FINAL REPORT

Lead Assessment of Old Indoor Firing Range
RCMP South Alberta District Building
920 – 16th Avenue NE, Calgary, Alberta

ROYAL CANADIAN MOUNTED POLICE

PROJECT NO. 1010205

Jacques Whitford

PROJECT NO. 1010205

REPORT TO: **Ms. Karen Dupuis, B.E.S.**
Manager, Sustainable Development
Strategic Investment & Procurement Planning
RCMP, North West Region
Yellowknife, NWT
X1A 2R3

FOR: **Lead Assessment of Old Firing Range**
RCMP South Alberta District Building
920 – 16th Avenue Ne
Calgary, AB

March 31, 2006

Jacques Whitford Limited
708 – 11th Avenue SW, Suite 500
Calgary, Alberta
T2R 0E4

Phone: 403-263-7113
Fax: 403-263-7116

www.jacqueswhitford.com

Table of Contents

List of Tables

List of Drawings

List of Appendices

1.0 INTRODUCTION

Jacques Whitford Limited (Jacques Whitford) was retained by the Royal Canadian Mounted Police (RCMP) to conduct a lead assessment of the Calgary Post Garage (subject building) located at the RCMP South Alberta District Building in Calgary, Alberta. Based on our conversation with the RCMP, future use of the subject building will remain as it is presently for vehicle maintenance and repair.

The purpose of this assessment was to assess the concentration of lead in paint chip samples and on ceiling, wall, floor and HVAC surfaces at the site, and to determine if abatement measures are required to address lead impacts, if any. Air samples were also collected to assess the level of airborne lead dust within the subject building.

Ms. Wanda Moore of Jacques Whitford completed the site work within the subject building on February 24, 2006.

2.0 SCOPE OF WORK

The Lead Assessment was conducted in accordance with standard Industrial Hygiene practices, as well as provincial requirements stipulated for controlled substances in the Alberta Occupational Health and Safety Code, October 2003. The program consisted of the following scope of work:

- Review pertinent documentation related to the site provided by the RCMP;
- Develop an appropriate reconnaissance and Health and Safety plan based on the documentation review;
- Collect a total of 30 swipe samples from walls, floor and ceiling located in the old firing range to screen for lead dust levels;
- Collect and analyze a total of four swipe samples from inside the intake and exhaust vents of the subject area's HVAC systems to assess lead dust levels;
- Assess lead dust contamination levels outside the old firing range by collecting and analyzing 20 lead dust swipe samples from ceiling, wall and floor surfaces of the areas adjacent to the old firing range;
- Assess all painted surfaces for lead content of swipe sample locations inside and outside of the old firing range;
- Collect three lead in air samples from within the old firing range for analysis of lead;
- Collect three lead in air samples from the areas outside the old firing range for analysis of lead;
- Submit collected samples to CAEL and/or SCC accredited laboratories; and,
- Prepare and submit a draft and final report addressing the findings, the laboratory results, conclusions, recommendations, a work plan, and cost estimates for the decontamination and abatement activities for lead.

3.0 LIMITATIONS

Lead dust sampling was conducted on accessible surfaces within the subject building as detailed in the scope of work. The lead dust concentration in inaccessible areas including, but not limited to, ceiling spaces, wall cavities, crawlspaces and interior surfaces of HVAC ductwork (beyond those surfaces reachable by hand), were not assessed.

The HVAC system located in the building is a dedicated extraction system. Therefore, swipe samples of the HVAC system were not collected outside the building. In addition, only one intake vent was accessed for sample collection. The remaining intake vents were inaccessible due to either being bolted shut or because of equipment and parts stored directly under the vents.

4.0 METHODOLOGY

Ms. Wanda Moore of Jacques Whitford conducted a visual assessment and sampling activities within the subject building on February 24, 2006. All field sampling was conducted in accordance with standard practices as per Alberta Workplace Health and Safety (WHS) guidelines as well as Jacques Whitford's Standard Operating Procedures (SOPs), which have been developed based upon standard industry practices including regulatory bodies in Canada and the United States of America.

This report reflects the observations, findings and analysis of materials sampled at the time of the assessment. Analytical results reflect the sampled materials at the specific sampling locations.

5.0 LEAD DUST

5.1 Background Information

Lead dust can be created in firing ranges by exploding lead styphnate primers present on ammunition, friction from the lead slug against the gun barrel, or lead slugs hitting the bullet trap, walls, floors, or ceiling of the range.

Analytical results of the swipe samples were compared to the Department of National Defence General Safety Standard Chapter 42 entitled "Decontamination Protocol for Indoor Firing Range Safety Standard" (further referred to as "DND Safety Chapter 42"), which is presented in **Appendix A**. The document specifies the maximum acceptable lead dust concentration on floors, walls and ceilings within indoor firing ranges as 0.01 milligrams (mg) / 100 square centimeters (cm^2).

Analytical results of the lead in air samples were compared to Schedule 1 of the Alberta Occupational Health and Safety Regulation (January, 2004), which stipulates that the eight hour Occupational Exposure Limit (OEL) for lead is 0.05 mg/m^3.

5.2 Lead Swipe Samples

A visual assessment of the subject building was conducted prior to sampling in order to determine the ideal locations for collection (i.e., areas where the majority of firing activities occurred). Locations where samples were recovered were noted on a floor plan and are presented in **Appendix B**. Photographs of sample locations are presented in **Appendix C**.

Lead dust samples were collected using swipe sampling protocols in accordance with NIOSH Method 9100. In general, a clean, sterile gauze pad, which was moistened with distilled water, was wiped across a surface area of approximately 10 cm X 10 cm. Subsequently, each sample was placed in a sealed, clearly labeled plastic bag and submitted to Maxxam Analytics Inc. (Maxxam) of Calgary, Alberta for lead content analysis. A total of 46 swipe samples were submitted to Maxxam for analysis, including two blanks for quality assurance/quality control purposes.

5.3 Lead in Air Samples

A total of six lead in air samples were collected inside and outside the old firing range in the areas identified in the above scope of work section. Locations where samples were recovered were noted on a floor plan and are presented in **Appendix B**.

Air samples were collected using a 0.8 µm cellulose ester membrane (MCE) filter attached to a low volume pump set to a flow rate of approximately 2.0 L/min. The samples were collected over a one hour period. The air flow rates through the pumps were measured before and after sample collection with a representative sampling media in line using a rotameter. After sampling, the samples were labeled and placed in sealed plastic bags, and submitted to Maxxam of Burlington, Ontario for lead analysis. Both the sample collection and analysis procedures were based on NIOSH Method 7300 - Elements by ICP.

A total of eight samples were submitted to Maxxam, including two blanks for quality assurance/quality control purposes.

6.0 LEAD-BASED PAINT

6.1 Background Information

In 1976, Canadian regulations limited the amount of lead in interior paint to 0.5% by weight. Paint with more than 0.5% lead content by weight or approximately 5,000 parts per million (ppm) is considered to be lead-based according to Health and Welfare Canada and the United States Department of Housing and Urban Development (HUD) Guidelines. The presence of lead-based paint generally requires exposure protection for workers during demolition or renovation activities.

6.2 Paint Chip Samples

A visual assessment of the subject building was conducted to identify major paint applications (noted by different colour). Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only. Prior to sample collection, the painted surfaces were wiped with a moistened gauze pad to remove any surface dust. A total of three paint chip samples were collected throughout the subject building in locations of lead swipe sampling. These samples were sent to Maxxam of Calgary, Alberta for analysis to determine lead content. Test locations are presented on the drawings in **Appendix B**.

Where possible, all paint layers were collected to the substrate. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour will be presumed to be the same, regardless of differing sub-surface paints, if any.

7.0 FINDINGS

The following sub-sections present the results of the assessment conducted within the subject building for surface swipe sampling, air sampling, and paint chip sampling.

7.1 Lead Swipe Samples

A total of 44 surface swipe samples for lead and two blanks were collected within the subject building. A description of each sample, including its location and analytical result is presented in Table 1, below. Copies of the certificates of analysis provided by Maxxam for the samples analyzed are presented in **Appendix D**.

Table 1: Lead Swipe Sample Results

General Sample Location	Description of Sampled Surface	Sample No.	Pb Concentration (mg Pb/100 cm^2)	Maximum Acceptable Pb Dust (mg Pb/100cm^2)
Room 100 – Northwest Ceiling	Painted Concrete Ceiling	BS-01	0.001	0.01
Room 101 – North Wall – West	Painted Brick Wall	BS-02	0.002	0.01
Room 101 – North Wall – East	Painted Brick Wall	BS-03	<0.001	0.01
Room 101 – East Wall – North	Painted Brick Wall	BS-04	0.002	0.01
Room 101 – East Wall – Center	Painted Brick Wall	BS-05	0.008	0.01
Room 101 – East Wall – South	Painted Brick Wall	BS-06	0.004	0.01
Room 101 – South Wall – East	Painted Drywall	BS-07	0.003	0.01
Room 101 – South Wall – West	Painted Drywall	BS-08	0.001	0.01
Room 101 – West Wall – South	Painted Brick Wall	BS-09	<0.001	0.01
Room 101 – West Wall – Center	Painted Brick Wall	BS-10	0.001	0.01

Table 1: Lead Swipe Sample Results

General Sample Location	Description of Sampled Surface	Sample No.	Pb Concentration (mg Pb/100 cm^2)	Maximum Acceptable Pb Dust (mg Pb/100cm^2)
Room 101 – West Wall – North	Painted Brick Wall	BS-11	0.002	0.01
Room 101 – North Floor	Concrete Floor	BS-12	**0.011**	0.01
Room 101 – Center Floor	Concrete Floor	BS-13	0.004	0.01
Room 101 – South Floor	Concrete Floor	BS-14	0.005	0.01
Room 101 – North Ceiling	Concrete Ceiling	BS-15	**0.036**	0.01
Room 101 – Center Ceiling	Concrete Ceiling	BS-16	**0.200**	0.01
Room 101 – South Ceiling	Concrete Ceiling	BS-17	**0.017**	0.01
Room 100 – Floor Outside Room 101	Concrete Floor	BS-18	**0.037**	0.01
Room 100 – North Wall – East	Painted Brick Wall	BS-19	0.004	0.01
Room 100 – East Wall – North	Painted Brick Wall	BS-20	**0.031**	0.01
Room 100 – West Wall – Center	Painted Brick Wall	BS-21	0.006	0.01
Room 100 – East Ceiling – Outside Room 101	Painted Concrete Ceiling	BS-22	0.004	0.01
Room 102 – South Wall	Painted Brick Wall	BS-23	**0.010**	0.01
Room 102 – West Wall – Outside Room 103	Painted Brick Wall	BS-24	0.002	0.01
Room 102 – North Floor	Concrete Floor	BS-25	**0.010**	0.01
Room 102 – Center Floor	Concrete Floor	BS-26	0.008	0.01
Room 100 – East Wall – South	Painted Brick Wall	BS-27	0.003	0.01
Room 102 – North Ceiling	Painted Concrete	BS-28	0.002	0.01
Room 103 – West Wall – South	Painted Brick Wall	BS-29	0.002	0.01
Room 103 – West Wall – Center	Painted Brick Wall	BS-30	0.001	0.01
Room 103 – West Wall – North	Painted Brick Wall	BS-31	0.001	0.01
Room 103 – North Wall – West	Painted Drywall	BS-32	0.001	0.01
Room 103 – North Wall – East	Painted Drywall	BS-33	0.002	0.01
Room 103 – East Wall – North	Painted Brick Wall	BS-34	<0.001	0.01
Room 103 – East Wall – Center	Painted Brick Wall	BS-35	0.001	0.01
Room 103 – East Wall – South	Painted Brick Wall	BS-36	<0.001	0.01
Room 103 – South Wall – East	Painted Drywall	BS-37	<0.001	0.01
Room 103 – South Wall – West	Painted Drywall	BS-38	<0.001	0.01
Room 103 – South Floor	Concrete Floor	BS-39	0.007	0.01

