cleanup of these materials was conducted only sporadically and at the end of the job. Visible airborne dust was present, generated by prevailing winds and the movement of workers inside the containment, even in the absence of abrasive blasting. Prompt cleanup is required in the United States.[4] Normally this is conducted at the end of the day or at the end of each shift.

Ground tarps were sometimes used as a secondary containment system. The effectiveness of ground tarps appeared highly variable based on factors such as vertical distance to structure, wind direction and velocity, and effectiveness of the primary containment system. Ground tarps are used in the same fashion in the United States.

AIR MONITORING. Environmental air monitoring was not required, or conducted, at any site visited. As best as could be determined, environmental air monitoring requirements for abrasive blasting of lead-containing paint, such as the U.S. ambient air quality standards,[5] are nonexistent. In the United States, adherence to these standards is required in some localities and required by specification in many areas.

SOIL MONITORING. Soil lead level monitoring before, during, and after European projects is usually required. The Swiss have noted that as much as 70 μg of lead per square meter per day may be deposited on soil near contained projects during blasting and during movement and teardown of containment systems.[6] Total allowable lead in soils was found to be as low as 50 ppm, depending on the country. EPA has issued guidance[7] regarding allowable soil lead levels. Where children may be exposed to lead in soil, 400 ppm is considered an action level.

WATER MONITORING. No requirements to monitor water quality during blasting were discovered in any country. Blast debris, however, is not allowed to fall into the water or onto the land where it could run off into water. This is quite similar to requirements in the United States.[8]

DISPOSAL. Recycling (off site) or proper disposal of abrasive blast debris is required. Approved haulers transfer the contained waste to authorized treatment and/or disposal facilities. With the exception of Switzerland, such facilities are located in each country. These requirements are similar to requirements and guidance found in the United States.[9,10]

Worker Protection

The requirement to protect workers is generally the employer's responsibility. (An exception, however, exists in the newly enacted Construction Regulations of 1994 in Great Britain, which place the responsibility on the owner of the project and others.) Worker protection programs ranged from implemented to nonexistent. Safety issues seemed to be well addressed. For instance, scaffolding was found to be in good condition and properly erected. Toe boards, midrails, top rails, and crossbracing were seen at all locations. The lead-specific health issues were found to be less well addressed. Areas of discussion concerning lead-specific health issues include worker training, engineering controls, respiratory protection, medical monitoring, and decontamination facilities/worker hygiene.

WORKER TRAINING. No requirements or guidance similar to those in the United States[4,11–15] for training employees on the hazards of lead-containing paint removal were discovered during the tour. When asked about worker training, the hosts generally replied that workers are told removal activities may cause health problems. Crews typically consisted of a small core of permanent, skilled journeymen. The remainder of the work force was skilled or unskilled transient workers. Among the workers seen during the tour, ignorance of or insensitivity to potential adverse health effects of lead was apparent. Large quantities of spent abrasive and debris were found on the floor of all containment systems. Workers, without respiratory protection, moved throughout the containments, creating visible airborne dust. Cigarette butts, drink containers, and food wrappers were observed inside some of the containments. Items such as work clothes and gloves found stored in clean areas outside of the containments were sometimes covered with dust from the work areas.

ENGINEERING CONTROLS. Containments, as previously indicated, were used to control environmental contamination. Dust collection systems, when used, were inadequate to suppress visible airborne dust levels inside containment, even in the absence of abrasive blasting. Placement of the dust collectors appeared to be a matter of convenience. Visibility during active blasting, according to workers, approached zero. Containment, ventilation and dust collection systems are required in the United States.[2,4]

RESPIRATORY PROTECTION. Actual respirator use by workers was not observed. The following respirator types were observed: continuous flow abrasive blast hoods; half-mask air purifying respirators equipped with either high efficiency filters, organic vapor cartridges, or combination organic vapor/high efficiency; and disposable dust/mist respirators.

