Implementing Lead-Safe Work Practices for Steel Structures

Transportation Agency Policies in Twelve States

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Contents

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Readers of this report may also want to consult a companion document by Mark Goldberg and others, *Occupational Blood Lead Surveillance of Construction Workers: Health Programs in Twelve States* (report OSH2-96).

Acknowledgments

Maintenance of a vital infrastructure has long been essential to our well-being as a nation. However, 40 years after the construction of much of the natio n's highways, the increased demand for their restoration is paralleled only by the increased cost for such work. State transportation agencies are increasingly being called on to do more with less. Staff of 12 transportation agencies shared their valuable time with us to help answer the questions in our survey. We hope their responses will help us in developing strategies for restoring and maintaining safe and viable highwa structures, while assuring good working conditions and a safe and healthful environment for the construction workers essential to that task.

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Background

This report consists of a summary and analysis of results of a survey of 12 state Departments of Transportation (DOTs).[1] The 12 states whose DOTs were surveyed are California, Connecticut, Georgia, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, Ohio, Texas, and Washington.

The survey instrument was developed by staff from the Alliance To End Childhood Lead Poisoning, the Center to Protect Workers' Rights, the Mt. Sinai School of Medicine, and the New York State Department of Health, as well as other members of a working group that developed *Model Specifications for the Protection of Workers from Lead on Steel Structures.*[2] The purpose of the survey was to establish each DOT's level of sophistication on lead-related issues regarding worker and environmental protection and, more specifically, to determine particular state characteristics, such as the annual budget for bridge maintenance, repair, and demolition and the anticipated percentage of such structures estimated to contain lead (see annex A).

Departments of Transportation in four of the states surveyed did not return completed questionnaires. Instead, staff from agencies in Michigan, New Jersey, and Texas provided some responses to most survey questions by telephone. Louisiana sent a copy of the state specifications (see table 1 and annex B).

Discussion of Survey Results

Although this section includes a policy analysis based on the survey data collected pursuant to this project, it must be emphasized that the analysis is perforce limited in scope and reliability by three factors.

First, the survey instrument was not comprehensive enough to elicit all pertinent information needed to draw useful conclusions. The parties involved in planning this project agreed that the survey instruments should be relatively short forms, to get as much pertinent information as possible without forcing respondents to spend too much time responding to the questions. It was felt that this would maximize our chances of getting respondents to fill out and return the forms in a timely manner. As it turned out, in most cases several phone calls were required to get DOTs to return the completed forms, and four DOTs failed altogether to do so. Therefore, the assumption that a short form would result in a higher percentage of returned questionnaires was probably correct. However, the down side of this approach is that less information was obtained than would be optimally desirable.

Second, relatively little follow-up with respondents was planned or possible. Overall, DOT

[1] Throughout this report, "DOT" refers only to state Departments of Transportation.

[2] Published by The Center to Protect Workers' Rights, 1993.

respondents were less than anxious to cooperate with us on these questions. This was not a surprise, as all parties involved in the planning of this project anticipated that many DOTs would be reluctant to share and discuss weaknesses in their individual programs with us. As a result of this anticipated

Table 1. Key survey findings

State	Budget ($ millions)	Lead H&S Specs?	Structures coated w/ lead-based paint	Duration of jobs (months)	Extra training required?[a]	Stricter worker-action levels?[a]	Blood-lead levels to DOT
CA	$39.945	No	70% steel	70%:<2 25%:2-12 5%:>12	No	No	No
CT	$63. - $114.	Yes	90%+ steel	75%:2-12 15%:>12 10%:<2	Yes	Yes	Yes
GA	$46.	No	85% steel 5% concrete	70%:<2 20%:2-12 10%:>12	No	No	Yes
LA	No Data	No	No data	No data	No	No	No
MD	$15. - $20.	Yes	99% steel and concrete	80% <2 18% 2-12 2% >12	Yes	No	No
MA	$27.+	Yes	98% steel	5% <2 65% 2-12 30% >12	No	Yes	Yes
MI	Est. $114.	No	50% steel	(See note)	No	No	No
NJ	$134. - $150.	Yes	About 88%	Avg. 1 yr	No	No	Yes
NY	Est. $130.	Yes	Most	20% <2 60% 2-12 20% >12	No	Yes	Yes
OH	$21.	No	(See note)	97% 2-12 3% >12	No	No	No
TX	Up to $47.	No	5% steel	90% <2 10% 2-12	No	No	No
WA	$28.4	No	95% steel	25% <2 65% 2-12 10% >12	No	No	No

a. At issue is whether DOT contract requirements exceed state and/or federal standards.

Note: In Ohio, reportedly 80% of all steel structures and 20% of all concrete structures slated for *maintenance and repair* are coated with lead-based paint, as are 50% of all steel structures and 50% of all concrete structures slated for *demolition*. Ohio contacts provided a July 1994 estimate of 2,530 -3,089 bridges coated with lead-based paint.

Michigan contacts stated that 100% of all maintenance jobs take less than 2 months to complete, 70% of all other jobs last between 2 and 12 months, and the remaining 30% last more than 12 months.

reaction, telephone follow-up calls were generally limited to confirming written responses and obtaining supplementary information and materials whenever possible from cooperative DOT personnel.

