

APPENDIX

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Practical Health and Safety Solutions

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October 5, 2023

Project Number: 7004

Lead Exposure Survey

Dear Client:

Please find below the results of the lead worker exposure survey performed for Winnipeg Transit in Building B located at 421 Osborne Street, Winnipeg on September 29th, 2023.

Background

A concern had arisen regarding potential exposure to lead-containing paint. Reportedly, paint comes off the rafters when equipment is run in the Dyno 2 Room. Testing was performed to measure the air and surface levels of lead that workers may be exposed to.

Methodology

Air Samples

Samples were collected using sampling trains consisting of a small air pump, an MCE filter cassette, and a hose connecting the two. The samples were collected as area samples by placing the sampling trains in fixed positions in the shop. One sampler was placed in the Dyno 2 Room while the DPF filter cleaner was running. Two rounds of filters were done during testing (four total filters cleaned). Four other samplers were placed in other areas of the garage to measure background levels of lead in the shop.

The samples were collected using normal industrial hygiene sampling pumps. The pumps were calibrated before and after sampling to ensure a reliable flowrate. A flowrate of 3 litres per minute was used for all samples. After testing, the samples were analysed at an AIHA-accredited laboratory using NIOSH (National Institute of Occupational Safety and Health) Analytical Method 7300 for lead.

Surface Samples

Testing for surface contamination of lead was performed using Ghost Wipes. Ghost Wipes are sampling wipes that dissolve completely in solution leaving behind only the metals that were found on the sampling area. A 10 cm x 10 cm template was used to quantify the sample areas. Two surface samples were collected near each air sample. Samples were collected of high-touch surfaces, as a metric of what workers would be coming into contact with on a regular basis, and of areas that are not cleaned often to give an idea of long-term lead accumulation. The samples were then analysed at an AIHA-accredited laboratory using EPA 6010D for lead.

Allowable Exposure Limits

Air Samples

The airborne results were compared to the 2019 Threshold Limit Value (TLV) for lead of 50 µg/m³ (0.05 mg/m³). TLVs represent time-weighted average airborne concentrations to which it is believed that a worker can be exposed, 8 hours per day, 40 hours per week, without adverse effect. The 2019 TLVs have been adopted in the Safety and Health legislation as the allowable exposure guidelines in Manitoba. The 2023 lead TLV is also 50 µg/m³.

Surface Samples

The province of Manitoba does not have surface contamination limits for metals. However, Safety in Numbers (www.safetyinnumbers.ca) is a resource that assesses compliance to Manitoba legislation and good practice. This reference includes a list of acceptable surface contamination limits for lunchrooms. In lieu of other standards, these limits are used in this report.

Results and Discussion

The results from the lead samples are provided in the following tables. A copy of the lab results has been appended (Appendix A). Pictures of the sample locations can be found in Appendix B (air sample locations) and Appendix C (surface sample locations).

Airborne Lead Sampling Results

Work Station	Lead Concentration (µg/m³)
Dyno 2	<0.56
Rebuild – Rad Shop	<0.57
Stores – Row 13-15 Near Back Wall	<0.57
Brakes – Outside Office	<0.60
Paint Shop – Outside Paint Booths	<0.63
2019 Lead TLV	50 µg/m³

The airborne lead levels were very low and well within the allowable exposure limit. Workers wear a half-face particulate respirator when in the Dyno 2 Room. These respirators, when used as part of a comprehensive respiratory protection program (which includes fit testing, worker education, workers that are clean shaven, etc.) have an assigned protection factor of 10. That is to say that the worker's exposure when using such a respirator is 10 times less than the concentration outside the mask. Based on these sampling results, no respiratory protection is needed to reduce lead exposures for workers in Dyno 2.

Surface Lead Sampling Results

Work Station	Surface Sampled	Lead Concentration (µg/100 cm ²)
Dyno 2	Control Panel*	<1.0
	Top of DPF04*	18.1
Rebuild – Rad Shop	Computer	12.3
	Top of Blue Cabinet	53.7
Stores – Row 13-15 Near Back Wall	Top of Front Desk	3.1
	Shelving Rack 11	110
Brakes – Outside Office	Computer Mouse and Keyboard	1.7
	Top of Safety Storage Cabinet	5.2
Paint Shop – Outside Paint Booths	Top of Electrical Panel	50.8
	Top of AC01 Ingersoll Rand	3.4
Lead Surface Wipe Screening Level		22 µg/100 cm²

*These areas had been recently cleaned so samples were collected at the end of the testing period after the DPF filter cleaner had been running.