Table 1: Lead Swipe Sample Results

General Sample Location	Description of Sampled Surface	Sample No.	Pb Concentration (mg Pb/100 cm^2)	Maximum Acceptable Pb Dust (mg Pb/100cm^2)
Room 103 – North Floor	Concrete Floor	BS-40	0.005	0.01
Room 103 – South Ceiling	Concrete Ceiling	BS-41	0.007	0.01
Room 103 – North Ceiling	Concrete Ceiling	BS-42	0.007	0.01
Room 103 – HVAC	Interior	BS-43	0.003	0.01
Room 103 – HVAC	Interior	BS-44	**0.014**	0.01
Blank #1	n/a	BS-45	0.001	0.01
Blank #2	n/a	BS-46	<0.001	0.01

Note: Bold results indicate exceedences to DND Safety Chapter 42-specified maximum acceptable concentration for that surface.
mg Pb/100 cm^2 = Milligrams of lead per 100 centimeters square.

Based on the analytical results, nine of the 44 surface swipe samples collected (20.5% - not including the field blanks) were found to contain lead in excess of the maximum allowable concentration as specified by DND Safety Chapter 42. Laboratory results of the field blanks were below detection limits.

According to the results, it appears that the concentration of lead found in samples generally followed an increasing trend the closer the collected sample was to the old rifle range area (Room 101 and Room 103). Within the old rifle range area, the samples in excess of the project criteria were located either on the floor or ceiling of Room 101 and within the HVAC system of Room 103. Additionally, one floor and two walls samples outside the old rifle range were found to be in excess of the project criteria.

7.2 Lead in Air Samples

A total of six air samples and two blanks were collected within the subject building for the determination of airborne lead levels. A description of each sample, including its location and analytical result is presented in Table 2, below. Copies of the certificates of analysis provided by Maxxam Laboratories for the samples analyzed are presented in **Appendix D.**

Table 2: Lead in Air Sample Results

General Sample Location	Sample No.	Analytical Result (mg/m^3)	OEL (mg/m^3)
Room 101 – South	AS-01	<0.024	0.05
Room 101 – North	AS-02	<0.024	0.05
Room 102 – South	AS-03	<0.024	0.05
Room 100 – Northwest	AS-04	<0.024	0.05
Room 100 – Southwest	AS-05	<0.024	0.05
Room 103 – Center	AS-06	<0.024	0.05

Table 2: Lead in Air Sample Results

General Sample Location	Sample No.	Analytical Result (mg/m^3)	OEL (mg/m^3)
Blank #1	AS-07	NC	0.05
Blank #2	AS-08	NC	0.05

Note: NC = Non-calculable
mg/m^3 = Milligrams per cubic meter
OEL = Occupational exposure liimit

Based on the analytical results, the six air samples collected within the subject building are below the laboratory detection limit of 0.024 mg/m^3, and therefore, below the OEL limit of 0.05 mg/m^3. The laboratory results of the field blanks indicated non-calculable lead concentrations.

Please note that the air results are based on minimal disturbance within the subject area (i.e., low occupancy and minimal air movement).

7.3 Paint Chip Samples

A total of three paint chip samples were collected to assess the lead content of painted surfaces where lead swipe samples were collected. Laboratory results and corresponding sample locations and descriptions are presented in Table 3, below. Laboratory certificates of analysis are located in **Appendix D**.

Table 3: Paint Chip Analysis Results

Sample ID	Sample Location	Paint Colour	Lead Based (Yes/No)	Lab Results (ppm)
PS-01	Room 101- East Wall	Light Gray	No	8.82
PS-02	Room 100 – North Wall	Yellow	No	68.8
PS-03	Room 103 – North Wall	White	No	1.19

Note: ppm = parts per million

The laboratory analysis indicates that none of the three paint chip samples contain greater than 5,000 ppm of lead. As a result, the sampled paint applications are not considered to be lead-based paint as per the above-noted standards. However, the lead contained in the paint applications should be taken into consideration during confirmatory swipe sampling after the decontamination activities. Decontamination activities may affect the condition of the paint applications resulting in flaking of the paint or the leaching of lead contained in the paint.

8.0 RECOMMENDATIONS

8.1 Lead Dust

All surfaces exceeding acceptable lead dust concentrations, including exposed pipe and duct work within the subject building should be abated to levels below the project criteria, in accordance with the provisions of DND Safety Chapter 42. The rooms that were identified to have been impacted by lead above the project criteria include rooms 100, 101, 102 and 103. The lead decontamination work plan/specification is presented in **Appendix E**.

Corrective action or remedial work on surfaces containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust. It is recommended that dust suppression measures be followed and a polyethylene enclosure with negative air units be utilized during remediation in order to lessen the potential release of any airborne lead into other areas of the building during the cleaning operation. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust. This equipment would include, but not be limited to:

- Disposable or cleanable work gloves;
- Coveralls (Tyvek or similar) with foot covering;
- Goggles or face shields; and,
- Properly fitted half-face respirators with HEPA cartridges.

Prior to the completion of the abatement procedures, a comprehensive confirmatory sampling program should be undertaken to assess lead levels on cleaned surfaces to ensure the lead concentrations are below the criteria of 0.01 mg/100 cm^2. The lead contained in the paint applications identified in this assessment should be taken into consideration during confirmatory swipe sampling. Decontamination activities may affect the condition of the paint applications resulting in flaking of the paint or the leaching of lead contained in the paint.

8.2 Lead in Air Samples

After the lead abatement of the subject area, lead in air samples should be collected to ensure that the lead concentrations remain below the OEL of 0.05 mg/m^3. Higher concentrations could result from the disturbance of presently settled lead-containing dust during decontamination activities.

9.0 CLOSURE

This report has been prepared by Jacques Whitford Limited (Jacques Whitford) for the sole benefit of the RCMP. This report may not be relied upon by any other person or entity without the express written consent of the RCMP.

Any use that a third party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such third parties. Jacques Whitford accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The conclusions presented represent the best judgment of the assessor based on current environmental standards and the site conditions observed on the dated cited within this report. Due to the nature of the investigation and the limited data available, Jacques Whitford cannot warrant against undiscovered environmental liabilities. It is possible that additional, concealed hazardous materials may become evident during renovation and/or demolition activities within the subject building.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

We trust that the report meets your current requirements. Should you have any questions or concerns regarding the above, please do not hesitate to contact the undersigned.

Respectfully submitted,

JACQUES WHITFORD LIMITED

Reviewed by:

Original signed by Wanda Moore

Original signed by Andy Andriotis

Wanda Moore
Indoor Environment Technician

Andy Andriotis, B. Sc., P. Eng.
Senior Review

WM:AA/pr

APPENDIX A

Decontamination Protocol for Indoor Firing Range Safety Standard

Jacques Whitford

CHAPTER 42

Effective: 01 Jan 2003

DECONTAMINATION PROTOCOL FOR INDOOR FIRING RANGE SAFETY STANDARD

This chapter contains the following material:

PURPOSE

1. The purpose of this chapter is to promulgate the Decontamination Protocol for Indoor Firing Ranges Safety Standard and prescribe its implementation in DND and the CF.

APPLICATION

2. This standard is promulgated by the Directorate of General Safety in conjunction with other safety specialists within the Department of Defence and the Canadian Forces. In general, this standard applies to DND Public Service employees and to military personnel of the Canadian Forces, in accordance with the following paragraphs.

3. Part II of the Canada Labour Code is the primary law that governs occupational health and safety in the federal workplace. It applies to the Public Service of Canada and to persons employed in the Public Service of Canada as specified at section 123(2) of the Canada Labour Code. It should be noted that in the domain of occupational health and safety the various provincial and territorial occupational health and safety laws are not applicable to federal public servants. The Canada Labour Code, Part II and its Regulations also apply to Non-Public Funds (NPF) employees unless specifically exempted. The Code, its OSH Regulations and Treasury Board Directives and Standard therefore apply to the Department of National Defence and its civilian employees.

4. The Canada Labour Code, Part II only applies to CF members in those instances where they have direct management and/or supervisory responsibilities over DND civilian employees or any other non-CF person granted access to the workplace. It is DND/CF policy to have its military component comply with General Safety Policy as contained in A-GG-040-001/AG-001 and its related documentation, and with the General Safety Standards as contained in C-02-040-009/AG-001. A commander may override a General Safety Standard if it places a serious limitation on the capability to fulfill an operational or a training commitment. When the nature or urgency of an operational or a training situation requires the departure from General Safety Policy or Standards, the applicable Commander shall employ recognized risk management practices to determine an appropriate course of action and must be prepared to justify the decision. In cases where the departure from General Safety Policy or Standards will be of a continuing nature, applicable Commanders must seek approval from Higher Headquarters for the continued action.

SCOPE

5. This standard applies to personnel, material, works and buildings throughout DND and the CF.

CONFLICTS OR OMISSIONS

6. Where there is conflict between the specifications of this standard and some other recognized authoritative reference, or if there is a safety requirement that is not addressed in this document, the relevant subject matter expert or safety specialist shall be consulted to provide guidance for the resolution of the conflict or issue. Copies of relevant documents and decisions should be forwarded to D Safe G3 for information purposes and amendment action to this standard.

RESPONSIBILITIES

7. All Commanding Officers are responsible to ensure full compliance with this safety standard. Accordingly, such authorities are to ensure that safety measures to meet or to exceed these minimum requirements are incorporated in all applicable orders, directives and publications.

