TITLE: Anesthetic Gas Use and Vaporizer Maintenance

PURPOSE: This policy was developed by the Occupational Health & Safety (OHS) Program to protect researchers and Office of Animal Resources (OAR) staff from occupational exposure to anesthetic gases used for animal surgeries and procedures. It intends to outline the expectations for the scavenging of waste gas and maintenance of vaporizers.

BACKGROUND: Gas anesthesia can pose a significant health and safety risk if waste gas is not properly scavenged. Halogenated agents such as isoflurane and halothane are potential carcinogens and may produce reproductive issues. Additionally, acute exposure can cause eye, skin, and respiratory irritation, as well as confusion, drowsiness, nausea, cardiac arrhythmia, and liver and kidney damage.

POLICY:

1. Training
   a. All personnel must be properly trained in the safe and effective use of anesthetic gases. Careful attention must be given to minimize waste anesthetic gas (WAG) exposure.
   b. Training can be provided by experienced laboratory personnel or OAR. Contact OAR Veterinary Technician, Toni Mufford at toni.mufford@colorado.edu.
   c. Principal Investigators are responsible for providing information regarding anesthetic gases, for ensuring that their laboratory staff are properly trained and their training documented.

2. Engineering Controls: Anesthetic gases must be used in settings that have a mechanism to control waste gas and protect laboratory personnel. OHS, Environmental Health & Safety (EH&S), and the IACUC do not prefer or recommend a particular scavenging method and only require that the system adequately captures WAGs and protects employees from exposures.
   a. Active Scavengers: Use negative pressure (a vacuum or suction) to draw off the waste gas. Examples:
      i. Certified Chemical Fume Hoods
         - Administration of anesthetics by open drop method (liquid on gauze sponge or cotton ball) must be done in an annually certified chemical fume hood.
         - Induction chambers can be placed inside fume hoods.
      ii. Class II, Type B2 Biosafety Cabinet
         - Do NOT use any other types of biosafety cabinets, cell culture hoods, or cage changing stations. These recirculate filtered air in the room and the filters only capture particles, not gas.
      iii. Back Drafts and Down Drafts
         - Workstations with built-in ventilation can capture WAGs.
         - Slots in tables must not be blocked for proper ventilation.
iv. Local Exhaust Ventilation
   - Building vacuum systems with well-fitting nose cones will work but should have an air flow regulator. Too much vacuum will pull the gas off the animal and could potentially damage the vaporizer.
   - Snorkel exhausts can be used in conjunction with other types of scavenging.

b. Passive (Charcoal) Scavengers: Use the positive pressure of the oxygen stored in the cylinder to carry the waste gas away into activated charcoal filters.
   i. The canister must be used in an orientation that does not block the venting holes.
   ii. Follow manufacturer’s instructions for monitoring canister life (tracking time or weighing).

3. Documentation
   a. Vaporizers: Documentation of calibration and service must be affixed to each vaporizer. Most vaporizers require annual calibration according to their manufacturer. Information must include:
      i. Date of service
      ii. Name of certified professional who performed the service
      iii. Results of calibration
   b. Charcoal Scavengers: Record keeping (time of usage and/or net gain in weight) is necessary to ensure effectiveness.
   c. Training Documentation: Principal Investigators are responsible for ensuring that their laboratory staff are properly trained and their training is documented.

4. Anesthetic Gas Spills
   a. Small Spills (less than 25 mL)
      i. Small volumes of spilt halothane or isoflurane will evaporate readily at room temperature and will dissipate before any attempts to clean up the liquid are started.
      ii. Fill vaporizers with agent-specific keyed filler system or bottle adapter with spout to prevent excessive spillage. If possible, fill vaporizers when personnel are less likely to be entering room (i.e., end of work day)
   b. Large Spills (greater than 25 mL)
      i. Laboratory personnel should vacate the room immediately and close all the doors leading to the spill area. Call EH&S at 303-492-6025 or after hours call CUPD at 303-492-6666.

5. WAG Monitoring
   a. Monitoring trace gas concentrations in the workplace provides a quantitative assessment of the effectiveness of the WAG scavenging system in place. Measuring the concentration of the gas in the breathing zone of the worker using badges is the usual procedure. Air samples will be collected and analyzed according to OSHA Method 103 for halogenated anesthesia gases. WAG monitoring will be conducted when requested
Office of Research Integrity  
Institutional Animal Care and Use Committee

POLICY # 7

Approved: 8/24/16
Revised:

The CU Boulder Institutional Care and Use Committee shall periodically review this policy and propose changes as it deems necessary.