Results of Vacuum Attachment Efficiency Evaluation

MBX Bristle Blaster Power Tool Dust Collection System

KTA Project No. 290638

Presented to:

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October 28, 2009

WDC/DAO:kdw
JN290638
(290638 MontiPowerVac-09.doc)

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INTRODUCTION

In accordance with KTA-Tator, Inc. (KTA) Proposal No. PN090765 dated September 1, 2009, and subsequent Authorization to Proceed received on September 9, 2009, KTA has completed an independent laboratory evaluation of the efficiency of the vacuum attachment on the MBX Bristle Blaster power tool unit. This report describes the testing procedures employed and contains the results of the evaluation.

EXECUTIVE SUMMARY

The efficiency of the vacuum attachment on the MBX Bristle Blaster was evaluated during the removal of 9 - 15 mils of aged lead based alkyd coating (applied over mill scale) from bridge steel (structural components from a demolished bridge structure). The concentration of lead in the paint was 19.708%. Airborne samples of total lead, total nuisance dust and respirable dust were collected from the immediate work area, an area immediately adjacent to the vacuum attachment on the tool and on the tool operator during two (2) trials. Trial 1 was conducted with the vacuum in operation; Trial 2 was conducted without vacuum operation. Both trials resulted in the removal of coating from approximately 3.5 square feet of surface over a period of 61 minutes. The weight of debris that was not captured by the vacuum (collected on a floor tarp) was also weighed after each trial. Trial 1 (with the vacuum operational) generated 22.068 grams of debris that was not captured by the vacuum attachment; Trial 2 (without vacuum) generated 153.767 grams of debris. The use of the vacuum reduced the amount of debris collected on the floor tarp nearly seven-fold.

Use of the vacuum attachment reduced airborne total nuisance dust by 92-95% within the sampling area and by 99% in the operator's breathing zone (outside of respiratory protection). The airborne concentration of lead was reduced by 81-98% within the sampling area and by 99% in the operator's breathing zone (outside of respiratory protection) by engaging the vacuum attachment. Finally, respirable dust was reduced by 62%-100% within the sampling area and by 83% in the operator's breathing zone (outside of respiratory protection) by operating the vacuum. Tables 1 and 2 in the results section of this report contain the results of the air sampling.

SUBSTRATE

The test surface was comprised of 9 - 15 mils of aged lead alkyd coating on mill scale-bearing carbon steel channel acquired from a bridge structure that was demolished several years ago. The surfaces were comparable to SSPC (Society of Protective Coatings) Rust Condition G1 depicted in SSPC-VIS 1, Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning. A sample of the coating was removed and tested for total lead content. The total lead content of the coating was 19.708%

TEST PROCEDURES AND RESULTS

The following test procedures were used to evaluate the efficiency of the vacuum attachment on the MBX Bristle Blaster (connected to a standard shop-vac) equipped with 23 mm belts during the removal of the lead paint from steel channels removed from a bridge structure.

Set-up

The testing was performed in the KTA walk-in abrasive blast cleaning room, which is approximately 8′ x 8′ x 12′. The ventilation system was not used. A clean vinyl tarp was placed on the floor of the room to capture any debris that was not collected by the vacuum (when operated). A steel bridge channel (approximately 15″ x 60″) was positioned at working height on two (2) supports inside the room. The MBX Bristle Blaster (pneumatic 3500) was equipped with a new 23 mm belt and was operated for approximately thirty (30) minutes. A new belt was installed after thirty (30) minutes and the tool was operated for an additional thirty-one (31) minutes for a total elapsed sampling time of sixty-one (61) minutes. Trial 1 was conducted with the MBX Bristle Blaster vacuum attachment (dust collector) connected to a Dayton Model 6Z098F 10 amp wet/dry shop vacuum. Trial 2 was conducted with the dust collector attached to the tool, but the shop vacuum was not operational. Approximately 3.5 square feet of surface area was cleaned during each trial. Two (2) 23mm belts were used for each trial (four (4) belts total).

