Lab Safety Alert
Boron trifluoride gas release

University of Victoria | Occupational Health, Safety and Environment

INCIDENT DATE: July 28 2022
SUBJECT: Boron trifluoride gas release

BACKGROUND:

On July 22 2022, a research department worker was clearing out a stock pile of materials and equipment from a lab. Four unknown and unidentified metal cylinders were found under a bench and were given to a mechanical shop in the building to dismantle. The shop supervisor found a name plate "Chalk River". After looking online they determined the cylinders were neutron detectors developed in the 1960s and contained boron trifluoride gas under vacuum. They did not know the hazards of boron trifluoride gas. The worker cut a gas inlet at one end of the cylinder, they heard vacuum release and then a foggy gas came out. They immediately crimped the inlet to stop the gas release, decided to not further handle and submit to hazardous waste for pick up on July 28 2022. On the day of pick up by hazardous waste contractors, a shop worker moved the cylinders outside onto the loading bay for ease of pick up. They were wearing padded work gloves meant for material handling. After handling the compromised cylinder, they saw a small wisp of gas/mist emit one end of the cylinder and went to get pliers to re-crimp the gas inlet to prevent further gas release. They then noticed the glove on their right hand from handling the pliers was shriveled and discoloured. They removed their glove but did not notice any burns. The worker and supervisor then covered the compromised end with a Ziploc bag and wrapped it close with duct tape. OHSE was contacted for assistance.

INJURIES

The shop worker was advised to seek medical attention from possible hydrofluoric acid exposure as a precaution.

IMMEDIATE CAUSE

Boron trifluoride is a toxic gas and when in contact with water or moisture in the air, hydrogen fluoride is produced. Hydrogen fluoride (or hydrofluoric acid) is not only a corrosive acid but it will cause tissue death (also known as necrosis). Unlike other corrosive acids, burns or exposure from hydrofluoric acid are not immediately obvious and symptoms may appear up to 36 hours after exposure.

LEARNING OUTCOMES

A number of factors would have prevented the accidental release of boron trifluoride and potential exposure to hydrofluoric acid. First, the department researchers that originally found the cylinders in the lab should have investigated more to find out what the equipment was before concluding the cylinders were just bulk non-hazardous material. Many technical equipment or spectrometers used in laboratories may contain within a hazardous material for proper function. Secondly, the department had no records of the cylinders. It was speculated to have been brought to UVic by a particle physics professor who has long since retired and the cylinders have been forgotten over time. Thirdly, the shop worker that cut the cylinder open should have reviewed the SDS and/or sought chemical advice from OHSE when they learned the cylinders contained a chemical they did not know what the hazards were.

RECOMMENDATIONS TO PREVENT RECURRENCE

- Identify equipment and their hazards before handling
- Review the Safety Data Sheets (SDS) of all chemicals before handling
- Contact OHSE when abnormal or unknown equipment or waste are encountered
- Conduct regular lab inspections or clean outs
- Ensure retiring or relocating professors follow lab decommissioning protocols
- Ensure any lab equipment or materials that are left behind are documented/cataloged by department administers

More information on lab decommissioning and checklist:
https://www.uvic.ca/ohse/research/laboratory/decommissioning/index.php

More information on the hazards of hydrofluoric acid
https://www.uvic.ca/ohse/research/laboratory/special/index.php

More information on incident reporting:
https://www.uvic.ca/ohse/home/incident/reporting/index.php