Report of the

PANEL TO REVIEW THE ASBESTOS MANAGEMENT PROGRAM

at the

UNIVERSITY OF TORONTO

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TABLE OF CONTENTS

Tables & Figures

Executive Summary

In winter 2017-2018, three Vice-Presidents of the University of Toronto convened a Panel of experts to advise them on the University's policies and programs in regard to asbestos management on all three UofT campuses and other owned properties. From the Terms of Reference provided by the University, the mandate was to evaluate oversight and resources provided to the University's Asbestos Management Program. The Panel met with individuals from the various administrative and operational groups involved with the Asbestos Management Program, and with representatives of both student and employee groups. The Panel also received written comments from some of these groups.

Asbestos is the generic term for a group of naturally occurring silicate mineral fibres and, in the past has been mined and produced in many parts of the world. In most parts of the world, humans are exposed to background levels of airborne asbestos fibres. Because of its remarkably versatile properties, over the past century, asbestos has been used in hundreds of applications or types of products. Following the realization that asbestos could increase the risk of cancer and other health problems, most industrialized countries implemented regulations limiting occupational exposures to airborne asbestos by the late 1970's and, in recent decades, sought to ban or severely limit the use of asbestos. However, there continue to be legacy issues due to past uses. Asbestos is still found in buildings throughout the country which needs to be managed appropriately to avoid airborne exposures. At UofT, asbestos containing materials (ACM) are found in buildings on all 3 campuses, in pipe/duct/mechanical insulation, vinyl flooring, plaster, sprayed fireproofing, etc. In Ontario (and similar jurisdictions), there are detailed regulatory requirements on the management of ACM in buildings and safe procedures for their removal. The University of Toronto Asbestos Management Policy and Asbestos Management Program respond to these regulations and are the subject of this Review.

Our report includes some background sections – on asbestos and its uses (Chapter 5) and on the health effects and risks (Chapter 6). Given the importance of determining airborne asbestos concentrations, we have also included a discussion on the analytical and statistical methods associated with air sampling for asbestos in Chapter 7, together with a brief discussion and summary of exposure limits and guidelines (provincial, national and international). The remainder of our report discusses the UofT Asbestos Management Policy and Program and related issues and includes a number of recommendations and suggestions.

The Inventory of Asbestos-Containing Materials, a legislated requirement, is a comprehensive inventory of ACM present in buildings that are owned or operated by the University of Toronto, across all three campuses. For the St. George campus, both the individual survey reports on each building and summary

document are available online, to all UofT faculty, staff and students. The database is searchable, by building, floor and/or room number, to determine the details and nature of the ACM. The survey reports for University of Toronto Mississauga (UTM) and University of Toronto Scarborough (UTSC) buildings are also available online. The information collected in the Inventory appears to meet the legislative requirements, including that of information accessibility for employees and occupants and appears to be comprehensive and up-to-date.

Since early 2017, in response to incident(s) which occurred during wide-scale renovations to laboratories in the the Medical Sciences Building (MSB), over 4,000 air samples have been taken in and around the building by two well-known local consultants, using the widely accepted and used methods. Samples were taken over a 17 month period, in various locations throughout the building and some were taken outdoors, for comparison. Of the over 2,000 samples taken by one of the consulting companies, 95 % of the recorded values were below 0.004 fibres/cm^3. All of the outdoor samples were 0.004 fibres/cm^3 or less. Therefore 95 % of the samples **inside** the MSB were indistinguishable from the **outside**, and well below existing standards and guidelines. We have included a detailed discussion of how to report and interpret results from air sampling data that is at the low-end of the working range of the method. We have made several recommendations on reporting and internal guidelines or targets. These recommendations are intended to result in a more consistent approach to reporting data, which will be easier for end users to understand and interpret.

Panel members have reviewed the Asbestos Management Policy, Program and related documents available on the websites of both the Office of Environmental Health & Safety (EHS) and Facilities and Services. Taken together, they are consistent with the legislated provincial requirements, if not more restrictive in some places and, generally appear to be serving the University well. They are, for the most part, clear and unambiguous, with a few exceptions. As described more fully in Chapter 9, there is some lack of clarity in the descriptions of the roles and responsibilities. The Panel has raised a number of questions in Chapter 9 that the University would do well to consider.

The University is a large and complex organization. The Panel reviewed both the Governance and Management (Administration) structures, as they relate specifically to asbestos (health and safety). The Governing Council has delegated responsibility and authority on matters related to health and safety to the Business Board. Accordingly, the VP HRE provides quarterly reports to the Business Board. As discussed in both Chapters 9 and 10, management of occupational & environmental issues (and specifically related to asbestos) falls within three Vice Presidential portfolios: Human Resources & Equity, Research & Innovation and University Operations & Real Estate Partnerships. This is further complicated by the tri-campus nature of UofT – both UTM and UTSC have their own EHS presence, which also report to the UTM/UTSC Vice President and Principal. On the St. George campus, the Office

of Environmental Health & Safety is distributed across multiple portfolios. In summary, there are overlapping responsibilities at all levels – from senior administrative oversight and responsibility to the operational level - which could lead to confusion, diffuse management control and the appearance of compromised accountability. The Panel suggests that the University revisit the responsibility structures and organization across all 3 campuses and assess the adequacy of professional staffing levels to fulfill required functions under the Asbestos Management Program, as well as their other responsibilities.

Under the Occupational Health & Safety Act, Joint Health & Safety Committees and Supervisors have important roles and responsibilities and workers have a right to know about health & safety matters at their workplace. The Panel recognizes that the University is clearly aware of their responsibilities in these areas and has structures in place. Nevertheless, the Panel has made some suggestions which might enhance that which currently exists for asbestos. Given the importance of effective communication regarding health & safety and specifically around asbestos issues, this was an item discussed during stakeholder interviews and considered by the Panel. This is reviewed in Chapter 11 and recommendations provided.

ACRONYMS USED IN THIS REPORT

ACM	Asbestos Containing Materials
AMP	Asbestos Management Program
EHS	Office of Environmental Health & Safety
F&S	Facilities & Services Department (St. George Campus)
HCMG	Hazardous Construction Materials Group
JHSC	Joint Health & Safety Committee
LOD	Limit of Detection
LOQ	Limit of Quantitation
MOL	Ministry of Labour (Ontario)
MSB	Medical Sciences Building
ND	Not Detected
NIOSH	National Institute for Occupational Safety & Health (US)
NMAM	NIOSH Manual of Analytical Methods
PCM	Phase Contrast Light Microscopy
TEM	Transmission Electron Microscopy
UTM	University of Toronto Mississauga
UTSC	University of Toronto Scarborough
VP HRE	Vice President, Human Resources & Equity
VP RI	Vice President, Research & Innovation
VP UOREP	Vice President, University Operations & Real Estate Partnerships

Chapter 1: Terms of Reference as enunciated by the University

Mandate:

The University of Toronto is seeking advice and recommendations with respect to the University's asbestos program on all three campuses and other owned properties ("the Program"). The University wants to ensure that its program follows best practices and that it complies with Ontario regulations.

The Review team will be established by, report to, and be advisory to Vice-Presidents Scott Mabury (University Operations & Real Estate Partnerships), Vivek Goel (Research & Innovation) and Kelly Hannah-Moffat (Human Resources & Equity).

Given the limited time available to the Review team, the expectation is that the Review Team will become familiar with and be competent to comment on the broad outlines of the Program, specifically its oversight structure and the resources it can call upon, rather than the implementation details of the Program.

Context:

Asbestos is a commonly found building material that is present in many University of Toronto buildings, as it was routinely used in construction until the 1980s. It is present in a variety of building materials, including (but not limited to) sprayed fireproofing, thermal insulation, acoustic tiles and vinyl flooring. Serious health problems, such as asbestosis, lung cancer, and mesothelioma are associated with inhalation of harmful levels of asbestos fibres.

The University maintains a detailed database of locations where asbestos is known to be present. The UofT *Asbestos Management Policy* commits to removal of asbestos prior to demolition work. Any work is managed by our Capital Projects Group, overseen by our Hazardous Materials Group (HMG), and supported by Environmental Health & Safety (EH&S); activities are guided by our procedures and protocols.

Due to recent incidents where concerns have arisen regarding the handling of construction work involving asbestos, and as part of the University's ongoing commitment to a safe environment for work and study, the Review has been commissioned to evaluate oversight and resources provided to the University's Asbestos Management Program.

Scope:

This Review concerns the entirety of the University's asbestos program. The Program applies to all buildings and structures, machinery and equipment owned, occupied or operated by the University of Toronto at all campuses and other locations. It applies to all employees and students of the University, to occupants of University buildings, and to external organizations who may come in contact with or disturb asbestos-containing materials in University buildings.

Membership:

The Review Panel will comprise three individuals with advanced subject-matter expertise, chosen following an open call for nominations. Nominations will be accepted from individuals internal and external to the University. The Review Panel will be chaired by a member who is external to the University.

Process:

Reviewers will have discretion as to how to create a process that will facilitate the fulfilment of their mandate. They will conduct their meetings and interviews at the University. The University will provide secretariat support to the Reviewers to enable them to undertake their task.

Reviewers are encouraged to interview any individuals or specific groups they believe will help them in their review. These should include members of relevant Joint Health & Safety Committees, the Asbestos Advisory Committee, staff of the University's Capital Projects unit, HMG and EH&S groups, and representatives of undergraduate and graduate student groups. The reviewers shall invite representatives of employee groups, including representatives of the University of Toronto Faculty Association, USW and CUPE, Local 3902 to be interviewed. Reviewers will schedule interviews with representatives from all three campuses, and interviews may be supplemented by provision of written materials to the Reviewers.

The Review Panel will be provided, for examination, access to all materials maintained as part of UofT's Asbestos Management Program; for example these will include the asbestos program and policy, our standard operation procedures, and access to the Asbestos Data Website.

Reviewers will aim to deliver a brief written report to the three Vice-Presidents within two months of the Review Panel first face-to-face meeting. The report should focus on the adequacy of the oversight structure and resources provided to the Program. The University will make public the report and provide an administrative response within one month of receiving the report. The University will provide the report and the administrative response to the business Board of Governing Council for information.

Chapter 2: Members of the Panel

The Panel membership was finalized in January 2018 as:

Jack Siemiatycki, PhD, Université de Montréal (*Chair)*
H. Roland Hosein, PhD, MSc
Andrea Sass-Kortsak, PhD, CIH, ROH

Jack Siemiatycki, PhD is an epidemiologist and Full Professor in the School of Public Health at l'Université de Montréal, and is a Fellow of the Canadian Academy of Health Sciences. He has been involved in research on environmental and occupational causes of cancer for 40 years. He has conducted research on asbestos and cancer. He has been a Canada Research Chair, and currently holds the Guzzo-Cancer Society Chair in Environment and Cancer. In addition to his nearly 300 peer-reviewed publications, chapters and reports, he has been invited to sit on over 150 expert Panels and boards in several countries for such agencies as Health Canada, US National Cancer Institute, National Cancer Institute of Canada, World Health Organization, International Agency for Research on Cancer.

Roland Hosein, PhD, MSc is an Adjunct Professor, Division of Occupational & Environmental Health, Dalla Lana School of Public Health, University of Toronto and former Vice President of Environment, Health & Safety at General Electric Canada Company Inc. He has written and presented widely on the toxicology and epidemiology of inhaled gases, vapours and particles. He has participated in many not-for-profit boards and committees, including the Canadian Standards Association Board of Directors. His voluntary contributions have been recognized, including the Queen Elizabeth Diamond Jubilee Award.

Andrea Sass-Kortsak, PhD, CIH, ROH is an Associate Professor, Division of Occupational & Environmental Health, Dalla Lana School of Public Health (DLSPH), University of Toronto. She has a PhD in Epidemiology and is a professional Occupational Hygienist, concerned with the identification of health hazards (including asbestos) in the workplace, the evaluation and control of the hazards and the development, implementation and evaluation of policy, programs and procedures to reduce risks. For over 30 years she has been instrumental in the graduate professional training of Occupational Hygienists, including teaching courses covering a broad range of topics. Her research interests include the development of methods for improving estimates of exposure, the assessment of factors influencing workplace and environmental exposures and assessment of occupational risk factors in disease development. She has held a number of senior academic administrative appointments, including most recently Associate Dean, Academic Affairs at the DLSPH.

Chapter 3: Deliberations and Meetings

The Panel had an initial planning teleconference on January 29 2018. The Panel then met in Toronto on February 26 2018 and March 7-9 2018. During those meetings the Panel met with the following individuals, listed with their titles and responsibilities regarding asbestos. Those individuals were asked to explain their relationship to the problem of asbestos at UofT and to give their opinions about the strengths and weaknesses of the UofT program.