Air Sampling

Two (2) area samples and one (1) personal sample (for airborne lead, total nuisance dust and respirable dust) were collected throughout each of the two (2) trials (total of six (6) samples per trial). Area 1 ("Stationary Area") sample cassettes remained in one (1) position inside the blast room throughout the sampling process. These sample cassettes were positioned at working height, across from the operator near the area where the coating was removed. The position of the Area 2 sample cassettes ("Mobile Area") was controlled by a technician and was maintained along side of the MBX Bristle Blaster vacuum attachment. The sampling cassettes moved with the tool. The personal samples were positioned in the worker's breathing zone (forward of the shoulders, within a 6 - 9″ hemisphere, downward of the nose/mouth area) outside of respiratory protection. Both the tool operator and technician were equipped with eye protection and half face, negative pressure air purifying respirators equipped with High Efficiency Particulate Air (HEPA) filter cartridges. The tool operator was also equipped with cotton coveralls and gloves.

Airborne samples were collected using Gilian Personal Air Sampling Pumps calibrated for flow rate before and after sampling. All sampling was performed by Mr. Stanford Liang, CIH, CSP, KTA Safety and Health Officer. Sampling pumps for total nuisance dust and lead were operated at a flow rate of 2.0 liters/minute (total sample volume of 122 liters per trial). Sampling pumps for respirable dust were operated at a flow rate of 1.7 liters/minute (total sample volume of 103.7 liters per trial). Pre-weighed filter cassettes equipped with PVC filter media were used for all sampling. The filter cassettes for respirable dust sampling were mounted in cyclone samplers which are designed to only collect airborne particulate 10 microns and smaller.

Analysis of Air Samples

All samples were secured and transmitted with chains-of-custody to Schneider Laboratories, Inc. of Richmond, Virginia, for analysis. Schneider Laboratories, Inc. is an AIHA/ELLAP Certified Laboratory (No. 100527). Airborne total nuisance dust was determined for each of the three (3) samples (per trial) in accordance with NIOSH Method 0500; airborne respirable dust was determined in accordance with NIOSH Method 0600. Airborne lead was

determined in accordance with NIOSH Method 7082. The mass (in milligrams or micrograms) captured on each filter cassette was divided by the sample volume (liters) to determine the actual exposure. For the purposes of this report, the actual exposure values were not converted to eight (8) hour time-weighted averages (TWA), since the sampling was not designed to assess OSHA compliance, and the sampling time was not necessarily representative of a work shift.

Debris Collection

A vinyl tarp was positioned on the floor of the blast room to collect any debris produced by the tool during coating removal operations, but not collected by the vacuum (when operational). The debris was emptied from the tarp after each trial into pre-weighed containers and the mass (weight) of debris was calculated using a gravimetric laboratory balance.

Trial 2 (without Vacuum)

RESULTS

KTA was contracted by Montipower, Inc. to independently evaluate the performance of the vacuum attachment (dust collection device) on the MBX Bristle Blaster during the removal of lead paint from a structural steel bridge channel. The evaluation was performed by collecting airborne samples of total nuisance dust, respirable dust and total lead in the coating removal area, adjacent to the tool and in the operator's breathing zone outside of respiratory protection. Additionally, the quantity of debris collected on a floor tarp (not captured by the vacuum when operational) was also calculated. The debris collected on the floor tarp when the vacuum was operational (Trial 1) weighed 22.068 grams; the debris collected on the floor tarp when the vacuum was disconnected (Trial 2) weighed 153.767 grams, which is nearly seven times the amount collected after Trial 1. The results of the air sampling are provided in Tables 1 and 2 below.