Third, survey responses varied considerably in terms of the quality and the overall reliability of the responses. It seems clear that much depended on who was filling out the survey form or talking to us by telephone. In one case, contradictory answers were provided by the individuals we interviewed and the survey form was never returned to us.

In spite of the above limitations, the survey results permit general observations, analysis, and policy recommendations. Following are the key observations.

First, it seems clear that of the bridges in the country likely to need maintenance, repair, or demolition in the near future, most probably contain some lead-based paint. Of the states surveyed, only Michigan and Texas claim their bridge inventory is relatively free of lead, with these states reporting that lead-based paint is on 50% and 5% of their bridges, respectively.[3] Such assertions should be verified given that trends in other states indicate that 70 to 99% of steel structures are coated with lead-based paints. The overall pattern indicates an overwhelming likelihood that workers involved in bridge maintenance, repair, and demolition are likely to encounter lead-based paint in the course of their activities.

Second, lead health and safety specifications were enhanced beyond federal and state law only in northeastern and mid-Atlantic states.[4] It seems to be no coincidence that these are the regions of the country where lead poisoning has been most widely acknowledged to be a problem. This suggests that this geographic disparity is at least partly attributable to public awareness of the hazards associated with lead exposure.

Third, in several states,[5] most jobs reportedly take less than two months to complete. It is possible that a high frequency of short-duration jobs reflects a greater volume of regular maintenance. Greater attention to maintenance is desirable to the extent that it extends bridge life and delays the need for more costly rehabilitation or demolition, which can include extensive abrasive blasting and torch cutting. (Abrasive blasting and torch cutting potentially produce the highest lead exposures.) It is

[3] No response was obtained from Louisiana.

[4] Connecticut, Maryland, Massachusetts, New Jersey, and New York.

[5] California (70%), Georgia (70%), Maryland (80%), and Texas (90%). Michigan reported 100% of its maintenance jobs require less than two months to complete.

also possible, however, that the quick nature of the short-duration jobs might result in greater attention to productivity and less attention to safe work practices. This suggests that safety practices in those states merit particularly close scrutiny.

Conversely, it can be expected that in states where a significant percentage of the work requires a year or so to complete, work practices are likely to be more evolved and greater consideration is more likely to be given to health and safety.[6] Given that the states in this category have some of the most health-protective requirements of the 12 surveyed, this assumption seems to be borne out.

Fourth, DOT budgets for maintenance, repair, and demolition of bridges varied considerably, from low of $15 million to $20 million in Maryland to a high of up to $150 million in New Jersey. It is difficult to account for such variability. On an optimistic note, greater budgets may reflect that work is being done in a way that incorporates health and safety measures that add cost to projects. Conversely, the availability of relatively large sums of money might conceivably permit the state to rush to delead bridges before such work becomes more expensive to undertake in light of heightened standards and more stringent enforcement of safe work practices. Or, more simply, increased budgets may reflect increased lead-painted bridge stock in a given state. The number of steel bridges in each surveyed state is given in table 2.

Table 2. Number of steel bridges in each surveyed state, with states ranked by total number

State	Less than 60 feet	Longer than 60 feet	Total
Ohio	3,938	6,744	10,682
New York	721	3,694	4,415
Michigan	1,287	3,103	4,390
Georgia	427	3,061	3,488
Texas	135	3,156	3,291
Massachusetts	409	1,771	2,180
Maryland	520	1,605	2,125
New Jersey	397	1,385	1,782
California	181	1,236	1,417
Connecticut	183	1,026	1,209
Washington	257	646	903

[6] New Jersey (100%), Massachusetts (30%), New York (20%), and Connecticut (15%). Michigan reported 30% of its repair and demolition jobs require more than 12 months to complete.

Louisiana	70	388	458

Source: Coatings and Corrosion Costs of Highway Structural Steel. Federal Highway Administration Report FHWA-RD-79-121; March 1980.

Obstacles and Opportunities

The survey results point up several obstacles to enhanced lead-related work practices and policies. However, opportunities clearly exist to address the obstacles.

First and foremost, a thorough understanding is needed of the potential risks involved in this hazardous work. Those states that have documented significant lead poisoning prevalence rates (including Connecticut, Maryland, Massachusetts, New Jersey, and New York) have attempted to address the underlying causes of worker exposures with enhanced specifications and other requirements and innovations intended to reduce the risk of harmful lead exposures. (It should be emphasized that each of these states has an occupational blood-lead registry program, which is necessary to assess the magnitude of occupational lead poisoning.)[7] One obstacle blocking progress elsewhere seems to be the relative lack of knowledge in most other states in the country about this issue. The corresponding opportunity is to improve awareness in those states through education and the establishment and use of blood-lead surveillance systems. More focus on the lead issue needs to occur through local unions, health departments, other appropriate organizations (such as the Steel Structures Painting Council and the American Association of State and Highway Transportation Officers [AASHTO]), and outreach efforts.

Second, the cost issue needs to be brought into sharper focus. Although several states surveyed complained that costs had escalated due to worker and environmental protection concerns, no mention was made about corresponding savings in terms of adverse health effects avoided, the costs of medical treatment avoided, enhanced worker productivity, and/or environmental remediation costs avoided, among others. A thorough cost-effectiveness analysis reflecting such factors could go a long way toward making such standard complaints about increased costs of doing business look rather simplistic, and might also provide persuasive arguments for policymakers interested in reducing overall state costs, let alone simply protecting worker health and the environment generally.

