HAZARDOUS BUILDING MATERIALS ASSESSMENT

BUILDING NO.: 29

200 University Avenue West,
Waterloo, Ontario



Issued: September 26, 2016

Prepared for:
Ms. Kate Windsor, *Director*
University of Waterloo – Safety Office
200 University Avenue West
Waterloo, Ontario, N2L 3G1

Performed by:

Jordan Miller, B.Sc., CRSP
Occupational Hygienist
Project Coordinator

Reviewed By:

Jeremy J. Gore, C.E.T., EP
General Manager, SW Ontario

SEL Project Number 2-111015-001

52 McIntyre Place, Unit J
Kitchener, ON
N2R 1H9

TEL 519.954.2732 1.877.GO.TO.SEL
FAX 519.772.1968
www.safetechenv.com

Professional Engineers Ontario
APGO

TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... **i**

1.0 INTRODUCTION **6**
1.1 Background and Objectives 6
1.2 Building Description 7
1.3 Past Asbestos Sampling (Historical Data) 7

2.0 SAMPLING – 2015 REASSESSMENT & UPDATE **8**
2.1 Asbestos Sampling 8
2.2 Lead Paint Sampling 11

3.0 RESULTS & RECOMMENDATIONS – BUILDING NO.: 29 ..... **11**

LIST OF TABLES – BUILDING NO. 29

Table 1 Past Bulk Sampling – 2011 Designated Substance Audit
Table 2 Bulk Sample Analytical Results for Determination of Asbestos Content
Table 3 Results of Paint Condition and Lead Content

LIST OF APPENDICIES – BUILDING NO. 29

Appendix A Laboratory Certificates of Analysis (Asbestos & Lead)
Appendix B Photographic Log
Appendix C List of Damaged Asbestos-Containing Materials

EXECUTIVE SUMMARY

Safetech Environmental Limited (SEL) was retained by the University of Waterloo (UW) Safety Office to conduct a designated substances and hazardous building materials assessment within the Carl A. Pollock Hall (i.e. Building 29) located on the Waterloo Campus at 200 University Avenue West in Waterloo, Ontario.

The objective of our assessment was to determine and/or verify the presence, location, condition and quantities of designated substances (as defined under Section 30 of the Occupational Health and Safety Act RSO 1990 c. 0.1) and other specific hazardous materials within the building that may be impacted by future work. As part of the assessment, asbestos-containing materials were re-assessed and/or verified present based on available documentation for on-going management by UW in accordance with Ontario Regulation 278/05. Samples of suspect building materials were collected where necessary to verify asbestos content by laboratory analysis.

Information contained within the University's existing Asbestos Management Database was verified and updated accordingly based on our findings, which are presented in this technical report. The database is designed to be an on-going management document and should be referenced prior to conducting any work as an initial step towards determining the presence of asbestos-containing materials. The Asbestos Management Database is managed by the University of Waterloo Safety Office.

The following types of Designated Substances and Hazardous Materials are confirmed and/or suspected present within the Carl A. Pollock Hall. Assessment results and specific recommendations based on our findings are provided in Section 3 (page 11). Refer to the University's Asbestos Management Database for a detailed room-by-room inventory of building materials and conditions.

- Asbestos (friable and non-friable)
- Silica
- Lead
- Mould
- Mercury
- PCBs
- Ozone Depleting Substances

Lastly, refer to the "*2015 Hazardous Building Materials Cover Report" f*or additional details including, but not limited to:

- Detailed Scope of Assessment
- Survey and Sampling Methodology
- General Recommendations
- Material Condition Assessment Criteria
- Background Information
- Limitations of the Assessment

September 26, 2016

University of Waterloo
Safety Office - Commissary Building
200 University Avenue West
Waterloo, Ontario N2L 3G1

Attention: **Ms. Kate Windsor,**
Director, Safety Office

RE: **Hazardous Building Materials Assessment**
Carl A. Pollock Hall - BUILDING NO.: 29
200 University Avenue West, Waterloo, Ontario (Site)

1.0 INTRODUCTION

1.1 Background and Objectives

On January 29 and February 1, 2016, personnel from Safetech Environmental Limited (SEL) performed an assessment for hazardous building materials within Carl A. Pollock Hall (i.e. **Building** 29) located on the Waterloo Campus at 200 University Avenue West in Waterloo, Ontario, to determine and/or verify the presence, quantity, forms, and conditions of Designated Substances present.

The survey included a review of the all accessible areas of the building for the presence and extent of hazardous building materials, which excluded the roof and elevator shafts. At the time of the assessment, the surveyors could not access rooms 1320C, 1323E, 1345, and 2397. In addition, the ceiling spaces of rooms 1329A, 1331, 1331A, 1331B, 1332, 1332D , 1333, 1334, 1336, 1342, 3876, 3877, 3878, 3886, 3887, 3888, 3889, 3976, 3976A, and 3978 could not be accessed.

Limited destructive testing was performed; however, no destructive inspection methods were conducted for the purpose of this investigation. Bulk samples were collected from building materials that were suspected of containing asbestos and paint scrapings were collected from various painted surfaces to determine lead content. Ceilings were accessed by lifting existing ceiling tiles or through existing hatches in solid ceilings. Wall cavities were not accessed and no materials were physically removed (or damaged) to view conditions behind.