February 26, 2018

Stakeholder meeting

Mr. Jeff Miller Interim Director, Facilities Management, UTSC
Ms. Darlene Costas, Project Coordinator, Facilities Management, UTSC
Mr. Paul Van Den Enden, Worker Member, Trades JHSC
(All are members of the Asbestos Advisory Committee, but were invited to provide context for their areas)

Medical Sciences Building

Ms. Heather Taylor, Director, Facilities Management & Space Planning (Faculty of Medicine)
Ms. Leah Scherk, Facilities Planner, Facilities Management & Space Planning (Faculty of Medicine)

Orientation to Asbestos Management Program

Ms. Yang Ting Shek, Occupational Hygienist and Safety Specialist, EHS
Mr. Irfan Miraj, Manager, Hazardous Construction Materials Group (HCMG)

VP Sponsors

Professor Scott Mabury, Vice-President, University Operations & Real Estate Partnerships (VP UOREP)
Professor Vivek Goel, Vice-President, Research & Innovation (VP RI)
Professor Kelly Hannah-Moffatt, Vice-President, Human Resources & Equity (VP HRE)

Wednesday March 7, 2018

UTM Meeting

Mr. Adrian Georgescu, Assistant Director, Bldg. Ops and Services, UTM

Capital projects meeting

Ms. Adrienne de Francesco, Executive Director, Capital Projects
Mr. Brian Szuberwood, Associate Director Capital Projects

Joint Health & Safety Committee Co-Chairs meeting

Ms. Tamar Mamourian, Ramsay-Wright Building (Absent)
Ms. Lisa Matchett, Ramsay-Wright Building
Ms. Lucy Chung, Sidney-Smith Building
Ms. Therese McGuirk, Sidney-Smith Building
Mr. Artur Jakubowski MSB
Ms. Heather Taylor MSB

UofT Student Union / Graduate Student Union delegates meeting

Mr. Nathan Chan, UofT Graduate Student Union General Council Representative

Thursday March 9, 2018

EHS & Hazardous Construction Materials Group – follow up meeting

Ms. Yang Ting Shek, Occupational Hygienist & Safety Specialist, EHS
Mr. Irfan Miraj, Manager, HCMG

EHS Team meeting

Mr. Marc Drouin, Director, Research Safety & Compliance
Ms. Gina Trubiani, Director, Occupational Health & Safety
Ms. Yang Ting Shek, Occupational Hygienist & Safety Specialist

United Steelworkers meeting

Ms. Colleen Burke, President Local 1998
Mr. Omero Landi, Regional Director
Mr. Mark Austin, Health & Safety Officer

UofT Faculty Association meeting

Ms. Terezia Zoric, VP-Grievances
Ms. Helen Nowak, General Counsel
Ms. Samantha Olexson, Staff member, General Counsel
Mr. Derrick McIntosh, Goldblatt Partners – External Counsel

Canadian Union of Public Employees meeting

Ms. Rebecca Strong, Staff Representative
Ms. Kristen Allen, Vice Chair, Local 3902
Ms. Leanne MacMillan, Staff Representative, Local 3261 (Cleaners, Food Service workers)
Ms. Pamela Arancibia, Chair, Local 3902
Ms. Bridget Prim

Friday March 10, 2018

EHS & Hazardous Construction Materials Group Meeting – Second follow up meeting

Ms. Yang Ting Shek, Occupational Hygienist & Safety Specialist, EHS
Mr. Irfan Miraj, Manager, HCMG

Wednesday March 28, 2018

Communications team meeting (by Teleconference)

Ms. Elizabeth Church, Director, Media Relations, UofT Communications
Mr. Liam Mitchell, Associate Director, Communications, Faculty of Medicine

Subsequent to those meetings, some groups submitted written documents to the Panel:

UofT Faculty Association -submission letter, speaking notes from meeting with Panel, Opinion report from ECOH Consultants

United Steelworkers Local 1998 - Speaking notes from the meeting with Panel

Canadian Union of Public Employees Local 3902 - Written Comments

UofT Graduate Students' Union - recommendations

Chapter 4: Panel comments on Terms of Reference

Some of the representatives of worker groups made clear that they disagreed with some aspects of the Terms of Reference. The various groups expressed concern, inter alia, that the mandate did not include a detailed analysis of the events that led to a major containment problem at MSB in winter 2017. There were also criticisms of an alleged lack of engagement with employee and student groups in various aspects including the constitution of the Panel. And there were allegations that the Panel could not provide an unbiased and informed evaluation of the problem.

The Panel members were unaware of these concerns of employee and student groups before meeting with their representatives. The Panel members had agreed to participate in the process, with the Terms of Reference as reproduced above, with an expectation that they were providing a service to all members of the university community. We heard the concerns and opinions of all of the stakeholders that were interviewed, and received their written comments. We relied on experts at the UofT with some managerial or technical responsibilities for additional relevant information. We have no reason to doubt the honesty, sincerity or competence of the individuals who provided information.

Our understanding of the Terms of Reference was that the University was hoping for a high-level view of the situation, not a detailed analysis. This was the mandate we accepted.

We hope this report serves the interests of all members of the UofT community.

Chapter 5: What is asbestos and where is it found?

5.1 What is asbestos?

Asbestos is the generic commercial designation for a group of naturally occurring silicate mineral fibres. There are various types of asbestos fibres; they vary by physical form and by chemical composition. The main general types are serpentine and amphibole fibres. Some asbestos fibres are relatively long and wavy; some are shorter and needle-like. The most widely used is a serpentine fibre called chrysotile, and this is the main type that has been mined and used in Canada. Even within a given type there are variations in composition and in purity. For instance, chrysotile asbestos coming from some mines may be contaminated with certain types of amphibole fibres.

Asbestos fibres tend to possess good strength properties (e.g. high tensile strength, wear and friction characteristics); flexibility (e.g. the ability to be woven); excellent thermal properties (e.g.heat stability; thermal, electrical and acoustic insulation); adsorption capacity; and, resistance to chemical, thermal and biological degradation.

5.2 Uses and production of asbestos

Modern industrial use of asbestos dates from about 1880, when the Quebec chrysotile fields began to be exploited. Because of its remarkably versatile properties, asbestos has been used in hundreds of applications or types of products. Asbestos has been used as a loose fibrous mixture, bonded with other materials (e.g. Portland cement, plastics and resins), or woven as a textile. The range of applications in which asbestos has been used includes: roofing, thermal and electrical insulation, cement pipe and sheets, flooring, gaskets, brake pads and other friction materials, coating and compounds, plastics, textiles, paper, mastics, thread, fibre jointing, and millboard. Different types of asbestos are suitable for different applications.

The volume of asbestos produced and used worldwide increased steadily through the 20th century until the 1970s when it is estimated that about 5 million metric tons of asbestos were used annually around the world. Following the realization that exposure to asbestos could increase the risk of cancer and other health problems, there were concerted efforts, initially in industrialized countries, to control asbestos exposure. Initially this involved the implementation of control measures to reduce the exposure levels of asbestos in the environments of workers. By the 1970s, most industrialized countries had in place regulations limiting the amount of asbestos that was permitted in the workplace air. Within the following 20-30 years, as alternative products were developed that could replace asbestos, most industrialized countries sought to ban or severely limited the use of asbestos.

While Canada was the first large-scale producer of asbestos, by the 1970s, asbestos was being mined and produced in many countries. Many countries including Canada have given up the production of asbestos in the recent past; the main producers today are Russia and China.

5.3 Environmental exposure

Asbestos fibres can be emitted to the atmosphere from both natural and anthropogenic sources.

Major anthropogenic sources include: open-pit mining operations (particularly drilling and blasting); crushing, screening, and milling of the ore; manufacturing asbestos products; use of asbestos-containing materials (such as clutches and brakes on cars and trucks); transport and disposal of wastes containing asbestos; and, demolition of buildings constructed with asbestos-containing products, such as insulation, fireproofing, ceiling and floor tiles, roof shingles, drywall, and cement .

The weathering of asbestos-bearing rocks is the primary natural source of atmospheric asbestos. Asbestos minerals are widespread in the earth's crust and in the environment where the rock mass is exposed. Examples include large chrysotile deposits in the Ural Mountains in Russia, in the Appalachian Mountains in the USA, in an area of California, and in the Eastern Townships of Quebec. No estimates are available of the amounts of asbestos released to the air from natural sources.

Although asbestos is a solid material; the very small fibres of asbestos are light enough to remain airborne for long periods of time. Combined with its characteristic durability, this ensures that asbestos fibres are widespread in the atmosphere.

The methods for the measurement of asbestos in air have evolved over time. The standard procedure that has been used for many years, involves drawing a volume of air through a filter and counting the number of fibres (of a particular size range) that can be seen under a high-powered microscope. The number of fibres is then reported as a function of the volume of air tested, and the results are given as number of fibres per cubic centimeter (cm^3) of air. More specific and sensitive analytical methods have been developed to quantify asbestos specific fibres, but these are not routinely used. (see Chapter 7.1 for further details on air sampling for Asbestos)

Asbestos fibres can be found in the air in rural locations, at great distances from any obvious sources of asbestos pollution. Typical concentrations in rural locations are in the order of 0.0001 fibres/cm^3. In urban locations the typical concentrations are about 10-fold higher (i.e. in the order of 0.001 fibre/cm^3). Typical concentrations are about 1000 times higher (i.e. in the order of 0.1 fibres/cm^3) in proximity to industrial sources of exposure (e.g. asbestos mine or factory, demolition site, or improperly protected asbestos-containing waste site).

In indoor air such as in homes, schools, and office buildings, measured concentrations of asbestos are in the range of 0.00003 to 0.00600 fibres/cm^3. Measured concentrations vary depending on the way in which the asbestos was used in the building construction (e.g. insulation versus ceiling or floor tiles), and on the condition of the asbestos-containing materials, on the indoor-outdoor ventilation conditions of the building, and on the amount of asbestos in the outdoor air.

Apart from the most remote and un-industrialized parts of the world, hardly any humans are completely unexposed to asbestos fibres. And this has been so for many decades.

5.4 Occupational exposure

The highest exposures to asbestos have occurred in various occupational settings. The following statistics on prevalence of occupational exposure to asbestos and levels of exposure to asbestos refer for the most part to workers who are exposed for a large fraction of the work period (day or week or month); it does not include sporadic accidental exposure episodes. And it generally refers to workers with fairly long-term exposure.

It is estimated that, globally, 125 million people are occupationally exposed to asbestos each year around the world (that is, in excess of any background exposure). Exposure occurs in the mining and milling of asbestos or other minerals found in proximity to asbestos deposits, the manufacturing or use of products containing asbestos, construction, automotive industry, and the asbestos-abatement industry (including the transport and disposal of asbestos-containing wastes).

In the USA the Occupational Safety and Health Administration (OSHA), estimated that 1.3 million employees in construction and general industry face significant asbestos exposure on the job. Furthermore, it is noted that the locus of such exposure has shifted from manufacturing and use of asbestos products to activities like building maintenance and asbestos remediation.

Similarly, Carex (CARcinogen Exposure) Canada[1], a research project generating an evidence-based carcinogen surveillance program for Canada, has estimated that 152,000 Canadians are currently exposed to asbestos in their workplaces. 88% of those exposed workers are in the construction trades and the remainder primarily in automotive repair, ship and boat building and remediation work.

Exposure to asbestos in occupational settings is regulated in many countries. Most industrialized countries, including Canada, have permissible limits of 0.1 fibres/cm^3, based on an 8-hour time-weighted average. Some other countries have permissible limits as high as 2.0 fibres/cm^3.

[1] https://www.carexcanada.ca/en/asbestos/occupational_estimate/

Asbestos has been monitored and measured in many workplaces. The concentrations vary greatly from place to place and time to time. A couple of examples illustrate the range for workers in occupations and industries which one would **not** expect to experience the highest exposures. One survey was conducted among workers in a hospital operation and maintenance program. The average exposure was about 0.1 fibres/cm^3. The other was conducted among maintenance personnel in buildings with asbestos-containing materials. Median concentrations were in the range of 0.01 to 0.02 fibres/cm^3.[2]

These asbestos exposure concentrations are much lower than they would have been in earlier decades, before significant regulations and substitutions were implemented to reduce asbestos exposure.

[2] International Agency for Research on Cancer (2012). IARC monographs on the evaluation of carcinogenic risk of chemicals to man. Vol. 100C. Asbestos. 2012. 309 pp.

Chapter 6: What are the health effects of exposure to asbestos ?

6.1 Asbestosis

The first health effect of asbestos that was noticed by physicians and documented in subsequent research was a fibrosis (scarring) of the lungs. Because it was so specific to asbestos workers, it was called asbestosis. Asbestosis is not a cancer. It is generally not fatal, but it significantly reduces lung function and the ability of the worker to work and live comfortably, and it could eventually contribute to a person's death. It turned out that asbestosis occurred in workers who had experienced extremely high levels of exposure for long periods of time. As regulations came into force and controls were implemented and concentration levels of asbestos declined substantially, the incidence of asbestosis has declined greatly. Among workers exposed in the past few decades in Canada or other industrialized countries, there has been little incidence of asbestosis. It was a disease of the working conditions that were prevalent before the control measures of the 1960s and 1970s were implemented, namely constant very high concentrations of asbestos exposure for many years if not decades. However because of the long latency periods of this disease (i.e. the period between first exposure and development of disease), there may be sporadic cases still occurring in Canada.

6.2 Cancer

By the 1960s, epidemiologic evidence had accumulated indicating that workers exposed for lengthy periods to asbestos fibres experienced an excess risk of lung cancer compared with the general population.

At the same time, evidence was accumulating regarding excess risks of a newly-recognized type of cancer called mesothelioma. Mesothelioma is a cancer of the linings of internal organs, and it is mesothelioma of the linings of the lung (the pleura) that are most at issue. Mesothelioma is much rarer than lung cancer. But it is even more strongly associated with asbestos exposure than is lung cancer. To provide a rough guideline, among people not exposed to asbestos, lung cancer is about 60 to 100 times more common than mesothelioma. But among asbestos-exposed workers (highly exposed for long periods), lung cancer is only 10 to 15 times more common than mesothelioma. Another way of expressing this is that the relative risk of getting lung cancer among asbestos workers (exposed to fairly high concentrations for many years) compared to the general population is about 2-fold for lung cancer and over 10-fold for mesothelioma.

These are not the only types of cancer that have been reported to be associated with asbestos exposure, but they are the best documented with the strongest evidence. There is also credible evidence that heavy exposure to asbestos can lead to larynx cancer and with somewhat less persuasive evidence, to ovarian cancer. There have been scattered reports of possible excess

risks of some other cancers, but these reports are not well substantiated. Apart from ionizing radiation, asbestos is the best-investigated among occupational carcinogens. Unfortunately, this does not mean that its cancer-causing potential is fully understood. On the contrary, there remain many open questions that hinder our ability to accurately predict health risks to people exposed to asbestos. There are many sources of uncertainty.

First, as indicated above, asbestos is an umbrella term that covers fibres with very different physical and chemical characteristics. It is very plausible, indeed likely, that some of these characteristics influence the carcinogenicity of asbestos fibres. It is therefore believed that the cancer risks may well differ by type of asbestos and even by how that asbestos is used. Indeed, when lining up the results of different epidemiologic studies of asbestos-exposed workers, it is striking how heterogeneous are the quantitative results on risk. This heterogeneity is the source of considerable controversy, with no widespread consensus on how to interpret it. Among plausible theories is the possibility that chrysotile asbestos, the type used most commonly in Canada, induces lower excess risks of cancer than other types of asbestos. There are variations on this theory.

The amount of exposure, measured in concentration and duration of exposure, clearly influence whatever risks asbestos may induce. For asbestosis to occur there appears to be some type of threshold of concentration and duration of exposure, below which there is little or no chance of excess risk. For cancer, on the other hand, while increasing exposure leads to increasing risk, it is not clear whether there is a threshold below which there is no excess risk. The statistical resolution of the studies is such that it is impossible to state with confidence the conditions under which there is no excess risk. In fact, this argument may be made for any carcinogen or alleged carcinogen. It is very difficult or impossible to prove an absence of risk. What we can say is that at low levels of exposure, for example below the regulated limits, no excess risks have been detected.

