

**STANDARD OPERATING PROCEDURES**  
**DIVISION OF COMPARATIVE MEDICINE**  
**UNIVERSITY OF SOUTH FLORIDA**

SOP#: 909.6

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<b>TITLE:</b>	<b>Anesthetic Gas Safety Practices</b>
<b>SCOPE:</b>	All Authorized Personnel
<b>RESPONSIBILITY:</b>	Training Coordinator, Facility Manager, Technical Staff,
<b>PURPOSE:</b>	To Outline Appropriate Use of Anesthetic Gas and Safety Practices

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**I. PURPOSE**

1. The purpose of this procedure is to inform personnel of practices to limit exposures to waste anesthetic gases (WAG) in the workplace.

**II. RESPONSIBILITY**

1. The Training Coordinator and Facility Managers are responsible for training and supervising personnel regarding the proper implementation of this SOP.
2. It is the responsibility of personnel working with anesthetic gases to be familiar with these procedures.

**III. PROCEDURES**

**Background Information**

1. Isoflurane, halothane, enflurane, desflurane, and sevoflurane are common halogenated anesthetic gases.
2. Halogenated anesthetics are typically clear, colorless, highly volatile liquids at ordinary pressure and temperature. Consequently these gases possess very poor warning properties and odor is not an adequate indication of overexposure.
3. Exposure to these agents occurs when vapors escape into the work place during the process of anesthetic administration.
4. Although studies of the potential risks associated with occupational exposures to waste anesthetic gas are inconclusive, the potential for health risks in the unscavenged anesthetic environment necessitates that waste anesthetic gas be scavenged, and exposures to waste anesthetic gas be kept to the lowest practical level.
5. The Occupational Safety and Health Administration (OSHA) have not established a permissible exposure limit for anesthetic gases.

## Mitigating WAG Exposures

1. Distinction between high waste anesthetic gas (WAG) levels and trace WAGs has been made, with trace levels defined as below concentrations needed for anesthesia or detectable by smell.
2. No occupational diseases or adverse health effects have been attributed to trace WAG exposure levels.
3. If you can smell isoflurane, it is an indication that isoflurane may have escaped into the room from various components of the anesthesia delivery system resulting in WAG levels are above acceptable thresholds.
4. In order to keep WAG levels below threshold, passive scavenging techniques in the mouse anesthetic environment (MAE) should include:
  - a. turning off the vaporizer at the end of induction, followed by
  - b. purging of the induction chamber with a 1.5-L/min oxygen flush for > 2 seconds,
  - c. tilting of the induction chamber away from the operator prior to opening,
  - d. briefly opening the induction chamber just enough to remove the anesthetized mouse
  - e. a tight-fitting facemask with diaphragm seal for use during maintenance anesthesia (e.g., URN-NRB System, Model AS-01-0525, Molecular Imaging Products, Bend, OR)
  - f. a low anesthetic flow rate of approximately 0.5 L/min oxygen at 2% isoflurane.
  - g. ensure that the passive charcoal scavenging device in service (e.g., F/Air® or EnviroPure® canisters) is within the manufacturer's recommended threshold for replacement. Refer to manufacturer's directions.
5. Detection of isoflurane can be an indication of faulty equipment, equipment setup, and/or improper anesthetic techniques.
6. Improper equipment/equipment setup that may contribute to the escape of WAG may include improper connections in the breathing circuit and/or scavenging system, defects in hoses, reservoir bags, bellows, induction chamber seals, and Y-connector.
7. Improper anesthetic techniques that may contribute to the escape of WAG may include gas flow set too high, leaving flow valves and vaporizers on after use or when disconnected from the patient, flushing the system into the room rather than the scavenging system, using improper scavenging system, poor fitting of face masks/laryngeal tubes, leaving induction chambers open, and careless filling of vaporizers.

## Controlling Exposures

1. Anesthesia equipment must be routinely inspected and maintained as described in SOP #1102 ***Veterinary Anesthesia Machine and Technique***, #1103 ***Equipment Maintenance and Calibration***, #1110 ***Veterinary Anesthetic Ventilator***, #1135 ***Portable IMPAC 6® Veterinary Anesthesia Machine***, and #1140 ***SurgiVet Multi-Station Lab Research Anesthesia System***.

2. Prior to using an anesthesia machine,
  - a. Visually inspect hoses and connections,
  - b. Connect the waste gas scavenging system,
  - c. Test breathing circuit for leaks and verify it can maintain positive pressure,
  - d. Weigh the charcoal scavenging device (e.g., F/Air® or EnviroPure® canisters) to ensure weight is below the manufacturer's recommended threshold for replacement. Refer to manufacturer's directions.
3. Scavenging systems must be used in all locations where inhaled agents are used.
4. Personnel using anesthetic agents must be trained in proper anesthetic technique applicable to their usage.

**Approved:**

**Date:**