Designated Substances

Program

Office of Risk Management

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Contents

INTRODUCTION

Designated substances are those identified under the Designated Substances Regulation (Regulation 490/09) of the Ontario *Occupational Health and Safety Act*. There are 11 designated substances:

1. Acrylonitrile
2. Arsenic
3. Asbestos
4. Benzene
5. Coke oven emissions
6. Ethylene oxide
7. Isocyanates
8. Lead
9. Mercury
10. Silica
11. Vinyl chloride

Employers of workplaces where these substances are present, used, handled or stored (i.e., uOttawa) are required to carry out an operational use assessment for a person who may be required to handle one or more of the designated substances. The assessment must be formally recorded and regularly reviewed. In circumstances where an exposure is possible, an exposure control program for the identified substances must be established. This program must give hierarchal priority to hazard controls. It is important to note that not all of the above designated substances are present on campus. In such cases, no additional action is required.

The University's Laboratory Health and Safety Committee was consulted and involved in the creation of this program.

DEFINITIONS

Ceiling (C): The concentration that is not to be exceeded during any part of the working exposure

Employer: The University of Ottawa or a person who employs any worker or enters into a contract for the services of any worker, including a contractor or subcontractor who performs any work or supplies services; examples of a person that may be considered an employer under the applicable health and safety legislation include a member of the Board of Governors, the president, a dean and a director

Health, safety and risk manager (HSRM): The dedicated, full-time staff member at a faculty or service responsible for providing support for risk, environment and health and safety issues

Occupational illness: A condition that results from a worker's exposure within a workplace to a physical, chemical or biological agent to the extent that the worker's normal physiological mechanisms are affected and the health of the worker is impaired. It includes occupational diseases as defined under the Workplace Safety and Insurance Act, 1997 and for which a worker is entitled to benefits under the Act.

Short-term exposure limit (STEL): The concentration at which it is believed that workers can be exposed continuously for a short period of time without suffering from irritation, chronic or

irreversible tissue damage, dose-rate-dependent toxic effects or narcosis of sufficient degree as to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency. Periods of exposure above the time-weighted average (TWA, see below) up to the STEL must be for less than 15 minutes, must not occur more than four times a day and must have at least 60 minutes between successive exposures.

Student: A person who is registered in a course or program of study at the University of Ottawa and who is not receiving remuneration for the work or activity being carried out

Supervisor: A person who has charge of a workplace or authority over a worker or another person and, depending on the workplace relationship, can include, for example, the president, a vice-president, a director, a dean, a manager or a principle investigator

NOTE: Determining whether a person meets the definition of supervisor does not depend on their job title but on whether they have responsibility for a location, such as an office or a laboratory, where paid or unpaid work is performed or give direction to workers, students, visitors, volunteers or learners in order for work to be completed.

Time-weighted average (TWA): The concentration during a conventional eight-hour work day and a 40-hour work week to which it is believed that most workers can be repeatedly exposed day after day, for a working lifetime, without adverse effect.

University Joint Occupational Health and Safety Committee (**UJOHSC**): The committee established by the University to review the responsibility systems that govern health and safety.

Worker:

a) A person who performs work or provides services for remuneration, including students hired by the University for a paid work-study placement or a CO-OP placement
b) A high school student who performs work or provides services for no monetary compensation under a work experience program authorized by the school board that operates the school in which the student is enrolled
c) A person who performs work or provides services for no monetary compensation under a program approved by a college of applied arts and technology, university or other postsecondary institution

d) Other persons who perform work or provide services to an employer for no monetary compensation

The terms **visitor**, **volunteer** and **learner** refer to a person who is not a worker or a student but who performs work at the University workplace in order to provide assistance or for reasons associated with education or training.

APPLICATION

The uOttawa Designated Substances Program applies to all persons involved in the acquisition, handling, storage, removal or disposal of a designated substance on the University of Ottawa's premises. These persons must comply with the provisions of the program, use necessary work and

hygiene practices and follow any exposure control protocols established under the Designated Substances Program.

Application is not limited by faculty, service or geographical location. In order to determine whether the Designated Substances Program, and thus the provisions of Ontario's Designated Substances Regulation (Regulation 490/09), apply, two questions must be answered:

1. **Is the substance present at uOttawa?**
    - If the substance is present, produced, used, processed, handled or stored on the University's premises, the regulation applies.
2. **If the substance is present, is any person likely to be exposed to the substance?**
    - If it is possible for a person to be exposed to the substance, regardless of the route of entry (inhalation, absorption, ingestion, injection, etc.), the regulation applies.

Note that there are exemptions to the program, as listed in sections 3 to 14 of the Designated Substances Regulation. However, in most cases, the regulation applies for all designated substances present in a workplace on campus.

Appendix 1 provides a decision tree for establishing whether a designated substance is present in the workplace.

