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September 20, 1995
Project No. 04082

Mr. Everett Barnard
Bridge Maintenance and Operations Division
Maine Department of Transportation
Augusta, Maine 04333

Re: Lead-Based Paint Removal with the *Sponge-Jet* System
Buckfield, Maine

Dear Mr. Barnard:

Jacques Whitford is pleased to present this report of area and personal exposure monitoring for airborne lead at the above-referenced bridge maintenance site. The bridge is located on Route 117 in Buckfield, Maine, and crosses the Nezinscot River. The lead monitoring was conducted to compare concentrations of airborne lead generated by abrasive blasting with silica sand to that generated by abrasive blasting with the *Sponge-Jet* system. In addition, rates of lead-based paint removal for each abrasive blasting technique were also monitored to assess productivity.

As you may be aware, the *Sponge-Jet* system consists of a recyclable polyurethane sponge material impregnated with abrasive grit such as steel or aluminum oxide. Because of the open cell structure of the sponge material, the *Sponge-Jet* system reportedly provides "micro-containment" of dust particles, thus reducing airborne lead levels compared to traditional abrasives such as silica sand and many other conventional abrasives. The *Sponge-Jet* media can reportedly be recycled following classification up to 5 to 10 times, depending on the type of media (*e.g.*, steel or aluminum oxide) and blasting practices.

Methodology

Three approximately 2-hour periods were monitored during abrasive blasting with a) *Sponge-Jet* media containing steel grit, b) *Sponge-Jet* media containing aluminum oxide, and c) silica sand. Monitoring of lead-based paint removal with the *Sponge-Jet* media was conducted on August 15, 1995; lead-based paint removal with silica sand was monitored on August 16, 1995.

Lead-based paint removal was conducted in a negative-pressure containment constructed similar to the specifications of a Steel Structures Painting Council (SSPC) Class 3 system[1]. Personal monitoring during each 2-hour period included one blaster, one vacuum attendant (vacuuming spent blast media during blasting) and one area monitor, located about 10 to 15 ft. "downwind" from the blaster. All workers within the containment were equipped with Bullard *Lancer* Blasting Hoods.

Air samples were obtained from the personal breathing zone of the workers and the stationary area monitor using calibrated sampling pumps and filter cassettes. The sampling pumps were calibrated to a flow rate of about 2 liters per minute. Lead testing was conducted by ESA Laboratories, Inc. of Chelmsford, Massachusetts. Testing was conducted in accordance with National Institute for Occupational Safety and Health (NIOSH) Method 7082.

Sampling Results

Concentrations of airborne lead detected during each of the three monitoring intervals are summarized below. Lead data for the vacuum attendant during the Sponge-Jet aluminum oxide test are not available due to accidental blockage of the sample pump tubing.

Subject	*Sponge-Jet*: Steel ($\mu g/m^3$)	*Sponge-Jet*: Aluminum Oxide ($\mu g/m^3$)	Silica Sand ($\mu g/m^3$)
Area Monitor	950	580	11,300
Blaster	4,990	22,500	69,800
Vacuum Attendant	1,420		2,630

[1] SSPC Guide 61 (CON), *Guide for Containing Debris Generated During Paint Removal Operations*, March 1, 1992.

The monitoring data indicate significantly lower airborne lead concentrations for both *Sponge-Jet* media as compared to the silica sand. This pattern is consistent for the samples tested from the area monitors and the worker's personal breathing zone. In all cases, the airborne lead concentrations from the breathing zone (outside the blasting hood) of the blaster are substantially higher than for the area monitor. This finding appears to be the result of lead contained in relatively large (and likely non-respirable) fragments of paint that are drawn into the sampling cassette attached to the blaster. The area monitor, being further away from the blasting zone, are less susceptible to picking up these larger particles. The test data are also consistent with worker reports of visibly less dust being generated with the Sponge-Jet system.

Rates of lead-based paint removal varied noticeably with the different blasting media. Approximately one 15 ft. long I-beam was blasted (*i.e.*, paint removed) over the approximate 2-hour shift using the *Sponge-Jet* media containing steel grit. Approximately 1 1/4 beams were blasted over 2 hours using the *Sponge-Jet* media containing aluminum oxide grit. Nearly 2 1/4 beams were blasted over 2 hours using the sand blast media. It should be noted, however, that greater worker familiarity and experience with the *Sponge-Jet* system may result in an increase in the rates of paint removal observed.

Conclusions

The limited test data indicate that abrasive blasting with the *Sponge-Jet* system produces significantly less airborne lead and associated dust than blasting with silica sand. While rates of paint removal with the *Sponge-Jet* system are lower than those observed for blasting with silica sand, enhanced worker experience with the *Sponge-Jet* system may narrow the range in rates observed.

Additional testing is warranted to better document rates of paint removal relative to concentrations of lead dust generated. Such testing will enhance the statistical validity of the data which may be influenced by worker habits, position of sampling pumps and containment characteristics, among others. Further paint removal system evaluation should also include an analysis of blasting equipment and abrasive media costs, as well as costs for disposal of *Sponge-Jet* media compared to spent silica sand and other abrasives.

Closure

Jacques Whitford appreciates the opportunity to serve the Maine Department of Transportation with this site monitoring. If you have any questions or require any additional information, please do not hesitate to contact the undersigned.

Sincerely yours,

JACQUES WHITFORD, INC.

D. Todd Coffin, C.G.

Enclosures:

Appendix 1 - Laboratory Test Data

cc: Herb Noyes, MDOT Division 7
Tim Youmans, *Sponge-Jet*

DTC7/buck-1

ESA LABORATORIES, INC.
22 ALPHA ROAD
CHELMSFORD, MA 01824
(508) 250-7150 FAX: (508) 250-7171

PO#/RELEASE: 4082/NA
CLIENT JOB#: NA

ESAL BATCH#: 952362

DATE RECEIVED : 08-17-95
DATE ANALYZED : 08-21-95
DATE REPORTED : 08-22-95

52966
TODD COFFIN
JACQUES WHITFORD, INC
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TEST DESCRIPTION	REFERENCE	ANALYTICAL METHOD
LEAD/AIR FLAME	PEL: 0.05 MG/M3; AL 0.03 MG/M3	NIOSH 7082

SAMP NO.	DATE CLLCT	SAMPLE ID/OTHER	PB-AF	MESSAGES
0011	08-10 5A		0.0011	
0012	08-10 6A		<1.0 UG	
0013	08-15 1A		0.95	
0014	08-15 1B		0.58	
0015	08-15 2A		4.99	
0016	08-15 2B		22.5	
0017	08-15 3A		1.42	
0018	08-16 1C		11.3	
0019	08-16 2C		69.9	
0020	08-16 3C		2.63	