REFERENCES

8. This standard prescribes the following publications and documents as forming a part of this standard. Other reference documents may also need to be referred to and their absence from this list in no way precludes their relevance.

a. A-LG-040-000/QR-001, Canada Labour Code, Part II, http://admie.ottawa-hull.mil.ca/Dge/EnviroOSH/documents/canada/caeclc/caaclce0.htm

b. Canada Occupational Health and Safety Regulations, http://admie.ottawa-hull.mil.ca/Dge/EnviroOSH/documents/canada/caeclc/caroshe0.htm

c. A-GG-040-001/AG-001, General Safety Program, Volume 1, Policy & Program, http://vcds.mil.ca/dsafeg/pubs/vol1/intro_e.asp

d. Fundamentals of Industrial Hygiene, 4th Ed, 1995, National Safety Council, ISBN 0-87912-171-8

d. **Occupational Health and Safety**, 2nd Ed, 1994, National Safety Council, ISBN 0-87912-154-8

f. **Lead in Paint and Dust Guidelines**, revision 2, March 1999, Program Development and Professional Services, Workplace Health and Public Safety Program (WHPSP), Health Canada.

OPI'S:

Admin OPI: - D Safe G3 – National Defence Headquarters, Ottawa, Ontario, K1A-0K2

Topic OPI: - Canadian Forces Medical Group – Director General Health Services – DCOS FHP, National Defence Headquarters, Ottawa, Ontario, K1A-0K2

CHAPTER 42, ANNEX A

Effective: 01 Jan 2003

DECONTAMINATION PROTOCOL FOR INDOOR FIRING RANGES

TABLE OF CONTENTS

Introduction

1. This document includes a complete description of the different methodologies to be used, the specific health and safety program and the management methods of the contaminated residues and wastes produced during the decontamination procedures.

Aim

2. The aim of the procedures is to decontaminate the interior of buildings. The specific objectives are the decontamination of the building, including the floors, walls, ceilings and the mechanical and electrical equipment. Once the decontamination completed, the maximum acceptable lead dust concentrations on the surfaces will be as follows:

a. Floors, walls and ceilings including the exposed structure .01 mg/100 cm^2 (100 micrograms/ft^2);

b. Window sills .05 mg/100 cm^2 (500 micrograms/ft^2); and

c. Window frames .08 mg/100 cm^2 (800 micrograms/ft^2).

Operational protocol

3. The aim of the sampling is to have a representative surface of a specific area to be characterized. The room to be characterized is split in areas (or blocks), each measuring between 4 to 8 meters in length (see Fig. 1).

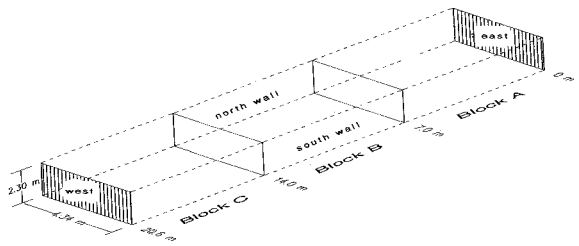


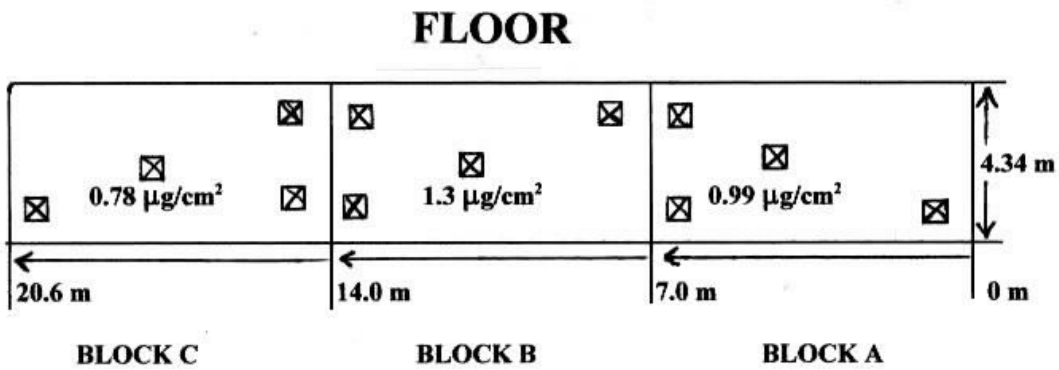
FIG. 1

4. For each block, a composite sample is taken on floor section, walls section and ceiling section.

5. The composite sample is composed of subsamples calculated as such :
- Floors and ceilings : ((length X width) X 0.5%) / ST
- Walls : ((length X height) X 0.5%) / ST

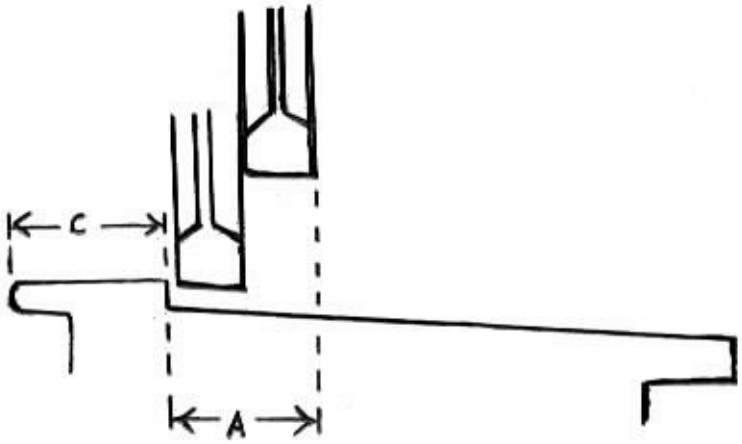
Where : length = length in cm width = width in cm
height = height in cm ST = surface of the template in cm^2

Example : the sample composition for the floor section in ''block A'', using a template of 20cm X 20cm , is made at least of 4 sub-samples (see Fig. 2)
((700cm X 434cm) X 0.5%) / 400cm^2 =3.8 sub-samples

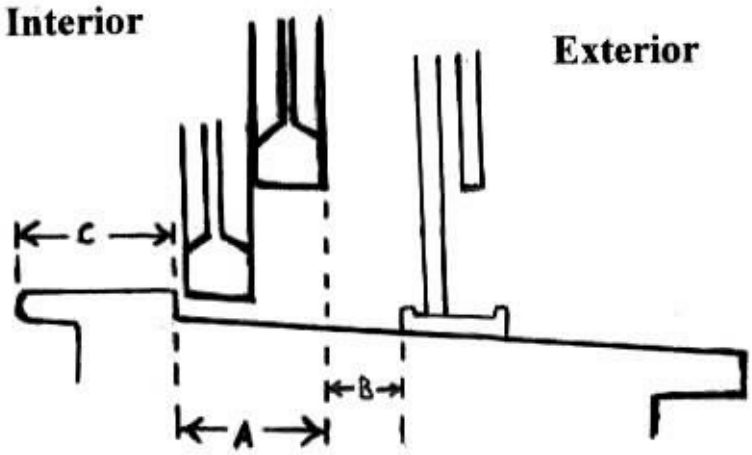


6. On top of the samples taken on walls, floors, and ceilings, samples must be taken on: the interior window sills, the window troughs (see Fig.3), the doors, the ventilation system (inside and outside), and any surfaces we want to know the status (contaminated or not).

Figure 3 – Window locations for dust sampling



ABOVE: sectional view of window (with no storm window) showing window trough area A, to be tested. The trough is the surface where both window sashes can touch the sill when lowered. The interior window sill is shown as area C. Interior window sills and window troughs should be sampled separately.



ABOVE: sectional view of window (including a storm window) showing window trough area A and B, to be tested. The trough extends out to the storm window frame. The interior window sill is shown as area C. Interior window sills and window troughs should be sampled separately.

7. Redo the same sampling protocol after the lead abatement.

8. Should laboratory results indicate that the wipe test exceed the criteria, the affected area should be cleaned again.

9. Dispose of all materials used for the decontamination, submit a statement certifying that they were disposed of in an approved centre.

10. Ensure the security of all employees on the work site and apply all the Canada occupational health and safety regulations governed by the Canada Labour Code, Part II.

Description of the building

11. The contracted firm will provide a full description of the building to be decontaminated. Schematic of all elements or sectors will be produced in order to facilitate identifications.

OPERATION METHODOLOGIES

12. A certified and specialized firm must perform the decontamination procedures. Health Canada should perform the co-ordination of the procedures and the environmental follow-up.

The procedures should entail the following activities:

a. The preparation of a specific health and safety program;

b. The realisation of comparative tests of decontamination;

c. The decontamination including the dust removal and the scrubbing with an acidified cleaning solution (lead-specific cleaning agent preferred);

d. The validation of the decontamination procedures; and

e. The management of the contaminated residues and wastes.

Specific health & safety program

13. The federal and provincial regulations on quality of the work environment provide all the necessary principles to insure the health and safety of the workers. The principles regarding nuisance and lead dusts correspond to all elements identified as posing a particular risk in the present program and are to be the object of a particular attention.

14. To this end an health and safety program must be elaborated (see Annex A) before the beginning of the decontamination procedures and must contain the following elements:

a. The risk factors related to lead

b. The determination of the work procedures and the equipment and material necessary to the health and safety of the workers during the decontamination procedures; and

c. The elaboration of a protocol of good practices of industrial hygiene for the workers.

15. Once the program is outlined and in place, it includes all necessary safety measures to reduce the risks of lead ingestion and absorption:

a. The work areas must be isolated

b. The heaping of dust must be lightly sprinkled with water to reduce the emission of dust particles; and

c. The workers must wear disposable coveralls, safety goggles a respirator fitted with approved cartridges and all other conventional safety equipment when required.

Comparative tests of decontamination

16. During the decontamination procedures, divers comparative tests on the decontamination procedures and cleaning products should be done. The aim of these tests is to confirm the efficiency of the proposed procedures as well as the different cleaning products.

Description of the procedures

17. The contracted firm must submit a complete description of the schedule and a work procedure of the decontamination methods to be used.

a. The construction of temporary wooden and polyethylene walls to isolate the procedures and to prevent the dust to infiltrate others sections of the building;

b. The dust removal from the interior of the temporary walls should be done with a high performance vacuum truck. At the end of the dust removal, the dust must be placed in sealed containers and then disposed of as per the existing regulations;

c. The entire building be washed with an acidified solution (lead-specific cleaning agent), then rinsed with water; and

d. The rinse water be recuperated with a vacuum cistern truck to be neutralized and disposed of as per the existing regulations.

Material and equipment required

18. The contracted firm will submit a complete list of the material and equipment that will be used for the decontamination.

Quality control measures of the procedures

19. During the decontamination procedures, various control measures must be taken in order to meet the aimed objectives. The sampling methods must be performed in accordance with the Sampling Guide. The quality control of the work procedures permits the validation of the cleaning of floors, walls, ceilings and mechanical & electrical equipment. The smear sampling method should be used to validate the dust removal. It is the responsibility of the responsible Preventive Medicine Technician (P Med Tech) to ensure that the Threshold Limit Values in the decontaminated site are not exceeded.