Another source of uncertainty in relation to the asbestos-cancer association is the role of cigarette smoking. Cigarette smoking is the most important risk factor for lung cancer and for laryngeal cancer, with relative risks in the order of 10 to 15 fold greater risks for smokers than for nonsmokers. The relative risks of these cancers in relation to asbestos exposure are closer to 2 (ranging in different studies from 1.2 to 5). It appears that the excess risk of lung cancer due to asbestos is greater among smokers than among non-smokers.

Yet another source of uncertainty in our epidemiologic information base derives from the difficulty of retrospectively ascertaining the lifetime exposure histories of study subjects.

The biological mechanisms by which asbestos can increase the risk of disease are not firmly established, though several hypotheses have been proposed.

6.3 Risk

Understanding the problem of asbestos (or any other risk factor) requires an understanding of the concept of risk. The concept of risk is closely related to the concept of probability.

Crossing a busy street on foot entails some probability of being hit by a vehicle. It is not a common event, and most people do not avoid crossing streets because of the possibility of being hit by a car. But there is a risk. Further, even not crossing a street, just walking on the sidewalk, entails some probability, albeit a lower probability, of being hit by a vehicle. Finally, crossing a busy street without looking each way entails an even higher probability of being hit by a car.

As everybody knows, there is a risk of cancer among people who are not exposed to asbestos. This is clearly the case for lung cancer and laryngeal cancer. Mesothelioma can occur among people who never had an obvious exposure to asbestos, though there are some who believe that these cases may occur because of the background level s of asbestos in the general environment. Asbestosis does not occur in the absence of asbestos exposure, though similar lung diseases can occur among workers exposed to coal dust and silica dust.

As with other risk factors (including smoking), most people exposed to asbestos do not suffer the disease that is associated with the carcinogen.

There is a quantitative gradient between the intensity of exposure to asbestos and the degree of risk that ensues.

6.4 Amount of exposure and degree of risk

Understanding the problem of asbestos (or any other risk factor) requires an appreciation of the notion of exposure-response relationship (or “dose-response” as it is sometimes called). For all dangerous behaviours or exposures there is some sort of exposure-response relationship. Exposure can be measured in terms of concentration or intensity of exposure at any given moment, or it can be averaged or accumulated over some period of time. It can take into account the frequency of exposure during a normal week or month. It can take into account the duration in years of exposure. Further, as indicated above, asbestos fibres are ubiquitous in urban environments; so it is not clear what we mean by the notion of exposed vs unexposed. Finally, as far as asbestos is concerned, there are complicating considerations of the types of asbestos that are in question.

We do know that as a general rule, the greater the concentration, frequency and duration of exposure, the greater the risk. As far as asbestos exposure is concerned, it is unknown whether there are “safe” levels of exposure that are guaranteed to carry absolutely zero risk. Governments set regulations in place that are generally established on a dose-response basis with some consideration of what is technologically and economically feasible. It is not known if

exposure above the government limits are in fact dangerous, or if exposure below the government limits are in fact perfectly safe.

The vast majority of research on asbestos health effects was conducted on workforces that were exposed well before the 1980s, and that experienced exposure levels perhaps hundreds of times greater than current exposure limits.

Even for carcinogens which are more potent than asbestos in the sense that exposed people experience greater excess risk than those exposed to asbestos, namely ionizing radiation and cigarette smoking, there are no known safe levels, although people with very little exposure have not been shown to experience any excess risks.

Despite these limitations on our ability to accurately and validly determine safe levels of exposure to asbestos (and other carcinogens), public health and occupational health regulators are required to set regulatory limits in the face of some scientific uncertainty. It is beyond the scope of this review to critically review the processes that lead to such determinations. We do not challenge or doubt that the regulations and guidelines derived by public health and occupational health authorities are the best that can be done with available knowledge. In the next section we will report some of the relevant public health and occupational health guidelines.

6.5 Mini-bibliography on asbestos exposure and asbestos health effects

The information in Chapters 5 and 6 is mainly based on information accumulated by the author over 40 years. Rather than burdening this report with extensive lists of individual study reports, we include here a list of some authoritative reviews and a few relevant studies, that can be consulted.

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Chapter 7: Regulatory Limits and Guidelines and Asbestos Air Sampling

7.1 Airborne Asbestos Exposure Limits or Guidelines

There are a number of airborne asbestos concentration guidelines, criteria or standards (limits) that apply to different circumstances.

Occupational exposure limits are regulated provincially, under the *Occupational Health and Safety Act of Ontario*[3]. There are two regulations which specify Occupational Exposure Limits for asbestos in Ontario:

1. Ontario Regulation 833: *Control of Exposure to Biological or Chemical Agents*[4]
   This regulation provides Occupational Exposure Limits (OELs) for over 725 substances, including asbestos. OELs are typically expressed as Time-Weighted Average (TWA) Limits, which means the time-weighted average concentration to which a worker may be exposed in a workday (nominally 8-hours) or workweek (40-hours). These OELs apply to workers who work with, or around, the substance. Exposure assessment to determine compliance is generally conducted over a full work shift (8-hours) as a personal measurement (i.e. sampling apparatus is attached to the worker to obtain a 'personal, breathing zone' measure of exposure). The OEL for Asbestos (in all its forms) is 0.1 fibre/cm^3 as an 8-hour TWA.

2. Ontario Regulation 490/09: *Designated Substances*[5]
   Designated substances are those substances *designated* as hazardous by the Ministry of Labour under the Occupational Health and Safety Act. Asbestos is one of the eleven (11) *Designated* Substances. In addition to OELs (which are the same as listed in Ont. Reg. 833 – i.e. for asbestos - 0.1 fibre/cm^3), the Designated Substances Regulation(s) provide much more detailed and specific regulatory requirements.

Most of the other provincial jurisdictions have the same OEL (0.1 fibre/cm^3) for all forms of asbestos (Alberta, British Columbia, Manitoba, Newfoundland & Labrador, Nova Scotia and Prince Edward Island).[6] New Brunswick, Quebec and Yukon Territory make OEL distinctions between different forms of asbestos (e.g. chrysotile, amosite, crocidolite) and have generally higher OELs while Saskatchewan, Northwest Territories and Nunavut have no specific OELs for

[3] *Occupational Health and Safety Act of Ontario* (RSO 1990, c.0.1, as amended 2018) https://www.ontario.ca/laws/statute/90o01#BK19
[4] https://www.ontario.ca/laws/regulation/900833
[5] https://www.ontario.ca/laws/regulation/090490#BK1
[6] CAREX Canada – Substance Profile – Asbestos https://www.carexcanada.ca/en/ revised June 2018

asbestos.[6] For Canadian workplaces that are under Federal jurisdiction, to which the Canada Labour Code 'Part II' applies, the OEL is 0.1 fibre/cm^3.

In the US, the federal Occupational Safety & Health Administration stipulates regulatory standards, known as Permissible Exposure Limits (PEL). For asbestos the PEL is 0.1 fibres/cm^3, also as a TWA over an 8-hour workday or 40-hour workweek (OSHA Standard 29 CRF 1910.1001). Also in the US, the American Conference of Governmental Industrial Hygienists (ACGIH) publishes annually a set of ***guidelines*** (not regulatory standards), which are recognized internationally and known as Threshold Limit Values (TLVs) for many chemical agents. The ACGIH TLV is also 0.1 fibres/cm^3, also expressed as a TWA. Similarly, the US National Institute of Occupational Safety & Health (NIOSH) Recommended Exposure Limit (REL) for asbestos is 0.1 fibre/cm^3. The 0.1 fibre/cm^3 occupational exposure limit is also used in many other countries, including Australia, Germany, Sweden and the UK. It was beyond the scope of the Asbestos Review Panel to conduct a thorough and exhaustive search of OELs world-wide; however, it appears that there is strong international consensus with respect to an ***occupational*** exposure limit of 0.1 fibre/cm^3. It is important to note that this time-weighted average exposure limit is for workers working with and around asbestos, as a personal exposure, averaged over an 8-hour workday / 40-hour workweek. It is not intended for public/community/environmental situations.

As described more fully in Chapter 5 (pages 8,9) of this report, asbestos is a naturally occurring mineral fibre which is found in very low concentrations, in the ambient air in both rural and urban settings throughout much of the world. However there are few ***environmental exposure limits or guidelines*** analogous to those that exist for occupational limits***.*** The Ontario Ministry of the Environment and Climate Change[7] has developed Ambient Air Quality Criteria which are 'desirable concentrations of a contaminant in air', used to assess general air quality resulting from all sources of a contaminant to air[8]. The Ambient Air Quality Criterion for asbestos is 0.04 fibres/cm^3. This criterion is based on an averaging time of 24-hours and is based on general, public exposure. It is important to note that this is NOT a legal, regulated standard; rather a 'desirable concentration'. The U.S. Environmental Protection Agency does not appear to have an environmental air quality standard or guideline for asbestos.

[7] Previously, the Ontario Ministry of the Environment (to 2014), then the Ontario Ministry of the Environment & Climate Change (2014 – 2018)

[8] Ontario Ministry of the Environment & Climate Change, Ontario's Ambient Air Quality Criteria, PIBS # 6570e01, Dec 2016 https://www.ontario.ca/page/ontarios-ambient-air-quality-criteria-sorted-contaminant-name

Other types of asbestos-related target concentrations

The Ontario Regulation 278/05: *Designated Substance: Asbestos on Construction Projects and in Buildings and Repair Operations*[9]*,* is the Designated Substance regulation specifically for a subset of asbestos workers - those working in buildings, repair work and construction projects. As described in detail in Chapter 9 of this report, this regulation specifies detailed health & safety requirements relating to the presence of asbestos containing materials in buildings, including inspections, inventory and record keeping; procedural requirements for work, training, etc. Specifically, at the completion of major remediation projects (described as Type 3 operations in the regulation), **clearance testing** is required. The regulation states: "**the work area passes the clearance test if every sample taken inside the enclosure area does not exceed a concentration of 0.01 fibres/cm^3".** [8] This is a legally enforceable limit, but it is NOT a personal, 8-hour TWA exposure for employees/workers. Rather it is based on a 2,400 litre air sample (typically 2.5 hour duration), taken inside the enclosure after the asbestos has been removed, to ensure that the abated room or area has been adequately cleaned (to less than 0.01 fibre/cm^3), under what could be considered as a *'worst case'* scenario (i.e. with significant mechanical air movement inside the enclosure). According to the regulation, only at this point may the enclosure be removed and the space released for occupancy.

Air sampling is also often conducted in areas adjacent to asbestos remediation projects to determine if there is any release of asbestos fibres from the remediation area or enclosure. In our admittedly not exhaustive or comprehensive search, we were unable to find a **legally enforceable** maximum concentration or even a best practice standard for these types of samples, which reflect public rather than asbestos-worker exposures. There is relatively common use of the concept of an Occupational Exposure Limit (OEL) *Action Limit* for these situations. In Occupational Hygiene practice an *Action Limit* is generally taken as 50% of the OEL and represents a level that triggers some remedial or control action to reduce the exposures in the workplace. For asbestos, the OEL in most Canadian jurisdictions is 0.1 fibre/cm^3, hence the *Action Limit* would be 0.05 fibres/cm^3, but this is specifically for asbestos workers. Many consultants, contractors, and owners use this *Action Limit* (less than 0.05 fibres/cm^3) as an indicator of an environment that is safe for occupancy, though, given the basis for the *Action Limit for asbestos workers,* this may not be justifiable.

[9] https://www.ontario.ca/laws/regulation/050278

The Government of Canada's "Public Services and Procurement Canada Asbestos Management Standard"[10] applies to Crown-owned and leased buildings and engineering assets where Public Services and Procurement Canada is the custodian, in which ACM is present or may be present. This Standard is very similar to Asbestos Management or Control Programs found in Provincial regulations (e.g. OR 278/05). It specifically refers to a final clearance testing criterion for High Risk removal projects (equivalent to Type 3 operations) of less than 0.01 fibres/cm^3. In addition, this federal standard also requires that for both Intermediate and High Risk projects (Type 2 and 3) "air monitoring for total fibre concentration outside of [adjacent to) work areas … be conducted daily… and a stop-work order will be issued when … measurements exceed 0.05 fibres/cm^3". Further, in situations where "a building occupant is, or may have accidentally been, exposed to airborne asbestos … a qualified person … conduct an investigation. If the "hazardous material could be present … at a level of at least 50% of the ACGIH TLV" this triggers the institution of a control program.

[10] Government of Canada, Asbestos Management Standard, Public Services and Procurement Canada, 2017 https://www.tpsgc-pwgsc.gc.ca/biens-property/ami-asb/nga-ams-eng.html (Sections 6.2.8.2, and 6.2.9)

The airborne asbestos exposure limits or concentration criteria are summarized below.

Table 1: Selected Airborne Asbestos Exposure Limits or Concentration Criteria				
Name of Limit	**Value**	**Jurisdiction(s)**	**Application**	**Type of Limit**
Occupational Exposure Limit	0.1 f/cm^3	Canada (Fed), Ontario, AB, BC, MB, NL, PE, US – OSHA, NIOSH, ACGIH (TLV) Int – Australia, Germany, Sweden, UK	Workers working with or around asbestos; In most jurisdiction these are legally enforceable	Averaged over 8-hour day, 40-hour workweek; Personal exposure
Ambient Air Quality Criteria	0.04 f/cm^3	Ontario Ministry of the Environment and Climate Change	Public; "desirable concentration" (not legally enforceable)	Averaged over 24-hours
None found		US – Environmental Protection Agency		
Clearance testing for Type 3 projects	0.01 f/cm^3	Ontario, Canada (Fed)	Airborne concentration inside 'cleaned enclosure'; not personal; legally enforceable	Area sample taken over approx. 2.5-hours (2,400L);
Action Limit	½ OEL = ½(0.1) = 0.05 f/cm^3	Used in Professional Practice internationally	Used in Professional Practice, generally for all chemical materials, as a 'best practice' for workers working with the materials, to 'trigger' action	Based on OEL – therefore average over 8-hr day

7.2 Air Sampling of Asbestos – Methods and Limits of Detection/Quantitation

The standard method for air sampling for asbestos fibres is the conventional US National Institute of Occupational Safety & Health (NIOSH), Manual of Analytical Methods (NMAM), Method 7400: *Asbestos and other Fibres by Phase Contrast Microscopy (PCM)*.[11] Air is drawn, at a known, fixed flow rate (maximum 16 litres/min) through a 25 millimeter (mm) diameter cellulose ester membrane filter, for a measured time period. Using phase contrast microscopy, the number of fibres present on the filter is counted according to the NIOSH prescribed set of counting rules. Only fibres longer than 5 microns (µm) with a length-to-width ratio equal to or greater than 3:1 are counted; as this is considered to be the fraction that can enter the gas exchange region in the lung. The number of fibres, as fibres per cubic centimeters of air (fibres/cm^3) is calculated, based on the volume of air sampled. It is important to note that ***all*** fibres, meeting the counting rules, are counted. The method cannot identify ***asbestos*** fibres specifically. Rather, it counts all fibres with those physical characteristics. Therefore, in environments where other fibrous materials are also present, this method can result in an overestimation of the asbestos airborne concentration. There is a second NIOSH Method, using transmission electron microscopy (TEM) (NMAM Method 7402 *Asbestos by TEM*)[12], which identifies and therefore allows quantification of ***asbestos*** fibres, specifically. The analysis by TEM takes much longer, using sophisticated instrumention that is not portable. Therefore, in asbestos remediation work, the PCM method is commonly used, with TEM used as a supplementary approach, in cases where there is need to validate the asbestos content on the filter.

