1.0 **Purpose:** To provide general safety recommendations when working in and handling various materials in a glove box. Since each glove box is unique in its application and operation, specific manufacturers’ recommendations and operating procedures should be obtained and followed to ensure safe and proper use.

2.0 **Scope:** There are many applications for glove box use. Including, but not limited to:

- **Chemical and Materials Research and Manufacturing**
  - Many of today's research disciplines are air sensitive and require a glove box to provide a maintainable inert atmosphere. In addition, many projects require a “clean room” atmosphere provided by enclosure in various types of glove boxes.

- **Biological Processing and Safety**
  - These glove boxes are considered Class III Biosafety Cabinets and provide the highest level of protection from infectious agents.

- **Pharmaceutical Research and Manufacturing**
  - Glove boxes provide a sterile environment for pharmaceutical research and manufacturing on a small scale.

3.0 **Applicable Guidelines:** Please refer to individual manufacturers’ specifications and guidelines.

4.0 **Responsibilities:** Any persons charged with the transport, storing, installation, commissioning, operating, maintenance and/or service of the glove box must be properly trained in its use. Prior to installation, initialization and operation of the system, the operations manual should be read in its entirety and be located in a suitable area near the system to allow for easy reference. Authorized individuals should be properly trained by either the manufacturers’ technical representative or a member of their department proficient in the use of the glove box. (PI or co-worker)

In addition to the guidelines and information contained within the manual, all internal, local health, safety and environmental guidelines should be followed. It is the responsibility of the user to follow all local health, safety and environmental guidelines with regards to the handling and disposing of substances that may be injurious to health. This also applies to the disposal of vacuum pump oil and all components and filtering devices that come in contact with gas flow within the unit.
5.0 Safety Procedures/Guidelines:

5.1 General
The following general safety guidelines must be considered when working with inert gas concentrations:
• The selected location should have a “room” volume that is significantly larger than the glove box interior volume.
• The system should be located in a well ventilated area. This is especially important during a purging procedure or when opening an active system (i.e. antechambers, etc.).
• All exhaust should be vented through an adequate disposal/ventilation system.

Improper use or operation by persons not qualified may result in danger to the:
• Life and health of the operator;
• System itself;
• Surroundings of the user;
• Performance and efficiency of the system.

General hazards of the system may arise in the following ways:

• Mechanical hazard caused by squeezing, shearing and cutting, catching and winding, stretching or by freely moving parts;
• Thrust caused by kinetic energy of moving mass;
• Sharp corners and edges;
• Electrical hazard caused by touching live parts (directly or indirectly);
• Thermal hazard causing burns;
• Chemical hazard causing poisoning, corrosion and explosion;
• Toxic hazard due to inhalation of vapors and gases;
• Gases under pressure;
• Liquids under pressure;
• Combination of hazards caused by:
  – faulty installation
  – incorrect loading
  – breakdown of power or media supply
  – breakdown and/or incorrect arrangement of preventive measures
  – combination of escaping media
5.0 Safety Procedures/Guidelines: (con’t)

5.1 General
• Hazards caused by:
  – human misconduct
  – noise
  – ejection of parts
  – disturbance / malfunction of control system
  – leaking of hoses or pipes
  – combination of atmospheres or vapors
  – fire hazard
  – natural hazards e.g. lightning, flooding, environmental catastrophes etc.

5.2 Over and under pressure safety of the box
Under normal operation conditions the box may be operated under various pressures. However in the unlikely case of a failure of a valve, the box may become exposed to extreme pressures. The standard safety feature to prevent a dangerous situation arising from this malfunction is provided by the glove itself. The fixture of the glove has been designed in a way that the glove will be dismounted before any damage is caused to the box.

5.3 Mechanical
When handling materials with mechanical, pneumatic or vacuum systems it is possible that materials may be ejected. Extreme caution should be taken to avoid any possible contact with the ejected materials without proper protection.

Simultaneous operation of the system by two or more persons is not recommended as this may cause hazards based on misconduct or mutual misunderstanding. In case of the system being operated by two or more persons, operation should be conducted in such a way as to ensure each individual’s respective task does not influence other tasks in any way.

Safety covers, panels, panes, windows or doors may not be removed at any time, unless there is a need for service. The system may not be opened (i.e. antechambers, etc.) during processing or power failures. In the case of any safety deficiencies, the system must be decommissioned and the service personnel informed accordingly. During decommissioning compliance with all local health, safety and environmental guidelines must be followed.

5.4 Electrical
This system operates under high voltage. Risk of injury caused by high voltages exists anytime the system is connected to the power supply, this includes when the system is powered off.
5.0 **Safety Procedures/Guidelines:** (con’t)

5.4 **Electrical (con’t)**
Connection to the main power supply must be performed by a qualified electrician according to local area guidelines. All neutral and ground wires must be connected accordingly.

Service required while the system is in operation should only be performed by qualified personnel trained in the knowledge and prevention of all potentially dangerous and hazardous situations.

The system must be grounded at all times. Do not remove or cut off any ground wire for the system or its components. In case of insufficient grounding or damaged ground conductor ensure the system will be inoperable and secure it against unauthorized or unintentional operation.

Replacement of fuses should be of the same type and current rating.

5.5 **Chemicals and Gases**
Proper handling of chemicals, corrosives and solvents is the user's responsibility. Materials used may be flammable, explosive, toxic.

Below are some guidelines to refer to when handling chemical substances:
- Ensure that proper guidelines are followed for working with hazardous chemicals;
- Observe relevant safety regulations as well as material safety data sheets (MSDS) and additional advice provided by the supplier;
- Wear proper protective safety masks, gloves and eyewear whenever working with chemicals, corrosives or solvents;
- Mark all containers and supply lines of chemicals (i.e. containers of media and waste) with appropriate labels and warning signs;
- Ensure proper ventilation and exhaustion of vapors;
- Keep away from ignition sources;

**Caution:** Released chemicals may react with each other, leading to unwanted and/or unknown substances, which may cause additional risks.

5.7 **Biological Hazards**
Biological hazards are not addressed under this policy. Please consult the Biosafety Policies for proper use and certification of Biosafety Cabinets.

5.8 **Certification**
All glove boxes should be properly installed and certified initially and routinely thereafter according to individual manufacturers' recommendations.
6.0 Document Management: This procedure shall be reviewed once every two years, or as changes require.

7.0 Associated UB Documents:
7.1 Campus Commitment to Safety, University at Buffalo, Office of the Provost, Office of the Senior Vice President, April 3, 2001.

8.0 Document Revision History:

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9.0 Document Author: Leona Zak, Industrial Hygienist, Environment, Health and Safety