Sampling of surfaces

20. During the decontamination procedures, the total number of smear samples should represent a minimum of 0.5% of the total surface taking in consideration the following factors:

a. Walls:	80% of the samples should be taken at the normal working height
b. Floors & ceilings:	samples should be distributed in a proportional manner, meaning 10% of each
c. Doors:	interior & exterior surfaces of the door
d. Windows:	the sills, frames and the each glass.

RESULTS

Air quality during the decontamination

21. In order to insure that the respiratory protection of the workers is adequate, air sampling should be taken and analysed to determine the concentration of lead in the ambient air. A certificate of the air analysis must be provided. It is important to mention that the Threshold Limit Value acceptable in a work environment for an 8-hour period without protection is 0.05 mg/m^3.

Smear analysis

22. In order to validate the decontamination procedures, three smear campaigns of the surfaces should be taken inside the building. The purpose of these campaigns permits to confirm the progress of the decontamination, to identify the sectors (areas) necessitating further cleaning and finally to confirm that the decontamination objectives have been met on all the surfaces.

Complicating circumstances

23. It is prudent to assume that some unforeseen difficulties might be encountered during decontamination. Some surfaces like unpainted cement floor or walls and wood are porous and might be impregnated with lead dust. Such areas will be extremely difficult to decontaminate therefore; different corrective measures will have to be considered and carefully studied such as:

a. Manual washing and scrubbing of rough surfaces

b. The sealing of cement floor with epoxy paint

c. The sealing of steel beams with a non-toxic paint for metal; and

d. The use of non-toxic paint on other porous surfaces.

MANAGEMENT OF CONTAMINATED WASTES

24. All wastes and residual materials resulting from the decontamination must be managed in accordance with the existing standards and regulations. All transport manifests/invoices will be provided to DND.

Lead materials

25. All materials that can be considered hazardous such as, dusts, wastes contaminated with lead will be sealed in appropriate containers. These residues will be shipped to an approved decontamination site.

Rinse waters

26. During the washing procedures with the acidified solution (lead-specific cleaning agent), a vacuum cistern truck will recuperate the rinse waters on the floors. The lead-contaminated waters will be transported to an approved decontamination site. All transport manifests/invoices and bill will be provided to DND as proof of proper disposal.

CONCLUSION

27. Upon completion of the decontamination, a formal and detailed report including analysis results, manifests, invoices, bills and quality control reports will be submitted to the proper military authorities.

CHAPTER 42, ANNEX B

Effective: 01 Jan 2003

SPECIFIC HEALTH & SAFETY PROGRAM FOR LEAD DECONTAMINATION

TABLE OF CONTENTS

INTRODUCTION

1. The regulations of the Canada Labour Code, Part II present, the measures to insure the health and safety of the employees on the work site. The standards with regard to nuisance and lead dusts correspond to the elements identified as representing a particular health risk to the workers during the decontamination procedures.

2. This Annex constitutes a specific health and safety program relative to the decontamination of the building. This program entails the following components:

a. The determination of the works methods and the equipment necessary to protect the health and safety of the workers during the decontamination;

b. The elaboration of a good practice protocol on the industrial hygiene point of view; and

c. The installation of the work premises including the warning placarding and WHIMIS.

RISK ELEMENTS: LEAD

3. Lead (Pb) is a blue-greyish malleable metal. It is a mineral in its natural form. Lead comes in a variety of forms:

a. Solid: lead bearings, bullets

b. Liquid: compound lead solution, molten lead

c. Fume: lead soldering and welding, lead in fusion; and

d. Dust: lead oxides and elementary lead.

Warnings

4. Lead is a teratogen (congenital malformation) therefore it has to be carefully manipulated.

5. Lead can adversely affect an individual if he inhaled or swallowed it through food, beverages or cigarettes.

6. Repeated exposures cause an accumulation of lead within the organism. A light level of exposure for a long period of time can cause fatigue, headaches, stomach disorder and difficulties to sleep.

7. Lead exposure increases the risk of hypertension. A heavy exposure to lead for a long period of time can cause serious damages to the kidneys and to the brain.

The absorption

8. The human organism can absorb lead through three ways: the respiratory tract, the digestive route and through the skin. The first two being unquestionably the most important.

Via the respiratory tract

9. The inhalation of lead fumes and dust remain the principal manner in which lead enters the organism. The proportion of lead retained in the lungs can be as elevated as 40% (30"10%) of all that has been inhaled. However, many factors such as the lead

physical form (vapours, fumes, dust particle sizes), its chemical form, the age, work environment (temperature, efforts) and the nature of the work of the individual alter the absorption conditions.

Via the digestive tract

10. Approximately 10% of the ingested lead is absorbed at the gastro-intestinal level. That's why, if good practices of personal hygiene are not strictly adhered to: hand washing, no eating, no drinking and no smoking at the workstation; the quantity of ingested lead will be significant. Furthermore, if the hygiene measures are neglected: showers, frequent cleaning of the work clothes, etc, the worker will facilitate lead ingestion.

Via the skin

11. The absorption through the skin of the inorganic compounds and certain organic lead compounds is negligible. Nevertheless some organic compounds will penetrate the skin. Furthermore, if the skin presents cuts, abrasions and lacerations it is imperative that particular preventive measures be taken.

PREVENTIVE MEASURES

12. Lead represents certain health risks and based on this fact, any contact with this material should be reduced to a minimum.

Control at the source

13. All materials susceptible to produce dust must be sufficiently dampened or treated in a manner to knock down the dust during the diverse manipulations.

14. Heating of material containing lead must be avoided (flames, blowtorch, etc). Lead has a low fusion temperature and a contact with a high heat source could produce lead fumes. Decontamination operations must be enclosed and an enveloping ventilation hood or a vacuum system must be used to recuperate the lead dusts.

During the operations

15. The following section describes the measures to be taken in order to restrict the expositions and the dissemination of the lead dusts.

a. Each individual will be responsible for the cleaning, the tidiness of his workstation and the cleaning and storage of his equipment and non-utilised materials.

b. All working surfaces must be as much as possible free of any accumulation of lead dust.

c. Deposited dusts on edges, frames, sills, appliances and equipment will be the object of an immediate and meticulous cleaning before they can be airborne by air circulation or air draughts.

d. Dry sweeping, brushing and scrubbing must be avoided.

e. **NEVER** use compressed air to dislodge dust.

f. Approved HEPA vacuum cleaners with attachments will be used and emptied in a manner to minimise the return in the work areas.

g. It is essential that the vehicles circulating inside or outside be kept scrupulously clean to prevent the dissemination of the contamination.

h. All containers or equipment susceptible to spread dust in the environment must be thoroughly washed before being taken out of the area of decontamination and all material containing lead will be transported in sealed and approved containers.

Sanitary measures

16. In order to the risks of lead absorption, certain hygiene measures are recommended. They are as follows:

a. It is absolutely forbidden to eat, drink, chew or smoke in the decontamination area.

b. The area used for work clothes storage must be physically separated from the one used for civilian clothing to prevent contamination.

c. Under no circumstances, the wearing of civilian clothes will be permitted on the decontamination site.

d. Circulation outside the contaminated area in contaminated work clothes will be avoided.

e. Contaminated clothes will be cleaned on a daily basis or adequately disposed of.

f. The workers will wash themselves before and after each work shift.

g. The cleaning of the face and hands will be done before their coffee breaks and their meals. Hand towels or paper towels can be used. Garbage cans should be provided for the contaminated and used paper.

h. The workers will have to follow strict sanitary rules before taking their meals:

(i) Removal of the work clothes

(ii) Removal of the remaining dust and dirt (i.e. on the footwear) by vacuuming; and

(iii) Everyone will have to wash their hands, forearms and face before consuming food at their coffee break or lunch hour. Hands must clean before smoking.

Other relative measures

17. The aim of the specific measures described in the present document is to minimise the risks of contamination essentially related to lead. In addition to these measures, the following precautions and rules will have to be respected without being limited to them.

(i) Any product brought on the work site will be in their original container. Each container will bear a label conform to the WHIMIS regulations.

(ii) The usual regulations to follow in case of an accident will be fully respected.

(iii) The standard lock-up procedures for the electrical and mechanical equipment and appliances will be strictly observed.

(iv) Before using any equipment of recuperation (truck, vacuum tools, etc) the worker will make sure that there is no incompatible residues or materials.

INDIVIDUAL PROTECTION

18. This section suggests certain measures and recommendations particular to the respiratory protection and protective work clothes needed in work areas contaminated with lead.

19. It has to be mentioned that the wearing of personal protective equipment does not serve as a substitute to the measures described in section 3.0. It must be reminded that good work practices are more often superior to the protective equipment.

Respiratory protection

20. It is most important that all personnel be trained on the usage and maintenance of respiratory apparatus. In particular, it is mandatory to clean, wash and disinfect the apparatus before and after each use.

21. During the usage, the following will be a must:

a. The respirator is to be properly fitted and a check for leaks will be performed in accordance with the regulations;

b. Any defectiveness detected in the functioning, adjustment or any other experienced difficulties in the wearing of PPE will be immediately reported to the supervisor;

c. Maintain a good personal hygiene at all time

d. Be freshly shaved

e. The face will be washed before and after the use of a respirator; and

f. The respirator selection will be as per the existing regulations to adequately protect the personnel against lead dust.

Working clothes

22. Beyond the respiratory protection, the decontamination procedures request the wear protective clothing and safety equipment. Personal protective equipment can be classified in seven categories:

1. Eyes: safety goggles.

2. Face: not required.

3. Head/ears: hardhat and earmuffs or ear plugs in areas where noise levels exceed 87dBA.

4. Hands: leather gloves for vacuuming and PVC or disposable gloves for others.

5. Feet: safety footwear and disposable shoe coverings.

6. Body: disposable coveralls (Tyvek) and security harness when scaffolding.

7. Respiratory tract: as described in section 4.1.

Other relative measures

23. Divers sanitary measures concerning the work clothes are also recommended in order to minimise the risks of personal contamination:

a. Selected clothing and equipment must exclusively be used in the decontamination areas.

b. Personal clothes may be worn under the coveralls as long as the later are specially conceived and worn in a manner to prevent the contamination of the personal clothes.

c. The working clothes will be replaced at least once a week.

d. Garbage bags or containers intended to received the contaminated clothes must be identified in a manner that workers know where to disposed of them.

e. Working clothes will be removed in a space exclusively designed for this purpose.

f. Anticipate certain cleaning dispositions for the work clothes, protective equipment such as vacuuming. Under no circumstances, the dust will be agitated, blown or dispersed into the ambient air.