DESCRIPTION OF DESIGNATED SUBSTANCES

This section provides an overview of the primary characteristics of designated substances, their potential health hazards as well as an indication of whether the substance may be found at uOttawa. See Appendix 4 for information on health effects and exposure values for designated substances.

Acrylonitrile

Acrylonitrile is a colorless to pale yellow liquid with an unpleasant odour. It is used in the manufacture of synthetic fibre, rubber, coatings, adhesives, etc. Acrylonitrile is toxic by inhalation and by skin exposure. Low-level exposure to acrylonitrile may cause eye and skin irritation, headaches, nausea or vomiting. High-level or prolonged exposure may result in damage to the heart, liver, kidneys or central nervous system.

Acrylonitrile and acrylonitrile compounds may be present on campus.

Arsenic

Arsenic is a strong poison. It is silver-grey, brittle, crystalline solid. Compounds containing arsenic are used as wood preservatives, insecticides and herbicides. Arsenic is also used in alloys of copper and lead. Elevated levels of arsenic can cause death, cancer or damage to nerves, the stomach, intestines and the skin. Lower concentrations can cause nausea, diarrhea, decreased production of red and white blood cells and abnormal heart rhythm.

Arsenic and arsenic compounds may be present on campus.

Asbestos

Asbestos is the name used for a group of fibrous minerals that occur naturally in soil and rock in some geographic areas. Asbestos fibres were formerly used in various building materials, including shingles, ceiling tiles, floor tiles, cement products, gaskets, insulation and paper products. Asbestos affects mainly the lungs and respiratory system. Inhalation of asbestos may result in a build-up of scar-like tissue, resulting in cancer of the lungs and surrounding membrane.

Asbestos is present on campus. A comprehensive asbestos management program is in place at uOttawa. While asbestos is briefly addressed within the context of this current program, more thorough information is available by consulting the uOttawa Asbestos Management Program.

Benzene

Benzene is a colorless liquid with a sweet odour. It is widely used across North America to make other chemicals, which are then used to make plastic, resin, nylon, rubber, lubricants, detergents, drugs and pesticides. Benzene is also a natural component of crude oil and gasoline. Exposure to benzene, via inhalation, can cause dizziness, drowsiness and unconsciousness. Long-term exposure may result in anemia, leukemia or damage to bone marrow.

Benzene and benzene compounds may be present on campus.

Coke oven emissions

Coke oven emissions are the airborne constituents of the by-product created by destructive distillation of coal and petroleum. The emissions can occur from the production of steel, from petroleum products and from the lining of high temperature furnaces. Exposure to coke oven emissions is a possible cause of lung cancer. Although coke oven emissions have not caused a high number of cases of skin cancer, dermal contact with coke oven emissions should be avoided.

Coke oven emissions are not likely to be present on campus.

Ethylene oxide

Ethylene oxide is a colourless gas at room temperature that becomes a liquid at 12°C. It is used in the manufacture of ethylene glycol, surfactants, fumigants, fungicides and petroleum demulsifiers. Exposure routes include inhalation, ingestion and skin or eye contact. Exposure can cause irritation of the eyes, skin, nose and throat and headaches, nausea and drowsiness. Exposure to high concentrations can cause frostbite, reproductive toxic effects, convulsions, liver and kidney damage and cancer.

Ethylene oxide and ethylene oxide compounds may be present on campus.

Isocyanates

Isocyanates are a group of organic compounds formed by treating diamines with phosgene. They are used in the production of polyurethane foam and resins. Routes of exposure include inhalation, ingestion and skin or eye contact. Exposure can cause nausea, abdominal pain, bronchitis and irritation of the eyes, skin, nose and throat. High-level exposure can cause asthma, conjunctivitis, pulmonary edema and cancer.

It is possible that isocyanates and isocyanate compounds are present on campus.

Lead

Lead is a naturally occurring bluish-grey metal. It is used in the production of batteries, ammunitions, solder, paint and pipes (including water pipes). The routes of exposure to lead are limited to inhalation and ingestion of lead, with the highest risk of lead exposure being the inhalation of lead containing dust. Lead can damage the nervous system, kidneys and the immune system.

Lead is present on campus in a variety of forms, including in old, painted surfaces and in the pipes in some buildings.

Mercury

Mercury is a naturally occurring metal. At normal temperatures, it is a shiny, silver-white odourless liquid. When heated, mercury becomes a colourless, odourless gas. Mercury is used to produce caustic soda and was also used in thermometers, dental fillings and batteries. The central nervous system is very sensitive to all forms of mercury; however, vapour is especially harmful because it can directly reach the brain. Exposure to high levels of mercury can permanently damage the brain, kidneys and a developing fetus. Short-term exposure may cause lung damage, nausea, vomiting, skin rashes and eye irritation.

Mercury can be found in some lab equipment (such as thermometers, manometers, etc.), medical equipment (such as blood-pressure cuffs), thermostats, fluorescent light fixtures, etc., which can be present on campus. Mercury-containing lab equipment (i.e., thermometers) should be substituted with less hazardous substances (where possible).