Under Section 30 of the Occupational Health and Safety Act RSO 1990 c. 0.1, a building owner must determine if there are any hazardous materials on site prior to any construction or demolition activity (including renovations or building alterations). Hazardous Materials or “Designated Substances" are a list of eleven organic and inorganic contaminants defined in the Act. The building owner must provide a complete and comprehensive list of all designated substances present on site to contractors and subcontractors during the bidding process. An owner who fails to comply with Section 30 is liable to the constructor and every contractor and subcontractor who suffers any loss or damages due to non-compliance.

Identification of suspect building materials was performed by conducting appropriate laboratory analysis of bulk samples of suspect material. Other Designated Substances such as mercury or silica, if present, were identified by observation only. Individual assessments were made to identify Designated Substances and their condition and requirements for special treatment such as control programs or specialized removal and disposal techniques. In conjunction with the survey for Designated Substances, the presence of Polychlorinated Biphenyl's (PCBs) in fluorescent light fixture ballasts, ozone depleting substances, and other potentially hazardous materials associated with the building were noted.

This report documents findings of our on-site inspection related to Building No.: 29. Sampling was carried out only for those compounds that were known to be present or those deemed to have a likely source of origin in the area under study. Survey Methodologies carried out for the investigation are outlined within the cover report Titled “*2015 Hazardous Building Materials Cover Report”*, dated DATE, 2015.

1.2 Building Description

Construction materials used for the building consist of a concrete block walls, concrete supports and steel framing, brick veneer exterior. Major interior finishes include vinyl sheet flooring, vinyl floor tiles, carpet, drywall, plaster, texture finishes, and acoustic ceiling tiles. The building includes a total of four (4) floor levels, encompasses 120, 500 ft² of floor space, and was built in 1971.

1.3 Past Asbestos Sampling (Historical Data)

Past sampling performed for the 2011 Asbestos Audit Update were also referenced during this assessment. Unfortunately a number of sample locations and material types could not be verified. The following sample(s) were included in this assessment; all other sample locations were re-sampled in order to verify site conditions.

TABLE 1
MTE 2011 Designated Substance Audit Report
Bulk Sample Analytical Results for Determination of Asbestos Content
Carl A. Pollock Hall, Building No.: 29

Sample ID	Material Description	Sample Location	Asbestos Content	Material Classification
33293-CPH-S03	**Sprayed-on Fireproofing Debris**	**1320**	**60% Chrysotile**	**ACM**
33293-CPH-S04	**2'x4' Ceiling Tiles Patterned Pinhole**	**1328**	**1.3% Chrysotile**	**ACM**
33293-CPH-S05	**12"x12" Vinyl Floor Tiles White with Green Fleck**	**2459**	**2.1% Chrysotile**	**ACM**
33293-CPH-S06	**12"x12" Vinyl Floor Tiles Green with White Fleck**	**1326**	**8.3% Chrysotile**	**ACM**
	Black Mastic		**4.4% Chrysotile**	
33293-CPH-S07	**12"x12" Vinyl Floor Tiles White with Brown Fleck**	**1333**	**1.9% Chrysotile**	**ACM**
	Yellow Mastic		None Detected	Non-ACM

2.0 SAMPLING – 2015 REASSESSMENT & UPDATE

2.1 Asbestos Sampling

Results of bulk sample analysis for the determination of asbestos content are summarized in Table 2. Materials have been classified as "ACM", "Non-ACM", "Suspected ACM" or "Presumed Non-ACM" based on analytical results. Materials classified as Suspected ACM or Presumed Non-ACM may require further analysis (depending on site-specific conditions) to verify whether the material should be classified as ACM or Non-ACM. Please refer to the Limitations section of the *2015 Hazardous Building Materials Cover Report* for additional details. The Laboratory Certificate of Analysis is included in Appendix A.

TABLE 2
Bulk Sample Analytical Results for Determination of Asbestos Content
Carl A. Pollock Hall, Building No.: 29
Sample Collection Date: January 29 – February 1, 2016

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
CPH- S01a	Drywall Joint Compound	1320B	0.5 Chrysotile	ACM
CPH- S01b		1323		
CPH- S01c		1346		
CPH- S01d		2396J		
CPH- S01e		2385A		
CPH- S01f		3679		

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
CPH- S01g		4362		
CPH- S01h		3884		
CPH-S02a	12”x12” Vinyl Floor Tile Beige w/ Green Streaks	1320B	1% Chrysotile	ACM
CPH-S02b				
CPH-S02c				
CPH-S03a	2’x2’ Ceiling Tiles Patterned Pinhole w/ pink backs	1353	1% Chrysotile	ACM
CPH-S03b				
CPH-S03c				
CPH-S04a	Fireproofing Tinted Green	1321	None Detected	Non-ACM
CPH-S04b		1321		
CPH-S04c		1324		
CPH-S04d		4367		
CPH-S04e		2368A		
CPH-S05	Parging Cement on Pipe Fittings	ET-05A	60% Chrysotile	ACM
CPH-S06a	Parging on Pump Tank	ET-05A	None Detected	Non-ACM
CPH-S06b				
CPH-S06c				
CPH-S07a	12”x12” Vinyl Floor Tile Mottled Beige	1323B	None Detected	Non-ACM
CPH-S07b				
CPH-S07c				
CPH-S07a	Black Mastic			Suspect ACM
CPH-S08a	12”x12” Vinyl Floor Tile Beige w/ Green Streaks	1332E	1% Chrysotile	ACM
CPH-S08b				
CPH-S08c				
CPH-S08a	Black Mastic		None Detected	Suspect ACM
CPH-S09a	Fireproofing Grey	1332E	None Detected	Non-ACM
CPH-S09b		1346A		
CPH-S09c		1334		
CPH-S09d		2387		
CPH-S09e		3679		
CPH-S10a	Fireproofing Grey	1332B	10% Chrysotile	ACM
CPH-S10b				
CPH-S10c				
CPH-S11a	12”x12” Vinyl Floor Tile Mottled Grey	1346A	None Detected	Non-ACM
CPH-S11b				
CPH-S11c				
CPH-S11a	Yellow Mastic			
CPH-S11b				
CPH-S11c				
CPH-S12a	2’x4’ Ceiling Tiles Short Fissures w/	1346A	None Detected	Non-ACM
CPH-S12b				