CONCLUSION

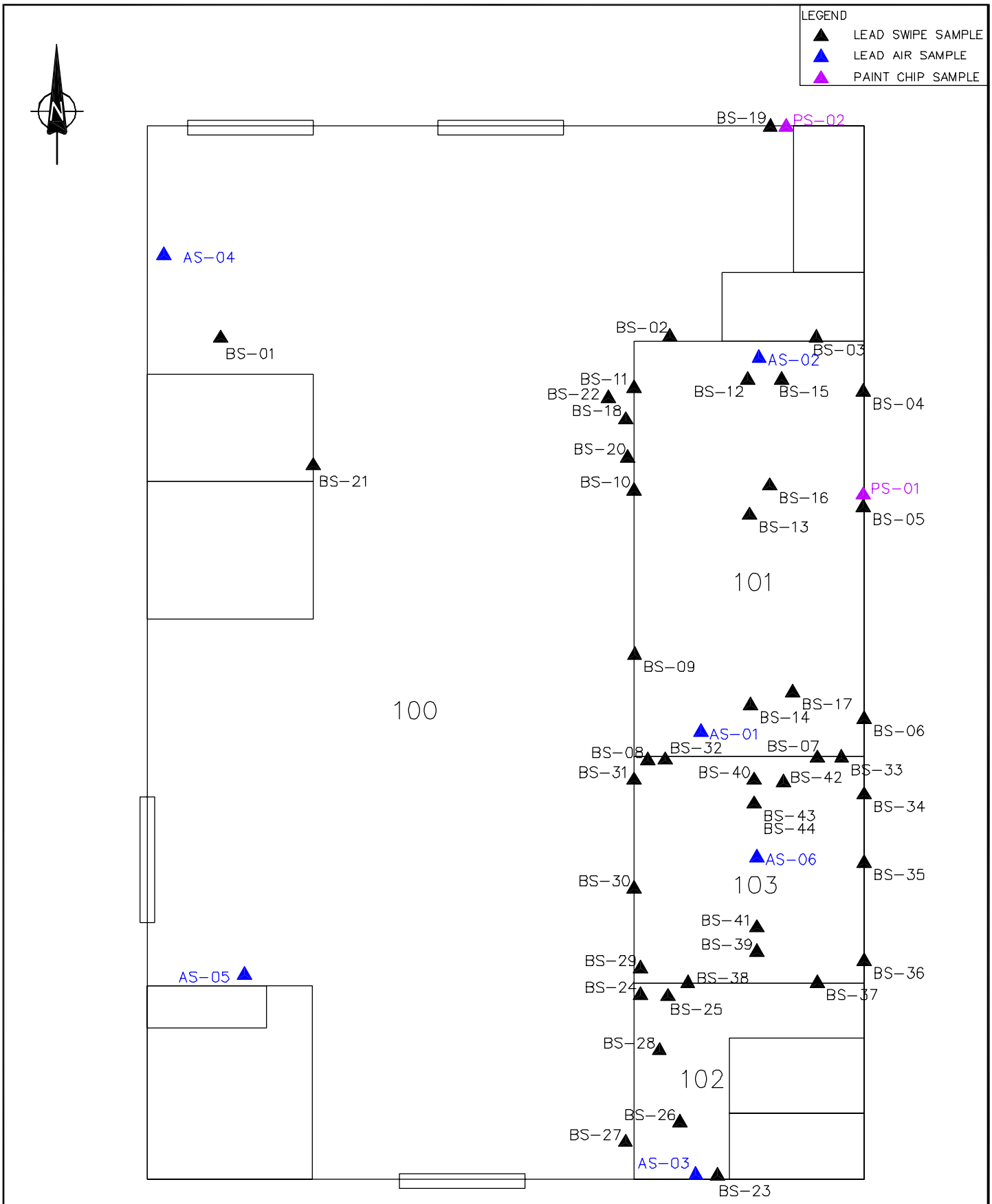
24. The implementation of control measures to eliminate the contamination at its source remains a priority in a health and safety point of view. Simple and feasible measures will contribute to the reduction of the contaminant at its source in a very appreciable way, notably in minimising the possibility of ingestion, which constitute a very important route of absorption in lead exposure.

This document was created to provide a base guideline which, is directed to reduce the risks to the health of the workers involved

APPENDIX B

Floor Plan Drawing

Jacques Whitford



*THIS DRAWING WAS ORIGINALLY CREATED IN COLOUR.

Jacques Whitford	SCALE: N.T.S. DATE: 06/03/06 DRAWN BY: LDP APPROVED BY:	CLIENT : RCMP TITLE : **LOCATIONS OF LEAD SWIPE, PAINT AND AIR SAMPLES** CALGARY POST GARAGE 920 - 16AVENUE NE CALGARY, ALBERTA	DRAWING NO. 1

\\CMIC\1010205\1010205-1.dwg 06/03/06

APPENDIX C

Photographs

Photo 1: Room 101

Photo 2: Room 103

Photo 3: Room 102

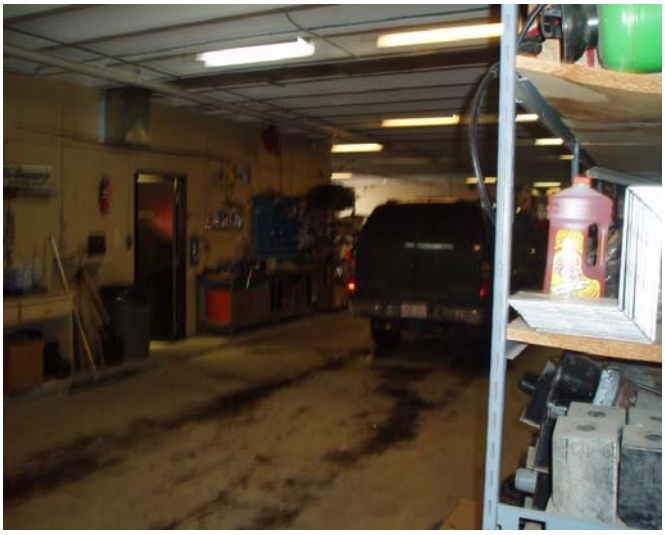


Photo 4: Room 100

Photo 5: Location of BS-01 (Room 100 – Northwest Ceiling)

Photo 6: Location of BS-02 (Room 101 – North Wall – West)

Photo 7: Location of BS-12 (Room 101 – North Floor)

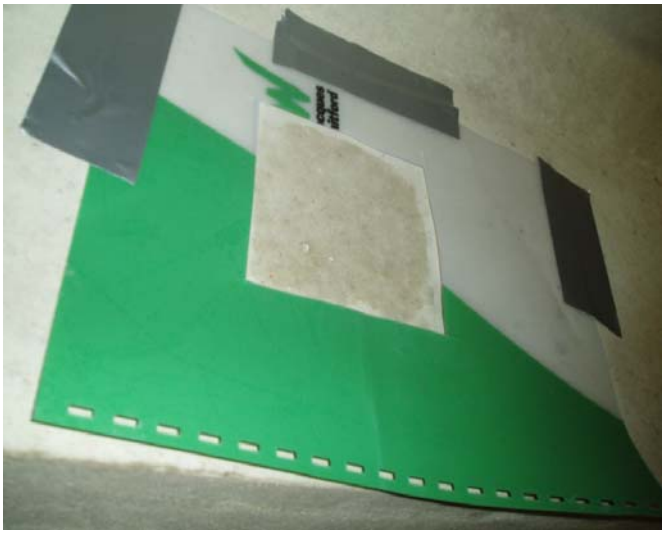


Photo 8: Location of BS-16 (Room 101 – Center Ceiling)

Photo 9: Room 103 – Intake HVAC Vent

APPENDIX D

Certificates of Analysis

Jacques Whitford

Your Project #: 1010205
Site: CALGARY
Coding # NSD016300
Your C.O.C. #: 113141

Attention: WANDA MOORE
JACQUES WHITFORD LTD.
CALGARY- NATIONAL CONTRACT
500, 708- 11 AVE. SW
CALGARY, AB
CANADA T2R 0E4

Report Date: 2006/03/03

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A607792
Received: 2006/02/27, 15:05

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Lead	3	N/A	2006/03/01	CAL SOP# 0068	ICP-MS

Validated by : _____
LILI ZHOU

Total cover pages: 1

Maxxam Job #: A607792
Report Date: 2006/03/03

JACQUES WHITFORD LTD.
Client Project #: 1010205
Site Reference: CALGARY
Sampler Initials: WM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		A65809	A65810	A65811		
Sampling Date		2006/02/24	2006/02/24	2006/02/24		
COC Number		113141	113141	113141		
	Units	**PS-01 RM. 101 - EAST WALL LIGHT GRAY**	**PS-02 RM. 100 NORTH WALL YELLOW**	**PS-03 RM. 103 NORTH WALL WHITE**	**RDL**	**QC Batch**
Elements						
Total Lead (Pb)	mg/kg	8.82	68.8	1.19	0.02	1058967

RDL = Reportable Detection Limit

Maxxam Job #: A607792
Report Date: 2006/03/03

JACQUES WHITFORD LTD.
Client Project #: 1010205
Site Reference: CALGARY
Sampler Initials: WM

General Comments

Results relate only to the items tested.

JACQUES WHITFORD LTD.
Attention: WANDA MOORE
Client Project #: 1010205
P.O. #:
Site Reference: CALGARY

Quality Assurance Report

Maxxam Job Number: CA607792

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1058967	SW	Calibration Check	Total Lead (Pb)	2006/03/01		95	%	82 - 107
		QC STANDARD	Total Lead (Pb)	2006/03/01		94	%	69 - 131
		BLANK	Total Lead (Pb)	2006/03/01	<0.02		mg/kg	
		RPD [A65809-01]	Total Lead (Pb)	2006/03/01	5.7		%	35

RPD = Relative Percent Difference

Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone(403) 291-3077 FAX(403) 291-9468

Your Project #: 1010205
Site: CALGARY
Coding # NSD016300
Your C.O.C. #: 113143, 113142, 113139, 113140

Attention: WANDA MOORE
JACQUES WHITFORD LTD.
CALGARY- NATIONAL CONTRACT
500, 708- 11 AVE. SW
CALGARY, AB
CANADA T2R 0E4

Report Date: 2006/03/06

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A607813
Received: 2006/02/27, 15:05

Sample Matrix: Soil
Samples Received: 46

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Lead	46	N/A	2006/03/06	CAL SOP# 0068	ICP-MS

Validated by : _____
LILI ZHOU

Total cover pages: 1

Maxxam Job #: A607813
Report Date: 2006/03/06

JACQUES WHITFORD LTD.
Client Project #: 1010205
Site Reference: CALGARY
Sampler Initials: WM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		A65940	A65953	A65954	A65955	A65956		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113143	113143	113143	113143	113143		
	Units	**BS-01 RM. 100 NW CEILING**	**BS-02 RM. 101 N. WALL - WEST**	**BS-03 RM. 101 N. WALL - EAST**	**BS-04 RM. 101 E. WALL - NORTH**	**BS-05 RM. 101 E. WALL - CENTER**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.001	0.002	<0.001	0.002	0.008	0.001	1062659