Third, it seems that not enough experimentation is occurring with some of the innovative technologies that are thought to reduce worker exposure to lead. In most cases, this problem refers back to the prior two obstacles cited— first, that some of these states do not believe they have a lead poisoning concern worth addressing (nor the data to prove otherwise) and, second, that many of these states believe that switching to or experimenting with technologies designed to reduce worker exposure will unnecessarily increase costs. Thus, it appears that this third identified obstacle to progress in implementing enhanced work practices and lead-related specifications is a function of, or certainly related to, the first two.

A fourth obstacle to progress identified through this survey is the predominant lack of an

[7] See *Occupational Blood-Lead Surveillance: Health Programs in Twelve States*, Washington, D.C.: The Center to Protect Workers' Rights, 1996.

appropriately trained state staff person to advise a DOT on health and safety issues. Most DOTs surveyed have an engineer on staff who serves as "health and safety expert." This is in most cases insufficient to ensure that health and safety concerns are being properly addressed. The lack of appropriate formal training also makes it unlik ely that such staff can address health and safet problems in a truly preventive manner. It is much more likely that such problems are reacted to, rather than anticipated and prevented. This significant obstacle can be overcome by stressing the importance of DOTs' hiring a professional industrial hygienist — if not as permanent staff, at least on an ongoing consulting basis. The presence of such an individual would likely constitute more of a positive influence on relevant DOT policy matters than would outreach efforts coming from outsid the DOT and potentially perceived by the DOT as far-fetched if not hysterical. In addition, such a staff person is needed to review contractor health and safety programs for lead before work proceeds.

Policy Recommendations

Several policy recommendations follow from the survey findings. Two apply at the state and federal levels.

1. Supplement state and federal law with additional specification requirements. The U.S. Department of Transportation should require comprehensive measures to protect workers and the environment against hazardous lead exposures. In the interim, states should follow the examples of such DOTs as those in Connecticut and New York. In particular, state DOTs should seriously consider lowering their thresholds for medical removal and intervention, as well as mandating appropriate worker training. The thresholds should be set based on state-specific data on worker safety and health.

2. In light of the rapid development of new technologies for industrial lead abatement, state agencies can play an important role in evaluating such technologies and communicating thei findings at meetings of professional, trade, and industry forums. Federal agencies can assist in the identification and evaluation of efficient technologies through investment in clean-technology research and development.

The remaining policy recommendations apply to the state level.

3. Include specific health and safety costs in the contract specifications. This is already being done by New York and has the effect of leveling the playing field so that all contractors must provide the same minimal level of worker protection.

4. Require the lead health and safet specifications to be highlighted. These important specifications should be promi nently featured in the overall contract requirements. For instance, this would require the Ohio DOT to reorganize its specifications so that the lead health and safety specifications are given more prominence in the contract document.

5. Require appropriate worker training and contractor certification. While Title X may soon

require such training and certification, the U.S. Department of Transportation should institut these requirements immediately. In lieu of such federal leadership, individual state DOTs

could do so. In addition to minimizing the risk of adverse health exposures, such requirements could avoid future problems, including a potential lack of qualified contractors and workers once the federal mandates take effect.

6. Hire a professional industrial hygienist as part of permanent DOT staff in each state. As discussed above, this could be the key to overcoming many of the current obstacles to real progress in the area of worker protection from lead exposures.

7. DOTs should require that contractors use the support of professional industrial hygienists in the development and oversight of lead health and safety programs. Such a program should b monitored daily by an industrial hygienist or by qualified personnel supervised by an industrial h gienist. A professional industrial hygienist should visit each site weekly to ensure that its lead health and safety program is up-to-date with current work activities.

8. Require contractors to use dust-minimizing technology. Uncontrolled abrasive blasting is a dust-generating technology that should be phased out altogether. Instead, local exhaust, vacuum-equipped, or similar technology should be more widely encouraged as a dust-minimizing methodology. Non-abrasive methods should also be more commonly explored, as should overcoating and other newer methods. Consistent with recommendations made b NIOSH, silica as a blasting abrasive should be strictly prohibited.

9. Require contractors to report blood-lead levels to DOTs. A lack of adequate DOT knowledge about whether and how well workers are protected from lead exposures at DOT sites is a critical flaw that must be addressed. By receiving mandatory and frequent blood-lead level reports, DOTs can help ensure that safe practices are followed that do not result in elevated blood-lead levels for workers and that contractors are instituting the controls that state agencies are paying for. Additionally, DOTs would then be better able to track individual work sites and identify contractors whose practices result in undesirable blood-lead levels. These contractors would then presumably be under pressure to improve, or be eliminated from consideration for future DOT jobs.

10. Require pre-bid conferencing. The U.S. Department of Transportation should consider reinstating the policy requiring pre-bid conferencing as a prerequisite to awarding contracts for bridge work. In the absence of such a federally mandated policy, DOTs should nevertheless require attendance for all bridge and steel structure contractors at pre-bid conferences to review project-specific lead hazards and to discuss minimum control requirements.

