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Inspection Date: October 26, 2016

Report of Workplace Inspection

Inspectee: THE GOVERNORS OF ST. FRANCIS XAVIER UNIVERSITY
Operating As: ST. FRANCIS XAVIER UNIVERSITY
Mailing Address: P.O. BOX 5000
ANTIGONISH, NS CANADA B2G 2W5
Worksite Location: Physical Sciences Centre, St. Francis Xavier University
Non-Management Rep: Ivy Green
Occupation: Administrative Assistant, Academic Technical Support Service
Management Rep: Shaun Chisholm
Occupation: Manager, Facilities Management

Inspection Overview:

On October 26, 2016, OHS Officers Paula Dobson and Beth Campbell attended a meeting regarding indoor air quality and conducted a brief inspection at St. Francis Xavier University. The focus of this report is indoor air quality in the Physical Sciences Centre (PSC). A separate report will be prepared by Officer Dobson to address any other OHS matters.

The PSC is a 3.5-story building with offices, classrooms, labs, and meeting rooms. The PSC has a floor area of 110000 square feet. The PSC has a general, mechanical ventilation system with four (4) air-handling units. There are fume hoods and local exhaust ventilation systems at certain workstations in the laboratories. The university has a service agreement with Siemens Canada Limited for technical support, emergency response, and lab control system testing.

The issue of indoor air quality in the PSC has been discussed internally at the university on numerous occasions since the building became regularly occupied in 2004. Email correspondence that was provided to the OHS Division shows that discussions regarding air quality in the PSC have taken place within the university community since 2006. In addition, records show that indoor air quality concerns in the PSC have been raised during at least nine Joint Occupational Health and Safety committee meetings that were held from February 2008 to November 2015.

Potential indoor air contaminants include the following:
-diesel exhaust from a back-up power generator;

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-diesel exhaust from idling fuel oil trucks; and
-vapour expelled from fuel oil tanks during filling.

Facilities Management has resolved various indoor air quality complaints. For example, FM located a leak in the propane gas piping system and remedied the situation. However, other indoor air quality concerns have not been fully addressed, and additional action is necessary to ensure the health of PSC occupants.

Back-up Power Generator

In the fall of 2010, the height of the exhaust stack on a diesel generator located at the PSC was extended to reduce the likelihood of exhaust entering the building. It is unclear whether exhaust from the diesel generator may enter the building during routine generator testing. A written procedure is required to clarify how the risk of diminishing indoor air quality will be controlled during generator maintenance and testing (see warning).

Fuel Oil Tank Filling

There are four fuel oil storage tanks outside the central heating plant: two tanks hold bunker-B fuel oil, and two tanks hold fish oil. Each tank holds approximately 40000 litres of fuel. The most likely source of indoor air contamination in the PSC is suspected to be exhaust from the transport trucks that deliver bunker-B oil. The engine of a transport truck must run for approximately 45 minutes in order to pump bunker-B oil into the storage tanks. The diesel exhaust generated by the idling transport truck may reach an air intake in the PSC and enter the general ventilation system of the building.

A second potential indoor air contaminant is fuel oil that has evaporated inside the storage tanks. There is a vent pipe connected to each tank that allows gases and vapours to escape during filling. The opening of each vent pipe is roughly 3 meters above each fuel storage tank. Fuel oil vapour is expelled from the tanks as they are filled with fuel.

The air intakes on the east side of the PSC are located 30-50 meters south of the fuel oil tanks, and approximately 10 meters above the ground. During fuel oil delivery, a transport truck parks along Martha Drive in between the central heating plant and the PSC. When the wind blows from the north, the likelihood of diesel exhaust and fuel oil vapours reaching the air intakes on the east side of the building is increased. A written procedure is required to clarify how the risk of contaminating the air supplied to the PSC will be controlled during fuel tank filling (see warning).

Inspection Findings:

1. Occupational Health and Safety Act

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General Overview of Occupational Health and Safety Act

Monitoring Indoor Air

The National Institute for Occupational Safety and Health (NIOSH) considers diesel exhaust a potential occupational carcinogen and recommends that employers reduce workers' exposures. Diesel exhaust exposure is also associated with immunologic, respiratory and cardiovascular health effects. Reasonable steps should be taken to ensure that exposure to diesel exhaust is minimized.

Diesel exhaust is a mixture of gases, vapour, and particles. The composition of diesel exhaust varies depending on many factors, such as the fuel, engine type and engine maintenance. Components of diesel exhaust that may be monitored include carbon black (a form of elemental carbon); diesel fuel as total hydrocarbons; carbon monoxide, and nitrogen dioxide.