RDL = Reportable Detection Limit

Maxxam ID		A65957	A65958	A65959	A65960	A65961		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113143	113143	113143	113143	113143		
	Units	**BS-06 RM. 101 E. WALL - SOUTH**	**BS-07 RM. 101 S. WALL - EAST**	**BS-08 RM. 101 S. WALL - WEST**	**BS-09 RM. 101 W. WALL - SOUTH**	**BS-10 RM. 101 W. WALL - CENTER**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.004	0.003	0.001	<0.001	0.001	0.001	1062659

RDL = Reportable Detection Limit

Maxxam ID		A65962	A65963	A65964	A65965	A65966		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113143	113143	113142	113142	113142		
	Units	**BS-11 RM. 101 W. WALL - NORTH**	**BS-12 RM. 101 N. FLOOR**	**BS-13 RM. 101 CENTER FLOOR**	**BS-14 RM. 101 SOUTH FLOOR**	**BS-15 RM. 101 NORTH CEILING**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.002	0.011	0.004	0.005	0.036	0.001	1062659

RDL = Reportable Detection Limit

Maxxam Job #: A607813
Report Date: 2006/03/06

JACQUES WHITFORD LTD.
Client Project #: 1010205
Site Reference: CALGARY
Sampler Initials: WM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		A65967	A65968	A65969	A65970	A65971		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113142	113142	113142	113142	113142		
	Units	**BS-16 RM. 101 CENTER CEILING**	**BS-17 RM. 101 SOUTH CEILING**	**BS-18 RM. 100 FLOOR OUTSIDE RM. 101**	**BS-19 RM. 100 N. WALL - EAST**	**BS-20 RM. 100 E. WALL - NORTH**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.200	0.017	0.037	0.004	0.031	0.001	1062659

RDL = Reportable Detection Limit

Maxxam ID		A65972	A65973	A65974	A65975	A65976		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113142	113142	113142	113142	113139		
	Units	**BS-21 RM. 100 W. WALL - CENTER**	**BS-22 RM. 100 E. CEILING OUTSIDE RM. 101**	**BS-23 RM. 102 SOUTH WALL**	**BS-24 RM. 102 W. WALL OUTSIDE RM. 103**	**BS-25 RM. 102 NORTH FLOOR**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.006	0.004	0.010	0.002	0.010	0.001	1062677

RDL = Reportable Detection Limit

Maxxam ID		A65977	A65978	A65979	A65980	A65981		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113139	113139	113139	113139	113139		
	Units	**BS-26 RM. 102 CENTER FLOOR**	**BS-27 RM. 100 E. WALL - SOUTH**	**BS-28 RM. 102 NORTH CEILING**	**BS-29 RM. 103 W. WALL - SOUTH**	**BS-30 RM. 103 W. WALL - CENTER**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.008	0.003	0.002	0.002	0.001	0.001	1062677

RDL = Reportable Detection Limit

Maxxam Analytics Inc

Maxxam Job #: A607813
Report Date: 2006/03/06

JACQUES WHITFORD LTD.
Client Project #: 1010205
Site Reference: CALGARY
Sampler Initials: WM

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		A65982	A65983	A65984	A65985	A65986		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113139	113139	113139	113139	113139		
	Units	**BS-31 RM. 103 W. WALL - NORTH**	**BS-32 RM. 103 N. WALL - WEST**	**BS-33 RM. 103 N. WALL - EAST**	**BS-34 RM. 103 E. WALL - NORTH**	**BS-35 RM. 103 E. WALL - CENTER**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.001	0.001	0.002	<0.001	0.001	0.001	1062677

RDL = Reportable Detection Limit

Maxxam ID		A65987	A65988	A65989	A65990	A65991		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113139	113140	113140	113140	113140		
	Units	**BS-36 RM. 103 E. WALL - SOUTH**	**BS-37 RM. 103 S. WALL - EAST**	**BS-38 RM. 103 S. WALL - WEST**	**BS-39 RM. 103 SOUTH FLOOR**	**BS-40 RM. 103 NORTH FLOOR**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	<0.001	<0.001	<0.001	0.007	0.005	0.001	1062677

RDL = Reportable Detection Limit

Maxxam ID		A65992	A65993	A65994	A65995	A65996		
Sampling Date		2006/02/24	2006/02/24	2006/02/24	2006/02/24	2006/02/24		
COC Number		113140	113140	113140	113140	113140		
	Units	**BS-41 RM. 103 SOUTH CEILING**	**BS-42 RM. 103 NORTH CEILING**	**BS-43 RM. 103 HVAC**	**BS-44 RM. 103 HVAC**	**BS-45**	**RDL**	**QC Batch**
Elements								
Total Lead (Pb)	mg/kg	0.007	0.007	0.003	0.014	0.001	0.001	1062678

RDL = Reportable Detection Limit

Maxxam ID		A65997		
Sampling Date		2006/02/24		
COC Number		113140		
	Units	**BS-46**	**RDL**	**QC Batch**
Elements				
Total Lead (Pb)	mg/kg	<0.001	0.001	1062678

RDL = Reportable Detection Limit

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL) Comments

Sample	A65940-01 Lead: Results reported as mg/swab.
Sample	A65953-01 Lead: Results reported as mg/swab.
Sample	A65954-01 Lead: Results reported as mg/swab.
Sample	A65955-01 Lead: Results reported as mg/swab.
Sample	A65956-01 Lead: Results reported as mg/swab.
Sample	A65957-01 Lead: Results reported as mg/swab.
Sample	A65958-01 Lead: Results reported as mg/swab.
Sample	A65959-01 Lead: Results reported as mg/swab.
Sample	A65960-01 Lead: Results reported as mg/swab.
Sample	A65961-01 Lead: Results reported as mg/swab.
Sample	A65962-01 Lead: Results reported as mg/swab.
Sample	A65963-01 Lead: Results reported as mg/swab.
Sample	A65964-01 Lead: Results reported as mg/swab.
Sample	A65965-01 Lead: Results reported as mg/swab.
Sample	A65966-01 Lead: Results reported as mg/swab.
Sample	A65967-01 Lead: Results reported as mg/swab. Detection limits raised due to dilution.
Sample	A65968-01 Lead: Results reported as mg/swab.
Sample	A65969-01 Lead: Results reported as mg/swab.
Sample	A65970-01 Lead: Results reported as mg/swab.
Sample	A65971-01 Lead: Results reported as mg/swab.
Sample	A65972-01 Lead: Results reported as mg/swab.
Sample	A65973-01 Lead: Results reported as mg/swab.
Sample	A65974-01 Lead: Results reported as mg/swab.
Sample	A65975-01 Lead: Results reported as mg/swab.
Sample	A65976-01 Lead: Results reported as mg/swab.
Sample	A65977-01 Lead: Results reported as mg/swab.
Sample	A65978-01 Lead: Results reported as mg/swab.
Sample	A65979-01 Lead: Results reported as mg/swab.
Sample	A65980-01 Lead: Results reported as mg/swab.
Sample	A65981-01 Lead: Results reported as mg/swab.

Maxxam Job #: A607813
Report Date: 2006/03/06

JACQUES WHITFORD LTD.
Client Project #: 1010205
Site Reference: CALGARY
Sampler Initials: WM

Sample A65982-01 Lead: Results reported as mg/swab.

Sample A65983-01 Lead: Results reported as mg/swab.

Sample A65984-01 Lead: Results reported as mg/swab.

Sample A65985-01 Lead: Results reported as mg/swab.

Sample A65986-01 Lead: Results reported as mg/swab.

Sample A65987-01 Lead: Results reported as mg/swab.

Sample A65988-01 Lead: Results reported as mg/swab.

Sample A65989-01 Lead: Results reported as mg/swab.

Sample A65990-01 Lead: Results reported as mg/swab.

Sample A65991-01 Lead: Results reported as mg/swab.

Sample A65992-01 Lead: Results reported as mg/swab.

Sample A65993-01 Lead: Results reported as mg/swab.

Sample A65994-01 Lead: Results reported as mg/swab.

Sample A65995-01 Lead: Results reported as mg/swab.

Sample A65996-01 Lead: Results reported as mg/swab.

Sample A65997-01 Lead: Results reported as mg/swab.

Results relate only to the items tested.

JACQUES WHITFORD LTD.
Attention: WANDA MOORE
Client Project #: 1010205
P.O. #:
Site Reference: CALGARY

Quality Assurance Report

Maxxam Job Number: CA607813

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1062659	SW	Calibration Check	Total Lead (Pb)	2006/03/06		97	%	82 - 107
		QC STANDARD	Total Lead (Pb)	2006/03/06		95	%	69 - 131
		BLANK	Total Lead (Pb)	2006/03/06	<0.02		mg/kg	
		RPD [A65940-01]	Total Lead (Pb)	2006/03/06	NC		%	35
1062677	SW	Calibration Check	Total Lead (Pb)	2006/03/06		95	%	82 - 107
		QC STANDARD	Total Lead (Pb)	2006/03/06		93	%	69 - 131
		BLANK	Total Lead (Pb)	2006/03/06	<0.001		mg/kg	
		RPD [A65972-01]	Total Lead (Pb)	2006/03/06	0.7		%	35
1062678	SW	Calibration Check	Total Lead (Pb)	2006/03/06		94	%	82 - 107
		QC STANDARD	Total Lead (Pb)	2006/03/06		92	%	69 - 131
		BLANK	Total Lead (Pb)	2006/03/06	<0.001		mg/kg	
		RPD [A65992-01]	Total Lead (Pb)	2006/03/06	0.9		%	35

NC = Non-calculable
RPD = Relative Percent Difference

Calgary: 2021 - 41st Avenue N.E. T2E 6P2 Telephone(403) 291-3077 FAX(403) 291-9468

Maxxam

Attention: Wanda Moore
Jacques Whitford Limited {NR}
708 11th Ave SW
Suite 500
Calgary, AB
T2R 0E4

Report Date: 2006/03/07

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A618562
Received: 2006/03/02, 9:00

Sample Matrix: Filter
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Total Metals Analysis on Filter by ICP (1)	8	2006/03/06	2006/03/07	Ont SOP 0072	NIOSH 7300

(1) This test was performed by Maxxam Analytics Burlington

MAXXAM ANALYTICS INC.

JOYCE MACDONALD, B.Sc., C. Chem
Sales Representative Air Quality Services

JMD/jpa
encl.