Ingestion can be a significant route of exposure for lead; lead containing dust on surfaces can get on workers' hands and be inadvertently ingested and thus contribute to their overall exposure.

While it is unfair to hold a large industrial shop to lunchroom standards, all of the high touch areas sampled (control panel, computers, desk) had levels within the criteria for surface lead levels in a lunchroom.

Higher, but not unusual, levels of lead were found on the high-dust areas. These areas are not touched or used often and some lead accumulation has occurred. Good hygiene practices, including washing hands after touching dirty/dusty objects prior to eating, drinking, or smoking, significantly reduces the potential for lead ingestion.

Conclusion

The airborne lead results were very low and well below the health-based exposure limit. These results indicate that inhalation is likely not a significant route of lead exposure for workers. Ingestion, from touching lead on surfaces then eating or

touching their face, is a more likely route of exposure. High-touch surfaces showed low levels of lead that would be acceptable in a lunchroom. Lead is accumulating in the settled dust, but normal hygiene practices, such as washing hands before eating, drinking, or smoking, should significantly reduce any risk.

I hope this information is of assistance to you. Should you have any questions, or if we can be of any further assistance, please contact me at (204) 668-3141.

Sincerely,

Winnipeg Air Testing

Per:

Heather Wylie

Heather Wylie, CIH, CRM
Industrial Hygienist

Appendix A – Copy of Laboratory Results

Project: Cow/Winnipeg Transit
 Location: 421 Osborne St WPG
 Number: 7004

PO Number:

Sample ID	Cust. ID	Location	Date	Time	Flow	Volume
Parameter		Method		Total	RL*	Conc.
534714-001		Dyno 2	09/29/23	236 min	3.04 L/min	718 L
Lead		NIOSH 7300M		<0.400 µg	0.400 µg	<0.557 µg/m3
534714-002		Rebuild Rad Shop	09/29/23	234 min	3.00 L/min	703 L
Lead		NIOSH 7300M		<0.400 µg	0.400 µg	<0.570 µg/m3
534714-003		Stores Row 13-15	09/29/23	225 min	3.10 L/min	698 L
Lead		NIOSH 7300M		<0.400 µg	0.400 µg	<0.574 µg/m3
534714-004		Brakes Outside Office	09/29/23	217 min	3.08 L/min	669 L
Lead		NIOSH 7300M		<0.400 µg	0.400 µg	<0.599 µg/m3
534714-005		Paint Shop Outside Booth	09/29/23	209 min	3.05 L/min	638 L
Lead		NIOSH 7300M		<0.400 µg	0.400 µg	<0.627 µg/m3

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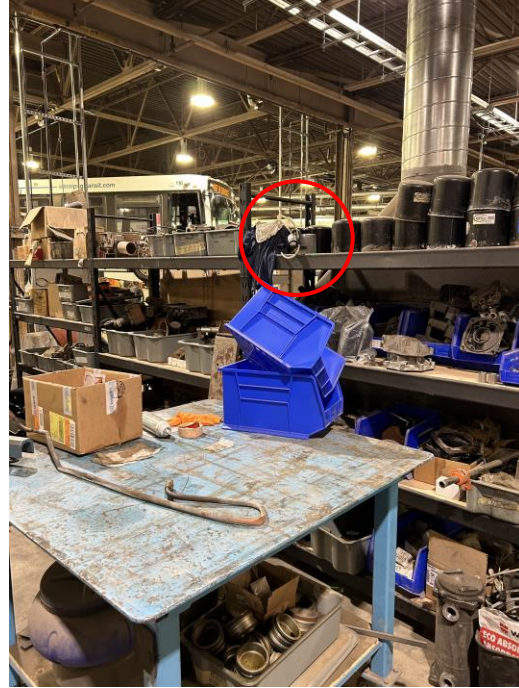
Sample ID	Cust. Sample ID	Location	Result	RL*	Units	Analysis Date	Analyst
Parameter		Method					
534714-006		Dyno 2 Control Panel					
<i>Metals Analysis</i>							
Lead		EPA 6010D	<1.00	1.00	µg/100cm2	10/04/23	DM
534714-007		Dyno 2 Top Of DP F04					
<i>Metals Analysis</i>							
Lead		EPA 6010D	18.1	1.00	µg/100cm2	10/04/23	DM
534714-008		Rebuild Computer					
<i>Metals Analysis</i>							
Lead		EPA 6010D	12.3	1.00	µg/100cm2	10/04/23	DM
534714-009		Rebuild Top Blue Cabinet					
<i>Metals Analysis</i>							
Lead		EPA 6010D	53.7	1.00	µg/100cm2	10/04/23	DM
534714-010		Stores Front Desk					
<i>Metals Analysis</i>							
Lead		EPA 6010D	3.05	1.00	µg/100cm2	10/04/23	DM
534714-011		Stores Shelving Rack II					
<i>Metals Analysis</i>							
Lead		EPA 6010D	110	1.00	µg/100cm2	10/04/23	DM
534714-012		Brakes Comp Mouse & Keybd					
<i>Metals Analysis</i>							
Lead		EPA 6010D	1.69	1.00	µg/100cm2	10/04/23	DM
534714-013		Brakes Top Storage Cabinet					
<i>Metals Analysis</i>							
Lead		EPA 6010D	5.16	1.00	µg/100cm2	10/04/23	DM
534714-014		Paint Shop Top Elec Panel					
<i>Metals Analysis</i>							
Lead		EPA 6010D	50.8	1.00	µg/100cm2	10/04/23	DM
534714-015		Paint Shop Top AC01 Inger					
<i>Metals Analysis</i>							
Lead		EPA 6010D	3.44	1.00	µg/100cm2	10/04/23	DM