Sample No.	Material Description	Sample Location	Asbestos Content	Material Classification
CPH-S12c	Pinholes			
CPH-S13a	Fireproofing Grey, cementitious	1333	None Detected	Non-ACM
CPH-S13b		2396J		
CPH-S13c		3607		
CPH-S15a	12”x12” Vinyl Floor Tile Grey w/ Black and White Streaks	2389	None Detected	ACM
CPH-S15b				
CPH-S15c				
CPH-S15a	Black Mastic			Suspect ACM
CPH-S15b				
CPH-S16a	2’x4’ Ceiling Tile Textured Pinhole	1336	None Detected	Non-ACM
CPH-S16b				
CPH-S16c				
CPH-S17a	Fireproofing Beige	3611	None Detected	Non-ACM
CPH-S17b				
CPH-S17c				
CPH-S18a	2’x4’ Ceiling Tile Round Fissure w/ Pinholes	3611	None Detected	Non-ACM
CPH-S18b				
CPH-S18c				
CPH-S19a	Fireproofing Off-White	3979	10% Chrysotile	ACM
CPH-S19b		4342		
CPH-S19c		4338		
CPH-S19d		3977		
CPH-S20a	1’x1’ Ceiling Tile Patterned Pinhole	3976A	1% Chrysotile	ACM
CPH-S20b				
CPH-S20c				
CPH-S21a	12”x12” Vinyl Floor Tile Mottled Gold	4362	None Detected	Non-ACM
CPH-S21b				
CPH-S21c				
CPH-S22a	12”x12” Vinyl Floor Tile Beige w/ Brown Streak	4373	None Detected	Non-ACM
CPH-S22b				
CPH-S22c				
CPH-S22a	Black Mastic			
CPH-S22b				
CPH-S22c				
CPH-S23a	12”x12” Vinyl Floor Tile White	4316A	None Detected	Non-ACM
CPH-S23b				
CPH-S23c				
CPH-S23a	Black Mastic		1% Chrysotile	ACM
CPH-S24a	12”x12” Vinyl Floor Tile White w/ Brown Streak	3883	None Detected	Non-ACM
CPH-S24b				
CPH-S24c				

2.2 Lead Paint Sampling

Results of paint sample analysis for the determination of lead content are summarized in Table 3. The Laboratory Certificate of Analysis is included in Appendix A.

TABLE 3
Results of Paint Condition and Lead Content University of Waterloo
Carl A. Pollock Hall, Building No.: 29
Sample Collection Date: January 29 – February 1, 2016

Sample No.	Location	Surface	Paint Colour & Condition	Lead Concentration (% by wt.)
CPH-L01	2368	Concrete Floor	Grey, Fair	0.2340
CPH-L02	4374	Concrete Wall	Beige, Good	0.0428

3.0 RESULTS & RECOMMENDATIONS – BUILDING NO.: 29

The following is a list which includes observations for any designated substances and/or hazardous materials that were present and/or suspected in the surveyed areas. The survey primarily focused on building materials; however, designated substances may exist within equipment of various operations on-site.

Laboratory Certificates of Analysis detailing results of bulk samples collected during this assessment and previous sampling by others are attached in Appendix A. A photographic log with links to digital photographs of asbestos-containing materials and conditions is provided in Appendix B and are referenced in the table below (i.e. P#). The locations of damaged asbestos-containing materials identified are provided in Appendix C.

It should be noted that samples collected as part of the University's past asbestos survey for this building are referenced in this report. Building materials previously determined to contain asbestos by bulk sample analysis may not have been re-sampled during this assessment and were deemed to contain asbestos based on UW's Asbestos-Containing Building Material Database and Management Program. Where discrepancies with past analytical data existed, additional sampling was performed for verification purposes.

Results of our survey findings are summarized on the following pages.

ASBESTOS

Asbestos-Containing Materials (ACM) that were identified include:

Friable Materials:

Pipe Insulation Materials

- Mechanical pipe fittings on hot water heating pipes at various locations throughout the building (i.e. elbows, valves, tees, etc.) (CPH-S05, Photograph P3 – Appendix C)

Spray Applied Fireproofing Materials

- Spray applied fireproofing (CPH-S10a-c, CPH-S19a-d, Photograph P8 – Appendix C)

Non-Friable Materials:

Acoustical Ceiling Tiles

- Ceiling tiles, 1'x1', within patterned pinholes within room 3976A (CPH-S20a-c).
- Ceiling tiles, 2'x2', with patterned pinholes within rooms 1321, 1327, 1353, 2405, and 3884 (CPH-S03a-c).
- Ceiling tiles, 2'x4', with patterned pinholes throughout the building (33293-CPH-S04a-c).