Silica

Silica is a transparent to grey odourless powder or crystal. It occurs widely in nature as sand, quartz, flint and diatomite. It is used in the manufacture of glass, ceramics, abrasives, water treatment products, cosmetics, insecticides, paint and foods as well as in the drying of glassware and as a preservative for plant samples. Crystalline silica is used in the production of concrete, cement, acoustic ceiling tiles and ceramic tiles used in construction. The routes of exposure include inhalation and skin or eye contact. Exposure may cause pneumoconiosis and irritation to the lungs, skin or eyes. Chronic inhalation can lead to silicosis.

Crystalline silica is present in the concrete, terrazzo flooring, ceiling tiles and plaster in various buildings at uOttawa. As a result, silica dust may be generated by the grinding, cutting or demolition of any of these building materials.

Vinyl chloride

Vinyl chloride, at normal atmospheric temperatures, is a colourless, flammable gas with a mild, sweet odour. It is used in the manufacture of polyvinyl chloride (PVC), which is used in furniture upholstery and many plastic products including plastic pipes, wire and cable coating. Exposure to vinyl chloride occurs mainly in workplaces where it is used to manufacture plastic. Breathing high levels of vinyl chloride for short periods of time can cause dizziness, sleepiness, unconsciousness and, at extremely high levels, death. Prolonged exposure may cause liver damage, immune reactions, nerve damage and cancer.

Vinyl chlorine and vinyl chloride compounds may be present on campus.

ASSESSMENTS

Assessments must be conducted when a potential for exposure to a designated substance exists. A designated substance can be present either in its physical infrastructure (infrastructure assessment) or during research or teaching activities (operational use assessment).

Infrastructure assessment

In 2007–2008, the University of Ottawa conducted a campus-wide, non-destructive infrastructure assessment of designated substances. As a result, the University now has independent reports for most of its buildings (including leased buildings) that identify and, where applicable, quantify designated substances confirmed or suspected in each building. **The infrastructure assessment did not take into consideration the operational use of designated substances during any activities carried out in the buildings (e.g., research or teaching)**.

SUMMARY OF DESIGNATED SUBSTANCES REPORTS

Appendix 2 contains a summary of the designated substances reports for the individual buildings on campus. The summary includes information from the **infrastructure assessments** only. The detailed reports or further information on campus buildings can be obtained by contacting:

- Facilities (ext. 2222)
- Office of Risk Management (ext. 5892)

Operational use assessment

Because the purpose for using of a designated substance can vary greatly, e.g., teaching vs. research, these uses must be assessed to determine whether a control program is required in the area in question. A template has been created to assist faculties and services in collecting information and evaluating whether a control program is required (see Appendix 3).

When an operational use assessment determines that a designated substance is being used, the assessment must be recorded in writing and readily available upon request.

When it is been determined that a designated substance is present:

1. Employees and students must be able to identify the designated substance in use, be familiar with the proper use and handling of the substance. They must be aware of the physical state of the substance and know the quantity or volume in use and the procedures in place at uOttawa for using the substance. A list and description of all “designated substances” is provided above and in sections 3 to 13 of the Designated Substances Regulation.
2. The assessment must record the pertinent elements of the hazard controls in place, such as:
    a. Type of engineering control (barrier, isolation, guarding, general and local ventilation, fume hoods, etc.)
    b. Description of work practices and procedures
    c. Description of hygiene practices;
    d. Requirements for personal protective equipment
    e. Emergency plans or procedures for spills and equipment failures as well as established maintenance programs

3. Supervisors must provide employees with information and training on the hazards presented by the substances in the workplace, including required precautions for the handling, use, storage and disposal of the designated substance. Training requirements may also include instruction on the use of control measures, such personal protective equipment (e.g., respiratory equipment).
4. Supervisors must inspect the workplace. During the inspection, the supervisor must observe all locations where a substance is handled, used, processed or stored. This inspection must identify both actual and potential hazards and include (at a minimum):
    a. Source(s) of contamination
    b. Likelihood of exposure
    c. Hazard controls in place
    d. Emergency equipment required
    e. Protective equipment required (e.g., respiratory equipment)
    f. User feedback

ASSESSMENT CONCLUSIONS

One of the following four conclusions **must be reached following an operational use assessment:**

1. Exposure to the designated substance is not possible and a control program is not required. **No additional action is required.**
2. Exposure to the designated substance is possible but engineering controls are in place. The risk of exposure (including in situations where an engineering control fails) is minimal so additional control measures are not required. **No additional action is required.**
3. Controls are in place, but exposure to the designated substance is possible. The health of users could be affected if the controls fail or are not properly maintained. Under the Designated Substances Regulation, **a control is required.**
4. Exposure to the designated substance is possible and controls are required in order to provide sufficient protection to users. Under the Designated Substances Regulation, **a control is required.**

Refer to Appendix 3 for a sample operational use assessment form. **Assessments must be conducted in consultation with the pertinent University** functional occupational health and safety committee(s). Assessment forms must be completed, maintained and regularly reviewed by the workplace supervisor with copies provided to:

- Health and Wellness, Human Resources (HRhealth@uOttawa.ca)
- Office of Risk Management (safety@uOttawa.ca)
- University's functional occupational health and safety committee(s), via the Office of Risk Management

CONTROL PROGRAM

After conducting a designated substance exposure assessment, the supervisor must develop and institute a control program in their workplace if the supervisor concludes that:

- A person is likely to be exposed to a designated substance **and**
- The health of the person may be affected by exposure to the substance

For information on the requirements of control programs, including those related to specific substances, consult section 20 of the Designated Substances Regulation.