Table 1 - Air Sampling Data with Vacuum Engaged (Trial 1)

Sample	Total Nuisance Dust (airborne)	Total Lead Dust (airborne)	Respirable Dust (airborne)
Stationary Area	0.574 mg/m^3	53.83 $\mu g/m^3$	0.579 mg/m^3
Mobile Area (moved w/ tool)	2.951 mg/m^3	676.77 $\mu g/m^3$	ND (<0.001 mg/m^3)
Personal Sample (on operator)	0.082 mg/m^3	22.83 $\mu g/m^3$	0.193 mg/m^3

ND: Non-detectable

Table 2 - Air Sampling Data without Vacuum Engaged (Trial 2)

Sample	Total Nuisance Dust (airborne)	Total Lead Dust (airborne)	Respirable Dust (airborne)
Stationary Area	11.475 mg/m^3	2,392.09 $\mu g/m^3$	1.543 mg/m^3
Mobile Area (moved w/ tool)	37.951 mg/m^3	3,554.30 $\mu g/m^3$	1.350 mg/m^3
Personal Sample (on operator)	10.328 mg/m^3	1,772.25 $\mu g/m^3$	1.157 mg/m^3

SCHNEIDER LABORATORIES

INCORPORATED
2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • (FAX) 804-359-1475

Excellence in Service and Technology

AIHA/ELLAP 100527, NVLAP 101150-0, NYELAP/NELAC 11413, CAELAP 2078, NC 593, SC 93003

LABORATORY ANALYSIS REPORT

Total Nuisance Dust based on NIOSH 0500

Using SLI M30

ACCOUNT #: 1861-09-2419
CLIENT: KTA-TATOR, Inc.
ADDRESS: 115 Technology Drive
Pittsburgh, PA 15275
PROJECT NAME:
JOB LOCATION: Pittsburgh PA
PROJECT NO.: 290638
PO NO.: 09PO-402

DATE COLLECTED: 10/2/2009
DATE RECEIVED: 10/7/2009
DATE ANALYZED: 10/12/2009
DATE REPORTED: 10/14/2009

Sample Type: AIR

SLI Sample No.	Client Sample No.	Sample Location	Filter Paper ID	Pre Weight mg	Post Weight mg	Sample Time (min)	Flow Rate (l/min)	Sample Volume (L)	Actual TND (mg/m^3)*	8 Hour TWA (mg/m^3)
30346300	ATM1	Lead Mobile 1st Trial		12.91	13.27	61	2.00	122.00	2.951	0.375
30346301	ATM2	Lead Mobile 2nd Trial		13.06	17.69	61	2.00	122.00	37.951	4.823
30346302	ATS1	Lead Stationary 1st Trial		12.57	12.64	61	2.00	122.00	0.574	0.073
30346303	ATS2	Lead Stationary 2nd Trial		11.84	13.24	61	2.00	122.00	11.475	1.458
30346304	PT1	Dust Lead 1st Trial		12.10	12.11	61	2.00	122.00	0.082	0.010
30346305	PT2	Dust Lead 2nd Trial		12.61	13.87	61	2.00	122.00	10.328	1.313

Analyst: IBTISSAM HOSN

Total Number of Pages in Report: 1

Reviewed By **Mohammed Eltilib, Analyst**

Results relate only to samples as received by the laboratory.

Visit www.slabinc.com for current certifications.

*Quality control data is available from the laboratory upon request. *Data precision justifies 2 significant figures. Unusual sample conditions, if any, are described. All testing is performed in strict accordance with Schneider Laboratories, Inc. protocol.*

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LABORATORY ANALYSIS REPORT

Total Respirable Dust based on NIOSH 0600

Using SLI M30

ACCOUNT #: 1861-09-2421
CLIENT: KTA-TATOR, Inc.
ADDRESS: 115 Technology Drive
Pittsburgh, PA 15275
PROJECT NAME:
JOB LOCATION: Pittsburgh PA
PROJECT NO.: 290658
PO NO.: 09PO-402