Vinyl Flooring Materials

- Vinyl flooring (12"x12", Beige with Light Green Streaks) throughout the building (CPH-S02a-c, Photograph P1 – Appendix C).
- Vinyl flooring (12"x12", Beige with Thick Green Streaks) throughout the building (CPH-S15a-c, Photograph P9 – Appendix C) and associated mastic (suspected ACM)
- Vinyl flooring (12"x12", Grey with Thin Black and White Streaks) throughout the building (CPH-S08a-c, Photograph P7 – Appendix C) and associated mastic (suspected ACM)
- Vinyl flooring (12"x12", Grey with Thin Black and White Streaks) throughout the building (CPH-S08a-c) and associated mastic (suspected ACM)
- Vinyl flooring (12"x12", White with Green Flecks) throughout the building (33293-CPH-S05a-c)
- Vinyl flooring (12"x12", Green with White Flecks) throughout the building (33293-CPH-S06a-c) and associated black mastic.
- Vinyl flooring (12"x12", White with Brown Flecks) throughout the building (33293-CPH-S07a-c)
- Black mastic beneath 12"x12" white vinyl floor tiles (CPH-S23a-c)

ASBESTOS (Continued)

Non-Friable Materials (Continued)

- Other black mastics are considered to be suspect asbestos-containing materials (CPH-S07a-c, CPH-S08a-c, and CPH-S15a-c)

Other Building Finishes

- Drywall joint compounds throughout the building (CPH-S01a-h).

The following building materials are suspected to contain asbestos until proven otherwise by intrusive or destructive testing methods, which shall be completed prior to any building renovation, alteration, equipment removal/replacement, or demolition work). These materials were not sampled due to inaccessibility, safety hazard restriction, or to prevent material damage that would compromise the building structure and/or envelope. All asbestos-suspect building materials are presented below:

- Roof tar and felt paper (built-up bitumen material)
- All exterior and interior caulking materials
- Internal materials within mechanical equipment (boilers, tanks, gaskets, etc.)
- Textile duct connectors and HVAC vibration dampers
- Concrete levelling compounds
- Elevator brakes
- Bell and spigot gasket inserts within original cast iron drain piping
- Mastics (i.e. adhesives for flooring, baseboards, pressed-on ceiling tiles)
- Soffits
- Heat shields in incandescent light fixtures
- Arc shields in electrical equipment / switch gear
- Firestop material (between floor and wall penetrations)
- Underground services
- Plaster ceiling within the Food Storage room 1334.
- An asbestos cement (Transite) mechanical duct within the mechanical room 1338A.
- Textile flexible ductwork expansion joints within mechanical room 3983.

No other materials suspected of containing asbestos were identified through bulk sample analysis or visual confirmation as part of our assessment.

Based on the investigation conducted by SEL, Appendix C summarizes all damaged ACM identified within Carl A. Pollock Hall (Building No.: 29). Damaged materials are presented as ‘repair’ or ‘removal’ work. ‘Accessibility’ and ‘Action’ ratings are defined in the cover report titled *“2015 Hazardous Building Materials Cover Report”* dated DATE, 2015.

ASBESTOS (Continued)

Friable asbestos containing materials in **POOR** condition must be removed and/or repaired immediately following applicable asbestos abatement procedures.

Friable asbestos-containing materials in **GOOD** condition can remain in place until major system upgrading, maintenance or demolition which could result in disturbance of this material. In the event the friable asbestos-containing materials are removed, Type 3 operations apply as outlined in Ontario Regulation 278/05, *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations* – made under the Ontario Occupational Health and Safety Act. Type 2 operations can be applied for the repair of friable materials or, removal of less than 1 square metre of friable asbestos-containing materials. In addition, Glove Bag operations can be applied for the removal of asbestos-containing mechanical pipe insulation fittings as outlined in Ontario Regulation 278/05.

Non-friable asbestos-containing materials in **POOR** condition must be removed and/or repaired immediately following applicable asbestos abatement procedures. Non-friable asbestos-containing materials in **GOOD** condition can remain in place until major system upgrading, maintenance or demolition which could result in disturbance of this material. In the event the non-friable asbestos-containing materials are removed, Type 1 operations apply (provided that the material is wetted down and removed using non-powered hand held tools) as outlined in Ontario Regulation 278/05, *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations* – made under the Ontario Occupational Health and Safety Act.

Renovation work that is planned for this building should be carefully reviewed in connection with this report and the accompanying asbestos management database to determine if asbestos abatement procedures are necessary. Intrusive investigation may be required prior to any renovation or demolition work. If a suspect material is identified (which is not listed in the management documents) then the suspect material shall be sampled to determine asbestos content prior to any disturbance.

LEAD

Lead was identified in concentrations above 0.1% Lead by Weight (1000 µg/g (ppm)), but less than 0.5% Lead by Weight in the grey floor paint within room 2368. Lead content greater than 0.1% by weight, but less than 0.5% by weight classifies the paint as a 'lead-containing' paint as per the October 2014 Environmental Abatement Council of Ontario (EACO) *Lead Guideline for Construction, Renovation, Maintenance or Repair.* All other paints that were sampled were found to have concentrations below 0.1% Lead by Weight (1000 µg/g (ppm)).

