Epsilon 5 Safety Notes Regarding Nitrogen and Beryllium

1. **Liquid Nitrogen**
   All users of the AQRC detectors must be aware of the hazards associated with the use of liquid nitrogen. Four hazards in using liquid nitrogen include:
   a. Gas under high pressure
   b. Contact with materials
   c. Contact with personnel
   d. Inadequate ventilation

   The large expansion ratio from liquid to gas (692 to 1) can produce high pressures due to the evaporation of the liquid if the container does not have adequate venting. In addition to exposure to high pressure gas, another personnel hazard is burns similar to high temperature contact. Also, although nitrogen gas is nontoxic, it is capable of displacing air and causing asphyxiation. Transfer liquid nitrogen only in well ventilated areas.

   Personnel should avoid wearing anything capable of trapping or holding spilled liquid nitrogen close to their flesh. An impervious apron or coat, cuffless trousers, and closed toe shoes are recommended. Wear safety glasses or full face protection. Remove all watches, rings, bracelets, or other jewelry. When gloves are used to handle containers or cold metal parts, they should be impervious and sufficiently large to be easily removed in the case of a spill.

   Vent storage containers to a well ventilated area to avoid build-up of nitrogen gas in the area.

2. **Beryllium**
   All users of the AQRC detectors and X-ray tubes should be aware of the hazards associated with Beryllium. The detectors and X-ray tubes are equipped with a thin Beryllium window. Do no touch the windows as the windows are fragile. The windows can be damaged by moisture condensation and they should be kept clean and dry at all times. The detector should not be stored or operated in a humid environment. If moisture condenses on the window during normal operation, either the humidity is too high or the detector has a vacuum problem. Moisture on the Beryllium window could result in Beryllium vapors which are toxic to breathe. Also fumes or the dust from Beryllium and its compounds can be hazardous if inhaled. During liquid nitrogen filling, condensation will occur. This is normal. It should go away as the unit warms up.