Total cover pages: 1

6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: 905-817-5700 Toll free:800-563-6266 Fax: 905-817-5777

Maxxam Job #: A618562
Report Date: 2006/03/07

Jacques Whitford Limited {NR}
Client Project #:
Project name:
Sampler Initials:

ELEMENTS BY ICP-AES (FILTER)

Maxxam ID		K91805					
Sampling Date		2006/02/24					
	Units	**AS-01 RM 101 SOUTH**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	120	<0.024	0.024	928398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		K91806					
Sampling Date		2006/02/24					
	Units	**AS-02 RM 101 NORTH**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	120	<0.024	0.024	928398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		K91807					
Sampling Date		2006/02/24					
	Units	**AS-03 RM 102 SOUTH**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	120	<0.024	0.024	928398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		K91808					
Sampling Date		2006/02/24					
	Units	**AS-04 RM 100 NW**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	130	<0.024	0.024	928398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: 905-817-5700 Toll free:800-563-6266 Fax: 905-817-5777

Maxxam Job #: A618562
Report Date: 2006/03/07

Jacques Whitford Limited {NR}
Client Project #:
Project name:
Sampler Initials:

ELEMENTS BY ICP-AES (FILTER)

Maxxam ID		K91809					
Sampling Date		2006/02/24					
	Units	**AS-05 RM 100 SW**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	120	<0.024	0.024	928398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		K91810					
Sampling Date		2006/02/24					
	Units	**AS-06 RM 103 CENTER**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	120	<0.024	0.024	928398

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		K91811					
Sampling Date		2006/02/24					
	Units	**AS-07 BLANK**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	N/A	NC	N/A	928398

N/A = Not Applicable
NC = Non-calculable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam ID		K91812					
Sampling Date		2006/02/24					
	Units	**AS-08 BLANK**	**DL**	**Vol (L)**	**mg/m3**	**DL (mg/m3)**	**QC Batch**
Total Lead (Pb)	ug	<3.0	3.0	N/A	NC	N/A	928398

N/A = Not Applicable
NC = Non-calculable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: 905-817-5700 Toll free:800-563-6266 Fax: 905-817-5777

Maxxam Job #: A618562
Report Date: 2006/03/07

Jacques Whitford Limited {NR}
Client Project #:
Project name:
Sampler Initials:

GENERAL COMMENTS

ICP: Post digestion duplicate and spike on sample K91805

Samples have been corrected for desorption efficiencies if average percent recoveries are less than 80% (does not apply to gravimetric and inorganic analysis).

Volumes have been submitted by the client.

Results relate only to the items tested.

6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: 905-817-5700 Toll free:800-563-6266 Fax: 905-817-5777

Maxxam

Jacques Whitford Limited {NR}
Attention: Wanda Moore
Client Project #:
P.O. #:
Project name:

Quality Assurance Report

Maxxam Job Number: GA618562

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
928398 N_R	MATRIX SPIKE [K91805-01]	Total Lead (Pb)	2006/03/07		110	%	75 - 125
	Spiked Blank	Total Lead (Pb)	2006/03/07		107	%	90 - 110
	Method Blank	Total Lead (Pb)	2006/03/07	<3.0		ug	
	RPD [K91805-01]	Total Lead (Pb)	2006/03/07	NC		%	20

NC = Non-calculable
RPD = Relative Percent Difference
SPIKE = Fortified sample

6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: 905-817-5700 Toll free:800-563-6266 Fax: 905-817-5777

APPENDIX E

Lead Decontamination Work Plan/Specifications

Jacques Whitford

Lead Decontamination Work Plan/Specifications

1.0 GENERAL

1.1 General Conditions

The Department of National Defence General Safety Standard Chapter 42 entitled “Abatement Protocol for Indoor Firing Range Safety Standard” (further referred to as “DND Safety Chapter 42”) defines procedures and requirements for the execution of indoor firing ranges. Such work shall be done in strict accordance with handling requirements specified herein.

Repairs and disturbances of lead-contaminated materials or dusts to be performed by firms and workers fully experienced in lead control. Proof of adequate training must be supplied to the Lead Consultant, if requested.

All lead work shall be executed in accordance with the DND Safety Chapter 42.

All work may be subject to review and air monitoring both inside and outside the lead work area(s) by the Consultant. Clean-up contamination of surrounding areas, indicated by visual inspection or air monitoring, caused by this work.

Lead abatement work to be completed within the subject building is as follows:

- Decontaminate all contents, including floor and ceiling surfaces, stored contents, and ventilation equipment, of the Calgary Post Garage in the following locations: Room 100, 101, 102 and 103.

1.2 Description of Abatement Work

Supply all labour, materials and equipment to perform the following:

- Construct a Work Area Enclosure of Rip-Proof Polyethylene, completed with 3-Chamber Abatement System, surrounding entire Lead Work Area in accordance with DND Safety Chapter 42;
- Isolate and protect electrical systems within Lead Work Area prior to commencing contaminated work. Utilize ground-fault panel for all temporary electrical requirements;
- Clean supply and exhaust ventilation systems using wet methods consisting of specified Lead Cleaning Agent (Ledisolv™ or similar lead dissolving agent). Rinse with clean water;
- Clean the floor and other horizontal surfaces (pipes, ledges, light fixtures, etc.) using HEPA vacuuming followed by wet methods consisting of specified Lead Cleaning Agent (Ledisolv™ or similar lead dissolving agent). Rinse with clean water;
- Clean walls and other vertical surfaces using wet methods consisting of specified Lead Cleaning Agent (Ledisolv™ or similar lead dissolving agent). Rinse with clean water;
- Clean porous items (cardboard boxes, fabrics, paper, etc.) using HEPA vacuums;
- Clean non-porous stored items using wet methods consisting of specified Lead Cleaning Agent (Ledisolv™ or similar lead dissolving agent). Rinse with clean water; and,
- Repeat all cleaning as necessary until confirmatory swipe sampling and/or air monitoring indicate clearance sample results that pass the stated criteria.

1.3 Reference Standards, Codes and Guidelines, Abatement Activities

All applicable national building codes, Canadian electrical codes and standards, fire and construction safety codes, shall be in effect during all aspects of this lead remediation project. In any situations where there are discrepancies between theses specifications and others, the more stringent standard shall always apply. The following list has been included as a guide only; others may apply:

- The Department of National Defence General Safety Standard Chapter 42 entitled "Abatement Protocol for Indoor Firing Range Safety Standard";
- The Government of Alberta "Occupational Health and Safety Regulation (January, 2004)";
- The Government of Alberta "Waste Control Regulation, Alta. Reg. 192/1996";
- The Government of Canada, *Regulations respecting the handling, offering for transport and transporting of dangerous good* (Extract from the Canada Gazette Part II, dated February 6, 1985). Commonly known as the Transportation of Dangerous Goods Act and Regulations; and,
- Office of the Fire Commissioner of Canada.

1.4 Restrictions

Do not allow eating, chewing gum or drinking in the work area.

Smoking is permitted only in designated areas.

Do not allow entry to work area by unauthorized persons.

Compressed air shall not be used in the work area.

Open flames will not be permitted in the work area (including, but not limited to torches and propane fired heaters).

1.5 Abatement Worker Protection

Instructions

Before commencing work instruct workers in use of respirators, dress, showers, entry and exit from work areas, and all aspects of work procedures and protective measures. A copy of these procedures shall be in written form and present on-site.

Respiratory Protection

Provide workers with personally issued and marked respiratory equipment acceptable to Labour Canada or provincial labour departments and as suitable for lead exposure in the work area.

Ensure that suitable respiratory protective equipment is worn by every worker and visitor who enters the work area. A respirator provided by a contractor and used by a worker:

- Shall be a NIOSH-approved half-face air purifying dust respirator equipped with P-100 HEPA filter cartridges, or better;
- Shall be fitted so that there is an effective seal between the respirator and the worker's face;
- Shall be assigned to a worker for the worker's exclusive use;

- Shall be used and maintained in accordance with the procedures specified by the equipment manufacturer;
- Shall be cleaned, disinfected and inspected after use on each shift, or more often, if necessary;
- Shall have damaged or deteriorated parts replaced prior to being used by a worker; and,
- When not in use, shall be stored in a convenient, clean and sanitary location.

Protective Clothing

Provide workers with protective clothing which shall:

- Be worn by every worker who enters the work area;
- Be made of a material which does not readily retain nor permit penetration by lead particulate or dust (i.e., tyvek® or equivalent);
- Consist of full body covering including head and feet covering with snug fitting cuffs at the wrist, ankles and neck;
- Include suitable footwear; and,
- Be repaired or replaced if torn.

2.0 PRODUCTS

2.1 Materials

General

The Contractor shall be required to supply all other materials necessary to fulfil the requirements of the Contract.

Deliver all materials in the original package and/or containers so that the manufacturer's name and the product brand name are un-obscured.

Store all materials in a manner which will prevent damage to them. This would include storing them off the floor, if subject to water damage, and out of direct sunlight if photosensitive.

Damaged or deteriorating materials must not be used, consumed stored or brought to the proposed job-site.

If materials while in the process of being used on the job-site become contaminated with lead, they will be thoroughly decontaminated to the satisfaction of the Consultant or will be disposed of in the same manner as lead wastes.

Polyethylene

All Polyethylene sheeting shall be a minimum 6 mil in thickness unless otherwise specified. Polytheylene shall be in sheet size to minimize joints.

Rip Proof Polyethylene

All Rip Proof Polyethylene used for floor covering shall be fibre reinforced and a minimum 12 mil in thickness. Polytheylene shall be in sheet size to minimize joints.

Tape

Tape shall be fibre reinforced duct tape suitable for sealing polyethylene in both dry conditions and wet conditions using amended water.

Lead Waste Receptors

All lead waste is to be placed in small means of containment which meet the requirements for transporting leachable toxic waste, in accordance with government regulations. All packaged waste is to be appropriately labelled and handled in accordance with government regulations.

2.2 Equipment

General

Prior to bringing any equipment on-site, each piece must be serviced and tested. No equipment will be brought on-site which has not been tested and shown to be in good working condition.

A sufficient inventory of protective clothing, respirators, filter cartridges, polyethylene sheeting of suitable size and thickness, duct tape, glue, sprayed-on adhesive, brushes and HEPA air filters shall be available at all times.
Any ladders and/or scaffolds utilized shall be of adequate length, properly maintained and in sufficient quantities to perform a safe working manner, in accordance with Occupational Health and Safety Regulations.

All extension cords and other electrical equipment shall be inspected prior to being brought on-site. Damaged equipment may not be brought on-site.

Equipment, which in the process of being used on the job-site becomes contaminated with lead, will be thoroughly decontaminated or disposed of as lead waste.

Airless Sprayer

High Pressure, low volume airless sprayers used for fogging during lead operations shall be tested prior to being used in the contained area to demonstrate that they are fully operational and properly maintained. Specific emphasis would be placed on ensuring that the correct fogging or atomizing nozzle is in place and operational. The nozzle for the airless sprayer shall be capable of delivering not less than 1 gallon per minute of fine particle spray of amended water.

HEPA Vacuums

High Efficiency Particulate Aerosol filtered vacuum equipment must have a filtering system capable of collecting and retaining lead dust to an efficiency of 99.97% for particles of 0.3 microns or larger. HEPA filters must have been individually tested and certified by the manufacturer.

All HEPA vacuums brought onto the job-site shall be visibly clean, shall be in a good state of repair and shall be maintained in such a state through completion of the project.