Other paints not sampled are also suspected to contain varying quantities of lead. Therefore, additional sampling may be warranted prior to conducting any specific renovation work. Work involving the disturbance of a lead-containing paint should follow the procedures outlined in the Ministry of Labour "*Lead on Construction Projects*" guideline and

the *EACO Lead Guideline for Construction, Renovation, Maintenance or Repair*.

Lead may also be present as a component in:

- Pipes
- Solder used in pipe fittings, and in the form of lead shot in cast iron drain pipes
- Lead-acid in emergency lighting batteries
- Ceramic tile glazing
- Mortar joints of exterior stonework

Lead-containing wastes should be recycled if practicable or handled and disposed of according to Ontario Regulation 347. If emergency lighting is removed the batteries are recommended to be sent to a recycling facility for proper treatment. As defined in clause e) of section 7.1 of the *EACO Lead Guideline,* "Removal of materials coated with lead-containing or lead-based paints and surface coatings, using non-powered hand tools, where the material remains chiefly intact and is not crumbled, pulverized, or powdered" are defined as a Class 1 operation.

SILICA

Silica (including free crystalline silica) may be a component of ceiling tiles, gypsum board, plaster, mortars, concrete (poured in place, block, pre-cast, etc.), brick, stone, terrazzo, and refractory brick materials noted in the Carl A. Pollock Hall. Testing for silica in these materials was not conducted.

Any work involving the disturbance of silica-containing materials should follow the procedures outlined in the Ministry of Labour "*Silica on Construction Projects*" guideline.
Type 1 operations are most common based on typical construction / renovation work; however, an assessment of specific work activities regarding silica-containing materials should be reviewed and assessed as part of the project planning stage for all jobs.

MERCURY

Mercury is suspected present in the form of mercury vapour within fluorescent light tubes and High Intensity Discharge (HID) lamps. The previous designated substance report lists liquid-mercury switched thermostat control units and suspected liquid mercury filled gauges associated with large mechanical equipment within the boiler room and/or mechanical areas.

Handle all lamps and mercury filled equipment with care and keep them intact. Send all waste lamps and decommissioned mercury-containing equipment to an approved mercury recycling/reclaim facility. Handle all equipment with care and avoid breakage/spillage. Any mercury-containing equipment that is to be removed is recommended to be recycled rather than disposed of in a landfill.

Mercury vapour and liquid is suspected in laboratory station drain traps within the XXX. Sampling for the presence of mercury vapour is recommended prior to removal of these drain pipes to determine if residual mercury is present and if remediation is necessary prior to any plumbing work.

PCBs

Polychlorinated biphenyls (PCBs) are suspected within fluorescent and HID light ballasts throughout the building within various fixtures. Oil cooled transformers or capacitors were not identified. At the time of removal or replacement of fluorescent light ballasts, the units should be inspected for PCB content.

OZONE DEPLETING SUBSTANCES

Chlorofluorocarbons (CFCs) are likely to be found as coolants in roof top air conditioner units (if present). All applicable regulations should be adhered to prior to removal or repair of systems that are suspected to contain CFC's.

Purge air-conditioning unit of remaining refrigerant prior to removal and disposal. This should be conducted by a certified person who holds a valid Ozone Depletion Prevention Certificate. Servicing and testing of refrigeration equipment should be conducted in accordance with Environment Canada's "*Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems*".

MOULD

No obvious area of any significant amount of mould growth (or water damage) was identified at the time of inspection. There are no recommended actions related to indoor mould growth or the suspected presence of concealed indoor mould growth as a result of any building envelope deficiency or water intrusion location.

OTHER DESIGNATED SUBSTANCES

Other Designated Substances such as Acrylonitrile, Arsenic, Benzene, Coke Oven Emissions, Ethylene Oxide, Isocyanates, and Vinyl Chloride were not identified nor are they suspected present within the building. Refer to the cover report for a detailed description of each type of Designated Substance and where they are typically found.

Building material(s) that are not detailed within this survey due to inaccessibility during the time of the survey and/or are uncovered during renovation/demolition activities, notably materials that are suspected to contain asbestos, should be properly assessed by qualified person prior to their disturbance.

Appendix A

Laboratory Certificates of Analysis (Asbestos & Lead)

emcscientific INCORPORATED

Laboratory Analysis Report

To:

Ben Rodricks
Safetech Environmental Ltd.
52 McIntyre Place, Unit J
Kitchener, Ontario
N2R 1H9

EMC LAB REPORT NUMBER: A22976
Job/Project Name: UW 2015/2016 DSA Reassessment – Building 29 **Job No:** 2-111015-001
Analysis Method: Polarized Light Microscopy – EPA 600 **Number of Samples:** 77
Date Received: Feb 4/16 **Date Analyzed:** Feb 9,10/16 **Date Reported:** Feb 10/16
Analyst: Dilshad Naeem, *Analyst*
Reviewed By: Banu Gurgen-Keough, *Laboratory Manager*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
CPH-S01A	A22976-1	Drywall joint compound	White, joint compound	ND			100
CPH-S01B	A22976-2	Drywall joint compound	White, joint compound	ND			100
CPH-S01C	A22976-3[5]	Drywall joint compound	White and off-white, joint compound	ND			100
CPH-S01D	A22976-4	Drywall joint compound	White, joint compound	ND			100
CPH-S01E	A22976-5	Drywall joint compound	Off-white, joint compound	**Chrysotile**	**0.5**		99.5
CPH-S01F	A22976-6	Drywall joint compound	NA				
CPH-S01G	A22976-7	Drywall joint compound	NA				
CPH-S01H	A22976-8	Drywall joint compound	NA				
CPH-S02A	A22976-9	12"x12" beige with light green streak VFT's	White, vinyl floor tile	**Chrysotile**	**1**		99
CPH-S02B	A22976-10	12"x12" beige with light green streak VFT's	NA				
CPH-S02C	A22976-11	12"x12" beige with light green streak VFT's	NA				
CPH-S03A	A22976-12	2'x2' patterned pinhole CT's	Beige, ceiling tile	**Chrysotile**	**1**	65	34
CPH-S03B	A22976-13	2'x2' patterned pinhole CT's	NA				