11. Require contractors to have on hand and understand essential documents, including applicable state and federal standards. A list of such materials is included in *Model Specifications for the Protection of Workers from Lead on Steel Structures* (The Center to

Protect Workers' Rights, 1993). As Massachusetts has done in its specifications, DOTs may insert a clause in

their specifications requiring contractors to obtain copies of certain materials and to be familiar with their contents. DOTs should consider putting the model specifications on such list.

12. Focus enforcement efforts through better DOT staff training. Enhanced enforcement efforts are likely to be one of the keys to better performance. DOTs should ensure that their staff are appropriately trained to critically evaluate contractor performance on their lead health and safety programs. In particular, enforcement efforts should target contractors whose records indicate problems with worker protection and the effective implementation of safe work practices.

13. Establish better ties within and among the states. Clearly, some DOTs have evolved toward safer work practices and more carefully crafted job specifications than others. Better communication between DOTs, through AASHTO for instance, may well help set those not lagging behind on a course toward enhanced lead-related job specifications. In addition, state health and labor agencies can be important allies in these efforts, and vice versa. Interagency collaboration, as demonstrated in Connecticut and New Jersey, maximizes a state's ability to effectively enforce regulations and prevent lead poisoning of workers and lead contamination of the community cost-effectively.

Annex A. State Summaries

This section reports individual state DOT responses to key survey questions. Where appropriate, th summary quotes directly from the completed survey response. However, in many places the summary paraphrases the actual response for purposes of clarity or brevity. In several instances, no response was given to particular questions, or if a response was given, it was ambiguous and/or the respondent was tentative. In those cases, attempts at follow-up were made. However, in some instances such follow-up yielded no clarification. In such cases, this section leaves the question unanswered, marked with a dash (—).

Key questions were determined by focusing on criteria designed to elicit information pertaining to: the size of the DOT budget for potentially lead-related work; the anticipated likelihood of encountering lead during the course of bridge work; the typical duration of such work; the existence of lead health and safety specifications that go beyond what is required under state and federal law; the level of lead-related expertise applied by the DOT in overseeing such work; whether DOTs routinely receive reports of workers' blood-lead levels; and an assessment of technologies being used or experimented with to achieve greater worker and/or environmental protection (see table 1).

California

ü Estimated annual budget: $39,945,000

ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 70% of steel bridges

ü Estimated duration of projected work: 70% less than 2 months; 25 % bet. 2 and 12 months; 5% more than 12 months.

ü Lead health and safety specifications: None beyond OSHA

ü DOT staff focused on lead health and safety program: "District Safety Office and Headquarters Safety Office review procedures, develop safety programs and procedures, and advise field personnel."

ü Training requirements in addition to OSHA/EPA: None

ü Blood-lead levels reported to DOT: No

ü Action levels stricter than OSHA's: No

ü Technologies being evaluated and/or used to reduce worker exposure: Water blasting with and without abrasives; hand tool cleaning; power tool cleaning; shrouded tools; vacuum blasting; sand and water slurry blasting (torbo system); copper slab with 15% Blastox abrasives.

ü Difficulties encountered with above technologies: "Low production rates, Increased costs.

ü Cost impact of above technologies: "Unknown at this time."

ü Technologies being evaluated and/or used to reduce environmental exposure: Same as those that reduce worker exposure.

ü Effects of above technologies on worker exposure: "Blastox: slight reduction in exposure reported by vendor — not yet tested by [CALDOT]. Torbo: demonstration looked ver promising. Exposure levels for 15% lead paint at 10µg/m^3."

ü Cost impact of above technologies: "No information except: Blastox mixed with copper slag may be used in the kilning of Portland cement. Since this is considered recycling, there is no long ter liability. Torbo: significant increase in production rates over most other cleaning methods (excep open dry blasting)."

ü Additional remarks: None

Connecticut

- ü Estimated annual budget: Between $63 million and $114 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 90+% of steel structures
- ü Estimated duration of projected work: 75% between 2 and 12 months; 15% more than 12 months 10% less than 2 months.
- ü Lead health and safety specifications: Required lump-sum fee to prepare and furnish: written Lead Health Protection Program procedures; written record of all employees participating in such program; procedure for instituting medical surveillance including method and personnel involved procedure for employee notification; procedure for employee exposure assessment with OSHA and CRISP guidelines; selection and justification of appropriate respiratory equipment and protective clothing; procedure for conducting employee training; written hazard communication procedures; written personal hygiene procedures; monthly certification; monthly compliance report; summary or annual reports.

  Also, weekly inspections and certification that respirators are being cleaned properly; use of CRISP forms to collect and report data to DOT; agreement to follow as a minimum the testing guidelines provided by CRISP. (CRISP is Connecticut Road Industry Surveillance Project.)
- ü DOT staff focused on lead health and safety program: Office of Construction and District offices oversee lead health and safety program development and execution. Contractor must provide certified industrial hygienist.
- ü Training requirements in addition to OSHA/EPA: Certified industrial hygienist must develop and conduct job-specific training using CRISP/DOT guidelines.
- ü Blood-lead levels reported to DOT: Site certified industrial hygienist provides blood-lead levels to DOT.
- ü Action levels stricter than OSHA's: Medical removal is triggered at 30 micrograms per deciliter (µg/dl), with intervention at 20 µg/dl.
- ü Technologies being evaluated and/or used to reduce worker exposure: Class 1 and 3 SSPC Guid 61 containment system (SSPC is Steel Structures Painting Council.)
- ü Difficulties encountered with above technologies: Not enough data
- ü Cost impact of above technologies: Cost is minimal
- ü Technologies being evaluated and/or used to reduce environmental exposure: "None at this time.
- ü Effects of above technologies on worker exposure: —