Appendix B – Images of Air Sample Locations

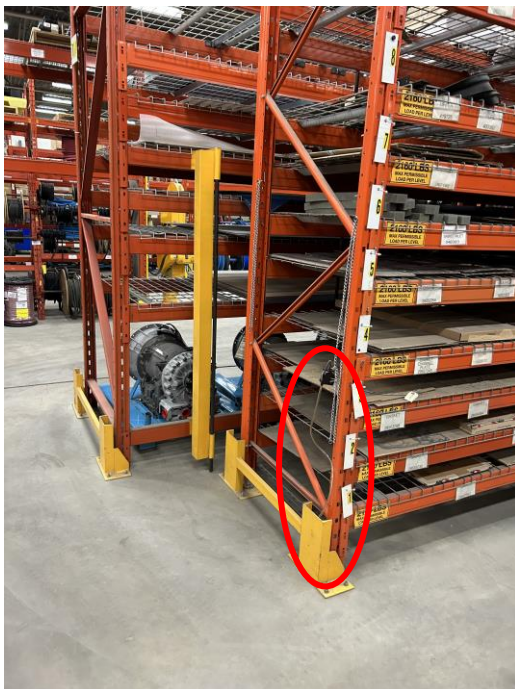
Dyno 2



Rebuild – Rad Shop



Stores – Row 13-15 Near Back Wall



Brakes – Outside Office



Paint Shop – Outside Paint Booths



Appendix C – Images of Surface Sample Locations

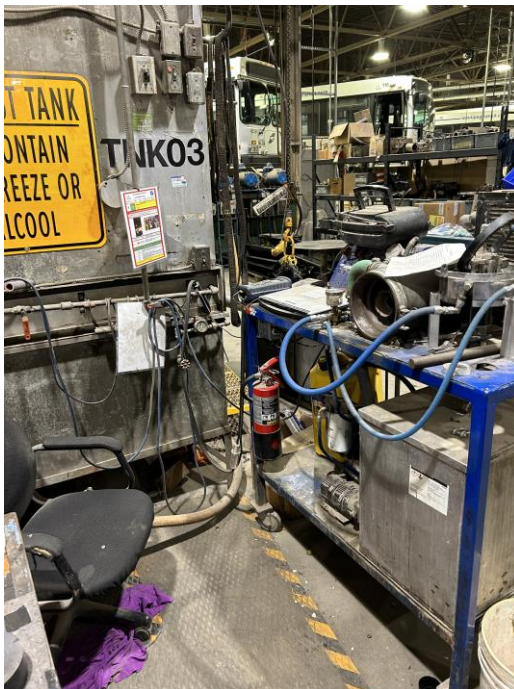
Dyno 2: Control Panel



Dyno 2: Top of DPF04



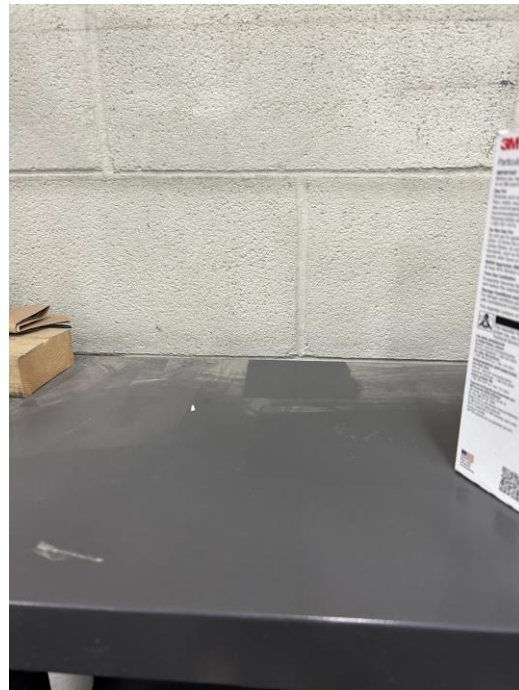
Rebuild – Rad Shop: Computer



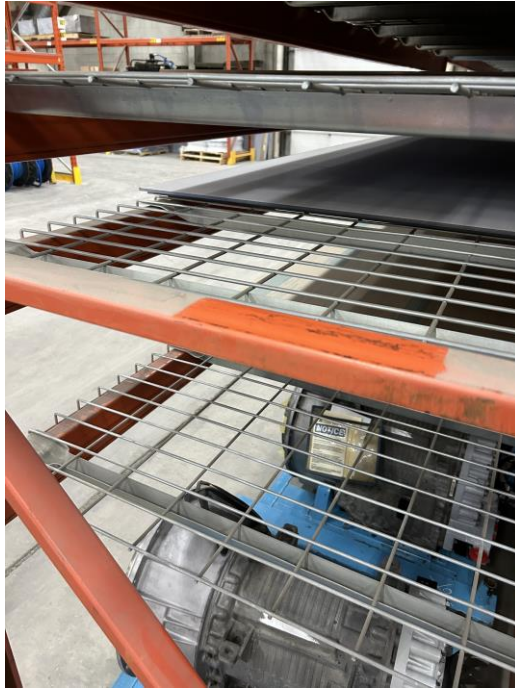