Components of a control program

CONTROL MEASURES

The control program must include control measures, with preference given to the hierarchy of hazard controls (for example, engineered controls) or a combination of work practices, protective equipment and other measures in order to limit a person's exposure.

Because it is possible for hazard controls to fail, the existence of a control does not completely eliminate the potential for exposure. For example, if a ventilation system or fume hood has not been adequately maintained, it could fail and lead to exposure.

In addition to controlling exposure to a hazard via engineering controls, protective equipment may also be required. Personal protective respiratory equipment must meet or exceed the requirements in the applicable equipment code and be used in accordance with established requirements. Consult the Designated Substances Regulation for the applicable respiratory equipment codes. To obtain a copy of the codes, please email the Office of Risk Management.

Fit testing required for respiratory protection

FIT TESTING – EMPLOYEES

1. An employee requiring a fit test must be referred to Health and Wellness.
2. Health and Wellness conducts an initial medical screening and, if no potential health issues are detected, refers the employee to one of the below testing organizations for a fit test (by appointment only):
    - GEM Health Care Services
      383 Parkdale Ave, Suite 304
      Ottawa ON K1Y 4R4
      Fees: 45$
      Duration: 20 minutes
    - Paramed
      1145 Hunt Club Rd, Suite 400
      Ottawa, ON
      K1V 0Y3
      Fees: 48$
      Duration: 20 to 30 minutes
3. If any potential health issues are detected, the employee must undergo a further medical evaluation (outside uOttawa).
4. The external testing organization provides Health and Wellness with confirmation of the completed mask and fit test to Health and Wellness.
5. Results of the employee's fit test and related information are retained by Health and Wellness.
6. An employee who still requires respiratory protection undergoes subsequent fit testing as required by section 9.1.6 of CSA standard Z94.4-11.

FIT TESTING – STUDENTS

1. Advise student or principal investigator (PI) that initial medical screening and fit testing is required prior to the use of a respirator (see CSA standard Z94.4-11 for an example of initial screening).
2. Refer student to one of the below testing organizations for a fit test (by appointment only):
    - GEM Health Care Services
      383 Parkdale Ave, Suite 304
      Ottawa ON K1Y 4R4
    - Paramed
      1145 Hunt Club Rd, Suite 400
      Ottawa, ON
      K1V 0Y3
3. If any potential health issues are detected, the student must undergo a further medical evaluation (outside uOttawa).
4. The external testing organization provides the student, supervisor or PI, as applicable, with confirmation of the completed mask and fit test.
5. Results of the student's fit test and related information are reatined by the student, supervisor or PI, as applicable.
6. A student who still requires respiratory protection undergoes subsequent fit testing as required by section 9.1.6 of CSA standard Z94.4-11.

MONITORING THE CONCENTRATION OF A SUBSTANCE

The control program must include a method for monitoring, sampling and determining airborne concentrations of a designated substance. A list of codes for measuring airborne substances is provided in the Designated Substances Regulation.

The sampling results must be posted in conspicuous locations, typically on the occupational health and safety bulletin boards on campus. Copies of the sampling results must also be provided to:

- Health and Wellness, Human Resources (HRhealth@uOttawa.ca)
- Office of Risk Management (safety@uOttawa.ca)
- University's functional occupational health and safety committee(s), via the Office of Risk Management

The Office of Risk Management can assist in coordinating any necessary sampling of airborne concentrations of designated substances. **The faculty or service is responsible for all costs associated with the sampling.**

PERSONAL EXPOSURE RECORDS

The control program must provide a method for:

- Monitoring the exposure of affected individuals in the workplace
- Medical monitoring of affected individuals in the workplace
- Maintaining information associated with the medical program

The purpose of a medical monitoring program is to help protect the health of persons through medical examinations, clinical tests, health education and medical record-keeping. Every person to

whom the Designated Substances Program applies must comply with the University's work and hygiene practices outlined in all applicable control programs for designated substances.

EMPLOYEE

Medical monitoring (also referred to as medical surveillance) is conducted in accordance with the appropriate code for medical surveillance, listed in the Designated Substances Regulation (Schedule 2, Part II) and available by emailing the Office of Risk Management or contacting Health and Wellness.