Ground Fault Panel

Electrical panel equipped with ground fault circuit breakers of sufficient capacity to power all electrical equipment and lights in the work area. All breakers shall have 5 mA ground fault protection. Panel should be complete with

all necessary accessories including ground fault interrupter lights, test switch to ensure unit is working and a reset switch.

Negative Air Unit

Portable air handling system which extracts air directly from lead work area and discharges air outside building. Unit shall be fitted with prefilter and HEPA final filter. Air shall pass HEPA filter before discharge. Unit shall have pressure differential gauge to monitor filter loading. Unit shall have auto shut-off and warning system for HEPA filter failure. HEPA filter shall have separate hold down clamps to retain filter in place.

2.3 Temporary Facilities

Provided by Owner

The owner will provide free of charge the following, as reasonably required by the Contractor to perform the work:

- Access to the areas in which the work is to be performed;
- Electric power (point source only);
- Access to sanitary facilities for workers; and,
- Non-potable water source.

Provided by Contractor

Contractor shall provide the following, as required for Contractor's use or required by the Contract:

- Temporary facilities including connections to electrical, water and drainage point sources;
- Any special facilities and supplies required by the specification and any relevant or applicable guidelines, codes, or regulations; and,
- All and any other materials, equipment and tools required to complete the work.

In addition, the Contractor shall maintain an adequate supply of protective clothing and equipment as described herein for use by Authorized Visitors, the Client and the Consultant/Inspector who may need to enter the work-site.

2.4 Abatement Contractors Responsibilities

The contractor shall ensure that all work is performed in accordance with the specification documents. Any requests for deviations must be submitted, and approved in writing, before implementing any changes. Any "unauthorized" deviations will be corrected at the Contractor's expense.

The Contractor shall ensure all work undertaken as part of this contract shall be performed in a manner that satisfies all applicable government health and safety requirements. In particular, the Contractor shall ensure all personnel engaged in the contract are provided with adequate approved respiratory protective equipment and protective clothing during all phases of the operation.

It shall be the Contractor's responsibility to ensure that all employees follow appropriate work procedures listed in the following section. Employees who repeatedly violate proper procedures shall be subject to disciplinary measures by the Contractor, including dismissal, if necessary.

2.5 Abatement Worker Protection

Instructions: Before the start of any work, all workers shall receive adequate instruction on the health hazards associated with lead exposure, proper use of respirators and protective clothing, entry and exit procedures for work areas and any other details related to work procedures and protective measures.

Respirators: Each worker shall be provided with a personally identified respirator accepted by the regulating agency as suitable protection for the lead exposure prevailing in the work area. If disposable filter cartridges are used, an adequate supply of filters shall be provided so that workers can install new filters following disposal of used filters and before contaminated areas are re-entered.

Protective Clothing: Workers shall be provided with suitable disposal type coveralls. The coveralls of preference are the one-piece type with a zipper, permanently attached hood and tight-fitting sleeves, leg cuffs, and booties (i.e., tyvek™ or equivalent). Any other body protective clothing required under applicable safety regulations shall be provided to the worker.

Each Worker Shall:

- Remove street clothing in a clean change area and put on clean coveralls, appropriate respiratory protective equipment, footwear, gloves and head covers before entering a designated work area;
- Remove all gross contamination and debris from protective clothing and footwear in a dirty change area. This shall be completed with the aid of a approved HEPA vacuum system and water source, exit the enclosure;
- Clean the outside of the respiratory device with soap and water and wash any exposed skin in shower;
- Proceed to the designated change area before eating, drinking, or smoking;
- Workers are not permitted to eat, drink, smoke or chew gum or tobacco at the work-site except in a designated clean area. The room designated for this purpose shall not be the clean change room;
- Upon completion of the lead abatement project, contaminated footwear may either be disposed of as contaminated waste or thoroughly cleaned with soap and water (before removal from the equipment and access room), then bagged for re-use at future work-sites; and,
- Perform all assigned tasks in a healthy and safe manner with due regard for their own well-being, their co-workers, and adherence to the provisions of the Alberta Occupational Health and Safety Regulations.

2.6 Abatement Visitor Protection

The Contractor shall provide on-site protective clothing and approved respirators to Authorized Visitors to the designated work area.

The Contractor shall ensure that Authorized Visitors receive adequate instructions in the proper use of protective clothing and respiratory protective devices prior to entry to a designated work area.

The Contractor shall ensure that Authorized Visitors have received adequate instructions in the proper procedures to be followed for entering and exiting a designated work area. Particular emphasis should be placed on their understanding of the abatement procedures and requirements.

2.7 Air Monitoring

The Consultant may perform air monitoring inside the work area(s). If airborne lead concentrations exceed 0.005 mg/m^3 inside the work area, the Contractor shall stop all work and modify work practices or ventilation to reduce worker exposures to acceptable levels. If airborne lead concentrations exceed 0.05 mg/m^3 outside the work area, the Contractor shall stop all work and immediately clean the contaminated areas at no cost to the Owner and/or the Consultant. Subsequent costs for retesting will be borne by the Contractor and deducted from the contract price.

Air monitoring and/or swipe sampling conducted to establish background levels and during the removal phases will be performed at the Owner's expense. However, should further testing and sampling be necessary due to poor work procedures and inadequate safety or control measures, additional costs incurred will be borne by the Contractor and deducted from the contract price.

2.8 Inspection

From commencement to completion of the work, the Consultant will be on site periodically both inside the work area and outside.

The Consultant is empowered by the Owner to inspect adherence to the specified procedures and materials, and to inspect for cleanliness and completion. Additional labour or materials expended by the Contractor to achieve the expected standard of the Lead Consultant, shall be at no additional cost to the Owner.

The Consultant is empowered by the Owner to order a shutdown of work when a leakage of lead from the controlled work area has occurred or is likely to occur. These conditions include, but are not limited to, inadequate wetting, failure of upper seals, water leaks, etc. Any additional labour to rectify these conditions shall be at no cost to the owner. This includes the actions of the general contractor.

Inspections, air and swipe sampling or monitoring performed as a result of the Contractors inability to achieve an acceptable level of performance will be charged to the Contractor.

2.9 Clearance Testing

Acceptance of the cleanliness of surfaces in the work area, and items to be disposed of as clean, will be based on surface contaminant swipe testing. For the purposes of this specification, surface lead concentrations shall comply with the DND Safety Chapter 42 which establishes the following clearance levels for lead in dust samples:

- 0.01 mg/100 cm^2 for floors, walls and ceilings including the exposed structure;
- 0.05 mg/100 cm^2 for window sills; and,
- 0.08 mg/100 cm^2 for window frames.

The Consultant may perform clearance air monitoring inside the work area(s). If airborne lead concentrations exceed 0.05 mg/m^3, the Contractor shall be required to reclean the work area.

The Consultant is empowered by the Owner to inspect adherence to the specified procedures and materials, and to inspect for cleanliness and completion. Additional labour or materials expended by the Contractor to achieve the expected standard of the Lead Consultant shall be at no additional cost to the Owner.

3.0 EXECUTION

3.1 Site Preparation

Lead Abatement Work Area(s)

Before beginning work, at each access to work areas, install warning signs in upper case 'Helvetica Medium' letters reading as follows:

- **CAUTION** (25 mm);
- **Lead Hazard Area** (25 mm);
- No Unauthorized Entry (19 mm);
- Wear Assigned Protective Equipment (19 mm); and,
- Breathing Lead Dust May Cause Serious Bodily Harm (7 mm).

Before beginning work, remove visible dust from surfaces in the work area where dust is likely to be disturbed during the course of the work. Use HEPA vacuum, or damp clothes where damp cleaning does not create a hazard and is other wise appropriate. Do not use compressed air to clean up or remove dust from any surface.

Prevent the spread of dust from the work area using measures appropriate to the work to be done that are consistent with the requirements for a lead abatement operation. Erect a polyethylene enclosure around the work area(s), shut off the mechanical ventilation system serving the work area(s) and seal ventilation ducts to and from the work area(s). Establish negative pressure in polyethylene enclosures as follows:

- Install and maintain HEPA filtered Negative Air Unit(s) sufficient to allow one complete air change every 15 minutes; and,
- Operate Negative Air Unit(s) continuously from time of Consultants Authorization to proceed until acceptable clearance results have been achieved and submitted in writing to the Contractor.

Maintenance of work area(s):

- Maintain work areas in tidy condition;
- Ensure that barriers and tape, of the work area(s), are effectively designated. Repair damaged barriers and remedy defects immediately upon discovery; and,
- The Contractor shall visually inspect each work area at least once per day on days when there are no shifts.

Lead abatement work shall not commence until:

- Arrangements have been made for disposal of waste;
- Work areas and abatement areas and parts of the building required to remain in use are effectively segregated; and,
- Tools, equipment and materials, and waste receptors are on hand.

Polyethylene seals on vents, ducts, grilles, louvers, dampers, diffusers, doors, windows, fixed equipment, etc., and on the outside of temporary partition walls shall remain in place. Ensure that the enclosure seal is maintained.

Lead Removal

Maintain enclosures in tidy condition.

Ensure that work area enclosures, barriers and polyethylene enclosures are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.

Remove and dispose of all stored items that cannot be effectively cleaned in consultation with the Owner and/or Consultant and dispose of as lead-based hazardous waste.

Clean all surfaces in the enclosure with HEPA vacuuming. Wash all non-porous surfaces in the site with the specified Lead Cleaning Agent (Ledisolv™ or similar lead dissolving agent).

Request Consultant to perform cleanliness inspection and testing.

Repeat all cleaning as necessary until confirmatory swipe sampling and/or air monitoring indicate clearance sample results that pass the stated criteria.

3.2 Waste Disposal

Ensure lead-based or contaminated materials removed during work is treated, packaged, transported and disposed of as lead waste.

NOTE: All waste and/or wash water is to be considered leachable toxic waste and treated accordingly as a hazardous waste product.

Clean up waste routes and loading area after each load. Use lead abatement procedures if appropriate or requested by Consultant. Waste may not be removed during work hours.

Retain and dispose of all waste generated by this section, as hazardous waste, unless testing suitable to Consultant shows otherwise.

Lead-containing wastes shall be disposed of in accordance with procedures established by the Alberta “Waste Control Regulation, Alta. Reg. 192/1996,” and the Government of Canada “Transportation of Dangerous Goods Regulations.”

Used a licensed carrier to transport lead-contaminated waste to a landfill or treatment facility licensed by Alberta Occupational Health and Safety.

Complete the manifests for waste shipping as appropriate for the waste as classified, and in compliance with the provincial regulations. The Contractor is responsible to ensure completion of manifest for each load leaving the site. Provide the Consultant with originating copies of all manifests (both hazardous and non-hazardous waste).

Cooperate with OHS inspectors and immediately carry out instructions for remedial work if requested, at no additional cost to Consultant and/or Owner.