According to the NIOSH Method 7400[11], the estimated **limit of detection (LOD)** is 7 fibres per mm^2 of filter area (7 fibres/mm^2), with the total filter area being 385 mm^2. This is the lowest quantity of a substance that can be distinguished from the absence of that substance with a confidence level (generally 99%). The actual limit of detection, as an air concentration (i.e. in units of fibres/cm^3 air), depends upon the volume of air sampled, which is a function of the flow rate in litres/minute multiplied by the sample duration (min).

$$Volume\ of\ air\ sampled\ (litres)\ =\ flow\ rate\left(^{litres}/_{min}\right)\ X\ \ duration\ (min) \qquad \text{Equation 1}$$

The maximum flow rate specified by NIOSH 7400 is 16 litres/min and, in the absence of significant amounts of non-asbestos dusts, the typical target volume of air to be sampled is 1,000

[11] US National Institute of Occupational Safety & Health (NIOSH), Manual of Analytical Methods (NMAM), Method 7400, Issue 2: *Asbestos and other Fibres by Phase Contrast Microscopy (PCM),* August 15, 1994 (https://www.cdc.gov/niosh/docs/2003-154/pdfs/7402.pdf

[12] US National Institute of Occupational Safety & Health (NIOSH), Manual of Analytical Methods (NMAM), Method 7402, Issue 2: *Asbestos by TEM,* August 15, 1994

litres, corresponding to a sample duration of just over 1 hour (62 min). The limit of detection is thus calculated as:

$$LOD = \frac{\mathbf{7}\ {}^{fibres}/_{mm^2}\ X\ \mathbf{385}\ mm^2}{\mathbf{1{,}000}\ litres\ X\ \mathbf{1{,}000}\ {}^{cm^3}/_{litres}} = \mathbf{0.003}\ \ \boldsymbol{fibres/cm^3} \qquad \text{Equation 2}$$

The NIOSH Method 7400[11] also specifies a **Limit of Quantitation (LOQ)** for PCM analysis. The LOQ is the smallest amount of a substance that can be measured with precision and can therefore be ***reliably*** reported. The LOQ for the method is 100 fibres/mm^2 filter area. Using Equation 2 and with the same sampling and analytical parameters, the LOQ for asbestos sampling is 0.04 fibre/cm^3, as shown below:

$$LOQ = \frac{\mathbf{100}\ {}^{fibres}/_{mm^2}\ X\ \mathbf{385}\ mm^2}{\mathbf{1{,}000}\ litres\ X\ \mathbf{1{,}000}\ {}^{cm^3}/_{litres}} = \mathbf{0.038}\ \ \boldsymbol{fibres/cm^3} \qquad \text{Equation 3}$$

Following Type 3 operations, Ont. Reg. 278/05[9], stipulates that after the completion of both the work and all the specified requirements for cleaning inside the enclosure, ***clearance air testing*** be conducted inside the enclosure. The clearance testing is to be conducted by either PCM or TEM method (or both, in some cases), following the relevant NIOSH method (7400/7402), with the important exception that the total volume of air sampled must be 2,400 litres (rather than the maximum 1,000 litres described in the NIOSH Methods). This means that clearance samples must run for a minimum of 150 min (2.5-hours) duration, assuming a flow rate of 16 litres/min. The details of clearance sampling requirements are covered in Sections 18(4) to 18(6) of Ont. Reg. 278/05. Clearance air testing is only required following Type 3 operations.

For **clearance** sampling, this increase in sample duration (or volume) means that the LOD and LOQ are correspondingly, lower. Specifically, using Equation 2, with the maximum flow rate of 16 litres/min and the minimum volume of air sampled as specified by the Regulation, of 2,400 litres – the limit of detection is 0.001 fibre/cm^3. Similarly, for **clearance** sampling, using Equation 3, with the specified volume of air sampled of 2,400 litres, the limit of quantitation (LOQ) is 0.016 fibres/cm^3. (Table 2)

Table 2: Limits of Detection and Quantitation for Asbestos Sampling		
Method	**LOD**	**LOQ**
Standard NIOSH 7400[11] - **60 min** @ 16 L/min - approx. 1,000 litres	0.003 fibres/cm^3	0.038 fibres/cm^3
Standard NIOSH 7400[11] - **120 min** @ 16 L/min - approx. 2,000 litres	0.001 fibres/cm^3	0.02 fibres/cm^3
Clearance sampling (OR 278/05[9]) 2.5 hrs @ 16 L/min – approx. 2,400 litres	0.001 fibres/cm^3	0.016 fibres/cm^3

The Limits of Detection and Quantitation are important in that they provide guidance as to how to interpret and report results at the low-concentration-end of the analytical method working range. Though not specifically in reference to asbestos sampling, NIOSH, in its document: *Guidelines for Air Sampling and Analytical Method Development and Evaluation*[13] suggests that, in general, chemical air sampling results:

- **"below** the LOD should be reported as 'Not Detected (ND)'
- **between** the LOD and the LOQ, should be reported numerically, to two significant figures, and enclosed in parentheses to emphasize the imprecision of the result"[13]

[13] US National Institute of Occupational Safety & Health (NIOSH), Guidelines for Air Sampling and Analytical Method Development and Evaluation, DHHD (NIOSH) Publicaation Number 95-117. https://www.cdc.gov/niosh/docs/95-117/ Appendix 3 – Taken from: NIOSH/DPSE Quality Assurance Manual (December 1991), Standard Operating Procedures for Industrial Hygiene Sampling and Chemical Analysis, **Limits of Detection and Quantitation (Standard Operating Procedure 018)**

Chapter 8: What is known about the extent of exposure to asbestos at UofT ?

8.1 Inventory of Asbestos Containing Materials (ACM)

As required by Ontario regulation (Ont. Reg. 278/05) *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*[9], the University of Toronto maintains a comprehensive inventory of asbestos-containing materials (ACM) present in buildings that are **owned or operated** by the University. It does not include buildings owned by other entities, including the Federated Colleges. On the St. George Campus, the inventory is within the *Asbestos-Containing Building Materials Survey Report*, which includes separate survey reports for each building. These reports are summarized in a single document: *ACM Summary Sheet St. George Campus.* The individual building survey reports and the Summary Sheet are available online[14], to all UofT faculty, staff and students. On this website, it is possible to search by specific St. George campus building, floor and/or room number to determine the details and nature of the ACM. All Facilities and Services (F&S) Trades and Utilities employees on the St. George campus are able to access this data from their smartphones, using the Asbestos Tracker Software. The University continues to update the Survey, annually as stipulated in Section 8 of the regulation (Ont. Reg. 278/05[9]). The website also has a 'public' section, accessible to all, which contains the St George campus building survey reports, as well as similar reports for buildings at UTM and UTSC. It should be noted that while the Regulation (Ont. Reg. 278/05[9]) stipulates that the ACM inventory for each building must be provided at each building in a hard-copy binder, the Panel was informed that the Ministry of Labour agreed in 2014 to allow the University to maintain the inventory on an accessible electronic database.

On the St. George campus, there are 135 buildings identified in the Inventory, of which 16 are new construction (post 1989) with no friable ACM, and 4 have been demolished. This leaves 115 buildings that potentially have ACM. In each building, the presence of asbestos is identified specifically in different building materials, as present, suspected or not present (Table 3, as extracted from *ACM Summary Sheet St George campus* document, online[14]). The survey data indicates the location of these materials, which is often only in certain, generally not publicly accessible, areas (e.g. basements, mechanical rooms) or in specific rooms. As part of the continuous update of the survey data, as abatement is conducted – for example if the asbestos containing vinyl floor tiles are replaced as part of a lab renovation - this is noted in the survey.

[14] https://asbestos.fs.utoronto.ca/

Table 3: Presence of ACM in buildings on St. George Campus (present or suspected) n= 115	
Building Material	**# buildings (%)**
Sprayed fireproofing	13 (12%)
Pipe/duct/mechanical insulation	99 (94%)
Vinyl flooring	92 (88%)
Plaster	80 (70%)
Drywall joint compounds	60 (52%)
Ceiling Tiles	27 (23%)
Texture Coat	19 (16%)
Transite Panels	46 (40%)
Masonry Sealant	35 (30%)

At UTM a complete reassessment of the building-by-building inventory has recently been completed by an external contractor. The Asbestos Survey Reports are uploaded to the Asbestos Data website[14], managed by F&S on the St. George campus in the '*Public'* section of the website, accessible to all. According to EHS personnel at UTM, there is no sprayed asbestos fireproofing at the UTM campus. Asbestos containing materials identified included vinyl tiles, drywall joint compounds, transite Panels (solid concrete Panels containing asbestos), pipe insulations, caulking, etc. The UTM data is in the form of reports, not searchable by building or material.

The UTSC inventory is also publicly available on the F&S Asbestos Data website[14]. The survey reports are by building and are essentially lengthy tables which itemize, room by room, the materials potentially containing asbestos, including drywall joint compound, fittings, elbows, ceiling tiles, floor, transite, asbestos boards, parging cement insulation (cement material containing asbestos as a binder), etc. For each, the location, quantity, type of asbestos, condition, accessibility and friability is also noted. The current reports are dated 2017 and the annual update were conducted this past summer (2018).

It is beyond the scope of the Asbestos Review Panel to verify the completeness and accuracy of these inventories. However, a general review of the survey reports from the three campuses

and some spot-checking of the searchable database (for St. George) indicates that the information collected appears to meet the legislated requirements, including that of information accessibility for employees and occupants, and appears to be comprehensive and up-to-date.

8.2 Airborne Asbestos Measurements taken at UofT as part of AMP

The UofT has conducted airborne asbestos measurements in various buildings with ACM present, during abatement projects, and as clearance sampling, etc. Since early 2017 over 4,000 air samples have been taken in and around the Medical Sciences Building (MSB), in response to the incident(s) which occurred during the wide-scale renovations to the building and its laboratories, associated with the Strategic Investment Fund (SIF) initiative of the Canadian Government. Each individual air sampling result from February 1, 2017 to June 29, 2018, is posted on the EHS website[15] on a table – *MSB Sampling Details Website*[16], that is freely available to the public. (The table also includes the results from Bulk Materials Sampling, to identify the presence of asbestos in materials (insulation, settled dust, etc), and the type and percentage of asbestos content. We have not reviewed this Bulk Materials data.) This table is searchable by room and provides the date of the air sample, result (in fibres/cm^3), comments and a link to the reference document (report from the consultant). It is beyond the scope of the Asbestos Review Panel to undertake a detailed analysis of this air sampling data; however, a qualitative review of the sampling data on the table, as well as some of the reports, provide a number of observations, as follows. The vast majority of the air sampling was conducted by two local consultants: Safetech Environmental Ltd and OHE Consultants Ltd. A few of the air samples (and many of the Bulk Materials analyses) were conducted by Pinchin Ltd. These 3 providers are well known in the remediation community, and widely used by business, government and institutions.

According to their reports, air sampling was conducted according to the NIOSH NMAM methods 7400[11] and 7402[12] and clearance samples followed the requirements of Ont. Reg. 278/05[9]. The samples were taken in various locations: inside enclosures; adjacent to abatement – nearby, on floors above or below; in mechanical shafts; in occupied and unoccupied spaces, etc. In addition, during building-wide sampling campaigns, outdoor reference samples were also taken, just outside the MSB building, to compare ambient outdoor concentrations to indoor levels. A brief review of the air sampling data available on the MSB website[16] indicates that airborne concentrations over the 17-month period were consistently very low. Table 4 provides summary data specifically for the air sampling results reported by one of the consultants (Safetech) which represents over 50% of all of the air samples taken in MSB during this period. Of the approximately 2,136 samples taken by Safetech, 95% of the recorded values were below 0.004 fibres/cm^3. The **outdoor** samples were all 0.004 fibres/cm^3 or less, with the vast majority being

[15] (https://ehs.utoronto.ca/msb-information/
[16] http://asbestos-msb.fs.utoronto.ca/

0.001 fibres/cm^3 or less. 95% of the samples taken **inside** the MSB, were indistinguishable from **outside** ambient levels.

Table 4: MSB Air Sampling Results† reported by Safetech	
CONCENTRATION RANGE†	**NUMBER OF SAMPLES (%)**
< 0.001 – 0.004 fibres/cm^3	2,029 (95 %)
0.005 – 0.01	90 (4.2 %)
0.011 – 0.02	12 (0.6 %)
0.021 – 0.05	3 (0.1 %) ‡
0.05 – 0.13	2 (0.1%) ‡
Total number of Safetech samples	2,136

Notes:

† Samples analyzed using the standard NIOSH Method 7400[11], which quantifies ALL fibres (see Chapter 7.1) The overall precision for this method is stated to be in the range of 0.115 to 0.13.[11] Using this, the Upper Confidence Limit (1-tailed, 95%) would be 21% higher than the measured value. For example, a measured concentration of 0.01 fibres/cm^3 will be below 0.012 fibres/cm^3, 95% of the time. Since the vast majority of the measurements in MSB were less than 0.01 fibres/cm^3, this statistical consideration does not influence the interpretation of the results.

‡These 5 samples were re-analyzed by NIOSH Method 7402[12] using TEM to identify and quantify ***asbestos fibres*** specifically. These more specific analyses indicated that all 5 samples measured less than 0.002 ***asbestos*** fibres/cm^3

Only 3 samples were found to be at or above the 0.05 fibre/cm^3 Action Limit. The highest sample (0.13 fibre/cm^3 was taken in a restricted-access mechanical shaft, which is only occasionally accessed by trained maintenance staff. Re-analysis of this sample, using TEM[12] to identify and quantify ***asbestos*** fibres specifically indicated <0.002 ***asbestos*** fibres/cm^3.

