












May show  Duke OESO Guidelines for Safe Use of Cryogenics  or  May show	
Examples: Dry Ice, Liquid Nitrogen, Liquid Helium, Liquid Hydrogen, Liquid Oxygen (O₂)	
Hazards	<ul style="list-style-type: none"> Potential explosion due to pressure buildup (mostly for liquid He and H₂, which can solidify air). Oxygen (O₂) deficiency (through displacement of O₂ by cryogenics other than liquid O₂). For cryogenic leaks, see "Emergencies". If large amounts (>2L) are dispensed, contact Lab Safety to assess ventilation and the possible need for an O₂ monitor. Oxygen enrichment around liquid oxygen may cause or intensify fire. Liquefied gases may condense oxygen from the air, causing liquid O₂ to build up as a contaminant. If oxygen-incompatible materials are present, violent reactions could occur. Tissue damage (frostbite)
Hazard Controls	Storage & Transportation <ul style="list-style-type: none"> Never store cryogenic liquids or dry ice in a walk-in cold room! Store liquid O₂ away from open flames and post "No Open Flames" nearby. Store liquid hydrogen, helium, and nitrogen away from flammable materials and ignition sources. (These gases may become contaminated with liquid O₂.) Store and transport cryogenic materials ONLY in Dewars or cryogenic liquid cylinders designed specifically for that cryogen. Inspect storage containers daily to ensure that no air or ice plugs exist in the openings. Cryogenics may be transported in elevators ONLY in containers certified to leak at less than or equal to 1 L of liquid (or 1 kg of solid) per day. 
	Engineering Controls <ul style="list-style-type: none"> Each part of a cryogenic system must have a pressure relief system (may require maintenance). Use and store cryogenics in well-ventilated areas such as most labs (not a closet or cold room). OESO evaluation/approval is required for use of cryogenics in a manner that could displace oxygen. See Lab-Specific Chemical Hygiene Plan template for examples of these high risk uses of cryogenics (including examples of "large quantities") or contact OESO with questions.
	Work Practice Controls <ul style="list-style-type: none"> Use liquid hydrogen, oxygen, helium and nitrogen away from flammable materials & sparks. For liquid helium and hydrogen storage systems, check the pressure relief and inspect for leaks regularly because of the risk of solidified air. Do not put your head inside a liquid nitrogen freezer, dry ice chest, or other enclosed space containing a cryogen. Do not use hollow rods or tubes as dipsticks. (When a warm tube is inserted into a cryogen, liquid will spout from the top of the tube.) Check the liquid levels regularly. If the liquid evaporates more rapidly than normal, the Dewar/liquid cylinder may be losing its vacuum. When retrieving cryopreservation vials that have been stored in liquid nitrogen, raise the vials out of the liquid phase and store them in the gas above the liquid for 24 hours to allow any trapped liquid nitrogen to escape. 
	Personal Protective Equipment <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Minimum PPE:</p> <ul style="list-style-type: none"> Safety glasses  Lab coat  Cryogenic gloves  </div> <div style="width: 45%;"> <p>If working with an open container:</p> <ul style="list-style-type: none"> Safety goggles  Face shield  Cryogenic apron  <p>← + Lab coat & cryo gloves</p> </div> </div>
Other	Emergencies See Emergency Response Flip Chart and/or lab specific chemical hygiene plan. (If cryogen is leaking, evacuate the area & call Duke Police at 919-684-2444.) If there is an oxygen monitor, fill pages 2&3 of the Cryogenics & O₂ Monitor Guideline . For other gas monitors, use the blank SOP template .
	Waste If the cryogen has been mixed with a hazardous waste, follow disposal procedures for that waste AFTER allowing the cryogen to evaporate in an unsealed container in a chemical fume hood. Do not dump the cryogen into sinks as the thermal shock may damage the sink or plumbing.
	Training Sign signature page in lab-specific plan to indicate review.
	Questions Contact OESO Lab Safety at 919-684-8822 or OESO Occupational Hygiene & Safety at 919-684-5996.