

Facility Entry Safety Procedure

Procedure for entering TRACES (Safely & in an Emergency)

1. Introduction

1.1. Purpose

The purpose of this document is to familiarize the user with the dangers and safety procedures involved when cryogenic liquid or solid (defined by the NIST as being below 93.15 K) used in an authorized and control manner in a laboratory environment. This document will highlight the dangers involved when entering the TRACES laboratory (EV215) in the EV Building.

1.2. Scope

The use of cryogenic substances is restricted to advanced staff and students who have been trained in the dangers, use and transportation (See Section 2)

1.3. Responsibility

All Users are expected to have training and follow U of T WHMIS and EH&S practices for laboratory safety and waste disposal BEFORE entering TRACES (EV215).

1.4. Accountability

User/Entry Personnel

1.5. Emergency Contacts

- Emergency Fire/Police/Ambulance:911
- UofT Police:416-978-2222

Emergency Contact Numbers: The only following individuals have keyed access to the room

- Lab Phone Number (EV215 only): 416-287-7643
- TRACES Lab Manager: Tony Adamo, Office: 416-287-7239
- Ronald Soong, Office: 416-208-2949
- Andre Simpson, Office: 416-287-7234
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2. Referenced Documents/Courses

- 2.1. [Standard for Inert Cryogenic Liquid Usage in the Laboratory](#) (link)
- 2.2. [Control Program for Liquid Cryogenic Transfer Facilities](#) (link)
- 2.3. [Cryogenic Liquids – Hazards \(CCOHS.ca\)](#) (link)
- 2.4. [Safely work with Cryogenic Liquids \(CCOHS.ca\)](#) (link)
- 2.5. [EHS101 WHMIS and Lab Safety](#) (course)
- 2.6. <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/safety-requirements-guidance-analytical-equipment-safety-code-32.html>
- 2.7. UofT's Compressed Gas Safety <https://ehs.utoronto.ca/wpcontent/uploads/2018/12/Compressed-gas-safety-standard-March-2018.pdf>

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3. Dangers

3.1. Flammable Chemicals

- A maximum of 500 L of combustible (class II and III) and flammable liquids (class I), of which no more than 250 L is flammable (class I), is stored in an approved flammable liquid storage cabinets. EV215 contains 3 flammable liquid storage cabinets. Furthermore, several instruments house bottles (~1L) of flammable solvents for immediate use.

- Additional Chemical Hazards:  Toxics  Poisons  Corrosives

3.2. Cryogenics

- The Raman and FTIR-VCD may contain inert liquid nitrogen in the detector storage (10L max). In addition, the NMR contains more than 200L of liquid nitrogen and 100L of liquid helium. The room also contains several dewars filled with liquid nitrogen (>200L), and liquid argon (>200L).

3.3. High Voltage

- High voltage transformer is located in EV215A. Furthermore, multiple high voltage/high amperage instruments are located in the room and in the utility rooms.

3.4. Magnet Field

- The NMR generates an intense magnetic field that extends beyond the perimeter of the magnet. This affects pacemakers, phones, credit cards by either interrupting the signals or demagnetizing the cards.

3.5. X-Rays

- X-Ray device(s) is operational when `X-Ray ON` sign is lit. This room contains multiple devices that emit high energy X-Rays. X-Rays of this nature will destroy soft tissue, eyes and organs.

3.6. Compressed Gases

- A minimum of 7 inert compressed gas cylinders (Nitrogen, Argon, Helium, Air) are stored within the lab.

3.7. Flammable Compressed Gases

- One cylinder of EACH of the following flammable compressed gases utilized by various instruments is stored in the flammable gas cabinets: Acetylene, Methane, and Hydrogen and mixed gas of Methane.

3.8. Oxidizing Compressed Gases

- Multiple cylinders of Oxygen, an oxidizing compressed gas are contained in the lab.

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3.9. Radioactive Materials

- Multiple containers, bottles and sample tubes will contain liquids samples of radioactive Uranium and Thorium in the lab.



3.10. Corrosive Materials

- Multiple containers, bottles and sample tubes will contain varying concentrations of various corrosive acids and bases such as nitric, hydrochloric and sulphuric acids and aqueous ammonia and sodium hydroxide.



3.11. Hydrofluoric Acid

- Please see the University of Toronto Hydrogen Fluoride Protocol for further information.
- <https://ehs.utoronto.ca/wp-content/uploads/2015/10/Hydrogen-Fluoride-Protocol.pdf>

Emergency Entry Procedure:

Never enter the room if the low-oxygen alarms are activated. In this case there is a real risk of suffocation. The immediate area should be evacuated.

Never enter the room if the X-Ray units have been compromised. 'X-ray ON' sign does not confirm or exclude the risk of X-ray exposure. The TRACES Lab Manager possesses an X-Ray survey meter to determine exposure levels. Until X-ray levels can be resolved, the area should be immediately evacuated.

Fire:

IF POSSIBLE POWER AND EMERGENCY POWER AND COMPRESSED AIR SHOULD BE CUT TO THE LABORATORY

4. Do not use water, use a powder that cannot freeze or ideally an inert gas fire extinguisher. ABC extinguishers are not recommended.
 - 4.1. Halotron I, NON-METALLIC fire extinguishers are recommended.
5. Large metal objects (metal breathing apparatus, fire extinguishers included) should NOT enter the room.
6. Small metal objects (metal tools, steel-toed boots included); keep a MINIMUM perimeter of 10 feet from the NMR magnet (far north east corner).

*Contact the TRACES Manager for further details.

Approver:
T. Adamo