Health and Wellness (Human Resources) coordinates the medical monitoring and assessments of employees at risk of exposure and maintains the associated records. All interactions with Health and Wellness are done in confidence and information remains confidential. The employee's faculty or service is responsible for all costs associated with medical assessments.

Medical assessment file must include:

- Employee name and date of birth
- History of the employee's positions at uOttawa
- Results of monitoring of exposure to the designated substance
- Time-weighted-average exposure of the employee to the designated substance
- Type and use of employee's respiratory equipment

An at-risk employee must participate in:

- A pre-placement medical examination, with a focus on the bodily systems that may be affected by the designated substance(s)
- Periodic medical examinations, with a focus on the bodily systems that may be affected by the designated substance(s)
- Clinical tests to determine the employee's fitness for continued, controlled exposure to the designated substance(s)
- Health education, including being advised of the hazards of the designated substance and the results of any clinical tests
- Record keeping, including details of the employee's employment history, any exposures, results of any medical assessments or clinical tests and any interventions

Health and Wellness will maintain on behalf of the University the medical monitoring records for employees involved in the acquisition, handling, storage, removal or disposal of a designated substance. These records are confidential and will be maintained until the later of:

  - The 40th anniversary of the date the first record was created in the personal exposure record or
  - The 20th anniversary of the date the last record was added to the personal exposure record.

STUDENT

Unpaid students working involved in the acquisition, handling, storage, removal or disposal of a designated substance are encouraged to discuss medical monitoring options with their doctor. The list of codes for medical surveillance is provided in Schedule 2 (Part II) of the Designated Substances Regulation. The codes outline the necessary medical examinations for the applicable designated substance. These codes are available by emailing the Office of Risk Management. Information on

student exposure is not maintained by the University. However, the University extends to students the same protections provided for employees.

EXPOSURE

In the event of an actual, suspected or near-miss exposure to a designated substance, the individual must seek medical treatment consistent with the designated substance in question. An individual who experienced an actual, suspected or near-miss exposure to a designated substance must convey this information to uOttawa. The individual must:

1. Report the situation to their immediate supervisor
2. Complete an accident, incident, occupational disease or near miss form
3. Participate in exposure follow-up with Health and Wellness, located in room 017 of Tabaret Hall

Questions about actual, suspected or near-miss exposures, medical monitoring or general health-related matters can be directed to Health and Wellness (ext. 1473 or HRhealth@uOttawa.ca).

Development of control program

If an exposure control program is required, the local health, safety and risk manager (HSRM) or the Office of Risk Management can offer assistance in developing a control program. Any control program must, however, be developed in consultation with the University's functional occupational health and safety committee(s). The approved version of a control program must be provided to the committee(s) and affected individuals must be provided with trained on the program.

REVIEWS

The supervisor is responsible for periodically reviewing designated substances assessments with support from the necessary personnel, as required. The review must take place when there has been a change to any process involving a designated substance and at least annually. The exercise must include a complete review of the initial assessment criteria and information on any new or related concerns.

Under Section 22 of the Designated Substance Regulation "change" means: "a change in a process involving a designated substance or in the methods and procedures in which the substance is produced, mined, processed, used, handled or stored, as the case may be." Under Section 22, if there is a change in a workplace that could result in a significant difference in the exposure of a worker to a designated substance, the supervisor must promptly carry out a further assessment of the exposure or likelihood of exposure of an employee to the designated substance.

DISPUTES

Any disagreements related to designated substance assessments, changes in processes, implemented control measures and procedures or emergency programs, the personnel involved in the dispute should email the Office of Risk Management (safety@uOttawa.ca) in an effort to reach a resolution.

If a resolution cannot be reached internally, the Office of Risk Management will ask the Ministry of Labour to provide a written decision on the matter.

TRAINING

Supervisors are responsible for providing employees with information and training on the hazards of designated substance(s), including the precautions or control measures required for safe handling, use, storage and disposal of the substance. This must include training on the use of any personal protective equipment.

Employees working with designated substances must also become familiar with the designated substances used in their workplace, including information on the quantities used, how they are to be handled and the physical form (solid, liquid, dust, fume, vapour, etc.) in which they are present and concentrations of the substances. Supervisors for the workplace in question will provide the necessary information and training to the employees. Supervisors are also responsible for maintaining employee training records.