ü Cost impact of above technologies: —

ü Additional remarks: Attachments (to the returned survey form) included "State and Federal Local Bridge Program" for Fiscal Year 1996. Also, CRISP is in danger of being eliminated due to lack of funding. From July 1, 1995 to June 30, 1996, CRISP will continue to function albeit with a skeleton crew. Currently no funding source has been found to maintain CRISP beyond June 1996.

Georgia

- ü Estimated annual budget: $46 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 85% of steel structures and 5% of concrete structures
- ü Estimated duration of projected work: 70% less than 2 months; 20% between 2 and 12 months; 10% more than 12 months.
- ü Lead health and safety specifications: Nothing beyond Federal requirements
- ü DOT staff focused on lead health and safety program: None
- ü Training requirements in addition to OSHA/EPA: Requires certification from contractor stating that supervisors have had training
- ü Blood-lead levels reported to DOT: Contractor reports blood-lead levels to DOT
- ü Action levels stricter than OSHA's: None
- ü Technologies being evaluated and/or used to reduce worker exposure: "SSPC. CL 3 that includes negative air and filtration equipment."
- ü Difficulties encountered with above technologies: None
- ü Cost impact of above technologies: "400% increase in cost when we required SSPC. CL 3 containment."
- ü Technologies being evaluated and/or used to reduce environmental exposure: "SSPC CL 3 that includes negative air and filtration equipment."
- ü Effects of above technologies on worker exposure: "Reduces dust in work area."
- ü Cost impact of above technologies: "400% increase in cost when we required SSPC CL 3 containment."
- ü Additional remarks: None

Louisiana

In addition to requiring compliance with "allapplicable Federal, State and Local laws and regulations and worker protection and environmental protection requirements," the specifications call for the following two supplementary elements:

1. Contractor must submit a written compliance plan to DOT for review 3 weeks prior to beginning work.

2. All personnel hired for work on each lead-related project must have at least 2 years' experience at their respective trades.[8]

[8]This information is based solely on a review of Louisiana's specifications for work on lead-coated structures; the questionnaire was not completed.

Maryland

- ü Estimated annual budget: $15 million -$20 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 99% of steel and concrete structures
- ü Estimated duration of projected work: 80% less than 2 months; 18% between 2 and 12 months; 2% more than 12 months.
- ü Lead health and safety specifications: Requires contractor to have a certified industrial hygienist, who must "monitor worker exposure and ambient air before and during cleaning operations at each bridge."
- ü DOT staff focused on lead health and safety program: Certified Industrial Hygienist representin DOT checks on field conditions and on the contractor's certified industrial hygienist
- ü Training requirements in addition to OSHA/EPA: Requires SSPC "QP-1" certification
- ü Blood-lead levels reported to DOT: No
- ü Action levels stricter than OSHA's: DOT's inspectors and project engineers are removed from site if their blood-lead levels reach 20 µg/dl
- ü Technologies being evaluated and/or used to reduce worker exposure: Containment ventilation per SSPC Guide 61; vacuum power tools on small repair contracts.
- ü Difficulties encountered with above technologies: "High cost and the fact that air-fed hoods and respirator and protection clothing are difficult to work in."
- ü Cost impact of above technologies: "Costs for cleaning and painting have risen from $1-$2/squar foot to $9-$13/sq ft."
- ü Technologies being evaluated and/or used to reduce environmental exposure: Vacuum power tools
- ü Effects of above technologies on worker exposure: "Worker safety has not been a problem."
- ü Cost impact of above technologies: "Unknown."
- ü Additional remarks: DOT attached (to the completed survey form) copies of DOT's cleaning and painting specifications and their lead and abrasive blasting protection requirements.

Massachusetts

- ü Estimated annual budget: At least $27 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 98% of steel structures
- ü Estimated duration of projected work: 65% between 2 and 12 months; 30 more than 12 months 5% less than 2 months.
- ü Lead health and safety specifications: Contractors are required to be familiar with "various bulletins, guidelines and publications listed" in the specifications, including two by SSPC, one b OSHA, and one by NIOSH. Contractors are also required to submit all employees to monthl blood lead tests regardless of blood lead levels. Medical removal at 40 µg/dl, with reinstatement at two consecutive readings of 30 µg/dl. "A CIH is required to prepare and administer the Health and Safety Program for lead." "A decontamination /changing facility must be provided and used along with hot water washing and respirator cleaning facilities." (CIH is certified industrial hygienist.)
- ü DOT staff focused on lead health and safety program: None
- ü Training requirements in addition to OSHA/EPA: None
- ü Blood-lead levels reported to DOT: Contractors required to report blood-lead levels to DOT and DOH
- ü Action levels stricter than OSHA's: Medical removal "at contractor's expens if blood-lead level reaches 40 µg/dl, with reinstatement when two consecutive tests confirm levels at or below 30 µg/dl.
- ü Technologies being evaluated and/or used to reduce worker exposure: Wet abrasive blasting; chemical stripping; vacuum-assisted power tools.
- ü Difficulties encountered with above technologies: Containment and disposal of water run-off
- ü Cost impact of above technologies: Wet abrasive blasting $3/square foot more cos -effective than dry abrasive blasting
- ü Technologies being evaluated and/or used to reduce environmental exposure: "None"
- ü Effects of above technologies on worker exposure: —
- ü Cost impact of above technologies: —
- ü Additional remarks: Current specifications for cleaning and painting steel bridges are attached.