DATE COLLECTED: 10/2/2009
DATE RECEIVED: 10/7/2009
DATE ANALYZED: 10/12/2009
DATE REPORTED: 10/23/2009

Sample Type: AIR

SLI Sample No.	Client Sample No.	Sample Location	Filter Paper ID	Pre Weight mg	Post Weight mg	Sample Time (min)	Flow Rate (l/min)	Sample Volume (L)	Actual RND (mg/m^3)*	8 Hour TWA (mg/m^3)
30346519	ARS1	Stationary Trial 1		10.74	10.80	61	1.70	103.70	0.579	0.074
30346520	ARS2	Dust Stationary Trial 2		11.56	11.72	61	1.70	103.70	1.543	0.196
30346521	ARM1	Mobile Trial 1		11.62	11.62	61	1.70	103.70	<0.001	<0.001
30346522	ARM2	Mobile Trial 2		11.57	11.71	61	1.70	103.70	1.350	0.172
30346523	PR1	Dust Trial 1		10.59	10.61	61	1.70	103.70	0.193	0.025
30346524	PR2	Dust Trial 2		11.73	11.85	61	1.70	103.70	1.157	0.147

Analyst: IBTISSAM HOSN

Total Number of Pages in Report: 1

Results relate only to samples as received by the laboratory.

Reviewed By **Julene M. Cartwright, Analyst**

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Amended Report

*Quality control data is available from the laboratory upon request. *Data precision justifies 2 significant figures. Unusual sample conditions, if any, are described. All testing is performed in strict accordance with Schneider Laboratories, Inc. protocol.*

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LABORATORY ANALYSIS REPORT

Air Filter Lead Analysis based on NIOSH 7082 Method

Using SLI P22 A14

ACCOUNT #: 1861-09-2419
CLIENT: KTA-TATOR, Inc.
ADDRESS: 115 Technology Drive
Pittsburgh, PA 15275
PROJECT NAME:
JOB LOCATION: Pittsburgh PA
PROJECT NO.: 290638
PO NO.: 09PO-402

DATE COLLECTED: 10/2/2009
DATE RECEIVED: 10/7/2009
DATE ANALYZED: 10/15/2009
DATE REPORTED: 10/15/2009

Sample Type: AIR

SLI Sample No.	Client Sample No.	Sample Description	Sample Time (min)	Flow Rate (L/min)	Sample Volume (L)	Total Lead (µg)*	Actual Exp (µg/m³)	8 Hour TWA (µg/m³)
30346300	ATM1	Lead Mobile 1st Trial	61	2.00	122.00	82.57	676.77	86.01
30346301	ATM2	Lead Mobile 2nd Trial	61	2.00	122.00	433.62	3,554.30	451.69
30346302	ATS1	Lead Stationary 1st Trial	61	2.00	122.00	6.57	53.83	6.84
	Endcaps missing; possible cross-contamination or sample loss.							
30346303	ATS2	Lead Stationary 2nd Trial	61	2.00	122.00	291.84	2,392.09	304.00
30346304	PT1	Dust Lead 1st Trial	61	2.00	122.00	2.79	22.83	2.90
30346305	PT2	Dust Lead 2nd Trial	61	2.00	122.00	216.21	1,772.25	225.22

Analysis Run ID: 44460

Analyst: Dara L. Fox

Total Number of Pages in Report: 1

Results relate only to samples as received by the laboratory.

Reviewed By Marti H. Baird

Marti H. Baird, Analyst

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*Minimum Reporting Limit: 2 µg Total Lead. OSHA PEL is 50 µg/m³ for the 8 hr TWA; OSHA action level is 30 µg/m³ for the 8 Hr TWA. All internal QC parameters were met. Exposure calculations are based on client-supplied information and assume zero exposure for time not sampled. *Data precision justifies 2 significant figures. Unusual sample conditions, if any, are described. Results are not blank-corrected unless noted by analyst. The client is responsible for verifying applicable standards and limits. See www.osha.gov (29 CFR Part 1910.1000).*