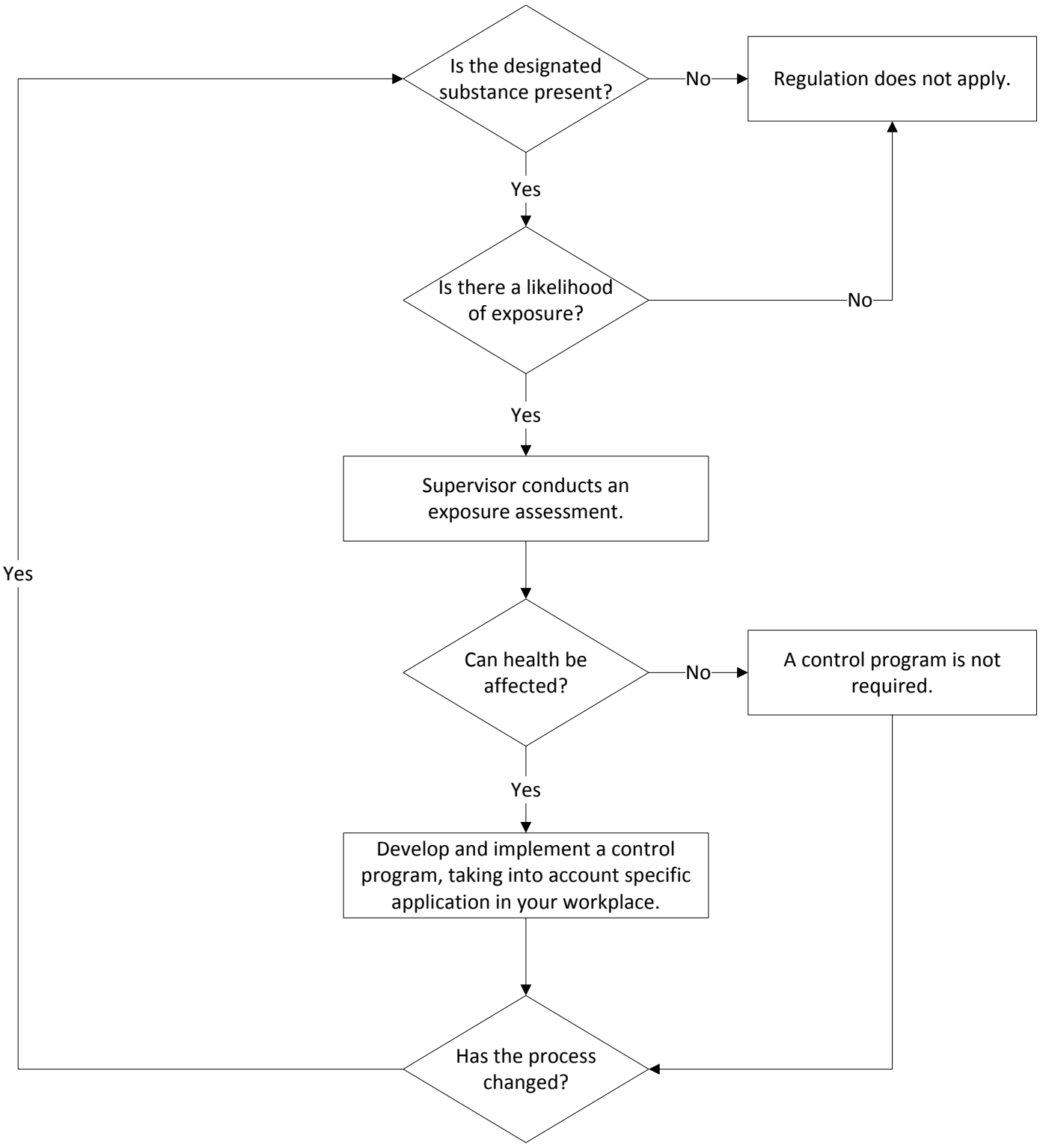
Further information, assistance and guidance can be obtained from faculty and service health, safety and risk managers or the Office of Risk Management.

RESOURCES

- Asbestos Management Program (uOttawa)
- Selection, Use and Care of Respiratory Protection Guidelines (uOttawa)
- Workbook for Designated Substances (Health & Safety Ontario)

APPENDIX 1 – DECISION TREE FOR IDENTIFYING PRESENCE OF DESIGNATED SUBSTANCES

Designated Substance Decision Tree



Adapted from Workplace Safety and Prevention Services.

APPENDIX 2 – SUMMARY OF DESIGNATED SUBSTANCES INFRASTRUCTURE REPORTS

Information on campus buildings is available by contacting:

- Facilities (ext. 2222)
- Office of Risk Management (ext. 5892)

APPENDIX 3 – SAMPLE OPERATIONAL USE ASSESSMENT FORM

uOttawa

Operational Use Assessment (Appendix 3)

This questionnaire is a supplement to the uOttawa Designated Substances Program to help guide the supervisor in assessing designated substances (as defined under Designated Substances Regulation (Regulation 490/09) in their workplace. This document will help prompt the supervisor and provide direction on any subsequent actions required based on the questionnaire answers. This document is to be maintained by the workplace supervisor and reviewed as necessary.

Section 19(3) of the Designated Substances Regulation requires that the assessment be conducted in consultation with the Joint Occupational Health and Safety Committee. Please coordinate interactions with the Committee via the Office of Risk Management.

Building Choose a building. **Room number**

Principal investigator **Date** Select date

Section 1 – Presence of designated substance(s)

1.1 Is the presence of a designated substance indicated on any safety data sheets (SDS) from suppliers of materials in your lab, workshop or area of responsibility?