Michigan

- ü Estimated annual budget: Approximately $114 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 50% of steel structures
- ü Estimated duration of projected work: Less than 2 months for all maintenance jobs; for all other jobs, 70% between 2 and 12 months and 30% more than 12 months.
- ü Lead health and safety specifications: —
- ü DOT staff focused on lead health and safety program: None ("Project manager")
- ü Training requirements in addition to OSHA/EPA: None
- ü Blood-lead levels reported to DOT: No
- ü Action levels stricter than OSHA's: No
- ü Technologies being evaluated and/or used to reduce worker exposure: Vacuum blasting
- ü Difficulties encountered with above technologies: "Workers don't like it. It makes work too slow."
- ü Cost impact of above technologies: "Cost is not a concern."
- ü Technologies being evaluated and/or used to reduce environmental exposure: Ontario Transportation Ministry's "Auto Blast" made by Steinman Engineering
- ü Effects of above technologies on worker exposure: "No worker protection needed."
- ü Cost impact of above technologies: "Reduces costs by half and enables quicker work."
- ü Additional remarks: None

New Jersey

- ü Estimated annual budget: $134 million - $150 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: About 88%
- ü Estimated duration of projected work: Average about 1 year
- ü Lead health and safety specifications: Require certified industrial hygienist on site. Also require monthly blood-lead sampling and zinc protoporphyrin counts. Also require post-employment or at least yearly physical exams for all employees who had blood-lead level in excess of 40 µg/dl at any time during their employment.
- ü DOT staff focused on lead health and safety program: Certified industrial hygienist or professional engineer with occupational health background
- ü Training requirements in addition to OSHA/EPA: None
- ü Blood-lead levels reported to DOT: Contractor required to report to DOT.
- ü Action levels stricter than OSHA's: —
- ü Technologies being evaluated and/or used to reduce worker exposure: —
- ü Difficulties encountered with above technologies: —
- ü Cost impact of above technologies: "Cost of work has probably gone up five times in the last five or six years."
- ü Technologies being evaluated and/or used to reduce environmental exposure: —
- ü Effects of above technologies on worker exposure: —
- ü Cost impact of above technologies: —
- ü Additional remarks: None

New York

- ü Estimated annual budget: Approximately $130 million

- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: "Most"

- ü Estimated duration of projected work: 60% between 2-12 months; 20% less than 2 months; 20% more than 12 months

- ü Lead health and safety specifications: Provides contract bid items to allow direct payment to contractors for: 1) Development and implementation of a Lead Health and Safety Program - paid on a lump sum basis prorated over the course of the job; 2) Development of a Lead Exposure Control Plan, paid on a lump sum basis on receipt; 3) Medical testing and exposure monitoring sample analysis, paid as cost plus 5% for overhead and profit; 4) Decontamination facilities, paid on a weekly basis.

  Also require qualified industrial hygienist to provide oversight of all aspects of contractors' lead health and safety program.

- ü DOT staff focused on lead health and safety program: Regional Construction Safety Coordinators are responsible for implementing NYDOT lead Health and Safety program on individual projects and for monitoring contractors' programs. Central Office Construction Division staff make Quality Assurance visits to selected projects.

- ü Training requirements in addition to OSHA/EPA Contractors required to provide documentation that OSHA training was completed.

- ü Blood-lead levels reported to DOT: Contractors required to submit all medical monitoring data.

- ü Action levels stricter than OSHA's: Intervention by an industrial hygienist if an increase of 10 µg/dl or more is observed between consecutive tests for any individual worker.

- ü Technologies being evaluated and/or used to reduce worker exposure: Alternative pain -removal techniques required; special ventilation and filtration requirements for containment systems; vacuum blasting; power tool cleaning to bare metal with vacuum attachment; chemical stripping; wet abrasive blasting.

- ü Difficulties encountered with above technologies: Vacuum blasting: ir regular surfaces, rivet heads, and sharp-angled steel members present problems in acquiring a perfect seal at the vacuu head; vacuum blast method is very slow and the equipment is unwieldy to use. Power tool (vacuum shrouded) cleaning: needle gun could no t prepare the surface to Commercial Blast Cleaning standards (SSPC-SP6). Chemical stripping: rust and mill scale were not effectivel removed, an alkaline residue was present on the surface which would have to be neutralized if paint were to be applied. Steel surfaces prepared by chemical removal methods do not meet Commercial Blast

Cleaning standards (SSPC-SP6) and would not be acceptable for painting without further cleaning. Chemical removal methods do not impart a surface profile for proper coating adhesion. Wet abrasive blasting poses such problems as worker safety endangerment due to slippery footing created by sludge, containment requirements for reduced dusting conditions and for the collection of water, and the need for chemical rust inhibitors.

