WASTE ANESTHETIC GAS SCAVENGING SYSTEMS

1. PURPOSE

1.1. The purpose of this Animal Care and Use Procedure (ACUP) is to describe waste anesthetic gas scavenging systems and safety precautions. This ACUP is approved by the Cornell Institutional Animal Care and Use Committee (IACUC). Any deviation must be approved by the IACUC prior to its application.

2. SCOPE

2.1. This ACUP is intended for use by all investigators and staff that administer gas anesthetics to research and teaching animals at Cornell University.

3. INTRODUCTION

3.1. Utilizing inhalant anesthetic gases for anesthesia in animals presents an occupational health risk via unintended human exposure. As such, it is necessary to prevent these gases from escaping into the workspace. This ACUP presents acceptable methods for Waste Anesthetic Gas (WAG) scavenging.

3.2. Contact the Center for Animal Resources and Education (CARE) at Cornell University by emailing care@cornell.edu for more information or for assistance.

4. MATERIALS AND EQUIPMENT

4.1. Anesthesia vaporizer and delivery system
4.2. WAG exhaust system (e.g., fume hood, hard ducted biosafety cabinet, or dedicated WAG exhaust device).
4.3. Activated charcoal canister (e.g., VaporGuard® canister) and canister holder.

5. PROCEDURE

5.1. Ensure that all individuals responsible for gas anesthesia are properly trained. Training records are maintained by the CARE training staff, and can be provided upon request.
5.1.1. The facility manager or CARE technician, within vivaria, and the laboratory or research group, outside of vivaria, ensure that the inhalant anesthetic equipment is certified once a year to ensure accurate delivery of the inhalant anesthetic and absence of equipment leaks. Equipment records (e.g., vaporizer certification and VaporGuard® canister monitoring) must be maintained and provided upon request from the facility manager, CARE veterinary staff, or IACUC inspectors.

5.2. To prevent and / or minimize human exposure to WAG, follow these guidelines:

5.2.1. Work in a well-ventilated area. Wherever possible, rodent systems should be located in a fume hood or a hard-ducted biosafety cabinet.
5.2.2. Maintain a good distance between the source of the gas and yourself.
5.2.3. Whenever possible, intubate the animal. If a face mask must be used, ensure a tight seal of the mask around the animal's nose and mouth.
5.2.4. WAG can continue to be released from materials for up to 3 hours after use. Thus, washing materials (e.g., induction chambers) with soap and water should be considered if off-gassing is suspected.
5.2.5. Use an appropriate scavenging system option (see Section 5.4).

5.3. Scavenging System Options

5.3.1. Gas Removal:

5.3.1.1. Place the exhaust tubing or induction chamber within a fume hood, hard-ducted biosafety cabinet, or overlying a room exhaust vent.

**NOTE:** Reliance on room exhaust duct work is only appropriate if the exhaust is ducted to the outdoors without recirculation.

5.3.2. Gas Deactivation

5.3.2.1. Use an activated charcoal canister (e.g., VaporGuard® canister).
5.3.2.2. Contact Environmental Health and Safety (EH&S) to conduct exposure monitoring when setting up an activated charcoal scavenging system.

**NOTE:** Activated charcoal canisters only absorb halogenated anesthetics (e.g., isoflurane and halothane). Nitrous oxide cannot be used with these systems.

5.3.3. Dilution Ventilation

5.3.3.1. This method relies on very low amounts of inhalant anesthetic, a means of rapid dispersal, and sufficient room exhaust (at least 10 air changes/hour).
5.3.3.2. Contact EH&S to conduct exposure monitoring when setting up a dilution ventilation procedure space.
5.4. Monitoring

5.4.1. Activated charcoal canisters: record the amount of time in use or canister weight after each use.

5.4.1.1. Remove the activated charcoal canister from the anesthesia machine.
5.4.1.2. Weigh the canister and record the date and weight on the canister in the space provided.
5.4.1.3. Shake canister briefly to evenly redistribute contents.
5.4.1.4. All canisters should be used in the upright, vertical position. Canisters with ventilation on the bottom should be elevated in a manner so as to not occlude ventilation holes.
5.4.1.5. Follow manufacturer’s recommendations regarding when a canister should be discarded. Most commonly, canisters must be discarded after either 12 hours of use or 50 gram increase in weight.
5.4.1.6. To discard, seal canister inside a plastic bag and place in the regular trash.

5.4.2. Measure human exposure to WAG whenever:

5.4.2.1. An induction chamber is being set up for use indoors and without the use of a certified fume hood, a hard-ducted biosafety cabinet, or a dedicated WAG exhaust device.

NOTE: induction chamber must always be exhausted and scavenged adequately (see Section 3d) prior to opening.

5.4.2.2. Anesthetic gas can be smelled.
5.4.2.3. People are complaining of fatigue or headaches when using the anesthetic equipment.

5.4.3. Human exposure monitoring is conducted by EH&S.

6. PERSONNEL SAFETY

6.1. Medical Emergencies: CALL 911.
6.2. For some gases, the exposure limit is exceeded once you can smell the gas. Be sure to check the odor threshold on the MSDS. If the odor threshold exceeds the OSHA guidelines contact EH&S to conduct monitoring.
6.3. Contact CARE (care@cornell.edu) to schedule annual inspection / certification of anesthetic equipment.
6.4. Contact EH&S (607-255-8200, dehs-mailbox@cornell.edu) for questions concerning WAG monitoring.

7. ANIMAL RELATED CONTINGENCIES

7.1. None
7.2. Non-emergency veterinary questions and requests for care, email CARE veterinary staff at care@cornell.edu.
8. REFERENCES

8.1. VaporGuard® activated charcoal filter:
http://www.vetequip.com/item.asp?catalogID=931401


http://www.cdc.gov/niosh/docs/88-119/

http://www.cdc.gov/niosh/docs/2007-151/


8.6. Duke University & Duke University Medical Center Animal Care & Use Program Policy. General Inhalational Anesthesia Machine/Vaporizer/Waste Gas Maintenance and Calibration:

9. APPENDIX

9.1. None

10. HISTORY

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