Yes ☐ – **Proceed to section 2.**

No ☐ – **No additional action required. Retain a copy of this document for your records.**

Section 2 – Substance identification

Complete section 2 to the best of your ability.

2.1 What is the name of the substance?

2.2 In what form does the substance enter the workplace?

2.2.1 Is the state of the substance altered during use (i.e., goes from liquid to gas)?

2.2.1.1 If yes, to what form?

2.3 Where is the substance used?

2.4 How is the substance used?

2.5 Where is the substance stored?

2.6 How much of the substance is available at a given time?

2.7 How much of the substance is used monthly or annually (indicate which)?

2.8 During normal use, is it possible for the substance to be released into the workplace? ☐ YES ☐ NO

2.8.1 If YES, at what stage could this occur?

2.8.1.1 In which location could the release occur?

2.8.1.1.1 Specify the job functions of at-risk personnel. ☐

2.8.1.1.1.1 How many employees could be affected by a release? ☐

2.9 If you answered YES to question 2.8, indicate how personnel would be exposed. Select all that apply.

2.9.1 ☐ Inhalation

2.9.2 ☐ Absorption

2.9.3 ☐ Ingestion

2.9.4 ☐ Injection

2.10 If you answered NO to question 2.8, is there a likelihood of spill, leak, accidents, etc.? ☐ YES ☐ NO

2.10.1 If YES, could persons be exposed? ☐ YES ☐ NO

2.11 Are there any activities or situations where a person is likely to be exposed? ☐ YES ☐ NO

2.11.1 If NO, **no additional action required. Retain a copy of this document for your records.**

2.11.2 If YES, **further assessment is required. Proceed to section 3.**

If an engineering control is chosen or implemented in order to contain the release or control exposure, an exposure assessment is required because there is a possibility for the engineering control to deteriorate or fail.

Section 3 – Exposure assessment

The answers in the previous sections indicate that the substance is present in the work environment and that exposure is possible. Additional factors, such as exposure frequency, duration, concentration and the presence of existing control measures must also be assessed.

The following resources are available to the principal investigators, lab managers and supervisors, if required, when conducting an exposure assessment.

- Health, safety and risk managers
- Health and Wellness, Human Resources
- Office of Risk Management

A three-step approach is recommended for the exposure assessment **for each substance and process** identified in the previous sections:

1. Collect relevant information related to the handling, use and storage of the designated substance.
2. Conduct a walk-through survey of the workplace in the area where the designated substance is used.
3. Carry out follow-up assessments and investigations, to the extent required.

When it is not possible to determine the presence or existence of an airborne concentration of a designated substance, air sampling may be required in order to quantitatively assess potential exposure. Results of air sampling may also help in selecting the proper hazard controls. For assistance with sampling, please contact your local health, safety and risk manager or the Office of Risk Management.

Operational Use Assessment (Appendix 3)

Example exposure assessment

Work process information

1. Document the cradle-to-grave use of the designated substance in your lab. Document the entire process—from receipt in the lab to when it is offered to uOttawa Hazardous Waste disposal personnel. Include a brief description of the applicable processes.
2. At each stage of the process, identify the frequency and duration of exposure (expressed in hours per week) as well as the number of people exposed to the substance.
3. At each stage of the process, identify the existing control measures implemented to control exposure to the designated substance:
    a. Engineering controls (fume hood, canopy hood, local exhaust ventilation, etc.)
    b. Administrative controls (work practices, reduced total exposure time, etc.)
    c. Personal protective equipment (e.g., respiratory protection)
    d. Other: Specify the control option
    e. N/A: No control is in place

Walk-through survey

The supervisor conducting the designated substance assessment performs a workplace survey to validate information collected in the previous sections. Prior to conducting a walkthrough, the supervisor is advised to let the lab or workshop personnel know about the purpose of the survey. The walk-through survey is intended to be representative of use within the workplace; therefore, multiple surveys may be required in order to assess potential exposures, determine peak periods of operation, etc. The supervisor is to:

- Note evidence of an uncontrolled substance in the workplace (i.e. dust in the air or on surfaces, spills in the workplace, etc.).
- Note the date and time of the assessment.
- Ask persons in the workplace about the use, handling and storage of the material.
- Observe and assess use, handling and storage practices used with the material.
- Document responses, conversations and interactions with personnel.

Survey criteria

Areas of focus during a walk-though survey include, but are not limited to:

- The condition and efficiency of the ventilation system
- Work practices by the personnel in the workplace
- Hygiene practices of the personnel in the workplace
- Any storage facilities where the designated substance is stored
- General housekeeping in the workplace
- Selection, use and care of personal protective equipment, specifically respiratory protection
- Emergency devices (emergency eyewashes/showers, first aid kits, spill kits, etc.) and the associated emergency procedures relevant to the work

Record all findings and observations from the walk-though survey. Append results to the end of this document.