EMC LAB REPORT NUMBER: A22976
Client's Job/Project Name/No.: 2-111015-001
Analyst: Dilshad Naeem, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
CPH-S03C	A22976-14	2'x2' patterned pinhole CT's	NA				
CPH-S04A	A22976-15	Green tint fireproofing	Green, cementitious material	ND		15	85
CPH-S04B	A22976-16	Green tint fireproofing	Green, cementitious material	ND		15	85
CPH-S04C	A22976-17	Green tint fireproofing	Green and white, cementitious material	ND		20	80
CPH-S04D	A22976-18	Green tint fireproofing	Green, cementitious material	ND		15	85
CPH-S04E	A22976-19	Green tint fireproofing	White and green, cementitious material	ND		25	75
CPH-S05	A22976-20	Parging cement on pipe fitting	Grey, parging cement	**Chrysotile**	**60**		40
CPH-S06A	A22976-21	Parging on pump tank	Grey, cementitious material	ND		30	70
CPH-S06B	A22976-22	Parging on pump tank	Grey, cementitious material	ND		30	70
CPH-S06C	A22976-23	Parging on pump tank	Grey, cementitious material	ND		30	70
CPH-S07A	A22976-24[6]	12"x12" beige oatmeal VFT's	2 Phases: a) White, vinyl floor tile b) Black, mastic	 ND ND			 100 100
CPH-S07B	A22976-25[6]	12"x12" beige oatmeal VFT's	White, vinyl floor tile	ND			100
CPH-S07C	A22976-26[6]	12"x12" beige oatmeal VFT's	White, vinyl floor tile	ND			100

EMC LAB REPORT NUMBER: A22976
Client's Job/Project Name/No.: 2-111015-001
Analyst: Dilshad Naeem, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
CPH-S08A	A22976-27	12"x12" beige with thick green streak VFTs	2 Phases: a) Off-white, vinyl floor tile b) Black, mastic	**Chrysotile** ND	**1**		99 100
CPH-S08B	A22976-28	12"x12" beige with thick green streak VFTs	NA				
CPH-S08C	A22976-29	12"x12" beige with thick green streak VFTs	NA				
CPH-S09A	A22976-30	Grey fireproofing	Grey, fibrous material	ND		30	70
CPH-S09B	A22976-31	Grey fireproofing	Grey, fibrous material	ND		30	70
CPH-S09C	A22976-32	Grey fireproofing	Grey, fibrous material	ND		30	70
CPH-S09D	A22976-33	Grey fireproofing	Grey, fibrous material	ND		30	70
CPH-S09E	A22976-34	Grey fireproofing	Grey, fibrous material	ND		30	70
CPH-S10A	A22976-35	Grey fibrous fireproofing	Off-white, fibrous material	**Chrysotile**	**10**	30	60
CPH-S10B	A22976-36	Grey fibrous fireproofing	NA				
CPH-S10C	A22976-37	Grey fibrous fireproofing	NA				
CPH-S11A	A22976-38[6]	12"x12" grey oatmeal VFTs	2 Phases: a) White, vinyl floor tile b) Yellow, mastic	ND ND			100 100

EMC LAB REPORT NUMBER: A22976
Client's Job/Project Name/No.: 2-111015-001
Analyst: Dilshad Naeem, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
CPH-S11B	A22976-39[6]	12"x12" grey oatmeal VFTs	2 Phases: a) White, vinyl floor tile b) Yellow, mastic	 ND ND			 100 100
CPH-S11C	A22976-40[6]	12"x12" grey oatmeal VFTs	2 Phases: a) White, vinyl floor tile b) Yellow, mastic	 ND ND			 100 100
CPH-S12A	A22976-41	2'x4' short fissure, PH CT's	Beige, ceiling tile	ND		60	40
CPH-S12B	A22976-42	2'x4' short fissure, PH CT's	Beige, ceiling tile	ND		60	40
CPH-S12C	A22976-43	2'x4' short fissure, PH CT's	Beige, ceiling tile	ND		60	40
CPH-S13A	A22976-44	Grey cementitious fireproofing	Grey, cementitious material	ND		40	60
CPH-S13B	A22976-45	Grey cementitious fireproofing	Grey, cementitious material	ND		40	60
CPH-S13C	A22976-46	Grey cementitious fireproofing	Grey, cementitious material	ND		40	60
CPH-S15A	A22976-47[6]	12"x12" grey with thin black and white streak VFT's	2 Phases: a) Grey, vinyl floor tile b) Black, mastic	 ND ND			 100 100
CPH-S15B	A22976-48[6,7]	12"x12" grey with thin black and white streak VFT's	2 Phases: a) Grey, vinyl floor tile b) Black, mastic	 ND ND			 100 100
CPH-S15C	A22976-49[6]	12"x12" grey with thin black and white streak VFT's	Grey, vinyl floor tile	ND			100