Conversations with individuals in all countries revealed no requirement for a formal respirator program such as that found in the United States.[16] Respirators were found lying in the work area at several sites. Examination revealed dust on the inside and outside of these respirators. Many workers designated to wear tight-fitting respirators were not clean shaven. At one site, airline fittings appeared to be homemade. At another site, hose length was approximately 300 m. At a third site, gauze-like cloth pads fitted over the facepiece were found on half-mask air purifying respirators. Workers said that petroleum jelly was applied to

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the cloth to provide a more comfortable fit. Dirty and unpackaged half-mask air purifying respirators were sometimes found in office areas, eating areas, and in one instance, living quarters. The above practices are not in accordance with requirements in the United States[4,16] or with common practice.[4,17–20]

Individuals familiar with allowable worker exposure levels cited the Federal Republic of Germany Maximum Concentration Values in the Workplace (MAK = 0.1 mg/m^3 for lead) or the British Occupational Exposure Standard (OES = 0.15 mg/m^3 for lead). However, exposure monitoring to determine actual worker exposures during abrasive blasting, cleanup, containment moving, project inspection, and other operations had not been conducted by anyone at any of the sites. Personal exposure monitoring, required in the United States,[4,16] had not been conducted on or by anyone encountered during the tour.

MEDICAL MONITORING. Medical monitoring to determine a worker's fitness to wear respirators, required in the United States,[16] was conducted by a major contractor in Germany. Otherwise, medical monitoring to determine the physical fitness of workers wearing air purifying respirators was not discovered during the tour.

Blood lead levels were determined annually or biannually according to most people asked. In Germany, allowable blood lead levels were 70 μg of lead per deciliter of blood for males and 25 μg for females. No documentation was available showing actual blood lead levels of workers at any site. Blood lead level monitoring is required initially and periodically on this type of project in the United States.[4]

DECONTAMINATION FACILITIES/WORKER HYGIENE. Decontamination facilities ranged from nonexistent in Switzerland to complete showerhouses in Germany and Great Britain. No linearly arranged clean room/shower/dirty room decontamination facilities were seen at any site, however. At one site, workers were seen leaving in their work clothes. No decontamination or wash facilities were available at this site. At another site, workers were seen showering and changing into clean street clothes prior to departure from the site. However, even where complete decontamination facilities existed, evidence was seen that workers did not necessarily use them prior to entry into clean areas such as mobile offices, mess halls and, in Germany, bunk areas. Soiled work clothes were seen in sleeping areas, clean rooms, and eating areas. High efficiency filter-equipped vacuums, for either housekeeping or worker decontamination purposes, were not found at any site. Decontamination facilities, hand washing stations, dedicated work clothes, and high efficiency filter-equipped vacuums are required in the United States.[4]

Conclusion

Protecting workers and the environment when abrasive blasting lead-containing paints is, at best, a difficult task. Containment systems that protect the environment increase worker exposure levels. The observed environmental protection practices typically meet or exceed the U.S. requirements, while observed worker training and protection practices fall short of U.S. requirements.

Techniques and conditions seen at lead-containing paint removal projects in Europe in many ways mirror similar projects seen in the United States. The issues are certainly the same. Communication with experts in other countries should continue and be expanded through programs such as the FHWA scanning tours. Sharing information on a multinational level may lead to more efficient and cost-effective solutions to the problems involved in protecting the environment, workers, and the steel bridge infrastructure during lead-containing paint maintenance and removal.

Acknowledgments

Special thanks to all the hosts in the various countries. Thanks also to tour members John Peart, Bob Kogler, and Krishna Verma, FHWA; Tom Bernecki, Northwestern University; Kirt Clement, Louisiana Department of Transportation and Development; Ed Cox, Indiana Department of Transportation; and Joe Conn, Loyola College.