Walk-through survey conclusions

3.1 During the walk-through survey, did you discover areas where controls were non-existent, insufficient or required improvement? ☐ YES ☐ NO

3.1.1 If you answered YES to question 3.1, provide a summary of the areas and how controls can be implemented or improved, or both.

3.1.2 Based on conditions observed, is personal exposure monitoring of persons in the workplace required or warranted? ☐ YES ☐ NO

3.1.2.1 If you answered YES to question 3.1.2, during which process(es) or where is this required?

Section 4 – Assessment conclusions

Upon completion of this exposure assessment, you will reach one of the following conclusions:

1. **A person's health cannot be affected.** This conclusion will be reached if the substance is present in the workplace but the amount, volume or physical state in which it is used does not present a hazard to the persons. This conclusion may also be reached if engineering controls are implemented and exposure to the designated substance is not possible, even if the engineering controls implemented were to fail.
2. **A person's health can be affected.** This conclusion will be reached if the substance is present and:

- There are no hazard controls in place,
- The controls in place are insufficient for the protection of users,
- The controls in place have the potential to fail or deteriorate,
- Personal monitoring indicates potential exposure or users or
- Personnel have reported related health effects associated with the use of a designated substance.

Assessment conclusion

Following the assessment, it is my conclusion that:

☐ **A person's health cannot be affected. No control program is required.**

☐ **A person's health can be affected. A control program is required.**

Collect and maintain all relevant documentation associated with this exposure assessment. Review the exposure assessment when there is a change in the handling, use or storage of the designated substance and at least annually.

If you are uncertain about the conclusion following your assessment, please contact your local health, safety and risk manager or the Office of Risk Management for assistance.

Section 5 – Control programs

If the exposure assessment concludes that a control program is required, the program will be unique to your workspace.

Your local health, safety and risk manager (and the Office of Risk Management are able to assist you in developing a program for the substance and workplace in question. All control programs must be developed in consultation with the Joint Occupational Health and Safety Committees. The final version of a control program must be submitted to the committee via the Office of Risk Management, and affected personnel must be trained on the provisions of the control program.

APPENDIX 4 – DESIGNATED SUBSTANCES REPORTS

To obtain information about the buildings on campus, please communicate with:

- Facilities (ext. 2222)
- Office of Risk Management (ext. 5892)

APPENDIX 5 – HEALTH EFFECTS AND EXPOSURE VALUES

This table outlines the potential health effects associated with exposure to each designated substance and the established exposure limits.

Designated substance	Bodily systems affected	Exposure Values				
		Forms	Time-weighted average (TWA)	Short-term exposure limit (STEL)	Ceiling (C)	Notations
Acrylonitrile	Heart, liver, kidney, neurological		2 ppm		10 ppm	Skin
Arsenic	Neurological, gastrointestinal, dermal		0.01 mg/m^3	0.05 mg/m^3		
Asbestos	Respiratory / lungs		0.1 f/cc			
Benzene	Hematological (blood), kidney, liver		0.5 ppm	2.5 ppm		Skin
Coke oven emissions	Respiratory / lungs		0.15 mg/m^3			
Ethylene oxide	Reproductive, liver, kidney		1 ppm or 1.8 mg/m^3	10 ppm or 18 mg/m^3		
Isocyanates	Respiratory, exposed skin areas	Toluene diisocyanate	0.005 ppm		0.02 ppm	
		Methylene bisphenyl isocyanate	0.005 ppm		0.02 ppm	
		Hexamethylene diisocyanate	0.005 ppm		0.02 ppm	
		Isophorone diisocyanate	0.005 ppm		0.02 ppm	
		Methylene bis	0.005 ppm		0.02 ppm	
		Methyl Isocyanate	0.02 ppm		0.06 ppm	Skin
		Ethyl Isocyanate	0.02 ppm		0.06 ppm	Skin
		Phenyl isocyanate	0.005 ppm		0.015 ppm	Skin
Lead	Gastrointestinal, neurological, musculoskeletal,	Elemental, inorganic and organic	0.05 mg/m^3			Skin (organic)

Designated substance	Bodily systems affected	Exposure Values				
		Forms	Time-weighted average (TWA)	Short-term exposure limit (STEL)	Ceiling (C)	Notations
	hematological, kidney	Tetraethyl	0.10 mg/m^3	0.30 mg/m^3		
Mercury	Neurological, kidney, respiratory, dermal	Elemental, inorganic and organic	0.025 mg/m^3			Skin
		Alkyl compounds	0.01 mg/m3	0.03 mg/m^3		Skin
Silica	Respiratory / lungs	Quartz/tripoli	0.10 mg/m^3			
		Cristobalite	0.05 mg/m^3			
		Fume	2 mg/m^3			
		Fused	0.1 mg/m^3			
Vinyl chloride	Liver, immune reactions, neurological		1 ppm			

Table adapted from information in the Control of Exposure to Biological or Chemical Agents Regulation (Regulation 833).