It should be noted that the two primary consultants (Safetech and OHE) reported their air sampling results quite differently from one another (though, with internal consistency). **Safetech** Air Monitoring Reports state *"quantitation working range for this method [PCM] is 0.04 to 0.5*

f/cc for 1000L air sample. The Limit of Detection (LOD) depends on sample volume and quantity of interfering dusts, and is <0.01 f/cc for atmospheres free of interferences." [17] This is correct and is, in fact, a direct quotation from of the NIOSH, Manual of Analytical Methods (NMAM), Method 7400: *Asbestos and other Fibres by Phase Contrast Microscopy (PCM)*.[11] The lower Limit of Quantitation (0.04 f/cm^3) is the LOQ value calculated for the same PCM method with a sampling time of 60 min (Table 2), rounded to 2 significant digits. In their reports and on their Air Sampling Spreadsheets, air sampling results are reported below this stated LOQ, with the majority of the results in the range of 0.001 to 0.004 fibres/cm^3 – at and below the LOD value of 0.003 (Table 2). Reporting numerical data at or below the LOD overestimates the confidence we have in the values and can result in confusion.

The **OHE** air sampling reports are also provided in tabular form, including relevant data for each sample (date, location, time, duration, volume of air and result). With each table, under a heading of General Notes, OHE states: "Limit of Detection (LOD) is 7 fibres/mm^2 ; Limit of Quantitation (LOQ) is 100 fibres/mm^2 ". There is no explanation of these terms and how they relate to the results presented[18]. These LOD and LOQ values are, in fact, the limits based on the ***fibre count per filter area***, again directly from the PCM NMAM Method[11]. The LODs and LOQs calculated earlier (Table 2, Chapter 7.2) correspond to these values, but are based on ***air concentrations (fibres/cm^3 of air)***, assuming certain sampling parameters (i.e. LOQ for 60 min duration sample taken at 16 L/min is 0.038 fibres/cm^3). Based on inspection of the table on the website: *MSB Sampling Details[15],* results from **ALL** of the OHE air sampling are reported as "less than 0.05 fibres/cm^3" (i.e. < 0.05 fibres/cm^3). This approach is presumably based on the *Action Limit* of 0.05 fibres/cm^3, which, as discussed previously (Section 7.1), has found somewhat common use in the asbestos abatement field. However, this reporting strategy might suggest that 0.05 fibres/cm^3 is the lowest value that can be reported, which conflicts with both their own reports as well as others (notably, from Safetech), which is confusing to the reader and those involved. The data, as presented, provides less information than actually exists and is, therefore, not helpful. The Panel was unable to examine the actual data; however given that the OHE sampling was done over the same time period and similarly throughout the MSB,there is no reason to believe that the actual OHE results would be different than the Safetech data, with virtually all measurements were negligible (i.e. indistinguishable from outside ambient levels (Table 4)).

[17] Air Monitoring Report – April 2, 2017, University of Toronto, Medical Sciences Building, Room 7366, Safetech Environmental Ltd. April 2, 2017 (example)

[18] PCM Analysis Report – 0.05 Level – April 26, 2017, University of Toronto, Medical Sciences Building, OHE Consultants, April 26, 2017

Sampling conducted for ***clearance testing*** purposes are reported as less than 0.01 fibres/cm^3, which is the threshold for a positive clearance test. All clearance samples listed in the table were found to be < 0.01 fibre/cm^3.

The third consultant, Pinchin Ltd, carried out one air sampling campaign March 27,28 2017. Their report[19] was similar to those from Safetech and OHE, except that they provided an "Actual Result" (ie. the number of fibres/volume of air - as reported by Safetech) as well as a "Reportable Result" (based on their LOD). For example, in the March 27, 2017 report for Room 1134, the Actual Result was 0.004 fibres/cm^3, and the Reportable result was, < 0.02 fibres/cm^3. This approach provides the maximum existing information, while recognizing the potential limitation of the data.

The Panel recommends that the University identify an approach to LOD and LOQ issues and the manner in which air sampling data should be consistently presented by their Consultants. For example, as summarized in Table 2, the University could identify representative sampling durations for typical sampling campaigns (e.g. 1-hour, 2-hours, 2.5-hours [for clearance testing], or other) and representative flow rates (e.g. 15 to 16 litres/min) and calculate the corresponding LOD and LOQ values. These should be included in the Scope of Work documents provided to Consultants, together with the manner in which air sampling data is to be reported. A clear statement of the appropriate LOD and LOQ should be included in all reports and sampling spreadsheets. Results less than LOD should be reported as < LOD; results between LOD and LOQ should be quantified, but also noted as being < LOQ; and results above LOQ should be quantified). In this manner all Consultant reports on Asbestos concentrations and levels would be consistent and, therefore, comparable, with due regard to the statistical confidence that applies to the result.

On the Safetech Air Sampling Spreadsheets the following statement appears:

> *"Interpretation of Results:*
>
> *1) Within Ontario, the Occupational Health and Safety Act - Ontario Regulation 490/09 Designated Substances adopts the ACGIH TWA of 0.1 fibres/cc.*
>
> *2) For each area tested compare the "Results f/cc" column to your area and how it compares to the above noted regulation."*

As mentioned above (page 17, 18), the Ontario OEL is intended for workers working with and around asbestos (Table 1), and therefore is the appropriate exposure limit for the asbestos

[19] Inspection Report – March 27, 2017, University of Toronto, Medical Sciences Building, Pinchin Ltd. March 27,2017

abatement workers. However, it would not be considered an appropriate guideline or standard for ambient measurements for general building occupants, students, etc. All 3 consultants also refer to the 0.05 fibre/cm^3 *Action limit or level*. As discussed previously (Section 7.1), in the asbestos abatement field, some consultants, contractors, owners etc., currently including the University, use this *Action Limit* (less than 0.05 fibres/cm^3) as the indicator of an environment that is safe for general occupancy. Considering the origins of the *Action Level* concept (i.e. 50% of an OEL and meant to trigger some form of remediation or control in a workplace), it may be difficult to justify this **occupational** limit for employees, students and visitors who are incidental to the remediation work being conducted and therefore not considered asbestos workers. A review of Table 3, suggests that we were unable to find a clearly defined ambient asbestos exposure criteria applicable to non-asbestos workers, the public, etc.

Given that asbestos is well known to be a human carcinogen, it would therefore seem appropriate to use, as a best practice, the standard risk reduction principal of '*as low as reasonablly achievable'* or *ALARA*. The University should choose an appropriate value to use as an internal guideline for ambient air samples within buildings - all relevant legislated standards would continue to apply (i.e. OEL, Clearance Testing, etc), but the internal guideline would apply to situations where there is no appropriate legislated standard. The internal guideline should be less than the 0.05 fibre/cm^3 *Action Limit* that is currently used, but should also take into account the LOD/LOQ issues. In selecting a UofT internal guideline, the MOE Ambient Air Quality Criteria of 0.04 fibres/cm^3 could be considered, but this is based on a 24-hour average. Alternatively, based on a 2-hour (120 minute sample), the LOQ is 0.02 fibres/cm^3 which could be considered as a reasonably achievable guideline. The University may also consider the 0.01 f/cc as its ***aspirational limit*** for all indoor spaces; which is going beyond what may be required in law, guideline or even best practice, but which, based on the air sampling results (Table 4), is readily achievable. The internal guideline should be discussed with the Asbestos Advisory Committee and the relevant JH&S Committees. In addition, it will be essential to update appropriate documents (e.g. AM Program, Scope of Work documents for Consultants, etc)

The ultimate interpretation and conclusions from the data collected over the past 17 months in the MSB would not change if these recommendations had been in force. The air sampling results were all within the guidelines that we recommend. The recommendations are intended to result in a more consistent approach to reporting data, which will be easier for lay employees, students and visitors to understand. In addition, an internal guideline which adheres to the *ALARA* principle would be considered as a 'best practice'.

Chapter 9: Key Features of the Asbestos Management Policy and Program

Panel members have reviewed the Asbestos Management ("AM") Policy and Program, and all of the relevant documents available on the websites of both the Office of Environmental Health & Safety (EHS), and Facilities & Services. Key features of the AM Policy and AM Program are summarized below, with commentary and questions from the Panel. The Asbestos Management Policy, Program and accompanying documents are consistent with the legislated provincial requirements, if not more restrictive in some places. They are generally clear and unambiguous, with a few exceptions, as described below. The Policy and Program generally appear to be serving the University well.

However, in part because of: (1) evolving administrative and management structures, (2) the evolution of tri-campus structures, and (3) program modifications to accommodate change over the past decade(s), it would be advisable to review the AM Program document, to ensure it reflects current University structure and practices.

9.1 Asbestos Management Policy

The Asbestos Management (AM) Policy[20] was approved by the Governing Council of the University of Toronto on June 23, 2011. It provides a clear, concise and unambiguous statement of the University's commitments and objectives, including the provision of a safe and healthy work and study environment for employees, students, contractors and visitors, in accordance with the University's Health and Safety Policy.[21] The AM Policy specifically references the appropriate legislated requirements outlined in the *Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations (Ont. Reg. 278/05)*[22], made under the *Occupational Health and Safety Act of Ontario*[23].

With respect to implementation, the AM Policy mandates the establishment of a comprehensive Asbestos Management Program (AM Program) and outlines, in general terms, the scope of the program and the need for definition and communication of the responsibilities of all parties. It allows for disciplinary sanctions against those who fail to meet their obligations. It also allows for amendment to the Program, in consultation with union representatives. The Business Board of Governing Council is to receive reports from the VP HRE on asbestos-related issues.

[20] https://ehs.utoronto.ca/wp-content/uploads/2015/10/Asbestos-Management-Policy.pdf
[21] http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppmar292004.pdf
[22] https://www.ontario.ca/laws/regulation/050278
[23] https://www.ontario.ca/laws/statute/90o01

9.2 Asbestos Management Program

The Asbestos Management (AM) Program[24] objectives specified in the AM Policy are reproduced in the **Introduction** section of the Program. The basic program elements are outlined, including; a written inventory of asbestos-containing materials (ACM), regular inspection, risk or hazard assessment guidelines, maintenance and prompt remediation of damage, access control, training and education of workers and supervisors, classification of asbestos related work (Type 1, 2 or 3), provision of safe work procedures, maintenance of records, medical surveillance program, control and monitoring of external contractors, and provisions for auditing the program. In addition, building occupants, the Joint Health and Safety Committees (JHSCs) and other persons who work with or around ACM are to be notified about the Inventory, the Program and asbestos-related work occurring in buildings owned or occupied by the university.

The program comprehensively applies to all buildings, structures, machinery and equipment owned, occupied or operated by UofT at all locations and to all UofT employees, students, occupants of UofT buildings and to external organizations who may come into contact with or disturb ACM in UofT buildings. The Office of Environmental Health & Safety (EHS) is responsible for the development, maintenance and administration of the AMP, with a review of the Program, in consultation with the Asbestos Advisory Committee and the appropriate JHSCs (e.g. Trades, Utilities, UTSC, UTM), at least once every 5 years, or when there has been update to the regulations.

The **responsibilities** of the workplace parties are described in Section 2 of the AM Program. As discussed elsewhere in our report (Chapter 10), it is clear that there is no ONE senior administrator, delegated by the President, who is ultimately responsible for Asbestos management at the University of Toronto. There are three Vice-Presidents - Research & Innovation (RI); University Operations & Real Estate Partnerships (UOREP); and, Human Resources & Equity (HRE) - who share this responsibility, primarily on the St. George campus. This is further complicated by the tri-campus nature of UofT. In particular, most of the facilities management/building operations/facilities planning, project development and construction at both UTM and UTSC are 'owned' by each campus, reporting to the campus Chief Administrative Officer (CAO), A. Arifuzzaman at UTSC and the Executive Director, P. Goldsmith at UTM.

Table 1 of Section 2 of the AM Program attempts to distribute 16 specific functions and roles relating to the Program and all work associated with ACM, across 5 groups of

[24] https://ehs.utoronto.ca/wp-content/uploads/2018/03/AsbestosManagementProgram20180419.pdf

administrative/operational (i.e. non-academic) divisions/departments at UofT. This is unfortunately complex given that some functions are university-wide and others campus-specific. The net result is that there is an appearance that everyone in all 5 groups are responsible for almost every aspect of the AM Program.

For example, in Table 1, what is meant by "Project Management" in the second column? Is this University Planning, Design & Construction Department, under the VP UOREP, or one of its 4 Directorates: Campus & Facilities Planning; Capital Projects (or, within Capital Projects the Project Management group); or Project Development. The Table suggests that this is a University-wide function, however, based on our discussions, this may not be the case. This arrangement needs clarification. It is essential that the responsible leader be identified (by title) to have the authority to 'make things happen' and be accountable. Similarly, the third column, Network Computing (presumably under Information Technology Services) and Telecommunications (under Facilities & Services) needs clarification and definition. The fourth column, Utilities, Property Management, Building Services, Grounds and Trades are all under Facilities and Services (F&S). These are all within the VP UOREP portfolio and have responsibility only on the St. George campus. The fifth column for UTM and UTSC should identify the senior manager responsible in each case. The 6th column "Other Departments who may conduct or contract renovation or construction work" needs further explanation. This seems to suggest that there are situations where 'departments' conduct or contract renovations or construction, without any of the normal channels (i.e. those in the first 4 columns) being aware/involved. This seems problematic to ensure proper communication.

Table 1 of the Program is confusing and, we believe, needs to be simplified and revised to ensure the lines of responsibility for each item is clear on all three campuses.

The Responsibilities section of the AM Program also describes the specific roles and responsibilities of other groups (Sections 2.2 to 2.8), including: EHS; Asbestos Advisory Committee; All Department Heads, Managers and Supervisors; Employees and Students; Occupational Health Services; External Contractors & Sub Contractors; and, the Manager, Hazardous Construction Materials Group (HCMG) (St George campus only.) Several questions arise:

- EHS (now within the VP RI portfolio) - Are the described EHS responsibilities (Section 2.2) University-wide or just St. George? In the AM Program document, there is no mention of the EHS presence at UTM and UTSC. Their responsibilities should be included. Item 6 also indicates that EHS, presumably the St. George staff is responsible for Auditing the program – this is also covered in Section 9 of the AM Program, where it also specifies that an annual

report of the audit is to be prepared for the VP HRE and the appropriate JHSC. Documentation of these audits was not provided to the Panel.