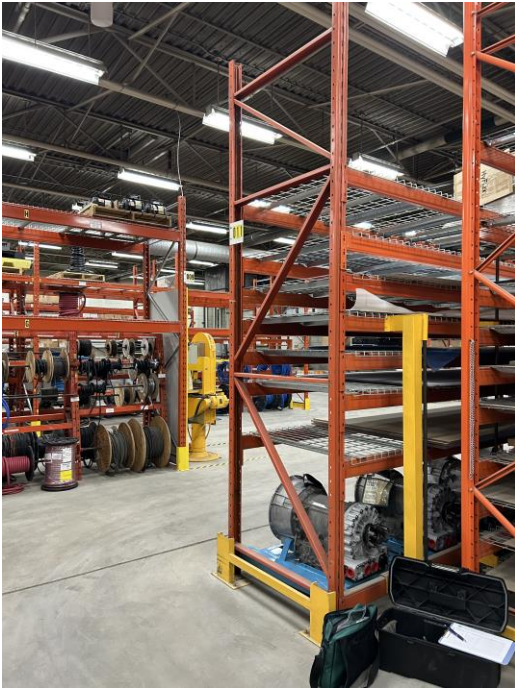
Rebuild – Rad Shop: Top of Blue Cabinet



Stores – Row 13-15 Near Back Wall: Top of Front Desk



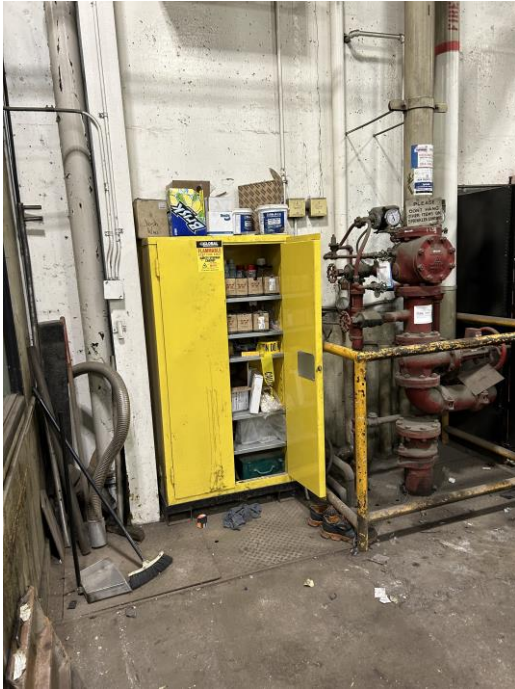
Stores – Row 13-15 Near Back Wall: Shelving Rack 11



Brakes – Outside Office: Computer Mouse and Keyboard



Brakes – Outside Office: Top of Safety Storage Cabinet



Paint Shop – Outside Paint Booths: Top of Electrical Panel



Paint Shop – Outside Paint Booths: Top of AC01 Ingersoll Rand