The exposure limits for chemical substances in NS workplace are called "Threshold Limit Values" or "TLVs". The TLVs refer to airborne concentrations of chemical substances that nearly all employees may be repeatedly exposed to, day after day, for a working lifetime, without adverse health effects. The TLVs are published by the American Conference of Governmental Industrial Hygienists (ACGIH) and referenced in the Workplace Health and Safety Regulations (section 2).

There are a number of challenges to monitoring for indoor air contaminants in the PSC. In particular, given that exposure to certain contaminants is expected to be intermittent, it may be difficult to collect air samples over a period of time that would offer confidence in the sampling results for contaminants that have the potential to exceed a TLV.

Siemens Canada Limited monitored the following parameters over from November 22-29, 2012: temperature, relative humidity, carbon dioxide, carbon monoxide, total volatile organic compounds, ozone, particulate matter (PM 10 and PM 2.5) and radon. There are no TLVs for humidity, TVOCs, PM 10 or PM 2.5. These are considered indicators of comfort for building occupants. These indoor air quality parameters can be helpful in identifying problems with and contaminant sources. The other indoor air quality parameters measured by Siemens were within legal limits at the time when monitoring took place.

Given that specific air contaminants, including diesel exhaust and fuel oil vapours, may

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enter the PSC, the implementation of exposure control measures is recommended. Once a reasonable effort has been made to minimize exposure, monitoring for contaminants, such as carbon monoxide and nitrogen dioxide could be considered if there is ongoing concern regarding these contaminants. If monitoring is carried out, it should be done at a time when the contaminant concentration is expected to be highest (for example, when filling the fuel tanks with bunker-B when the wind blowing from the north).

Warnings:

1. Occupational Health and Safety Act

52 Power to require reports, assessments and tests

Where

- (a) an officer determines that there may be a risk to health or safety; and
- (b) an employer, owner, contractor or constructor fails to establish that it would not be reasonably practicable to carry out the order, the officer may order, at the expense of the employer, owner, contractor or constructor that the employer, owner, contractor or constructor, as the case may be,
- (c) obtain a report or assessment from a person who possesses such special expert or professional knowledge or qualifications as are specified by the officer for the purpose of determining whether any biological, chemical or physical agent, material, equipment, machine, device, article, thing or procedure, in or about a workplace, conforms with this Act or the regulations or good professional practice; and
- (d) cause any tests necessary to the production of the report or assessment to be conducted or taken.

In consultation with the joint occupational health and safety committee, prepare a written procedure to summarize the how the following tasks will be carried out:

- **develop a schedule for generator testing, maintenance and repairs in coordination with key representatives from the Physical Sciences Centre (PSC)**
- **minimize the likelihood of contaminating indoor air during generator testing, maintenance and repairs**
- **notify building occupants of upcoming generator testing, maintenance and repair work**
- **respond in the event that exhaust from the generator is thought to enter the PSC mechanical ventilation system**
- **clarify how building occupants are to report indoor air quality concerns**
- **clarify how building occupants, Facilities Management, the joint occupational health and safety committee and the university health and safety advisor will communicate**

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regarding the action taken in response to indoor air quality concerns

2. Occupational Health and Safety Act

52 Power to require reports, assessments and tests

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- (c) obtain a report or assessment from a person who possesses such special expert or professional knowledge or qualifications as are specified by the officer for the purpose of determining whether any biological, chemical or physical agent, material, equipment, machine, device, article, thing or procedure, in or about a workplace, conforms with this Act or the regulations or good professional practice; and
- (d) cause any tests necessary to the production of the report or assessment to be conducted or taken.

In consultation with the joint occupational health and safety committee, prepare a written procedure to summarize the how the following tasks will be carried out:

- minimize the likelihood of contaminating indoor air during fuel oil tank filling, maintenance and repair work, power outages, and when the boiler is "tripped"
- notify PSC occupants of upcoming work that may affect indoor air quality
- respond in the event that indoor air contaminants are thought to enter the PSC mechanical ventilation system
- clarify how building occupants are to report indoor air quality concerns
- clarify how building occupants, Facilities Management, the joint occupational health and safety committee and the university health and safety advisor will communicate regarding the action taken in response to indoor air quality concerns

This inspection report was provided to Janet Beaton Health & Safety by:

Advisor

Officer Name: Beth M Campbell

Officer Signature: B Campbell

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This report was produced by Beth M Campbell, Occupational Health and Safety Officer, who may be contacted at:

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Section 67 and 69 of the Occupational Health and Safety Act allows orders and some decisions to be appealed. To get information and the required forms, see our Infosheet on Appeals at <http://www.gov.ns.ca/lae/healthandsafety/appealsOHSAct.asp> or call 902-424-5400 or 1-800-952-2687 (1-800-9LABOUR). Contraventions of the OHS Act and regulations can result in administrative penalties being issued. Compliance with orders issued by OHS officers is expected and required by law; it does not prevent a penalty from being issued.