- Department Heads, Managers & Supervisors (Section 2.4) are defined as Deans, Directors, Chairs & Managers not covered in Table 1. Chairs and some Directors typically report to Deans – so who is ultimately responsible? Are these senior academic administrators aware of these responsibilities under law and policy and have they had appropriate training?
- Section 2.6 Item 4 – "maintain all employee medical information in strict confidence within ***Health and Well-being Services"*** – see Section 2.6 title – Is the Occupational Health Services group part of EHS (i.e. in the VP RI portfolio) or part of Health & Wellbeing Services (i.e. in the VP HRE portfolio)? The AM Program document suggests the former, while the website suggests the latter.
- Section 2.8 Manager, Hazardous Construction Materials Group (HCMG) on the St. George Campus only - This section consolidates many of the very specific and important responsibilities to ***one position*** - clearly a pivotal role in the Program - with primary responsibility for providing services and for overseeing the administration, implementation and enforcement of the AM Program. This function (group) is situated within F&S – reporting to the Director, Property Management Group, who reports to the Chief Operations Officer, Property Services and Sustainability, who reports to the VP-UOREP. However, this only applies to the St. George campus. Who, specifically, has these important responsibilities at UTM and UTSC ? This should be clearly articulated in the document.

In addition to the Manager, HCMG, the other key pivotal role in the AM Program is within EHS, specifically the Manager, Occupational Hygiene & Safety, who reports through the Director (s) of EHS, to the Associate VP Research Oversight & Compliance, to the VP RI. This group is responsible for the development, maintenance, quality and effectiveness of the AMP, ensuring it meets all legislative requirements; as well as providing technical advice on asbestos identification, hazard evaluation and control; and training and education. The EHS responsibilities appear to be campus-wide, particularly related to the AM Program (development, monitoring, auditing) and training, though this is not entirely clear.

The two Manager positions (Manager HCMG and Manager Occupational Hygiene and Safety) work very collaboratively (and must do so to be effective in meeting their responsibilities), yet report through two different vice presidential portfolios (VP UOREP and VP RI). The roles and responsibilities of the VP HRE are somewhat less clear and may, in part be historical e.g. statutory reporting to MOL, reporting to Business Board, JHSCs, Occupational Health Services (as part of Health & Well-being Services & Programs.

There are clearly overlapping responsibilities with seemingly diffuse management control and oversight, and perhaps the appearance of compromised accountability.

As mentioned above, the Manager HCMG has no responsibilities for UTM and UTSC. Throughout, the Program document refers to "appropriate Director (UTM, UTSC, Project Management)" apparently, as the UTM/UTSC equivalent to the Manager HCMG on St. George. We assume that this is one person (position) on each campus, but it is not clear. Presumably, as mentioned above, this refers to UTM Facilities Management & Planning (Executive Director – Goldsmith) and UTSC Facilities Management (Director – Miller). The *primary responsibility for providing services and for overseeing the administration, implementation and enforcement of the AM Program* (see Section 2.8 for Manager, HCMG) should similarly be included for UTM and UTSC, with a responsible leader for each campus clearly identified.

There is some lack of clarity and inconsistency in the descriptions of the roles and responsibilities throughout the AM Program, partially a consequence of the tri-campus arrangements, as well as the evolving nature of the organization and structural units within the University. It would be advisable to re-visit this section of the AM Program and revise and clarify, as appropriate.

The **Asbestos Inventory** has been described previously in Chapter 8 of this report. Section 3.1 of the AM Program specifies that the responsibility for maintaining the inventory lies with the appropriate Director (UTM, UTSC, Project Management) or the Manager HCMG (St. George). It covers the required information to be kept in the inventory, and the accessibility of the inventory (now available on-line to the community). Periodic, scheduled visual inspection are stipulated and the Asbestos inventory records are to be updated once in each 12 month period and whenever new information becomes available. Further detail is provided, for the St George Campus regarding inspections of thermal insulation (asbestos containing) in Utility Rooms and Steam tunnels and procedures for reporting (and repairing) damaged materials. It is unclear as to why the provisions for inspection and reporting (Section 3.2, Items 2 – 6) only for the St. George campus. What happens at UTM, UTSC?

Bulk sampling – to determine the presence, type and quantity of asbestos in a suspect building material is described in Section 3.3. The sample is to be taken in accordance with O.Reg. 278/05[9], by competent employees or trained external consultants, analyzed by an accredited laboratory, with reports going to appropriate Director (UTM, UTSC, Project Management) and Office of EHS. Why are results NOT sent also to Manager, HCMG ? These reports should also be provided and available to the appropriate JHSC.

In conjunction with the periodic inspections of ACM, a **hazard assessment** to determine the potential risk of exposure to asbestos fibres, must be conducted by competent person(s) and relevant factors to consider in the assessment are provided (Section 3.4). The relevant JHSC should be consulted.

Section 4 describes the responsibilities and procedures for the **Repair and maintenance** of ACM determined to be in a condition such that exposure to the material is likely to occur. The appropriate Director (UTM, UTSC, Project Management) or the Manager HCMG (F&S, St. George Campus) is responsible for limiting access to the area (immediately); determining whether the material contains asbestos and, if so, the type; arranging for cleanup, repair, removal, identifying (on the work order) the work classification (Type 1, 2 or 3), the type of asbestos, and its location; notification to the Ontario Ministry of Labour (MOL) of Type 3 work; and, amending the building inventory. There is also a requirement to prepare and maintain procedures for reporting problems and conducting repair & maintenance operations; to consider proactive removal of any ACM when planning any maintenance, renovation or construction activities; and, to remove or encapsulate any ACM prior to any demolition activity. Again, the relevant JHSC should be notified about all these steps, and reports shared with them.

Section 5 describes **Access Control** and requires that building utilities/operations rooms such as mechanical and electrical rooms, service shafts, and tunnels, be kept locked, with appropriate signage. There is also provision for signage and notification of occupants in buildings where sprayed asbestos-containing fireproofing is present above false ceilings.

Section 6 describes the **Classification of Asbestos Work**. Ontario legislation categorizes asbestos work on construction projects and in buildings and repair operations as being Type 1, Type 2 or Type 3 (Ont.Reg.278/05[9]). *Section 12* of this regulation defines, using specific examples, these classifications. The UofT AM Program, uses these same definitions, with a few additional specific examples, (e.g.: adding the removal of AC vinyl floor tiles as a Type 2 operation and the removal of vinyl floor sheeting with asbestos-containing paper backing as a Type 3 operation. Vinyl flooring is not specifically mentioned in the Regulation.

Sections 13 to 18 of the Regulation provide very detailed procedures required for Type 1, Type 2 and Type 3 operations, including a section on Respirators. University employees do not undertake Type 3 operations, these are all contracted to fully qualified **external contractors**. All

such external workers, their supervisors and consultants must have completed an Asbestos Abatement Worker or Supervisor Training Program approved by the Minister of Trades, Colleges and Universities, as required by the legislation. Refer to Section 8 and Table 3 of the AM Program for details of the procedures and requirements. External contractors must follow the appropriate procedures as established by the UofT Asbestos Management program and Ont.Reg.278/05[9]. All asbestos work is subject to inspections by appropriately qualified and experienced personnel chosen by the appropriate Director (UTM, UTSC, Project Management) or Manager, HCMG (F&S, St George campus) and independent of the External Contractor. It is important to continue to monitor and closely supervise asbestos work by external contractors. From our interviews and review of documents there appears to be generally good compliance with these requirements.

On the UTM campus, UofT employees do NOT do any asbestos work (i.e. all Type 1, 2 and 3 work is contracted out to external firms), and at UTSC only Type 1 work may conducted by internal UofT staff. On the St. George campus, UofT employees (e.g. Trades; Building and Utilities Engineers; Control Technicians; Elevator Mechanics) may perform both Type 1 and Type 2 asbestos work. This work is also to be conducted in accordance with the procedures established by Ont.Reg 278/05[9] (*Sections 13 to 18)* together with the provisions of the AM Program. In addition, EHS, has established over 20 Standard Operating Procedures, providing additional, detailed procedural information for Type 1 and 2 work, including:

Type 1 Operations

Non-Friable Asbestos Disturbance
Missing Tile Replacement
Removal of Less Than 7.5 M^2 of Asbestos-Containing "Lay-In" Ceiling Tiles
Removal of Vinyl-Asbestos Floor Tiles or Vinyl Sheet Flooring (Less than 1000 ft^2 intact)
Removal of Asbestos-Cement Products (Minor Operation Intact)
Re-keying of Fire-Rated Doors with Friable Asbestos-Containing Core Material
Clean-Up of Flood Water in Buildings with Asbestos-Containing Sprayed Fireproofing

Type 2 Operations

Minor Friable Asbestos Disturbance
Clean-Up of Asbestos Material and Asbestos Dust
False Ceiling Entry (Type 2)
Drilling of Holes in Asbestos-Containing Wall and Ceiling Plaster with HEPA Filtered Tool
Drilling of Holes in Wall with Asbestos Drywall Compound with HEPA Filtration
Minor Friable Asbestos Removal
Minor Repair of Thermal Insulation

Removal of Asbestos-Containing Pipe Insulation Using a Glove Bag
Disturbance of Wall that contains Non-Friable A-C Coating using HEPA Filtered Power Tool
Drilling into a Wall that Contains a Non-Friable Asbestos-Containing Coating
Removal of Asbestos-Containing Ceiling Tiles (Major Operation)
Removal of Vinyl-Asbestos Floor Tiles and Sheet Flooring
Removal of Asbestos-Cement Board Products (Major Operation)
Minor Alteration of Fire-Rated Doors with Friable Asbestos-Containing Core Material
Replacement of HEPA Vacuum Filters or Dust Bags
Replacement of Air Handling Unit Filters Servicing Buildings with A-C Sprayed Fireproofing
Removal of More Than 1 M^2 of Drywall with Asbestos-Containing Drywall Compound
Entry into Mechanical Chases in Buildings with A-C Sprayed Fireproofing (Type 2 or 3)

Type 3 Operations (for External Contractors)

Major Friable Asbestos Removal

These Standard Operating Procedures apply to all work on all three campuses in addition to the legislated requirements and are readily available on the on-line Asbestos Data-base (https://asbestos.fs.utoronto.ca/), Further, procedural check-lists for Type 1 and 2 operations, separately, and an Equipment Check-list are all available on the EHS Website (https://ehs.utoronto.ca/our-services/occupational-hygiene-safety/asbestos-management-program).

The AM Program includes provision for the required **training and education** of all UofT employees who work around and who may disturb ACM, or who are responsible for managing, overseeing or coordinating such activities. (see Section 7.0 and Table 2) These courses are offered by EHS, on all 3 campuses, as required, and detailed attendance records are kept on a database that is accessible to all workers and their supervisors. Directors, managers and supervisors of UofT employees who work with or near asbestos are responsible for identifying these workers and ensuring that they attend the required training. All employees who perform Type 1 or Type 2 asbestos work (and their supervisors) are required to complete a one-day course (EHS 567 Asbestos Training for Asbestos Workers & Their Supervisors) as well as an on-line course (EHS 532 Respiratory Protection Training), followed by a fit testing session. Refresher courses are required (every 5 years for Asbestos Training and every 2 years for Respiratory Protection. There is a separate training course (EHS 570 Managing Asbestos Projects) required for employees who manage, oversee and coordinate asbestos work by UofT employees or external contractors. There is also an on-line Asbestos Awareness course, which is required for staff who do not perform work with asbestos, but may be exposed if they

inadvertently damage ACM, including caretaking staff/cleaners, those who move furniture, and campus police. This course is also available to any staff member interested in learning about asbestos (the hazards of exposure, types and locations of ACM at UofT and appropriate work practices & procedures). From our interviews, it appears that employees, and others were availing themselves of these courses.

The AM Program includes provision for a **Program Audit** by the Office of EHS on an annual basis with a report prepared for the VP HRE and the appropriate JHSC(s). Subject to access control and the training requirements established by the program, JHSCs may inspect the condition of materials identified in the Inventory, with copies of their reports and recommendations sent to the appropriate Director (UTM, UTSC, Project Management) or the Manager HCMG (St. George campus).

Three Appendices are particularly important to note. Appendix B lists the buildings, on the St. George Campus, which contain **Sprayed** Asbestos insulation. Of the 14 buildings listed, 6 have significant areas of sprayed asbestos fireproofing (Sidney Smith Hall, Galbraith Building, Medical Sciences Building (MSB), 215 Huron Street, Dentistry Building, and Edward Johnson Building). These buildings and the rooms affected have warning signs to indicate the presence of asbestos. One of the buildings listed as having Minor areas of sprayed asbestos fireproofing, (Building 028, (Old) Architecture Building) should be removed from the list as a major abatement was conducted in July 2017 and all of the sprayed asbestos-containing fireproofing as well as other ACM were removed. This appendix should also be amended to include any UTM and UTSC buildings that contain sprayed asbestos insulation. If there are none – this should be stated, for clarity. Appendix D outlines emergency procedures in the event of unexpected asbestos release and Appendix E provides guidance on procedures for removing an injured worker from a contaminated work area.

Chapter 10: UofT Governance & Management Structure and Resources - For Environmental Health and Safety (EHS) matters including the Asbestos Management Policy and Program

10.1 Governance Structure

The University of Toronto, with over 115,000 faculty, staff and students, and three campuses, has a very complex structure (Fig.1). The Governing Council, established by the University of Toronto Act in 1971, is the senior governing body that oversees the academic, business and student affairs of the University. As described in the *Mandate of Governance*[25] (October 2010), the 3 primary functions of governance are **approval** of specific policies, plans or projects, **oversight** (monitoring the quality and substance of institutional leadership and decision-making), and providing **advice and input.** There are 50 members of Governing Council: the President and Chancellor (*ex officio*), 16 Lieutenant-Governor-in-Council appointees (external to the University), 2 senior administrators appointed by the President, and 30 elected members (12 teaching staff, 8 alumni, 8 students and 2 administrative staff), elected from their estates. The Governing Council has 3 Boards: Academic Board, Business Board and the University Affairs Board, together with two Campus Councils (UTM and UTSC). Each of the Boards/Councils have several standing committees. Of relevance to this report, as described in section 5.12 of its Terms of Reference, the Business Board has delegated responsibility and authority on matters related to health & safety – approval of policies concerning the health & safety of university members and visitors, periodic review of programs to implement the OHS and Environmental Protection Acts and regulations and other relevant Governing Council policies[26]. Review of publicly available Business Board Reports (minutes)[27] from 2016 – 2018, show that the VP HRE does indeed provide quarterly reports to the Business Board on the University's compliance with legal requirements in the area of Health and Safety. The reports are generally brief and inform the Board as to the number of Ministry of Labour visits/inspections and the resulting number of orders issued. The VP HRE responds to any questions posed by Board members. At its January 29, 2018 meeting, the VP UOREP reported to the Board that the Asbestos Review Panel had been created, described its mandate and informed members that the Panel would hold meetings with key stakeholders and would welcome submissions from the University community. It should be noted that, as with all governance councils, boards and committees, Business Board meets both in ***Open Session***, for which Business Board Reports[27] are prepared and posted, as well as in ***Closed Session (in Camera)***, during which public reports are not prepared. The Panel is therefore

[25] http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Task+Force+on+Governance/2010-2011+Documentation/mandate.pdf
[26] http://www.governingcouncil.lamp4.utoronto.ca/wp-content/uploads/2016/07/tor-2015-2016bb.pdf
[27] http://www.governingcouncil.utoronto.ca/Governing_Council/bac/bb_1/bbmar.htm

not able to comment on whether more detailed discussion or reporting occurred regarding asbestos, during ***Closed Sessions***.