EMC LAB REPORT NUMBER: A22976
Client's Job/Project Name/No.: 2-111015-001
Analyst: Dilshad Naeem, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
CPH-S16A	A22976-50	2'x4' textured PH CT's	Beige, ceiling tile	ND		60	40
CPH-S16B	A22976-51	2'x4' textured PH CT's	Beige, ceiling tile	ND		60	40
CPH-S16C	A22976-52	2'x4' textured PH CT's	Beige, ceiling tile	ND		60	40
CPH-S17A	A22976-53	Beige fireproofing	Beige, cementitious material	ND		30	70
CPH-S17B	A22976-54	Beige fireproofing	Beige, cementitious material	ND		30	70
CPH-S17C	A22976-55	Beige fireproofing	Beige, cementitious material	ND		30	70
CPH-S18A	A22976-56	2'x4' round fissure, PH CT's	Beige, ceiling tile	ND		60	40
CPH-S18B	A22976-57	2'x4' round fissure, PH CT's	Beige, ceiling tile	ND		60	40
CPH-S18C	A22976-58	2'x4' round fissure, PH CT's	Beige, ceiling tile	ND		60	40
CPH-S19A	A22976-59	Off-white fireproofing	Off-white, fibrous material	**Chrysotile**	**10**	60	30
CPH-S19B	A22976-60	Off-white fireproofing	Off-white, fibrous material	**Chrysotile**	**10**	60	30
CPH-S19C	A22976-61	Off-white fireproofing	Off-white, fibrous material	**Chrysotile**	**10**	60	30
CPH-S19D	A22976-62	Off-white fireproofing	Off-white, fibrous material	**Chrysotile**	**10**	60	30
CPH-S20A	A22976-63	1'x1' patterned PH CT's	Beige, ceiling tile	**Chrysotile**	**1**	60	39
CPH-S20B	A22976-64	1'x1' patterned PH CT's	NA				

EMC LAB REPORT NUMBER: A22976
Client's Job/Project Name/No.: 2-111015-001
Analyst: Dilshad Naeem, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
CPH-S20C	A22976-65	1'x1' patterned PH CT's	NA				
CPH-S21A	A22976-66[6]	12"x12" gold oatmeal VFT's	Off-white, vinyl floor tile	ND			100
CPH-S21B	A22976-67[6]	12"x12" gold oatmeal VFT's	Off-white, vinyl floor tile	ND			100
CPH-S21C	A22976-68[6]	12"x12" gold oatmeal VFT's	Off-white, vinyl floor tile	ND			100
CPH-S22A	A22976-69[6]	12"x12" beige with thin brown streak VFT's	2 Phases: a) Off-white, vinyl floor tile b) Black, mastic	 ND ND			 100 100
CPH-S22B	A22976-70[6]	12"x12" beige with thin brown streak VFT's	2 Phases: a) Off-white, vinyl floor tile b) Black, mastic	 ND ND			 100 100
CPH-S22C	A22976-71[6]	12"x12" beige with thin brown streak VFT's	2 Phases: a) Off-white, vinyl floor tile b) Black, mastic	 ND ND			 100 100
CPH-S23A	A22976-72[6]	12"x12" white VFT's	White, vinyl floor tile	ND			100
CPH-S23B	A22976-73[6]	12"x12" white VFT's	2 Phases: a) White, vinyl floor tile b) Black, mastic	 ND **Chrysotile**	 **1**		 100 99
CPH-S23C	A22976-74[6]	12"x12" white VFT's	White, vinyl floor tile	ND			100
CPH-S24A	A22976-75[6,8]	12"x12" white with thick brown streak VFT's	White, vinyl floor tile	ND			100

emc scientific INCORPORATED

Laboratory Analysis Report

EMC LAB REPORT NUMBER: A22976
Client's Job/Project Name/No.: 2-111015-001
Analyst: Dilshad Naeem, *Analyst*

Client's Sample ID	Lab Sample No.	Description/Location	Sample Appearance	SAMPLE COMPONENTS (%)			
				Asbestos Fibres		Non-asbestos Fibres	Non-fibrous Material
CPH-S24B	A22976-76[6]	12"x12" white with thick brown streak VFT's	White, vinyl floor tile	ND			100
CPH-S24C	A22976-77[6]	12"x12" white with thick brown streak VFT's	White, vinyl floor tile	ND			100

Note:
1. Bulk samples are analyzed using Polarized Light Microscopy (PLM) and dispersion staining techniques. The analytical procedures are in accordance with EPA 600/R-93/116 method.
2. The results are only related to the samples analyzed. **ND** = None Detected (no asbestos fibres were observed), **NA** = Not Analyzed (analysis stopped due to a previous positive result)
3. This report may not be reproduced, except in full without the written approval of EMC Scientific Inc. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government.
4. The Ontario Regulatory Threshold for asbestos is 0.5%. The limit of quantification (LOQ) is 0.5%.
5. Cellulose is present.
6. Vinyl floor tiles may contain very fine asbestos fibres which the PLM method cannot detect. TEM analysis may be necessary to confirm the absence of asbestos.
7. Phase b) is small in size.
8. Another phase is present but was too small to analyze.