- ü Cost impact of above technologies: "Costs could be expected to be somewhat higher than those for open abrasive blasting using expendable abrasives. Low dusting abrasives bear a higher cost than those that pulverize upon impact (like Black Beauty)."

- ü Technologies being evaluated and/or used to reduce environmental exposure: Class A and localized containment systems, as well as alternative paint removal techniques expected to redu both worker and environmental lead exposure.

- ü Effects of above technologies on worker exposure: Reduced worker exposure in Class A containment structures, thanks to ventilation and filtration; no worker exposure outside containment structures.

- ü Cost impact of above technologies: Class A containment increases painting costs 210 to 270%.

- ü Additional remarks: None

Ohio

- ü Estimated annual budget: $21 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 80% of all steel structures and 20% of all concrete structures slated for maintenance and repair; 50% of all steel structures and 50% of all concrete structures slated for demolition.
- ü Estimated duration of projected work: 97% between 2 and 12 months; 3% more than 12 months.
- ü Lead health and safety specifications: None beyond OSHA
- ü DOT staff focused on lead health and safety program: None
- ü Training requirements in addition to OSHA/EPA: None
- ü Blood-lead levels reported to DOT: None
- ü Action levels stricter than OSHA's: None
- ü Technologies being evaluated and/or used to reduce worker exposure: Vacuum blasting, dry ice, chemical strippers.
- ü Difficulties encountered with above technologies: "Vacuum blasting was extremely slow and impossible on flange edges, cross frame angles, bolt heads and tight corn ers. Dry ice was extremely low and not productive. Chemical strippers still require sandblasting to provide anchor pattern."
- ü Cost impact of above technologies: "More than doubles the cost of performing the work."
- ü Technologies being evaluated and/or used to reduce environmental exposure: "Nothing at this time."
- ü Effects of above technologies on worker exposure: —
- ü Cost impact of above technologies: —
- ü Additional remarks: As of July 29, 1994, Ohio DOT's bridge inventory lists 2530 bridges with lead-based paint, plus an additional 559 that could possibly contain lead-based paint. Attached DOT memo dated August 3, 1994 estimates that "at our current pace, we could have all lead removed in approximately 9 years. Based on today's average cost of $205,000 to paint a bridge, our total cost to paint all remaining lead coated bridges would be $518,650,000, of which approximately one half would be borne by FHWA."

Texas

- Estimated annual budget: $47 million at most
- Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 5% of steel structures and no concrete structures are lead-coated
- Estimated duration of projected work: 90% less than 2 months; 10% between 2 and 12 months.
- Lead health and safet specifications: Nothing beyond Federal requirements
- DOT staff focused on lead health and safety program: None
- Training requirements in addition to OSHA/EPA: None
- Blood-lead levels reported to DOT: "Only on case-by-case basis."
- Action levels stricter than OSHA's: None
- Technologies being evaluated and/or used to reduce worker exposure: Vacuum blasting and "grinder enclosed shrouded tools."
- Difficulties encountered with above technologies: "No data"
- Cost impact of above technologies: "No data"
- Technologies being evaluated and/or used to reduce environmental exposure: "Total containment"
- Effects of above technologies on worker exposure: "No data"
- Cost impact of above technologies: "Doubled cost of projects"
- Additional remarks: None

Washington

- ü Estimated annual budget: $28.4 million
- ü Percentage of bridges and other elevated highway structures estimated to be coated with lead-based paint: 95% of all steel structures
- ü Estimated duration of projected work: 65% between 2 and 12 months; 25% less than 2 months; 10% more than 12 months.
- ü Lead health and safety specifications: Nothing beyond Federal requirements
- ü DOT staff focused on lead health and safety program: No
- ü Training requirements in addition to OSHA/EPA: None
- ü Blood-lead levels reported to DOT: No
- ü Action levels stricter than OSHA's: Medical removal of DOT staff at 30 µg/dl, with return at 25 µg/dl.
- ü Technologies being evaluated and/or used to reduce worker exposure: Shrouded tools; vacuum blasting; encapsulation products.
- ü Difficulties encountered with above technologies: None
- ü Cost impact of above technologies: —
- ü Technologies being evaluated and/or used to reduce environmental exposure: Vacuum blasting; vacuum tools; Blastox.
- ü Effects of above technologies on worker exposure: Reduced worker exposure to lead dust; disus of full containment reduces risk of injury and death by falling while rigging.
- ü Cost impact of above technologies: "Under development."
- ü Additional remarks: "Our main problem with implementing any environmental or health safet program is that the rules are continually changing, it seems that we are always in a state of flux. For example: we were told that zinc would not be regulated by the EPA; now, after zinc has been adopted as a primer constituent in lieu of lead the *Journal of Protective Coatings & Linings* states that zinc will probably be regulated as a hazardous material. This hit and miss method of regulation needs to be reformed."