References

1. Steel Structures Painting Council: SSPC Guide 6 Guide for Containing Debris Generated During Paint Removal Operations. Steel Structures Painting Council, Pittsburgh, PA (1995).
2. Code of Federal Regulations: Ventilation. 29 CFR 1926.57. U.S. Government Printing Office, Washington, DC (1974).
3. American Conference of Governmental Industrial Hygienists: Industrial Ventilation: A Manual of Recommended Practice, 21st ed. American Conference of Governmental Industrial Hygienists, Cincinnati, OH (1995).
4. Code of Federal Regulations: Lead; Interim Final Rule. 29 CFR 1926.62. U.S. Government Printing Office, Washington, DC (1993).
5. Code of Federal Regulations: National Primary and Secondary Ambient Air Quality Standards. 40 CFR Part 50. U.S. Environmental Protection Agency, Washington, DC (1971).
6. Swiss Federal Laboratories for Materials Testing and Research: Presentation to FHWA tour. Swiss Federal Laboratories for Materials Testing and Research (October 9, 1995).
7. U.S. Environmental Protection Agency: Residential Sampling for Lead: Protocols for Dust and Soil Sampling, Final Report. U.S. Environmental Protection Agency, Washington, DC (1995).
8. Code of Federal Regulations: Water Programs. 40 CFR, Subchapter D. U.S. Environmental Protection Agency, Washington, DC (1979).
9. Code of Federal Regulations: Hazardous Waste. 40 CFR, Parts 261 through 268. U.S. Environmental Protection Agency, Washington, DC (1980).
10. Steel Structures Painting Council: SSPC Guide 7 Guide for Disposal of Lead-Contaminated Surface Preparation Debris. Steel Structures Painting Council, Pittsburgh, PA (1995).
11. The Center to Protect Worker's Rights: Model Specifications for the Protection of Workers from Lead on Steel Structures. The Center to Protect Worker's Rights, Washington, DC (1993).
12. Steel Structures Painting Council: SSPC Worker Training in Industrial Lead Paint Removal and Abatement: OSHA Lead Standard and Environmental Compliance. Steel Structures Painting Council, Pittsburgh, PA (1995).
13. Steel Structures Painting Council: SSPC Supervisor/Competent Person Training for Deleading of Industrial Structures. Steel Structures Painting Council, Pittsburgh, PA (1995).
14. Trimber, K.A.: Industrial Lead Paint Removal Handbook, 2nd ed. KTA-Tater, Inc., Pittsburgh, PA (1993).
15. Code of Federal Regulations: Hazar Communication. 29 CFR 1926.59. U.

Government Printing Office, Washington, DC (1993).
16. Code of Federal Regulations: Respiratory Protection. 29 CFR 1910.134. U.S. Government Printing Office, Washington, DC (1974).
17. American National Standards Institute: American National Standard for Respiratory Protection. ANSI Z88.2. ANSI, Arlington, VA (1992).
18. National Institute for Occupational Safety and Health: NIOSH Guide to Industrial Respiratory Protection. U.S. Department of Health and Human Services, Washington, DC (1987).
19. American Industrial Hygiene Association: Respiratory Protection: A Manual and Guideline, 2nd ed. American Industrial Hygiene Association, Fairfax, VA (1991).
20. National Safety Council: Fundamentals of Industrial Hygiene, 3rd ed. B.A. Plog, Ed. National Safety Council, Chicago, IL (1988).

EDITORIAL NOTE: This article was written by Chris Lovelace in memory of John Peart, recently deceased. Chris Lovelace is an industrial hygiene consultant in the Health Hazards Control Branch, North Carolina Department of Environment, Health and Natural Resources, P.O. Box 27687, Raleigh, North Carolina 27611-7687; telephone: (919)733-0661.

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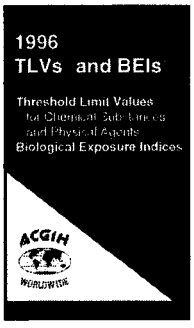

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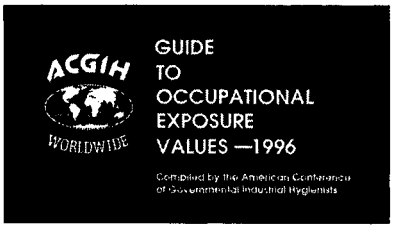

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