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B16-03062

Report To:

EMC Scientific Inc.
5800 Ambler Dr. #100,
Mississauga ON L4W 4J4 Canada
Attention: Alister Haddad

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 05-Feb-16
DATE REPORTED: 09-Feb-16
SAMPLE MATRIX: Paint Chips

JOB/PROJECT NO.: UW 2015/16 DSA
P.O. NUMBER: 2-111015-001
WATERWORKS NO. Reassess: Bldg 29

	Parameter		Lead				
	Units		µg/g				
	R.L.		5				
	Reference Method		EPA 6010				
	Date Analyzed/Site		08-Feb-16/O				
Client I.D.	**Sample I.D.**	**Date Collected**					
CPH-L01 - Grey on Concrete Floor (2368)	B16-03062-1	01-Feb-16	2340				
CPH-L02 - Beige on CB wall (4374)	B16-03062-2	01-Feb-16	428				

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

Appendix B
Photographic Log

Carl Pollock Hall – Photographic Log			
Photograph No.	**Room Number / Location**	**Material Type / Condition**	**Link (U of W file name and path)**
1	1320B	12”x12” VFT Beige w/ Green Streaks (CPH-S02), Good.	SEL USB flash drive
2	1321	Non-ACM Green Tinted Fireproofing (CPH-S04), Good.	SEL USB flash drive
3	ET-05A	Parging Cement on Pipe Fittings (CPH-S05), Good.	SEL USB flash drive
4	ET-05A	Parging on Pump Tank (CPH-S06), Good.	SEL USB flash drive
5	1326	12”x12” VFT Green w/ White Streaks (33293-CPH-S06), Good.	SEL USB flash drive
6	1323B	12”x12” VFT Mottled Beige (CPH-S07), Good.	SEL USB flash drive
7	1332E	12”x12” Beige w/ Green Streak (CPH-S08), Good.	SEL USB flash drive
8	1332B	Grey Fibreous Fireproofing (CPH-S10), Poor.	SEL USB flash drive
9	2389	12”x12” VFT Grey w/ B&W Streaks (CPH-S15), Good.	SEL USB flash drive
10	4362	12”x12” VFT Mottled Gold (CPH-S21), Good.	SEL USB flash drive
11	4373	12”x12” VFT Beige with Brown Streak (CPH-S22), Good.	SEL USB flash drive
12	4316A	12”x12” VFT White (CPH-S23), Good.	SEL USB flash drive
13	1326B	Damaged ACM FB on perimeter beam above CB wall.	SEL USB flash drive

Carl Pollock Hall – Photographic Log			
Photograph No.	**Room Number / Location**	**Material Type / Condition**	**Link (U of W file name and path)**
14	1326H	ACM FP debris on surface of CTs.	SEL USB flash drive
15	4338	ACM FP debris on surface of drywall ceiling.	SEL USB flash drive
16	Corridor 1323A	Inadequate upper seal separating ACM FP from 'abated' areas.	SEL USB flash drive
17	Corridor 4316A	Exposed ACM FP - debris likely present on surface of ceiling.	SEL USB flash drive
18	ER 3977	Damaged ACM FP at ceiling pipe penetration.	SEL USB flash drive
19	MR 3983	ACM FP debris on surface of AHU.	SEL USB flash drive
20	MR 3983	Damaged ACM fitting.	SEL USB flash drive
21	Office 4342	ACM FP debris on surface of CTs.	SEL USB flash drive

Appendix C

List of Damaged Asbestos-Containing Materials

UNIVERSITY OF Waterloo

Building:	Figures:	Notes:
Carl A. Pollock Hall		**HM** - Homogenous Material - Homogeneous with previously sampled material
Date Built:		**SL** - Sample Location - Material Sampled
1971		**VC** - Visually Confirmed - Deemed ACM based on surveyor recognition
Building Size:		**AMP** - Asbestos Management Plan
120,500 SF		**ACM** - Asbestos-Containing Material

All quantities listed are considered approximate and should be verified prior to any renovation or demolition work within the areas.

Room Number	Room Description	Inspected Item	Inspected Material	Material Description	Material Detailed Location	Friability	Quantity	Condition	Sample / Identification Summary	Sample ID	Sample Report Date	% Asbestos & Fibre Type	Asbestos Classification	Recommended Action	General Notes
1343	Stairwell	Mechanical	Pipe Fitting	Parged Cement	Ceiling	F	1	Poor	HM	CPH-S05	2/10/2016	60% Chrysotile	ACM	AMP	
3977	Electrical Room	Structure	Firespray	Off-White	Above Ceiling	F	-	Poor	SL	CPH-S19D	2/10/2016	10% Chrysotile	ACM	AMP	6 square feet of damage
3982	Janitorial Room	Structure	Firespray	-	Above Ceiling	F	-	Poor	HM	33293-CPH-S03	3/18/2009	60% Chrysotile	ACM	AMP	Debris suspected on ceiling tile
3983	Mechanical Room	Structure	Firespray	-	Above Ceiling	F	-	Poor	HM	33293-CPH-S03	3/18/2009	60% Chrysotile	ACM	AMP	Approx 20 ft2 of damage. Debris on surface of AHU
		Mechanical	Pipe Fitting	Parged Cement	Ceiling	F	1	Poor	HM	CPH-S05	2/10/2016	60% Chrysotile	ACM	AMP	