10.2 Management Structure (Administration)

The President is the Chief Executive Officer (CEO) of the University and, under the University of Toronto Act, has "general supervision over and direction of the academic work of the University and the teaching and administrative staff thereof."[28] The President and his Senior Executive Group (VP & Provost, VP Advancement, VP Communications, VP HRE, VP UOREP, VP International, VP RI, VP & Principal UTM, and VP & Principal UTSC) "have the responsibility for articulating the University's mission and strategic directions (on the advice of and for ultimate approval by governance). They also have the responsibility for outlining problems, explaining issues, identifying the need for changes in policy and formulating new policy for governance consideration." (*Mandate of Governance Policy, October 2010[25]).* Of relevance to this report and as discussed in Chapter 8, the management of Occupational & Environmental Health issues falls within 3 different Vice Presidential Portfolios – Human Resources & Equity, Research & Innovation and University Operations & Real Estate Partnerships.

10.3 Office of Environmental Health & Safety (EHS) Organization

Until relatively recently, the Director of EHS reported to the VP HRE, with almost all EHS functions, including Occupational Hygiene & Safety, Biosafety, Radiation Safety, Chemical & Lab Safety, and Environmental Protection Services (biological, chemical & radioactive waste disposal) consolidated in the one Office, under the Director. Occupational Health Services (including medical surveillance programs) reported to Health & Well-Being Programs & Services (also within the HRE portfolio). The only EHS function outside of the HRE portfolio was the Hazardous Construction Materials Group (HCMG), which was within Facilities & Services (F&S) under the VP UOREP.

More recently, there have been significant changes to the structure and organization of EHS across the UofT. Since October 2016, the bulk of the EHS functions have been split into two groups (each with its own Director):

- **Research Safety & Compliance[29]** (Director – Drouin), including Biosafety, Chemical & Lab Safety, Radiation Protection & a H&S Officer for Faculty of Arts & Sciences; and,

[28] www.president.utoronto.ca/duties-responsibilities-2
[29] https://ehs.utoronto.ca/aboutus/contact-us/

- **Occupational Health & Safety**[29] (Director – Trubiani), including Occupational Hygiene & Safety, which covers most health & safety issues not related to research and consists of a Manager (YT Shek) , an Occupational Hygiene Technologist (Wong), an Occupational Hygiene Technician (Sun) and a H&S Advisor for the Faculty of Arts & Sciences (Weidner). Shek, Wong and Sun all have professional Masters degrees in Occupational Hygiene. In addition, the Ocupational Health & Safety group also apparently has *dotted-line* relationships to both Occupational Health Services (Health & Well-Being) and EHS functions at UTM and UTSC (with UTM & UTSC CAOs).

Both of these groups now report through the Associate VP Research Oversight & Compliance to the VP RI[30]. In addition to the HCMG (which reports through the Property Management Group, to F&S), Environmental Protection Services now reports through the Building Services, Grounds & Trades group, also to F&S. These two groups are therefore within the VP UOREP portfolio. The VP HRE is responsible for reporting on Workplace Health and Safety per the Ministry of Labour and other statutory requirements, Labour Relations and the Employment Standards Act. In addition, the responsibility for health and medical surveillance appears to fall under the VP HRE, as does oversight of the many Joint Health & Safety committees. Figure 2 shows the distribution of ownership at the administrative level for asbestos management, provided to the Panel at the outset of this Review.

The organization and reporting structure for EHS across the University is further complicated by the tri-campus nature of UofT. Both UTM and UTSC have significant EHS presence. At UTSC, within the Office of Business, Operations and Strategic Affairs under the CAO (Arifuzzaman), EHS Services is part of the Department of Campus Safety & Security. The EHS group consists of a Manager (Yuen), a H&S Officer (Lam) and a H&S Coordinator[31] Both Yuen and Lam have professional Masters degrees in Occupational Hygiene. There is a *dotted-line* relationship from UTSC EHS to the Occupational Health & Safety Director at St. George, under the VP RI. At UTM, the EHS function is within the Facilities Management and Planning department, under the Executive Director (Goldsmith). The EHS group consists of a Manager (W-T Shek) and a H&S Officer.[32] W-T Shek also holds a professional Master's degree in Occupational Hygiene and apparently reports to the OHS Director at St. George. The Panel was assured that there are good working relationships within St. George and sharing of resources, including training. However, both UTM and UTSC EHS report through the VP & Principal of their respective campus.

[30] http://www.research.utoronto.ca/wp-content/uploads/2018/10/OVPRI_OrgChart-VPRIExec_20181026.pdf
[31] https://www.utsc.utoronto.ca/ehs/
[32] http://www.utm.utoronto.ca/facilities/staff/environmental-health-safety

Therefore, it would appear that EHS responsibilities are actually shared over 5 VP portfolios – with no single senior executive holding ultimate responsibility and accountability for EHS.

Managing the asbestos issue is a particularly good example of how challenging it is for a large institution like UofT to set up an organizational structure that would effectively meet its legislated requirements and the efficient management of the EHS portfolio, as well as all of its other responsibilities. There are clearly overlapping responsibilities at all levels – from senior administrative oversight and responsibility, as described immediately above – to the operational level, as described more fully under the AM Program in Chapter 9. Based on Organization Charts from the various departments found on their UofT websites, the Panel has prepared an abridged Organization Chart to illustrate the complexity of the structure as it relates to asbestos activities (see Figure 3). Some interviewees and Panel members felt that EHS is organized into silos, with even some key EHS resources (i.e. Hazardous Construction Materials Group) not having any formal relationship with EHS. This results in confusion regarding ownership of the issues, which could lead to seemingly diffuse management control and oversight and, perhaps the appearance of compromised accountability.

As previously recommended (Chapter 9), the University may wish to revisit the EHS responsibility structures and organization across all 3 campuses, to determine if it is sufficiently sturdy to ensure that legal and best practices needs are properly met. Consideration should be given as to whether there should be one senior executive reporting at the highest operational level possible. The structure should be simple and clear as to responsibilities and authorities, providing optimal transparency, management control & oversight, and, accountability.

10.4 Resourcing for EHS

Irrespective of the organizational structure, the University has in place a substantial EHS team consisting of appropriately skilled and trained professionals covering occupational health, occupational hygiene and safety, occupational nursing, occupational medicine, research safety and compliance, biosafety, chemical and lab safety, radiation safety, environmental protection services, and training communication, along with administrative support[29]. Both UTM and UTSC have on-site resources and other satellite locations including the aerospace facilities are provided service from the St. George campus-based EHS.

As described in Chapter 9, many individuals and groups have responsibilities under the Asbestos Management Policy and Program. There are two key professional staff who are clearly key to

the AM Program: Irfan Miraj, PEng, MHSc, Manager, Hazardous Materials Manager reporting to the VP UOREP and, from within EHS staff, Yang Ting Shek, BSc, MPH, ROH, CIH, CRSP, Occupational Hygiene & Safety Manager, within the VP RI portfolio. They are both highly trained, qualified and competent with appropriate educational and professional credentials and substantial professional experience, One group of interviewees felt that the AM Program was not properly resourced; however, based on a review of their qualifications and experiences, the Panel does not believe that this is the case. It could be argued that during a period of increased asbestos abatement work, as was the case during the MSB renovation projects in 2016-7, that additional professional staff would have been helpful. The HCMG consists of only 2 individuals (the Manager plus one). Given the number of Type 2 and 3 projects underway at St. George and the important, ongoing need for periodic audit/inspection of such projects, this may not be sufficient. On the EHS side, the Manager OH&S has only two staff. With the exception of health and safety specifically in laboratories, this small team deals with issues such as accident investigations and statistics, audits and inspections, first aid, asbestos and other Designated Substances, mould, noise, ergonomics, chemical safety, heat/cold stress, indoor air quality, materials handling, lockout-tagout and working at heights and in confined spaces. Given their multiple responsibilities, in addition to asbestos, the professional staffing level here may not be sufficient to meet responsibilities and oversee programs.

10.5. Joint Health and Safety Committees (JHSC)

As shown in Figure 2, the responsibility for the statutory JHSC fall under the responsibility of the VP HRE. The EHS website has a section on JHSC. It is noteworthy that there are 50 separate JHSC across the University, representing apparently all **University of Toronto** employees and covering large buildings, departments, faculties and campuses. The website has a publicly available section which lists each JHSC, shows that each committee, as required by statute, has joint worker and management co-chairs and provides a list of the members.[33] It is beyond the scope of the Asbestos Review Panel to verify the completeness and accuracy of these lists. At least one worker and one management member of each committee must be “fully certified”. This is a 2-step process involving a 3-day Basic Certification training, followed by a 2-day Workplace Hazard-Specific Training. The Panel assumes that this 2-day program, offered by EHS, includes information on asbestos. The publicly available section also provides JHSC resources, including electronic copies of the materials that are required by statute to be posted on JHSC Bulletin Boards, including the OHS Act, relevant University Policies, etc. There is also a “My JHSC Module”, which is an online tool using a web-based platform, available only to JHSC

[33] https://ehs.utoronto.ca/jhsc/jhsc-listing-resources/

members. It apparently contains committee meeting minutes, inspection reports and individual member training records. The Panel is also aware that there are local area JHSC Bulletin Boards and we presume that the materials required by the OHS Act (e.g. JHSC membership, OHS Act, relevant University policies, Orders issued by MOL inspectors, etc.) are posted, together with minutes of the most recent JHSC meeting[34]. These items are all mentioned on the EHS website as being required items on JHSC bulletin boards. Again, verification of compliance, completeness and currency of the materials in the online tool and bulletin boards is beyond the scope of the Panel.

During some of the stakeholder interviews, the Panel heard that, on occasion, employees lodged complaints regarding health & safety concerns directly to the Ministry of Labour. From some interviews, it was not clear whether worker members are involved early enough on H&S matters as they arise.

While workers do have this right, there is a reporting process involving notification to the supervisor and JHSC. During relevant training opportunities, employees must be encouraged to use the templates provided on the JH&S committee site. However, worker members of JHSCs must be seen to be an equal partner on H&S matters in their workplaces. As soon as the EHS team or management are aware of any H&S concerns, the joint co-chairs should be alerted, and the information shared with committee members as early as possible. Worker members must be consulted early and given the opportunity to accompany a management member to the worksite on any H&S matter, including any testing, and visits by external parties on EHS.

10.6 Right to Know

The Occupational Health and Safety Act (OHSA) in 1980 gave workers "the right to participate" in occupational health and safety, "the right to know" about on-the-job hazards and "the right to refuse" work that they believe to be unsafe. This Act gave workers a voice in how OH&S is approached in the workplace. In 1990, these rights were strengthened by amendments covered in Bill 208.

This means that all employees have a right to know about potential or actual hazards present in their work environment and the right to be trained on and receive information about any

[34] https://www.ontario.ca/page/guide-health-and-safety-committees-and-representatives (Appendix B: Sample Template for JHSC minutes

hazardous substance that they are exposed to, or are likely to be exposed[35] in *their workplace* and *their work*. Given the size and complexity of the UofT, the interpretation of *their workplace* may differ somewhat amongst individuals and groups. For example, employees working in MSB may consider the entirety of the MSB complex to be *their workplace*, while others may limit their perception of *their workplace* to their office, classroom or lab; corridor or floor; or their building; or, the entire campus. This is further complicated by the wide range of building/campus travel for various jobs. Therefore, it may be difficult to determine what level of information flow is appropriate. The Panel believes that the "right to know" should be interpreted broadly, information about hazards in the workplace should be readily available and communicated widely. Chapter 11 provides further discussion on Communication.

Under the OHS Act, all workers and supervisors must be provided with basic health and safety training, which the University provides with the Basic Health & Safety Awareness course, offered on-line. Training records are maintained by EHS. The Panel is aware that the University also provides an extensive array of workplace- and/or hazard-specific courses.[36]

10.7 Supervisors

The OHS Act is clear on the definition of a Supervisor, "a person who has charge of a workplace or authority over a worker"[37] and their role and responsibilities for H&S matters[38]. The precise identification of a supervisor is more complex in a University environment – with faculty, staff and students. Some faculty are Academic Administrators (Directors, Chairs, etc), some have laboratories with staff (technicians, graduate students…), and some employ research assistants, or other staff. Some staff are unionized, and others not, yet a unionized staff member could be a Supervisor and non-unionized Professional or Managerial staff may, or may not be a Supervisor. Most students are not considered to be workers under the OHS Act, yet many students are employed (e.g.as Teaching Assistants) and it is possible that under certain circumstances a Teaching Assistant could be a supervisor. It is not clear to the Panel that all faculty, staff and students understand their roles in relation to OHS. The Panel understands that the University is reviewing the role of the supervisor and urges the University to complete this review, as soon as possible, and develop strategies and, if necessary, further training to ensure that all faculty, staff and students understand their responsibilities.