Annex B: Questionnaire Sent to State Transportation Agencies

National Survey
A. Condition of Infrastructure and Projected Workload
(The questions in this section are intended to gather information and demolition work involving the disturbance of lead-based paint on bridges and other elevated highway structures. If you cannot give a precise answer to any of these questions, please respond with your best estimate.)
Please state your agency's projected annual budget for work involving:
a. maintenance of bridges and other elevated highway structures
**b. repair of those structures:<OL> %repair work<OL>%painting/re-coating
**
c. demolition of those structures:
<P>
2. Please estimate the respective anticipated Federal contributions and State contributions for each of a, b, and c above.
**a. Federal State
**
**b.<OL><LI> Federal State <LI> Federal State **
c. Federal State
3. Please estimate the percentage of those structures that are steel structures vesus the percentage that are concrete:
a. % steel structures
b.%concrete structures
<P>
4. Please estimate the percentage of those structures that you anticipate are coated with lead-based paint:
a. <OL><LI>% of maintenance work on steel structures
**<LI> % of maintenance work on concrete structures
**
<P>
b. <OL><LI>% of repair work on steel structures
**<LI> % of repair work on concrete structures
<P>**
c. <OL><LI>% of demolition work on steel structures
**<LI> % of demolition work on concrete structures
<P>**
5. Please estimate the anticipated duration of projected work
**a. % of jobs less than 2 months duration
**
**b. % of jobs between 2 and 12 months duration
**
c. % of jobs greater than 1 year's duration.<P>
b. Environmental & Occupational Lead Exposure Preventin
(Please provide details about current or planned programmatic initiatives to protect workers and the environment from hazardous exposures to lead.)
<P>
1. Does your state DOT have written contract specifications related to lead health and safety for workers? If so, could you please send us a copy?<P>
**a. When were these specifications written?
**
b. Have they been modified since the 1993 OSHA lead in construction standard were issued? If so, how were they modified?<P>
2. Does your state DOT have written contract specifications related to the prevention of environmental exposures to lead? If so, could you please send us a copy?<P>
**a. When were these specificatins written?
**
b. What prompted their development?<P>
3. Does your state DOT have specific staff whose duties include development and/or execution of a worker lead health and safety program? If so, please indicate their involvement.
**a. At the contract bid review level?
**
b. At the lead health and safety program development level?
c. At the lead health and safety program execution level?<P>And please indicate what if any professional qualifications are required for this staff position:

4. Does your state DOT impose specific worker and supervisor training requirements for contractors with

respect to lead? If so, what are they, who is responsible for conducting the training, and how do you verify that training requirements have been met?<P>
5. Does your state DOT receive blood lead level reports on workers employed by contractors on DOT sites? If so, are these reports submitted by your state's health department or by the individual contractor?<P>
a. Has your agency established any threshold blood lead level, or any speicific increase in individual blood lead levels over time, either of which is stricter thatn what OSHA requires? If so, what action is triggered when?<P>
C. Technologies Designed for Preventin of Occupational and/or Environmental Exposures<P>
1. What technologies are being evaluated and/or used to reduce<U>worker</u> exposure to lead in your state DOT's maintenance, repair, and/or demolition efforts on bridges and other elevated highway structures? (eg shrouded tools)<P>
**a. How are these technologies being evaluated to determine their effectiveness in reducing lead exposures?
**
**b. What if any difficulties have you encountered with these technologies?
**
c. For each technology evaluated, please estimate the cost impact of utilizing the technology:
<P>2.
2. What technologies are being evaluated and/or used to reduce <U>environmental</u> exposur to lead in your state DOT's maintenance, repair and/or demolition efforts on bridges and other elevated highway structures?
<P>
a. What effects have each of these technologies had on worker protection or exposure?
<P>
b. For each technology evaluated, please estimate the cost impact of utilizing the technology:

<P>
Finally, do you know of any studies evaluating the condition of your state's transportation infrastructure, particurlarly relating to bridges and other elevated highway structures? If so, would you be so kind as to send us a copy of their conclusions and/or executive summaries?

Annex C: Participating State Transportation Agencies

California Department of Transportation
1120 N Street
Sacramento, CA 95814
Phone: 916-654-5266
Mailing Address: P.O. Box 942873
Sacramento, CA 94273-0001

Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, Connecticut 06111
860-594-3000

Georgia Department of Transportation
2 Capitol Square
Atlanta, Georgia 30334
404-656-5260

Louisiana Department of Transportation
and Development
P.O. Box 94245, Capitol Station
Baton Rouge, LA 70804-9245
504-379-1200

Maryland Department of Transportation
State Highway Administration
707 North Calvert Street
Baltimore, Maryland 21202
410-333-1122
Mailing Address: P.O. Box 717
Baltimore, Maryland 21203-0717

Massachusetts Highway Department
Transportation Building
Room 3510
10 Park Plaza
Boston, Massachusetts 02116-3973
617-973-7000

Michigan Department of Transportation
425 West Ottawa
P.O. Box 30050
Lansing, MI 48909
517-373-2090

New Jersey Department of Transportation
1035 Parkway Avenue
Trenton, New Jersey 08625
609-530-2001

New York State Department of Transportation
1220 Washington Ave.
State Campus, Bldg. 5
Albany, New York 12232
518-457-4422

Ohio Department of Transportation
25 South Front Street
Columbus, Ohio 43215
614-466-2335

Texas Department of Transportation
Dewitt C. Greer Bldg.
11th and Brazos Streets
Austin, TX 78701-2483
516-463-8585

Washington State Department of Transportation
Highway Administration Building
Maple Park Drive
Olympia, Washington 98504
360-705-7054