[35] https://www.ontario.ca/laws/statute/90o01#BK19 (section 25, 27)
[36] https://ehs.utoronto.ca/training/
[37] https://www.ontario.ca/laws/statute/90o01#BK19 (section 1(1))
[38] Idem (section 27)

Chapter 11 Communications

11.1 Communication Infrastructure at University of Toronto

The University has a central communication infrastructure, under the Vice President, Communication. His portfolio consists of over 30 staff, in 4 integrated teams: Brand Marketing, Communication Partnerships, News & Media Relations and Digital Creative Solutions.[39] In addition, many of the Faculties have their own communications staff, who work very closely with the central communications teams. For example, the Faculty of Medicine's Office of Communications manages internal and external communications for the Faculty, including the creation and promotion of news stories, media relations, digital and social media, and advancement and marketing.[40]

11.2 Communications specifically related to Asbestos

As described elsewhere (Chapters 8 & 9), based on the AM Program document and information obtained during our various meetings, the University appears to be meeting its obligations, as legally mandated, for asbestos communications. Specifically, the asbestos-containing materials (ACM) inventories (3 campus) appear to be comprehensive, up-to-date, readily accessible (on-line) to the entire community, with employees aware of their existence (see Chapter 8). Specific training is provided to employees who may be working with ACM and more general (on-line) training is available to the entire community. When ACM will be disturbed (Type 2 & 3 operations), the Ministry of Labour inspectorate is appropriately notified, as are the relevant JHSCs. In addition, a *Notice of Project* is issued by Facilities & Services to appropriate departmental Business Officers and others, for wider distribution to occupants. For projects involving ACM, the scope of the project, as described in the *Notice of Project* includes these details. There was some concern that these Notices were not sufficiently distributed to all building occupants. The communication pathway for these *Notic*es should be reviewed to ensure that the information is widely and reliably disseminated.

The Panel heard from some of the stakeholders that they felt that the University was unprepared to deal with communications around the breach incidents that occurred in 2016-17 at the MSB.

[39] http://communications.utoronto.ca/utc-contacts/
[40] https://medicine.utoronto.ca/office-communications

Many of the interviewees felt that the University could have been more transparent, quicker and proactive with the relevant asbestos information to all of its various communities.

The Members of the Panel met (via teleconference) with a representative from Central Communications (Elizabeth Church, Acting Director, Media Relations) and from Medicine (Liam Mitchell, Associate Director), both of whom were heavily involved with the MSB situation. The Panel was advised that senior academic administrators typically are the spokespeople, when serious issues arise that may have significant consequences for the university and may generate media interest. In the case of the MSB breach incidence(s), the key spokesperson was the VP UOREP, together with the Dean of the Faculty of Medicine (T Young). The Panel was assured that such executives receive media training, though it is not clear whether this includes detailed information on risk communication, specifically. The VP UOREP and the Dean were quoted in several News stories released by UofT Communications, issued informational materials (mostly via email) to MSB occupants and both met with building occupants at Town Hall Meetings. They were supported by UofT professional staff (EHS, HCMG, consultants), as well as by an occupational physician with subject matter expertise who is both a Scientist at Public Health Ontario and a faculty member from the Dalla Lana School of Public Health. Other communication strategies included regular consultations with the JH&S Committee, regular updates through MedEmail, weekly email updates, etc. All of this information is readily available to the community – easily accessed on the EHS website (https://ehs.utoronto.ca/), under a tab titled MSB Information. Also available on this website are all of the air sampling data from February 2017 to June 28, 2018.

The communications about asbestos work, particularly major construction / remediation projects, must be broadly disseminated to building occupants – faculty, staff, students, and others. The important 'Right to Know' principle established in the OH&S Act has been discussed in this report (Chapter 10.6).

Key personnel with new H&S information must ensure that all representatives of staff, faculty and students are kept informed. It is normal to use the JHS Committees as a primary vehicles for EHS communication, but representatives must be reminded to promptly pass the information to their constituents. Similarly, Business Officers and others receiving information must ensure that this is widely disseminated. Other strategies developed during the MSB incident (e.g. weekly posting of updates on progress of work, posting of air sampling result and reports, etc.) should also be maintained on a go-forward basis, whenever major construction / remediation projects

are planned. The EHS web site is rich with EHS information including asbestos information[41]. As noted in Chapter 8, it is commendable that the University chose to load its asbestos inventory of all buildings, as well as the asbestos sampling results (using standard methods and recognized consulting firms and laboratories) on this website – fully available to the broad community, and this should continue.

The University may wish to revisit its EHS information flow as it relates to asbestos and perhaps more broadly, to ensure that these communication strategies are based on sound risk communication principles, providing appropriately detailed information and implemented proactively, rather than reactively only when some unexpected incident occurs. It is important to remember that under the Occupational Health & Safety Act, employees have ***a right to know*** and a ***right to participate***. Given the importance of well-designed risk communication strategies, the University may also wish to consider providing training or support, as needed, to front-line EHS and other professional staff, who regularly communicate with faculty, staff and students on sensitive EHS matters.

Broad communication with employees (faculty, staff) of a complex organization the size of UofT is difficult and the additional, important need to communicate effectively with students adds another layer of complexity. The Panel learned of concerns from students (especially graduate students) about problems of disclosure on asbestos, especially speed and degree of outreach. The Panel sought advice from the representative about the best ways to reach students so that the information is relevant, timely, and expected to have a high uptake ratio, but no immediate solutions were identified. Certainly technology is available, but the University and student groups should consider how to approach this issue. The student outreach site, Acorn, could be revisited for its robustness in reaching students with non-traditional information. It may make sense to reach out to other similar large institutions in North America to search for best practices on student engagement. Similarly, there are other groups (visitors, volunteers, contractors) that are legitimately on campus, in buildings (e.g. MSB) who may need to be informed about asbestos projects (or other issues). As an example of a potential strategy, many establishments use information television screens located strategically (at entrances, elevator lobbies), with scrolling information on EHS and emergencies. As changes are made, the best technologies should be applied for speed, precision and reach.

[41] https://ehs.utoronto.ca/resources/hazardous-materials-information/

Chapter 12 Going Forward

The Panel did not discern any egregious deficiencies in the UofT Asbestos Management Program. As with any complex organizational plan, there are alternative ways of organizing the structures and implementing the processes. It was beyond the scope of this Panel's mandate to evaluate all possible alternatives and formulate very specific recommendations. However, a number of issues, ranging from high-level to higher-resolution, drew the attention of the Panel as issues which the University should consider to improve the system. The following list contains some recommendations and suggestions that we believe would be worth considering.

1. It is important to continue to monitor and closely supervise external building or renovation contractors undertaking work that might affect asbestos.

2. The University should revisit the organization structure as it relates to Environmental Health & Safety. In particular, it should review whether the organizational pyramid with 3 VPs at the top compromises any of the goals of the programs or transparency, management control/oversight or accountability. If so, consideration should be given to streamlining the organization.

3. The University should ensure that all relevant "Department Heads, Deans, Chairs, Directors and Managers" (Section 2.4) are aware of their responsibilities under the OH&S Act and the relevant Regulations (including specifically O.Reg. 278/05) and have the necessary training. This detailed training is particularly important for those who have faculty, staff or students who are located in buildings which contain asbestos, especially friable sprayed ACM.

4. The role of the JHSCs must be understood by all key university personnel, and its performance should be monitored.

5. The AM Program should be reviewed to ensure that all sections are consistent and reflect current University structure and practices. In particular, the organizational responsibilities and oversight of the Program, as embodied for example in its Table 1, should be revisited and if necessary revised to clarify responsibilities among the various management/operational divisions/departments. This should be done in relation to each of the 3 campuses.

6. The key Managers associated with the AM program (Occupational Hygiene & Safety and Hazardous Construction Materials Group) are well qualified and experienced professionals. The University should assess whether professional staffing levels are sufficient to meet responsibilities and oversee programs.

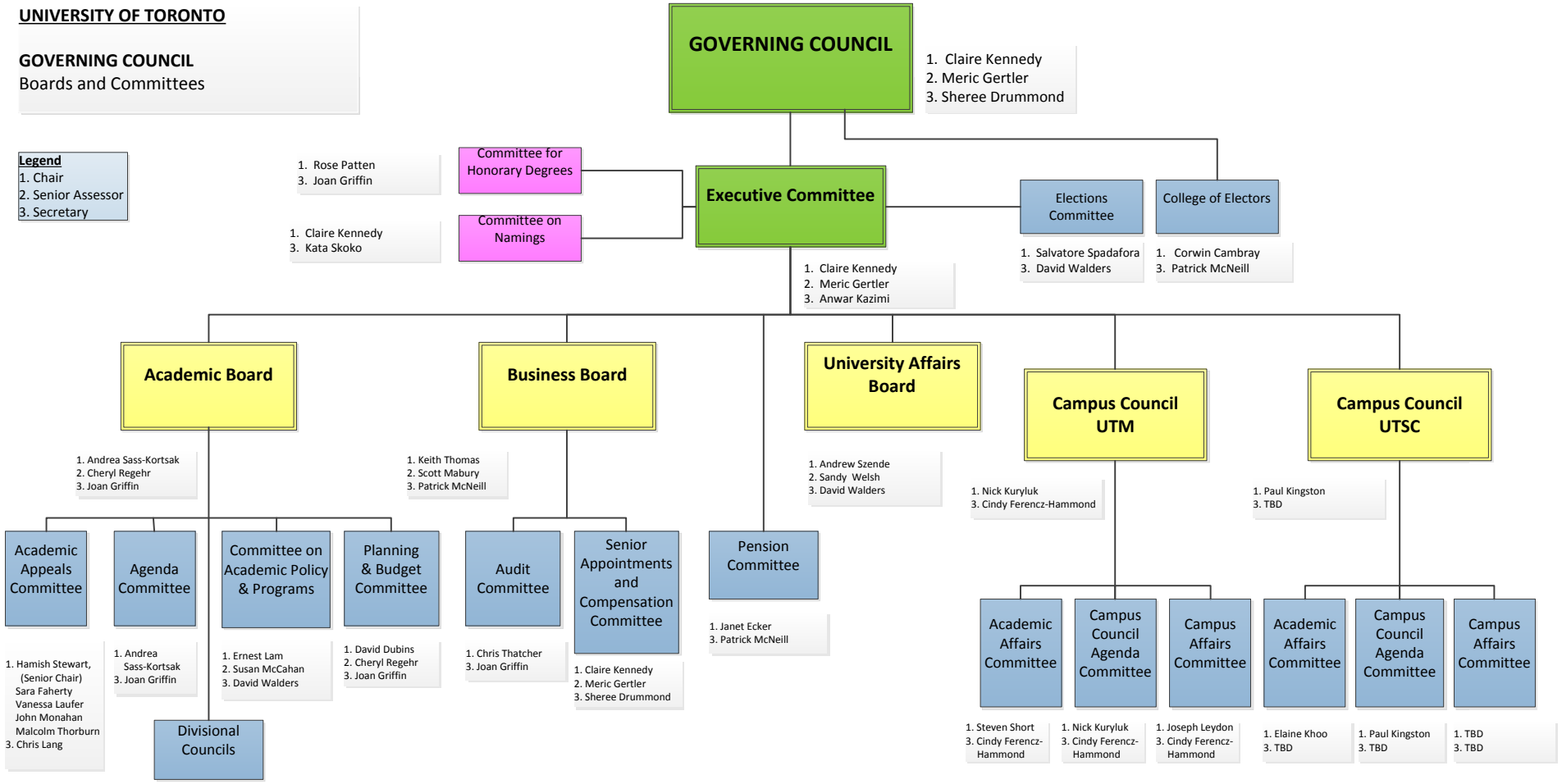
7. In consultation with relevant stakeholders, the University should make explicit the levels of exposure that it considers acceptable in UofT buildings. These levels should be at least as stringent as those required by prevailing government legislation.

8. Unless there are compelling feasibility issues that preclude this, the University should contractually require that all contractors engaged to conduct asbestos measurement campaigns at the University should follow a standard measurement approach (to be determined in consultation with relevant stakeholders, and covering issues like LOD, LOQ, sampling durations) and a standard format for presentation of such measurement results.

9. Internal communications about asbestos work, particularly major construction / remediation projects (including *Notice of Project* documents) should be widely and reliably disseminated to building occupants – faculty, staff, students and others. Communication strategies developed during the MSB incident should be maintained on a go-forward basis when major projects are being planned and executed.

10. The University should consider enhancing training and education strategies to ensure that all faculty, staff and students understand their responsibilities.

Figure 1: Governing Council, Boards and Committes



GC/ONLINE/ GC-Boards-Committees-CampusCouncils_and_Chairs.Secretaries_Jul 31 2018

Figure 2: Oversight of Asbestos-related incidents

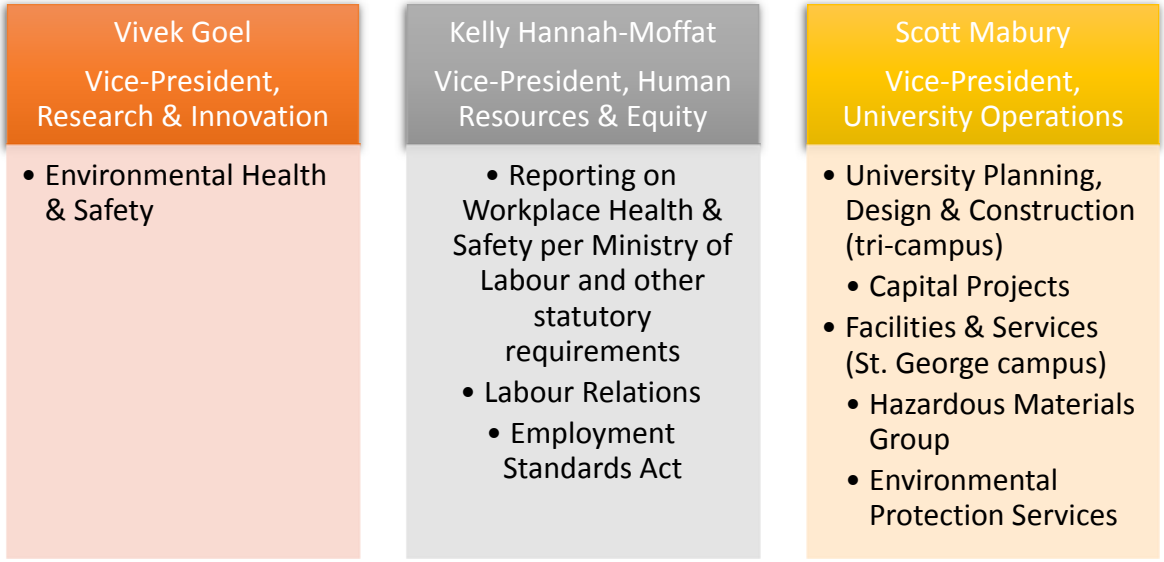


Figure 3: UofT Asbestos Activity Organizational Chart

(abridged from Organization Charts of the various departments found of their UofT websites)